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College of Aeronautics

PhD Thesis

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QUALITY MANAGEMENT PRACTICES IN THE SOUTH EAST ASIAN AIRLINES' OPERATIONS FUNCTION

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Abstract

Despite the recent Asian economics crisis (1997-1998), air traffic volumes in Asia-Pacific will continue to grow over the next decade. As the market is becoming more and more attractive, the competition amongst the airlines operating in the region has challenged the Southeast Asian carriers. The demanded quality of product/service by the customer has become a crucial issue.

The ability to provide quality products and services is increasingly becoming a key determinant of an airline's business success. The quality of any organisation's products and services is determined by the core business or operational processes that create them. If the chain of processes is made effective and efficient, then the resulting products and services will also be effective and efficient.

Airline business activities consist of sales and marketing, engineering and maintenance, flight operations, and ground services. For the purpose of this study the operations function, which consists of aircraft maintenance, flight operations and ground services, becomes a focus, as it is the core activity of operational processes that causes the success or failure of delivering quality products and services to the customer.

The study was aimed at developing a model of quality management practices for the operations function of the 'developing' airlines of Southeast Asia. It was conducted through extensive literature and field studies, based on the quality management practices of certain airlines in Southeast Asia and Western Europe.

The study found that there were twelve critical success factors of quality practices in the operations function, which should be managed differently depending on the airlines' organisational contexts, in order to keep their operational effectiveness and efficiency at the required level. The findings configured a model that provides airlines' executives or managers with guidelines, which they can consult in their decision-making process when conducting quality improvement for their organisation. They may well be used by other airlines as well.

The findings from the study also contribute to the knowledge of process quality, and the applicability of the quality concept developed in the social and business disciplines of airlines' operational organisation.

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Notation

BA	British Airways
CSF	Critical Success Factors
DP	Deming Prize
EQA	European Quality Award
FedEx	Federal Express
GDP	Gross Domestic Product
GIA	Garuda Indonesia
ISO	International Standard Organization
KLM	KLM Royal Dutch Airlines
MAS	Malaysia Airlines System
MBQNA	Malcolm Baldridge Quality National Award
Operations	Airlines' Operations Function
QM	Quality Management practices
RPK	Revenue Passenger Kilometre
SAS	Scandinavian Airlines System
Southwest	Southwest Airlines
TAI	Thai Airways International

Part I

BACKGROUND AND DESK RESEARCH

Chapter 1. Introduction

Chapter 2. Developing the Critical Success Factors and Identifying its Organisational Context in Manufacturing and Service Firms

Chapter 3. Developing the Critical Success Factors and Identifying its Organisational Context in Airlines

Chapter 1
Introduction

This chapter provides an overall view of the research. It describes the background, the aim and the benefits of the research, and the research methodology. Finally, it describes the structure of this thesis.

This chapter covers six sections, as follows:

Section 1.1 covers the background of this research, the problems that this research will focus on, and the research questions addressed.
Section 1.2 describes the aim of the research, the research process, the area of study, and the airlines included in the study.
Section 1.3 discusses the benefits of the research.
Section 1.4 describes the research methodology.
Section 1.5 describes the structure of the thesis.
Section 1.6 provides the summary of the discussion in this chapter.

1.1 Background to the Research

In Asia-Pacific, the dynamic growth of air transport activities is both a cause and an effect of economic development. In particular, it has enabled the region's integration into, and exploitation of, the global economy (Graham, 1995). The airline industry plays an essential role in the economic and social growth of the region (Oum and Yu, 2000). It provides transportation of people and goods on a global scale and improves air links with the world, encouraging trade, tourist travel and investment. The earnings of a national airline company may be significant in the total economy of a country, and in a country's foreign exchange balance.

Throughout the 1980s and 1990s, rising per capita incomes in Asia-Pacific resulted in an expansion in intra-regional trade and the emergence of a sizeable "middle income"

class with the resources to travel. As a result, the demand for air travel sustained annual growth rates in excess of 10% and there were expectations that Asia-Pacific would be the engine of growth for the world's travel industry well into the 21st Century (Chin *et al*, 1999).

For the period 1985-1995, Asia-Pacific's scheduled airline traffic grew at an average annual rate of 10.1%. In early 1997, the International Air Transport Association (IATA) forecast average growth of 7.4% per annum between 1995 and 2010. The region is set to overtake Europe, to become the second largest aviation market after North America. IATA predicted that Asia-Pacific would account for more than half of the world's air traffic by 2010, up from one-third in the early 1990s (Figure 1.1). By the year 2000, international air passenger traffic numbers will be about 201 million and by 2010 this will increase to 393 million. Although the impact of the 1997-1998 currency and economic crisis in Asia prompted IATA to moderate the short-term forecast in March 1998, the association is still predicting solid growth in the millennium (IATA, 1998; Li, 1998; Chin *et al*, 1999).

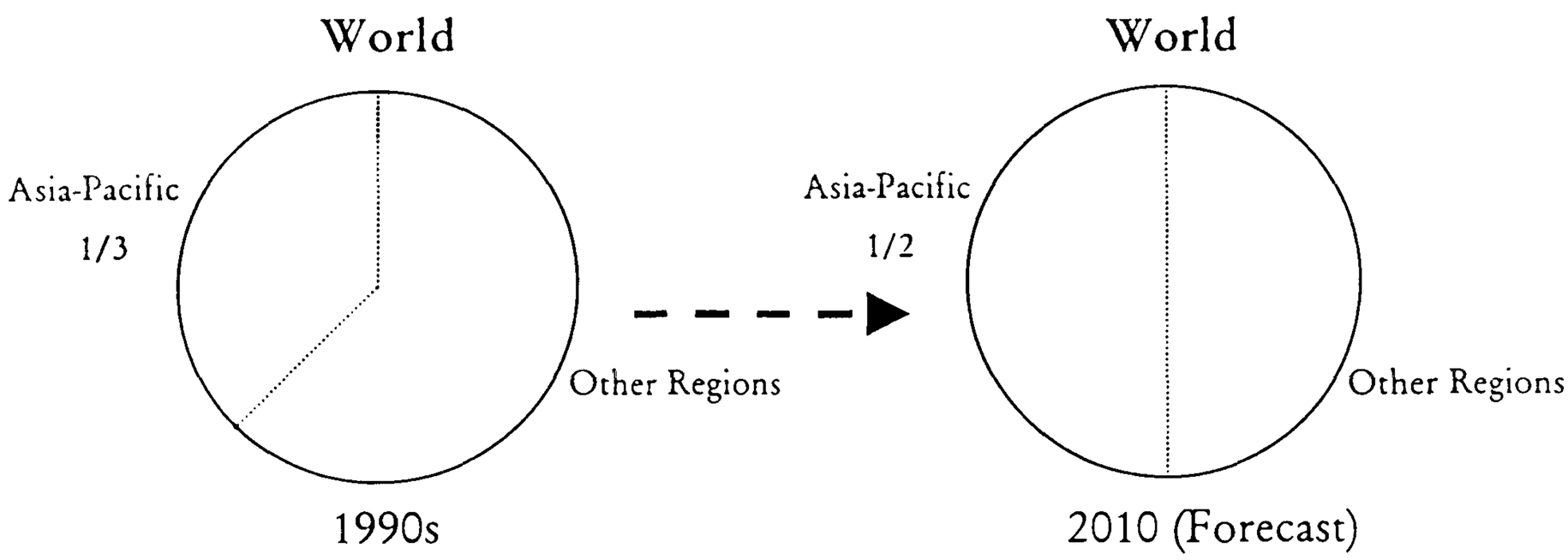


Figure 1.1. Asia-Pacific and World Air Traffic

IATA moderated its growth forecast in Asia Pacific from 7.4% a year until 2010 to 4.4% per annum and 5-6% on international routes, even though it has not adjusted its long-term forecast. Boeing argues that economic growth in Asia will resume and,

over the next ten years, will average between 2-3%. The prospect is that Asia will again be one of the main driving forces of air traffic growth globally. Airbus is similarly optimistic that growth will re-emerge in Asia's travel markets after a 2-3 year period. So, despite the recent Asian economic crisis, air traffic volumes in Asia-Pacific will continue to grow over the coming decade (ICAO, 1997; Li, 1998; Chin *et al*, 1999; Oum and Yu, 2000; Boeing Current Market Outlook, 2000; Airbus Global Market Forecast 2000-2019, 2000).

Looking at Southeast Asia, where the largest number of Asia-Pacific countries are located, there are at least three points that have to be considered in regard to the development of air transport in the region:

- The first point is the importance of Southeast Asia in terms of economic growth, indicated by Gross Domestic Product (GDP), and air traffic volumes in Revenue Passenger Kilometre (RPK) within the region, as well as to and from the region.

- Second is that the market in the region is opening up, resulting in increasing airline competition.

- Third is the past operating performance of the Southeast Asian airlines, given operating ratio as an indicator for operations effectiveness and efficiency.

1.1.1 The importance of Southeast Asia

Demand for air travel will continue to be driven primarily by economic (GDP) growth. The World Bank, as well as the Boeing Company, conducted a study that compared GDP growth rates between China, Southwest Asia, Southeast Asia, the CIS Region, Central America, South America, Africa, the Middle East, Europe, North America, Oceania, and Northeast Asia (The World Bank, 2000; Current Market Outlook 2000).

Although financial crisis hit many Asian economies in 1997-1998, the recovery seemed well under way in 1999. So, the year 1999 showed improved economic performance and the expectation is for continued gradual improvement. Importantly, the study mentioned that there are three regions that are considered to be the highest in economic growth, as indicated by percentage growth of GDP 1986 to 1999 and forecasted for 2000 to 2019. These are China, Southwest Asia, and Southeast Asia. See Table 1.1.

Table 1.1 Annual GDP Growth rates (%)

Region	1986 – 1999 (Past)	2000 – 2019 (Forecast)
Northeast Asia	2.77	2.31
Oceania	3.11	2.34
North America	2.85	2.35
Europe	2.14	2.41
Middle East	1.40	3.95
Africa	1.99	4.15
South America	2.44	4.45
Central America	2.46	4.47
CIS Region	-3.88	4.52
Southeast Asia	5.87	4.73
Southwest Asia	5.09	5.00
China	8.57	6.28

Source: The World Bank, 2000; Boeing, Current Market Outlook 2000.

Furthermore, in terms of air traffic growth within the region in Revenue Passenger Kilometre (RPK), Southeast Asia was amongst the highest for the period 1986-1999, and was forecasted to grow by 5.4% for the years 2000-2019. This is higher than the average of the world's air traffic growth of 4.8% for the same period (see Table 1.2).

Looking at the growth of passenger air traffic flow to and from Southeast Asia, it could be seen that Southeast Asia's average traffic flow from/to all regions is 6.1% RPK. It is positively above the world total average of 4.8% RPK (see Table 1.3). It can be concluded from the above discussion that Southeast Asia is not only experiencing relatively high market growth, but still has potentially higher market growth, even after the crisis.

Table 1.2 Annual RPK growth rates within the region (%)

Region	1986 – 1999 (Past)	2000 – 2019 (Forecast)
North America	4.8	3.3
Oceania	7.9	3.4
Middle East	3.2	4.2
Europe	6.7	4.8
CIS Region	-7.8	4.9
Central America	5.5	5.2
Africa	4.7	5.4
Southeast Asia	8.0	5.4
Northeast Asia	7.7	6.8
South America	6.2	7.0
Southwest Asia	4.2	7.0
China	11.6	7.4
World	5.2	4.8

Source: Boeing, Current Market Outlook 2000.

1.1.2 The opening up of the Southeast Asian market

Even though air traffic will continue to grow, the immediate consequence of the 1997-1998 crisis for Southeast Asian airlines is the escalation of the debt service and lease costs and operating costs. Collectively, the Asian economies have accumulated over US$ 240 billion in short-term debts. Four flag carriers in Southeast Asia, namely Garuda Indonesia, Malaysia Airlines, Philippine Airlines and Thai Airways

International, are experiencing the most difficulties. Home-based air travel has drastically decreased as a result of dramatic currency depreciation (Li, 1998; Chin *et al*, 1999). To make it even worse, the airlines were highly exposed because of commitments to purchase aircraft and spares in hard currency. The value of their debt escalated rapidly and interest rates and fuel costs in domestic currency increased.

Table 1.3 Traffic Flow to/from Southeast Asia

Region to/from Southeast Asia	2000-2019 % year
Africa	5.5
China	5.0
Europe	4.9
Middle East	3.5
North America	4.3
Northeast Asia	7.1
Oceania	3.6
Southwest Asia	6.6
Southeast Asia	6.1
World Total	4.8

Source: Boeing Current Market Outlook 2000

Meanwhile, deep depreciation of Asian currencies would boost the tourist market. Southeast Asia destinations, in particular, would be attractive to tourists from North America and Europe. But this would challenge main Southeast Asian carriers, because they must compete head-on with carriers from North America and Europe.

Furthermore, the economic crisis has led to intervention by the International Monetary Fund (IMF) (Rimmer, 2000). Some of the main requirements in the IMF rescue packages, to Thailand and Indonesia in particular, are deregulation and liberalisation of the economy on a broad basis. This means that the Southeast Asian airlines would

be more open to competition from foreign airlines such as North American and European ones. However, the economic crisis has and will continue to force Southeast Asian airlines to restructure their operations, and to improve the efficiency of their organisations.

1.1.3 The performance of Southeast Asian airlines

Referring back to world airline performance in the last ten consecutive years, between 1989 and1998[1], only a few airlines were able to effectively and efficiently serve their market through their operational processes, as indicated by the operating ratio[2].

In Europe these airlines included British Airways (BA), KLM Royal Dutch Airlines (KLM), and Scandinavian Airlines System (SAS) and in America they included Southwest Airlines (Southwest) and Federal Express (FedEx). In Asia, only Singapore Airlines (SIA) met the criteria. This is the most crucial issue for certain Southeast Asia airlines, which did not have the same operating performance as the airlines mentioned above. These included Malaysia Airlines (MAS), Garuda Indonesia (GIA), Philippine Airlines (PAL), and Thai Airways International (TAI), even before the crisis.

1.1.4 The needs of the Southeast Asian airlines

From these discussions, it can be concluded that the Southeast Asian airlines need to improve their performance in order to be successful against the background of rising competition and higher market demand. This raises a number of questions:

1) How can the airlines of Southeast Asia improve their performance? What area of organisation should be focused on for improvement?

---

[1] Air Transport World magazine, Airline Business magazine, IATA Statistics, ICAO Financial Report.
[2] Airline profitability is best measured by the operating ratio that is the operating revenue expressed as percentage of operating cost. The operating ratio gives an indication of management efficiency in controlling costs and increasing revenue (Nasr, 1995; Doganis *et al.*, 1995; Morrell, 1997).

2) Could they learn from the successful airlines of other regions? What are the differences in the organisational context, internally and/or externally, between the Southeast Asian airlines and those of other airlines, which should be taken into consideration?

Various studies have demonstrated that there is a direct relationship between quality management practices and a firm's performance, which eventually will improve profitability (George and Weimerskirch, 1994; U.S. GAO, 1991; Jones, 1998; Bank, 2000; Forza and Filippini, 1997; Adam, 1994; Adam *et al*, 1997; Buzzell and Gale, 1987; Hakes, 1996; Easton and Jarrell, 1998). Some of these studies are discussed in the following paragraph.

Forza and Filippini (1997) conducted a study that proposes and elaborates a model which examines quality management practices in relation to two dimensions of quality performance: quality conformity and customer satisfaction. The quality management practices consist of orientation towards quality, links with customers, links with suppliers, process control, and human resources. After constructing and testing the model, the results show the existence of two distinct paths of direct influences which lead, respectively, to customer satisfaction and quality conformance.

Adam (1994) relates alternative quality improvement approaches to actual operating and financial performance. In this study, multiple quality approaches were correlated to quality, operating, and financial performance measures for 187 US business firms. Results indicate a strong and significant relationship between a quality improvement approach and performance quality.

The US General Accounting Office (GAO) (1991) reviewed 20 companies that were among the highest-scoring applicants, in 1988 and 1989, for the Malcolm Baldrige National Quality Award (MBNQA). The conclusion was that the companies that adopted quality management practices experienced an overall improvement in corporate performance. They achieved better employee relations, higher productivity, greater customer satisfaction, increased market share and improved profitability.

Bank (2000) concludes from his study that profit is achieved through quality improvement. Figure 1.2) shows that an increase in profit (X) through increased sales would require a significant increase in operating costs (A). Instead, to achieve the same profit (X) through quality improvement would require only operating costs (B), which are significantly less than operating costs (A).

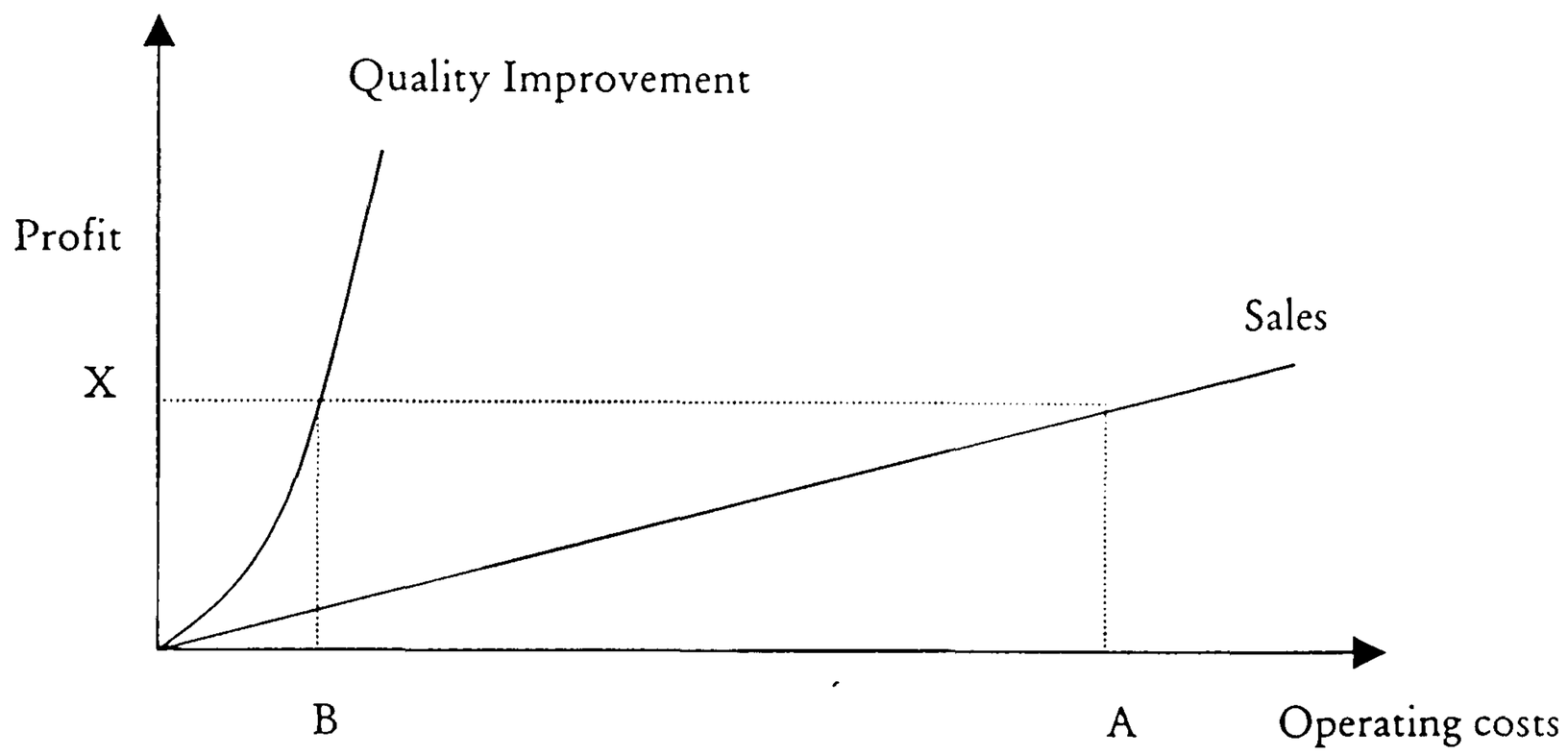


Figure 1.2. Quality Improvement for Profit

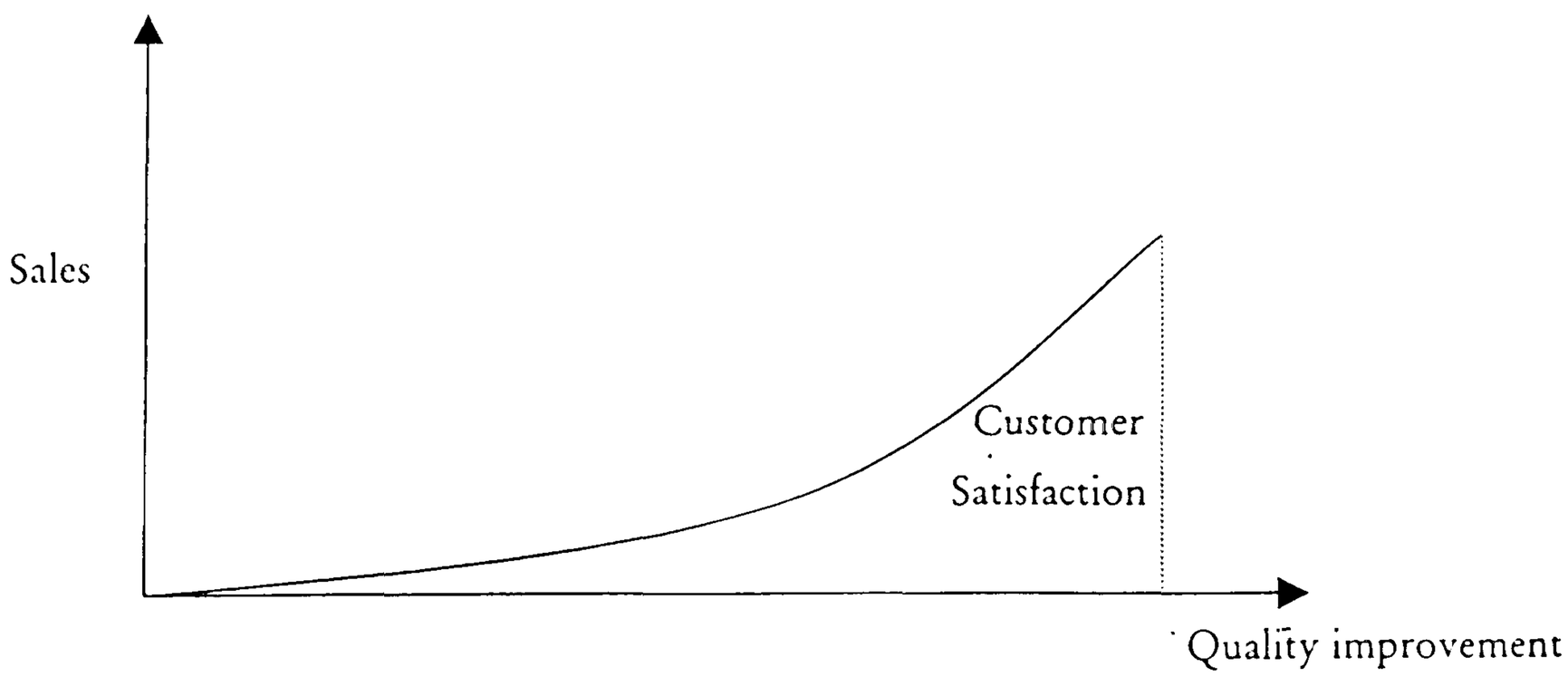


Figure 1.3. Quality Improvement for Sales Growth

The study also explains (see Figure 1.3) that, the more quality improves, the faster sales will increase, because customer satisfaction brings its own acceleration.

Furthermore, George and Weimerskirch (1994) developed a diagram that reflects the experiences of quality leaders worldwide (see Figure 1.4). The diagram shows how conformance quality and perceived quality improve profitability.

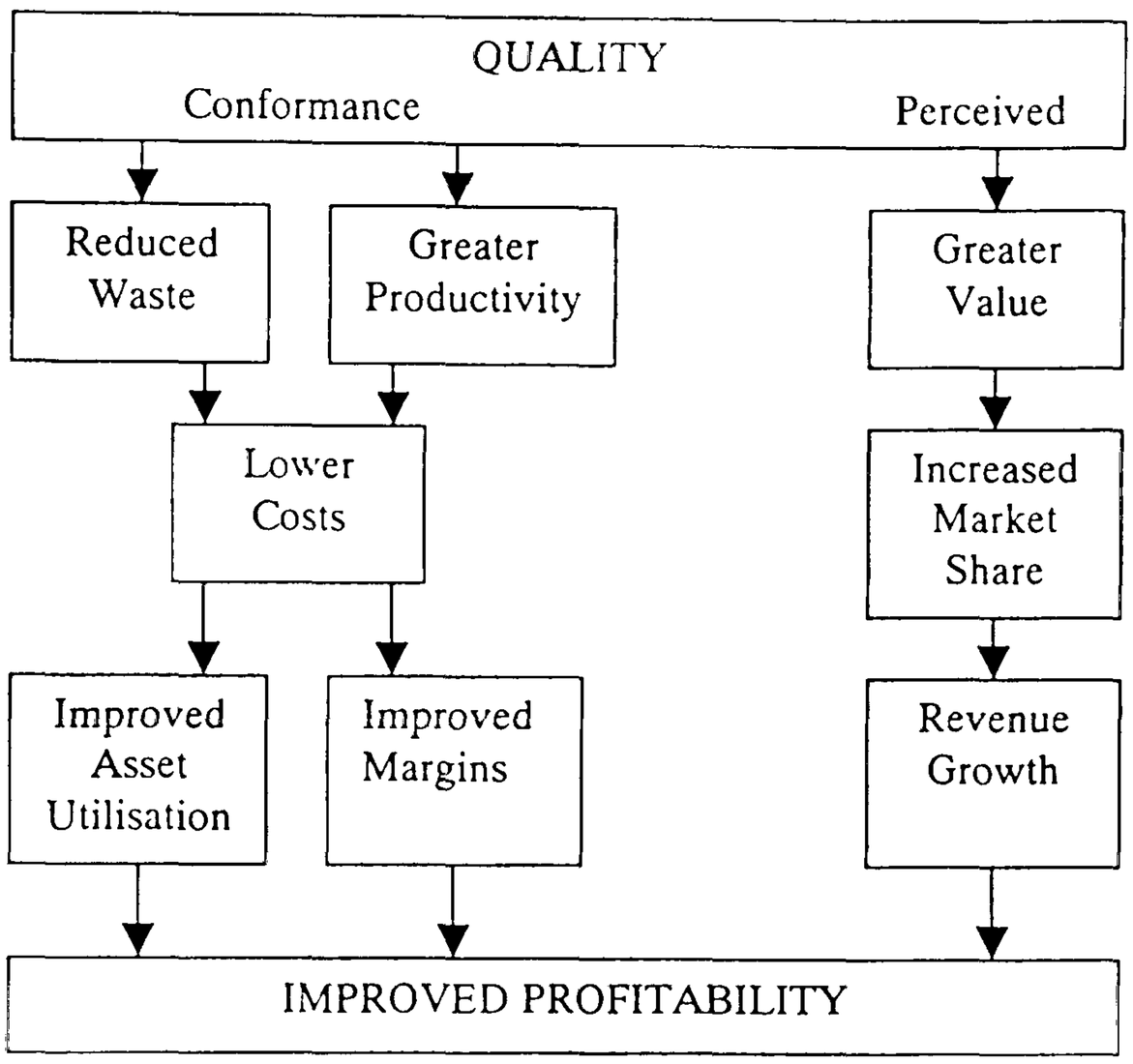


Figure 1.4. Quality to Profitability[3]

All of these studies agree that improving the quality of an organisation's products and services is fundamental to business success. Therefore, this research will focus on quality management practices as a means of improving the performance of the airlines of Southeast Asia.

Airlines have three major line functions: the first is marketing, sales and services, which sell and service available seat miles, the second is flight and ground operations,

[3] Source: George and Weimerskirch, 1994.

which deliver the product to the consumer, and the third is engineering and aircraft maintenance, which keeps the equipment in condition to provide safe and saleable air transportation. (Lynch, 1984; Wells, 1994; Dempsey and Gesell, 1997).

Since the foundation of commercial air service is an airline's promise to get people and goods to their destination, based on the schedule that it publishes (Barry, 1965; Berdy and Gershkoff, 2000), the operations function, which consists of flight and ground operations and aircraft line maintenance, will become the focus of this research. Also, because this function is a core[4] activity of an airline's operational process, it can make a contribution to the success or failure of delivering quality in the product and direct service to the customer (Dempsey and Gesell, 1997; Lynch, 1984; Hakes, 1991; Galloway, 1996; Yun *et al*, 1996; Ran and Sluis, 1997; and Rosander, 1985).

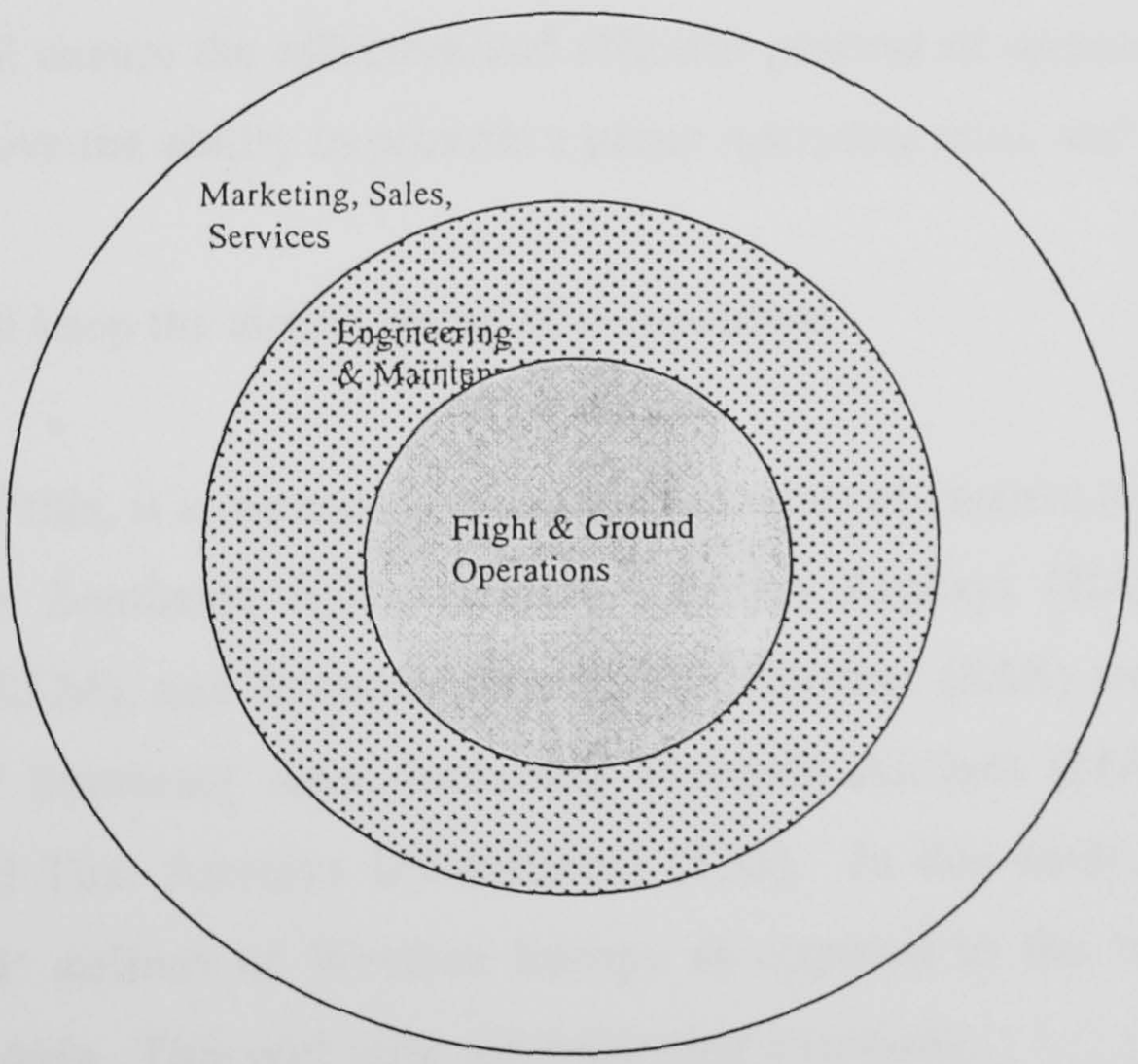


Figure 1.5. The Position of the Operational Function[5]

Figure 1.5 describes the position of the operations function within an airline's major line functions.

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[4] Core processes concentrate on satisfying external customers. They directly add value in a way perceived by the customer of the business. They respond to a customer request and generate customer satisfaction (Galloway, 1996).

The efforts of an airline's organisation to provide consistent product quality through its operational function will improve their ability to achieve a better operating ratio, which will ensure operating profit in the end.

Based on the above discussion, therefore, the 'developing' airlines of Southeast Asia, as a starting point, need to focus their effort for improvement on the activities of the operations function. In this case, a quality improvement initiative has to be successfully practised, and a model of quality management practices will be required[6], for the following reasons:

- It will ensure that the operations function delivers products and services conforming to the requirements of the customer, as well as the industry,

- It will ensure the effective and efficient process of operations, which eventually improve the ability to provide a better operating ratio, and

- It will keep the airline ahead of competition.

Because of this, it is necessary to select a number of carriers to be used as a yardstick against the Southeast Asian airlines. British Airways (BA), KLM Royal Dutch Airlines (KLM), and Scandinavian Airlines System (SAS) were compared with the airlines of Southeast Asia, including Malaysia Airlines (MAS), Garuda Indonesia (GIA), and Thai Airways International (TAI). In this study, these airlines are the 'successful' airlines of Western Europe as opposed to the 'developing' airlines of Southeast Asia. This will raise the following questions:

---

[5] Source: Yun *et al*, 1996; Ran and Sluis, 1997; and Rosander, 1985.
[6] Based on review of the case studies described in Chapter 3 (Bank, 1992; Heskett *et al*, 1997; Yun *et al*, 1996; Ran and Sluis, 1997; Azhashemi and Ho, 1999; Bunz and Maes, 1998; Laszlo, 1999; Binney, 1992; Zaid, 1994; and Rosander, 1985).

a) What are the success factors that the 'developing' airlines of Southeast Asia could learn from the 'successful' airlines, in order to practise quality management in their operations?

b) What are the differences in the organisational context of the 'developing' airlines and the 'successful' airlines, which could make the practices different?

c) How could these success factors be managed to implement successful quality management practices in the operations function of the 'developing' airlines of Southeast Asia?

1.2 Aim of the Research

The aim of this study is to address the questions raised above. The research will proceed as follows:

- Identify the critical success factors of quality management practices in the operations function of the airlines.

- Analyse the differences in quality management practices between these two groups of airlines.

- Highlight the variables of organisational context which cause differences in the practices between the 'successful' and the 'developing' airlines.

- Develop a model of quality management practices for the operations function in the 'developing' airlines of Southeast Asia.

As mentioned before, the focus of this research is on quality management practices in the operations function of airlines. The operations function in this study is defined as the activities performed by the line departments to provide the safe, punctual, and efficient transportation of passengers on the ground and in the air. The activities comprise: (referred to in Chapter 3)

a) managing passengers and baggage,
b) managing aircraft movement, and
c) managing maintenance.

The research covers airlines in two regions, namely Western Europe and Southeast Asia. The Western European airlines included in the study as 'successful' airlines are British Airways (BA), Scandinavian Airlines System (SAS), and KLM Royal Dutch Airlines (KLM). The Southeast Asian airlines included in this research as 'developing' airlines are Malaysia Airlines (MAS), Garuda Indonesia (GIA), and Thai Airways International (TAI).

1.3 Benefits of the Research

The quality management practices model is designed to provide significant practical assistance to organisations planning or conducted quality management practices within their operations function. Note that, while the research is based on the practices of specific airlines, the model developed from this research might also be suitable to assist other airlines in planning and practising quality management.

The research can also provide airline executives or managers with guidelines which they will find useful in their decision-making processes when conducting process improvements for their operations. The research contributes to the knowledge of process quality, and the applicability of quality concepts developed in the social and business disciplines of airlines' operational organisations.

1.4 Research Approach

This research was conducted through four stages, as follows:

- A preliminary study
- Development of the research structure

Activity (Box **A0**) – *"Develop a Model of Quality Management Practices in the Operations Function for the 'developing' airlines of Southeast Asia"*. The arrows represent:

- **Input** (Arrow **I1**) – *"The Need for a Model of Quality Management Practices in the Operations Function for the 'developing' airlines of Southeast Asia"*. This is described in Chapters 1, 2, and 3.

- **Controls** (Arrows **C1**, **C2**, **C3**, and **C4**) – *"Quality Management Practices Definitions"* (C1), *"Airline Operations Function Definition"* (C2), *"Questionnaires Plan"* (C3), and *"Semi-structured Interview Plan"* (C4). These will be used as references to control the research process. These are developed from the summary of the discussion in Chapter 2 (for C1), Chapter 3 (for C2), Chapter 4 (for C3), and Chapter 5 (for C4).

- **Mechanism** (Arrows **M1**, and **M2**) – *"Desk Research"* (M1), and *"Survey Research"* (M2). These will be used as tools and resources to find the information required for this research. These are discussed in Chapters 2 and 3 (for M1), and Chapters 4 and 5 (for M2).

- **Output** (Arrow **O1**) – *"A Model of Quality Management Practices in the Operations Function for the 'developing' airlines of Southeast Asia"*, which is the objective to be achieved in this research. This is discussed in Chapter 6.

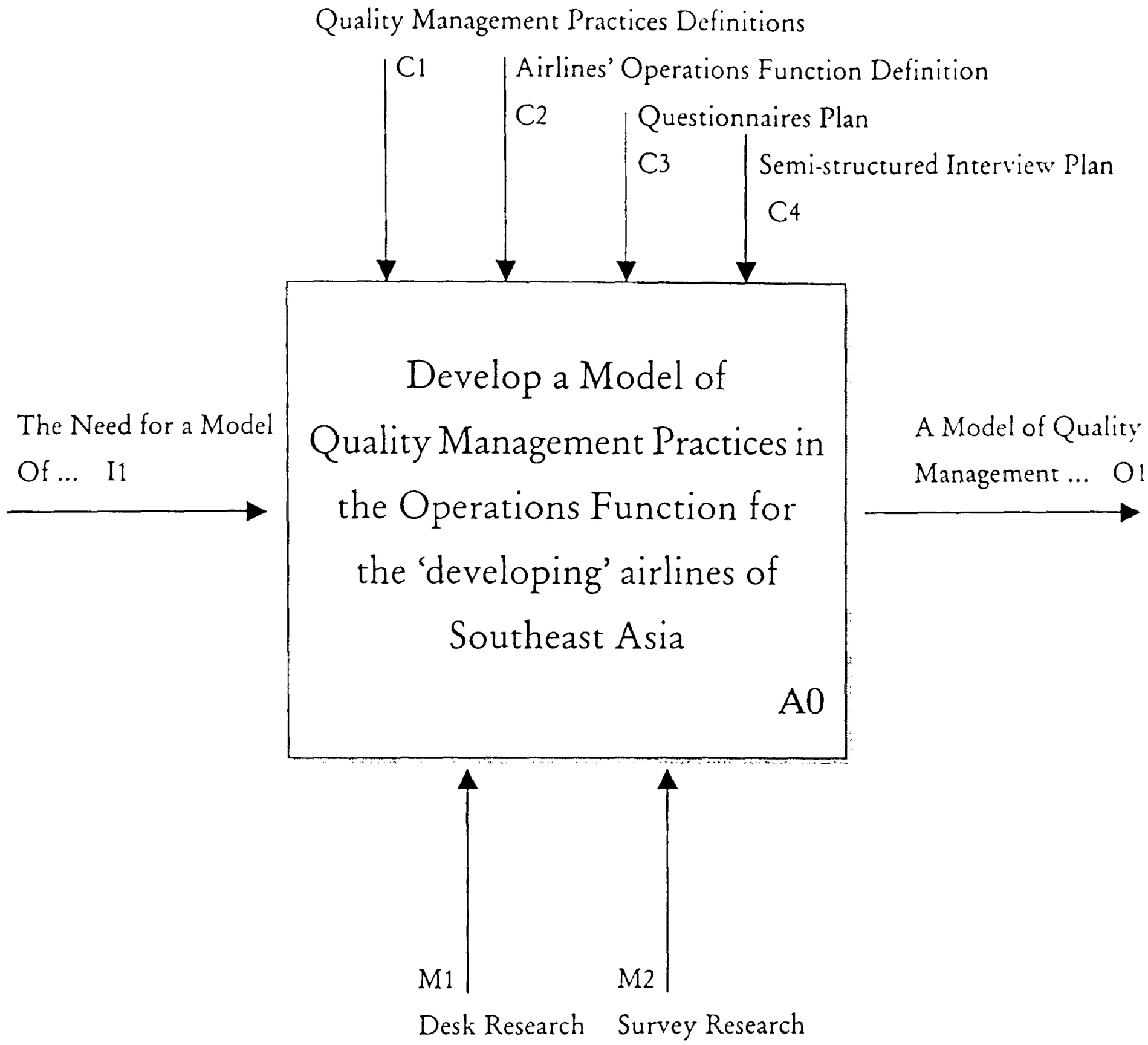


Figure 1.6. Main Diagram of Research Process Structure

This Activity (Box A0) is decomposed into three sub-activities, which are described below. Figure 1.7 illustrates the decomposition of the Activity (Box A0), which is as follows:

- The collection of information, and
- The development of a model of quality management practices in operational functions, for the 'developing' airlines of Southeast Asia.

1.4.1 Preliminary Study

The preliminary study was conducted to define the background to the research and to determine the area of research, the aims as well as the benefits of the research, and how the research should be approached.

1.4.2 Research Structure

Having done the preliminary study, a structure was developed to conduct the research. Research activity is considered to be a process with certain inputs which result in an output. In order to structure and map the research process systematically, Integrated Definition 0 (IDEF 0) methodology is used.

IDEF 0 is a business process analysis and modelling methodology, which is still the best modelling representation available for process work, because it visually displays important information about processes often neglected by other tools (Rasmus, 1999; McConnelly, 1999; Hanrahan, 1999; Mann, 1996). IDEF 0 is a structured methodology that assists in the handling and understanding of information through decompositional diagrams. See Appendix A for details.

The approach of IDEF 0 begins by defining clearly the activity to be mapped. This is undertaken through the use of an activity diagram. The activity box defines the activity and the arrows represent the inputs, controls, mechanisms, and outputs of the activity. The diagrams will be used as a communication tool for discussing the research and integrating the research findings to form the model. This structure was also used for defining the layout or structure of the thesis (see Figures 1.6 and 1.7).

Figure 1.6 illustrates the research structure and is described below.

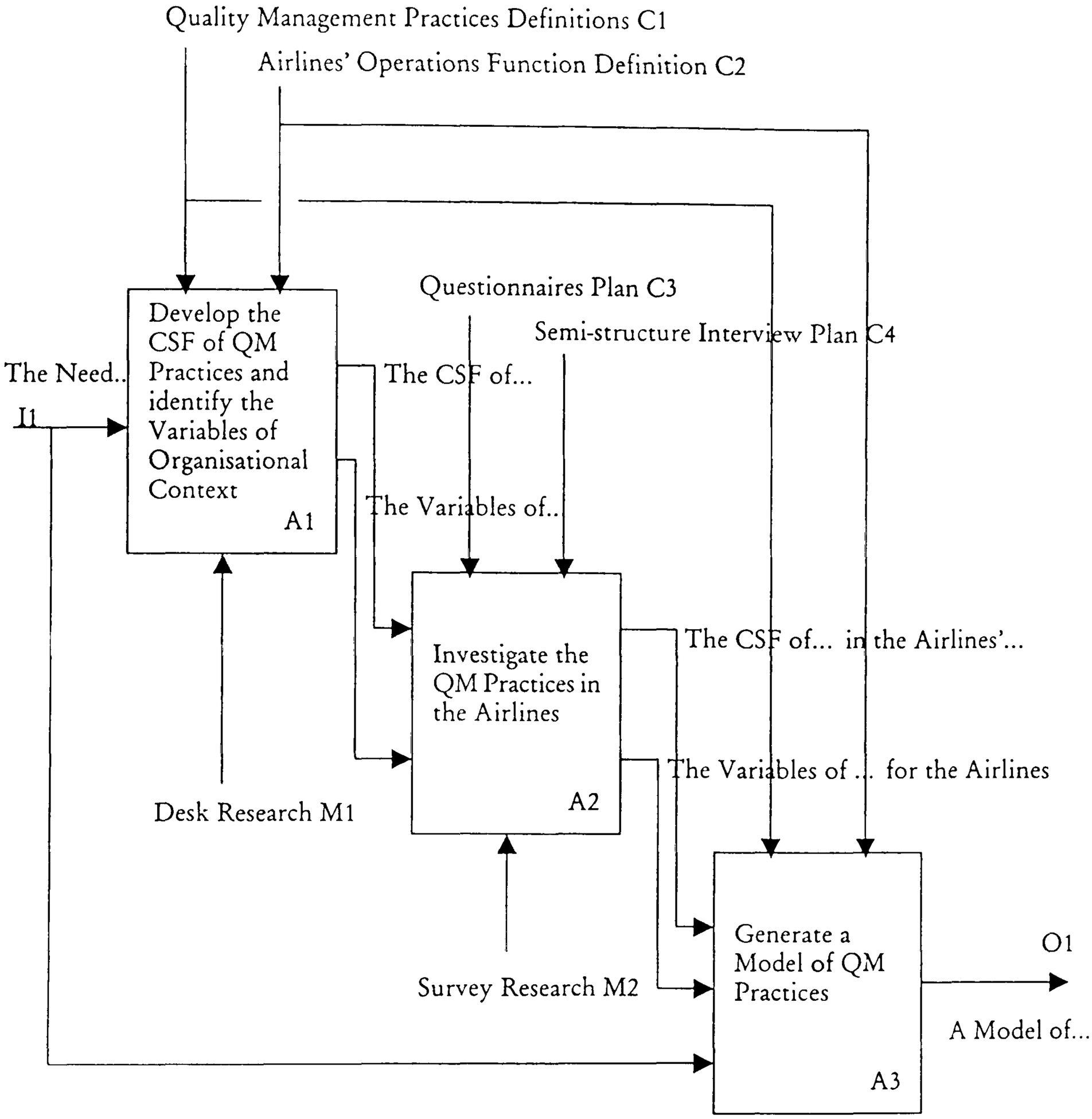


Figure 1.7. Decomposition Diagram of Research Process Structure

- **First sub-activity** (Box **A1**) – *"Develop the Critical Success Factors of Quality Management Practices and identify the Variables of Organisational Context"*. This is a *"Desk Research"* (M1) activity, with *"The Need for a Model of QM..."* (I1) as an input and it uses *"Quality Management Practices Definitions"* (C1), and *"Airline Operations Function Definition"* (C2) as references or controls to the

process. The results would be used as input for the next sub-activity to find information required, and are described in Chapters 2 and 3.

- **Second sub-activity** (Box **A2**) – *"Investigate the Quality Management Practices in the Airlines"*. It uses *"Survey Research"* (M2) as tool with an input from previous activity (from Box A1), and *"Questionnaires Plan"* (C3), and *"Semi-structured Interview Plan"* (C4) as references. This will result in a confirmation of the Critical Success Factors and the differences of Quality Management Practices in operational function activities, and the organisational context influence the practices. This is discussed in Chapter 4 and 5.

- **Third sub-activity** (Box **A3**) – *"Generate a Model of Quality Management Practices"*. This process uses *"Quality Management Practices Definitions"* (C1) and *"Airline Operations Function Definition"* (C2) as references, and *"The Need for a Model of Quality Management..."* (I1) and the output from previous sub-activity as input (from Box A2). The output of this sub-activity would be the Model (O1). This is discussed in Chapter 6.

1.4.3 Information Collection

Two approaches were adopted to collect data and information:

- desk research
- survey research

The desk research was conducted through extensive literature reviews. The survey research was conducted through the use of a questionnaire and semi-structured interviews.

The extensive review of literature identified the critical success factors of quality management practices in the operations function and its variables of organisational context. These results were then used to construct questionnaires and to develop questions for semi-structured interviews.

The questionnaires were used to collect information from selected senior airline managers, regarding critical success factors of quality management practices in the operations function of their organisations. Semi-structured interviews were used to obtain more detailed information on the variables of organisational context that influence the practices.

1.4.4 Model Development

Based on the findings from desk and survey research, the model of quality management practices has been developed through the use of the research process structure (refer to Figures 1.6 and 1.7).

1.5 Thesis Structure

The thesis structure was based on the research structure (see Figures 1.6 and 1.7). It is divided into three parts:

PART I – **Background and Desk Research**

Chapter 1 – *"Introduction"*. This chapter provides an overall view of the research. It describes the background, aims and benefits of the research. It then describes the research approach used and the structure of the thesis.

Chapters 2 and 3 – *"Developing the Critical Success Factors and Identifying their Organisational Context"*. This is the main desk research. It describes the critical success factors of quality management practices, and the variables of organisational quality contexts developed and identified from extensive literature reviews on manufacturing and service firms, as well as airlines.

PART II – **Survey Research**

Chapters 4 and 5 – *"Investigating Quality Management Practices in the Airlines"*. These chapters provide an overall view of the survey research process. This part describes the planning and design of the questionnaire and the semi-structured interviews, as well as the analysis of the information gathered and the findings from the questionnaires and semi-structured interviews.

PART III – **The Model and Research Conclusion**

Chapter 6 – *"Generating a Model of Quality Management Practices"*. This chapter discusses the integration of all the findings in order to develop the model. It represents the outcome of this research.

Chapter 7 – *"Research Conclusion"*. This chapter summarises the research presented in this thesis, the need for the research, the approach used, and the findings, as well as offering suggestions for further research in the future.

1.6 Summary of Chapter

The promising Asian economic growth, the rise of competition between airlines in Southeast Asia, and the worsening of business operating problems since the Asian crisis have required the 'developing' airlines of Southeast Asia to improve their performance against the background of rising competition and higher market demand.

A direct link exists between a firm's performance and the practice of quality management. This research focuses on quality management practices as a means of improving the 'developing' Southeast Asian airline performance. The research concentrates on the operations function of airline organisation, as this is the core activity of any airline's operational process.

The performance of a number of 'successful' European airlines is used as a yardstick against which the performance of 'developing' Southeast Asian airlines is measured. Success is defined by the airline's operating ratio.

It is the objective of this thesis to develop the model of quality management practices in the operations function for the 'developing' airlines of Southeast Asia, taking into account the operating environment within which such carriers are performing.

The benefit of the research findings for academicians in the field of quality management application, and for practitioners in airline operational organisations in particular, is also highlighted.

It uses IDEF 0 as a research process structure in order to ensure that the research is processed systematically.

This thesis consists of seven chapters and is divided into three parts. It is laid out as the research process structure.

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Chapter 2

Developing the Critical Success Factors and Identifying Their Organisational Context in Manufacturing and Service Firms

This chapter's aim is to describe the development of the critical success factors of quality management practices in manufacturing and service business organisations, and to identify the variables of organisational context that influence these practices. In this desk research, extensive literature reviews have been carried out on the issue of quality management practices in manufacturing and service firms, as well as the practices in different countries and organisational contexts.

This chapter is divided into four sections:

Section 2.1 defines the 'quality management practices' to be used in the research.

Section 2.2 reviews the previous studies on critical success factors of quality improvement initiatives in manufacturing and service firms.

Section 2.3 identifies the organisational contexts that influence the critical success factors of quality management practices.

Section 2.4 summarises the discussion in this chapter.

2.1 Defining 'quality management practices'

A number of different terms and definitions are used to describe quality improvement initiatives in organisations (Boaden, 1997; Hackman and Wageman, 1995; Martinez-Lorente *et al.*, 1998). Several different terms, such as Quality Control, Total Quality Control, Company Wide Quality Control, Quality Improvement Process, Total Quality and many others have been found in the literature.

2.1.1 The developed quality management concept

Over the past few decades quite a number of authors, such as Deming (1986), Crosby (1979), Juran and Gryna (1993), Feigenbaum (1991), Ishikawa (1985) and others, have

developed certain propositions in the area of quality management practices. Deming put the responsibility on top management for the continual improvement of products and services to meet customer requirements and industry standards, and to stay ahead of competition.

The major emphasis of Deming's philosophy on quality management is that top management must orientate itself to constantly innovate and to commit resources to support innovation and continual improvement. The leadership issues that management must pursue in developing strategies for managing quality are: building quality into products and services; breaking down department and worker-supervisor barriers; developing long-term partnerships with suppliers; restoring pride of workmanship; eliminating dependence on mass inspection; and removing numerical quotas and targets and concentrating instead on improving processes.

Juran advocated an impressive managerial process for top management consisting of quality planning, control and improvement. The process begins with quality planning to identify the intended customers and their needs. The planners should then proceed to develop product as well as process design in response to these needs. Juran emphasised the significance of quality improvement.

Juran introduced a concept called 'the costs of poor quality' and advocated that quality improvement should be aimed at continually reducing the costs of poor quality that would result from product deficiencies, while at the same time developing product features that meet customer needs. Juran recommended quality control as a means of accomplishing this goal.

The costs of poor quality are those costs that would disappear if all products and processes were perfect, or had no deficiencies. It is the purpose of quality improvement to reduce the costs of poor quality to zero and hence eliminate the chronic waste due to product deficiencies.

Crosby, in a similar vein to Deming and Juran, stated that effective quality management, to be practical and achievable, must start at the top. He defined quality as conformance to requirements, in the sense that any product or service that has been consistently produced

according to its design specifications is of high quality. In order to implement quality plans, he recommended the support of management participation and attitude, professional quality management, original programmes and recognition.

Crosby stated that zero defects should be the management standard. Regarding the costs of quality, Crosby said that if quality were improved, total costs would eventually fall.

Feigenbaum defined total quality control (TQC) as an effective system for integrating the quality deployment, quality maintenance and quality improvement efforts of the various groups in an organisation, so as to enable marketing, engineering, production and service at the most economical levels that allow for full customer satisfaction. He argued for managerial and technical implementation of customer-oriented quality, changes in the basic attitudes of people required for a positive approach, the infrastructure of a modern business organisation, a systems approach to quality systems and the focus of business strategic planning to foster business growth and strategic quality leadership. TQC requires effective ways to integrate the efforts of large numbers of people with large numbers of machines and huge quantities of information.

Ishikawa advocated company-wide quality control, emphasising that everyone in every division in the company must study, practise, and participate in quality control. Personal responsibility of senior management, customers focus, prevention of over inspection, employee involvement and total organisational participation are central to company-wide quality control.

The goal of such company-wide quality control should be continual improvement, with the focus on producing products that customers really want. He strongly promoted the use of quality circles at all levels, cause-and-effect diagrams, and cross-functional teamwork in addressing quality improvement efforts. Ishikawa believed mainly in the use of simple methods of working together, namely co-operation, training and education, to solve problems and remove barriers to improvement.

In their prescriptions for quality management, these authors repeatedly discuss the importance of such critical factors as top management leadership for quality, supplier

quality management, process management, employee training, and employee involvement in quality.

2.1.2 The established quality management practices award

Furthermore, worldwide, several quality awards, or similar prizes, have been developed and established as a quality management implementation framework, such as the Deming Prize (1951) in Japan, the Malcolm Baldrige National Quality Award (1987) in the United States of America, the European Quality Award (1991) in Europe, and ISO 9000 Quality Assurance Standards (1987).

The Deming Prize was the first to be established, back in 1951. It was set up by the Union of Japanese Scientists and Engineers to commemorate Dr. Deming's contribution to Japanese industry and to promote further the continued development of quality control in Japan.

The Deming Prize is given to companies that have achieved distinctive performance through the application of company-wide quality control. The company's performance on the application of company-wide quality control is evaluated through two examinations, the document examination and the on-site examination. The aim of the examinations is to find out how well a firm implements total quality control (TQC) by assessing its quality assurance policies and activities, the implementation of company-wide quality control, and the results achieved through the application of statistical techniques and quality circles.

The Malcolm Baldrige National Quality Award is an annual, national, US quality award, established in 1987. Its purpose is to promote quality awareness and understanding of the requirements for quality excellence, to recognise the quality achievements of US companies, and to publicise successful quality strategies. The award assessment is based on a set of examination criteria outlined in the written application that each applicant submits and includes information and data on the firm's quality process and quality improvement results. Although the point value of each examination category/item is subject to change every year, customer satisfaction has always been the most important category, as it is the overall goal of the quality system.

The European Foundation for Quality Management (EFQM) was founded by 14 of the leading Western European businesses in 1988, when many of the major companies in Europe realised that the only way to survive in business was to pay much greater attention to quality. The European Quality Award was established in 1991 in recognition of achievement of quality, as a feature of the policy of the EFQM,. The aim of the award is to enhance the position of Western European companies in the world market, by accelerating the acceptance of quality as a strategy for global competitive advantage and by stimulating and assisting the development of quality improvement activities.

The examination process consists of three main sections, namely initial assessment, site visits, and final review and decision. The assessment criteria consist of nine categories that are divided into two groups, the results and the enablers. In other words, the award assesses customer and employee satisfaction, the organisation's impact on society, and the business results being achieved through leadership, people management, policies, strategy, resources and processes.

The ISO 9000 quality assurance standards, consisting of ISO 9000, 9001, 9002, 9003 and 9004, were first issued in 1987 and revised in 1994 by the International Organization for Standardization (ISO). These standards are based on the concept that certain minimum characteristics of a quality management system could be usefully standardised, giving mutual benefit to suppliers and customers alike.

The major purpose of these standards is to provide an effective quality system reflecting a company's management practices for producing goods and services that conform to specified requirements in order to enhance and facilitate trade. From the date of publication, the adoption of ISO 9000 standards was phenomenal.

Originally, they were adopted by the European Community (EC), requiring that anyone doing business with the EC should have the ISO 9000 certification. The certification process consists of an audit of the implementation of a company's documented quality system after it has been verified and seen to conform to the requirements of the applicable ISO 9000 standard. Depending on the number and the nature of the nonconformances found during the audit, the company is either recommended or rejected for certification.

2.1.3 The need to define quality management practices

These authors' insights into quality management provide a defined quality management concept or framework that can be chosen for further study. It has also been found that each model has its unique award system and set of examination criteria. Nevertheless, until recently, there has been no systematic attempt in the literature to organise and synthesise the various sets of critical factors identified by different authors nor measures of overall organisational quality management (Saraph *et al.*, 1989; Black and Porter, 1995).

This research develops its own framework or model based on empirical evidence, instead of using one of the previously defined frameworks or models, for the following reasons:

1) Since the aim of this research is to identify a common[1] framework or model applicable to all of the airlines included in this study, employing only one particular quality management practice's framework or model might not be suitable or would not be appropriate.

2) Each organisation might have a different organisational context that could influence the way quality management should be practised (Syrett and Pike, 1995; Kristensen *et al.*, 1995; Raghunathan, 1997).

3) The airlines included in this research might have different frameworks and level of quality management practices amongst them (Koller, 1996).

However, what is most important here is to start by defining those terms to be used in this study: quality, quality management practices, and the dimension.

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[1] Most of the airline companies based their quality concepts on more than one quality thought leader (Koller, 1996).

Table 2.1 Quality Definitions

Deming[2]	Juran et al.. (1974)[3]	Crosby (1979)[4]	ISO – 8402 (1986)[5]	Groocock, J. M. (1986)[6]	Zeithaml et al., (1990)[7]	Tenner and Toro (1992)[8]
Quality is a predictable degree of uniformity and dependability at low cost and suited to the market. Quality should be aimed at the needs of the consumer, present and future. Use statistics to measure performance in all areas. Reduce variability by continual improvement.	Quality is defined as 'fitness for use'. This concept of fitness for use, popularly called 'quality', is a universal concept applicable to all goods and services. The evaluation of quality is based on whether the product is fit for use on delivery to the user and on whether it continues to be fit for use. The quality of a product is the degree of fitness of all its features and characteristics for the customer's use.	Quality is 'conformance to requirements'. Requirements must be clearly stated so that they cannot be misunderstood. Measurements are taken continually to determine conformance to those requirements. The non-conformance detected is the absence of quality. The quality of a product is the degree of conformance of all its features and characteristics to the product requirement specification.	Quality is the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs.	The quality of a product is the degree of conformance of all the relevant features and characteristics of the product to all of the aspects of a customer's need, limited by the price and delivery he or she will accept. It emphasises the important point that a product does not inherently have quality. It has quality only in relationship to a customer's need.	Service quality is defined by the customer, and it is the discrepancy between the customer's expectations and perceptions. The 10 dimensions: 1. Tangibles 2. Reliability 3. Responsiveness 4. Competence 5. Courtesy 6. Credibility 7. Security 8. Access 9. Communication 10. Understanding	Quality is a basic business strategy that provides goods and services that completely satisfy both internal and external customers by meeting their explicit and implicit expectations.

[2] As cited in Oakland, J. S. (1993) Total Quality Management: The route to improving performance. Butterworth-Heinemann, Oxford.
[3] Juran, J. M., Gryna, Jr., F. M., and Bingham, Jr., R. S. (1974). Quality Control Handbook. McGraw-Hill, New York.
[4] Crosby, P. B. (1979). Quality is Free. McGraw-Hill, New York.
[5] BS 4778 (1987); ISO – 8402 (1986). Quality Vocabulary: Part 1, International Terms.
[6] Groocock, J. M. (1986). The Chain of Quality: Market Dominance Through Product Superiority. John Wiley.
[7] Zeithaml, V. A. et al. (1990). Delivering Quality Service: Balancing Customer Perceptions and Expectations. The Free Press, Toronto.
[8] Tenner, A. R., and Toro, I. J. (1992) Total Quality Management: Three Steps to Continuous Improvement. Addison-Wesley, Reading.

Table 2.2 Quality Management Practices Definitions

Feigenbaum[9]	Ishikawa[10]	ISO – 8402 (1986)[11]	BS. 4778 (1991)[12]	Oakland (1993)[13]	Miyauchi (1994)[14]
Total quality control is an **effective system for integrating the quality development, quality maintenance, and quality improvement efforts of the various groups in an organisation so as to enable production and service at the most economical levels, which allow full customer satisfaction.**	Total quality control is a system for integrating the quality technologies into various functional departments (i.e. engineering, production, sales and service) to achieve customer satisfaction.	TQM is the management approach of an organisation, centred on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to the members of the organisation and to the society.	A management philosophy embracing all activities through which the needs and expectations of the customer and the community, and the objectives of the organisation, are satisfied in the most efficient and cost-effective way by maximising the potential of all employees in a continuing drive for improvement.	Total quality management is a way of managing business processes to ensure complete customer satisfaction at any stage, internally and externally.	Total quality control is an action to produce and deliver commodities and services, which conform with customer requirements by being better, easier, cheaper, faster, and safer than those of competitors, with the full participation of every employee, in every organisation, at every stage/phase through the TQC concept and statistical methods.

[9] As cited in Bicheno, J. (1994). The Quality 50. PICSIE, Buckingham.
[10] As cited in Moir, P. W. (1988). Profit by Quality: the essentials of industrial survival. Ellis Horwood, West Sussex.
[11] ISO – 8402 (1986). Quality Vocabulary: Part 1, International Terms.
[12] BS. 4778: Part 2 (1991).
[13] Oakland, J. S. (1993). Total Quality Management: The route to improving performance. Butterworth-Heinemann, Oxford.
[14] Miyauchi, I. (1994). Total Quality Management. JUSE.

2.1.4 What is 'quality'?

The word quality is widely used, and its meanings and interpretations are as varied as the people who use this term. Several different definitions from selected authors are given below (see Table 2.1):

a) Quality is defined as fitness for use (Juran, 1974).

b) Quality is conformance to requirements (Crosby, 1979).

c) The totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs (BS 4778, 1987; ISO 8402, 1986, Quality Vocabulary: Part 1, International Terms).

d) The customer defines (service) quality, and it is the discrepancy between customers' expectations and their perceptions (Zeithaml et al.., 1990).

e) The quality of a product is the degree of conformance of all of the relevant features and characteristics of the product to all of the aspects of a customer's need, limited by the price and delivery he or she will accept (Groocock, 1986).

f) Quality is a basic business strategy that provides goods and services that completely satisfy both internal and external customers by meeting their explicit and implicit expectations (Tenner and Toro, 1992).

In some definitions, various aspects of product and service quality are combined into multidimensional descriptions. For instance, Garvin (1984) combined numerous aspects of product quality into eight general dimensions: performance, features, reliability, conformance, durability, serviceability, aesthetics and perceived quality. Parasuranam, Berry, and Zeithaml (1991) identified five dimensions of service quality: tangibles, reliability, responsiveness, assurance, and empathy.

Taking into account these several different definitions, it can be concluded that **quality of a product is the ability of the product to satisfy the requirements of the customer as well as the industry's standard.** Furthermore, in a business organisation, quality has to

be defined in consideration of its context along with the processes within the organisation. This can be explained by the consideration of several approaches (Seawright and Young, 1996):

a. Manufacturing-based quality. Early definitions of quality centred on producing in conformance with objective design specifications or within acceptable production defect rates. The concept can also be extended to services.

b. Product-based quality. Quality is defined as an objectively measurable construct: the amount of some product or service attribute or characteristic, such as durability, reliability, serviceability, performance, and features. It is assumed that improvements in product specifications are equivalent to increases in quality. Product-based quality results from a combination of product or service design and from operations that produce them according to the design.

c. User-based quality. This is based on the fulfilment of users' needs. Customer satisfaction is the basis for user-based definitions of quality.

d. Value-based quality. These definitions are an extension of user-based definitions; customer satisfaction is considered concurrently with price. In value-based definitions, quality is defined as excellence, or fitness for use, at an acceptable price.

The above definitions of quality do not operate independently. For instance, manufacturing-based quality affects product-based quality, which in turn affects user-based and value-based quality. All of these definitions reflect the order in which the definitions relate to each other. The continuance moves from the internal perspective to the external. This implies that appropriate internal procedures are necessary to achieve desired external results.

This makes it clear that quality is critical to every phase of every process in an organisation, and input quality would be reflected in the quality of the final product (Feigenbaum, 1951; Deming, 1986). It could be said that **the definition of quality in a business firm should not be associated with product quality alone but also , more**

importantly, with a process in which the quality of the product can only be ensured by the process.

2.1.5 Quality management practices in business organisations

The following sub-section describes the definitions of "quality management practices" presented by several gurus in this field (see Table 2.2):

a. Ishikawa, K. (cited by Moir, P.W., 1988)[15]: "Total Quality Control is a system for integrating quality technologies into various functional departments (i.e. engineering, production, sales and service) to achieve customer satisfaction".

b. Feigenbaum, A.V. (1991): "Total Quality Control is an effective system for integrating the quality-development, quality-maintenance, and quality-improvement efforts of the various groups in an organisation, so as to enable marketing, engineering, production and service at the most economical levels, which allow for full customer satisfaction."

c. BS.4778: Part 2 (1991): "A management philosophy embracing all activities through which the needs and expectations of the customer and the community, and the objectives of the organisation, are satisfied in the most efficient and cost-effective way, by maximising the potential of all employees in a continuing drive for improvement."

d. International Standard for quality management, ISO/DIS 8402 (1991): "A management approach of an organisation, centred on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to the members of the organisation and to the society."

e. Miyauchi, I. (Union of Japanese Scientists and Engineers, 1994): "Total Quality Control is an action to produce and deliver commodities and services, which conform with customers' requirements by better, easier, cheaper, faster, and safer processing than competitors and with the full participation of every employee in

[15] Moir, P.W. (1988) "Profit by Quality: the essentials of industrial survival". Ellis Horwood, West Sussex, England.

every organisation at every stage and phase through the TQC concept and statistical methods."

f. Oakland, J.S. (1993): "Total 'quality management' is a way of managing business processes to ensure complete 'customer' satisfaction at any stage, internally and externally."

Of the considerable number of definitions of quality management practices, we could say that **quality management practices in a business organisation mean managing a process of delivering quality to satisfy the requirements of customer and industry standards, in which particular management techniques and organisation commitment through employees'involvement are necessary.**

2.1.6 The Dimension of Quality Management Practices

It could be said that there are two dimensions that cover quality management practices in a business organisation; one is standards-based and the other is people-centred. The standard-based dimension gives a reference line from which to start an improvement, but improvement itself only occurs when people are motivated and have sufficient skills to carry it out, as individuals and/or as a team.

Kume (1995) argued in his study that standards-based quality management practices try to achieve quality by setting standards and making people follow them. The activities of modern organisations are carried out under the system of division of labour, with large numbers of people each responsible for their own particular part of the work. Under such a system, the overall efficiency of the activities can be increased and reliable quality achieved by specifying, in writing, each individual's assigned role.

The type of standards-based management described above is the foundation of quality management practices. However, it is difficult to effectively achieve quality by standards-based management alone, for several reasons:

- It is impossible to standardise every activity, since many tasks contain irregular elements.
- The existence of standards tends to create a static situation in which people believe that they only have to follow the standards.

- Standards are sometimes set by people who are unfamiliar with the actual situation. Problems generally arise through not knowing the standards, failing to follow the standards even though they are known, or trying to achieve inappropriate standards.

Meanwhile, a study conducted by Carr (1993) mentioned that work is improved and made reliable by setting new standards, teaching people to follow the standards, and revising inappropriate standards. Standards are launching pads for improvement. However, standardisation by itself will not result in improvement. The motivation for improvement is not to be found in standards-regulated activities. Improvement occurs when people are constantly on the lookout for problems, are dissatisfied with the status quo, and have sufficient motivation and skills to improve it.

People-centred quality management practices try to secure quality by making both managers and staff recognise that quality is essential to their own development, as well as being important to customers. Being people-centred does not mean ignoring standardisation, but it does put greater weight on attitudes towards quality. Rather than setting standards and enforcing them, it emphasises having people constantly thinking about how to produce better quality goods or services while they work.

2.1.7 Conclusion

Following the discussion of the quality management practices above, conclusions can be drawn as follows:

1) Quality is not only relevant to the product but also to the process. It can be said that the process to achieve the objective is as important as the objective itself.

2) Quality management practices in business organisations will need certain management techniques or methods to bring all resources, and employees in particular, to bear in order to achieve the objective of quality management practices.

3) The success of practising quality management in a business organisation is mainly dependent on how the organisational factors within the dimensions are managed.

This conclusion leads to a discussion to identify the critical organisational factors that make quality management practices successful.

2.2 Studies on the Critical Success Factors of Quality Management Practices

Critical Success Factors (CSF) can be defined as those characteristics, conditions, or variables that, when properly sustained, maintained, or managed, can have a significant impact on the success of an organisation (Leidecker and Bruno, 1984; Boynton and Zmud, 1984; Brooks, 1991). Managing these factors appropriately would deliver successful quality management practices and, ultimately, result in improved financial performance for the organisation (Deming, 1986; Saraph *et al.*, 1989). This section discusses the critical success factors of quality management practices in manufacturing and service firms, which have been developed by several authors.

2.2.1 The Critical Success Factors of Quality Management Practices in manufacturing and service firms

Extensive literature reviews have been conducted on the above subject and several selected studies of manufacturing and service firms, conducted by several different authors, are outlined in Table 2.3.

Saraph, Benson, and Schroeder (1989) conducted a study on the level of quality management, organisation-wide, in manufacturing and service companies. The aim of their study was to identify the critical success factors of quality management and to develop their operational measurement in a systematic way.

The study employed literature reviews and questionnaires, and resulted in eight critical factors of quality management. The result can be used by an organisation's management to identify and measure the areas of quality management that have to be improved.

A different study conducted by Flynn, Schroeder, and Sakakibara (1991) focused on manufacturing plant level practices. This empirical research employed literature studies and the use of questionnaires. It resulted in seven key dimensions of quality management, which could be used as an instrument to measure the plant level quality initiatives.

A study conducted by Porter and Parker (1993) came up with eight critical factors of quality management. The factors can be arranged in a hierarchical model. The model developed suggested which processes senior management need to undertake to develop a successful strategy for implementing quality management in manufacturing and service companies. This study was conducted through literature reviews and interviews.

Another empirical study conducted by Black and Porter (1995) came up with the result of a set of critical factors of quality management for manufacturing and service companies. By using a statistical method, the results provide visual information on the relationship between the various factors, the strength of those relationships and the relative importance of those factors. The findings offer a direction for the development of an empirical understanding of the critical factors of quality management.

Ahire, Golhar, and Waller (1996) conducted research in manufacturing that resulted in a framework to examine the effects of integrated quality management strategies on a firm's product quality. This study was conducted mainly through detailed analysis of related literature.

Table 2.3 Sample of prior studies on Critical Success Factors of Quality Management Practices

Authors	Saraph et al.. (1989)[16]	Flynn et al.. (1991)[17]	Porter & Parker (1993)[18]	Black & Porter (1995)[19]	Ahire et al.. (1996)[20]
Background	To date, there has been no systematic attempt to organise and synthesise the various prescriptions offered, nor have measures of organisational quality management been proposed for areas such as top management leadership, training, employee involvement, and supplier management.	The majority of the empirical work on quality management can be characterised by a narrow focus and a lack of rigor, particularly with regard to reliability and validity issues. Research must initially specify the important dimensions of quality management, determine that they are measured reliably and validly, and only subsequently determine their effect on plant or firm performance.	There is less agreement as to what are the key elements of TQM and what are the critical factors that influence the TQM implementation process.	There still seem to be relatively few empirical studies that either confirm or contradict any of the widely accepted theories developed during the past decade. There is still no clear consensus as to what TQM involves and the interrelationships between techniques and concepts. There are few frameworks of practical use to organisations undergoing a TQM programme. People view the same phenomenon from radically different perspectives.	While many Western firms have adopted integrated Quality Management (QM) strategies, their implementation has not been equally successful. It is important to develop the QM theory, investigate linkages among the QM strategies, and identify the ones that are critical for improving product quality.
Objective	Identification of critical factors of quality management and development of its operational measures that can be practised (to be used as a measurement instrument) to achieve effective quality management in a business unit.	Identifies and substantiates the key dimensions of quality management, which can be used to assess quality management practices at plant level.	Examine the key elements of TQM and the critical factors that influence the TQM implementation process.	The development of an empirically based framework of TQM.	The major objectives of this research are to: (1) identify constructs of QM strategies and develop scales for measuring these constructs, (2) empirically validate the scales, and (3) conduct a preliminary investigation of the relationships among the QM strategies.

[16] Saraph, V. J., Benson, P. G., and Schroeder, R. G. (1989) "An Instrument for Measuring the Critical Factors of Quality Management", *Decision Sciences*, Vol. 20, No. 40, Fall 1989, pp. 810-829.
[17] Flynn, B. B., Schroeder, R.G., and Sakakibara, S. (1991) "A framework for quality management research and an associated measurement instrument", *Journal of Operations Management*, 11 (1994), pp.339-366.
[18] Porter, L. J., and Parker, A. J. (1993) "Total quality management – the critical success factors", *Total Quality Management*, Vol. 4, No. 1, 1993.
[19] Black, S., and Porter, L. J. (1995) "An empirical model for total quality management", *Total Quality Management*, Vol. 6, No. 2, 1995, pp. 149-164.
[20] Ahire, S. L., Golhar, D. Y., and Waller, M. A. (1996), " Development and validation of TQM implementation constructs", *Decision Sciences*, Vol. 27, No. 1, pp. 23-56.

Authors	Saraph et al.. (1989)	Flynn et al.. (1991)	Porter & Parker (1993)	Black & Porter (1995)	Ahire et al.. (1996)
Applied	Manufacturing and services	Manufacturing	Manufacturing and services	Manufacturing and services	Manufacturing
Level	Organisation-wide practices	Plant level practices	Organisation-wide practices	Organisation-wide practices	Organisation-wide practices
Method	120 organisational requirements for effective quality management were generated from the quality prescriptions of quality gurus. Through a judgmental process by authors and a group of quality professionals, those prescriptions were grouped into eight factors, each with its operational measures/items. Using data collected from 162 general managers and quality managers of 89 divisions of 20 companies, validity and reliability tests were conducted on that quality management construct.	Derived from practitioners and empirical literature on quality management, seven dimensions of quality management were developed. Based on the seven dimensions of quality management identified in this research, a set of 14 perceptual scales was developed. The scales were assessed for reliability and validity with a sample of 716 respondents at 42 plants.	An extensive literature survey on a series of case studies was carried out to identify the critical factors necessary for the successful implementation of TQM. Eight critical factors were identified. Ten organisations were surveyed against the eight critical factors. A structured interview format was designed to ensure consistent coverage of the eight critical TQM factors. The interviews were conducted with the 'board member responsible for quality'.	Two studies performed by the authors. The first employed an exploratory study of the same items examined by previous research, with use of factor analysis to determine scientifically which items were grouped into each critical factor. The second study employed a totally new research design covering a wider domain of items and determining the relative importance of those items through the use of ratio scaling techniques.	Through a detailed analysis of the prescriptive, conceptual, empirical and practitioner literature, this research identifies 12 constructs of integrated QM strategies. Using a survey of 371 manufacturing firms, the constructs are then empirically tested and validated.

Authors	Saraph et al.. (1989)	Flynn et al.. (1991)	Porter & Parker (1993)	Black & Porter (1995)	Ahire et al.. (1996)
Results	Specification and measurement of the critical factors of quality management permit managers, as decision-makers, to identify areas of quality management where improvements should be made. Researchers can use the instrument to examine certain hypotheses concerning quality management. CSF: 1. The role of management leadership and quality policy. 2. Role of the quality department. 3. Training 4. Product and service design 5. Supplier quality management 6. Process management 7. Quality data and reporting 8. Employee relations	The instrument is designed for use at the plant level, allowing measurement of plant level initiatives. Seven dimensions and their scales: 1. Top Management Support: - Quality leadership - Quality improvement rewards 2. Quality Information: - Feedback - Process control 3. Process Management: - Cleanliness and organisation - Maintenance 4. Product Design: - New product quality - Interfunctional design process - Product design simplicity 5. Workforce Management: - Selection of teamwork potential - Labour skills - Teamwork 6. Supplier Involvement: - Supplier relationship 7. Customer Involvement: - Customer interaction	The eight critical factors are indeed crucial to the successful implementation of TQM in that they can be arranged in a hierarchical model. A model has been developed suggesting the process that senior management needs to undertake in developing a successful strategy for implementing total quality management. The eight critical factors are: 1. Management behaviour 2. Strategy for TQM 3. Organisation for TQM 4. Communication for TQM 5. Training for TQM 6. Employee involvement 7 Process management and systems 8. Quality technologies	The research identifies a set of critical factors of TQM. It provides visual information on the relationships between the various factors, the strength of those relationships and the relative importance (criticality) of those factors. The findings offer a direction to the development of an empirical understanding of the critical factors of TQM. CSF: 1. People and customer management. 2. Supplier partnerships. 3. Communication of improvement information. 4. Customer satisfaction orientation. 5. External interface management. 6. Strategic quality management. 7. Teamwork structures for process improvement. 8. Operational quality planning. 9. Quality improvement measurement systems. 10. Corporate quality culture.	A framework to examine the effects of integrated QM strategies on a firm's product quality is suggested. The 10 QM constructs: 1. Top management commitment 2. Customer focus 3. Supplier quality management 4. Design quality management 5. Benchmarking 6. SPC usage 7. Internal quality information 8. Employee empowerment 9. Employee involvement 10. Employee training 11. Product quality 12. Supplier performance

A study by Krumwiede, Sheu and Lavelle (1998) mentioned that quality achievement of product or service is a never-ending process and is primarily a management responsibility. Improper understanding of quality management, lack of top management support, and inflexibility of the corporate culture cause the failure of quality management practices. Leadership behaviour and the personality of top management should facilitate activities such as team building, improving customer service, reconciling group differences, career planning, adapting to change, analysing troublesome behaviour among employees and facilitating competitive strategic thinking.

Terpstra and Rozell conducted a study in 1994, which concluded that, related to process effectiveness, goal setting constitutes a simple, but potentially powerful means of increasing organisational effectiveness. A person's goals are a major determinant of work motivation and performance. Specific goals in terms of product quality should be clear and set for the individual employees and the organisation.

Difficult goals result in greater effort than do easier goals, and feedback results in higher effort than does the lack of feedback. Individual and organisational factors should be considered when setting goals. Supervisory feedback should be provided. Feedback may also serve to enhance the feelings of efficacy, competence, or recognition. Organisational strategies and top management objectives will have some bearing on the goals that are set for staff.

The Menon, Jaworski, and Kohli (1997) study proved that interdepartmental conflict and connectedness would affect the process effectiveness and efficiency in producing quality of product. Interdepartmental conflict and interdepartmental connectedness appear to influence the level of quality. The link between interdepartmental conflict and product quality appears to be robust across environments characterised by varying degrees of market and technology turbulence. Interdepartmental interactions can be improved by a host of actions, including management style that exhibits less risk aversion, greater empowerment of employees, and the development of a market-based reward structure to create common incentives.

Another study conducted by Ittner and Larcker (1997) regarding process management concludes that certain process management techniques improve profitability.

a) Firms must bring individual activities under control to achieve successful process improvement.

b) Increased training in problem-solving, use of teams, empowerment of employees, and increased emphasis on non-financial and team-based performance measures are required for successful process improvement.

c) Information on process and problem solving facilitates problem identification and correction and encourages closer communication and co-ordination between work groups, allowing more rapid cross-functional problem-solving and smoother production flows.

d) Data gathering and analysis can be enhanced through the application of problem-solving tools.

e) Benchmarking of products and processes can be valuable for the improvement of products and/or processes.

f) Suppliers can provide firms with ideas for improving product designs, which influence the organisation's cost structure, and impact on the efficiency of the entire process.

g) Customer involvement can have significant influence on product design.

2.2.2 Conclusion

The following conclusions could be drawn from the considerable background, objectives, and methods of the studies discussed Table 2.3:

In order to achieve successful quality management practices in either manufacturing or service business organisations, there are at least seven main (groups of) factors that could be considered as critical and which have to be managed:

a) First, process orientation and technique, which ensures efficient work across various related functions within the organisation, such as organisational structures, process management, management systems, quality technology and teamwork structures.

b) Second, skills and motivation, which could ensure the persistence efforts of the organisation's employees in pursuing quality in their work or daily activities, such as training, employee relations, empowerment, and organisation working culture.

c) Third, information utilisation and analysis, which should make each function within the organisation aware of their weaknesses and strengths, as well as actions to be taken regarding the continuity and effectiveness of the organisation's process chain as a whole, such as quality data and reporting, communication, measurement systems, and benchmarking.

d) Fourth, customer relationships, which could ensure that what the organisation processes is what the customer wants and expects, such as quality planning, product and service design, supplier involvement and customer relationships.

e) Fifth, management behaviour, which makes a driver for the other factors above, such as the role of management leadership, top management support and quality achievement rewards.

f) Interdepartmental interaction, which will determine the ease of the flow of work from one function to another within the organisation, such as interdepartmental connectedness and conflict.

g) Technology and market turbulence awareness, which could enhance the employees' awareness in pursuing quality for their product and service, such as awareness of changing market demand and the development of technology in the industry.

This discussion illustrates that managing these factors within the process is the main contribution to the effectiveness and efficiency of the process itself.

2.3 Aspects influencing quality management practices

Many authors and practitioners agree that quality management practices need to be tailored to the organisation (Mann, 1992; Prasad and Sprague, 1996; Adam *et al.*, 1997). Studies, which have been done by several authors on internal and external organisational factors, have resulted in several variables of organisational quality contexts (Benson *et al.*, 1991; Malhotra *et al.*, 1994; Dale *et al.*, 1997; Tata and Prasad, 1998).

It is necessary to find out how quality management practices differ in different countries and then to determine which organisational context variable influences the practices. Some of the studies reviewed are described in Tables 2.4 and 2.5.

2.3.1 Quality management practices in different countries

In their study, Yavas and Marcoulides (1996) found that there is no doubt that the description of quality management practices is greatly simplified by using the proposed six-factor model of quality. These variables include:

1) communication,
2) commitment,
3) control/responsibility,
4) measurement,
5) present status, and
6) execution.

This study represents an initial move towards determining the generalisation of a model of quality management practices across two different groups of managers. One group represents companies in the USA and the other represents companies in Asia, including Japan, Taiwan, Hong Kong, and Singapore.

A different study, performed by Syrett and Pike (1995), confirmed that all quality management initiatives have common features, whether they originate in Southeast Asia, North America, Europe, or Japan. Companies in Hong Kong, Malaysia and the Philippines have found that, where differences have occurred, they have been either for internal organisational reasons or due to external economic factors that are unrelated to

geographical location. Very few are linked to local culture or management traditions. An exception to this is empowerment, particularly in those companies with a strong collectivist culture, where it is hard to get front-line staff to work 'outside their box' in dealing with specific customer needs or complaints.

In the end, whatever the culture or country, sponsorship and direct involvement by senior management is critical to the success of quality management. The study confirmed that quality management is a universally applicable management concept.

Furthermore, a study conducted by Raghunathan, Rao, and Solis (1997) came to the conclusion that, in both developed and developing countries, in this case the USA, China and India, quality management practices were considered to be important. In these three countries, leadership, strategic quality planning and quality assurance were perceived by the managers to be more important. However, human resource development was not perceived to be as important as the rest of the practices.

Another study by Kristensen, Dahlgaard, and Kanji (1995) mentioned that, in general, the Nordic and Western companies would benefit from doing benchmarking studies in the East, concerning the following areas where performance is particularly good:

1) standardisation,
2) management by facts,
3) education and training,
4) team building.

This study argued that the main reason for the quality differences between the East and West is not a difference in culture, but simply because there is good management and there is bad management, and this makes all the difference.

Table 2.4 Samples of research on Quality Management Practices in different countries.

Authors	Yavas & Marcoulides (1996)[21]	Syrett and Pike (1995)[22]	Raghunathan *et al.*, (1997)[23]	Kristensen *et al.*, (1995)[24]	Chou, Y., Chang, P, and Tuan, C. (1993)[25]
Background	Recently, empirical evidence increasingly points toward convergence of attitudes about quality. Closer interaction, technology and competition appear to be helping to reduce cross-national managerial differences. Studies by many researchers note emerging similarities between the attitudes of US and Japanese managers. These studies, however, simply compare attitudes without paying much attention to the components of quality. Most of the existing studies also lack formal statistical testing of the hypotheses developed.	Many Asian companies have autocratic styles of leadership and hierarchical management that render TQM programmes very hard to introduce effectively. Employees in many Asian countries, particularly those with collectivist cultures, are unused to the level of front-line discretion that TQM programmes demand of them.	In the increasingly changing and competitive world, developed and developing countries are in different stages of the quality movement. There may be opportunities for developing countries to learn from the success and failures of the quality management practices of developed countries. While there has been a growing interest, there is neither an instrument nor systematic attempts to compare quality management practices among developing and developed countries. The question of which quality management practices are common to, and different between, developing and developed countries, and to what extent, is yet to be answered.	It is a well-known fact that TQM performance varies widely throughout the world. This is because the time period in which TQM has been used is different and also the definitions vary from country to country. The TQM definition in Europe is, "TQM is the culture of an organisation committed to customer satisfaction through continuous improvement", while in Japan, "TQM is a management philosophy which is characterised by being scientific, i.e. based on data and logic, systematic, and company wide". It is expected that these differences will also reflect differences in the practical approach to TQM.	Economic interaction between two Chinese economies, China and Taiwan, has become increasingly significant. Economic reform has been going on for over 10 years in China. Therefore, it would be interesting to find out if China still lags behind the industrialised world in management concepts and techniques.
Countries	USA and Asia (include Japan, Taiwan, Hong Kong, and Singapore)	United Kingdom and Hong Kong	USA, China and India. (developed and developing countries)	Denmark, Sweden, Finland, Japan, Korea, and Taiwan. (Nordic and East Asian)	China and Taiwan.
Industry	Electronics	Manufacturing and service sectors	Manufacturing and service sectors.	Manufacturing sector.	Mostly in manufacturing sector.

[21] Yavas, B. F., and Marcoulides, G. A. (1996). "An examination of cross-cultural quality management practices in American and Asian firms", In Prasad, S. B. (Eds.), *Advances in International Comparative Management*, Vol. 11, 1996, pp. 51-67.
[22] Syrett, M., and Pike, J. (1995). The Quest for Quality: Mastering management in Asia. The Economist Intelligence Unit, Hong Kong.
[23] Raghunathan, T. S., Rao, S. S., and Solis, L. E. (1997). "A comparative study of quality practices: USA, China and India", *Industrial Management & Data Systems*, 97/5 [1997] 192-200.
[24] Kristensen, K., Dahlgaard, J. J., and Kanji, G. K. (1995) " A comparison of TQM-performance in the Nordic and East Asian countries", In Kanji, G. K. (Eds.), *Total Quality Management: Proceedings of the first world congress*, Chapman & Hall.
[25] Chou, Y., Chang, P., and Tuan, C. (1993). "Total quality control Chinese style and its management implications – Taiwan versus China", *Total Quality Management*, Vol. 4, No. 3, pp. 283-303.

Authors	Yavas & Marcoulides (1996)	Syrett and Pike (1995)	Raghunathan *et al.*. (1997)	Kristensen *et al.*. (1995)	Chou, Y., Chang, P, and Tuan, C. (1993)
Objective	To examine the generalisation of a model of quality management practices across American and Asian firms and to determine whether or not there is a difference in the structure of quality management models used by managers from American and Asian organisations. Do they view quality management practices in a similar manner? If the models are not similar, to what degree do they differ and how?	The questions that should be answered are: • Are the above matters a barrier to effective TQM programmes? • Is the approach taken in Japan and South Korea and, more recently, in North America and Europe appropriate to Southeast Asia? • Where are the potential differences most likely to occur?	To develop an instrument (questionnaire) to measure quality management practices and results, and to identify and summarise the differences, as well as commonalties, in quality management practices in the three (developed and developing) countries.	To perform a macro benchmarking study to demonstrate differences in TQM performance between Nordic and East Asian companies in order to identify possible gaps that may lead to improved performance for European companies in the future.	To perform a comparative study of quality control methods and principles used in mainland China and Taiwan. TQM is used for comparison because TQM is implicated from the chief executive officer level through to the design, production, examination, sales, material, maintenance, and finance departments. This study is necessary in order to understand the management modernisation processes and progress on both sides.
Method	The questionnaire, which contained opinion statements, was developed through a comprehensive review of the literature on quality management and was subsequently tested and refined through exploratory factor analytic techniques. The respondents were asked to note their agreement on a 5 point Likert scale. To assemble the data obtained from Asian firms into one group, the covariance matrix from each country was statistically compared and tested for equality of covariance structure across countries. The invariance of the quality management model was tested using LISREL VIII.[26]	Questionnaires were sent to a random sample of 1,000 companies in the United Kingdom and Hong Kong and field work was conducted among companies operating the most long-standing and successful TQM initiatives. The report was developed based on a sample of 100 British companies and 65 Hong Kong companies.	Questionnaire methodology was chosen as an instrument. In developing the instrument, appropriate procedure were followed, including a pilot test of the instrument. The result was 75 items under eight constructs. The questionnaire was mailed to quality managers and/or senior executives in the three countries. Analysis of variance (ANOVA) was chosen as the statistical methodology to compare the differences in mean values of the constructs among the countries. This was then followed by Tukey post hoc comparison tests whenever the F-values were significant.	Qualitative study with samples of 190 manufacturing companies from the Nordic countries and 177 manufacturing companies from East Asia.	The questionnaire was used as a basis for empirical analysis. In China, the State Council selected 39 nucleus companies, and in Taiwan, 47 small to medium-sized companies were selected. Methods of frequency was used to examine the practice of quality control carried out by organisations on both sides to try to compare and analyse their respective situations.

[26] Joreskog & Sorbom, 1993, as cited by the author.

Authors	Yavas & Marcoulides (1996)	Syrett and Pike (1995)	Raghunathan *et al.*, (1997)	Kristensen *et al.*, (1995)	Chou, Y., Chang, P. and Tuan, C. (1993)
Result	There is no doubt that the description of quality management practices is greatly simplified by using the proposed six-factor model of quality. These variables include, 'communication', 'commitment', 'control/responsibility', 'measurement', 'present status', and 'execution'. This study represents an initial move toward determining the generality of a model of quality management practices across two different groups of managers.	All TQM initiatives have common features, whether they are in Southeast Asia, North America, Europe or Japan. Companies in Hong Kong, Malaysia and the Philippines have found that, where the differences have occurred, they have been due to either internal organisational reasons or to external economic factors that are unrelated to geographical location while very few were linked to local culture or management traditions. An exception to this is empowerment, particularly in those companies with a strong collectivist culture. It is hard to get front-line staff to work 'outside their box' in dealing with specific customer needs or complaints. In the end, whatever the culture or country, sponsorship and direct involvement by senior management is critical to the success of TQM implementation. And it is confirmed that total quality is a universally applicable management concept.	It was found that, in all three countries, quality management practices were considered to be important. The commonalties were that in all the three countries' leadership, strategic quality planning and quality assurance were perceived to be more important. However, human resource development was not perceived to be as important as the rest of the practices, and is likely to be similar in the three countries.	In general, the Nordic and Western companies will benefit from doing benchmarking studies in the East concerning the following areas where performance is particularly good - standardisation - management by facts - education and training - team building. There is no such thing as a special Asian management style that would be impossible to apply in the West. There is good management and there is bad management, and this makes all the difference.	Taiwanese businesses tend to take the rights and needs of their customers more seriously than businesses in China. The co-operation between businesses and their suppliers in Taiwan is much stronger than in China. The degree of participation of all departments in new product development in a Taiwanese business is greater than in a Chinese business. Applying statistical quality control is more deep-rooted in Taiwan than in China. Workers in Taiwan usually play a far more important role. Chinese businesses tend to encourage their workers by monetary incentives. Taiwanese take on-the-job education and training more seriously. And most businesses in China still do direct deals between producer and customer, while in Taiwan these are conducted through agencies. These differences may be attributed to the differences in the stage of economic development, economic systems, property, right structure, the degree of foreign capital involvement, business characteristics and scale of the individual business organisation.

Additionally, a study conducted by Chou, Chang, and Tuan (1993) has come to the conclusion that Taiwanese businesses tend to take the rights and needs of their customers more seriously than do Chinese businesses. The co-operation between businesses and suppliers in Taiwan is much stronger than in China.

The degree of participation of all departments in new product development in a Taiwanese business is greater. Statistical quality control in Taiwan is more deep-rooted than in China. Workers in Taiwan usually play a far more important role. Chinese businesses tend to encourage workers by monetary incentives. Taiwanese take on-the-job education and training more seriously. China does direct deals between producer and customer, whilst Taiwan goes through agencies.

Of the considerable studies above, it can be argued that, importantly, they have the same features of quality management practices, even if they have a different approach of implementation. It also indicates that the differences between countries do not make any significant difference in quality management practices but, instead, that these are influenced by internal organisational factors and external economic factors or by organisational contexts.

2.3.2 Organisational contexts affecting quality management practices

Several studies were conducted to see what organisational context could affect the management of critical success factors of quality management practices in an organisation. Some of the studies are illustrated in Table 2.5.

A comparative study conducted by Malhotra *et al.* (1994) evaluated determinants of service quality between developed and developing countries. The framework for the study consists of ten determinants: reliability, access, understanding of the customer, responsiveness, competence, courtesy, communication, credibility, security, and tangible considerations. These determinants or dimensions were used as a basis for the comparative evaluation.

Table 2.5 Organisational Context

Researcher/ Author	Malhotra *et al.* (1994)[27]	Benson *et al.* (1991)[28]	Tata and Prasad (1998)[29]	Dale *et al.* (1997)[30]
Area of Research/ Discussion	Developed and developing countries	Manufacturing and service companies	Companies from two different cultures	Manufacturing company
Aspects that influence the success of quality management practices	Environmental factors: Environmental considerations can account for contrasts between developed and developing countries. 1. Economic development aspects: - level of affluence - technology - education - competition - communications infrastructure. 2. socio-cultural influences: - the value of time.	Contextual variables: Organisational quality context influences managers' perceptions of both ideal and actual quality management. This suggests that knowledge of organisational quality context is useful for explaining and predicting quality management practice. 1. Corporate support for quality 2. Past quality performance 3. Managerial knowledge 4. The extent of external quality demands.	The importance of aligning TQM implementation or quality management practices with the national culture and with the culture and structure of the company. In low power distance/low uncertainty avoidance national culture, companies are likely to have flexibility-oriented cultures and organic structures that are conducive to TQM implementation. In high power distance/high uncertainty avoidance national cultures, companies are more likely to have control-oriented cultures and mechanistic structures that are not conducive to TQM success.	Typical pitfalls that have a negative impact on TQM implementation: - inadequate leadership - fear and resistance to change - lack of quality management and problem-solving skills - failure to complete projects - break-up of improvement teams - lack of resources devoted to quality improvement and - inadequate information and its analysis. These fall into five groups, i.e.: (1) internal/external environment (2) management style (3) policies (4) organisation structure (5) process of change.

[27] Malhotra, N. K., *et al.* (1994), "International Services Marketing: A Comparative Evaluation of the Dimensions of Service Quality between Developed and Developing Countries", *International Marketing Review*, Vol. 11, No. 2, 1994, pp. 5-15.
[28] Benson, P. G., *et al.* (1991), "The Effects of Organizational Context on Quality Management: An Empirical Investigation", *Management Science*, Vol. 37, No. 9, September 1991, pp. 1107-1124.
[29] Tata, J., and Prasad, S. (1998), "Cultural and structural constraints on total quality management implementation", *Total Quality Management*, Vol. 9, No. 8, 1998, pp. 703-710.
[30] Dale, B. G., *et al.* (1997), "Sustaining total quality management: what are the key issues?", *The TQM Magazine*, Vol. 9, No. 5, 1997, pp. 372-380.

The study was processed by assigning environmental factors, which can be categorised into economic factors and socio-cultural factors, to each of the ten dimensions. The service quality dimensions of reliability, access and understanding the customer were linked to conventional economic development aspects, such as levels of affluence, technology, education, competition, and communications infrastructure. The responsiveness dimension was attributed to socio-cultural influences concerning the value of time. The rest of the service quality determinants were associated with socio-cultural factors.

From the study, it can be said that these environmental considerations can account for contrasts between developed and developing countries. The environmental differences between developed and developing countries can have varying influences on service quality determinants. There was a need to understand the environmental differences between countries in terms of economic development and to emphasise the various dimensions of service quality accordingly.

In their study, Benson, Saraph, and Schroeder (1991) proposed a system-structural model of quality management that relates organisational quality context, actual quality management, ideal quality management, and quality performance. The study involved 152 managers from 77 business units of 22 manufacturing and service companies.

Following the discussion in the study on the system-structural model, quality management can be characterised as a three-stage process model. First, a manager perceives the organisational quality context, which consists of external quality demands, past quality performance, corporate direction and support, resources availability, and the competitive forces. Secondly, depending on the organisational quality context, the manager's views regarding quality management change needs were then formulated. Finally, knowing the context and the organisational change needs, the manager implements an organisational response to attain the desired quality performance. The resulting quality performance feedback becomes part of the organisational quality context.

The model represents one of the first reported attempts at using organisation theory to enhance the understanding of quality management. It characterised the quality

management actions taken by managers as being triggered by stimuli in their environments or organisational quality contexts.

The study indicates that managers' perceptions of ideal and actual quality management are influenced by the business unit's quality context. It includes such internal factors as the degree of top management support, the organisation's past quality performance, and such external factors as the degree of competition and the extent of government regulation of quality. The study's findings also suggest that knowledge of organisational quality context is useful for explaining and predicting quality management practices.

Tata and Prasad (1998) proposed a model that delineates the influence of national and organisational culture and the structure on the effectiveness of quality management implementation. The study was conducted by first examining the literature on organisational culture and structure, then identifying the connections between a company's culture, structure and quality management implementation and, finally, exploring the influence of national culture on the success of a company's quality management programme.

The study suggests that only one-third to one-half of the organisations had observed significant improvements through quality management programmes. This lack of significant success was often not a failure of the quality management concept, but a failure to pay sufficient attention to the cultural and structural variables that influence quality management practices. Quality management involves changing the way people interact and work in an organisation. It is a context-dependent programme, the success of which depends to a large extent on cultural and structural factors.

Another study, conducted by Dale, Boaden, Wilcox and McQuater (1997), describes the main issues that impact on the sustaining of quality management practices. The issues reflect a variety of business operational perspectives, including continual improvement, organisational behaviour, human resources management, industrial relations and the labour process. The issues were grouped into five categories: internal/external environment, management style, policies, organisation structure and process of change. They were then configured into a quality management sustaining audit tool, and the examination was conducted at six manufacturing sites. As a result, in all six organisations

in which the quality management sustaining audit tool was tested, most of the issues which impact on the sustaining of quality management practices were identified. In each case there was evidence to suggest that, if the issues are ignored, they will present areas of potential difficulties.

The studies come to the conclusion that the variables of organisational quality contexts that should be considered are:

a) The variable that relates to management's knowledge – it is suggested that the more a company's managers know about quality concepts, theories, and techniques, the more likely they are to make positive changes in actual quality management practices in their organisation (Deming, 1986; Juran, 1986; Crosby, 1979; Benson *et al.*, 1991, Malhotra *et al.*, 1994; Dale *et al.*, 1997). Senior management's support for quality may take many forms, including setting objectives in the area of quality, rewarding managers on the basis of the quality of the unit's services, and making resources available for quality improvement (Benson *et al.*, 1991; Dale *et al.*, 1997).

b) The variable that affects the level of quality management practices – the present level of a company's quality management practices is a function of the company's past quality performance (Benson *et al.*, 1991)[31]. It is critical that organisations understand their starting position and then utilise the practices that offer them the potential for the greatest improvement (Mraz, 1993)[32].

c) The variable that relates to the extent of external quality demand – the degree of competition, the extent of barriers to entry in the industry, the extent of quality demands by customers, and the extent of government quality regulation, all will have an effect on the focus of quality management practices in the company (Benson *et al.*, 1991; Adam *et al.*, 1981; Lockyer *et al.*, 1981)[33].

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[31] P. George Benson, Jayant V. Saraph and Roger G. Schroeder (1991). "The Effects of Organizational Context on Quality Management: An Empirical Investigation", Management Science, Vol. 37, No. 9, September 1991.

[32] A study conducted by the American Quality Foundation and Ernst & Young, (1993) in Best Practices Report.

[33] Adam, E., J. Hershauer and W. A. Ruch (1981). "Productivity and Quality", Prentice-Hall, Englewood Cliffs, NJ.

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2.4 Summary of chapter

Quality and quality management has been defined by different authors from different point of views and considerations. Authors such as Deming, Juran, Ishikawa, Feigenbaum, and Crosby have given certain propositions and insight into quality management practices. Furthermore, several frameworks or models such as the Deming Prize in Japan, the Malcolm Baldrige National Quality Award in USA, the European Quality Award in Europe, and the ISO 9000 Series have been established.

In spite of this, no study refers to these established frameworks or models, or makes a systematic attempt to organise and synthesise the various sets of identified critical factors. The discussion also indicates that quality and quality management was defined according to what it would be needed for. Nevertheless, the definition to be used in this study has been formed.

It is concluded that the quality of a product is the ability of the product to satisfy the requirements of the customer as well as the industry's standard. The concept of quality relates not only to a product but, importantly, to the process itself. Quality management practices mean managing the process by making use of all the organisations' resources in the most effective and efficient way possible to fulfil the requirement of the customer as well as the industry's standards. This will require management of the critical factors within the organisation.

It has also been concluded that the success of quality management practices within an organisation will be affected by how the critical factors of quality management practices are managed. The discussion in this chapter has identified seven areas or factors on which the success of quality management practices in the organisation rely. These are:

1) Process orientation and technique – ensures efficient work across various related functions within the organisation.

2) Skills and motivation – could ensure the persistent effort of the organisation's employees in pursuing quality in their work.

3) Information utilisation and analysis – should make each team function within the organisation aware of their weaknesses and strengths, as well as the action to be taken regarding the continuity and effectiveness of the organisation process chain as a whole.

4) Customer relationship – could ensure that what the organisation processes is what the customer wants and expects.

5) Interdepartmental interaction – would determine the easiness of flow of work from one function to another within the organisation.

6) Technology and market turbulence awareness – could enhance employees' awareness in pursuing quality for their products and services.

7) Management behaviour – makes a driver for the other factors above.

The differences in managing the critical success factors of quality management practices in a business organisation would be affected by certain variables of organisational contexts. These variables of organisational context are:

1) The variable that relates to the knowledge of the management.
2) The organisation's past performance in quality – a variable that affects the level of quality management practices.
3) The variable that relates to the extent of external quality demand.

Chapter 3
Developing the Critical Success Factors and Identifying Their Organisational Context in Airlines

This chapter's aim is to describe the development of the critical success factors of quality management practices in airline operational functions, and how the organisational context can influence these practices. In conjunction with what has been discussed in Chapter 2, an extensive literature review has been carried out, covering most of the previous studies on the issue of quality management practices in airlines.

The reviews will also determine how far the previous studies have focused on airline operations and the extent to which the differences in quality management practices between airlines have been studied. It will confirm the need for a model of quality management practices in an airline's operational functions.

This chapter is divided into five sections:

Section 3.1 defines the operational functions in airline organisation.

Section 3.2 discusses the previous studies on quality management practices in airlines.

Section 3.3 discusses the preliminary findings and proposes a model of quality management practices in the operational functions of airlines.

Section 3.4 describes the preliminary model diagram.

Section 3.5 summarises what has been discussed and the conclusions drawn in this chapter.

3.1 Definition of Airline Operational Functions

This section defines operational functions by describing the position of operations within an airline's processes, and the importance of these functions, as well as the

activity, the main elements within the operational organisation, and the aim of quality management practices in the organisation.

3.1.1 Airline's operational processes

In defining the operational activities, it is necessary to describe the position of the operations function related to other functions within an airline's organisation. In their case studies, Yun *et al.*, (1996), Ran and Sluis (1997), and Rosander (1985) described the position of the operations function within an airlines' major line functions as an operational process (see Figure 3.1).

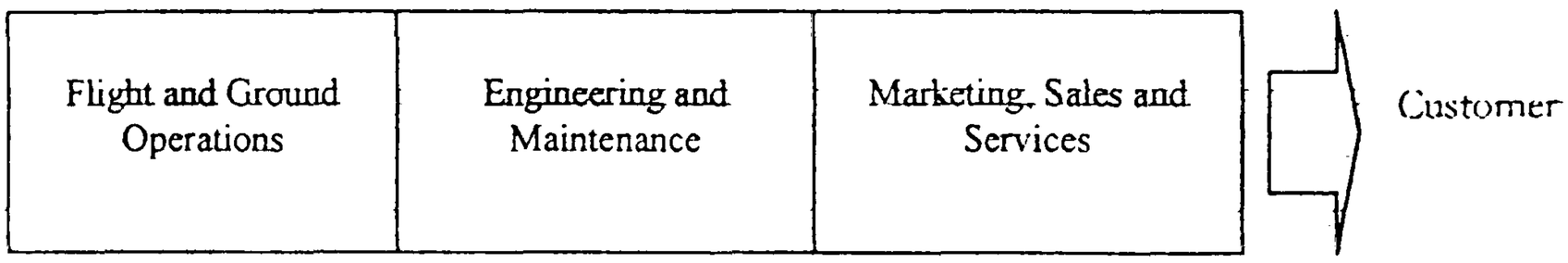


Figure 3.1 Airlines' Operational Process[1]

As described before, the operational process (Wells, 1994; Lynch, 1984) consists of marketing, sales and services, engineering and maintenance, and flight and ground operations. It is described as follows:

- Marketing, sales and services make decisions about marketing policy, so as to define the market sector and demand, and develop the product specification, with reference to the ability of the production systems.

- Engineering and maintenance keep the company's equipment in condition to provide safe and saleable air transportation.

- Flight and ground operations are responsible for developing flight operation policies, procedures, and techniques that have as their purpose the safe, efficient, and progressive operation of aircraft.

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[1] Source: Yun *et*., 1996; Ran and Sluis, 1997; and Rosander, 1985.

The airline's operational processes start and end with marketing, sales and services, while engineering and maintenance and flight and ground operations ensure its completion. The whole must fulfil customer requirements and meet the industry's standards.

3.1.2 The importance of the operations function

Airlines promise to get people and goods to their destinations, based on the schedules that they publish (Barry, 1965; Berdy and Gershkoff, 2000). Based on this requirement, the operations function, which consists of flight and ground operations, and aircraft line maintenance, would become a core[2] activity of the airline operational process. This is because the operations function can contribute to the success or failure of delivering quality in the product and direct service to the customer (Dempsey and Gesell, 1997; Lynch, 1984; Hakes, 1991; Galloway, 1996; Yun *et al.*, 1996; Ran and Sluis, 1997; and Rosander, 1985).

The operations function plays a part in meeting customer requirements and the industry's standards. It concentrates on 'how' the product or service will be achieved, while marketing, sales and services are involved with 'what' is to be produced (Ran and Sluis, 1997). The focus of this study is on the improvement of the operations function.

3.1.3 Operational activity

In line with the need to describe the operational activities, a conceptual study conducted by Porter (1985) argues that a business is regarded as an accumulation of activities that are performed to design, produce, market, deliver and support its product. This can be represented by a value-chain (see Figure 3.2).

The value chain consists of value activities and a profit margin. Value activities are the elements from which the firm creates a valuable product for its customer. Value

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[2] Core processes concentrate on satisfying external customers. They directly add value in a way perceived by the customer of the business. They respond to a customer request and generate customer satisfaction (Galloway, 1996).

activities can be divided into five categories of primary and four categories of secondary activities.

Primary activities are the activities involved in the physical creation of the product and its sale and transfer to the buyer, as well as after-sale assistance (Porter, 1985). It covers:

1) Inbound logistics – activities connected with the receipt, storage and dissemination of inputs for the product.
2) Operations – activities associated with the transformation of inputs into the final product.
3) Outbound logistics – activities associated with the physical distribution of the product.
4) Marketing and sales – activities which include advertising, promotion, pricing, choice, fostering of distribution channels and product design.
5) Service – activities connected with the enhancement and maintenance of the product value.

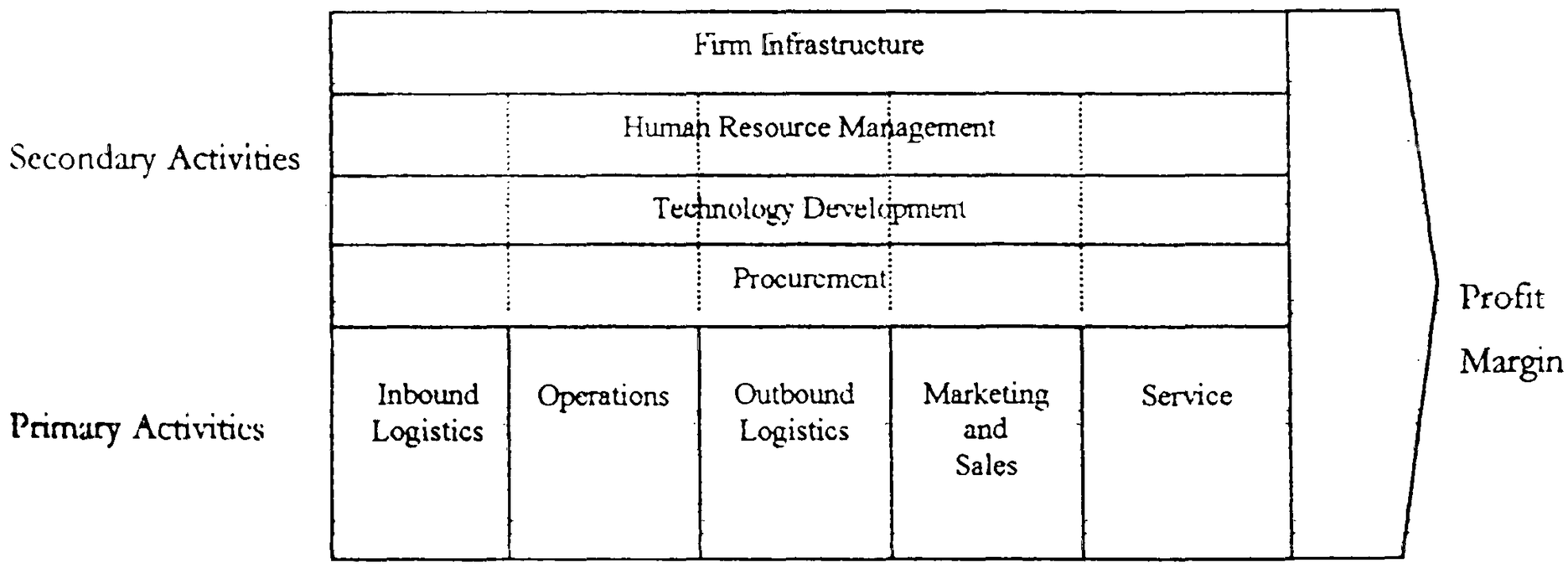


Figure 3.2 The Value Chain (Porter, 1985)

Secondary activities support the primary activities and each other by providing purchased inputs, technology, human resources, and various firmwide functions. It covers:

1) Procurement – the function of purchasing inputs used in a firm's value chain.
2) Technology development – use of technology in a firm's value chain.

3) Human Resource management – activities such as recruiting, training, development, and motivation.
4) Firm infrastructure – activities such as finance, accounting, planning, legal matters, government affairs and general management. The activity supports the entire value chain rather than individual activities.

These activities are interconnected and interdependent. As the operations function is a primary activity for an airline or a service firm which provides the service on its premises, inbound and outbound logistics are non-existent (Porter, 1985; Yun *et al.*, 1996; Ran and Sluis, 1997). So, the value chain in this case will have primary activities as described below.

1) Operations – activities associated with transforming inputs into the final product,

2) Marketing and sales – the activities associated with providing a means by which buyers can purchase the product and inducing them to do so, and

3) Service – the activities associated with providing services to enhance or maintain the value of the product.

In order to define the activities within an airline's operational functions, the airline's major organisational line functions are assigned to or described against the value chain activities (see Table 3.1).

Table 3.1 Porter's Value-chain Primary Activities for Major Airline Line Functions [3]

Organisational Airline Line Functions	Operations [4] Activities associated with transforming inputs into the final product form.	Marketing & Sales Activities associated with providing a means by which buyers can purchase the products and inducing them to do so.	Service Activities associated with providing service to enhance or maintain the value of the product.
Flight and Ground Operations Responsible for developing flight-operation policies, procedures, and techniques that have as their purpose the safe, efficient and progressive operation of aircraft.	▪ Crew Scheduling and Monitoring ▪ A/C Loading and Ground Services ▪ Catering Up-lift ▪ Fax & Goods Handling ▪ Flt. Planning and Documentation ▪ Operations Control		
Engineering and Maintenance To keep the company's equipment in condition to provide safe and saleable air transportation.	▪ Line & Base Maintenance ▪ Overhaul/Engineering ▪ Cabin Interior & Exterior quality ▪ Aircraft Routing		
Marketing, Sales and Services Making decisions about marketing policy, to define the market sector and demand, develop the product specification and pricing, with reference to the ability of the production systems.		▪ Market Research ▪ Product Design ▪ Pricing and Revenue Management ▪ Advertising ▪ Promotion ▪ Reservation and Sales ▪ Market Performance Monitoring ▪ Distribution	▪ Customer Relationship Management

[3] For primary and direct activities in an airline's organisational line function. Primary and direct activities (Porter, 1985) are the activities that are directly involved in the physical creation of the product and its sale and transfer to the buyer, as well as after-sale assistance. Airline line function departments (A. Wells, 1990) are those areas that are directly involved in producing and selling air transportation.

[4] In the service industry, transformation means transaction between service provider and the customers, and it includes preparation, production and delivery, in which production and delivery coincide. (Ran and Sluis, 1997; Yun *et al.*, 1996)

Table 3.2 Operations Function Activities

Activities	Description	Phase of Flight
1. A/C Routing & Line Maintenance	Conduct planning for aircraft rotation and ensure serviceability of aircraft for scheduled flights.	Pre and Post Flight
2. Crew Scheduling & Monitoring	Developing crew schedules for all flight personnel to obtain maximum utilisation and availability for each flight.	Pre and Post Flight
3. A/C Loading & Ground Services	Baggage and cargo loading. Ground services to prepare the aircraft for departure.	Pre and Post Flight
4. Catering Uplift	Food, beverage, dry goods and other service goods to be used to serve the passengers and provide other services during flight.	Pre and Post Flight
5. Passenger On the Ground & In flight Handling	Prepare passengers to be ready for the flight departure and arrival. Ensuring the services with regard to safety, punctuality and efficiency of operations.	Pre, In, and Post Flight
6. Flight Planning & Documentation	Flight clearance preparation, technical log, loading and balance calculation, general declaration and other commercial documentation.	Pre and Post Flight
7. Flight Operations Planning & Control	Monitoring all flight movement, including irregularities and deviations.	Pre, In, and Post Flight

Further studies conducted by Barry (1965), Lynch (1984), Wells (1994), and Dempsey and Gesell (1997) have produced a definition of operations function activity (see Table 3.2). The operations function is defined as the activities performed by the airline line departments to provide a safe, punctual, and efficient transportation of passengers on the ground and in the air. The activities include:

a) Aircraft routing and line maintenance – planning for aircraft rotation and ensuring serviceability of aircraft for scheduled flights.

b) Crew scheduling and monitoring – developing crew schedules for all flight personnel to obtain maximum utilisation and availability for each flight.

c) Aircraft loading and ground services – goods and cargo loading and unloading. Ground services to prepare the flight for departure.

d) Catering uplift – food, beverage, dry goods and other service goods to be consumed or used by passengers.

e) Passenger on the ground and in-flight handling – preparing passengers to be ready for flight departure and arrival. Ensuring services with regard to safety, punctuality and efficiency of operations.

f) Flight planning and documentation – flight clearance preparation covering all detailed proposed flights, including all factors related to the safety of the operation. Loading and balance calculation. List of passengers carried. Cargo documentation and other commercial documents regarding the flight.

g) Flight operations planning and control – monitoring of all flight operations policies, methods, and procedures. Investigating all irregularities and deviations.

3.1.4 The elements of operations function organisation

Operations function activity means transporting people and/or goods, from one place to another, without any physical change taking place. The process of transportation involves three main physical elements (Barry, 1965; Kloppenborg and Gourdin, 1991).

a) First, there are operatives or persons who handle the various types of airline equipment, facilities, passengers and goods. This includes:

- the staff who do the aircraft routing, crew scheduling and monitoring, flight planning and documentation, and controlling the flight progress,

- ground/ramp services staff who conduct the loading and/or unloading of goods, and supervise catering uplift,

- airport terminal staff who handling the passengers, and airport facilities,

- maintenance crews who conduct aircraft line maintenance and aircraft ground services, and

- flight crew and cabin attendants who handle the passengers onboard the aircraft.

b) Second, there are airline equipment and facilities. This includes the aircraft itself, aircraft ground support equipment, flight loading/unloading equipment, and airport terminal and ramp facilities related to the requirements of the flight concerned.

c) Third, there are the passengers and goods. They are served and accommodated in interaction with the operatives, with or without using the equipment and facilities.

It is necessary to manage the interaction between 'operatives', 'equipment and facilities', and 'customers' so that the objective of the operations process activities can be met.

3.1.5 The objective of the operations function and the aim of quality management practices.

The objectives of the operational activities are to fulfil the requirements of the customers and to meet the industry's standards in safety, punctuality and efficiency. Referring to what has been discussed in Chapter 2 (Section 2.1 Quality management practices definition), quality management practices in the operations function are aimed at ensuring the effectiveness and efficiency of the operations process. The effectiveness and efficiency of the process is achieved through the interaction of the three elements of operatives, equipment and facilities, and customers in a specific way, to manage critical success factors of quality management practices within the organisation itself.

3.1.6 Operations function process diagram

A diagram can be drawn to describe the operations function process. The operations function in an airline organisation is defined as the transformation of goods, or people, from one place to another without any physical change taking place. It can be defined as a set of interrelated work activities providing output of greater value than the inputs by means of transformations (Melan, 1992; Thomas, 1997). The process has three elements: (see Figure 3.3)

- transformation,
- feedback, and
- repeatability.

In the operations process, transformation mainly involves locational conversion of inputs into outputs. Locational transformation means moving objects from one place to another.

Feedback involves regulatory means by which the transformation activities are modified or corrected to maintain certain attributes of the output. Any process requires feedback to regulate its input. Feedback is needed to avoid degradation of the process.

Repeatability implies that the process is executed many times in the same manner. The operations process is the continual repetition of activities in order to convert inputs into better outputs.

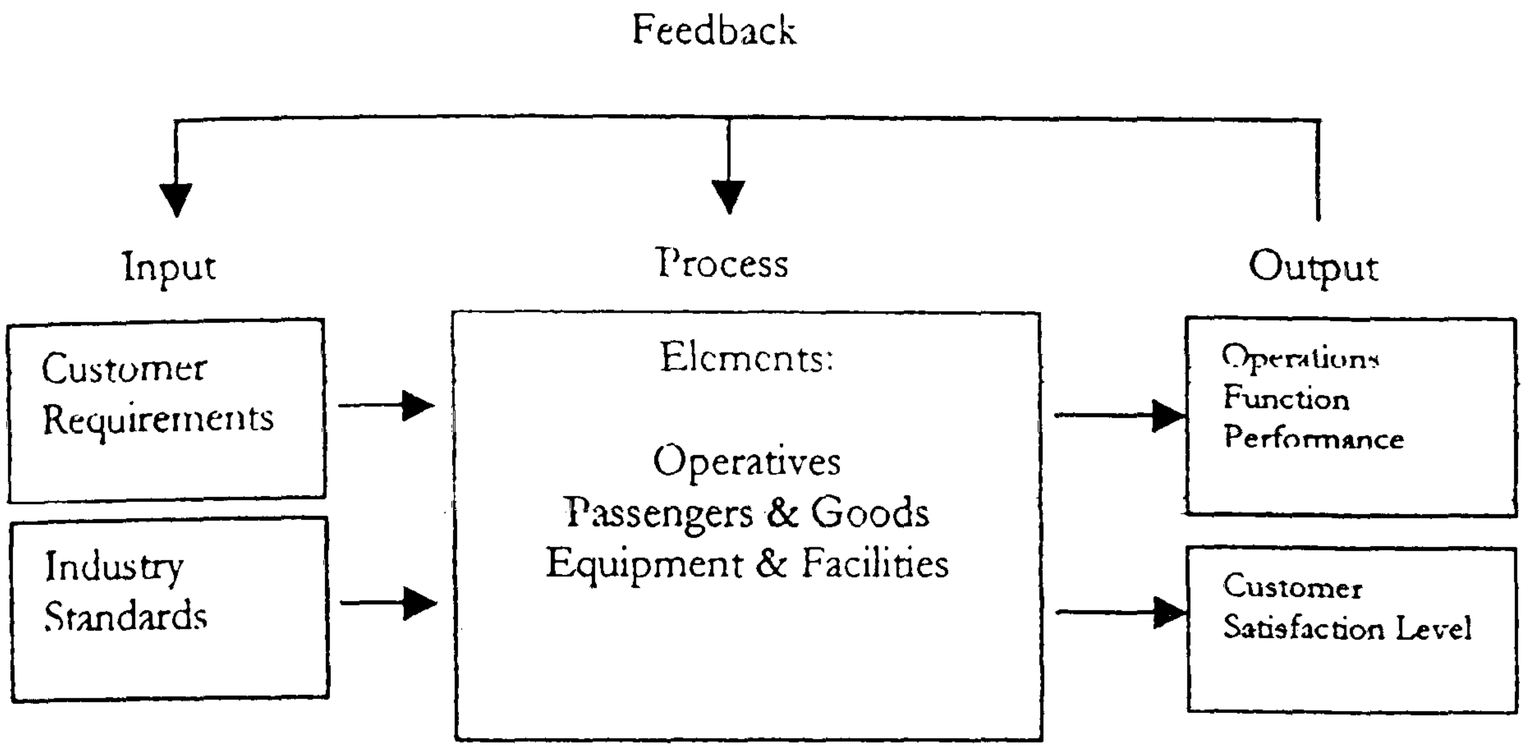


Figure 3.3. Airlines' Operations Function Process

3.2 Literature review on 'quality management practices' in airlines

Extensive reviews of case studies and research related to quality management practices in airline have been conducted. The result should address the following research questions:

a) How have airlines been practising their quality improvement? What was their aim? How did they organise their effort? And in which part of the organisation did the success of the quality improvement initiative seem to be crucial?

b) To what extent have the previous studies been focused on the operations function of the airlines?

c) To what extent have the differences in quality management practices between the airlines been studied?

Since the 1980s, 'quality management practices' have been recognised by airlines as one of the keys to their business success (Kloppenborg and Gourdin, 1991; Gourdin, 1988). Since then, there have been a number of studies on the status of quality management practices in airline organisation.

3.2.1 Case study reviews

Case studies that describe quality management practices in airlines have been carried out on successful airlines such as British Airways (Bank, 1992; Heskett *et al.*, 1997), Singapore Airlines (Yun *et al.*, 1996), KLM Royal Dutch Airlines (Ran and Sluis, 1997), Scandinavian Airlines System (Azhashemi and Ho, 1999), Southwest Airlines (Bunz and Maes, 1998; Laszlo, 1999), and Federal Express (Binney, 1992). There have also been studies on other airlines such as Malaysia Airlines (Zaid, 1994), and Japan Air Lines (Rosander, 1985).

Although a number of these airlines have encountered some difficulties in recent years, it is the aim of the case study reviews to highlight the key factors which contributed to their success at the time. The following are discussions of some of the quality management case studies in airline industry.

1) British Airways (Bank, 1992; Heskett *et al.*, 1997)

This case study focused on British Airways (BA) operations from 1983 to 1992. The authors mentioned that implementing 'quality management practices' in the organisation was the direct route BA took to transform itself from an attitude of indifference towards passengers to a world-beating airline in less than a decade.

This case study provides information on BA's key success factors during the study period.

- Attention to employee satisfaction – first focusing management attention on making everyone in the organisation satisfied with their job. The Chief Executive Officer (CEO) at the time personally introduced the programme.

- Provide extensive training – service process quality improvement, as it is called in the case study, was the focus of the extensive training that was provided to all BA's 30,000 employees.

- Focus on the customer to win the business – the objective was to do a better job of providing the results expected by passengers. This was done by introducing the

techniques of systematic problem solving, with group working, leadership, and discussion in solving practical problems concerned with business success.

As a result of BA's efforts, nearly every operating statistic improved and customer satisfaction levels increased. Better handling of customer complaints resulted in increased job satisfaction (from below 10% up to 69%). Revenues increased by 48% between the 1992 and 1996 fiscal years, faster than other airlines in Europe.

2) Singapore Airlines (Yun *et al.*, 1996)

The author describes how quality improvement was successfully implemented in Singapore Airlines (SIA). SIA therefore gained international recognition, and this was the major factor in its successful business performance.

SIA's quality improvement initiative involved two major aspects: determining customer requirements and expectations, and organising to deliver them. The author summarised the quality improvement principles in SIA as follows:

- Commitment to customers – SIA's corporate goal was to deliver the highest quality of customer service that was safe, reliable and economical. The 'Customer First' approach was one of the key ingredients in SIA's success. SIA conducted regular passenger opinion surveys to monitor the quality of its services.

  The survey results were analysed and a quarterly Service Performance index, comparing past and present performance, was distributed to key personnel in the organisation. Action was taken to address areas that showed a drop in ratings.

Customer feedback was also obtained from the compliments and complaints received by the airline. Prompt action was taken on every valid comment. Statistics were compiled to determine the ratio of compliments to complaints, which was tracked over time to monitor trends. Focus group studies were conducted regularly by the Market Research department to predict future customer requirements.

The 'Customer First' approach also applied to the airline's internal structures. It was acknowledged that the needs, requirements and expectations of the internal customers must be met first before the organisation could provide the service that satisfied its external customers. It also meant that all service operations were connected to form a service chain.

- Commitment to quality – the airline realised right from the beginning that it operated in an environment where other airlines offered the same type of aircraft, level of fares and frequency of flights. The way to forge ahead, therefore, was to consistently provide the utmost in customer service with 'a little extra' aimed at establishing its market niche.

SIA achieved quality services through systematic service process management, focusing on the critical success factors. Task forces were formed to review any prevailing issues. Cost deduction could be achieved through careful examination of processes.

Service indicators provided useful feedback in managing the process quality. A service benchmark offered the necessary target for the achievement of service improvements.

- Total involvement – the airline believed in the total involvement of every employee in achieving quality service for the company. Empowering employees and motivating them to perform at their best can only be achieved when the supporting structure is in place.

SIA practiced decentralisation. This brings the decision-making process to the lowest possible level. SIA's management system and training were designed to ensure that even low-level managers were empowered and encouraged to make independent decisions according to their own judgement of the situation.

SIA practiced management job rotation, which moved executives between departments every few years. Sectorial interest was minimised when staff acquired a total perspective.

This management practice created an appetite for change and innovation as people constantly brought new ideas with them to new jobs.

Human resource development is of particular importance in a service industry such as air travel. Apart from helping employees acquire the right skills to perform their job better, training should be a motivator. SIA believed in continuing education and provided training throughout an employee's career.

SIA conducted regular reviews to ensure that its salaries were market competitive. Under a profit-sharing scheme, employees received special bonuses based on the profitability of the company.

Effective employee communications were essential to building total service involvement. Corporate newsletters and circulars helped promote information sharing. Interaction between staff and management was encouraged through regular staff meetings.

3) KLM Royal Dutch Airlines (Ran and Sluis, 1997)

The authors concluded in their case study, conducted between 1984 and 1996, that quality improvement initiatives worked for KLM by giving the organisation increased revenue, decreased costs and, importantly, inspiring the staff. The 'quality management practices' in KLM were, basically, to achieve full customer satisfaction by providing reliable, punctual, caring, and friendly services. Some basic elements in the airline quality policies addressed by the authors were:

- Focusing on the end result, i.e. a satisfied customer – reliability, punctuality, caring and friendliness were very relevant to KLM's service delivery and were mainly related to the employees in the front line who were in direct contact with the customer. Since service delivery takes place in an interactive process with the customer, only general guidelines can be given. It is therefore of utmost importance to empower front line staff to act in the best possible way to satisfy the customer in any given situation.

- Personnel quality awareness was established by intensive training on how to satisfy the customer in every possible situation – teamwork became even more important and the crucial aspect of having well-trained and well-motivated employees was emphasised to the managers.

- Changing the organisation to shorten reaction time – business units became fully responsible for their own bottom line results, with maximum autonomy to control their own critical success factors. Managers were made accountable for their achievements in this respect, preferably in direct relation to remuneration.

- Emphasis in process control to improve efficiency – for every step in the process, both the internal and the external customer played an important role in business process thinking. Quality improvement teams started to work on problem solving and sustainable preventive measures throughout the company. Self-assessment provided direction for the continual improvement activities in crucial result areas.

- They guaranteed the continuity of the organisation by winning customer preference, realising high market coverage, and achieving and maintaining competitive cost levels.

4) Scandinavian Airlines System (Azhashemi and Ho, 1999)

The authors aimed to describe the success of a quality improvement initiative in a European service organisation, in which the management performance after transition showed increase in the growth rate, scale, stability, profits and market share. The authors concluded that the definition of quality improvement, and how it could be implemented successfully by this airline, were as follows:

- Management cycle – Scandinavian Airlines System's (SAS's) vision was to provide extraordinary customer satisfaction. This vision was supported by sound strategic planning, effective control, and efficient operations.

- Business structure – in the airline business, one seat on an aircraft is much like any other. It is the quality of passenger service that makes the big difference, especially

the treatment of passengers by front-line personnel, starting from the first contact through to the end of passengers' journey with the airline.

- Management resources – resources were concentrated to facilitate the 'moment of truth', i.e. the contact between the employee and the passenger.

- Management design – since it was understood that the 'moment of truth' occurred daily, with 50,000 events, processes were put in place to anticipate these occurrences.

- Corporate culture – the corporate culture took into account the values, beliefs, customs, and behaviour of passengers and employees.

5) Southwest Airlines (Bunz and Maes, 1998)

This case study was compiled from several studies conducted by a number of authors. It stated that the airline had been able to satisfy its customers completely since 1971, and achieved a place among the Fortune 500 in a relatively short period of time. The study was targeted to identify the source of the success of the airline as an organisation with a high degree of employee motivation.

The authors used the term 'excellent' for the success of the airline. There are eight attributes of an 'excellent' company:

- A bias for action – in general, an organisation with a bias for action is open for change and new innovations. At Southwest, 'open door' policies and 'let's try' approaches were part of the special organisational perspective. Employees were encouraged to generate ideas and then try them, or implement solutions to problems on the spot, instead of waiting for time consuming upper management decisions.

- Close to the customer – Southwest treated the customers as valued clients. Letters from their customers were taken seriously and answered by top management personally, not standardised. Top management believed that the letters helped them to monitor employee performance in serving the customer, and letters giving input from the customers revealed areas in which the organisation could improve.

- Autonomy and entrepreneurship – companies encouraging autonomy and entrepreneurship are characterised by innovators and risk takers at all levels. Southwest was a company that encouraged its people to express their individuality. Southwest's culture also de-emphasised hierarchy. Internal competition at Southwest existed in a friendly and motivating way. Southwest also accepted failure as a natural and forgivable occurrence.

- Productivity through people – 'excellent' companies are people oriented, and productivity through people underlines this notion. Southwest employees shared similar personality characteristics, such as a sense of humour and outgoing attitude. Southwest did not use personality testing. Nevertheless, the company hired on the basis of attitude. In treating its employees well, Southwest expected the same behaviour towards the customer.

- Hands-on, value driven – in addition to directing work, representatives of upper management participated in lower level work, because they believed in equality and to publicly demonstrate their commitment to high standards through their own work. Southwest's upper management performed one day each quarter as reservation agents, ticket agents, goods handlers, etc., in order to maintain a feel for what was going on in the field and to understand the difficulty of these jobs.

- Stick to the knitting – is a metaphor that implies keeping focused on well-performed tasks and not going in for over-hasty expansion. Many companies expand too fast and then cannot deal with the resultant problems, such as insufficient funds or lack of specialised expertise.

- Simple form, lean staff – keeping an organisational staff lean simplifies channels of communication in an organisation. While other airlines hire in prosperous times and fire in more difficult times, the number of Southwest Airlines' employees continued to grow, but only to meet their needs.

- Simultaneous loose-tight properties – they were fanatical centralists around the few core values that they saw as key to the enterprise, but individual input was encouraged

and hierarchy in general de-emphasised. The CEO himself personally approved expenditure over $1,000 and considered having financial aspects under control as very important.

From the discussion above, it can be seen that Southwest fulfilled all the eight attributes of an excellent company as defined by Peters and Waterman (1982). This was mostly the result of the very strong motivation of the people. There are at least three factors that influence people motivation. These are the leadership of their CEO, management-employee relations, and employee training.

6) Federal Express (Binney, 1992)

This case study is about how FedEx carried out their business in Europe (UK) between 1986 and 1992. This review discusses the quality management features used by the FedEx management in the UK firm.

Started in 1974, Federal Express (FedEx), the worldwide parcels transportation company, grew rapidly to become the first US company to reach an annual turnover of $1 billion in under ten years, without benefiting from mergers or acquisitions. It was observed that the FedEx performance was largely based on a total commitment to customer-focused quality initiatives in every aspect of its operations.

FedEx entered the UK parcels distribution market in 1986 by buying an existing distribution business, Lex Wilkinson. A total quality management (TQM) approach was introduced to the UK firm in 1989, as the company was already qualifying for the Malcolm Baldrige Award in the USA.

A great deal of Fed Ex's success was explained by its "people, service and profit" philosophy. These concepts were at the heart of its worldwide approach to business.

a) People

The organisation believed in its own people and their right to be treated with respect. Performance was discussed openly and objectively. It was measured visibly. Commitment and success were recognised and positive behaviour reinforced. Training

was provided and valued. People were empowered, within specific guidelines, to help the customer.

A key procedure was "survey, feedback, action", where employees' opinions of their managers and the company were solicited as a survey and discussed as a feedback, and change was implemented as an action to improve leadership and the organisation. It was designed to ensure that open and honest feedback between managers and their reports was given, received and used. It provided an accurate ongoing indicator of employee relations within the company.

b) Integration around the customer

"Excellence for the customer" was the message in everything. The business focus was simple: "absolutely, positively on time". Everyone in the organisation knew that his or her job was to get the parcel to its destination on time. The key quality indicators all reflected this focus, the systems were designed to achieve it and FedEx people exuded it.

A key technique to enable this to happen is empowerment. It requires belief on the part of individual employees that initiatives taken and decisions made will be rewarded, not punished. Staff know that they will have the support of management if they have considered the best interests of the customer first.

One of the features of the company was the clarity of the framework within which people were empowered. In some ways, FedEx was a very rigid organisation with procedures and policies to cover every eventuality, yet, at the same time, this was what empowered people because the limits were so clear. People seizing initiative were rewarded, indeed celebrated, if the result was customer satisfaction.

c) Communication

Regular communication from the centre helped keep people informed and reinforced a sense of belonging. Clarity around specific policies and procedures ensured clear expectations of staff. One-to-one feedback was formalised and effective; good and bad news was communicated. External customer communications were managed and monitored constantly for effectiveness.

d) Organisational style

The organisational style was classless and open. It had an American, success-oriented feel to it that cut through British taboos and reservations. The award schemes played an important part in this, much more through their public recognition than any monetary value they represented.

e) Problem solving

People within FedEx took a practical approach to problems. Everyone had a common base and language for tackling problems and they did so with vigour. The aim was always first to do what was necessary to satisfy a customer quickly, then to trace back to the root causes of a problem in order to eliminate the source, thus avoiding repetition of the problem.

The focus of the quality initiative in the UK was problem solving, and great care was taken to ensure that the training materials used in the UK were appropriate. The first step was to check that senior managers knew and had experienced the concepts, tools and techniques that staff were going to learn. The managers therefore all attended quality workshops run by in-house trainers. Following these workshops, the managers set up quality action teams (QATs) to work on real problems affecting their part of the business.

The next step was to develop a network of quality facilitators across the network of stations. Each of the facilitators received 22 days' training and could act as a resource to help any QAT. After this, QATs made up of employees from different functions and different levels were set up in regions and stations. Members were trained in the philosophy of Total Quality Management and, specifically, in the tools and techniques of problem solving.

A number of QATs have achieved significant results. The criteria used to evaluate a project are: will it improve service, will it reduce costs or will it do both? To support and expand on the energy being created by the QATs, a number of award schemes were introduced to recognise individual and team contributions to quality.

f) Customer/supplier alignments

These marked a recognition that the quality efforts needed to emphasise more specifically the customers' requirements. FedEx defined quality as "doing the right things right". The quality initiative had got people thinking and working on quality improvement but not necessarily on matters that were critical to the customer.

The customer/supplier alignments applied to both internal and external customer relationships. They clearly identified who was the customer and who was the supplier in any situation, but recognised that it was a "two way street" and that in order to receive the required service from a supplier, the customer had to recognise and agree certain conditions.

g) Technology

FedEx used technology throughout its operation to improve speed and reliability, to eliminate errors and to reduce costs. Computer technology was in the hands of all employees, not just management.

It was concluded in the case study that it took time before a shift in management style allowed employees to feel confident enough to use this freedom to real effect. However, quality management initiatives were successfully practised, and enabled FedEx to continue their business in intercontinental transportation of express parcels.

The success of FedEx's quality management initiative in its UK firm was also indicated by improvement of service quality indicators, from 80% in 1986 to 98.9% for the fiscal year 1991/1992, which took into account:

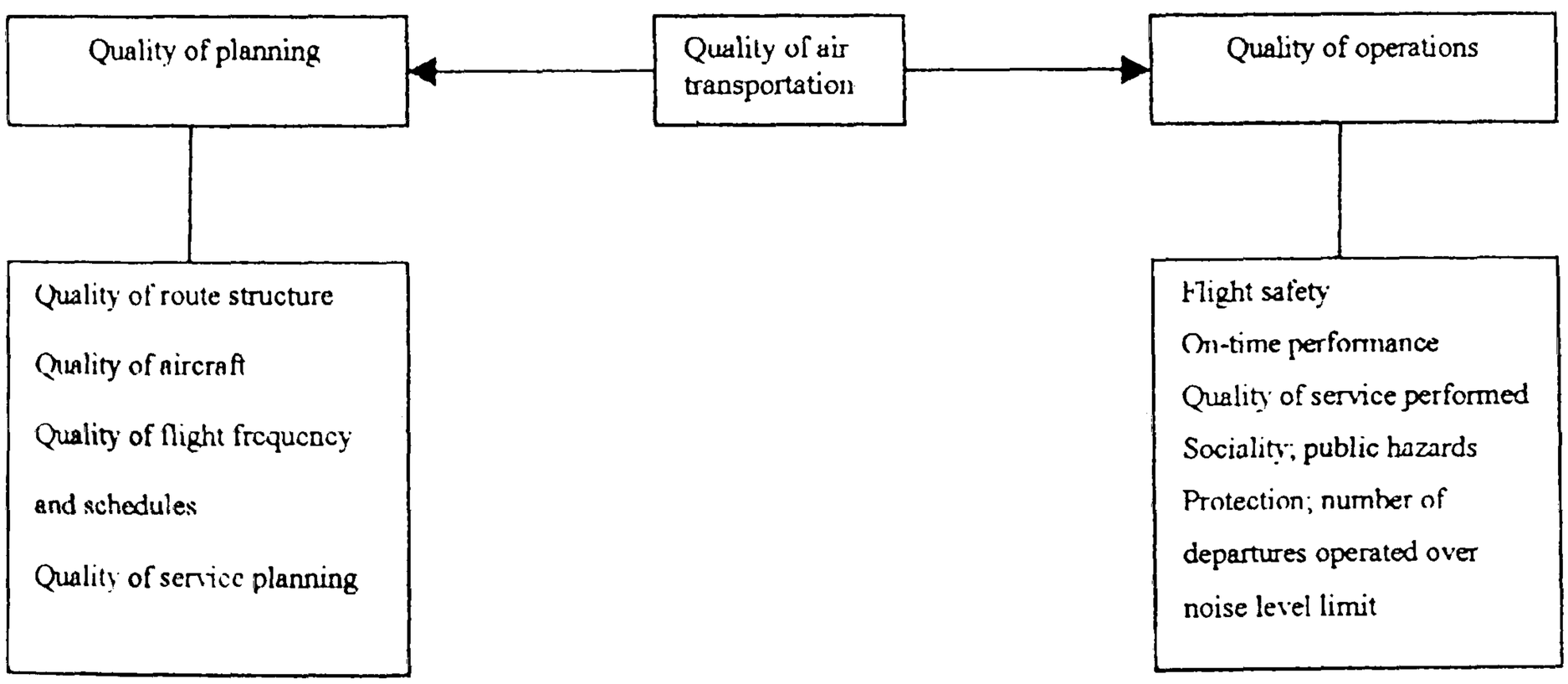
- delivery service failure,
- missing or late packages,
- overages and shortages;
- abandoned calls,
- traces,
- complaints reopened,
- lost packages, and
- damaged packages.

7) Japan Air Lines (Rosander, 1985)

This study concentrated more on describing what quality of air transportation meant to JAL and how this airline practised it. JAL defined the objective of quality control (as it was called in JAL) as the consolidation of a system of guaranteeing the quality of the products offered to customers.

The above definition required each part of the organisation to take responsibility for the building up of the quality of air transportation. Quality control should be a company-wide activity, involving all managers and workers. The quality of air transportation was achieved by systematic coordination of all employees in every part of the organisation (see Figure 3.4). Ceaseless efforts by all management personnel were required, as well as by every worker in the company. The company and each division established policies of quality control and specific targets to be reached.

Figure 3.4 JAL's Quality of Air Transportation



In order to put the above requirement into effect on a day-to-day basis, the zero defects (ZD) program was introduced by JAL in 1967. The idea was that quality control in the field of air transportation must have as its core the necessity to ensure the absolute safety of flight operations, which meant a complete elimination of fatal and other accidents,

because loss of human life could never be compensated for. This was a fundamental part of JAL's concept of air transportation. Therefore, each job must be performed carefully by following the standards set and avoiding mistakes.

It was most important for each worker to be actively concerned with improving the quality of his own job area. Because of this, the motivation, participation and teamwork of every worker was required.

The ZD programme impacted on the organisation as follows:

a) The spirit of elimination of errors and the challenge to perform jobs perfectly infiltrated into all departments and sections in the company. It was reflected in all the activities of the company at every opportunity.

b) Through ZD group activities, each individual employee developed an awareness of the importance of being vitally and actively involved in all aspects of his work. Through such activities, targets at higher and higher levels were achieved throughout the company.

c) ZD group activities improved the communication among the workers themselves, as well as enabling the smooth transmission of policies from managers and supervisors.

d) Suggestions from ZD groups contributed remarkably to the improvement of quality and productivity.

Some examples of results in quality control assisted by ZD programme were:

a) Flight safety – the rate of fatal accidents was zero, and no tolerance was allowed. JAL had established a flight safety record of about 800,000 flight hours by December 1980.

b) Reliability of aircraft – one of the most important factors determining the quality of air transportation. It is closely related to safety, schedule performance, and on-time departure. When it was recorded from 1972 until 1979, JAL's reliability was superior to the average of other airlines.

c) Baggage irregularities – one of the factors most detrimental to good service, which often creates problems for passengers in their travels. Although baggage irregularities cannot be eliminated completely, due to the congestion of airport facilities and several kinds of errors committed not only by airline personnel but also by contracted workers, JAL improved procedures and facilities for baggage handling. The baggage irregularity rate for domestic services improved for the period 1972 to 1979, from approximately 25,000 pieces of luggage down to less than 15,000 pieces in 1979.

8) Malaysia Airlines (Zaid, 1994, 1995)

This case study is about how Malaysia Airlines started their quality management practices in 1991 and their progress through to 1995. Malaysia Airlines launched a programme called Destination Service Excellence (DSE) in July 1991. It was then amplified by their chairman, during the company's 20th anniversary commemorations in October 1992, when he announced the company's vision to become the "An Airline of Excellence", offering the very best to its passengers in terms of safety, comfort, service and punctuality.

The DSE programme was an extension of quality management practices to provide a clear focus on customer requirements at the heart of the business processes and to create a quality service culture through internal communications and human relations management practices, which could firmly reflect the importance the company placed on good customer service. Four organisational aspects had to be taken into account for the success of the programme.

a) The individual in the organisation – it is said that before a total quality organisation can be created, a total quality person is needed. The organisation's employee, as an individual, is in fact the person who will ensure that the organisation is successful in achieving its goals.

b) Managerial effectiveness – it is necessary to nurture a win-win partnership between the individual and the organisation, and between the organisation and the customers.

c) Organisational productivity – the leadership of the organisation must be intimately involved in ensuring that the quality paradigm is planted in the minds and hearts of all staff.

d) The non-human side of the organisation – the equipment, facilities, processes and systems also contribute to the customers' impression of the type of quality to expect of the company.

These organisational aspects become the foundations on which Malaysia Airlines built to implement the customer-driven strategy which it wished to achieve:

- Reinforcing the corporate culture to foster change – conscious efforts were made to reinforce the customer-driven focus and quality-orientation conveyed, in top management's vision for excellence, to all employees.

- Communicating externally with customers – this external communication process formed an important part of managing the evidence by providing tangible clues to help customers, as well as employees, form the right mental picture of the intangible service offered by Malaysia Airlines.

- Malaysia Airlines' advertisements – the advertising medium played a major role in Malaysia Airlines' communication strategy.

- New uniforms for front-line employees – by managing the tangibles associated with the service experience, marketeers had the opportunity to reinforce other service quality dimensions with a quality look, by paying attention to basics such as cleanliness, orderliness and customer-friendly system, to the extent that such tangible evidence was appropriate to the target market and overall service strategy.

- Meal services – was concerned with the condition and appearance of the food, the cycle of menu change to meet the changing needs and expectations of customers, and other services related to food and beverages, based on the feedback from voyage reports and passengers.

- Cabin crew proficiency in foreign languages – cabin crew proficiency in a variety of foreign languages was another aspect of the customisation strategy employed by Malaysia Airlines.

- Taking advantage of technology – airlines generally invest substantially in technology such as computer systems, modern aircraft and other high-tech equipment for reservations, scheduling, engineering maintenance and in-flight entertainment. The company invested heavily in these areas, which were necessary to keep up with the competition, or to improve the speed and efficiency of operations.

This study then discussed how the company gauged the expectations and perceptions of customers, including that of its employees.

a) In-flight surveys – any gaps revealed between the level of service provided against the company's standards would necessitate corrective measures by the respective departments concerned.

b) Survey audits – another survey method used to improve the quality of services to customers was service audits. Reports from these audits were communicated to the departments concerned, so that they were made aware of their performance and deviations from standards set by the company, as well as the demands from the customers.

c) Market studies – the research findings assisted the departments concerned to assess the market potential and design specific products to meet the requirements of customers.

d) Complaint and compliment monitoring – analyses of complaints helped to gauge performance standards and to improve areas such as training, product knowledge, and service delivery systems, so as to serve the customer better.

e) Positioning research – this was to gauge the effectiveness of the advertising campaigns in communicating the intended messages to customers.

f) Employee research – in order to satisfy the customers well, it was also necessary understand the needs and expectations of the employees.

As Malaysia Airlines continued on the journey to service excellence, the company collected some good results, some of which were:

- Survey audits, conducted by In-flight Research Services of London in 1993, found that Malaysia Airlines had emerged as "number one" in the First Class and third in the Business Class audit.

- Malaysia Airlines was presented the Catering Performance Bond by British Airways for two consecutive years in 1991 and 1992, in recognition of the excellent catering services provided by Malaysia Airlines at Subang Kuala Lumpur International Airport.

From all of these case study reviews, it is very clear that management commitment to quality management practices, and leadership in disseminating it, is the key to successful quality management practices in these airlines. This factor becomes a driver to bring all of the organisation's resources to bear on process improvement initiatives that focus on customer requirements and the industry's standards.

Skill improvements for the organisation's employees and an enhancement of their motivation are indispensable factors to ensure persistent effort in successful practices. Managing the process of work through employing a statistical method and benchmarking against other firms on quality improvement processes and performance, and requiring cross-functional teamwork from the employees, become the way to reach the objectives of the airlines. All of these meant that the airlines were successful in improving their organisational performance.

3.2.2 Literature on the status of quality management practices in airlines

The status of quality management practices in the airline industry became a crucial issue long before the 1980s, as it had been successfully practised in manufacturing and other service industries. Some of the related literature is now discussed.

In his study, Gourdin (1988) cited what Philip Crosby said, "quality is conformance to requirements", which means, "doing it right the first time". What worried him was that one industry that had a particularly difficult time embracing this concept was the airline industry. Part of the reason is that air transportation is not provided by the airlines alone. It is a joint effort involving the airlines and the government. Unfortunately, since the airline is the one entity the customer comes into direct contact with it is, by default, blamed for the ills of the entire system, despite management's best efforts and intentions. But the biggest problem is that there is no consensus among the users and providers of air transport as to what quality means in the airline industry.

The study conducted by Gourdin examined the issue from the standpoint of the carrier, the passenger, and the government. Each group has different ideas about what that quality means.

Since quality in the airline industry involves a three-way partnership, the study recommends that:

- first, passengers have to adopt realistic expectations regarding air travel in a competitive environment,

- second, airlines must emphasise the service elements over which they have control: baggage handling, aircraft maintenance, crew training, and reservations handling,

- finally, the government must redefine its role in a deregulated environment.

The discussion in the study highlighted aspects that should be taken into consideration when defining quality for the airline industry, and for the success of quality management practices in the organisation.

A recent study on the status of 'quality management practices' in airlines from different regions was conducted by Koller (1996). The study covered the benefits of having 'quality management practices' in the organisation, what factors influenced these practices, and how important the quality issues were for the future.

Among the airlines studied, there were 5 passenger airlines, 7 cargo airlines, and 44 airlines that provide passenger as well as cargo services. The participating airlines come from Asia, the Middle East, Africa, South America, North America, and Europe. The findings of the study indicated that the areas where quality improvement programmes had been practised by most of the airlines were flight service, reservations, cargo, maintenance, finance, accounting, human resources, and information systems.

The study noted that the airlines based their quality concepts on different quality gurus. Most of them cited W. Edwards Deming, some of them mentioned Kaoru Ishikawa and Joseph Juran, and others had followed the concepts of Philip Crosby. Two-thirds of the airlines developed their processes with their own staff, together with external consultants. Only one third developed their quality improvement process with their own staff, without any external assistance.

Of the companies who had a quality programme in place, 63% were satisfied or very satisfied with the goals of their current quality programme. Only 38% were satisfied or very satisfied with the education and training efforts of their current quality programme while only 44% were satisfied or very satisfied with the management involvement in their current quality programme.

This study identified some major problem areas:

- Very often the vision, mission, and functional goals did not reflect a customer focus nor were they reflected in the actions of the organisations' employees.

- A relatively high percentage of airlines were not satisfied with their training in 'quality management practices'. The airlines mostly provided formal training for middle management only; top management, and front-line employees were often excluded.

- Most airlines did not have the commitment and involvement of top management, despite the fact that they recognised its importance. Even though many airlines periodically measured their past performance, only a few of them planned to meet their customers' needs and expectations.

- Most of the airlines with a quality programme in place had not been able to change their corporate culture and leadership style. Only a few airlines were able to design a new incentive and reward system.

Nevertheless, several success factors were identified:

- In airlines where top management was involved in cascading training efforts, it could be seen that employees were more prepared to change their own working behaviour.

- Understanding among employees reduced defects and waste, improved customer satisfaction and resulted in increased profits and, eventually, increased market share. This contributed to the success of the quality programme and to empowerment, through delegating decision making to front-liners close to the problems.

- Successful airlines started their quality management practices programme with a clear strategy and action plan.

3.2.3 Conclusion

The above discussion on airline studies can be seen as providing the answers to the questions asked at the beginning of this section, as follows:

a) The 'quality management practices' programmes in these airlines have very similar features. The fulfilment of customer requirements and of industry standards become the aims, even though different airlines might have different customers with different requirements to be met. The use of certain management techniques and the involvement of organisations' employees are crucial to the management approach to a successful programme. Furthermore, different organisational contexts amongst these airlines have given quality management practices a different status.

b) The studies cover the case of successful airlines in quality improvement, particularly in the area of providing service to the customer. Making sure the customer is always satisfied and getting financial benefit from this is more likely to be the focus. The efforts in fact resulted in improvement of the airlines' reputations, financial results,

and employee and customer satisfaction. In these studies, the quality management practices in the operations function of the organisation has not been specifically covered.

c) The differences between the airlines in quality management practices was not studied. Instead, the benefits, constraints, problems and the important points needed for successful quality improvement in the airlines were examined.

3.3 Preliminary Findings to Propose a Model

The outcome of the case study reviews were examined, based on the seven success factors of quality management practices, and the organisational context discussed in Chapter 2 (Sections 2.2 and 2.3).. The examination was conducted in relation to the evidence of the critical success factors of quality management practices in the organisations and the variables of organisational context. The results can be used as preliminary findings to propose a model of quality management practices in airlines' operational functions.

3.3.1 The Critical Success Factors of Quality Management Practices in the Operations Function.

Airlines' products and services should, in the end, produce the required quality. It should meet the standards of the airline industry as well as satisfying the requirements and expectations of the customer in terms of safety, punctuality and efficient processes of the operations function. Airlines' operational quality is a result of a series of activities in the operational processes. These activities involve interaction between airlines' staff and crew members (operatives), equipment and facilities, and customers, in which effectiveness and efficiency are affected by how the factors described below are managed.

1) Process Orientation and Technique. This factor is to ensure efficient work across various related functions within the operations function. The airlines' operational activity is a process. A process is a network of interdependent components that work together through several various stages towards the aim of the system (Saraph *et al.*, 1989; Flynn *et al.*, 1991; Porter and Parker, 1993).

The use of a common working method such as a statistical technique, either individually or in a working group, would result in easiness and promptness of daily problem solving (Ittner and Larcker, 1997; Berdy and Gershkoff, 2000). A problem re-occurrence prevention project and further process improvement projects involve the entire staff in process improvement teams within their own function, as well as cross-functioning to make one process of the operations function.

In BA, it was carried out by introducing the techniques and application of systematic problem solving, group working and leadership experiences. In SIA, they had systematic service process management, involving task forces to focus on critical success factors in the service process. In KLM, business process thinking and quality improvement teams were introduced. In SAS, management and its employees concentrated to facilitate the 'moment of truth'. In Southwest, they kept communication channels within the organisation simple, which improved their process efficiency. In FedEx, everyone had a common base and language for tackling problems, with the aim of tracing back to the root causes of a problem in order to avoid repetition of the problem. In JAL, the concept of Zero Defects was introduced, with stress on the elimination of fatal and other accidents through defects prevention in the operations process.

2) Skills and Motivation. This factor ensures the persistent efforts of staff in pursuing quality in operational activities. The effort to ensure the quality of products and services is affected by many human factors, which are very difficult to standardise and evaluate. These factors include behaviour, attitudes, judgement, decisions and actions.

Attainment of quality in products and services is dependent on understanding, influencing, directing and improving human factors in the operations function. Sufficient and appropriate knowledge and skills of the organisation's staff in problem-solving, use of teams, empowering, and increased emphasis on non-financial and team-based performance measures are required for enhanced motivation (Barry, 1965; Saraph *et al.*, 1989; Flynn *et al.*, 1991; Porter and Parker, 1993; Ahire *et al.*, 1996; Melan, 1992; Nichols and Richter, 2000).

Specific goals in terms of product and service quality should be clearly set for individual staff and for organisations. Difficult goals result in greater effort than do easier ones, and feedback results in higher effort than does the lack of feedback. A group's ideas, attitudes and actions are worth more than the individual's.

Creating and employing work performance assessment criteria could enhance staff motivation. Organising and encouraging all employees to become involved in setting up the organisation's objectives within their own scope of work is essential.

BA's management focused attention on employee job satisfaction and provided extensive training for the entire workforce. SIA empowered and motivated their employees by supporting them in their work, conducting job rotation, regular salary reviews, and decentralisation of the decision-making process. KLM front line staff were empowered to act in the best possible way to satisfy customers in any given situation. Employees' awareness of quality was established by intensive training and teamwork, and the managers had maximum autonomy to control their own critical success factors, which were related to remuneration. In SAS, the passenger service quality was realised through a different treatment by front-line personnel. In Southwest, autonomy and entrepreneurship were encouraged, and the organisation's culture de-emphasised hierarchy. In FedEx, key procedures for survey, feedback, and action were employed. This was about ensuring that open and honest feedback between managers and their reports was given, received and used. In JAL, employees' motivation, their participation and teamwork are required,. since each job must be carefully performed and the standards followed to avoid mistakes.

3) Information Utilisation and Analysis. Use of this factor should make each function within the organisation aware of their weaknesses, and strengths, as well as the actions to be taken regarding the continuity and effectiveness of the operational function's process chain as a whole. Information on how the organisation performs and its processes will facilitate problem identification and correction for the related functions (Saraph *et al.*, 1989; Flynn *et al.*, 1991; Porter and Parker, 1993; Black and Porter, 1995; Ahire *et al.*, 1996; Ittner and Larcker, 1997; Nichols and Richter, 2000). It will also encourage closer communication and co-ordination between functions, enabling more rapid cross-functional problem-solving and smoother operations (Menon *et al.*,

1997; Irrgang, 2000). Benchmarking of an airline's operational performance and processes with other airlines or similar service companies can prove valuable in improving processes (Ahire *et al.*, 1996).

BA working groups conducted regular discussions on the problems concerned with business success. SIA regularly conducted service benchmarking, corporate newsletters were circulated to promote information sharing, and regular staff meetings took place. KLM implemented interactive processing between functions within the organisation, through teamwork across the functions. SAS closely monitored and measured information on how the passengers were being served, from the first contact to the end of the journey. Southwest's top management made use of the feedback from customers to improve employee performance in serving the customer. In FedEx, one-to-one feedback was formalised to communicate good and bad news, regarding individual as well as departmental performance. In JAL, there was a systematic coordination of all employees that could ensure the effectiveness of communication within the organisation.

4) Customer Relationship. This factor ensures that the operational activities carried out are what the customer expects. Because the customer is the final arbiter of each stage of an airline's operational processes, these processes should focus on what the customer requires and expects (Ittner and Larcker, 1997). Periodic customer expectation surveys on the issues related directly to the airline's operations would be necessary to improve the organisation's effectiveness in serving the customer (Flynn *et al.*, 1991; Black and Porter, 1995; Ahire, 1996; Carnaroli, 2000).

BA conducted a 'service process quality improvement' programme, which focused on how work was organised. SIA implemented a 'customer first' approach, which studied past and present service performance and planned for the future. KLM involved the customer in the operational process. SAS, since it recognised that the 'moment of truth' occurs as many as 50,000 times daily, planned to anticipate these occurrences. One of the measures took into account the behaviour of passengers, as well as the employees who serve them. In Southwest, letters from customers were taken seriously and dealt with by top management personally. In FedEx, with a message of "excellence for the customer", the organisational focus was getting the

parcel to its destination, absolutely, positively, on time. MAS, as part of their effort to deliver excellence service to the customer, established a form of communication with the customer.

5) Interdepartmental Interaction. This factor will determine the ease of the flow of work from one function to another in operational activities. Interdepartmental conflict and cohesiveness appear to influence the level of quality achieved in operations (Melan, 1992; Menon *et al.*, 1997; Nichols and Richter, 2000).

Quality management practices should involve all managers and staff, and are achieved by a systematic coordination of all employees' activities at every level and function of the organisation (Porter and Parker, 1993; Black and Porter, 1995; Irrgang, 2000). This factor could be generated from the implementation of the other factors above, within each airline, particularly by paying attention to employee job satisfaction, reducing bureaucracy within the organisational structure, using cross-functional teamwork, encouraging entrepreneurship and risk taking, better management-employee interaction, and introducing a reward system.

SIA's "customer first" approach also applied to the organisation's internal structures, and interaction between staff and management was encouraged through regular meetings. In FedEx, the customer/supplier alignments applied to both internal and external customer relationships. In JAL, one of the effects of the Zero Defects programme was to improve communication among employees from different departments or functions.

6) Technology and Market Turbulence Awareness. This factor enhances employees' awareness of the need to pursue quality for the products and services delivered as an output of their work. Interdepartmental interaction appears to be characterised by varying degrees of market and technological turbulence being perceived by the organisation's staff.

A high level of employee awareness of technological advances (Menon *et al.*, 1997; McGrath, 2000, Rogers *et al.*, 2000) and market conditions could stimulate their efforts to find a better approach to providing better quality operational processes than

before, or better ones than their competitors. This factor should be generated within airlines' organisational processes, because of the nature of the airline business.

In JAL, awareness of the availability of computer technology brought improvements to baggage delivery. In MAS, the availability of modern technology caused the company to invest with the aim of successfully creating service excellence.

7) Management Behaviour. This is a driver for the other factors above. It optimises the use of resources in order to achieve quality output of operational activities. Managers need to strive toward the optimisation of the organisation's resources, over time, to better fulfil its mission (Saraph *et al.*, 1989; Flynn *et al.*, 1991; Porter and Parker, 1993; Ahire *et al.*, 1996; Nichols and Richter, 2000).

   It is the task of management to define the organisation's objectives with clarity and stick to them (Klein and Kim, 1998). Managers' behaviour and personalities should facilitate activities such as team building, improving customer service, reconciling group differences, adapting to change, and facilitating competitive thinking (Ittner and Larcker, 1997; Krumwiede *et al.*, 1998).

   In BA, the CEO at the time was physically involved in running the improvement programme. SIA's management paid great attention to the development of human resources management. KLM managers were made accountable for their achievements. In SAS, the organisation had a vision to provide extraordinary customer satisfaction. Southwest's management implemented an 'open door' and 'let's try' policy. FedEx's very fist step was to check that senior managers knew and had experienced the quality management concepts, tools and techniques before the staff started to learn them. In MAS, 'Destination Service Excellence' started with direction from the company's chairman.

3.3.2 The Variables of Organisational Context

As was described in Chapter 2 (Section 2.3), what the airlines practised was influenced by their organisational context. It could be concluded that there are three variables of organisational context involved in managing the critical success factors of quality

management practices in the operational functions. The variables of organisational context include management knowledge, past quality performance, and external quality demand.

a) Management Knowledge – the level of knowledge of quality management, the business, and the organisation's situation will influence the management of the critical success factors. It influences managers' perceptions of the importance of quality management practices in their organisation, and then affects their behaviour in work, particularly in the work related to quality improvement initiatives.

b) The Airlines' Past Quality Performance – the level of the organisation's quality performance will affect their management's actions when initiating quality improvement. It would be the organisation's starting point when implementing its quality improvement initiatives. The differences in how airlines manage their critical success factors is affected by this variable.

c) External Quality Demand – airlines may be forced to focus attention on quality practices in order to survive stringent customer quality requirements or demanding government product quality regulations. These external quality demands will drive organisations to pursue more effective and efficient processes in their operating functions. It will also affect the effort of the airlines in focusing their quality improvement initiatives.

3.4 The Preliminary Model Diagram

A model of quality management practices in airlines' operational functions can be proposed, based on:

- Firstly, the operations function is a process, and quality management works with the process in an effort to improve effectiveness and efficiency within the organisation (referred to in Section 3.1).

- Secondly, the critical success factors of quality management practices (referred to in Section 3.3) are an instrument to regulate the process in order to ensure the output quality.

- Thirdly, the variables of organisational context (referred to in Section 3.3) influence the way the critical success factors are managed.

Based on the above discussion, a preliminary diagram to describe the model of quality management practices in airlines' operational functions can be drawn (see Figure 3.5). Input, process, output, and feedback are the main parts of the operational function's processes and activities. The critical success factors of quality management practices become the organisation's aspect within the operations function. As the process continues, the critical success factors of quality management practices will also influence the process through a feedback mechanism. Meanwhile, the organisational context affects the way the critical success factors will be managed along with the processes.

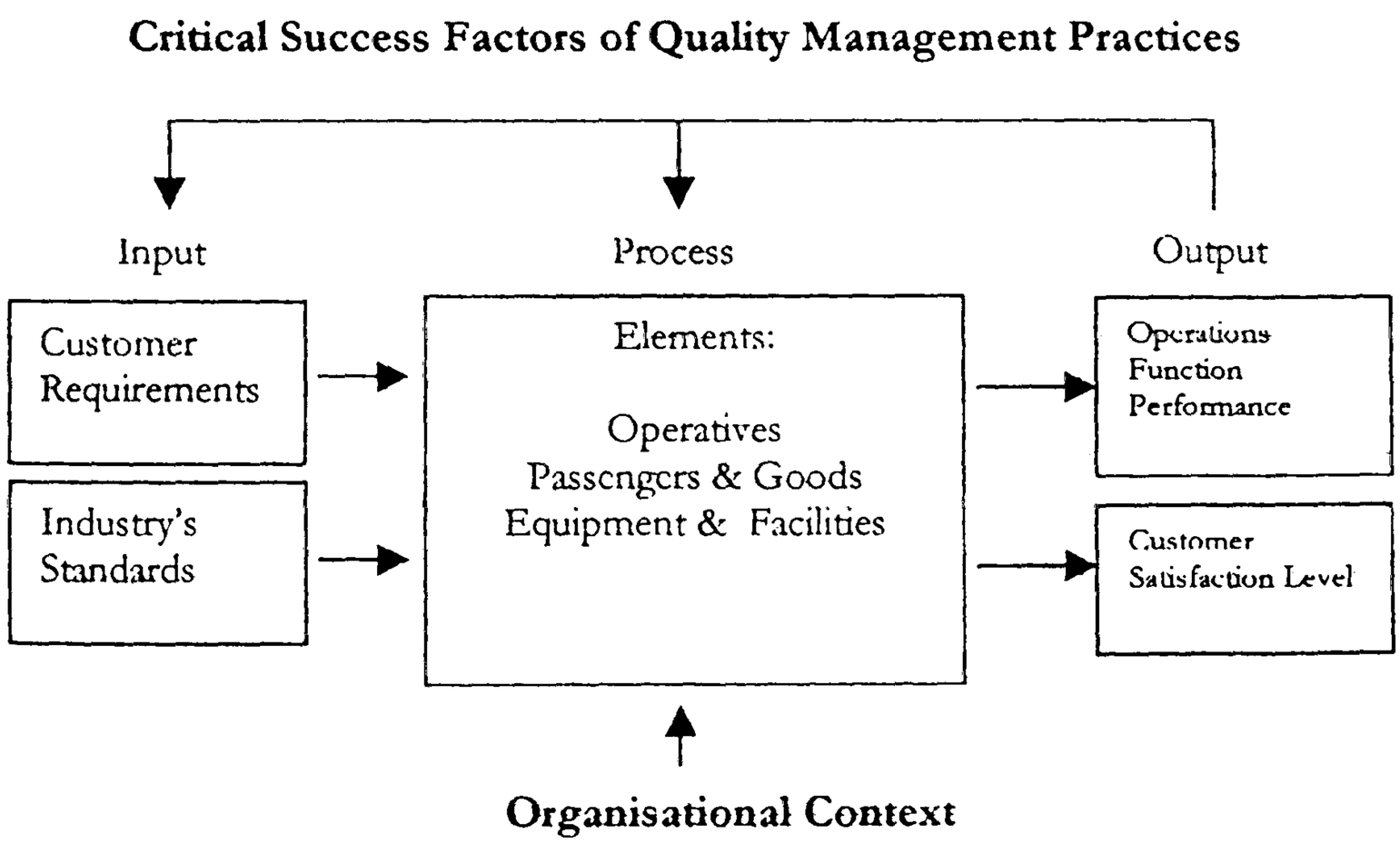


Figure 3.5. Preliminary Model Diagram

3.5 Summary of Chapter

Based on the literature review, it has become apparent that the practice of quality management in the airline industry has been under-researched, as there are only a small number of studies reporting on this area.

The majority of existing studies on airline quality management practices are focused on Western carriers. The studies do not explore the relevance of what appear to be the key success factors in the Western carriers to developing carriers.

The existing studies on airline quality management practices have been conducted on single airlines; there is no study that compares the different practices between two or more airlines, individually or in-groups.

The case studies consider the general organisation of airlines as opposed to their individual functions. The studies have never been focused on how airlines organise their core functions, and the importance of this to ensure the further success of the airlines.

As mentioned before, the objective of the research is to develop a model of quality management practices in operational functions for the 'developing' airlines of Southeast Asia. Therefore, with regard to the above statements, the research has been conducted in order to fill the existing gap in previous research.

The Objective of this Research is as follows.

- First, the research has focused on airlines' core operational processes, i.e. the airlines' operational function. The operational processes cover seven activities. These activities aim to pursue safe and punctual flight, and an efficient operational process. They are:
  a) Aircraft Routing and Line Maintenance.
  b) Crew Scheduling and Monitoring.
  c) Aircraft Loading and Ground Services.
  d) Catering Uplift.
  e) Passenger on the Ground and in Flight Handling.

f) Flight Planning and Documentation.

g) Flight Operations Planning and Control.

To perform these activities, there are three main elements that interact within the organisation:

- first, operatives or persons who handle the various types of airline equipment and facilities, passengers and goods,
- second, equipment and facilities, and
- third, the passengers and goods.

The operational function's aim is to fulfil customer requirements and meet the industry's standards. The effectiveness and efficiency of the interaction process of these elements will ensure the fulfilment of the customer requirements as well as meeting the industry's standards. This effort is called a 'quality management practice' in the operational process.

- Secondly, case study reviews have been conducted on airline experiences in practising quality management. These reviews give evidence of the critical success factors of quality management practices and the variables of organisational contexts discussed in Chapter 2. The critical success factors consist of:

1) Process orientation and techniques to ensure efficient work across various related functions within the organisation.

2) Skills and motivation to ensure the persistent effort of the employees in pursuing quality in their organisation's activities.

3) Information utilisation and analysis to ensure that each function within the organisation is aware of their performance status.

4) Customer relationships, which ensures that the operational activities are carried out according to what the customer requires and expects.

5) Interdepartmental interaction, which will determine the ease of workflow from one function to another within the organisation.

6) Technology and market turbulence awareness to enhance the effectiveness of the organisation's employees in pursuing quality output of their work.

7) Management behaviour is the driver that enables the above factors to function. It will optimise and inspire the most effective use of the organisation's resources.

The variables of organisational context that influence the practices are:

a) Management knowledge is the level of knowledge of quality management, the business, and the organisation's situation, which become the most crucial variables that should be considered at the very beginning, before quality management practices can be initiated.

b) The airlines' past quality performance is studied by the organisation's management in order to determine the continuity of their quality management practices.

c) External quality demand is the level of quality of products or services that should be provided by the organisation, and which is demanded by external parties. This will influence the focus of management's attention to quality management practices in their organisation.

- Thirdly, as a result of literature reviews in the desk research, a preliminary model diagram can be proposed. It has been developed based on the idea that the operations function is a continual process, which has an input, a process, an output, and a feedback mechanism. The critical success factors of quality management practices in the operational function become an instrument to be used in order to ensure the effectiveness and efficiency of the process. Meanwhile, the variables of organisational context must be considered when including the critical success factors in the process (see Figure 3.5).

- Finally, a further study was conducted through survey research, in order to develop a model of quality management practices in the operational function for the 'developing' airlines of Southeast Asia,. In the survey research, the study is conducted on the quality management practices in the 'successful' airlines of Western Europe and the 'developing' airlines of Southeast Asia. The study not only aims to validate the applicability of the critical success factors discussed in this chapter to the airlines' operational function, but also to find the differences between the Southeast Asian and the Western European practices.

Part II

SURVEY RESEARCH

Chapter 4. Investigating the Quality Management Practices in the Airlines – A Questionnaire Survey

Chapter 5. Investigating the Quality Management Practices in the Airlines – An Interview Survey

Chapter 4
Investigating the Quality Management Practices in the Airlines – A Questionnaire Survey

The aim of this chapter is to describe the investigation of quality management practices in airlines' operational functions, and the critical success factors in particular, by using a questionnaire as part of survey research. This chapter provides an overall view of the planning of the questionnaire, the responses and the resultant data, and the critical success factors of quality management practices, which were identified after data analysis.

This chapter is divided into four sections, as follows:

Section 4.1 explains the questionnaire design.
Section 4.2 discusses the response and data analysis.
Section 4.3 analyses findings from the questionnaire.
Section 4.4 summarises discussion in this chapter.

4.1 Designing the Questionnaire

The use of a questionnaire is popular in the research of quality management practices. Nevertheless, it is important to ensure that the questionnaire is designed to acquire the required data or information from selected sources. The questionnaire that was developed was aimed at validating the critical success factors of quality management practices in airline operational functions, as well as measuring the differences in the practices between airlines.

To achieve this objective, the questionnaire was developed as follows:

- First, the questionnaire was based on the seven critical success factors of quality management practices discussed in Chapter 3, so as to validate the desk research in this area.

- Secondly, the seven critical factors were translated into questions to represent the organisational interactions within the defined operations function. This made them operational.

- Thirdly, the questionnaire results represented the quality management practices in the airlines as well as the differences between them. It measured the airlines` quality management practices.

- Fourth, the questionnaire was suited to the level of knowledge of middle and senior managers of airline operational functions. This is because it was designed to be answered by managers, based on their perception of their organisation's quality management practices.

- Fifth, the questionnaire was distributed to the 'successful' airlines of Western Europe and the 'developing' airlines of Southeast Asia. Particular care was taken to ensure that the questions were easy to understand, comprehensive, and that there were no ambiguities.

- Sixth, the data obtained from the questionnaire was analysed through statistical methods.

The stages involved in planning the questionnaires are described below:

- developing the questionnaire,
- determining the samples and distribution process, and
- determining the data analysis method.

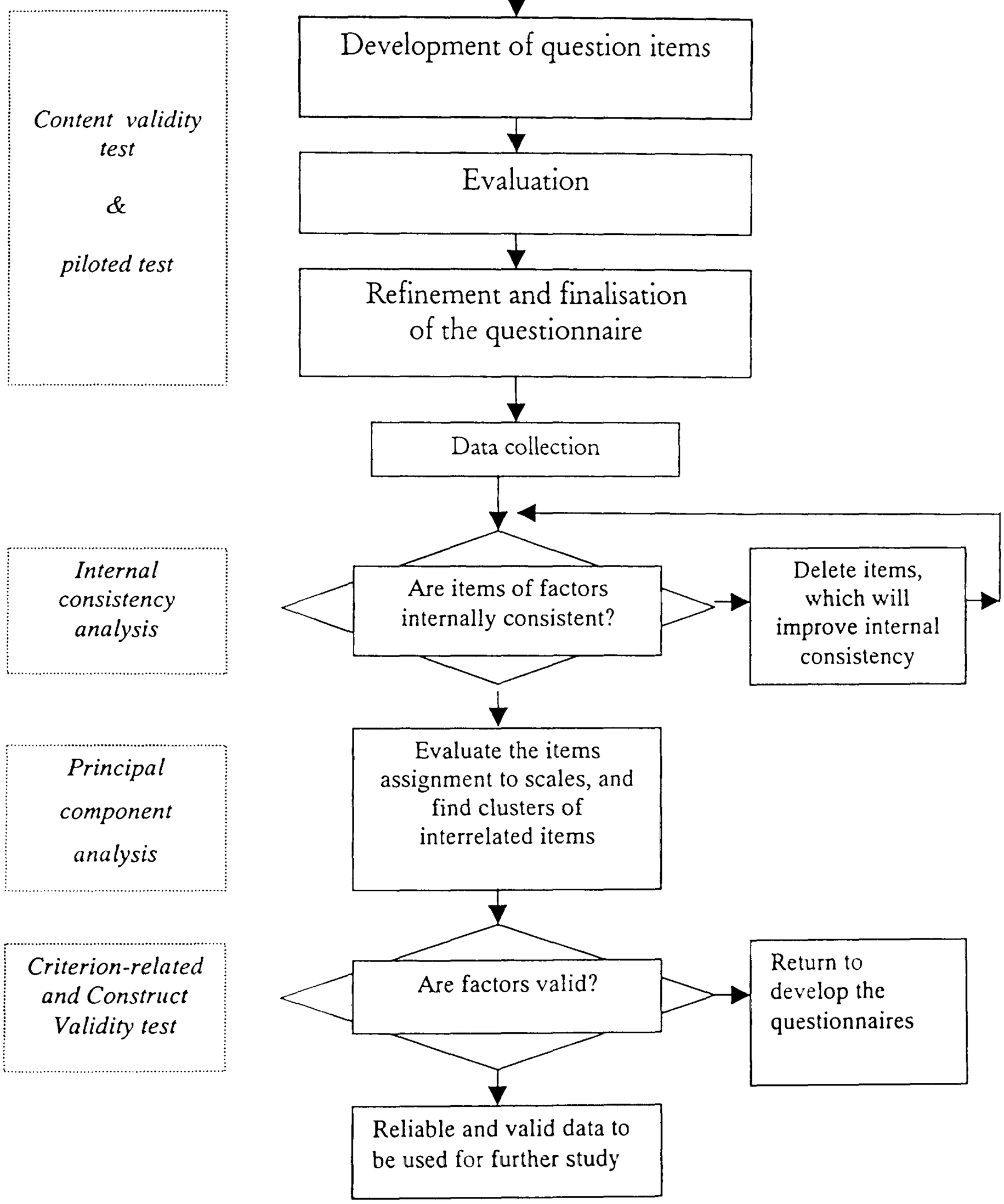
The development of the questionnaire design and data processing methodology is illustrated in Figure 4.1.

4.1.1 Developing the Questionnaires

The seven critical success factors of quality management practices in airline operational functions, identified through extensive literature reviews and desk

research, were used to develop the questions. (See Appendix B for the question development process.)

Figure 4.1 Questionnaire Design and Data Processing



The process was to first to define the aim of the related factor, then describe the factor, and finally develop the questions. The questions were related to the affect the interaction of the three elements (operatives, equipment and facilities, and customers) had on the organisation of the operations function.

The Likert scale (one to five rating) was employed to convert the responses to the question (qualitative) into a statistical (quantitative) data. The data, which needed to be collected through the use of the questionnaire, was the scale of the critical success factors of quality management practices in airline operational functions, and the differences in scale of managing those factors between the two group of airlines.

The questions were then evaluated by relevant academicians and practitioners. A pilot questionnaire was also conducted. These steps ensured the validity of the content of the questionnaire and the ease of administrating the questionnaire results later. The validity of the questionnaire's content will be discussed further in the following section.

After refinement, the questionnaire was ready to be distributed to the relevant respondents for the collection of data.

The questionnaire was developed in 3 sections: (See Appendix C for the Questionnaire.)

- Section A – "Respondent Data". Detailed information about the respondents was required in order to ensure that the questionnaire was answered by the appropriate managers. It consisted of the airline's name, the manager's current position and responsibility in the operational function, including years of work experiences related to operational activities.

- Section B – "Question Items". The main body of the questionnaire consisted of sixty-four questions, including six on operational output. Each of the questions was measured using the Likert scale by assigning a score between scale 1 (one) and 5 (five). The factors were numbered from 1 to 8. Factor 1 was the

operational process output, and factors 2 to 8 were about the critical success factors of quality management practices in airline operational functions.

- Section C – "Factor Priority". This consisted of a list of critical success factors that had to be put in order by the respondents. Its purpose was to identify the gap between the importance of the factor and the effort that had been put into it, as perceived by the managers. The gap between the critical success factors determined the order of priority for the factors.

4.1.2 Questionnaire Administration

The data sources were determined by the type and number of airlines, and the managers' position in the airlines being appropriate to providing the data required. The sample of airlines implementing quality management was selected through publications such as literature on airlines' quality case studies, Airline Business and Air Transport World magazines, as well as through IATA Statistics and ICAO Annual reports. It covered selected airlines from two regions, namely Western Europe, and Southeast Asia.

Western European airlines, which have been able to maintain their operating ratio (before tax) at equal to or more than one for the last ten years, were included in the study as 'successful' airlines and included British Airways (BA), KLM Royal Dutch Airlines (KLM), and Scandinavian Airlines System (SAS). The Southeast Asian airlines included in this research study could be considered as 'developing' airlines, such as Thai Airways International (TAI), Garuda Indonesia (GIA), and Malaysia Airlines (MAS).

The questionnaire was addressed to individual managers within the organisation who were responsible for operational activities. The manager is the key element of successful quality improvement efforts in an organisation. However, managers can also be greatly resistant to changes required to implement quality management (Harrington, 1989; Kuei and Madu, 1995; Larson and Sinha, 1995).

For both reasons, the questionnaire needed to be filled in by all the executives or managers at the first to third level, i.e. those who were responsible for the quality of

work at these stages in the operational process. These managers were the most likely to be qualified to complete the questionnaire.

The total number was 150 managers for each airline group. Approximately 300 questionnaires were sent to the top three levels of management, including the executives and/or the general managers in the operational areas of the selected airlines. This was based on the estimated numbers of operations function managers from these organisation levels of the airlines. It was estimated that the total number of managers of each airline's operations function positioned in the airline's home base operations is between 40 to 60.

The questionnaires were sent to the following airlines:

- Western Europe: 150 questionnaires were sent to the executives in British Airways (BA), KLM Royal Dutch Airlines (KLM), and Scandinavian Airlines System (SAS).
- Southeast Asia: 150 questionnaires were sent to the executives of Thai Airways International (TAI), Garuda Indonesia (GIA), and Malaysia Airlines (MAS).

To make completion as easy as possible, a page was attached to each questionnaire describing its purpose and an introductory covering letter was included, as well as a self-addressed envelope for easy return of the questionnaire.

4.1.3 Data Analysis Method

In order to ensure that the questionnaire used was reliable and the data obtained was valid, reliability and validity tests were performed. Reliability in survey research has the same basic meaning as it does in everyday life. It concerns consistency, or the extent to which a measuring procedure yields identical results on repeated trials. The most fundamental test of reliability is "repeatability," the ability to get the same data values from several measurements made in a similar manner. If we ask employees about their job satisfaction at time 1, and then ask them again at time 2 using the same question, the consistency of the two sets of answers is a direct measure of the reliability of the question and its response categories. The reliability of a measure, therefore, may be questioned if, under repeated applications, the resulting measurement is not the same (Hayes, 1997). A valid measure is one which measures

what it is intended to measure. In fact, it is not the measure that is valid or invalid, but the use to which the measure is put. We might use educational level to measure social status. The issue is not whether we have measured education properly, but whether this is a sustainable measure of social status. The validity of a measure then depends on how we have defined the concept it is designed to measure (Flynn *et al.*, 1991). See Figure 4.1 for questionnaire reliability and the data validity testing process. Statistics Package for Social Science (SPSS version 9.0) software was employed for this purpose.

4.2 Questionnaire Response and Data Analysis

When analysing data from the questionnaire, it was important to bear in mind that the data obtained would be very much influenced by the respondents' perception of their organisation's quality management practices. Different respondents would have different interests in response to the questionnaire. Respondents might tend not to respond to the questionnaire if that would show them or their company in a negative way. All the above points are dependent on the respondent's position in the organisation, their knowledge and experience in the related field, and their motivation. The respondents were chosen because of their competencies in relation to the questions asked in the questionnaire.

4.2.1 Responses

The responses from the two groups of airlines in Western Europe and Southeast Asia are described below: (See Appendix C for the list of respondents.)

1) The 'successful' Western European airlines – from three samples of airlines in Europe, i.e. BA, KLM, and SAS, approximately 150 executives and managers, directly involved in operational functions, were included as samples for this research. Of these, 17 responded (11% response rate).
2) The 'developing' Southeast Asian airlines – there were 150 executives and managers in the TAI, MAS, and GIA samples. 33 questionnaires were returned (22% response rate).

While the number of responses is relatively small, it could be argued that is not always necessary to collect a large number of samples, as many others studies were

conducted based on similarly small samples (Hart, 1987; Sykes, 1990 as cited by Mason, 1995). Nevertheless, before the collected data from the respondents could be processed for its reliability and validity, the data had to be tested for its relative precision. Sampling techniques were used to ensure the adequacy of parameter estimation. The estimation uses confidence interval in its 'confidence' term. An appropriate confidence level of estimation will ensure the sample size necessary to reach the accuracy of consistency. Therefore, the precision in measuring the object is guaranteed accuracy (Bhattacharyya and Johnson, 1977). The relative precision was formulated as follows:

$$\text{Relative precision} = \frac{\textit{Bound of Error in Confidence Interval}}{\textit{Mean (as the Central Tendency)}}$$

In quantitative measurement, the relative precision is used and usually is limited to 10% to 20% to decide the sample size. The sample size is formulated as follows:

Confidence Interval = Mean ± *bound of error*

$$= \bar{x} \pm z\frac{s}{\sqrt{n}}$$

If relative precision must less than 20%:

$$\frac{z(s/\sqrt{n})}{\bar{x}} < 20\%$$

So, the sample size is: $$n > \left(\frac{z.s}{20\%.\bar{x}}\right)^2$$

If 50 samples (**n** = 50) have been collected, it produces mean ($\bar{x}$) = 10 and standard deviation (s) = 2, with confidence interval 95%, therefore **z** = 2. For **N** (estimated population) = 300, the relative accuracy can be calculated by using formula as follows:

$$\text{Relative accuracy} = \frac{z.s}{\bar{x}} \Big/ \sqrt{\frac{n(N-1)}{N-n}}$$

The research uses less than 20% of relative precision with 95% confidence interval (z = 2). The calculation was conducted for all the data together, as well as for each group separately.

With relative precision less than 20%, question numbers 12, 13, 30, 46, and 61 had to be deleted (see Appendix C). As a result, the sample size when taken together as a whole, or separately as an individual group of airlines, is considered sufficient to ensure the adequacy of parameter estimation. In other words, it can be said that the data supplied by each group of airlines would give sufficient accuracy or unbiased information. The data collected was then processed as Figure 4.1.

4.2.2 Data Analysis

All of the respondents were competent to answer the questionnaire, as is recorded in Section A of the questionnaire. All the respondents' current jobs were positioned in the operational functions of BA, KLM, SAS, TAI, MAS, and GIA. Their experience ranged from 3 years up to 20 years in the work related to operational activities.

The data obtained from Section B of the questionnaire was tested for its reliability and validity before it was analysed. The statistical process is described in Table 4.1.

1) Reliability

Reliability is broadly defined as the degree to which questionnaire scales are free from error. It is the measurement of the degree of dependability, consistency or stability of the scale. There are three general classes of reliability (Nunnally, 1967): stability, equivalence, and internal consistency.

- Measures of stability – the correlation between the survey scores for two different times in the survey for the same set of people.
- Measures of equivalence – compares two equivalent forms of a survey designed to measure the same construct.
- Measures of internal consistency – is concerned with the degree to which the items in the survey are measuring the same thing.

Table 4.1. Statistical Procedures Performed

Intention	Procedure	Results
1. Relative Accuracy – to check relative accuracy in measuring the research object, for the entire sample and also separately for each group in the sample.	Relative accuracy = $\frac{2.s}{\bar{x}} / \sqrt{\frac{n(N-1)}{N-n}}$ Std. Dev. = s Mean = $\bar{x}$ Population (estimated) = N Sample (collected) size = n Relative accuracy should be less than 20% for 95% confidence interval (z = 2). Calculation conducted for all the data together and for each group separately. (Bhattacharyya and Johnson, 1977)	Question numbers 12, 13, 30, 46, and 61 were deleted because $\geq 20\%$ As a result, the sample size when taken together as a whole, or separately as an individual group, was considered sufficient to ensure the adequacy of parameter estimation.
2. Reliability – to ensure the degree of dependability, consistency or stability of the scale.	Reliability assessment with internal consistency statistic. It was estimated using reliability coefficient Cronbach's alpha tests. The higher the correlation among the items, the greater the alpha. The tests were conducted on each factor with its assigned items. Reliability coefficients of 0.6 or more are considered to be good. (Cronbach, 1951; Nunnally, 1967)	Question numbers 20, 21, 22, 38, and 45 (with $\alpha < 0.3$) were deleted to get Cronbach alpha ≥ 0.6 or to achieve maximisation of alpha within each group of assigned factor items tested. The result has ensured internal consistency of the refined scale.
3. Principal Component Analysis – to evaluate the assignment of the items to scales.	It uses principal component extraction with varimax rotation to find clusters of interrelated items and to maximise the size of the coefficient that relates the items to the factors. (SPSS v. 9.0)	12 new factors from 7 previous factors resulted from this procedure, and all the items have been appropriately assigned to scales.

Intention	Procedure	Results
4. Criterion-related Validity Test – to ensure that the scale is related to an independent measure of the relevant criterion.	Association was measured by performing correlation analysis test. By looking at the attained level of significance (p – value), the significance of association can be determined. (Quazi *et al.*,1998; Madu, 1998)	The 12 factors have acceptable degree of criterion-related validity. The factors, as measures of quality management practices, are collectively correlated with the related output to be measured with correlation and is significant at the 0.05 level (2-tailed)
5. Construct Validity Test – to evaluate the construct validity of each factor.	It uses principal axis factoring with varimax rotation to account for the maximum amount of subfactor in each factor. (Quazi *et al.*,1998; Madu, 1998)	From 12 factors, only one factor (Technology Usage and Management) has given 2 subfactors.
6. Independent-Samples T Test – to obtain a probability statement about the differences in means between two populations.	The T test procedure provides a 95% confidence interval for the difference between the two means. It uses a common cut-off value of .05 to reject or fail to reject the null hypothesis of no difference. (SPSS v. 9.0)	Management Involvement, Technology Usage Orientation, Interdepartmental Interaction, Improvement Programme Evaluation, and Employees' Participation have significance (2-tailed) value of less than .05, which indicates that the differences on these factors between the two groups of respondents are significant.

Of these, the internal consistency works quite well and is the most general form of reliability estimation in field studies (Madu, 1998; Saraph *et al.*, 1989; Quazi *et al.*, 1998). The internal consistency of a set of questions refers to the degree to which questions in the set are homogeneous. It ensures the degree of dependability,

consistency or stability of the scale used in the survey. There are two estimates of internal consistency: split-half reliability estimate and Cronbach's alpha estimate.

The split-half method estimates internal consistency by dividing the scale into halves, then correlating the scores on these halves. The length of the scale affects reliability estimates: the more items on the scale, the higher the reliability. This actually estimates the reliability for a scale that was half the original length, because the scale was divided in half.

Cronbach's alpha estimate measures how closely the questions in the survey were interrelated. Unlike the split-half reliability method, however, this method does not have to be corrected for length. Cronbach's estimate of reliability is calculated using variance of individual items and covariances between the items. It also can be calculated using the correlations between the items.

In this research, internal consistency was estimated using a reliability coefficient such as Cronbach's alpha. Cronbach's alpha internal consistency is based on the idea that items comprising a scale should show high levels of internal consistency. The higher the correlation among the items, the greater the alpha. High correlations imply that high or low scores on one question are associated with high or low scores on other questions. For example, in the context of this study, respondents who strongly agree that the best way to solve problems is to work together (question number 39) are also likely to agree that it should be easy to talk with anyone they need to, regardless of rank or position (question number 42), if reliability is high.

Cronbach's alpha varies from 0 to 1. The formula for alpha is as follows:

$$\alpha = \frac{(\textit{Number of items})\ (\textit{Average correlation among items})}{1 + (\textit{Average correlation among items})\ (\textit{Number of items} - 1)}$$

If the average correlation among the items is held constant, then alpha increases as the number of items increases. In other words, a scale with more items, all things being equal, should have a higher reliability. Since alpha is related to scale length, rules of thumb for what constitutes an acceptable level of reliability should consider length.

Generally, reliability coefficients of 0.6 or more are considered to be good (Nunnally, 1967). Maximisation of the alpha coefficient might require eliminating item(s) for each dimension (see Figure 4.1). The SPSS reliability programme can be used to perform this test.

In the internal consistency reliability test (referred to in Appendix B, pages 216 to 232), two statistics that can be helpful. The 'Alpha if Item Deleted' column tells us what the reliability of a scale would be if the items were deleted from the current scale. If alpha increases when an item is deleted, that is one indication that the item may not be necessary for scale construction. The 'Corrected Item-Total Correlation' is essentially the correlation between the item in each row and the other items. However, theoretical and practical factors should also influence the decision to drop an item.

Using the SPSS reliability programme, the analysis resulting in maximisation of the alpha coefficient would require eliminating from none to three items for each factor. Table 4.2 shows the original sets of questions associated with the seven factors, the questions dropped from the original sets to achieve maximisation of alpha, and the reliability coefficients associated with the resulting factors.

Table 4.2. Internal Consistency Analysis Results

7 Critical Success Factors	Question Numbers	Number of Questions	Questions Deleted (by number)	Alpha
Process Orientation & Techniques	7 - 11	5	None	0.84
Skills & Motivation	14 - 26	13	20, 21, 22	0.88
Information Utilisation & Analysis	27 - 29, 31 - 33	6	None	0.87
Customer Relationship	34 - 38	5	38	0.82
Interdepartmental Interaction	39 - 45	7	45	0.83
Technology & Market Turbulence Awareness	47 - 52	6	None	0.84
Management Behaviour	53 - 60, 62 - 64	11	None	0.89

The questions numbered 20, 21, 22, 38, and 45 (alpha less than 0.3) have been deleted in this test to get Cronbach alpha greater or equal to 0.6. Forty-eight items were left after this test. The table shows that maximised reliability coefficient ranged from 0.82 to 0.89, indicating that some scales are more reliable than others. The coefficients of 0.6 or more are considered adequate (Cronbach, 1951). This means that the scales developed in the form of questions were judged to be reliable.

2) Validity

Before conducting criterion-related and construct validity tests, factor analysis was carried out to evaluate the assignment of the variables or items to scales or factors. Factor analysis operates on the correlation matrix of the variables to be factored. The basic rationale is that the variables are correlated because they share one or more common components, and if they did not correlate there would be no need to perform factor analysis. Looking at the correlation matrix (see Appendix C for the table), it is noted that correlation is significant either at the 0.01 level (2-tailed) or 0.05 level (2-tailed). This is reassuring and indicates that factor analysis is a reasonable technique to use.

Factor analysis with principal component extraction and varimax rotation was employed. The method was used to find clusters of interrelated items and to maximise the size of the coefficient that relates the variables or items to the scales or factors, so, it attempts to account for the maximum amount of variation in a set of variables or items.

The principal components analysis extracted 12 factors or components with eigenvalues greater than 1. Eigenvalues are fairly technical measures, but in principal components analysis, and some factor methods, their values represent the amount of variance in the variables that is accounted for by the component or factor. These 12 components accounted for 84.56% of the total variance in the data set (see Appendix C for the results).

After determination of the number of factors, the factors were rotated to maximise the size of the coefficients that relate the variables to the factors. This is done for ease of interpretation, as the ideal situation is one in which a variable loads highly on one factor and very low on all other factors. The varimax rotation maximises the variances of the loadings.

Table 4.3 shows the rotated component matrix for the 48 question items. The items group into their interrelated clusters and make 12 new factors from the previous 7 factors. This indicates that the items have been appropriately assigned to scales. This also maximises the size of the coefficient that relates the items to the factors. The 12 new factors were named accordingly to represent their items group, replacing the previous 7 factors as 12 Critical Success Factors of Quality Management Practices in airlines operational functions. (See Table 4.5.)

Table 4.3. Principal Component Extraction Results – Rotated Component Matrix

Items	1	2	3	4	5	6	7	8	9	10	11	12
q50 - Technology is changing rapidly	0.87				0.17							-0.16
q51 - New product possible through technology	0.84		0.12		0.11			0.15		0.14		-0.30
q52 - Technology-based equipment is employed	0.83		0.13	0.11	0.24	0.14					0.12	
q8 - Statistical/ common method in day-to-day problems	0.66	0.17	-0.17		0.14		0.39		0.22			0.18
q60 - Top/senior management agrees on training for future benefit	0.65	0.15					-0.13			0.29	0.53	
q64 - Top/senior management encourage the use of new working methods	0.65	0.11	0.18	0.24					0.30	0.14	0.50	
q43 - Members feel comfortable in calling each other	0.60				0.55		0.19		0.11		0.16	
q7 - Statistical/ common tech. for operations' weak links	0.57	0.11	-0.16		0.17		0.45	0.27	0.20	0.16	-0.11	
q34 - Customer requirement surveys	0.56	0.12	0.36	0.35	0.27	0.37		-0.24	0.15			
q36 - Use of customer representative	0.50	0.38	0.42	0.15	0.20	0.31				-0.21	0.21	0.16

Items	1	2	3	4	5	6	7	8	9	10	11	12
q31 - Benchmarking with other airlines	0.47		0.28	0.41	0.24	0.26		0.30	-0.12	0.17	0.28	
q14 - Departmental performance to reward the managers	0.14	0.86		0.26	0.11							0.18
q15 - Departmental performance to reward the staff		0.84			0.10	0.32	0.18	0.15	0.11		0.18	0.13
q16 - Team-based performance to reward the managers		0.69		-0.11		0.55	0.20					0.18
q17 - Team-based performance to reward the staff		0.68	0.22		-0.20	0.46	0.23			0.14		
q63 - Managers reward team working	0.25	0.62	0.35	0.32			0.32	-0.14		0.18	0.23	0.10
q49 - Demand from new customers	0.27	0.57		0.13			0.10	0.43	0.34		0.14	
q62 - Top/senior management rewards team working	0.19	0.50	0.47		0.11	0.15			-0.12	0.23	0.50	-0.21
q25 - Approval for staff to join departmental team			0.93				0.11	0.17			0.14	
q26 - Approval for staff to join cross-department teams		0.14	0.87	0.11		0.14		0.18			0.12	
q35 - Translating customer requirement	0.35	0.35	0.54	0.26	0.22	0.17	-0.15	-0.23		-0.35		0.20
q56 - Top/senior management time spent		0.46	0.48	-0.17	0.30	-0.10			0.28		0.30	0.24
q39 - Solve problem together	0.36	0.32	0.42		0.24	-0.13		0.14	0.11	0.34	-0.11	0.15
q28 - Operations benchmarking against competitors				0.88					-0.11	0.16		
q29 - Operations benchmarking against the best				0.81			0.25	-0.13	0.18			
q32 - Benchmarking results for own organisation		0.38		0.73		0.28	0.19	0.32				
q33 -The organisation well-informed of benchmarking result	0.19	0.15	0.40	0.57	0.35	0.24		-0.13	0.15	0.32	0.18	
q54 - Top/senior management involved in objectives setting	0.27		0.40	0.47	0.32	0.19		0.10	0.16	0.13	0.38	-0.16
q42 - Easy to talk with anyone	0.38			-0.13	0.80		0.20					
q41 – Objectives do not conflict	0.39			-0.10	0.76	-0.23			0.26			
q53 - Top/senior mgt. involvement	0.20		0.39	0.43	0.58		-0.13		0.13	0.19	0.31	

Items	1	2	3	4	5	6	7	8	9	10	11	12
q18 - Customer satisfaction to reward the managers		0.23		0.17		0.87			0.18			
q19 - Customer satisfaction to reward the staff		0.22	0.19		-0.24	0.85		0.12				
q10 - New precaution project	-0.10	0.16		0.22	0.18		0.86					-0.14
q9 – Percentage of employees use the methods	0.11		0.19	0.12			0.81	-0.13	0.15			0.19
q11 - New follow-up action project	0.29	0.19		0.14		0.13	0.68	0.38		0.19	0.15	0.16
q48 - Customers look for new product	0.19		0.11	-0.18	0.11			0.77				0.26
q55 - Your participation in group activity		0.23	0.28	0.33				0.69	0.32			
q47 - Customers' preferences change over time	0.59	0.13	0.11		-0.21			0.59	0.17	0.14		
q57 - Your time spent communicating	0.11	0.10	0.16		0.14	0.19	0.16		0.85		0.17	
q58 - You make periodic evaluation of operational activities			-0.11	0.13	0.24				0.76	0.32		0.17
q44 - Members are quite accessible	0.39	0.14			0.18		0.23	0.24	0.12	0.70	-0.18	
q27 - Analyse the operations quality	0.25	0.19		0.40				-0.24	0.18	0.66		0.15
q59 - Top/senior management make periodic evaluation	0.14		0.21	0.26	0.45				0.31	0.60	0.32	
q37 - Importance of customer visits		0.16	0.29	0.26						-0.19	0.72	
q23 - Percentage of staff in departmental teams	-0.18	0.11	-0.19			0.11		0.13		0.15		0.84
q24 - Percentage of staff in cross-dept. team	-0.19	0.35	0.20	0.13		0.17	0.11				-0.17	0.70
q40 - Working teams in all levels organisation	0.22	0.43			0.10			0.27	0.28		-0.17	0.49

The next thing to be taken into account is validity, to test the degree to which a measure accurately represents what it is intended to measure. Validity refers to the degree in which a questionnaire's scales truly measure the constructs that they are intended to measure. Three different types of validity are generally considered, i.e. content validity, criterion-related validity, and construct validity.

Content validity is not evaluated numerically. Content validity depends on how well the researcher develops the questions to cover the content domain of the variable being measured (Quazi *et al.*, 1998; Nunnally, 1967). The eight measures of the critical success factors of quality management practices in airline operational functions (the seven critical success factors and one factor of operations function output) were developed based on extensive literature reviews, the researcher's experience, and evaluations by academicians and practitioners.

Three sources can be drawn upon to provide content validity to the measure. Firstly, a thorough literature search pertaining to the phenomenon had to be performed to lead to its understanding (Carmines and Zeller, 1979 as cited by Mason, 1995). An extensive literature study of quality management definition and practises in manufacturing, services or airlines organisation, and airline operational functions, in Chapter 2 and 3, concluded that there were critical success factors of quality management practices and organisational context, which affect the success of quality management practices in airline operational functions. The results of this contributed to the approach used in developing the research instrument.

Secondly, the researcher's experience in the field of air transport, as well as quality management practices, was used as a basis for developing the research instrument. In the period from 1990 to 1997, the researcher was in-charge of quality management promotion for one of the airline companies in Southeast Asia. During this time, the researcher was involved in planning, identifying the critical success factors, helping the implementation process throughout the organisation, particularly the operations function, and evaluating the programme.

Beside this activity within the airline, the researcher has been involved in giving consultation to other businesses, such as the car, heavy industry tools manufacturing and sea transportation services, in setting up quality-related training programmes, and quality management systems. The researcher also attended three quality management seminars for senior management organised by the Union of Japanese Scientists and Engineers (JUSE) in 1990, 1991, and 1993. These seminars mainly focused on quality management promotion planning and the critical success factors of quality

management practices in the service and manufacturing industries. They were conducted through case studies, workshops and field surveys. This experience contributed to the content of the research instrument.

Finally, experts in the field of quality management practices and airline operation functions management, academicians from universities and practitioners from three airlines in Western Europe and Southeast Asia were consulted to perform a pilot test. This contributed to the process of designing the research instrument, particularly in avoiding ambiguity in the questions used in the questionnaire. Because it is based on these three sources, the research instrument is considered to have content validity.

Criterion-related validity is concerned with the extent to which a measuring instrument is related to an independent measure of the relevant criterion (Madu, 1998). The twelve factors as measures of quality management practices in airline operational functions have criterion-related validity if the measures, collectively, are highly and positively associated with a factor of operations function output. Association can be measured by performing a correlation analysis test (See Figure 4.2.)

By looking at the attained level of significance (p – value), the significance of association can be determined. See Appendix C for the result of criterion-related validity in the correlation matrix. It can be seen that the 12 factors of quality management practices have an acceptable (p – value) degree of criterion-related validity when taken together at a significant level of 0.05 (2-tailed).

Referring to the test result in Appendix C, the factors numbered 1, 4, 5, 7, 8, and 10 have positive correlation (significant at the 0.01 and 0.05 level) direct to the factor of process output, quality of flight. Meanwhile, factors 2, 3, 6, 9, 11, and 12 correlate to the process output, quality of flight through other factors at 0.01 level of significance. So, the 12 factors as a measure of quality management practices in airline operational functions are collectively correlated with quality of flight of the airline calculation based on the data given by the respondents.

The construct validity test helps to account for the maximum amount of subfactor in each factor, as well as to ensure that the classification of items into factors is correct. The construct validity of each factor can be evaluated by factor analysing the items of each factor. The procedure to conduct the test is similar to the previous factor analysis with principal component factoring.

Table 4.4. Construct Validity Test Results

12 Critical Success Factors	**Subfactors**	**Question numbers**
1. Technology Usage and Management	A B	36, 64, 34, 31, 52, 60 7, 8, 50, 51, 43
2. Reward System	None	14, 15, 16, 17, 63, 49, 62
3. Team Building	None	25, 26, 35, 56, 39
4. Benchmarking	None	28, 29, 32, 33, 54
5. Interdepartmental Interaction	None	42, 41, 53
6. Customer Oriented Motivation	None	18, 19
7. Process Improvement Technique	None	10, 9, 11
8. Quality Demand Awareness	None	48, 55, 47
9. Manager-Staff Communication	None	57, 58
10. Improvement Programme Evaluation	None	44, 27, 59
11. Customer Feedback Handling	None	37
12. Employees' Participation	None	23, 24, 40

In this process, the suitability of the 12 factor data to be analysed was ensured by employing Kaiser-Meyer-Olkin (KMO) measurement and Bartlett's test of sphericity

evaluation for each of the 12 factors of item groups. KMO measurement is an indicator of how well-suited the sample data are for factor analysis. Small values of KMO indicate that factor analysis may not be appropriate for the data. It is suggested (Kaiser, 1974) that values of 0.9 or higher are great and values below 0.5 are unacceptable. Bartlett's test of sphericity evaluates the null hypothesis that the correlation matrix is an identity matrix, which would indicate no relationships among the variables and, so, no basis on which to proceed with factor analysis. A significant test result will reject this hypothesis.

The result (see Appendix C) of KMO measurements for the respondent data collected by the 12 factors shows sampling adequacy with a value range between 0.500 to 0.866, while Bartlett's test shows a significant value of 0.000. This indicates that the sample data is suited to be analysed.

Employing principal axis factoring with varimax rotation to each group of items (the 12 factors) resulted in dividing factor 1, Technology Usage and Management, into two subfactors. The result of this test indicates that the data given by the respondent is valid with this construct (see Table 4.4).

To prepare further use of the factor analysis result, factor scores were calculated for each respondent. This calculation also validates the first factor solution using a different method with an oblique rotation. In the process, the factor scores will be saved as variables, so a new variable for every factor extracted will be created. This involves solving the factors as a function of the variables. Regression as a default method is quite adequate to be used in this process.

The result from this calculation (see Appendix C) shows that there are two variables containing scores for the Technology Usage & Management factor on the two subfactors, and one variable containing a score for each of the 11 factors derived from the principal axis factoring (previous process in the Construct Validity Test). These factor scores will be used for further comparison study in practising quality management between the two groups of airlines.

Before the result could be used as an instrument to measure quality management practices in airline operational functions, a reliability test (as done previously) was also conducted on the 12 factors as a new construct. This test gave a result of Cronbach alpha ranging from 0.696 to 0.934 for the 12 factors (see Appendix C for the result). It indicated that, with $\alpha \geq 0.6$, the constructs are considered to be reliable for use as a Quality Management Practices measurement instrument.

Reliability and validity tests were conducted and resulted in a reliable instrument to measure the quality management practices in the airline operational functions with valid data given by the respondents. This measurement instrument was based on a set of 12 critical success factors of quality management practices, with one of the factors (Technology Usage and Management) consisting of two subfactors. These subfactors were Management Involvement and Technology Usage Orientation and represent the related items covered. (See Table 4.4.)

Further analysis to the data from the questionnaire produced a probability statement about the differences in mean between two populations (the Southeast Asian and the Western European). The t test is commonly used for this conduct. There are two t tests that involve comparison of two means. The independent-samples t test applies when there are two separate populations to compare. An observation can only fall into one of the two groups. The paired-samples t test is appropriate when there are two measures to be compared for a single population. If the same observation contributes to both means, the paired-samples t test takes advantage of this fact and can provide a more powerful analysis.

In this study, an observation can fall into the Southeast Asian group, so the independent-samples t test was chosen. The dependent measures in this test were all of the 13 factor scores resulting from a previous calculation process (see Appendix C). This yielded 13 separate analyses. The independent variable was the airlines. The 13 factor scores for the Southeast Asian and the Western European groups were compared. An independent-samples t test was then conducted, with a 95% confidence interval for the difference between the two means. It used a common (Norusis, 1999) cut-off value of 0.05 to reject or fail to reject the null hypothesis of no difference.

As a result, there were 5 factors and subfactors that had significant (2-tailed) values of less than 0.05, indicating that the differences of these factors' practices between the two groups of respondents were significant. These factors are Management Involvement subfactor (0.000), Technology Usage Orientation subfactor (0.000), Interdepartmental Interaction factor (0.026), Improvement Programme Evaluation factor (0.015), and Employees' Participation factor (0.026). On the other hand, the Benchmarking factor (0.093) has the least differences. (See Appendix C.)

Meanwhile, Section C of the questionnaire was also tested for its reliability. The test indicated reliability with Cronbach's alpha 0.79 for the combined data of the Southeast Asian and the Western European groups, and 0.80 and 0.78 for data of the Southeast Asian and the Western European groups when tested separately (see Appendix C). It meant that the data was reliable with Cronbach alpha above 0.7, and the use of Section C as a measurement instrument was considered to be reliable.

4.3 The Findings

There were three main findings from analysing the questionnaire. Firstly, it was found that there were 48 items clustered into 12 factors. These 48 items grouped into the 12 factors resulted from the previous 7 factors with the 58 questions used in the questionnaire. These 12 factors become critical success factors of quality management practices in the airlines' operational functions, and after the Construct Validity Test, one of the factors was divided into 2 subfactors. This factor was Technology Usage and Management.

Secondly, the valid data obtained from the questionnaire could be used to find how the two groups of airlines managed the critical success factors of quality management practices in the operations function, as well as to identify the differences and similarity in these practices. The following examination will be focused on those factors amongst the 12 that show significant differences or similarities between the two groups of airlines.

Thirdly, the data obtained from Section C of the questionnaire gave information on the differences of the gap of factor importance and effort between the Southeast Asian

and the Western European groups. These differences created a different order of priority to critical success factors of quality management in the two groups of airlines. The following paragraph discusses these three points.

4.3.1 The Measurement Instrument

A set of 48 items within 12 factors (with 2 subfactors in one of the factors) formed a measurement construct for quality management practices in the operations function (see Table 4.5).

Table 4.5. Quality Management Practices Construct for Operations Function

1. TECHNOLOGY USAGE AND MANAGEMENT

1a. MANAGEMENT INVOLVEMENT

Q36 Customer representatives are used to review the operations

Q64 Top/senior management encourage the use of new working methods

Q34 Customer requirements surveys are being carried out

Q31 How often the benchmarking result is used to improve efficiency

Q52 Technology-based equipment is used

Q60 Agree that top/senior management accept to train employees for future benefit

1b. TECHNOLOGY USAGE ORIENTATION

Q7 How often statistical or common methods are used to improve operations chain

Q8 How often statistical or common methods are used to solve daily problems

Q50 Agree that technology is changing rapidly

Q51 Agree that new services have been developed because of technology

Q43 Agree that anyone can call anyone from other departments with comfort

2. REWARD SYSTEMS

Q14 Departmental performance in assessment criteria for managers

Q15 Departmental performance in assessment criteria for staff

Q16 Team-based as assessment criteria for managers

Q17 Team-based as assessment criteria for staff

Q63 Managers give rewards to encourage team-working

Q49 Agree that new demands are coming

Q62 Top/senior management give rewards to encourage team-working

3. TEAM BUILDING

Q25 Approval for staff to become involved in departmental teams

Q26 Approval for staff to become involved in cross-functional teams

Q35 Customer requirements are translated to operations

Q56 Percentage of top/senior management's time spent in communicating quality

Q39 Agree to solve the problem, managers and staff together

4. BENCHMARKING

Q28 Benchmark the efficiency of operations against competitor

Q29 Benchmark the operations efficiency against best performer

Q32 Use of benchmarking result to improve working process

Q33 Information on benchmarking result

Q54 Top/senior management involved in objectives setting

5. INTERDEPARTMENTAL INTERACTION

Q42 Agree that to talk to anyone is easy, regardless their position

Q41 Agree that the departments' objectives are in harmony

Q53 Top/senior management involved in operations activities improvement

6. CUSTOMER ORIENTED MOTIVATION

Q18 Customer satisfaction influence assessment for managers

Q19 Customer satisfaction influence assessment for staff

7. PROCESS IMPROVEMENT TECHNIQUE

Q10 How often new project is conducted to prevent problem re-occurring

Q9 Percentage of members use statistical or common methods

Q11 How often follow-up project is conducted

8. QUALITY DEMAND AWARENESS

Q48 Agree that customer tend to look for new services

Q55 Managers' participation in group activities

Q47 Agree that customer preferences always changing

9. MANAGER-STAFF COMMUNICATION

Q57 Percentage of managers' time spent in communicating quality

Q58 Managers make periodic evaluation on quality management practices

10. IMPROVEMENT PROGRAMME EVALUATION

Q44 Members are accessible to others from different organisations

Q27 How often the quality of operations is analysed

Q59 Top/senior management make periodic quality evaluation

11. CUSTOMER FEEDBACK HANDLING

Q37 Importance of customer visit

12. MEMBERS' PARTICIPATION

Q23 Percentage of staff in departmental teams

Q24 Percentage staff in cross-functional teams

Q40 Numbers of department levels conducting working-team activity

These 48 items, clustered within 12 factors, when implemented, will have an effect on the success of quality management practices in airline operational functions. It can also be said that the success of quality management practices in airline operational functions is dependent on how the airline's management practises the 48 items in these 12 critical success factors.

4.3.2 The Differences and Similarity in practices

Statistical calculation demonstrates that there was a significant difference, in quality management through the critical success factors practises, between the Southeast Asian group and the Western European group, in Management Involvement, Technology Usage Orientation, Interdepartmental Interaction, Improvement Programme Evaluation, and Employee Participation, while there was a similar level of practises in Benchmarking.

The finding became a focus for further discussion in order to find out how the organisational context could affect the practices in the airlines. The outcome was then used to refine the preliminary model diagram outlined in Chapter 3. The following discussion is on the factors that had either significant differences between both groups of airlines, or similarities.

1) Technology Usage and Management – Management Involvement Subfactor.

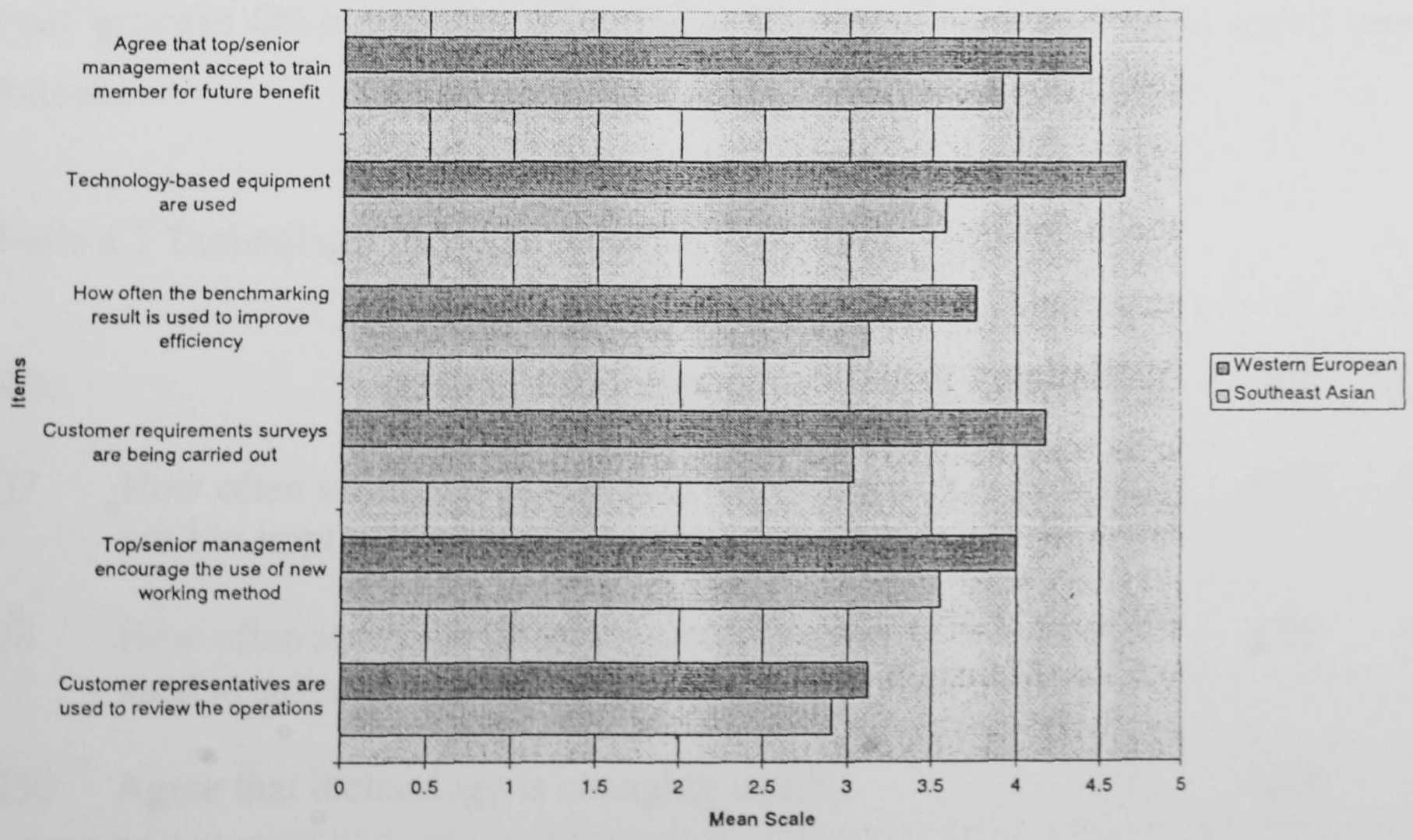
Statistical calculation (t test) showed that the items that were grouped under this subfactor had a significant (2-tailed) value of 0.000 on *equal variances not assumed* for their factor scores (see Section 4.2 and Appendix C). This indicated that

significant differences in practising these items existed between the two groups of airlines. The items and their mean scales were as follows:

Table 4.6 Management Involvement Subfactors

NO.	QUESTION ITEMS	SEA	WE	DIFF
Q36	Customer representatives are used to review the operations	2.91	3.12	-0.21
Q64	Top/senior management encourage the use of new working methods	3.55	4	-0.45
Q34	Customer requirements surveys are being carried out	3.03	4.18	-1.15
Q31	How often the benchmarking result is used to improve efficiency	3.12	3.76	-0.64
Q52	Technology-based equipment is used	3.58	4.65	-1.07
Q60	Agree that top/senior management accept training employees for future benefit	3.91	4.44	-0.53

Figure 4.2 Management Involvement



The Southeast Asian group had a lower scale than the Western European group in practising this subfactor, particularly on Customer Requirements Surveys (Q34) and Technology-based Equipment Uses (Q52) (see Table 4.6). This was probably because of less quality demand awareness, customer oriented motivation, and orientation to advanced technology usage in the Southeast Asian group.

The situation for the Southeast Asian group could become the main issue, as external quality demand was becoming increasingly high. It is very obvious that the less we know of our customers' requirements, the less we can serve them, and we might not even fulfil their requirements. Furthermore, the airline business is very much influenced by technological advancement; making use of new technology could improve effectiveness and efficiency in providing service to the customer. Direct involvement of top/senior management in these two activities, and applying an appropriate reward system, might change the situation.

2) Technology Usage and Management – Subfactor Technology Usage Orientation

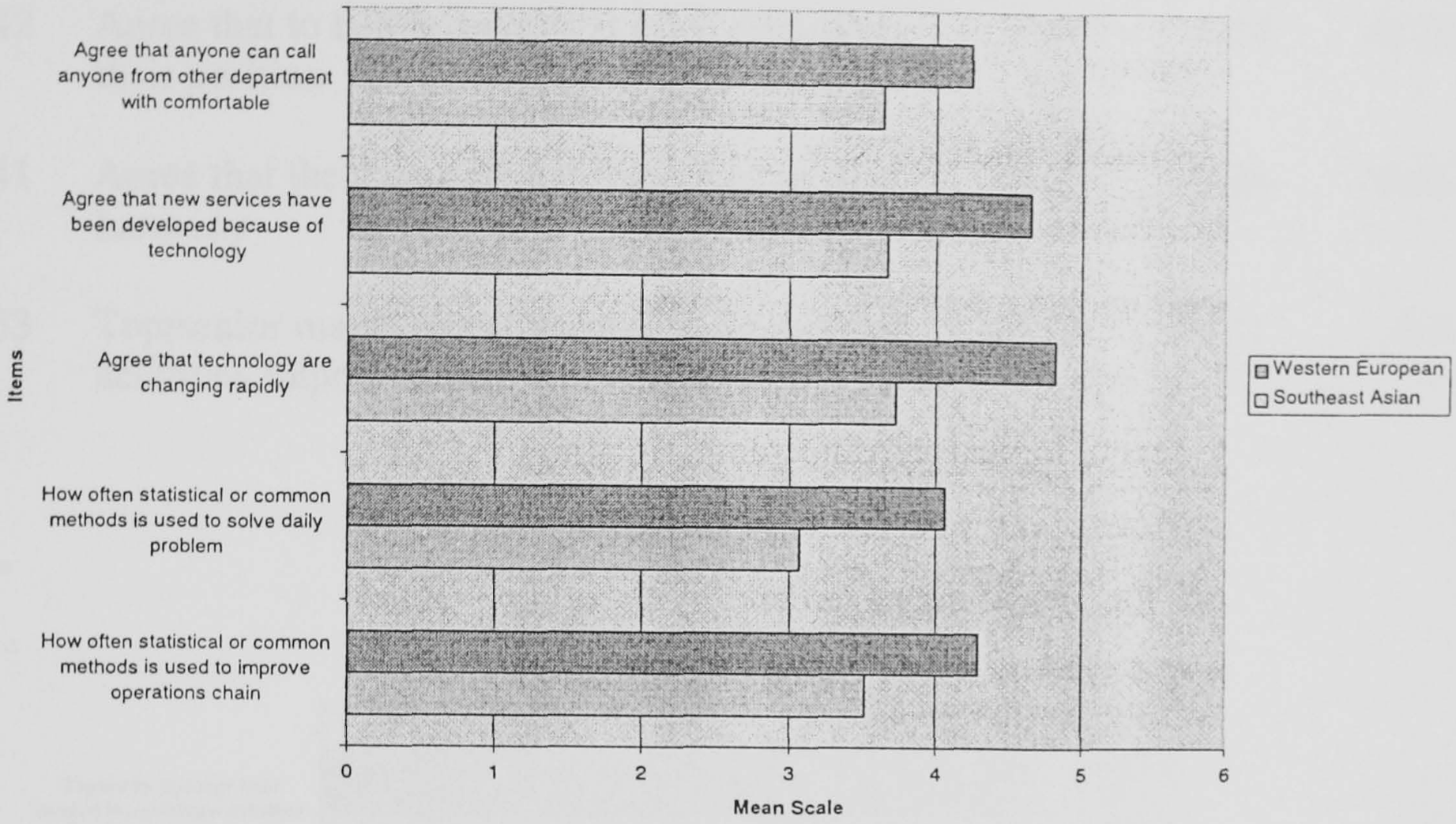
A t test for the items grouped under this subfactor had significance (2-tailed) values of 0.000 on *equal variances not assumed* for their factor scores (see Section 4.2 and Appendix B). This indicated that significance differences in practising these items exist between the two groups of airlines. The items and their mean scales were as follows:

Table 4.7 Technology Usage Orientation Subfactors

NO.	QUESTION ITEMS	SEA	WE	DIFF
Q7	How often statistical or common methods are used to improve operations chain	3.52	4.29	-0.78
Q8	How often statistical or common methods are used to solve daily problems	3.07	4.06	-0.99
Q50	Agree that technology is changing rapidly	3.73	4.82	-1.1
Q51	Agree that new services have been developed because of technology	3.67	4.65	-0.98

Q43	Agree that anyone can call anyone from another department with comfort	3.64	4.24	-0.6

Figure 4.3 Technology Usage Orientation



The Southeast Asian group seems to have had less practise in the use of advanced technology (Q50), the use of statistical or common methods in solving daily problems (Q8), and in realising that technological advancements should be used to develop newer services (Q51) than the Western European group. This situation might have been caused by less practise in improvement programme evaluation, and could be very much related to management involvement, in which the Southeast Asian group needed more practise than the Western European group.

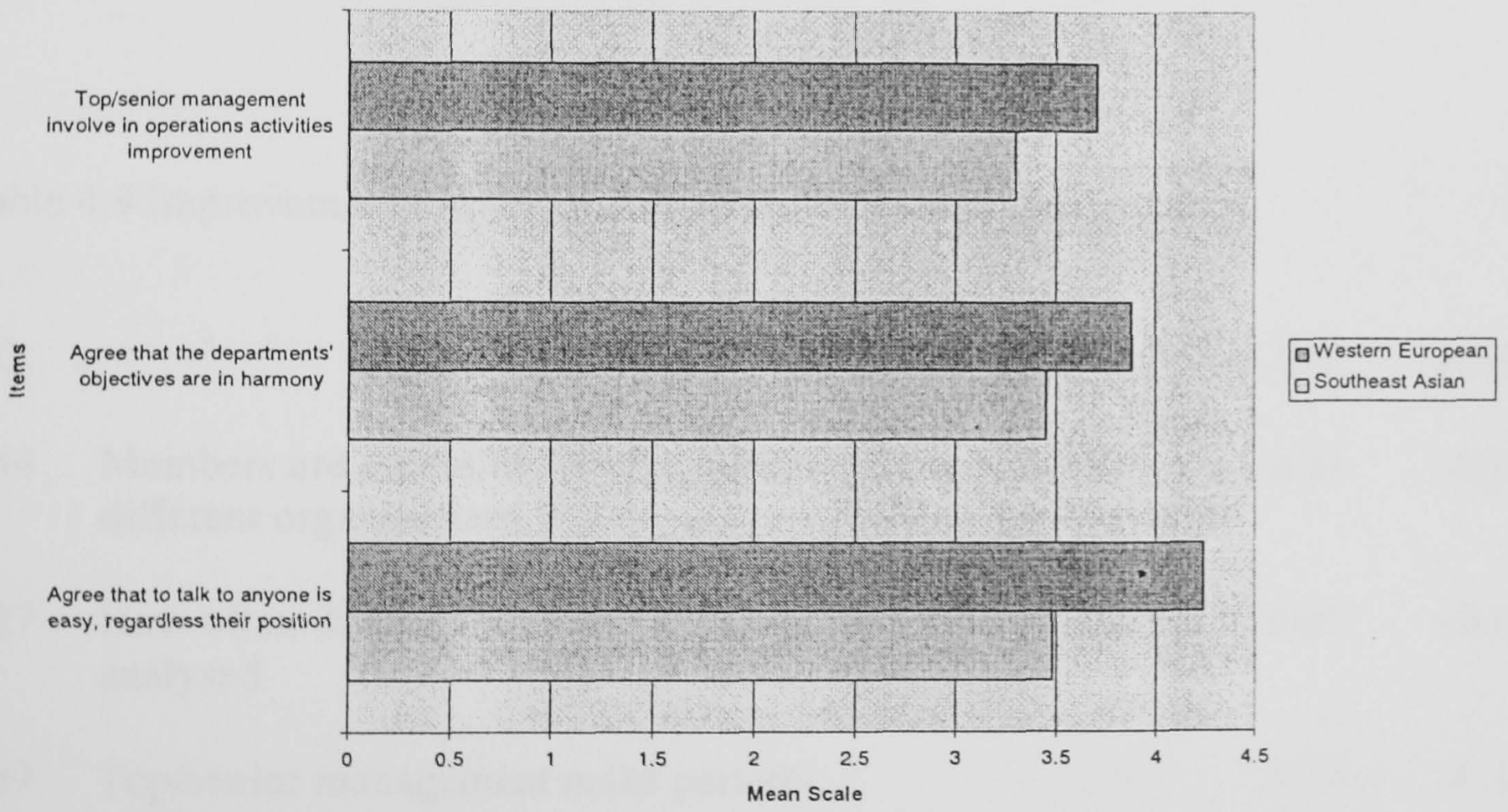
3) Interdepartmental Interaction

A t test for the three items grouped under this factor had significance (2-tailed) values of 0.026 on *equal variances not assumed* for their factor scores (see Section 4.2 and Appendix B). This indicated that there were significance differences existing between the two groups of airlines. The items and their mean scales were as follows:

Table 4.8 Interdepartmental Interaction factor

NO.	QUESTION ITEMS	SEA	WE	DIFF
Q42	Agree that to talk to anyone is easy, regardless their position	3.48	4.24	-0.75
Q41	Agree that the departments' objectives are in harmony	3.45	3.88	-0.43
Q53	Top/senior management involve in operations activities improvement	3.3	3.71	-0.4

Figure 4.4 Interdepartmental Interaction



It seems that the Southeast Asian has more difficulties in interacting between the departments within the Operations function (Q42) than the Western European, which could influence the other items (Q41 and Q53). This situation affects directly the quality of flight as an output of Operations function process. Creating team building motivation amongst the organisation member with top/senior management involvement seems to be appropriate to improve the practices.

4) Improvement Programme Evaluation

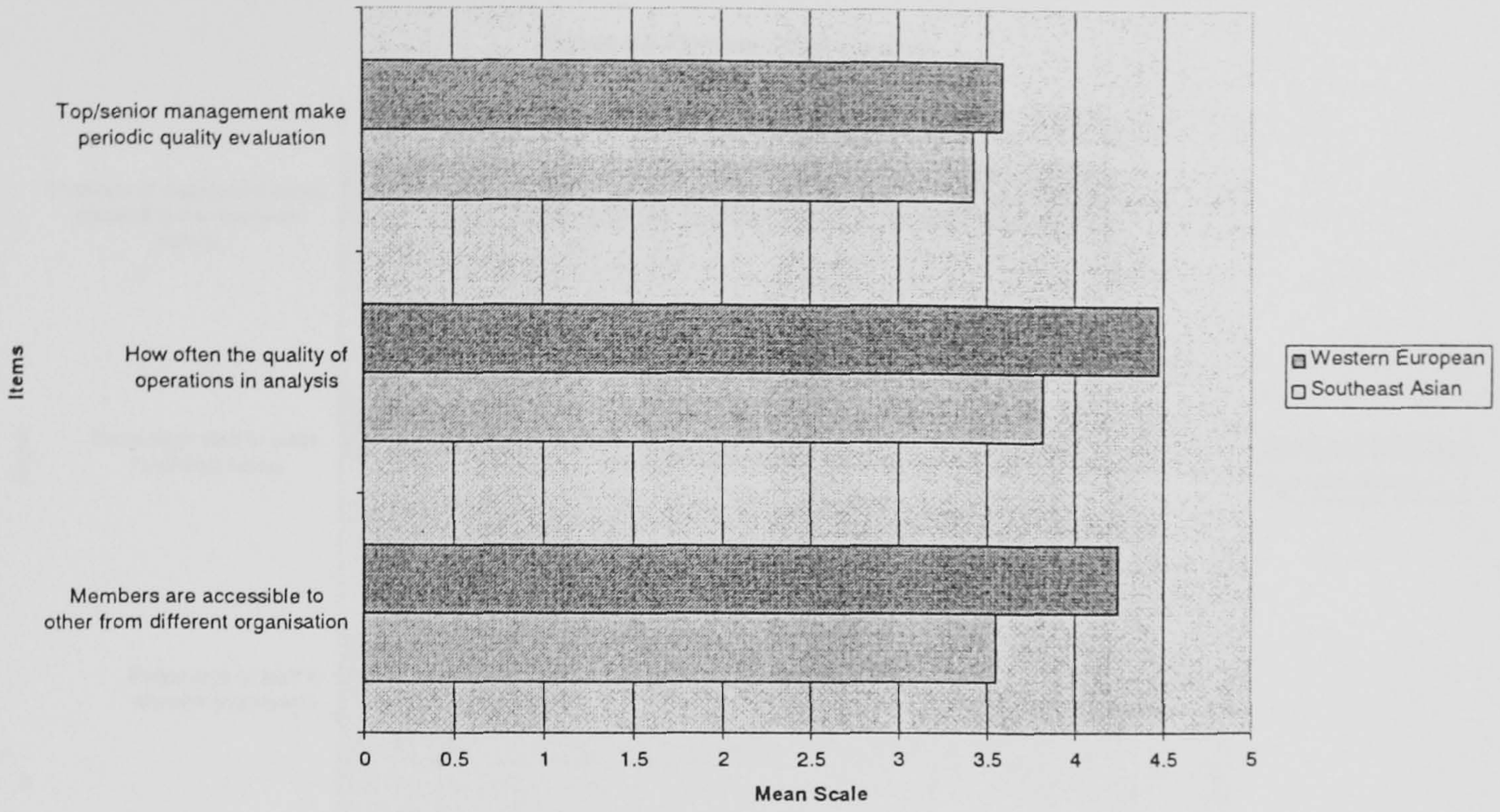
A t test for those items grouped under this factor had significant (2-tailed) values of 0.015 on *equal variances not assumed* for their factor scores (see Section 4.2 and Appendix B). This indicated that a significant difference existed between the two groups of airlines.

Looking at the graph, the Southeast Asian group has a lower scale of practices than the Western European group and less practice found in the organisation's employee accessibility (Q44) and in analysing the organisation's performance (Q27). This situation might be caused by less interdepartmental interaction and a less appropriate reward system. Since the result of programme evaluation will become an indicator of the progress of an improvement initiative, effort should be made to improve interaction between the departments and to give appropriate rewards.

Table 4.9 Improvement Programme Evaluation factor

NO.	QUESTION ITEMS	SEA	WE	DIFF
Q44	Members are accessible to others from different organisations	3.55	4.24	-0.69
Q27	How often the quality of operations is analysed	3.82	4.47	-0.65
Q59	Top/senior management make periodic quality evaluation	3.42	3.59	-0.16

Figure 4.5 Improvement Programme Evaluation



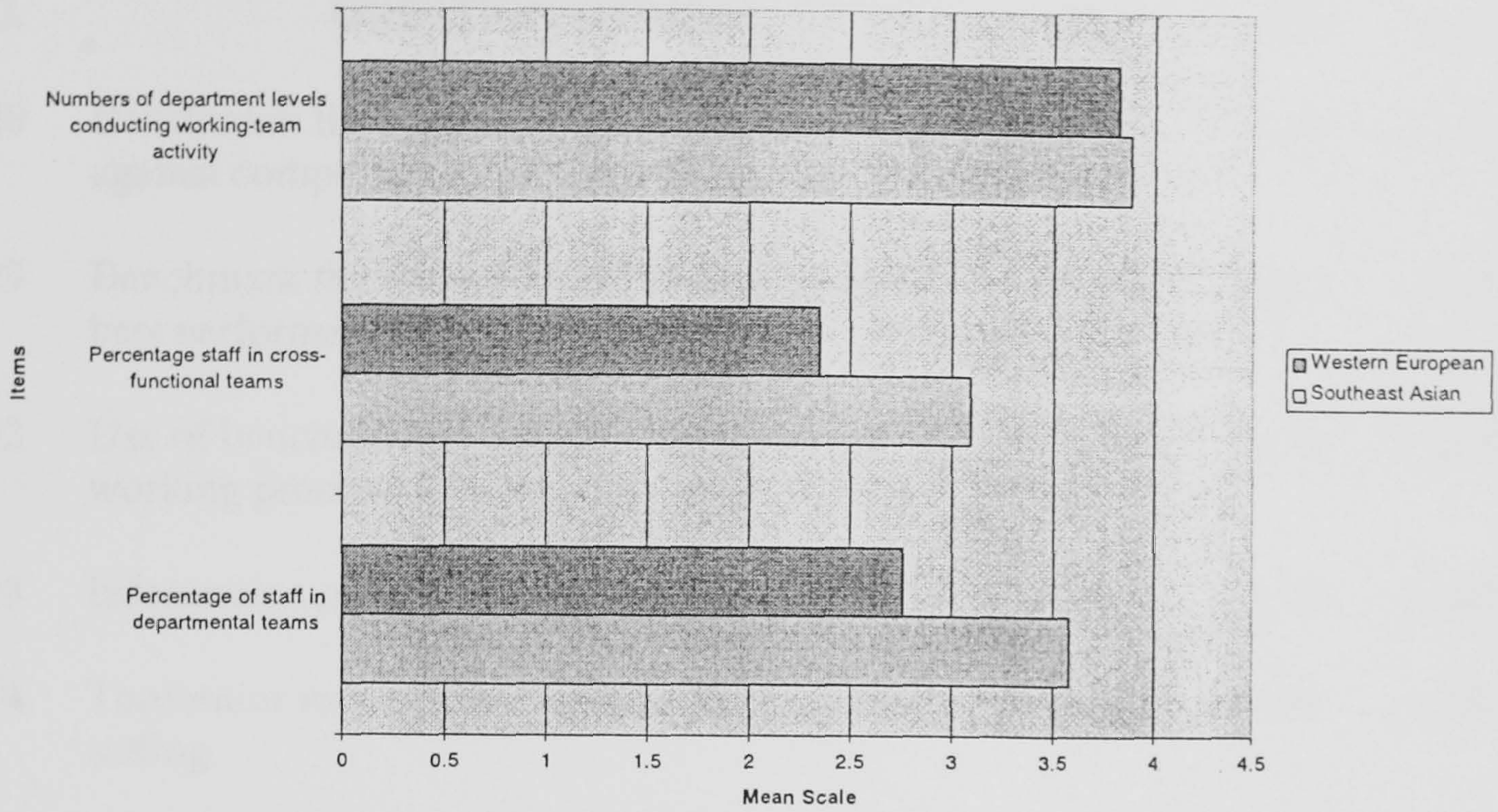
5) Employees' Participation

Those items grouped under this factor had significant (2-tailed) values of 0.026 on *equal variances not assumed* for their factor scores (see Section 4.2 and Appendix B). The items and their mean scales were as follows:

Table 4.10 Members' Participation factor

NO.	QUESTION ITEMS	SEA	WE	DIFF
Q23	Percentage of staff in departmental teams	3.58	2.76	0.81
Q24	Percentage of staff in cross-functional teams	3.09	2.35	0.74
Q40	Numbers of department levels conducting working-team activity	3.88	3.82	0.06

Figure 4.6 Members' Participation



The Southeast Asian has a higher scale on the percentage of staff members in either the departmental team (Q23) or the cross-functional team (Q24) than the Western European. This might become a good opportunity for the programme to succeed. Nevertheless, effective communication between the managers and the staff, and an appropriate reward system applied within the organisation will certainly be needed in order to ensure the right direction of improvement of the airlines' Operations function.

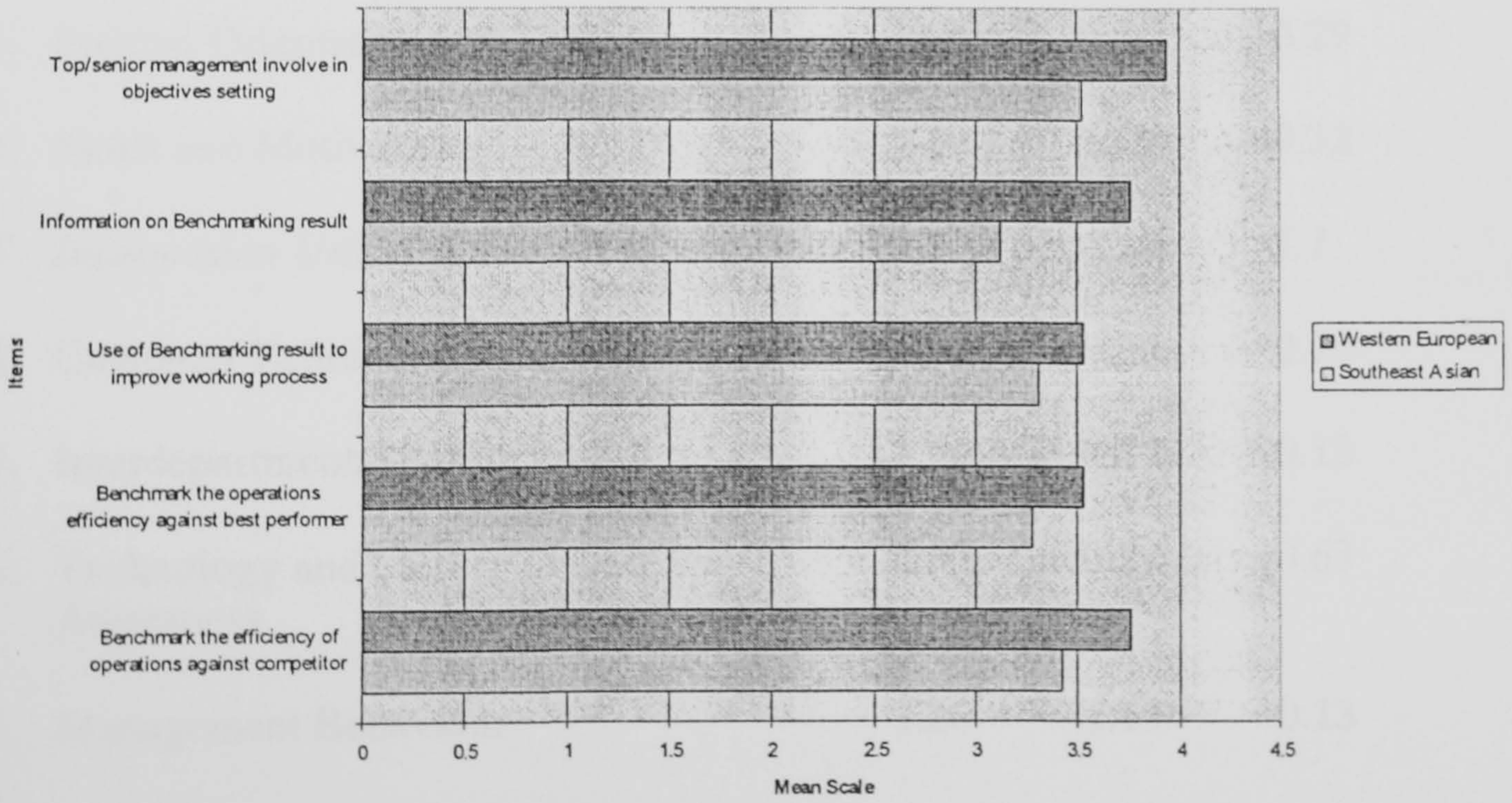
6) Benchmarking

A t test for the items grouped under this factor has a significant (2-tailed) value of 0.093 on *equal variances assumed* for its factor score (see Section 4.2 and Appendix B). This indicates that there are no significant differences. Instead it indicates a strong similarity exists between the two groups of airlines in practising these items. The items and their mean scale are as follows.

Table 4.11 Benchmarking factor

NO.	QUESTION ITEMS	SEA	WE	DIFF
Q28	Benchmark the efficiency of operations against competitor	3.42	3.76	-0.34
Q29	Benchmark the operations efficiency against best performer	3.27	3.53	-0.26
Q32	Use of benchmarking result to improve working process	3.3	3.53	-0.23
Q33	Information on benchmarking result	3.12	3.76	-0.64
Q54	Top/senior management involve in objectives setting	3.52	3.94	-0.43

Figure 4.7 Benchmarking



Although it indicated that the Southeast Asian group had a lower scale than the Western European group on availability of benchmarking result information (Q33), the practices of these five items under the Benchmarking factor in both groups of airlines seemed to be equal. The differences on Q33 (as indicated in the above Table 4.11 and Figure 4.7) might be related to the lower use of the result (Q31) in

Management Involvement subfactor, and of the analysis of the operations function performance (Q27) in the Improvement Programme Evaluation factor discussed previously in this section.

This equal practises situation is a strong incentive for the Southeast Asian group, encouraging them to continue their efforts to improving their operational functions performance. Nevertheless, consistent management involvement in these factor practises, encouraging team building, giving appropriate rewards, improving interaction between departments, using of common improvement techniques, and regular programme evaluation, will still be necessary.

4.3.3 The Differences in Priority

Table 4.12 Factor Importance and Effort

Importance - Effort Gap	**SEA**	**WE**	**Diff**
1. Process Orientation and Technique	1.09	0.8	0.29
2. Skills and Motivation	1.39	1.07	0.32
3. Information Utilisation and Analysis	*1.3*	*0.2*	*1.1*
4. Customer Relationship	1.09	0.33	0.75
5. Interdepartmental Interaction	1	0.87	0.13
6. Technology and Market Turbulence Awareness	0.83	0.2	0.63
7. Management Behaviour	1.26	1.13	0.13

The results from Section C of the questionnaire (see Appendix D of the questionnaire form) showed that for each of the seven critical success factors practised in the operations function, a gap existed between factor importance and the effort that had been put into the factor. These gaps created a different order of priority for the practise of the critical success factors in each group of airlines. The widest gap differences existing between the two groups of airlines was on Information Utilisation & Analysis factor (see Table 4.12).

In referrence to these seven factors used in the questionnaire, the Southeast Asian group's gap, starting from the widest, was:

- Skills and Motivation,
- Information Utilisation and Analysis,
- Management Behaviour, and then
- Customer Relationship and Process Orientation & Technique (both these factors are in the same position) and finally,
- Technology and Market Turbulence Awareness.

Meanwhile, the Western European group's gap, starting with the widest, was:

- Management Behaviour,
- Skills & Motivation,
- Interdepartmental Interaction,
- Process Orientation & Technique,
- Customer Relationship, and finally,
- Technology & Market Awareness and Information Utilisation & Analysis, both with the same gap.

Although the gaps indicate that different efforts would be needed by the airlines to close their gaps, both groups showed the same top two priority factors (Skills and Motivation and Management Behaviour).

The information obtained from Section C was used in semi-structured interviews, as additional information to Section B's results. Because of this, the validity of the data obtained from Section C was not calculated based on the data obtained from the questionnaires but, instead, it was based mainly on the results of the interviews.

4.4 Summary of chapter

The results of the questionnaire showed that the seven critical success factors of quality management practices, with the 58 question items discussed previously in Chapter 3, were suitable for and could be practised in the airline operational functions, in this case, in the selected 'successful' airlines of Western Europe and the 'developing' airlines of Southeast Asia. These seven critical success factors with 58

items were then arranged into 12 factors, grouped from 48 items after statistical calculation. The 12 critical success factors of quality management practices in the operations function are:

1) Technology Usage and Management, consists of 2 subfactors.
   a. Management Involvement
   b. Technology Usage Orientation
2) Reward Systems
3) Team Building
4) Benchmarking
5) Interdepartmental Interaction
6) Customer Oriented Motivation
7) Process Improvement Technique
8) Quality Demand Awareness
9) Manager-Staff Communication
10) Improvement Programme Evaluation
11) Customer Feedback Handling
12) Employee Participation

The questionnaire, which was developed as the result of desk research, was not only aimed at validating the critical success factors of quality management practices in airline operational functions, but also at measuring the differences in the practices between the airlines. It indicated that there were differences in practising quality management between the 'developing' airlines of Southeast Asia and the 'successful' airlines of Western Europe.

There were differences in the scale of managing the critical success factors of quality management practices in operational functions between the two groups of airlines. The differences were statistically tested, and resulted in four groups of items with significant differences in practises between the Southeast Asian group and the Western European group, and one group of items with the least differences of practises between the two groups of airlines.

The groups of items with significance differences were:

1) Technology Usage and Management

a. Management Involvement

- Customer representatives are used to review the operations
- Top/senior management encourage the use of new working methods
- Customer requirements surveys are being carried out
- The benchmarking result is used to improve efficiency
- Technology-based equipment is used
- Top/senior management accept training employees for future benefit

b. Technology Usage Orientation

- Statistical or common methods are used to improve the operations chain
- Statistical or common methods are used to solve daily problems
- Aware that technology is changing rapidly
- New services have been developed because of technology
- Anyone can call anyone from another department with ease

2) Interdepartmental Interaction

- To talk to anyone is easy, regardless their position
- The department's objectives are in harmony
- Top/senior management involved in operations activities improvement

3) Improvement Programme Evaluation

- Members are accessible to others from different organisations
- The quality of operations is analysed
- Top/senior management make periodic quality evaluations

4) Employees Participation

- Numbers of staff in departmental teams
- Numbers of staff in cross-functional teams
- Numbers of department levels conducting working-team activity

One group of items with less differences or almost similar practises was:

5) Benchmarking

- Benchmarking the efficiency of operations against competitors
- Benchmarking the operations efficiency against the best performer
- Use of benchmarking results to improve working process
- Information on benchmarking results
- Top/senior management involved in objectives setting

The differences in the gap of critical factor importance and effort between the airlines resulted in a different order of priority of critical success factor effort to be put in by each of the airlines. The order of priority gave Management Behaviour, and Skills & Motivation factors for both groups of airlines as their top factors of priority for more effort.

The findings on critical success factors of quality management practices in airline operational functions discussed in this chapter can be used to refine the preliminary model discussed in Chapter 3. Additionally, semi-structured interviews also needed to be conducted to find out how the organisational context influenced the differences between the two groups of airlines.

Chapter 5
Investigating the Quality Management Practices In the Airlines – An Interview Survey

This chapter describes the information collection process on variables of organisational context through semi-structured interviews. The information collected will then be used in conjunction with the questionnaire results to develop the model that is the aim of this research.

The discussion in this chapter is organised as follows:

Section 5.1 describes planning to use semi-structured interviews.
Section 5.2 discusses the information collection process.
Section 5.3 describes the findings from the semi-structured interviews
Section 5.4 summarises the results.

5.1 The use of a Semi-structured Interview

Semi-structured interviews were used to investigate the impact of organisational context on the critical success factors of quality management practices in the airlines, and to give an insight to the process of developing a model of quality management practices for the 'developing' airlines of Southeast Asia.

Three stages were involved in planning the semi-structured interview:

- First, determining the information needed,
- Secondly, identifying the source of information, and
- Finally, development of the interview questions.

5.1.1 Information Required

It was mentioned in the beginning of this thesis that the model that was being developed was for the 'developing' airlines of Southeast Asia. Because of this, the information to be collected covered:

a) Information on how critical success factors of quality management practices in the operations function would be influenced by organisational context in the 'developing' airlines of Southeast Asia.

b) Information on how the 'successful' airlines of Western Europe perceived the differences in the practices between the 'developing' airlines of Southeast Asia, and themselves.

The information gathered would validate the differences as they appear in the results of the questionnaire between the Southeast Asian and the Western European airlines. At the same time, this was a way to identify the variables of organisational context that made the Southeast Asian practices different to the Western European practices.

5.1.2 Information Sources

Executives and/or managers to be interviewed were selected from questionnaire respondents who indicated they would participate in this further research. However, more importantly, the sources had to be appropriately competent to give the information required for this research. The 'developing' airlines of Southeast Asia were represented by TAI and GIA, and the 'successful' airlines of Western Europe were represented by SAS.

5.1.3 Question Development

Referring to the required information (Section 5.1.1) above, the questions for the semi-structured interviews were chosen by considering:

- Firstly, the result of discussion on variables of organisational context that affect the quality management practices in the airlines (see Chapter 3).
- Secondly, the results of the questionnaire, as discussed in Chapter 4.
- Finally, different questions were prepared for the Southeast Asian and the Western European groups.

Chapter 3 described the variables of organisational context that give impact on the management of critical success factors of quality management practices in the

operational functions of the airlines. They are Management Knowledge, Past Quality Performance, and External Quality Demand (see Sections 3.3 and 3.4).

In Chapter 4, the results of the questionnaire showed that both groups of airlines have similar quality management features (7 critical success factors became 12 factors or groups of items). However, significant differences in practices exist between the 'developing' airlines of Southeast Asia and the 'successful' airlines of Western Europe in the groups of items under Technology Usage & Management, Interdepartmental Interaction, Improvement Programme Evaluation, and Employee Participation. Meanwhile, strong similarities of practises were found in groups of items under the Benchmarking factor.

The Southeast Asian airlines' 'Effort-Importance' gap on the Likert scale (the result of Section C of the questionnaire) shows a different gap width compared to the gap of the Western European airlines. These differences have created a different order of priority. Nevertheless, from the 7 factors used in the questionnaire, Management Behaviour and Skills & Motivation factors are the top priority for more effort for both airlines. This result is to be validated with the information gathered from semi-structured interviews.

The questions were developed for TAI, GIA, and the Scandinavian Airlines System (SAS) separately. The questions were used in the interview after a presentation on the results of the questionnaire to the interviewee. The questions for TAI and GIA were:

1) How are the critical success factors of quality management practices managed in your organisation's operational functions?

2) What is the organisation's aspect that influences the practices?

These questions were aimed at getting information on the actual practices and their constraints, as perceived by the interviewees.

The questions for SAS were:

1) Would you comment on the 'Effort-Importance' gap differences found between the 'successful' Western Europe and the 'developing' Southeast Asia airlines? This question was based on the result of Section C of the questionnaire. It aimed to get information from the airline's senior managers (interviewees) based on their perception of the differences mentioned in this question and the influence of organisational context on the differences.

2) Would you share your ideas on how the 'Effort-Importance' gap might be reduced? (Either for the Western European or the Southeast Asian airlines.) Referring to the first question and taking into account the knowledge and experience of the senior managers about critical success factors of quality management practices in the operations function and its variables of organisational context, this question aimed to get information on the ideas the interviewee had on how to close the gap.

3) Would you suggest that the Southeast Asian airlines should follow what the Western European airlines have been doing so far? Referring to the gap differences between the two groups of airlines, this question was aimed at bringing the interviewee's focus on the needs of the Southeast Asian carriers. This was necessary to give insight into the model being developed.

5.2 Information Collection Process

The information from TAI and GIA was collected through direct interviews. The information was recorded by note taking and some tape recording. The tape recording was used for validating purposes when the notes were incomplete or difficult to understand. If some of the information was still unclear, it was validated by a follow-up phone call.

The information from SAS was collected through the interactive use of the internet. The information exchange was prepared in structured form, which followed the same sequence as the TAI and GIA interviews.

5.2.1 The Process

The interviews started with recording the interviewee's position and experience in the organisation's operational functions and the results of the questionnaire were presented, followed by a semi-structured discussion using the questions. The steps were:

1) Step 1 was to record the position and experience of the respondent/interviewee in the organisation's operational functions – this was to ensure the interviewees' suitability to give data/information. From the selected respondents, there were two interviewees from each airline:

   - From Thai Airways International: the Executive Vice President of Operations, and the Director of Aviation Training Customer Services.

   - From Garuda Indonesia: the Executive Vice President of Operations, and the Vice President of Aviation Safety.

   - From Scandinavian Airlines System: the Quality Assurance Senior Co-ordinator, and the Airline Operations Senior Advisor.

   All of them were senior managers in their organisation, with sufficient experience related to operational activity to answer the related questions.

2) Step 2 was a presentation directing the discussion on the critical success factors of quality management practices in operational functions, obtained from the literature reviews and the questionnaire. At the end of this step, the interviewee had some understanding of the differences in quality management practices between the 'successful' airlines of Western Europe and the 'developing' airlines of Southeast Asia, as developed in this thesis. The presentation is described below.

   - First the objective of the research was described. As stated in Chapter 1, the objective of the research is to develop a model of quality management practices in operational functions for the 'developing' airlines of Southeast

Asia. This gave the interviewee a "big picture" of the research being conducted and proposed that the Southeast Asian airlines would obtain great benefit by participating in the research, while the Western European airline would be able to ascertain its position in practising quality management related to the Southeast Asian airlines.

- Second was a discussion on the area of study, in which the airlines' operational process/activity was defined. It covered the aim of the operational process and the activities, as defined in Chapter 3. This directed the discussion and also addressed the issue of what appears to be important to the success of quality management practices in the airlines.

- Third was a discussion of the critical success factors of quality management practices in operational functions. Earlier it was said that there are 7 factors that have to be managed to improve the effectiveness and efficiency of the organisation process. These 7 factors were organised, after statistical process calculation, into 12 groups of items or 12 factors with 48 items. This gave the interviewee a reference area to start the discussion.

- Finally, the practices of critical success factors of quality management between the two groups of airlines were compared. The differences, as well as similarities, had been calculated as a result of Sections B and C of the questionnaire data analysis. This comparison made clear the differences and similarities in the practices of the two groups of airlines.

3) Step 3 was a discussion to investigate variables of organisational context that produce differences in managing the critical success factors of quality management practices in the airlines' operational functions– this discussion was guided using the questions above.

5.2.2 The Interview

Following the steps above, TAI's interviewee described the significant issues as follows:

- Four issues were considered in the interview. They were technology usage, interaction between departments, the use of information, and training. The interviewee described how these four issues were managed within the organisation to improve their operational function process and how the organisational context of the airline had influenced the way these four issues were being managed.

- The interviewee emphasised how important the technology issue was for the operational activities. Despite this, technological advancement had not been utilised as one of the factors that could improve the efficiency of the operational processes and the effectiveness in providing service to the customer. This information might explain why they had a lower scale of practices on the Technology Usage Orientation groups of items (Chapter 4) but a wider gap of effort to be covered on the Technology & Market Turbulence Awareness factor (Section C of the questionnaire) than the Western European airlines.

- On the interdepartmental interaction issue, although the members of each department had realised the important of this issue to the efficiency of the operational process, it still needed involvement from top/senior management to encourage the interaction and make it happen.

- On the information issue, this airline had been using modern information technology within their organisation. Nevertheless, the interviewee was aware that processes to ensure the availability of necessary information, particularly on the results of benchmarking with other performers in the same business, had not been established yet.

- The interviewee argued that improving skills and enhancing the motivation of their employees were the most important things to maintain the safety, punctuality and efficiency of their operational functions. The organisation had to facilitate the necessary training and knowledge improvement as well as to provide a reward scheme to stimulate their employees' performance. The interviewee agreed that the effort on this factor had to be increased. This might explain why they have a lower scale of practices in 6 groups of items under Management Involvement sub-

factor (see Chapter 4) and a wider gap of effort to be covered on the Skills and Motivation factor (in the results of Section C of the questionnaire) than the Western European airlines.

- It was also mentioned during the interview that the effort to reach and maintain the industry's standard was conducted not only by improving the skills and motivation of the organisation's employees, but also by implementing International Standard ISO 9001 as a quality assurance framework. Based on this, the organisation can perform benchmarking using past performance or other airline performance data.

The interviewees from Garuda Indonesia identified the following issues:

- The interviewees agreed that enhancing the motivation of the organisation's employees was the most important factor in ensuring that the operations function process and output requirements were met. The managers had to facilitate their employees' activities in solving day-to-day problems in order to improve operational performance. This needed managers' knowledge about quality, policies, and quality goals, and commitment in providing the resources required, as well as a rewards scheme. Consistency in this matter would surely generate more employee trust of management than before.

- Awareness of increasingly high business competition had caused management to increase their efforts to established the availability of information on operational performance. However, this information had still not been used effectively to improve operational efficiency and effectiveness.

- Although the employees' understanding about the connection of each department activity within the operational function had been realised, interaction between departments still needed to be improved and more attention should be paid to it by the managers.

- Lastly, management involvement was perceived by the employees as low in effort. This was believed to be the most influential factor to ensure the success of quality

management practices in the operational function. This situation was probably related to the fact that sufficient knowledge on quality management practices amongst the managers had not been established yet.

Meanwhile, using the three questions prepared, the discussion about the 'successful' airlines of Western Europe, as represented by Scandinavian Airlines System (SAS), was as follows:

- The Western European airlines would appear to be putting in greater effort on most of the factors, but towards less important targets. Meanwhile, the gaps appeared larger with regard to Southeast Asian airlines, because they placed the importance of the subject so much higher. This could be because the Western European airlines seemed to have a firm quality performance on average. So, what they needed then was more effort to close the gap, and the gap was not wider than the Southeast Asian airlines, since the Western European airlines had earlier quality improvement initiatives than did the Southeast Asian airlines.

- What happened with the Southeast Asian airlines was that the extent of external quality demand within the region was quite high or strong due to the development of the market in the region. This caused the Southeast Asian to set the target quite high, meanwhile realising that they had started quality improvement a bit late compared to the Western European airlines.

- For both groups of airlines, the management needed to provide an environment that empowered staff to use the skills that they possessed. Managers must delegate and empower whilst ensuring that the necessary tools and training were provided. With regard to Southeast Asian airlines, there appeared to be a need to move towards a more team based structure, using the principles of process management. This was difficult as it challenged traditional management authority and power.

- The most important factors, in which both regions had a significant gap, were skills/motivation and management behaviour. The industry is known for fierce competition and cost-effective measures are carried out in every process of

change. This may affect motivation considerably and has to be mastered in a balanced way and demands professional management.

- In regard to identifying processes and studying the interdependence of one process with another, the Southeast Asian airlines should not attempt to decrease the gap by lowering their perception of its importance. They should strive to increase their effort by harnessing the momentum that is produced by successful teamwork. However, since the airline industry is of a global nature, the best practices should preferable be adopted. It is dangerous to generalise too, since particularities always exist. Here, the management knowledge would become crucial to the success of those efforts mentioned above.

5.3 The Findings

- From the results of the interviews, it can be concluded that variables of organisational context of management knowledge, past quality performance, and external quality demand affect the management of critical success factors of quality management practices in the airlines' operational functions (see Chapters 3 and 4).

- The level of management knowledge of the quality management, business, and organisation issues made a significant difference in the items practised by the Southeast Asian and the Western European airlines under factors of Technology Usage & Management (with Management Involvement and Technology Usage Orientation sub-factors), Interdepartmental Interaction, Improvement Programme Evaluation, and Employee Participation. This condition also placed the factors of Skills and Motivation and Management Behaviour as the most important areas leading to success in quality management practices (Section C).

- Past organisation quality performance has to be considered by the management in order to continue their quality management practices. This situation resulted in the Southeast Asian airlines putting the factor Skills and Motivation as being closely influenced by Management Behaviour (Section C of the questionnaire). The skill required for improvement of the operational process and employees'

motivation to improve customer relationship was becoming the main concern. In the Western European airlines, although the Skills and Motivation factor was also regarded as one of the most important factors, it was not as much influenced by Management Behaviour as in the Southeast Asian airlines.

- For the Southeast Asian airlines, due to market growth, external quality demand will determine the extent and focus of quality management practices in the organisation. This context led the management of the Southeast Asian airlines to put in a relatively higher target demand (in the scale as indicated in the results of Section C of the questionnaire) for all of these factors than did the Western European airlines. However, the focus is mainly on improving the employees' skills and participation in operations function process improvement, and enhancing motivation of the employees in customer satisfaction, which is also very strongly influenced by management involvement and the need to use new technology.

5.4 Summary of Chapter

Technology Usage & Management, Interdepartmental Interaction, Improved Programme Evaluation, Employee Participation, and Benchmarking factors (see the result from Section B of the questionnaire) that were practised differently by both groups of airlines, were considered in the interview. The interview found out how the Management Behaviour and Skills & Motivation (the results from Section C of the questionnaire) should become the top two priorities and that it has to have more effort put into it, particularly for the 'developing' airlines of Southeast Asia. This, at the same time, validated the results of Section C of the questionnaire.

Relating to the above point, the differences in practising the Technology Usage & Management, Interdepartmental Interaction, Improvement Programme Evaluation, and Employee Participation factors have been affected by variables of organisational context, such as management knowledge, previous quality performance of the organisation, and customer or external demand of quality. Meanwhile, similar practises for Benchmarking have resulted from a strong perception and understanding

by the airlines' management, to fulfil the need of external quality demand or customer requirements and to meet the industry's standard.

Regarding to the aim of the research, the model of quality management practices for the operational functions of the 'developing' airlines of Southeast Asia that is being developed should consider Management Behaviour and Skills & Motivation factors as the main focus in the framework.

Part III

THE MODEL AND RESEARCH CONCLUSION

Chapter 6. Generating a Model of Quality Management Practices

Chapter 7. Research Conclusion

Chapter 6
Generating a Model of Quality Management Practices

The aim of this chapter is to describe the model development process by integrating the findings from the desk research after it was processed through the survey research. The definitions of quality management practices and airlines' operational functions were employed as references in the process.

This chapter consists of three sections:

Section 6.1 discusses the model development process.
Section 6.2 describes the model of quality management practices in the operations function for the 'developing' airlines of Southeast Asia.
Section 6.3 is a summary of what is discussed in this chapter.

6.1 Model Development Process

After refining the preliminary proposed model discussed in Chapter 3, the model that is specifically suitable for the 'developing' airlines of Southeast Asia can be developed. It will be used as guidance to improving the effectiveness and the efficiency of the operations function in the airline organisation. Referring to what has been discussed in Chapter 3, the process requirements in developing the model could be described as follows:

1) The quality improvement initiative in the operations function of the airline should be integrated with the processes within the organisation. Improvement of the effectiveness and efficiency of the operations function is achieved by practising quality management through managing the critical success factors within the process.

2) Critical success factors of the quality management practices should represent the organisational factors that are critically needed in the process. It was discussed before that there were three elements, 'operatives', 'equipment and facilities', and

'customers', that interact with each other within the operations function (Chapter 3). To succeed with the interaction, the critical success factors have to be managed. The management of the critical success factors of quality management practices in the airlines will be affected by the organisational context of the airlines.

3) Variables of organisational context identified in the research (Chapters 3 and 5) should be specifically suited for the 'developing' Southeast Asian airlines.

4) The model should be developed in a certain way, so that the process of improving quality can be continually performed following the customer requirements and industry's standards.

6.2 The Model of Quality Management Practices

The model was developed for quality management practices in the operations function for the 'developing' airlines of Southeast Asia. The model is described in a process activity and covers:

- the aim of the model,
- the concept underlying the model,
- the structure of the model, and
- application of the model to the 'developing' airlines of Southeast Asia.

6.2.1 The Aim of the Model

The model is to be used by management of the 'developing' airlines in Southeast Asia to improve their operational functions' processes in order to ensure the fulfilment of the customer requirements and to meet the industry's standards. The model will guide management in managing the critical success factors of quality management practices with regard to its organisational context in their operations function.

6.2.2 The Underlying Concept

What should be considered most in developing the model is the concept underlying it.

The definition of the quality of a product is the ability of the product to satisfy the requirements of the customer as well as to meet the industry's standard. In a business organisation, quality has been defined by considering its context within the organisation's processes. Therefore, the definition of quality in a business firm should not be associated with product quality alone, but with the process by which the quality of the product can be assured.

Furthermore, quality improvement initiatives in a business organisation mean managing a process of delivering quality in which a particular management technique and organisation commitment through employees' involvement is necessary. It is also because of practising quality management that improving the organisation's effectiveness, as well as its efficiency, makes it possible to meet the requirements of the customer and the industry's standards. Therefore, quality management practices in the organisation of a business firm should always be the way the organisation is managed on a day-to-day basis, and part of the organisation's business process.

The model was then developed by looking at the operations function in the airline as a process. The operations function in an airline is defined as the transformation of goods, or people, from one place to another without any physical change taking place. The process of transformation involves three main physical elements:

- first, there are operatives or persons who handle the various sorts of airline equipment and facilities, and its raw materials;

- secondly, there is the equipment and facilities; and

- thirdly, there are the raw materials that are the object of change. In this case, passengers and goods are the raw materials.

The interaction of these three elements is reflected in the three aspects of managing passengers and goods, managing aircraft movement, and managing maintenance. It covers seven activities in the process. These activities aim to achieve the safety and punctuality of the flight and the efficiency of the operations process. See Chapter 3, Section 3.1.

- Aircraft Routing and Line Maintenance - conduct planning for aircraft rotation and to ensure serviceability of aircraft for scheduled flight.

- Crew Scheduling and Monitoring - developing Crew Schedules for all flight personnel to obtain maximum utilisation and availability for each flight.

- Aircraft Loading and Ground Services - baggage and cargo loading. Ground services to prepare the aircraft for departure.

- Catering Uplift - food, beverage, dry goods, and other service goods to be used to serve the passengers and provide other services during flight.

- Passenger on the Ground and in Flight Handling - prepare passengers to be ready for the flight's departure and arrival. Ensuring the services are performed with regard to safety, punctuality and efficiency.

- Flight planning and documentation - flight clearance preparation, technical log, loading and balance calculation, general declaration, and other commercial documentation.

- Flight Operations Planning and Control - Monitoring all flight movement, including irregularities and deviations.

A process can be defined as a set of interrelated work activities providing output of greater value than the inputs by means of transformations. A process has three elements:

- transformation,
- feedback, and
- repeatability.

In this operational process, transformation mainly involves locational conversion of inputs in to outputs. Locational transformation means moving objects from one place to another.

Feedback involves regulatory means by which the transformation activities are modified or corrected to maintain certain attributes of the output. Any process requires feedback to regulate its input. Feedback is needed to avoid degradation of the process.

Repeatability implies that the process is executed many times in the same manner. The operational process is continually repeating activities to convert inputs into better outputs.

The operational process has to be conducted effectively so as to achieve the desired output. By improving the process to make it more effective, it may simultaneously become more efficient.

The effectiveness and efficiency of the processes are affected by how the operational elements interact with each other. Quality management practices make interaction of the elements take place in such a way that effectiveness and efficiency of the processes are achieved. The success of quality management practices in the organisation will depend on how its critical factors are managed with regard to the organisational context.

6.2.3 Structure of the Model

As mentioned before, the operational process is a set of interrelated work activities to transport goods and/or people from one place to another. The operations function within the airline organisation is a core[1] part of the airlines' operational processes. The model represents the operational processes, including the quality management practices, within the organisation. The model is divided into three parts:

- the main body, which consists of input-process-output activities,
- feedback and management of the critical success factors, and
- the variables of organisational context.

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[1] Core processes concentrate on satisfying external customers. They directly add value in a way perceived by the customer of the business. They respond to a customer request and generate customer satisfaction.

6.2.4 Input-Process-Output

This process starts with customer requirements and the industry's standards as inputs and ends with customer satisfaction level and operational performance as outputs. To process the input, the three elements of 'operatives' or staff/crew members, 'equipment and facilities', and 'customers' interact within the operational processes.

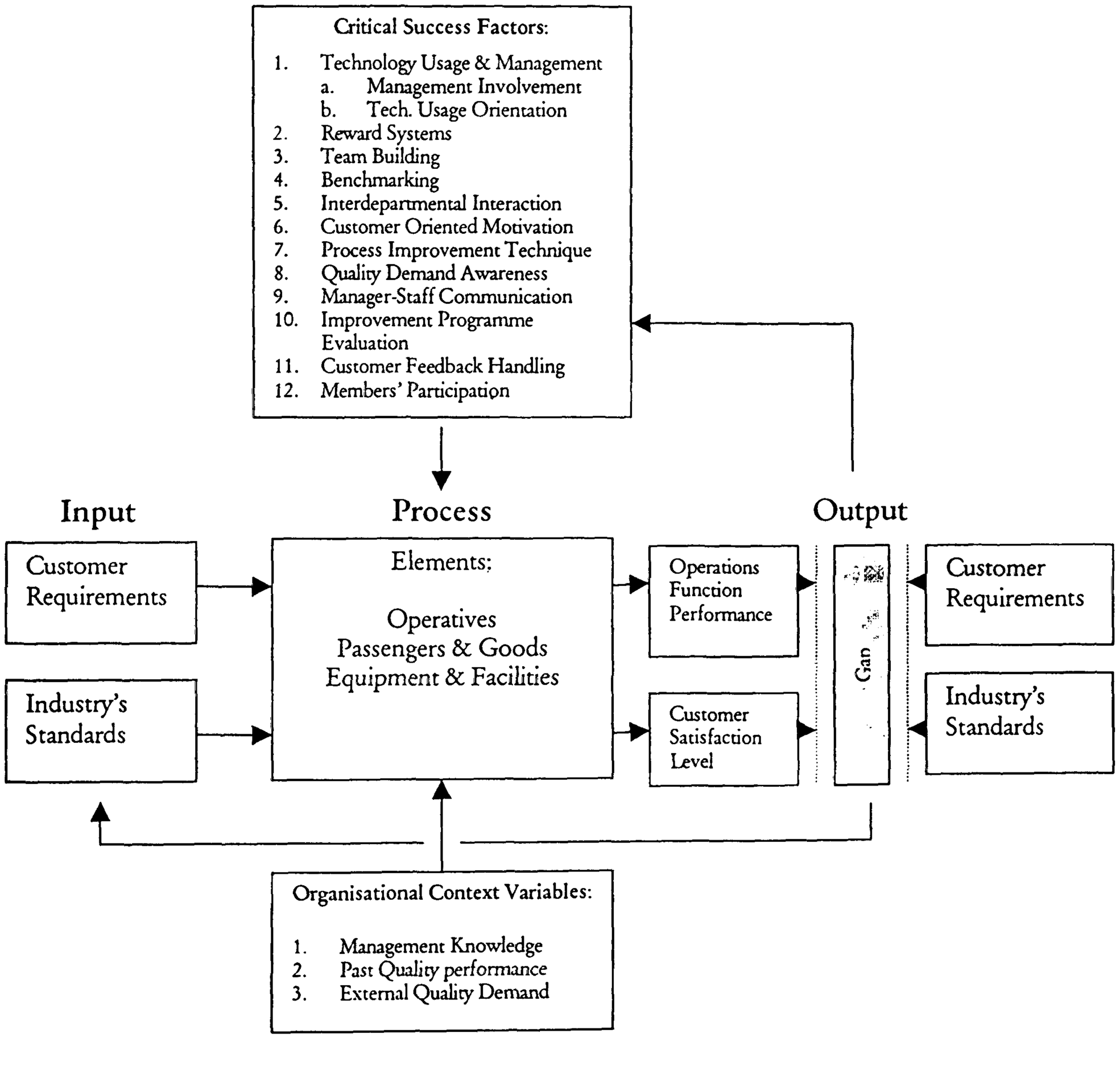


Figure 6.1. A Model of Quality Management Practices in Airlines' Operations Function

The output of this process is the level of safety and punctuality of the flight, efficiency of the operational process, and the customer satisfaction level. The gap between the output and the requirements will then become a feedback for improvement back to the

input as well as to be used to manage the critical success factors of quality management practices within the organisation.

6.2.5 The critical success factors of quality management practices

The second part of the model structure is the critical success factors of quality management practices in the operations function (referred to in Chapter 4, Section 4.3).

1a) Technology Usage and Management – Management Involvement

Management should spend sufficient time and effort to get involved in formulating objectives, facilitating team building, improving customer service, reconciling group differences, adapting to change, and facilitating competitive thinking. Management involvement in practising quality management has a significant effect on the technology usage orientation of the organisation's employees, benchmarking exercises, team building, interaction between departments, evaluation of the improvement programme, and rewards given to employees.

Since this sub-factor has significant correlation with almost all of the factors, it will contribute significantly to the ability of operational functions to achieve the required quality for flights. This will be facilitated by practising the following six items, which are clustered under the Technology Usage and Management, and Management Involvement sub-factors

.

- Customer representatives are used to review the operations
- Top/senior management encourage the use of new working methods
- Customer requirement surveys are being carried out
- Benchmarking results are used to improve efficiency
- Technology-based equipment is used
- Top/senior management accept the need to train members for future benefit

Efforts to meet customer requirements become the main focus of the operations function. The use of technology advancement and the result of benchmarking are necessary to improve the effectiveness and efficiency of the process. Nevertheless,

encouragement from top/senior management and investment in skill training for the organisations' employees are a foundation to successful efforts.

1b) Technology Usage and Management – Technology Usage Orientation

It is necessary to create a working environment that can give staff full access to information on their airlines' products and services, competitors' performance, technology development, and market conditions. Technology usage orientation has a strong direct connection with the quality of flight as an output of the operational function. Orientation of the employee toward the use of advanced technology will create a better interaction between the departments and the use of process improvement techniques, higher customer demand awareness, and a better use of improvement programme evaluation result. The following items facilitate the practices.

- Statistical or common methods are used to improve the operations chain
- Statistical or common methods are used to solve daily problems
- Awareness that technology is changing rapidly
- Awareness that new services have been developed because of technology
- Anyone can call anyone from other departments with ease

The stronger the orientation towards the use of technological advancement, the greater the chances of improved effectiveness and efficiency in the operational process. The orientation should also encourage the employee to use common working methods in the daily working environment as a "working language". Because of this, the orientation toward the use of technology could become stronger amongst the staff. Nevertheless, management involvement has a significant influence on this sub-factor practice.

2) Reward Systems

A reward system has an important role in maintaining the employees' motivation, and will only work if the management of the organisation is involved in setting up this system. It has direct correlation with team building within the organisation, orientation of the staff to customer demands, motivation to use common working

techniques, and motivation to evaluate the improvement programme. These groups of seven items form the organisation of reward.

- Departmental performance in assessment criteria for managers
- Departmental performance in assessment criteria for staff
- Team-based assessment criteria for managers
- Team-based assessment criteria for staff
- Managers give reward to encourage team-working
- Awareness that new demands are coming
- Top/senior management give rewards to encourage team-working

By realising that there will always be new demands from the customer, a reward system should be established to encourage the entire staff to meet these demands. Departmental performance and teamwork should become the criteria in the assessment to give a reward, either to managers or staff. This is the job of top/senior management.

3) Team Building

Team building within the organisation is influenced by the reward system and, significantly, by encouragement from top/senior management. Team building spirit, which shows in team work, either within a department or between departments, will become a 'vehicle' to make benchmarking exercises successful, programme evaluation effective, and improve quality demand awareness and the efficiency of customer feedback handling. These items create improved teamwork within the organisation.

- Approval for staff to become involved in departmental teams
- Approval for staff to become involved in cross-functional teams
- Customer requirements are translated to operations
- Top/senior management' time is spent in communicating quality
- Agreement to solve the problem, managers and staff working together

The aim of teamwork should be to translate customer requirements into operational activity. Top/senior management encouragement, through communication, will strengthen the process of building the teamwork orientation within the organisation.

4) Benchmarking

Benchmarking is a prerequisite to effective improvement. Benchmarking should be used in improvement programme evaluation and in handling customer feedback. The benchmarking exercise is influenced by teamwork, interaction between departments, and the techniques used in the exercise. The results of benchmarking will be used to assess the level of improvement achieved, and have a direct correlation with the quality of flight.

Utilising these items should give the indicators the organisation needs to measure the position of improvement initiatives against previous performance, other competitors, or the best performer in a similar business.

- Benchmark the efficiency of operations against a competitor
- Benchmark the operations efficiency against the best performer
- Use of benchmarking results in improving working processes
- Availability of information on benchmarking results
- Top/senior management involvement in setting objectives

5) Interdepartmental Interaction

Motivating the organisations' employees to improve interaction amongst themselves and with other departments will determine the ease with which objectives and flows of work are set up in the operational functions. This factor will determine the cohesiveness of the operations function.

Interdepartmental conflict and connectedness appear to influence the level of quality achieved in the operations function. There are three items grouped under the Interdepartmental Interaction factor.

- Talking to anyone is easy, regardless of their position
- The departments' objectives are in harmony
- Top/senior management are involved in operations activities improvement

Interdepartmental interaction should be focused on improving the efficiency of the operational process. It correlates with benchmarking effectiveness, team building

existence, the results of improvement programme evaluation and, significantly, with management involvement and technology usage orientation. This factor correlates directly with the quality of the airline's flights. For this factor, involvement of the top/senior management will have an effect on the practices.

6) Customer Oriented Motivation

Customer oriented motivation is very much maintained or influenced by the existence of a reward system within the organisation. It is also affected by direct involvement from top/senior management. These two items are used to keep up the motivation of staff, to meet the requirements of the customers, in performing their daily work.

- Customer satisfaction influence assessment for managers
- Customer satisfaction influence assessment for staff

In order to achieve motivation, customer satisfaction should become one of the criteria used to assess manager and staff work performance.

7) Process Improvement Technique

The employees in the operational functions have the main role in conducting efficient operations and in achieving this objective effectively. The orientation of the staff towards the whole operation as a process and their work as part of it will ensure the easy flow of work across various related functions within the organisation.

The employment of programme improvement techniques will be influenced by the organisation's orientation toward the use of advanced technology in the operational processes. Strong technology orientation will stimulate the better use of improvement techniques. The use of improvement techniques should also affect the benchmarking exercise and programme evaluation. Motivation to use these techniques is influenced by reward systems. The three items grouped under this factor define the techniques to be used in improvement processes.

- New project is conducted to prevent problems re-occurring
- Employees use statistical or common methods

- Follow-up project is conducted

Prevention processes should be used to ensure that the problem does not re-occur. In order to achieve the quality demanded at the end of the process, it is necessary to conduct follow-up activities to the finished project (solved problem). All of these activities should be participated in by the employees and be performed with common or statistical methods.

8) Quality Demand Awareness

There must be opportunities and facilities for employees to acquire more knowledge on quality issues and to improve their skills in quality improvement techniques. Quality awareness will be strengthened by involvement from management, orientation toward advanced technology usage, reward systems, and mutually influenced by team building.

- Aware that customers tend to look for new services
- Managers' participation in group activities
- Aware that customer preferences are always changing

Employee awareness of the three items clustered in this factor, i.e. changing customer preferences and the demand for new services, has to be established and. management participation is needed to ensure that this happens.

9) Manager/Staff Communication

Management/staff communication correlates with the success of programme evaluation and the level of participation by the employees. Effective communication will support these two factors significantly. This factor would ensure that each function within the organisation is well informed of their weaknesses and strengths.

- Managers' time spent in communicating quality
- Managers make periodic evaluation on quality management practices

The two items in this group of factors represent the need to communicate the quality issue and the result of periodic quality programme evaluation, between the manager and the staff.

10) Improvement Programme Evaluation

Improvement programme evaluation correlates with the output of the operational functions. The effort to conduct the evaluation is influenced significantly by management involvement, technology usage orientation, and communication between the managers and the staff within the organisation. Effectiveness of the evaluation will depend on how the departments interact, team building orientation amongst the members, how the benchmarking is being exercised, and the existence of a reward system.

Improved effectiveness and efficiency in the operational process cannot be achieved by only one project or all at once, but instead, will need a continual effort. Evaluation of the process efficiency and objective achievement will give an indication of the level of success of the improvement programme as a whole. In this factor, three items need to be practised.

- Members are accessible to others from different organisations
- How often the quality of operations is analysed
- Top/senior management make periodic quality evaluation

Staff accessibility between departments and organisational performance analysis will be the major practices for success in this factor. Nevertheless, involvement of top/senior management in this practice is inevitable if the programme is to be evaluated.

11) Customer Feedback Handling

Because the customer is the final arbiter, the customer's feedback should be represented throughout all phases of the operational process. Customer feedback handling correlates with benchmarking. Its process efficiency and resultant effectiveness is influenced by the strength of teamwork within the organisation. The continuity of the effort to exercise this factor will need top/senior management involvement. One item in the construct represents this factor.

- Importance of customer visit

Meeting the customer requirements at the end of the operational process should be ensured by paying attention to customer comments and including them in the improvement process.

12) Employee Participation

The organisation's commitment to quality management practices should be realised by the participation of the staff in operational improvement activity at all levels of the organisation. Employee participation is a factor that can create the organisation's energy to sustain an improvement effort. This can be measured by observing the three items under Employee Participation factor.

- A percentage of staff in departmental teams
- A percentage of staff in cross-functional teams
- A number of department levels conducting working-team activity

This factor is influenced by the existence of a reward system and communication between management and staff.

6.2.6 The variables of organisational context

In managing the critical success factors of quality management practices in the airlines' operational functions, the variables of organisational contexts that influenced the practices should be considered: (referred to in Chapter 3, Section 3.3, and Chapter 5, Section 5.3)

1) Management knowledge – the more the managers know about quality concepts and techniques to improve the operational process, the more likely they are to make positive changes in the organisation. Support from senior managers may take many forms, including setting objectives in the area of safety, punctuality and efficiency, rewarding managers on the basis of the quality-related performance of their department, and making resources available for the quality improvement initiative.

2) Past quality performance – the present level of an airline's quality management practices is a function of the airline's past quality performance. The management should understand their starting position and then utilise the practices that offer them the potential for the greatest improvement. Information on the past performance of the operational functions is necessary and the objective should be to define the activity to be conducted in the process of improvement.

3) External quality demand – the degree of competition, the extent of barriers to entry into the airline industry, the extent of quality demands by customers, and the extent of government quality regulation, will have an impact on the level of quality management practices in the airlines. This will affect the selection of critical success factors of quality management practices in the operational functions that have to be made a priority or focus of improvement.

6.2.7 Application to the Southeast Asian Group

Considering all of the findings on organisational context for the 'developing' airlines of Southeast Asia, the application of the model should be conducted through managing the critical success factors of quality management practices in the operational functions of the airlines. Management behaviour in supporting skills improvement and motivation enhancement should be emphasised as an orientation to practice quality management in the organisation. Based on this orientation, the four critical success factors of Technology Usage & Management, Interdepartmental Interaction, Improvement Programme Evaluation, and Employee Participation will become the main programme.

1) In Technology Usage & Management – Management Involvement:

Managers should periodically be involved in conducting customer expectation surveys on the issues directly related to the operations function, and invite customers to observe the operations function in certain daily work activities. They could also give the opportunity and provide facilities for the staff to acquire more knowledge on operational functions quality issues and to improve their skills on process quality improvement techniques.

2) In Technology Usage & Management – Technology Usage Orientation:

Use statistical methods or common techniques to identify the weak links in the operational chain of activities, and solve problems by improvement practices. Conduct a project to prevent solved-problems from re-occurring and/or for further operational process improvement. All of these activities will create a working environment that stimulates the staff of the organisation to find information on their airline's product/service, competitors' performance, technology development, and market demand.

3) In Interdepartmental Interaction:

Allow the employees to communicate freely with different functions in order to perform their work or other work-related activities.

4) In Improvement Programme Evaluation:

Conduct periodic meetings to evaluate past problems and actions that have been taken on them.

5) In Employee Participation:

Organise and encourage the entire staff to get involve in setting up the organisation's objectives within their own level and scope of work. Involve the entire organisation in process improvement teams, within their own functions, as well as across functions.

6) On Benchmarking:

Consistently perform benchmarking exercises, internally and externally with other airlines and non-airline organisations. A competence cross-functional team might be necessary to facilitate the exercise throughout the organisation.

Since quality improvement is a never-ending process, in order to make the process of improvement continue as the diagram (Figure 6.1) describes it, further effort should be conducted by employing the 12 factors as a quality management construct to measure the practices.

6.3 Summary of Chapter

The results from desk research, which consist of definitions of quality management practices and airline operational functions, were referred to as underlying concepts used to develop the preliminary model diagram. The results from the survey research, through the use of the questionnaire and interviews, were used to refine the preliminary model to become the model required.

The model is in the form of an activity diagram describing an airline's operational processes, with the 12 critical success factors of quality management practices, which consist of 48 items, as a feedback element that should be managed with regard to the 3 variables of organisational context.

The 12 critical success factors of quality management practices in the operational functions of the airlines are:

1) Technology Usage and Management
2) Reward Systems
3) Team Building
4) Benchmarking
5) Interdepartmental Interaction
6) Customer Oriented Motivation
7) Process Improvement Technique
8) Quality Demand Awareness
9) Manager/Staff Communication
10) Improvement Programme Evaluation
11) Customer Feedback Handling
12) Members' Participation

The 3 variables of organisational context that affect the critical success factors are:

1) Management Knowledge
2) Past Quality Performance
3) External Quality Demand

Application of the model to the Southeast Asian airlines' operational functions was developed, based on the differences between managing the critical success factors of

quality management practices in the Southeast Asian airlines and the Western European practices. In this process, the Western European practices were used as a yardstick against the Southeast Asian practices, in which Management Behaviour and Skills & Motivation issues became the main orientation in performing Technology Usage & Management, Interdepartmental Interaction, Improvement Programme Evaluation, Employee Participation, and Benchmarking as the programme. The model will be able to be used by the management of the 'developing' airlines of Southeast Asia as guidance in improving operational process quality, enabling it to face the regional market growth.

Chapter 7
Research Conclusion

This chapter summarises the study process and presents conclusions about the outcome of the study, as well as giving suggestions for future study. This chapter is divided into six sections:

Section 7.1 emphasises why this research was needed and how it was conducted.
Section 7.2 describes the process of the research and how the method used ensured its reliability and validity.
Section 7.3 describes the research findings and the model.
Section 7.4 discusses a determinant foundation for the model to work.
Section 7.5 describes the research contribution.
Section 7.6 gives suggestions for further research.

7.1 The Need for the Research

The need for the 'developing' Southeast Asian airlines to improve their organisational efficiency and effectiveness arises from market growth in Asia-Pacific, particularly in the Southeast Asian region. Despite the economic crisis of 1997-1998, this economic growth remains the highest amongst all of the regions in the world.

This situation, eventually, brings more competition between the airlines operating in the region. Therefore, there is a need for the 'developing' airlines of Southeast Asia to improve their ability to deliver, consistently, a high quality of service. This is why quality management practices are needed in the operational functions of these airlines. Quality management practices mean managing the organisational factors in a certain way, so that the output of the process within the organisation will always meet customer requirements, as well as meeting the industry's standards. In this case, the operational functions in the airlines' organisation become the focus area of the research.

In the preliminary study, the need for this research was further studied and determined by extensive literature reviews, as part of desk research. These reviews demonstrated that there was a great need for this research and gave an indication of how it should proceed in order to fill the gap found in previous research.

A model of quality management practices in operational functions, for the 'developing' airlines of Southeast Asia, was the main objective of this research. In order to achieve this, the following factors had to be researched:

a) First, information on the critical organisational factors that create successful quality management practices in an airline's operational functions was collected and developed from desk and survey research.

b) Secondly, the differences in managing these factors between the 'developing' airlines of Southeast Asia and the 'successful' airlines of Western Europe were measured in scale for each factor, through the use of the survey research.

c) Thirdly, the variables of organisational context that make the practices different between the two groups of airlines were identified from the information collected through desk and survey research.

All the findings were then integrated through a research process structure (see Chapter 1) to generate the model.

7.2 Approach to Development of the Model

The research approach started with a preliminary study and the development of the research process structure (see Chapter 1). Using the research structure as a framework, the research was then conducted by collecting information through desk and survey research and, finally, the findings were integrated to generate the model.

A preliminary study (see Chapters 1, 2 and 3) was conducted to determine the need for this research and how it should be processed. Further processing of this study then

followed the research process structure. Integrated Definition (IDEF 0) language was employed as a research process structure.

IDEF 0 is the most appropriate process mapping software to use in a process improvement field. This software ensures that all of the process elements are appropriately defined and included in the research process, to ensure a systematic research process and the validity and reliability of the research results (see Appendix A).

Following the research process structure, the first activity was 'developing the critical success factors of quality management practices and identifying their variables of organisational context'. This was the desk research activity, in which extensive literature reviews were conducted. The review included literature on:

- quality management definitions;
- quality improvement initiatives in airline operational functions;
- the definition airline operational functions;
- determining the critical success factors of quality management; and
- defining organisational contexts as they affect quality management practices.

This desk research resulted in an initial or a preliminary model of quality management practices in the operational functions of airlines. It is described in Chapters 2 and 3.

The next activity in the research process structure was 'investigating the critical success factors and their organisational contexts'. This was carried out through survey research, conducted by employing a questionnaire and semi-structured interviews. After testing the reliability and the validity of the results, the critical success factors of quality management practices in the operational functions of the airlines and the variables of organisational context were determined. These findings were disclosed in Chapters 4 and 5.

The final activity in the research process, described in Chapter 6, was to generate the model. The findings from previous activities were studied and processed according to the requirements of the model.

7.3 Research Findings and the Model

Based on the analysis of the research findings the, critical success factors of quality management practices in the operational functions for the 'developing' airlines of Southeast Asia were ascertained. The main findings of the research were:

1) The critical success factors of quality management practices in the airlines' Operations function.
2) The differences in managing the critical success factors between the 'developing' airlines of Southeast Asia and the 'successful' airlines of Western Europe.
3) The variables of organisational context that make the differences.
4) The model that has been developed from integrating the findings.

7.3.1 The Critical Success Factors of Quality Management Practices in the Airlines' Operations Function.

The critical success factors were the outcome of desk and survey research. The desk research identified the "critical success factors of quality management practices in airlines' operational functions" (Chapter 3, Section 3.3). These findings were then developed into a questionnaire for use in the survey research. This consisted of the 7 factors of critical success, with 58 questions.

The survey research validated the findings from the desk research into the airline practices, particularly for the 'developing' airlines of Southeast Asia and the 'successful' airlines of Western Europe. It further refined "the critical success factors of quality management practices in airlines' operational functions" (Chapter 4, Section 4.3).

This refinement, after validity and reliability tests, configured the 7 critical success factors, consisting of 58 questions, into 12 factors, consisting of the 48 items left after statistical testing. They were:

1) Technology Usage and Management – there were 2 subfactors under this factor. Firstly, the Management Involvement subfactor, consisting of 6 items:

- Customer representatives are used to review the operations.
- Top/senior management encourage the use of new working method.
- Customer requirement surveys are being carried out.
- How often the benchmarking result is used to improve efficiency.
- Technology-based equipment is used.
- Agree that top/senior management accept to train staff for future benefits.

Secondly, the Technology Usage Orientation subfactor, which consisted of 5 items:

- How often statistical or common methods are used to improve operations chains.
- How often statistical or common methods are used to solve daily problems.
- Agree that technology is changing rapidly.
- Agree that new services have been developed because of technology.
- Agree that anyone can call anyone from other department with comfort.

2) Reward Systems – this group consisted of 7 items:

- Departmental performance in assessment criteria for managers.
- Departmental performance in assessment criteria for staff.
- Team-based assessment criteria for managers.
- Team-based assessment criteria for staff.
- Managers give rewards to encourage teamwork.
- Agree that new demands are coming.
- Top/senior management give rewards to encourage teamwork.

3) Team Building –5 items were grouped under this heading:

- Approval for staff to become involved in departmental teams.
- Approval for staff to become involved in cross-functional teams.
- Customer requirements are translated to operations.
- Percentage of top/senior management's time spent in communicating quality.
- Managers and staff agree to solve the problem together.

4) Benchmarking –consisted of 5 items:

- Benchmarking the efficiency of operations against competitors.
- Benchmarking the operation's efficiency against the best performers.

- Use of a benchmarking result to improve working processes.
- Information on benchmarking results.
- Top/senior management involved in objectives setting.

5) Interdepartmental Interaction – there were 3 items under this factor:

- Agree that to talk to anyone is easy, regardless their position.
- Agree that the departments' objectives are in harmony.
- Top/senior management involved in operations activity improvement.

6) Customer Oriented Motivation –covered 2 items:

- Customer satisfaction influence assessment for managers.
- Customer satisfaction influence assessment for staff.

7) Process Improvement Technique – there were 3 items under this factor:

- How often new projects are conducted to prevent problems re-occurring.
- The percentage of staff using statistical or common methods.
- How often follow-up projects are conducted.

8) Quality Demand Awareness – 3 items were grouped together to represent this factor:

- Agree that customers tend to look for new services.
- Managers' participation in group activities.
- Agree that customer preferences are always changing.

9) Manager-Staff Communication – consisted of 2 items:

- The percentage of managers' time spent in communicating quality.
- Managers make periodic evaluations of quality management practices.

10) Improvement Programme Evaluation – there were 3 items under this factor:

- Members are accessible to others from different organisations.
- How often the quality of operations is analysed.
- Top/senior management make periodic quality evaluation.

11) Customer Feedback Handling – this factor was represented by one item:

- Importance of a customer visit

12) Employee Participation – 3 items represented this factor:

- Percentage of staff in departmental teams.
- Percentage of staff in cross-functional teams.
- Number of department levels conducting team working activity.

The results gave information on the quality management features practised in the 'developing' airlines of Southeast Asia and the 'successful' airlines of Western Europe. Also, the 12 critical success factors (with 48 items) of the airline quality management practices revealed some differences, which were noted and are described in the following paragraph.

7.3.2 The Differences in Managing the Critical Success Factors

Both groups of airlines rated management behaviour, and skills and motivation issues as the main orientation in quality management practices (Section C of the questionnaire). The Southeast Asian airlines perceived high quality demand for their products and services because of the region's market growth. They realised that they would have to perform better if management behaviour and the skills and motivation of their employees were to become the main orientation in quality management practices in their operational functions. It was also noted that the skills and motivation in the Southeast Asian airlines would be very much influenced by the management behaviour in their practising of the critical success factors.

On the other hand, the Western European airlines had similar ideas about the skills and motivation issue, but would rather leave their staff to find their own way to exercise this factor. This was because their staff seemed to be aware of the business situation, due to the airlines having established quality management earlier than the Southeast Asian airlines.

However, the scale of practices identified by the questionnaire and the findings from the semi-structured interviews also indicated that there were differences between the

two groups. Significant differences were noted in Technology Usage and Management (consisting of Management Involvement and Technology Usage Orientation sub-factors), Interdepartmental Interaction, Improvement Programme Evaluation, and Employee Participation, whilst the least differences were found in Benchmarking practises.

The differences between the Southeast Asian practices and the Western European practices were:

1) The Southeast Asian group had a lower scale than the Western European group in practising the Technology Usage & Management factor (for Management Involvement subfactor) particularly on Customer Requirements Surveys and Technology-based Equipment Uses (see Table 4.9 in Chapter 4).

2) The Southeast Asian group seemed to be less aware than the Western European of the need for the organisation to remain in operation by making use of advanced technology, the use of statistical or common methods in solving daily problem, and seemed not to realise that technology advancement could be used to develop new services.

3) It seems that the Southeast Asian airlines had more difficulty in bringing about interaction between the departments within the operational function than the Western European airlines, which could influence the other items.

4) Looking at the graph of the Improvement Programme Evaluation factor, the Southeast Asian group had a lower scale of practices than the Western European group. Improvement programme evaluation could be the key indicator to identifying this position or level of the quality improvement progress.

5) The Southeast Asian airlines seemed to have a higher scale on the percentage of staff in either departmental teams or cross-functional teams but, on the other hand, on the previous factors (Management Involvement, Technology Usage Orientation, and Improvement Programme Evaluation) the Southeast Asian group needed to have more practices.

6) Although it was indicated in the graph that the Southeast Asian airlines had a lower scale than the Western European airlines on availability of benchmarking result information, the practice of these five items under the Benchmarking factor by both groups of airlines were statistically almost equal. The differences (as indicated in Table 4.14 and Figure 4.6) can be related to the use of the results and the analysis of operational performance discussed previously in this section.

7.3.3 The variables of organisational context

This result came from desk and survey researches. The desk research led to "the variables of organisational context" that impact on management of the critical success factors (Chapter 3, Section 3.3). The survey research validated the result from desk research for the differences in managing the critical success factors of quality management practices in the airlines' operational functions, as shown in "variables of organisational context" for airlines' operational functions (Chapter 5, Section 5.3).

It can be said that the three variables of organisational context that have an impact on the management of the critical success factors of quality management practices in the operational function were:

a) Management knowledge is a variable that will influence how management lead process quality improvement within the organisation. It will determine motivation of the organisation's staff and the commitment of the management, in particular.

b) Airlines' past quality performance is a variable that will influence the orientation to conduct quality management programmes. It will determine which factors should be emphasised in the quality improvement programme.

c) External quality demand is the area of quality of product or services to be improved in order for the organisation to remain in business. It will determine the quality requirement for the output of the operational functions.

7.3.4 The Model

Based on the findings of the research, a model was developed to be used by the Southeast Asian airlines as a framework to guide them in their quality improvement initiatives in the operational functions.

The underlying concept for the model is based on the processes of the operational functions of the airlines. It has input, process activity, output, and a feedback mechanism that cover the critical success factors of quality management practices and variables of organisational context (Figure 6.1, Chapter 6, Section 6.2).

The 'customer requirements' and 'industry's standards' become the inputs of the process. The process activity is an activity in which the three main elements, 'operatives', 'equipment and facilities', and 'customers', interact with each other. The 'operations function performance' and 'customer satisfaction level' become the output. The gap between the actual output and the expected output are then fed back to the process activity through management of the critical success factors, by taking into account the variables of organisational context that influence them.

7.4 A Determinant for the Model to Work

It is stated that consistency in applying the model would enable the 'developing' airlines of Southeast Asia to improve their operations function performance, fulfilling the customer requirements and meeting industry standards in safety, punctuality, and efficiency. It must be born in mind that the application of the model is not a short-term task, but instead a long and continual process.

Practising quality management in the operational function should not become an additional activity separate from daily-work activity. If so, the quality improvement will only be adding a workload to the organisation's staff without giving any significant result. Because of this, management should make quality management practices their organisation's programme, with improved product and service quality an organisation goal.

Timing will be very important to the success of promoting quality improvement initiatives. There must be motivation of the staff, without them being disturbed about their past performance, otherwise motivation to practise quality management will not arise. If the above situation is combined with the leadership of the top management, it will generate energy for the organisation to move forward so as to reach its goal. Additionally, all the departments should have the same orientation toward organisational objectives, otherwise friction between them will obstruct the energy flow across the organisation, which would otherwise enhance the strength of the operations function process chain. In the above situation, correct timing is important for not losing the momentum.

Considering the above discussion, it can be argued that the knowledge and understanding of top management on how to practise quality management becomes the main issue for successful practices. This should then lead to top management getting physically involved in managing the critical success factors of the quality management practices that deliver tangible benefits to the organisation.

7.5 Research Contribution

As mentioned before, since the early 1980s the airline industry has put quality as one of the important issues for succeeding in the marketplace. Many airlines have been trying to design their own quality improvement programmes or have adopted one from other, successful, organisations. Some of the airlines have successfully implemented a quality programme, some have just started one, but some of them do not even know where to begin. By focusing on airline operational functions, this study has been able to find the critical success factors of quality management practices in operational functions. The findings were then developed into a model of quality management practices in operational functions, particularly for the 'developing' airlines of Southeast Asia.

The outcome of this study has contributed to the field of quality management as well as to the field of airline management. This can be described as follows:

1) Each of the 12 critical success factors of quality management practices in airlines' operational functions is a programme on its own. It will affect how the management and its staff interact within the function and make use of the airline's equipment and facilities to serve and handle the passengers and goods in day-to-day working operational activity. This exercise will improve the effectiveness and efficiency of the organisation in pursuing safety, punctuality and the efficient processing of the operational function. Besides, these factors with their question items will also become an instrument to measure the progress of the programme.

2) Further development of the research findings has generated a model of quality management practices in the operations function for the 'developing' airlines of Southeast Asia.. They describe the position of the critical success factors of quality management practices within the operations function and relate them to the variables of organisational context that influence the process. Applying this model will give the management and the employees of the organisation a picture or a map of the whole process of improvement within the operations function. For the 'developing' airlines of Southeast Asia, this model will give guidance as to how to improve the effectiveness and efficiency of the operational processes. The concept underlying the model and its structure can also be used in any airline for the process improvement programme within their operational functions.

3) The variables of organisational context that affect the management of critical success factors of quality management practices in airline operational functions. This finding will give awareness to the management of an airline of the effect of organisational context to the success of quality improvement initiative. The variables of the organisational context should become aspects that will be analysed and taken into consideration by the management in managing the critical success factors of quality improvement programmes. Analysing these variables in different airlines will give different results, depending on their organisational situation.

4) Finally, it can be said that the outcome of this study has identified the applicability of quality management concepts for airline operational functions, which have never been empirically studied before.

7.6 Suggestions for Further Research

This research has been conducted by involving a number of airlines from Western Europe and Southeast Asia, and by studying the quality management practices in their operational organisations for a period of time. Involving more airlines from other regions for future study would improve the level of validity and reliability of the findings. Additionally, further study on each factor of the critical success factors of quality management practices and its variables of organisational context mentioned in this research would improve applicability of the model, not only for operational functions, but also for other airline functions.

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Appendix A
Introduction to IDEF 0

IDEF or Integrated Definition language is the modelling technique used to model functional process and corresponding information to support functional process improvement. This methodology was to be used as a regimented approach to analysing organisation of a firm, capturing "as-is" process models, and for modelling activities within the firm organisation.

IDEF's roots began to form when the Air Force of the United States, in response to the identification of the need to improve manufacturing operations, established the Integrated Computer-Aided Manufacturing (ICAM) programme in the mid 1970s. As it is needed for several different purposes, this family of methods has been developed into several different models as follows:

- The IDEF 0 is used to model the activities to accomplish a process and produce a product. It will discuss in more details later.

- IDEF 1 is used for information modelling, which captures conceptual views of the organisation's information. It is an analysis method to capture, communicate, analyse, and understand the information needs of the organisation of a firm.

- IDEF 1X is used for data modelling, which captures the logical view of the firm's data and is based on an entity relationship model.

- IDEF 2 is a simulation model design method, and it is used to represent time varying behaviour of resources in a manufacturing system.

- IDEF 3 is a process description capture method, and it is used to capture behavioural aspects of a system. It is a structured method used to express how a system or an organisation works and show different user views of the system.

- IDEF 4 was developed to support the object-oriented design method.

- IDEF 5 through IDEF 14 still in the process of development[1].

Of these models, the IDEF 0 was the most suitable for the purpose of this research. The basic building block used in IDEF modelling is the ICOM. ICOM stands for Input, Control, Output, and Mechanism. Here is a generic ICOM (Figure 1) that shows the relationships of the Input, Control, Output, and Mechanism to the activity.

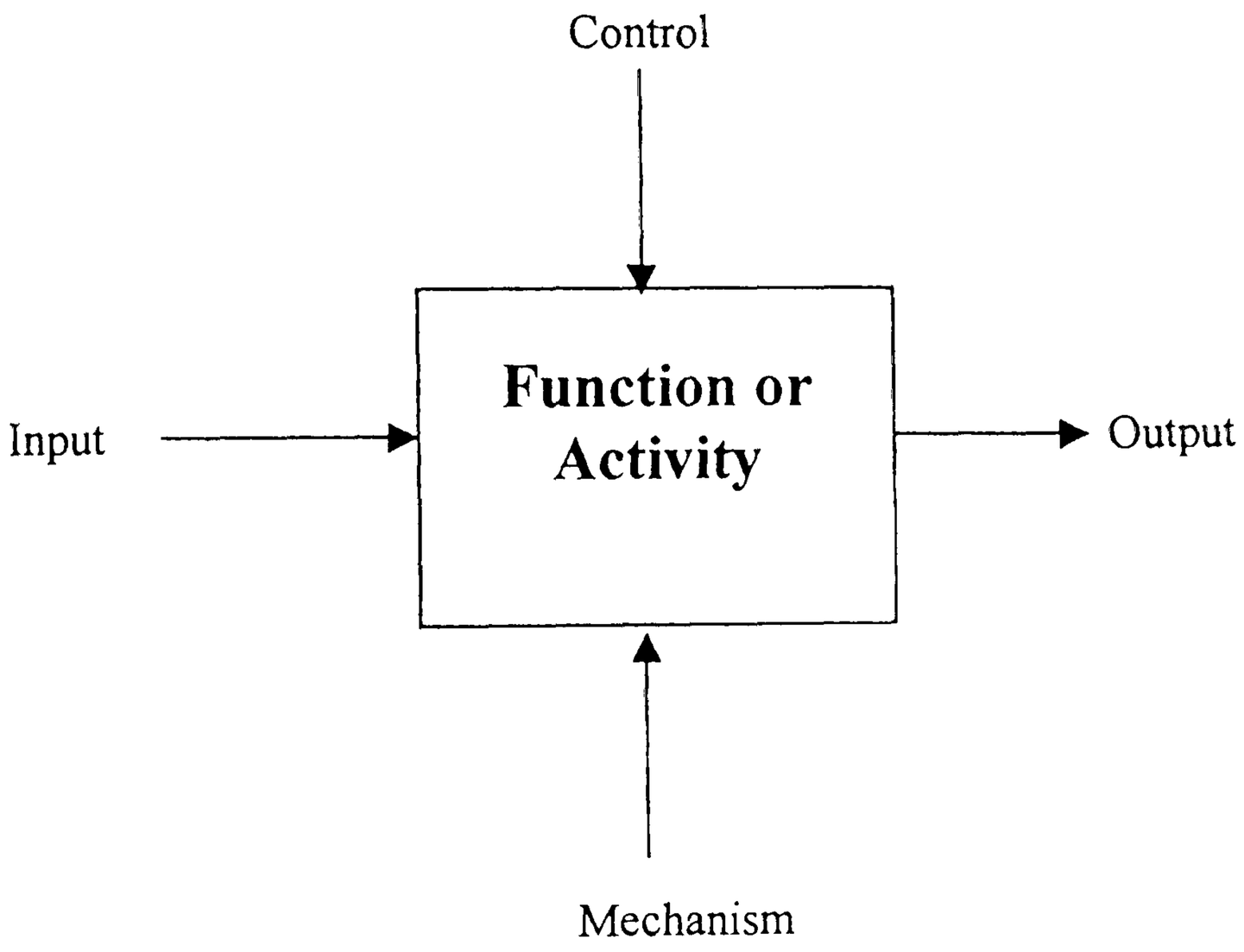


Figure 1. A Generic IDEF Model

Input – It will be transformed by the activity or process. This include material and information

[1] Hanrahan, R. P. The IDEF Process Modeling Methodology. SOFTWARE technology Support Center. http://www.stsc.hill.af.mil/crosstalk/1995/jun/idef.asp (25th August 1999).

Control - Those elements related to the activity that constrains or governs how the activity will be conducted. Examples include policy, budget constraints, and customer requirements.

Output - The result of the activity. This is the input after it is transformed by the activity.

Mechanism - Those things that do or support the activity. This may be people, systems, facilities or equipment necessary to accomplish the activity. The direct costs of doing an activity are associated with the mechanisms.

The first step in constructing an IDEF0 function model is to create the context diagram. The context diagram limits the scope of our modelling effort. It is a model of the function at the highest level (Figure 2).

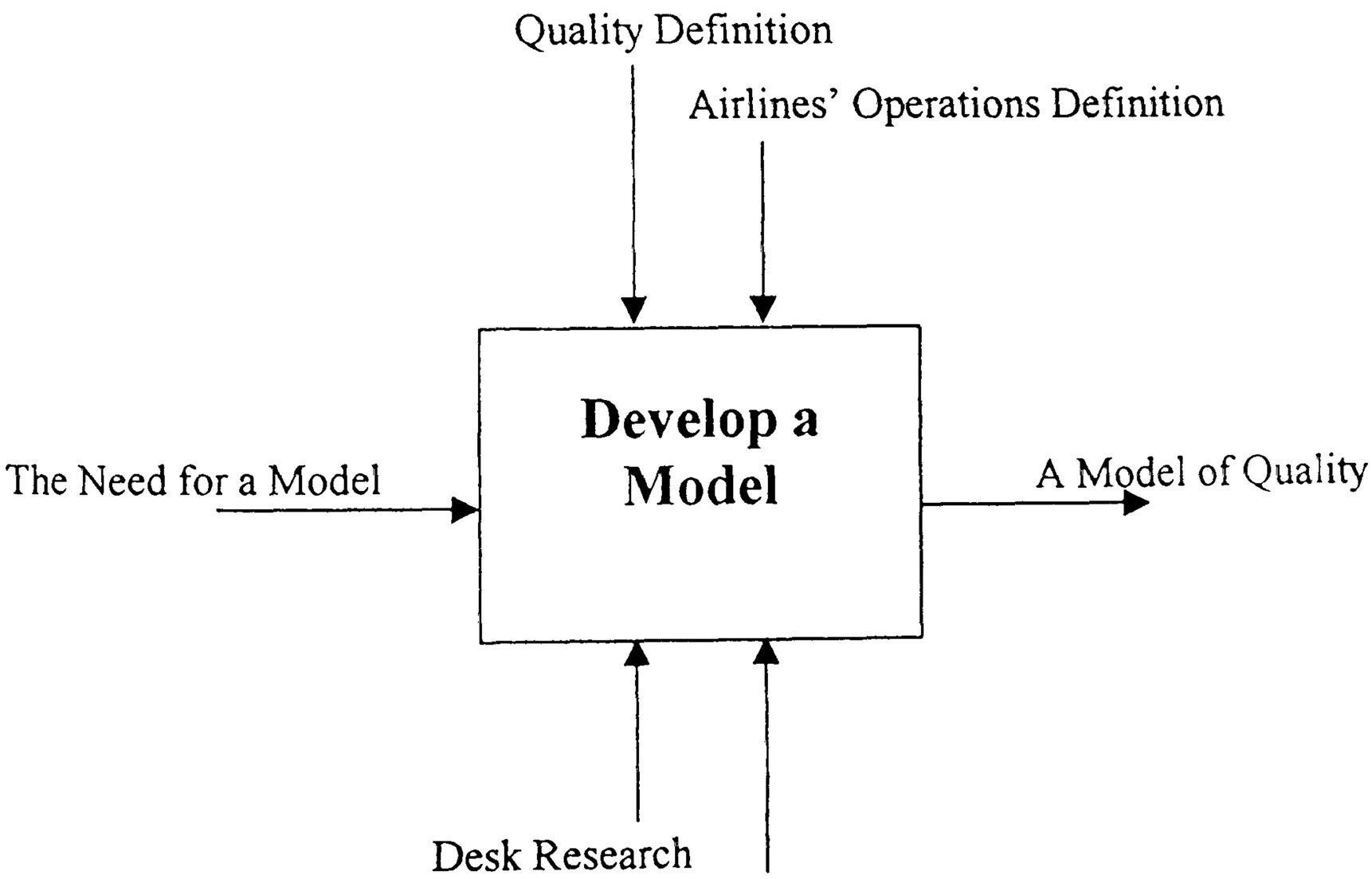


Figure 2. A Context Diagram of IDEF Model

In this modelling example we will use a simple example with which is used in this research. The scenario is that you have a group of airlines that needs to have a common model of quality management to be practised in their organisation; you need to have the quality management literatures reviewed; you will have respondents to be interviewed; and you will have quality management concept to be referred. We will build this model from the point of view of the researcher. The model would be different if we took another point of view, such as that of the airliner.

The next step in IDEF Modelling is to do a functional decomposition of the context diagram. In IDEF we use the node tree to show that decomposition. This is just like a work breakdown structure used by project managers.

In the node tree, (Figure 3) we have decomposed the activity (A0) into sub-activities (A1, A2, and A3). Each of these sub-activities could be further decomposed as needed for analysis. When we decompose an activity, we will break it down into three to six sub-activities. Activities are identified by a number that indicates their level in the model and relationship to the parent activity. The node tree will be the basis for the next step of modelling - that is constructing decomposition diagrams.

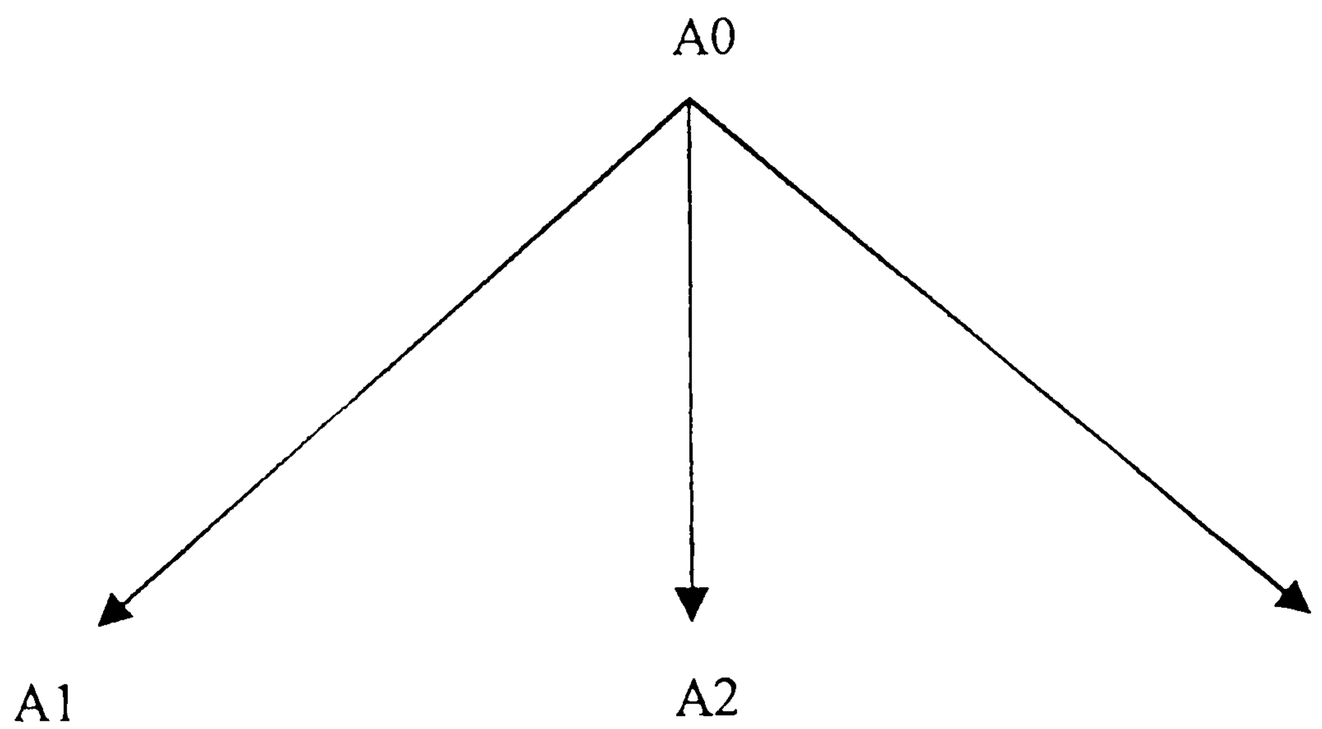


Figure 3. A Node Tree Diagram

Once we have constructed the node tree, we can build a decomposition diagram of our model using ICOMs (Figure 4). First we arrange four boxes in a descending, stair step

fashion. This arrangement facilitates drawing lines on the diagram. Once we have the boxes, we add the ICOMs (Input, Control, Output, and Mechanisms) for each activity.

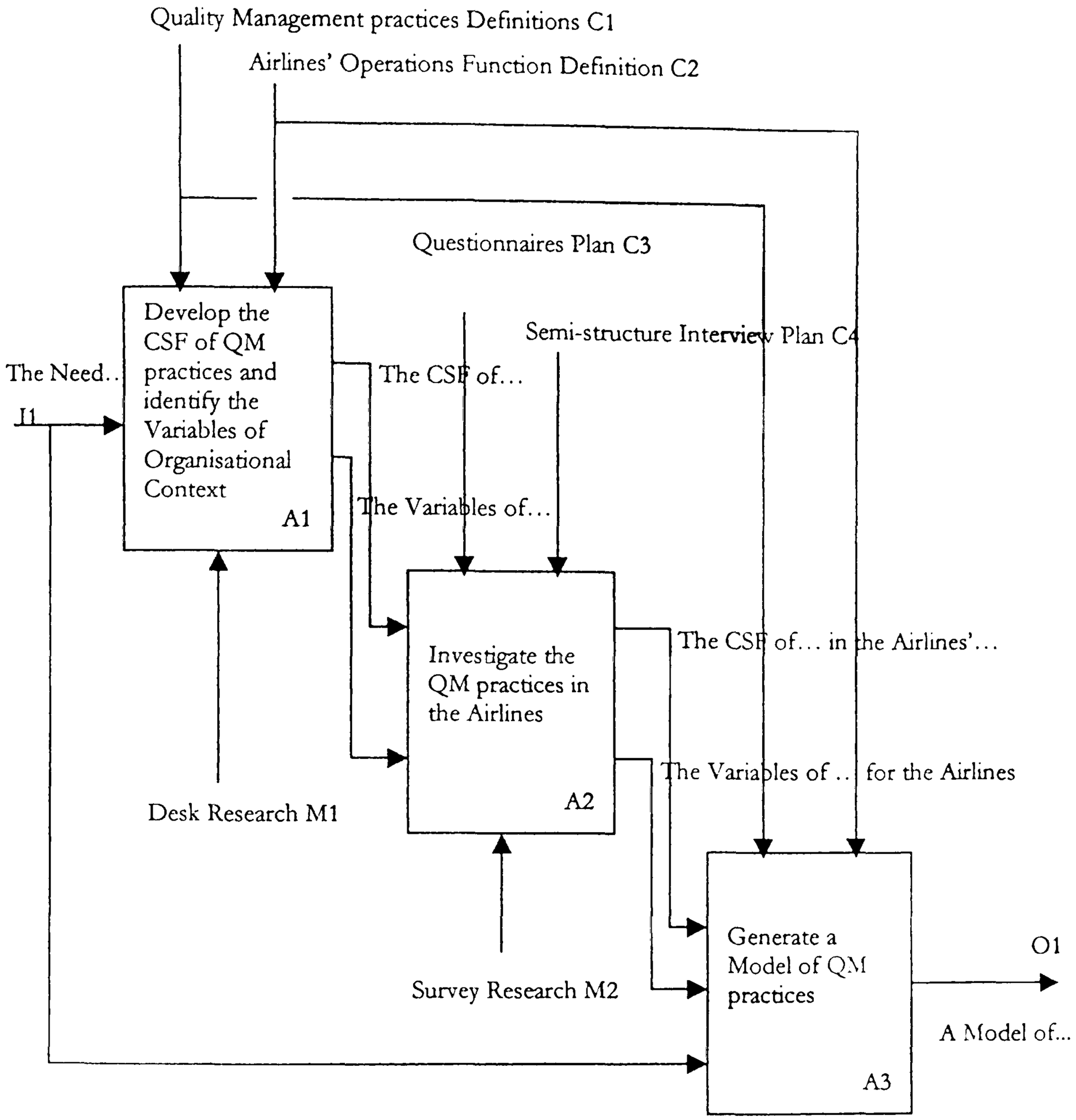


Figure 4. Decomposition Diagram (adopted from Figure 1.2 in Chapter 1)

The ICOMs from the context diagram are reflected on the decomposition diagram. In the quest for more detail, some ICOMs may be split at the lower levels. As we decompose our models further, we use the same process to build decomposition diagrams at each level.

Building IDEF models is an iterative process. We will continue refining the model until it has the level of detail that we need. This example of IDEF0 function and information modelling has most of the features of the typical models used to support business process reengineering. The key points addressed by this example are:

- The analysis must reflect a specific viewpoint.
- The ICOM is the working element of the IDEF diagram.
- IDEF0 diagramming follows a structured approach form the A0 level through decomposition to the lowest level needed for the analysis.
- Modelling is an iterative process. The first time through need not be perfect. Subsequent iterations of the analysis will continue to improve the model at all levels.

Appendix B. Question Items Development Process

Critical Success Factors	Description	Construct	Question items
Quality of Flight	The product at the end should satisfy the requirements of national and international standards as well as the requirements of customer and their (perceived-quality) expectations. *Notes:* *This factor is to measure the level of quality of the product as a result of managing operating process as managers perceive it.*	Customers praise the degree of product quality. The product quality compared to the major competitors. Customer opinion about quality of the product that are offered by the firm over a period of time. Indication that the product complies with industry requirements. The degree of profitability gained from product quality. The frequencies of award/prize received by the organisation as for recognition of its product quality.	1. Our customers praise our product quality. (1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Usually, 5 = Often) 2. The quality of our airline's product is better than that of our major competitors. (1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Usually, 5 = Often) 3. Our customers demonstrate their satisfaction by repeat business with our airline. (1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Usually, 5 = Often) 4. I could indicate that our product delivered to the customer meets the requirements of standard of airline industry. (1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Usually, 5 = Often) 5. I could indicate that this organisation has significantly gained its operating profitability over the past three years. (1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Usually, 5 = Often) 6. This organisation has been able to maintain its operating profitability for the last ten years. (1 = Strongly Disagree to 5 = Strongly Agree) 7. Award/Prize has been given to this organisation as for recognition of its product quality. (1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Usually, 5 = Often)

Critical Success Factors	Description	Construct	Question items
Process Orientation and Technique	For every step in the process, both the internal and the external customer play an important role. This is even more so in the service industry, where production and delivery coincide. Each stage of the process must be subject to the same scrutiny of the methods, the people, skills, equipment and so on to make sure they are correct for the job. Organisation must bring individual activities into statistical control to have successful process improvement. *Notes:* *This factor is to measure the flow of work across various related functions within the process. Techniques and tools employed by individual and/or group of members are important as a common 'working language' to ensure the flow of work.*	The use of statistical methods to reduce operational variability (e.g. Aircraft serviceability level, Various flight delay times, etc.) The use of process-focused improvement techniques (e.g. in Flight scheduled turnaround times, Lost baggage tracking process, New service design process, etc.) The use of cross-functional working team in process improvement projects.	1. What percentage of members of this unit/department regularly uses statistical methods or any organisations' specific methods? (1 = Almost none, 2 = 1%-25%, 3 = 26%-50%, 4 = 51%-90%, 5 = More than 90%) 2. How often do you use organisations' specific methods to identify the weak link in the chain of process activities as an improvement practice? (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always) 3. Does management have to approve the members of the organisation to be involved in departmental improvement teams / quality circles or cross-functional improvement teams? (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always)

Critical Success Factors	*Description*	*Construct*	Question items
Skills and Motivation	Increased training in problem-solving, use of teams, empowerment of employees, and increased emphasis on non-financial and team-based performance measures are required for successful process improvement. A person's goals are a major determinant of work motivation and performance. Specific goals in term of product quality should be clear and set for individual members and organisations. Difficult goals result in greater effort than do easier goals, and feedback results in higher effort than does the lack of feedback. A group's ideas, attitudes and actions are worth more than the individual's. Teamwork became even more important. Attainment of quality in service is depend upon understanding, influencing, directing and improving human factors in service operations. *Notes:* *This is to measure the effort that has been put on to improve the skill and to enhance the motivation required. It is related to members as an individual as well as in a group.*	The amount of time spent in quality management-related training by managers and all of the staff including front-liners. The use of non-financial and team-based performance measures in reward system. The specificity and clarity of the objectives to be pursued by all members in each unit / department. The degree of difficulties to achieve the agreed objectives. The involvement of all members in departmental or cross-functional teamwork / project. Empowerment to make decisions during the difficult time deal with the customer, with no written procedures.	1. What is the average numbers of hours per year spent in quality management-related training programme by managers and all of the staff including front-liners? (1 = less than 10 hrs., 2 = 10-20 hrs, 3 = 21-30 hrs., 4 = 31-40 hrs., 5 = More than 40 hrs.) 2. How important is unit / departmental performance in practicing quality in the assessment criteria used for a reward / compensation of its managers? (1 = Not at all, 2 = Slightly, 3 =Secondary, 4 = Major, 5 = Primary) 3. How important is unit / departmental quality performance in the assessment criteria used for a reward / compensation of its staff? (1 = Not at all, 2 = Slightly, 3 = Secondary, 4 = Major, 5 = Primary) 4. How important is team-based performance in the assessment criteria used for a reward / compensation of managers? (1 = Not at all, 2 = Slightly, 3 = Secondary, 4 = Major, 5 = Primary) 5. How important is team-based performance in the assessment criteria used for a reward / compensation of staff? (1 = Not at all, 2 = Slightly, 3 = Secondary, 4 = Major, 5 = Primary) 6. Customer satisfaction assessment influence the criteria used for a reward / compensation of front-line managers and staff. (1 = Not at all, 2 = Slightly, 3 = Secondary, 4 = Major, 5 = Primary) 7. Our airline's quality objective is challenging to be pursued. (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always) 8. Our unit / department's quality objective is specific and clearly defined. (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always) 9. What percentage of organisation's member is involved in departmental improvement teams? (1 = Almost none, 2 = 1%-25%, 3 = 26%-50%, 4 = 51%-90%, 5 = More than 90%) 10. What percentage of organisation's member is involved in cross-functional improvement teams? (1 = Almost none, 2 = 1%-25%, 3 = 26%-50%, 4 = 51%-90%, 5 = More than 90%) 11. To what degree are managers and staff members empowered to make decisions within their realm of activity without their superior prior approval? (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always) 12. Managers always have to approve the team projects before the team can start to work. (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always)

Critical Success Factors	Description	Construct	Question items
Information Utilization and Analysis	Information on process and problem solving will facilitate problem identification and correction, encourages closer communication and co-ordination between work groups, allowing more rapid cross-functional problem-solving and smoother production flows. Data gathering and analysis can be enhanced through the application of problem-solving tools. Benchmarking of products and processes can be valuable for the improvement of the products and /or processes. Feedback could also be in the form of tallies, charts, or graphs that depict performance over time. *Notes:* ***This is to measure the effort that has been put on in analysing the organisation quality performance and the use of the result and communicated through out the organisation in order to improve the process quality.***	The use of process improvement and problem-solving management tools in information exchange between units / departments. Frequencies of the organisation benchmark the product, and its process with other airlines or similar businesses.	1. What percentage of unit / department's member use the process improvement or problem-solving tools (e.g. Cause and Effect diagrams, Pareto analysis, Matrix diagrams, etc.)? (1 = Almost none, 2 = 1%-25%, 3 = 26%-50%, 4 = 51%-90%, 5 = More than 90%) 2. How often is benchmarking of customer satisfaction used to monitor the position of the company? (1 = Never, 2 = Rarely, 3 = Quite often, 4 = Frequently, 5 = Regularly) 3. How often is benchmarking of operating process with other airlines or similar businesses used to improve the product quality? (1 = Never, 2 = Rarely, 3 = Quite often, 4 = Frequently, 5 = Regularly) 4. I always use the result of benchmarking to improve the working process in my unit / department. (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always) 5. This organisation conduct benchmarking exercise for every stages of its operating process. (1 = Strongly Disagree to 5 = Strongly Agree) 6. This unit / department are well informed of organisation performance analysis result that are related to this unit / department function. (1 = Never, 2 = Rarely, 3 = Quite often, 4 = Frequently, 5 = Regularly)

Critical Success Factors	Description	Construct	Question items
Customer and Supplier Relationship	Because the customer is the final arbiter of process design and ongoing performance, customers should be represented throughout all phases of a process management program. Suppliers can provide firms with ideas for improving product designs, influence the organization's cost structure, and impact the efficiency of the entire process. *Notes:* *This is to measure how far the consumer of organisations' product and the organisations' suppliers get involve in the process in producing end product.*	Frequencies of the customer involve in design reviews, and the identification and development of new products and processes. Involvement of customers and supplier in the development of organisation's strategic plan as an indicator of long-term strategic relations. Supplier involvement in the product development process. The importance of non-price factors in supplier selection.	1. Extent to which marketing research are being done by organisation as part of operating process management. (1 = Never, 2 = Rarely, 3 = Quite often, 4 = Frequently, 5 = Regularly) 2. Extent to which customer expectations are translated into design specifications for a new product by a cross-functional team including the customer. (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always) 3. Extent to which meetings with customers are employed to identify product features that go beyond meeting customer requirements and (perceived-quality) expectations. (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always) 4. Extent to which customer representatives on the review team are used to verify that the design of the product meets the customer requirements. (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always) 5. How important are customer visits to the development of new products? (1 = Not at all, 2 = Slightly, 3 = Secondary, 4 = Major, 5 = Primary) 6. How important are feedback offered by current customers? (1 = Not at all, 2 = Slightly, 3 = Secondary, 4 = Major, 5 = Primary) 7. Are customers involved (either formally or informally) in the development of the long-term business plan? (1 = No role, 2 = Minor role, 3 = Secondary role, 4 = Significant role, 5 = Central role) 8. Are suppliers involved in the development of the long-term business plan? (1 = No role, 2 = Minor role, 3 = Secondary role, 4 = Significant role, 5 = Central role) 9. How important are suppliers to the development of new products to speeding up new product development? (1 = Not at all, 2 = Slightly, 3 = Secondary, 4 = Major, 5 = Primary) 10. How frequently are suppliers selected in order to build a strong long-term strategic partnership? (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always) 11. How important is quality in selecting suppliers? (1 = Not at all, 2 = Slightly, 3 = Secondary, 4 = Major, 5 = Primary) 12. How important is on-time delivery in selecting suppliers? (1 = Not at all, 2 = Slightly, 3 = Secondary, 4 = Major, 5 = Primary) 13. How important is uninterrupted supply in selecting suppliers? (1 = Not at all, 2 = Slightly, 3 = Secondary, 4 = Major, 5 = Primary)

Critical Success Factors	Description	Construct	Question items
Interdepartmental Interaction	Quality management practices should involve all managers and all staff, and are achieved by a systematic coordination of all members in every part of the organisation. Interdepartmental conflict and connectedness appear to influence the level of product quality. *Notes:* *This is to measure how interdepartmental interaction in present situation and the effort to improve it.*	A sense of community or togetherness among managers and all staff working for the organisation. Level of cross-functional activities between units / departments within the organisation. Degree of conflict and connectedness between departments.	1. The best way to solve problems is for a group of people to work together including both managers and staff members of the organisation. (1 = Strongly Disagree, 2 = May be, 3 = Might be, 4 = Probably, 5 = Strongly Agree) 2. Cross-functional activities on problem solving or operating process improvement are taken in almost all levels of organisation. (1 = Not at all, 2 = Some, 3 = Quite a few, 4 = Most, 5 = Almost all) 3. Unit / department's objectives are in harmony with each other. (1 = Strongly Disagree, 2 = May be, 3 = Might be, 4 = Probably, 5 = Strongly Agree) 4. It is easy to talk with anyone you need to, regardless of rank or position. (1 = Strongly Disagree, 2 = May be, 3 = Might be, 4 = Probably, 5 = Strongly Agree) 5. Members from different units / departments feel comfortable calling each other when the need arises. (1 = Strongly Disagree, 2 = May be, 3 = Might be, 4 = Probably, 5 = Strongly Agree) 6. Members of this unit / department are quite accessible to those in other unit / department. (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always) 7. Communications from one unit / department to another are expected to be routed through 'certain channels'. (1 = Strongly Disagree, 2 = May be, 3 = Might be, 4 = Probably, 5 = Strongly Agree) 8. Managers discourage members from discussing work-related matters with those who are not their immediate superiors or subordinates. (1 = Strongly Disagree, 2 = May be, 3 = Might be, 4 = Probably, 5 = Strongly Agree)

Critical Success Factors	Description	Construct	Question items
Technology and Market Turbulence Awareness	Degree of interdepartmental interaction appears to be characterized by varying degrees of market and technology turbulence perceived by the organisation's members. *Notes:* *This is to measure the level or degree of awareness toward changes derived from outside organisation.*	Awareness to the customer's preferences changes. Awareness to the need of advanced technology to always satisfy the customer preferences.	1. In airline business, customers' product preferences change quite a bit over time. (1 = Strongly Disagree to 5 = Strongly Agree) 2. Our customers tend to look for new products all the time. (1 = Strongly Disagree to 5 = Strongly Agree) 3. We are witnessing demand for our products from customers who never bought them before. (1 = Strongly Disagree to 5 = Strongly Agree) 4. The technology we use in this business is changing rapidly. (1 = Strongly Disagree to 5 = Strongly Agree) 5. A large number of new product ideas have been made possible through technological breakthrough in our business. (1 = Strongly Disagree to 5 = Strongly Agree) 6. Technology-based equipment are employed by the organisation in regular basis responses to the industry need (1 = Never, 2 = Rarely, 3 = Quite often, 4 = Frequently, 5 = Regularly)

Critical Success Factors	Description	Construct	Question items
Management Behavior	Managers are responsible to strive toward optimisation of the organisation's resources through time to better serve the aim. It is the task of management to define the organisation's objectives with clarity and stick to them. Managers behaviour and personality should facilitates activities such as team building, improving customer service, reconciling group differences, adapting to change, and facilitating competitive strategic thinking. *Notes:* *Any managers are responsible to optimize resources within their own work unit / department. This is also to measure how the managers lead the organisation, as the members perceive it.*	Visualisation of physical conduct of management toward quality practices. Deployment of organisation's policy and objectives. The degree of risk aversion of management.	1. Extent to which top management is physically involved in operating process improvement and product quality objectives setting. (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always) 2. Extent to which manager participates physically in problem solving group activity. (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always) 3. The percentages of managers' time spend to communicate with customer, or supplier, or organisation's members enforcing quality principles. (1 = Less than 1%, 2 = 1%-20%, 3 = 21%-50%, 4 = 51%-90%, 5 = More than 90%) 4. Extent to which top management makes periodic evaluation of quality practices. (1 = Never, 2 = Rarely, 3 = Quite often, 4 = Frequently, 5 = Regularly) 5. Top management agrees that members must be properly trained to perform their tasks and retrained for future benefit to the organisation. (1 = Strongly Disagree, 2 = May be, 3 = Might be, 4 = Probably, 5 = Strongly Agree) 6. Extent to which investment in the training facilities is accepted. (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always) 7. Extent to which top management gives recognises and rewards to encourage team working. (1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Usually, 5 = Almost always) 8. Top management encourages the development of innovative working process. (1 = Strongly Disagree to 5 = Strongly Agree) 9. Top management accepts occasional new product failures as being normal. (1 = Strongly Disagree to 5 Strongly Agree)

Appendix C

Reliability and Validity Test Results

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AIRLINES	POSITION	YEARS	EXPERIEN
Garuda	EVP Operations	1 year	22 years
Garuda	Head	1 year	23 years
Garuda	Manager	1 1/2 years	22 years
Garuda	Head	1 year	13 years
Garuda	Director	1 year	20 years
Garuda	Director Maint.	5 years	22 years
Garuda	Director Maint.	3 years	23 years
Garuda	VP	3 years	13 years
Garuda	VP Maintenance	n/a	17 years
Garuda	Manager	3 years	19 years
Garuda	Manager	2 years	20 years
Garuda	Head	2 years	5 years
Garuda	Manager	1/4 year	15 years
Garuda	VP Operations	2 years	25 years
Garuda	Director	1/2 year	23 years
Garuda	Manager	3 years	8 years
Garuda	Manager	1 year	5 years
Garuda	Manager	5 years	8 years
Garuda	Head Flt.Safety	2 years	27 years
Garuda	Director	2 years	9.5 years
Garuda	Line Operations	6 years	26 years
Garuda	Line Operation	4 years	24 years
Garuda	Director Ops.	4 years	10 Years
Garuda	Director	n/a	n/a
Garuda	Director	n/a	n/a
Garuda	Director	n/a	n/a
Garuda	Director	n/a	n/a
Garuda	Director	n/a	n/a
Thai Airways Int.	VP Maintenance	5 years	25 years
Thai Airways Int.	EVP Operations	3 years	26 years
Thai Airways Int.	Deputy Director	6 months	5 years
Thai Airways Int.	Dep.Chief Pilot	1 year	12 years
MAS	Manager	2 years	21 years
SAS	Co-ordinator	21/2 years	16 years
SAS	Director	3 year	13 years
SAS	SVP	n/a	n/a
SAS	Advisor	4 years	18 years
SAS	Area Manager	2 years	28 years
SAS	Manager	n/a	n/a
SAS	Project Manager	10 years	39 years
SAS	Managers	4 years	20 years
SAS	Director	1 year	13 years
SAS	Manager	n/a	n/a
British Airways	Manager	1/2 year	10 years
British Airways	General Manager	2 years	20 years
British Airways	General Manager	1 year	14 years
British Airways	Manager	1 1/2 years	5 1/2 years
British Airways	Director	5 years	30 years
British Airways	Consultant	n/a	n/a
KLM	Head	3 years	15 years

JOB	CASE_LBL	D1Q1	D1Q2	D1Q3	D1Q4	D1Q5	D1Q6	D2Q7
Operations	GA1	4.00	4.00	3.00	5.00	4.00	2.00	4.00
A/C Inspection	GA2	3.00	4.00	5.00	5.00	4.00	3.00	4.00
Co-ordinating	GA3	4.00	3.00	4.00	5.00	5.00	3.00	5.00
Logistic	GA4	3.00	2.00	2.00	2.00	4.00	4.00	3.00
Cabin Condition	GA5	5.00	3.00	4.00	1.00	4.00	4.00	5.00
Resource Management	GA6	3.00	4.00	3.00	2.00	4.00	4.00	3.00
Quality Standard	GA7	3.00	3.00	4.00	2.00	5.00	5.00	4.00
Maintenance	GA8	3.00	3.00	4.00	1.00	5.00	5.00	5.00
Maintenance	GA9	3.00	3.00	3.00	1.00	3.00	3.00	2.00
Material Control	GA10	5.00	4.00	4.00	4.00	4.00	5.00	4.00
Material Support	GA11	5.00	4.00	4.00	3.00	3.00	4.00	4.00
Cabin Procurement	GA12	3.00	3.00	4.00	2.00	4.00	4.00	3.00
Procurement Process	GA13	3.00	3.00	3.00	3.00	4.00	4.00	2.00
Information System	GA14	5.00	4.00	4.00	1.00	3.00	#NULL!	4.00
Base Maintenance	GA15	3.00	3.00	3.00	2.00	5.00	5.00	3.00
Spareparts Control	GA16	3.00	2.00	2.00	2.00	3.00	2.00	2.00
Logistic	GA17	5.00	3.00	3.00	4.00	5.00	5.00	5.00
Maint. Planning	GA18	3.00	2.00	2.00	1.00	4.00	4.00	1.00
Flight Safety	GA19	4.00	4.00	3.00	1.00	3.00	3.00	4.00
Flt.Safety Analysis	GA20	4.00	4.00	3.00	1.00	4.00	3.00	3.00
Captain Pilot	GA21	3.00	3.00	4.00	5.00	4.00	1.00	2.00
Captain Pilot	GA22	3.00	3.00	2.00	3.00	4.00	1.00	2.00
Ops. Control	GA23	4.00	4.00	5.00	1.00	4.00	4.00	5.00
Operations	GAX1	4.00	5.00	3.00	4.00	4.00	1.00	3.00
Operations	GAX2	4.00	5.00	3.00	4.00	4.00	1.00	3.00
Operations	GAX3	4.00	5.00	3.00	4.00	4.00	1.00	3.00
Operations	GAX4	4.00	5.00	3.00	4.00	4.00	1.00	3.00
Operations	GAX5	4.00	5.00	3.00	4.00	4.00	1.00	3.00
A/C Line Maintenance	THAI1	5.00	4.00	5.00	5.00	5.00	3.00	5.00
Directing Operations	THAI2	5.00	5.00	5.00	5.00	5.00	3.00	5.00
Cockpit Crew Training	THAI3	4.00	3.00	4.00	5.00	5.00	4.00	4.00
Captain Pilot	THAI4	3.00	3.00	3.00	5.00	5.00	3.00	4.00
Customer Services	MAS1	3.00	5.00	5.00	5.00	5.00	1.00	4.00
Quality Assurance	SAS1	3.00	3.00	3.00	1.00	5.00	5.00	4.00
Quality Assurance	SAS2	5.00	5.00	5.00	5.00	5.00	#NULL!	5.00
Operations	SAS3	5.00	5.00	4.00	5.00	5.00	1.00	5.00
Rules & Regulations	SAS4	5.00	5.00	5.00	5.00	5.00	3.00	4.00
Process Management	SAS5	4.00	5.00	5.00	5.00	5.00	#NULL!	4.00
Operations	SAS6	4.00	4.00	3.00	5.00	5.00	3.00	4.00
A/C Maintenance	SAS7	4.00	4.00	4.00	5.00	5.00	4.00	5.00
Customer Rel.	SAS8	4.00	4.00	5.00	4.00	5.00	5.00	4.00
Traffic Ops. Center	SAS9	5.00	4.00	4.00	4.00	4.00	5.00	5.00
Operations	SASX	4.00	3.00	3.00	5.00	5.00	3.00	5.00
Cabin Services Act.Planning	BA1	3.00	5.00	3.00	5.00	5.00	2.00	4.00
Operations Control	BA2	3.00	5.00	3.00	5.00	5.00	#NULL!	5.00
Improvement Process	BA3	3.00	4.00	3.00	4.00	5.00	#NULL!	4.00
Manpower Planning	BA4	3.00	5.00	3.00	3.00	2.00	3.00	3.00
Flt. Ops.Control	BA5	3.00	5.00	4.00	5.00	5.00	4.00	4.00
Operations	BAX	5.00	5.00	5.00	#NULL!	#NULL!	5.00	5.00
Safety & Security	KLMUK1	3.00	4.00	3.00	5.00	4.00	4.00	3.00

D2Q8	D2Q9	D2Q10	D2Q11	D3Q12	D3Q13	D3Q14	D3Q15	D3Q16	D3Q17	D3Q18
#NULL!	3.00	3.00	3.00	1.00	1.00	3.00	4.00	4.00	4.00	2.00
3.00	4.00	3.00	3.00	3.00	2.00	4.00	4.00	5.00	4.00	5.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00	5.00
3.00	4.00	3.00	3.00	2.00	3.00	2.00	2.00	2.00	2.00	2.00
5.00	2.00	2.00	2.00	4.00	3.00	3.00	3.00	3.00	3.00	1.00
#NULL!	2.00	4.00	#NULL!	3.00	3.00	3.00	4.00	4.00	4.00	4.00
#NULL!	3.00	5.00	5.00	3.00	3.00	5.00	5.00	5.00	5.00	4.00
4.00	3.00	4.00	4.00	5.00	4.00	4.00	5.00	5.00	4.00	5.00
2.00	3.00	3.00	3.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00
4.00	4.00	4.00	4.00	3.00	4.00	4.00	4.00	5.00	5.00	4.00
4.00	3.00	4.00	#NULL!	3.00	4.00	4.00	5.00	5.00	4.00	4.00
3.00	3.00	3.00	3.00	1.00	3.00	4.00	4.00	3.00	3.00	5.00
3.00	4.00	4.00	4.00	2.00	4.00	3.00	3.00	2.00	2.00	2.00
3.00	3.00	3.00	3.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00
#NULL!	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	5.00
1.00	4.00	5.00	3.00	2.00	2.00	4.00	4.00	4.00	4.00	4.00
4.00	2.00	3.00	3.00	3.00	3.00	2.00	4.00	4.00	4.00	4.00
1.00	1.00	1.00	1.00	2.00	2.00	4.00	4.00	4.00	4.00	4.00
4.00	5.00	5.00	5.00	1.00	1.00	5.00	5.00	5.00	5.00	5.00
2.00	2.00	3.00	3.00	1.00	1.00	5.00	3.00	3.00	3.00	3.00
2.00	2.00	2.00	2.00	1.00	1.00	2.00	2.00	#NULL!	#NULL!	3.00
2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00
4.00	3.00	5.00	3.00	1.00	1.00	4.00	4.00	4.00	4.00	1.00
2.00	3.00	4.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
2.00	3.00	4.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
2.00	3.00	4.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
2.00	3.00	4.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
2.00	3.00	4.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
5.00	5.00	5.00	5.00	2.00	3.00	3.00	3.00	2.00	2.00	3.00
5.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00
2.00	2.00	4.00	2.00	4.00	4.00	4.00	4.00	4.00	3.00	5.00
4.00	4.00	4.00	4.00	4.00	3.00	3.00	4.00	3.00	4.00	5.00
4.00	2.00	3.00	4.00	2.00	2.00	4.00	4.00	1.00	2.00	2.00
4.00	3.00	2.00	2.00	2.00	1.00	4.00	3.00	3.00	3.00	3.00
5.00	2.00	3.00	3.00	1.00	1.00	3.00	1.00	1.00	1.00	3.00
5.00	4.00	4.00	3.00	2.00	1.00	4.00	4.00	4.00	4.00	4.00
5.00	3.00	3.00	3.00	2.00	2.00	3.00	3.00	4.00	4.00	5.00
3.00	2.00	3.00	3.00	2.00	2.00	1.00	1.00	1.00	1.00	4.00
3.00	3.00	4.00	3.00	4.00	3.00	3.00	3.00	4.00	3.00	4.00
5.00	5.00	4.00	4.00	4.00	3.00	4.00	4.00	4.00	4.00	4.00
5.00	3.00	5.00	3.00	3.00	2.00	3.00	3.00	3.00	3.00	3.00
5.00	4.00	4.00	4.00	2.00	2.00	4.00	4.00	4.00	3.00	4.00
4.00	5.00	5.00	4.00	5.00	4.00	2.00	3.00	4.00	4.00	5.00
4.00	3.00	3.00	3.00	1.00	1.00	4.00	3.00	3.00	2.00	3.00
5.00	4.00	3.00	3.00	2.00	2.00	4.00	4.00	3.00	4.00	4.00
3.00	3.00	2.00	3.00	1.00	1.00	2.00	2.00	3.00	3.00	4.00
3.00	4.00	3.00	3.00	2.00	1.00	2.00	1.00	2.00	3.00	2.00
5.00	4.00	5.00	4.00	4.00	4.00	4.00	3.00	2.00	3.00	1.00
2.00	3.00	5.00	5.00	2.00	2.00	3.00	3.00	3.00	4.00	2.00
3.00	3.00	4.00	3.00	1.00	1.00	4.00	3.00	2.00	3.00	4.00

D3Q19	D3Q20	D3Q21	D3Q22	D3Q23	D3Q24	D3Q25	D3Q26	D4Q27	D4Q28	D4Q29
2.00	3.00	5.00	4.00	4.00	4.00	3.00	3.00	3.00	4.00	3.00
4.00	4.00	4.00	5.00	3.00	3.00	4.00	4.00	4.00	4.00	3.00
4.00	4.00	5.00	5.00	5.00	4.00	3.00	3.00	5.00	3.00	3.00
2.00	4.00	4.00	3.00	4.00	4.00	4.00	4.00	4.00	2.00	2.00
1.00	5.00	5.00	5.00	5.00	1.00	1.00	1.00	4.00	1.00	1.00
4.00	4.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00
4.00	5.00	5.00	4.00	4.00	4.00	3.00	3.00	4.00	3.00	3.00
4.00	4.00	4.00	5.00	3.00	2.00	1.00	3.00	5.00	4.00	4.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
4.00	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00	4.00
4.00	4.00	4.00	4.00	5.00	5.00	5.00	5.00	4.00	4.00	4.00
4.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	2.00	3.00
3.00	3.00	4.00	3.00	2.00	2.00	3.00	3.00	3.00	4.00	4.00
3.00	3.00	4.00	2.00	2.00	2.00	4.00	4.00	2.00	3.00	2.00
5.00	4.00	5.00	3.00	5.00	3.00	4.00	4.00	4.00	3.00	3.00
4.00	4.00	4.00	4.00	4.00	3.00	3.00	3.00	3.00	3.00	3.00
4.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	2.00	2.00
4.00	4.00	4.00	4.00	4.00	3.00	3.00	4.00	4.00	4.00	4.00
5.00	3.00	3.00	5.00	5.00	5.00	2.00	2.00	5.00	4.00	4.00
3.00	5.00	5.00	4.00	3.00	4.00	3.00	3.00	5.00	4.00	3.00
3.00	4.00	2.00	4.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
3.00	4.00	3.00	5.00	3.00	3.00	3.00	2.00	3.00	3.00	2.00
1.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	3.00	3.00	3.00
2.00	5.00	4.00	4.00	3.00	2.00	3.00	3.00	4.00	4.00	4.00
2.00	5.00	4.00	4.00	3.00	2.00	3.00	3.00	4.00	4.00	4.00
2.00	5.00	4.00	4.00	3.00	2.00	3.00	3.00	4.00	4.00	4.00
2.00	5.00	4.00	4.00	3.00	2.00	3.00	3.00	4.00	4.00	4.00
2.00	5.00	4.00	4.00	3.00	2.00	3.00	3.00	4.00	4.00	4.00
3.00	4.00	5.00	3.00	4.00	4.00	3.00	3.00	3.00	4.00	5.00
5.00	5.00	5.00	4.00	5.00	4.00	5.00	5.00	5.00	5.00	5.00
5.00	5.00	4.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00	3.00
5.00	4.00	4.00	5.00	4.00	3.00	5.00	5.00	4.00	4.00	4.00
2.00	4.00	5.00	5.00	2.00	2.00	5.00	5.00	5.00	3.00	3.00
3.00	4.00	3.00	4.00	2.00	2.00	3.00	4.00	4.00	3.00	2.00
1.00	4.00	5.00	4.00	4.00	2.00	2.00	2.00	5.00	5.00	5.00
4.00	4.00	4.00	5.00	2.00	2.00	3.00	3.00	5.00	3.00	5.00
5.00	4.00	4.00	4.00	2.00	2.00	3.00	3.00	4.00	4.00	4.00
4.00	4.00	5.00	5.00	3.00	2.00	2.00	2.00	3.00	3.00	3.00
3.00	4.00	4.00	3.00	3.00	2.00	3.00	2.00	4.00	2.00	3.00
4.00	4.00	5.00	4.00	3.00	3.00	#NULL!	3.00	5.00	5.00	5.00
3.00	3.00	3.00	4.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00
3.00	4.00	5.00	5.00	4.00	3.00	3.00	4.00	5.00	5.00	4.00
5.00	5.00	5.00	4.00	2.00	2.00	4.00	4.00	5.00	3.00	3.00
3.00	5.00	5.00	4.00	5.00	4.00	2.00	2.00	5.00	4.00	3.00
4.00	5.00	4.00	5.00	2.00	2.00	4.00	4.00	5.00	5.00	5.00
4.00	#NULL!	4.00	4.00	5.00	3.00	2.00	2.00	5.00	4.00	3.00
3.00	4.00	4.00	3.00	2.00	2.00	4.00	4.00	5.00	3.00	3.00
1.00	4.00	5.00	5.00	2.00	2.00	2.00	2.00	4.00	4.00	4.00
3.00	#NULL!	5.00	4.00	2.00	1.00	4.00	4.00	4.00	4.00	2.00
2.00	4.00	5.00	5.00	2.00	4.00	3.00	3.00	5.00	4.00	3.00

D4Q30	D4Q31	D4Q32	D4Q33	D5Q34	D5Q35	D5Q36	D5Q37	D5Q38	D6Q39	D6Q40
4.00	4.00	4.00	3.00	2.00	3.00	3.00	4.00	4.00	4.00	4.00
4.00	4.00	4.00	4.00	4.00	4.00	3.00	5.00	4.00	4.00	4.00
4.00	4.00	3.00	4.00	4.00	3.00	4.00	4.00	5.00	5.00	4.00
3.00	3.00	2.00	3.00	3.00	3.00	3.00	2.00	3.00	4.00	4.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	5.00	4.00	4.00
3.00	3.00	4.00	3.00	4.00	3.00	4.00	4.00	4.00	4.00	4.00
3.00	3.00	3.00	3.00	3.00	3.00	4.00	3.00	5.00	4.00	5.00
4.00	3.00	4.00	4.00	3.00	1.00	3.00	3.00	5.00	4.00	4.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	5.00	4.00	4.00	4.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
3.00	2.00	3.00	2.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
5.00	4.00	3.00	3.00	4.00	3.00	3.00	4.00	4.00	4.00	3.00
4.00	3.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	5.00	4.00
3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	5.00	4.00	5.00
3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	5.00	4.00	5.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1.00	2.00	5.00	2.00	1.00	1.00	1.00	1.00	5.00	4.00	5.00
2.00	3.00	4.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00
2.00	1.00	2.00	1.00	2.00	2.00	1.00	#NULL!	2.00	5.00	2.00
2.00	3.00	3.00	2.00	2.00	3.00	2.00	4.00	4.00	5.00	4.00
3.00	3.00	3.00	2.00	3.00	4.00	3.00	2.00	2.00	5.00	5.00
3.00	2.00	3.00	3.00	2.00	2.00	1.00	4.00	4.00	3.00	3.00
3.00	2.00	3.00	3.00	2.00	2.00	1.00	4.00	4.00	3.00	3.00
3.00	2.00	3.00	3.00	2.00	2.00	1.00	4.00	4.00	3.00	3.00
3.00	2.00	3.00	3.00	2.00	2.00	1.00	4.00	4.00	3.00	3.00
3.00	2.00	3.00	3.00	2.00	2.00	1.00	4.00	4.00	3.00	3.00
4.00	4.00	4.00	3.00	3.00	3.00	4.00	4.00	4.00	5.00	5.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	4.00	4.00	4.00
5.00	5.00	4.00	5.00	5.00	3.00	4.00	4.00	5.00	5.00	4.00
5.00	5.00	3.00	5.00	3.00	3.00	4.00	5.00	5.00	5.00	4.00
3.00	3.00	3.00	3.00	4.00	3.00	3.00	4.00	4.00	4.00	4.00
5.00	5.00	3.00	4.00	5.00	2.00	2.00	2.00	5.00	5.00	2.00
4.00	3.00	3.00	5.00	5.00	4.00	4.00	2.00	5.00	5.00	5.00
5.00	3.00	3.00	3.00	5.00	4.00	4.00	3.00	4.00	3.00	3.00
3.00	3.00	3.00	2.00	3.00	2.00	2.00	2.00	4.00	2.00	4.00
44.00	3.00	4.00	5.00	3.00	2.00	2.00	4.00	4.00	#NULL!	4.00
5.00	5.00	5.00	5.00	5.00	4.00	4.00	5.00	5.00	5.00	4.00
3.00	4.00	4.00	3.00	4.00	3.00	3.00	3.00	2.00	2.00	3.00
5.00	4.00	5.00	5.00	5.00	4.00	4.00	4.00	5.00	5.00	5.00
4.00	4.00	3.00	4.00	5.00	3.00	3.00	4.00	4.00	5.00	3.00
4.00	3.00	3.00	3.00	5.00	4.00	4.00	3.00	5.00	5.00	4.00
4.00	5.00	4.00	5.00	5.00	5.00	4.00	5.00	5.00	4.00	4.00
4.00	5.00	3.00	3.00	2.00	2.00	2.00	3.00	5.00	3.00	5.00
3.00	3.00	3.00	3.00	4.00	3.00	3.00	1.00	3.00	5.00	4.00
5.00	4.00	4.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00
5.00	4.00	4.00	3.00	3.00	2.00	4.00	4.00	4.00	5.00	3.00
3.00	3.00	3.00	5.00	5.00	4.00	2.00	3.00	4.00	5.00	4.00

D6Q41	D6Q42	D6Q43	D6Q44	D6Q45	D6Q46	D7Q47	D7Q48	D7Q49	D7Q50	D7Q51
2.00	3.00	3.00	3.00	4.00	3.00	4.00	4.00	3.00	4.00	3.00
4.00	4.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	5.00	4.00
5.00	5.00	5.00	5.00	3.00	3.00	4.00	4.00	5.00	5.00	4.00
4.00	4.00	4.00	4.00	2.00	2.00	4.00	4.00	3.00	2.00	2.00
4.00	4.00	4.00	4.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	5.00	3.00	4.00	4.00
4.00	3.00	4.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00
4.00	5.00	5.00	4.00	2.00	1.00	4.00	3.00	5.00	4.00	4.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
3.00	4.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00
3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	4.00
4.00	4.00	5.00	2.00	3.00	1.00	4.00	4.00	4.00	4.00	3.00
3.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
4.00	4.00	4.00	4.00	3.00	3.00	5.00	5.00	3.00	4.00	5.00
5.00	4.00	4.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00
2.00	2.00	2.00	3.00	3.00	3.00	4.00	4.00	4.00	3.00	3.00
1.00	1.00	1.00	5.00	5.00	1.00	5.00	5.00	5.00	2.00	2.00
3.00	2.00	4.00	4.00	4.00	4.00	5.00	2.00	5.00	5.00	5.00
2.00	2.00	2.00	2.00	2.00	3.00	4.00	3.00	3.00	2.00	2.00
4.00	4.00	3.00	4.00	5.00	4.00	4.00	4.00	4.00	3.00	4.00
5.00	5.00	5.00	4.00	1.00	4.00	5.00	5.00	5.00	5.00	5.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
4.00	4.00	5.00	4.00	4.00	1.00	4.00	4.00	5.00	5.00	4.00
4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00	5.00
4.00	4.00	4.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00
4.00	4.00	5.00	4.00	4.00	3.00	5.00	5.00	5.00	5.00	5.00
5.00	5.00	5.00	5.00	4.00	1.00	5.00	5.00	5.00	5.00	5.00
4.00	4.00	2.00	4.00	5.00	4.00	5.00	4.00	4.00	5.00	5.00
4.00	5.00	5.00	5.00	2.00	2.00	5.00	4.00	4.00	5.00	5.00
5.00	5.00	5.00	5.00	2.00	1.00	5.00	3.00	4.00	5.00	5.00
2.00	3.00	3.00	4.00	3.00	1.00	4.00	4.00	4.00	5.00	5.00
4.00	4.00	4.00	4.00	3.00	3.00	5.00	5.00	4.00	5.00	4.00
4.00	5.00	3.00	4.00	4.00	3.00	5.00	4.00	4.00	4.00	5.00
5.00	5.00	5.00	5.00	1.00	1.00	5.00	5.00	4.00	5.00	4.00
3.00	5.00	4.00	3.00	2.00	3.00	4.00	4.00	3.00	4.00	4.00
5.00	5.00	5.00	4.00	4.00	1.00	5.00	4.00	3.00	4.00	4.00
3.00	4.00	5.00	5.00	3.00	2.00	5.00	3.00	4.00	5.00	5.00
4.00	4.00	4.00	4.00	2.00	2.00	4.00	4.00	3.00	5.00	5.00
4.00	2.00	5.00	3.00	1.00	5.00	5.00	3.00	5.00	5.00	5.00
4.00	3.00	5.00	4.00	2.00	1.00	4.00	4.00	2.00	5.00	4.00
3.00	4.00	4.00	4.00	3.00	2.00	4.00	3.00	3.00	5.00	5.00
4.00	5.00	5.00	5.00	2.00	1.00	4.00	4.00	4.00	5.00	5.00
3.00	4.00	4.00	4.00	2.00	5.00	5.00	5.00	4.00	5.00	5.00
5.00	5.00	4.00	5.00	2.00	2.00	2.00	3.00	4.00	5.00	4.00

D7Q52	D8Q53	D8Q54	D8Q55	D8Q56	D8Q57	D8Q58	D8Q59	D8Q60	D8Q61	D8Q62
4.00	4.00	5.00	4.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00
4.00	4.00	5.00	5.00	4.00	4.00	4.00	4.00	5.00	4.00	5.00
5.00	4.00	3.00	3.00	5.00	5.00	4.00	5.00	5.00	5.00	5.00
2.00	4.00	4.00	4.00	4.00	3.00	4.00	3.00	4.00	3.00	3.00
3.00	2.00	2.00	2.00	4.00	4.00	5.00	3.00	4.00	3.00	2.00
4.00	3.00	4.00	4.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00
4.00	3.00	4.00	5.00	3.00	5.00	4.00	4.00	4.00	4.00	4.00
3.00	3.00	4.00	4.00	3.00	4.00	4.00	4.00	5.00	5.00	4.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
4.00	4.00	4.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
3.00	4.00	4.00	3.00	4.00	4.00	4.00	4.00	4.00	3.00	4.00
4.00	3.00	4.00	3.00	3.00	4.00	3.00	2.00	4.00	4.00	3.00
3.00	3.00	4.00	3.00	4.00	5.00	4.00	4.00	5.00	4.00	4.00
4.00	2.00	2.00	3.00	3.00	2.00	2.00	2.00	3.00	3.00	3.00
4.00	3.00	4.00	4.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00
4.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
4.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
3.00	4.00	4.00	4.00	4.00	3.00	4.00	4.00	4.00	4.00	4.00
2.00	1.00	2.00	5.00	2.00	3.00	4.00	2.00	2.00	2.00	2.00
3.00	3.00	3.00	4.00	3.00	3.00	3.00	3.00	5.00	3.00	4.00
2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	5.00	4.00	2.00
4.00	4.00	3.00	4.00	4.00	2.00	3.00	4.00	5.00	3.00	4.00
4.00	2.00	2.00	5.00	4.00	4.00	4.00	2.00	3.00	3.00	3.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
5.00	4.00	4.00	5.00	3.00	4.00	4.00	4.00	4.00	5.00	3.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	3.00	4.00	4.00
5.00	5.00	5.00	5.00	4.00	4.00	3.00	4.00	5.00	55.00	4.00
5.00	5.00	5.00	5.00	4.00	4.00	3.00	5.00	5.00	5.00	5.00
5.00	3.00	3.00	4.00	3.00	5.00	5.00	3.00	4.00	3.00	3.00
5.00	4.00	4.00	3.00	2.00	3.00	5.00	5.00	4.00	4.00	2.00
5.00	5.00	4.00	4.00	4.00	4.00	5.00	5.00	5.00	5.00	5.00
5.00	3.00	3.00	3.00	3.00	3.00	2.00	2.00	5.00	4.00	4.00
4.00	3.00	4.00	5.00	2.00	5.00	5.00	3.00	4.00	4.00	1.00
4.00	4.00	4.00	3.00	3.00	2.00	2.00	3.00	#NULL!	3.00	3.00
5.00	5.00	5.00	4.00	3.00	3.00	4.00	4.00	5.00	5.00	4.00
4.00	3.00	3.00	3.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00
4.00	5.00	4.00	5.00	4.00	4.00	5.00	5.00	3.00	3.00	3.00
5.00	3.00	4.00	4.00	3.00	5.00	5.00	5.00	5.00	4.00	4.00
5.00	3.00	3.00	3.00	3.00	2.00	3.00	3.00	5.00	4.00	3.00
5.00	4.00	5.00	4.00	3.00	3.00	4.00	3.00	5.00	5.00	4.00
5.00	3.00	3.00	3.00	2.00	3.00	4.00	3.00	5.00	4.00	3.00
4.00	3.00	4.00	3.00	3.00	3.00	2.00	3.00	4.00	4.00	3.00
5.00	4.00	4.00	3.00	3.00	2.00	3.00	3.00	5.00	4.00	3.00
5.00	3.00	5.00	4.00	2.00	2.00	3.00	4.00	5.00	5.00	5.00
4.00	5.00	5.00	3.00	3.00	4.00	5.00	5.00	4.00	4.00	3.00

D8Q63	D8Q64	A1	A2	A3	A4	A5	A6	A7	B1	B2
4.00	4.00	4.00	5.00	4.00	5.00	5.00	4.00	5.00	4.00	4.00
4.00	4.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00
5.00	4.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	5.00	4.00
3.00	3.00	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!
2.00	4.00	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!
4.00	3.00	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!
4.00	4.00	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!
4.00	4.00	3.00	5.00	4.00	3.00	4.00	2.00	5.00	2.00	3.00
3.00	3.00	5.00	4.00	5.00	3.00	5.00	3.00	5.00	5.00	3.00
5.00	5.00	4.00	5.00	4.00	5.00	4.00	4.00	4.00	4.00	4.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
3.00	4.00	4.00	5.00	5.00	5.00	5.00	4.00	5.00	3.00	3.00
4.00	4.00	4.00	5.00	5.00	4.00	4.00	4.00	3.00	3.00	3.00
2.00	2.00	3.00	4.00	4.00	4.00	5.00	4.00	5.00	2.00	3.00
4.00	4.00	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!
3.00	3.00	4.00	4.00	4.00	4.00	5.00	4.00	4.00	3.00	3.00
3.00	3.00	5.00	5.00	5.00	5.00	5.00	4.00	5.00	3.00	3.00
4.00	4.00	4.00	4.00	4.00	5.00	5.00	4.00	5.00	3.00	3.00
4.00	2.00	4.00	5.00	5.00	5.00	5.00	3.00	5.00	1.00	1.00
3.00	4.00	4.00	5.00	5.00	5.00	4.00	4.00	4.00	3.00	2.00
2.00	2.00	5.00	5.00	5.00	5.00	4.00	4.00	5.00	2.00	2.00
3.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.00	3.00
4.00	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.00	3.00
3.00	3.00	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!
3.00	3.00	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!
3.00	3.00	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!
3.00	3.00	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!
3.00	3.00	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!
4.00	4.00	4.00	5.00	4.00	5.00	4.00	5.00	5.00	3.00	3.00
5.00	5.00	5.00	4.00	5.00	5.00	4.00	5.00	5.00	4.00	4.00
3.00	3.00	4.00	4.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00
4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.00	5.00
4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00
4.00	4.00	5.00	5.00	5.00	5.00	5.00	4.00	4.00	3.00	3.00
2.00	4.00	5.00	5.00	5.00	5.00	3.00	5.00	5.00	3.00	4.00
5.00	5.00	5.00	5.00	4.00	5.00	4.00	4.00	5.00	4.00	3.00
4.00	4.00	3.00	5.00	4.00	4.00	5.00	4.00	4.00	4.00	4.00
1.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00	4.00
4.00	#NULL!	4.00	4.00	3.00	3.00	4.00	4.00	5.00	3.00	4.00
4.00	4.00	4.00	5.00	4.00	5.00	5.00	4.00	5.00	3.00	3.00
3.00	3.00	2.00	4.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
4.00	4.00	3.00	4.00	4.00	5.00	4.00	2.00	4.00	4.00	3.00
4.00	4.00	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!
4.00	4.00	4.00	5.00	5.00	5.00	4.00	4.00	4.00	2.00	4.00
5.00	5.00	5.00	5.00	4.00	5.00	5.00	4.00	5.00	4.00	4.00
3.00	4.00	4.00	4.00	4.00	3.00	3.00	2.00	4.00	3.00	3.00
3.00	4.00	4.00	5.00	4.00	3.00	5.00	2.00	5.00	2.00	3.00
4.00	4.00	5.00	5.00	5.00	3.00	3.00	4.00	5.00	5.00	5.00
4.00	4.00	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!
4.00	3.00	4.00	4.00	2.00	3.00	4.00	2.00	5.00	3.00	4.00

B3	B4	B5	B6	B7	MEAND1	MEAND2	MEAND3	MEAND4	MEAND5	MEAND6
4.00	4.00	5.00	3.00	4.00	4.00	3.25	3.14	3.50	3.20	3.17
4.00	4.00	3.00	3.00	4.00	4.20	3.40	3.86	3.83	4.00	4.17
4.00	4.00	4.00	4.00	4.00	4.20	5.00	4.50	3.67	4.00	4.83
#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	2.60	3.20	2.86	2.67	2.80	4.00
#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	3.40	3.20	2.79	1.50	2.00	4.00
#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	3.20	3.00	3.71	3.50	3.80	3.33
#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	3.40	4.25	4.07	3.17	3.60	3.83
4.00	4.00	4.00	3.00	5.00	3.20	4.00	3.86	4.00	3.00	4.33
4.00	3.00	5.00	3.00	2.00	2.60	2.60	2.93	3.00	3.00	3.00
4.00	5.00	4.00	4.00	4.00	4.20	4.00	4.43	4.17	4.20	3.67
4.00	4.00	4.00	4.00	4.00	3.80	3.75	4.36	4.00	4.00	3.50
2.00	4.00	2.00	3.00	3.00	3.20	3.00	3.21	2.50	5.00	4.17
4.00	4.00	4.00	3.00	3.00	3.20	3.40	2.71	3.50	3.60	3.17
2.00	3.00	4.00	2.00	3.00	3.40	3.20	2.71	2.33	2.00	4.17
#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	3.20	3.50	4.14	3.17	3.80	4.17
3.00	3.00	3.00	3.00	3.00	2.40	3.00	3.50	3.00	3.00	3.00
2.00	2.00	2.00	3.00	3.00	4.00	3.40	3.71	2.67	3.00	3.00
3.00	4.00	4.00	4.00	4.00	2.40	1.00	3.57	4.00	3.80	2.83
2.00	1.00	1.00	2.00	1.00	3.00	4.60	3.86	3.67	1.80	2.83
2.00	3.00	3.00	3.00	3.00	3.20	2.60	3.14	3.67	3.40	3.50
1.00	2.00	2.00	2.00	2.00	3.80	2.00	1.83	1.67	1.75	2.50
3.00	3.00	4.00	3.00	4.00	3.00	2.00	2.93	2.67	3.00	4.00
4.00	2.00	3.00	2.00	2.00	3.60	4.00	3.07	2.83	2.80	4.83
#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	4.00	2.80	2.50	3.33	2.60	3.00
#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	4.00	2.80	2.50	3.33	2.60	3.00
#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	4.00	2.80	2.50	3.33	2.60	3.00
#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	4.00	2.80	2.50	3.33	2.60	3.00
#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	4.00	2.80	2.50	3.33	2.60	3.00
2.00	3.00	3.00	3.00	3.00	4.80	5.00	3.07	3.83	3.60	4.50
5.00	4.00	4.00	5.00	5.00	5.00	4.80	4.79	5.00	5.00	4.83
3.00	3.00	3.00	3.00	3.00	4.20	2.80	3.86	3.83	3.80	3.83
4.00	5.00	4.00	5.00	4.00	3.80	4.00	4.07	4.33	4.20	4.33
3.00	4.00	5.00	4.00	3.00	4.60	3.40	3.07	4.00	4.00	4.83
4.00	3.00	2.00	4.00	3.00	3.00	3.00	2.86	3.00	3.60	3.67
5.00	4.00	3.00	4.00	3.00	5.00	3.60	2.21	4.50	3.20	4.33
4.00	5.00	3.00	5.00	4.00	4.80	4.20	3.29	4.00	4.00	5.00
4.00	5.00	3.00	5.00	4.00	4.80	4.20	3.29	4.00	4.00	5.00
3.00	4.00	5.00	4.00	4.00	5.00	3.60	3.29	3.50	4.00	3.00
4.00	4.00	3.00	3.00	2.00	4.80	3.00	2.50	2.83	2.60	3.67
4.00	3.00	3.00	3.00	4.00	4.20	3.40	3.14	3.50	3.00	4.00
3.00	4.00	3.00	4.00	3.00	4.40	4.60	3.77	5.00	4.60	4.83
2.00	3.00	3.00	3.00	3.00	4.40	4.00	2.71	3.33	3.00	3.33
5.00	3.00	3.00	4.00	5.00	4.20	4.40	3.57	4.67	4.40	4.83
#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	4.00	4.60	3.79	3.67	3.80	4.17
5.00	5.00	3.00	3.00	2.00	4.20	3.40	3.00	3.50	4.20	4.17
4.00	5.00	5.00	4.00	5.00	4.20	4.00	3.43	4.83	4.80	3.67
4.00	5.00	3.00	3.00	3.00	3.80	3.00	2.86	3.83	2.80	4.00
4.00	2.00	4.00	1.00	3.00	3.20	3.20	2.50	3.33	2.80	4.00
4.00	3.00	3.00	3.00	4.00	4.40	4.40	2.86	3.83	3.00	4.33
#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	5.00	4.00	3.00	3.50	3.40	3.83
3.00	4.00	3.00	2.00	3.00	3.80	3.20	3.00	3.83	3.60	4.67

MEAND7	MEAND8
3.67	4.00
4.17	4.36
4.50	4.36
2.83	3.55
3.83	3.09
3.83	3.73
3.83	4.00
3.83	3.91
3.00	3.00
3.83	4.09
3.67	3.91
3.83	3.27
3.83	4.00
4.33	2.36
4.00	3.82
3.00	3.00
4.00	3.00
3.50	3.91
3.50	2.64
4.17	3.45
2.67	2.27
3.83	3.55
4.83	3.27
3.00	3.00
3.00	3.00
3.00	3.00
3.00	3.00
3.00	3.00
4.50	3.91
4.83	5.00
3.83	3.64
5.00	4.36
5.00	4.55
4.67	3.73
4.67	3.45
4.50	4.64
4.50	3.27
4.50	3.36
4.33	3.11
4.67	4.09
3.83	2.64
4.00	4.18
4.50	4.18
4.33	3.27
4.67	4.09
4.00	3.27
4.00	3.18
4.50	3.45
4.83	3.73
3.67	4.00

Summarize

Case Processing Summary[a]

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Relative Accuracy	64	100.0%	0	.0%	64	100.0%

a. Limited to first 100 cases.

Case Summaries[a]

	Relative Accuracy
1	.06
2	.06
3	.06
4	.12
5	.05
6	.12
7	.07
8	.10
9	.08
10	.07
11	.08
12	.13
13	.12
14	.08
15	.09
16	.09
17	.08
18	.09
19	.09
20	.04
21	.05
22	.05
23	.09
24	.10
25	.08
26	.08
27	.05
28	.06
29	.07
30	.34
31	.08
32	.06
33	.08
34	.09
35	.09
36	.10
37	.08
38	.06

Case Summaries[a]

	Relative Accuracy
39	.06
40	.05
41	.07
42	.07
43	.07
44	.06
45	.09
46	.11
47	.05
48	.05
49	.05
50	.06
51	.06
52	.06
53	.07
54	.06
55	.06
56	.06
57	.07
58	.07
59	.07
60	.06
61	.39
62	.07
63	.06
64	.05
Total N	64

a. Limited to first 100 cases.

Summarize

Case Processing Summary[a]

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Relative Accuracy for Southeast Asia	64	100.0%	0	.0%	64	100.0%

a. Limited to first 100 cases.

Case Summaries[a]

	Relative Accuracy for Southeast Asia
1	.07
2	.08

Case Summaries[a]

	Relative Accuracy for Southeast Asia
3	.08
4	.16
5	.05
6	.15
7	.10
8	.13
9	.10
10	.09
11	.11
12	.15
13	.13
14	.10
15	.09
16	.11
17	.10
18	.12
19	.11
20	.06
21	.06
22	.06
23	.09
24	.11
25	.10
26	.09
27	.07
28	.08
29	.09
30	.09
31	.10
32	.08
33	.10
34	.11
35	.11
36	.14
37	.09
38	.07
39	.06
40	.06
41	.08
42	.09
43	.09
44	.07
45	.08
46	.10
47	.06
48	.06
49	.06
50	.08

Case Summaries[a]

	Relative Accuracy for Southeast Asia
51	.07
52	.07
53	.09
54	.08
55	.08
56	.06
57	.07
58	.06
59	.08
60	.07
61	.53
62	.07
63	.07
64	.07
Total N	64

a. Limited to first 100 cases.

Summarize

Case Processing Summary[a]

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
Relative Accuracy for Western Europe	64	100.0%	0	.0%	64	100.0%

a. Limited to first 100 cases.

Case Summaries[a]

	Relative Accuracy for Western Europe
1	.10
2	.07
3	.11
4	.12
5	.08
6	.19
7	.07
8	.12
9	.12
10	.13
11	.10
12	.24

Case Summaries[a]

	Relative Accuracy for Western Europe
13	.24
14	.14
15	.16
16	.16
17	.14
18	.14
19	.16
20	.06
21	.07
22	.07
23	.18
24	.15
25	.13
26	.14
27	.07
28	.11
29	.13
30	.69
31	.10
32	.09
33	.13
34	.11
35	.14
36	.13
37	.15
38	.10
39	.13
40	.10
41	.10
42	.10
43	.10
44	.07
45	.19
46	.27
47	.08
48	.08
49	.08
50	.04
51	.05
52	.05
53	.10
54	.09
55	.09
56	.10
57	.15
58	.15
59	.14
60	.08

Case Summaries[a]

	Relative Accuracy for Western Europe
61	.08
62	.14
63	.13
64	.06
Total N	64

a. Limited to first 100 cases.

Reliability

..... Method 1 (space saver) will be used for this analysis .....

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D2Q7	13.4444	11.3889	.6680	.8018
[illegible]	13.8222	10.6949	.6293	.8177
D2Q9	14.0000	12.0909	.6399	.8104
D2Q10	13.6222	12.3313	.5572	.8310
D2Q11	14.0889	11.4465	.7597	.7799

Reliability Coefficients

N of Cases = 45.0 N of Items = 5

Alpha = .8406

Reliability

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D3Q14	41.5870	50.3367	.6001	.8240
D3Q15	41.6087	46.6879	.8093	.8071
D3Q16	41.6739	45.9135	.7782	.8080
D3Q17	41.7174	47.8517	.7785	.8108
D3Q18	41.5435	48.1203	.6035	.8230
D3Q19	41.6957	48.0386	.6363	.8203
D3Q20	40.8478	59.9541	-.0389	.8568
D3Q21	40.7609	59.3860	.0119	.8549
D3Q22	40.8478	57.3319	.1745	.8486
D3Q23	41.5870	52.3812	.4252	.8363
D3Q24	42.0217	50.5551	.5743	.8257
D3Q25	41.6957	53.9942	.3564	.8402
D3Q26	41.6304	52.9937	.4348	.8352

Reliability Coefficients

N of Cases = 46.0 N of Items = 13

Alpha = .8424

Reliability

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D3Q14	29.1458	46.5527	.5654	.8678
D3Q15	29.1667	42.6950	.8080	.8488
D3Q16	29.2083	41.7004	.8111	.8474
D3Q17	29.2292	43.7974	.7866	.8517
D3Q18	29.0833	43.9929	.6057	.8653
D3Q19	29.2083	43.7855	.6576	.8606
D3Q23	29.1042	48.6485	.3701	.8821
D3Q24	29.5833	45.9078	.5939	.8657
D3Q25	29.2292	49.3293	.3752	.8804
D3Q26	29.1667	48.4823	.4447	.8758

Reliability Coefficients

N of Cases = 48.0 N of Items = 10

Alpha = .8770

Reliability

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D4Q27	16.9600	14.5290	.5508	.8670
D4Q28	17.4600	13.2739	.7438	.8355
D4Q29	17.6400	13.3371	.6729	.8473
D4Q31	17.6600	13.1269	.6324	.8558
D4Q32	17.6200	14.0771	.6837	.8472
D4Q33	17.6600	12.2698	.7535	.8324

Reliability Coefficients

N of Cases = 50.0 N of Items = 6

Alpha = .8700

Reliability

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
[illegible]4	13.6122	8.4090	.6827	.6903
D5Q35	14.0408	9.1650	.7162	.6853
D5Q36	14.0408	8.4150	.7261	.6738
D5Q37	13.5918	10.5383	.4147	.7836
D5Q38	12.9592	12.2066	.2547	.8184

Reliability Coefficients

N of Cases = 49.0 N of Items = 5

Alpha = .7795

Reliability

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D5Q34	9.5102	6.6301	.6947	.7451
D5Q35	9.9388	7.0170	.8034	.7015
D5Q36	9.9388	6.6003	.7487	.7173
D5Q37	9.4898	8.8801	.3602	.8874

Reliability Coefficients

N of Cases = 49.0 N of Items = 4

Alpha = .8184

Reliability

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D6Q39	21.8163	12.5281	.4899	.6944
D6Q40	22.0408	13.0816	.4684	.7012
D6Q41	22.3061	11.1752	.6951	.6426
D6Q42	22.1837	11.0697	.6485	.6512
D6Q43	22.0408	11.1233	.6019	.6628
D6Q44	22.1224	12.4847	.5540	.6824
D6Q45	22.8776	16.5264	-.1414	.8339

Reliability Coefficients

N of Cases = 49.0 N of Items = 7

Alpha = .7350

Reliability

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D6Q39	18.7959	12.7491	.4730	.8326
D6Q40	19.0204	13.5204	.4095	.8416
D6Q41	19.2857	10.8333	.7845	.7687
D6Q42	19.1633	10.8061	.7180	.7824
D6Q43	19.0204	10.5204	.7291	.7796
D6Q44	19.1020	12.7185	.5331	.8210

Reliability Coefficients

N of Cases = 49.0 N of Items = 6

Alpha = .8339

Reliability

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D7Q47	19.7600	10.5127	.5840	.8149
D7Q48	19.9800	11.7343	.3583	.8532
D7Q49	20.0200	11.2445	.4464	.8391
D7Q50	19.7600	9.0433	.7520	.7780
D7Q51	19.8600	9.1024	.7711	.7741
D7Q52	19.9200	9.1363	.7528	.7781

Reliability Coefficients

N of Cases = 50.0 N of Items = 6

Alpha = .8362

Reliability

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D8Q53	35.9796	35.1037	.7104	.8735
D8Q54	35.7551	35.1471	.7158	.8732
D8Q55	35.7347	38.0740	.4592	.8888
D8Q56	36.1837	38.1947	.5304	.8845
D8Q57	35.9184	36.7849	.5400	.8845
D8Q58	35.7551	37.3554	.4941	.8872
D8Q59	35.9184	34.2432	.7740	.8690
D8Q60	35.3265	37.8912	.4699	.8883
D8Q62	35.9388	35.8503	.6529	.8772
D8Q63	35.8571	36.1250	.6467	.8777
D8Q64	35.7143	36.1667	.7417	.8730

Reliability Coefficients

N of Cases = 49.0 N of Items = 11

Alpha = .8896

Factor Analysis

Communalities

	Initial	Extraction
F2q7 - Statistical/common tech. for operations' weak link	1.000	.741
F2q8 - Statistical/common method in day-to-day problem	1.000	.770
F2q9 - Percentage members use the methods	1.000	.826
F2q10 - New precaution project	1.000	.895
F2q11 - New follow up action project	1.000	.853
F3q14 - Dep' tal performance to reward the managers	1.000	.877
F3q15 - Dep' tal performance to reward the staff	1.000	.939
F3q16 - Team-based perf. to reward the managers	1.000	.890
F3q17 - Team-based perf. to reward the staff	1.000	.859
F3q18 - Cust. satisfaction to reward the managers	1.000	.895
F3q19 - Cust. satisfaction to reward the staff	1.000	.918
F3q23 - Percentage of staff in dep' tal teams	1.000	.855
F3q24 - Percentage staff in cross-dept. team	1.000	.780
F3q25 - Approval fro staff to join dep' tal team	1.000	.931
F3q26 - Approval for staff to join cross-dept. teams	1.000	.880
F4q27 - Analyse the operations quality	1.000	.812
F4q28 - Operations benchmark againts competitiors	1.000	.829
F4q29 - Operations bechmark against the best	1.000	.795
F4q31 - Benchmarking with other airlines	1.000	.818
F4q32 - Bechmarking results for own organisation	1.000	.910
F4q33 - Own organisation well inform of benchmarking result	1.000	.915
F5q34 - Customer requirement surveys	1.000	.874
F5q35 - Translating customer requirement	1.000	.921

Extraction Method: Principal Component Analysis.

Communalities

	Initial	Extraction
F5q36 - Use of customer representative	1.000	.859
F5q37 - Important of customer visit	1.000	.747
F6q39 - Solve problem together	1.000	.673
F6q40 - Working team in all levels organisation	1.000	.685
F6q41 - Objectives not conflicted each others	1.000	.882
F6q42 - Easy to talk with anyone	1.000	.883
F6q43 - Members feel comfort to call each other	1.000	.751
F6q44 - Members are quite accessible	1.000	.869
F7q47 - Customers' preferences change over time	1.000	.825
F7q48 - Customer look for new product	1.000	.779
F7q49 - Demand from new customer	1.000	.760
F7q50 - Technology is changing rapidly	1.000	.828
F7q51 - New product possible through technology	1.000	.895
F7q52 - Technology-based equipment are employed	1.000	.838
F8q53 - Top/senior management involvement	1.000	.897
F8q54 - Top/senior management involve in objectives setting	1.000	.805
F8q55 - Your participation in group activity	1.000	.846
F8q56 - Top/senior management time spent	1.000	.818
F8q57 - Your time spent to comunicate	1.000	.883
F8q58 - You make periodic evaluation of operations activities	1.000	.833
F8q59 - Top/senior make periodic evaluation	1.000	.903
F8q60 - Top/senior management agrees on training fro future benefit	1.000	.846
F8q62 - Top/senior management rewards team working	1.000	.911

Extraction Method: Principal Component Analysis.

Communalities

	Initial	Extraction
F8q63 - You give reward to team working	1.000	.888
F8q64 - Top/senior encourage the use of new working method	1.000	.898

Extraction Method: Principal Component Analysis.

Factor Analysis (Principal Components Analysis) - Appendix C

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	14.326	29.847	29.847	14.326	29.847	29.847
2	5.424	11.300	41.147	5.424	11.300	41.147
3	4.188	8.725	49.872	4.188	8.725	49.872
4	3.040	6.333	56.205	3.040	6.333	56.205
5	2.722	5.671	61.876	2.722	5.671	61.876
6	2.185	4.552	66.427	2.185	4.552	66.427
7	1.983	4.131	70.558	1.983	4.131	70.558
8	1.679	3.497	74.056	1.679	3.497	74.056
9	1.567	3.265	77.321	1.567	3.265	77.321
10	1.297	2.702	80.023	1.297	2.702	80.023
11	1.101	2.294	82.317	1.101	2.294	82.317
12	1.074	2.239	84.556	1.074	2.239	84.556
13	.999	2.081	86.637			
14	.844	1.758	88.394			
15	.737	1.536	89.930			
16	.609	1.269	91.199			
17	.572	1.192	92.391			
18	.540	1.124	93.515			
19	.460	.959	94.475			
20	.388	.808	95.283			
21	.340	.709	95.992			
22	.315	.656	96.648			
23	.273	.570	97.218			
24	.224	.466	97.684			
25	.210	.437	98.121			
26	.179	.374	98.494			
27	.162	.337	98.831			
28	.125	.260	99.091			
29	.104	.216	99.307			
30	9.571E-02	.199	99.506			
31	7.626E-02	.159	99.665			
32	4.661E-02	9.710E-02	99.762			
33	4.185E-02	8.719E-02	99.849			
34	2.982E-02	6.214E-02	99.912			
35	2.324E-02	4.841E-02	99.960			
36	1.199E-02	2.498E-02	99.985			
37	7.199E-03	1.500E-02	100.000			
38	3.060E-15	6.376E-15	100.000			
39	2.171E-16	4.523E-16	100.000			
40	1.488E-16	3.099E-16	100.000			
41	9.376E-17	1.953E-16	100.000			
42	-4.525E-17	-9.426E-17	100.000			
43	-1.380E-16	-2.875E-16	100.000			
44	-1.535E-16	-3.199E-16	100.000			
45	-2.536E-16	-5.282E-16	100.000			
46	-4.100E-16	-8.543E-16	100.000			
47	-4.986E-16	-1.039E-15	100.000			
48	-1.622E-15	-3.379E-15	100.000			

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	6.699	13.956	13.956
2	4.890	10.187	24.143
3	4.138	8.620	32.764
4	4.021	8.377	41.141
5	3.186	6.637	47.778
6	2.930	6.104	53.882
7	2.846	5.929	59.811
8	2.634	5.487	65.298
9	2.428	5.058	70.356
10	2.351	4.898	75.254
11	2.284	4.758	80.013
12	2.181	4.543	84.556
13			
14			
15			
16			
17			
18			
19			
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Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component					
	1	2	3	4	5	6
F5q36 - Use of customer representative	.775		-.128	-.312	-.228	
F8q63 - You give reward to team working	.759	.338				
F4q33 - Own organisation well inform of benchmarking result	.751		-.446	.246	.181	
F8q64 - Top/senior encourage the use of new working method	.742	-.275	-.162			-.258
F4q31 - Benchmarking with other airlines	.720	-.176	-.180	.119	-.218	
F5q34 - Customer requirement surveys	.706	-.137	-.278		-.106	-.240
F8q53 - Top/senior management involvement	.679	-.213	-.454		.341	
F8q62 - Top/senior management rewards team working	.672	.150	-.363	-.212		
F8q54 - Top/senior management involve in objectives setting	.671	-.197	-.472	.105		.108
F7q52 - Technology-based equipment are employed	.660	-.479			-.343	
F8q59 - Top/senior make periodic evaluation	.647	-.223	-.190	.180	.458	
F7q49 - Demand from new customer	.614	.144	.282			
F3q15 - Dep' tal performance to reward the staff	.612	.593	.181	-.174		
F8q60 - Top/senior management agrees on training fro future benefit	.611	-.360	-.105		-.126	-.337
F2q11 - New follow up action project	.609	.110	.393	.275	-.158	.341
F6q39 - Solve problem together	.604	-.131	.172	-.245	.169	.120
F5q35 - Translating customer requirement	.600	.133	-.349	-.339		-.103
F6q43 - Members feel comfort to call each other	.597	-.515	.126			
F3q14 - Dep' tal performance to reward the managers	.597	.392	.164		.132	-.216
F7q50 - Technology is changing rapidly	.578	-.571	.132		-.305	-.204
F8q55 - Your participation in group activity	.548	.168	.160			.346
F2q8 - Statistical/common method in day-to-day problem	.548	-.259	.513	.177		
F3q26 - Approval for staff to join cross-dept. teams	.543	.208	-.373	-.317		.413

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component					
	1	2	3	4	5	6
F4q32 - Bechmarking results for own organisation	.527	.469		.436	-.197	.128
F6q44 - Members are quite accessible	.519	-.258	.469	.233	.158	
F7q47 - Customers' preferences change over time	.493	-.166	.438		-.369	
F8q56 - Top/senior management time spent	.488	.184	-.111	-.482	.486	
F4q27 - Analyse the operations quality	.486			.451	.263	-.330
F3q18 - Cust. satisfaction to reward the managers	.466	.433			-.146	-.398
F6q40 - Working team in all levels organisation	.445	.203	.431	-.221	.189	
F2q9 - Percentage members use the methods	.390	.259	.209	.328		.292
F3q16 - Team-based perf. to reward the managers	.426	.678	.259	-.147		-.255
F3q17 - Team-based perf. to reward the staff	.492	.614	.189	-.145	-.231	-.144
F3q24 - Percentage staff in cross-dept. team	.268	.589	.214		.260	
F7q51 - New product possible through technology	.527	-.576	.115		-.415	-.104
F6q42 - Easy to talk with anyone	.452	-.541	.200	-.147	.248	.196
F6q41 - Objectives not conflicted each others	.466	-.539	.147	-.275	.418	
F3q19 - Cust. satisfaction to reward the staff	.437	.533			-.367	-.277
F2q7 - Statistical/common tech. for operations' weak link	.516	-.264	.562	.169	-.134	
F5q37 - Important of customer visit	.401	.104	-.526			
F7q48 - Customer look for new product	.262		.456	-.278	-.227	.374
F4q28 - Operations benchmark againts competitiors	.351	.108	-.339	.668		
F4q29 - Operations bechmark against the best	.360	.131	-.262	.662		
F8q58 - You make periodic evaluation of operations activities	.402		.274	.154	.554	-.210
F2q10 - New precaution project	.247	.202	.189	.425		.540
F3q25 - Approval fro staff to join dep' tal team	.462	.155	-.380	-.377	-.131	.507

Extraction Method: Principal Component Analysis.

Factor Analysis (Principal Components Analysis) - Appendix C

Component Matrix[a]

	Component					
	1	2	3	4	5	6
F8q57 - Your time spent to comunicate	.482		.124		.373	
F3q23 - Percentage of staff in dep' tal teams		.385	.410		.389	

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component					
	7	8	9	10	11	12
F5q36 - Use of customer representative		.250				
F8q63 - You give reward to team working	-.335	-.124	-.131			.169
F4q33 - Own organisation well inform of benchmarking result				.151	-.136	-.118
F8q64 - Top/senior encourage the use of new working method		-.119		-.164	.235	.270
F4q31 - Benchmarking with other airlines	.240			.192	.229	-.108
F5q34 - Customer requirement surveys		.375			-.225	
F8q53 - Top/senior management involvement		.123				-.143
F8q62 - Top/senior management rewards team working	-.310	-.355			.100	-.141
F8q54 - Top/senior management involve in objectives setting	.196		.125			-.109
F7q52 - Technology-based equipment are employed		.145		.102		
F8q59 - Top/senior make periodic evaluation		-.251	.168	.165		-.174
F7q49 - Demand from new customer	.101	-.300		-.406		
F3q15 - Dep' tal performance to reward the staff	-.168			-.218		-.238
F8q60 - Top/senior management agrees on training fro future benefit		-.296			.311	
F2q11 - New follow up action project	-.138		.102		.257	
F6q39 - Solve problem together		-.168	-.173	.223	-.203	
F5q35 - Translating customer requirement		.429	-.206		-.177	.187
F6q43 - Members feel comfort to call each other	-.118	.252			.138	
F3q14 - Dep' tal performance to reward the managers	-.146		-.421	-.188	-.122	-.149
F7q50 - Technology is changing rapidly						
F8q55 - Your participation in group activity	.538	-.106		-.187	-.163	-.100
F2q8 - Statistical/common method in day-to-day problem	-.160	.185				.178
F3q26 - Approval for staff to join cross-dept. teams	.106	-.126	.154	.140	-.182	.135

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component					
	7	8	9	10	11	12
F4q32 - Bechmarking results for own organisation	.215		-.222	-.128		-.200
F6q44 - Members are quite accessible		-.319		.337	-.113	
F7q47 - Customers' preferences change over time	.347	-.251				.159
F8q56 - Top/senior management time spent	-.159	-.124				
F4q27 - Analyse the operations quality		-.285		.267		.154
F3q18 - Cust. satisfaction to reward the managers	.191	.246	.371	.149		-.230
F6q40 - Working team in all levels organisation	.209	.174	-.252	-.104		.152
F2q9 - Percentage members use the methods	-.378	.140	.273			.353
F3q16 - Team-based perf. to reward the managers	-.211		.105			-.164
F3q17 - Team-based perf. to reward the staff	-.234	-.150		.127		
F3q24 - Percentage staff in cross-dept. team	.124	.250	-.251	.268		.143
F7q51 - New product possible through technology		-.130	-.132		-.202	
F6q42 - Easy to talk with anyone	-.234	.245				-.323
F6q41 - Objectives not conflicted each others		.233				-.151
F3q19 - Cust. satisfaction to reward the staff	.191	.101	.398	.128		
F2q7 - Statistical/common tech. for operations' weak link	-.104		.158			
F5q37 - Important of customer visit				-.364	.367	
F7q48 - Customer look for new product	.394				.233	-.126
F4q28 - Operations benchmark againts competitiors	.187		-.290			
F4q29 - Operations bechmark against the best		.165	-.120	-.208		.206
F8q58 - You make periodic evaluation of operations activities	.322		.274	-.109	-.146	
F2q10 - New precaution project	-.450	.165	.152	-.118		-.122
F3q25 - Approval fro staff to join dep' tal team		-.104	.106	.225		.220

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component					
	7	8	9	10	11	12
F8q57 - Your time spent to comunicate	.167		.568	-.316		.167
F3q23 - Percentage of staff in dep' tal teams	.205	.123	-.156	.233	.465	.147

Extraction Method: Principal Component Analysis.

a. 12 components extracted.

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
F7q50 - Technology is changing rapidly	.868				.174	
F7q51 - New product possible through technology	.841		.117		.111	
F7q52 - Technology-based equipment are employed	.830		.133	.112	.239	.142
F2q8 - Statistical/common method in day-to-day problem	.663	.169	-.170		.136	
F8q60 - Top/senior management agrees on training fro future benefit	.653	.150				
F8q64 - Top/senior encourage the use of new working method	.649	.114	.182	.240		
F6q43 - Members feel comfort to call each other	.604				.546	
F2q7 - Statistical/common tech. for operations' weak link	.565	.113	-.157		.168	
F5q34 - Customer requirement surveys	.558	.117	.361	.345	.272	.369
F5q36 - Use of customer representative	.504	.384	.418	.146	.204	.313
F4q31 - Benchmarking with other airlines	.469		.282	.415	.242	.260
F3q14 - Dep' tal performance to reward the managers	.145	.855		.257	.114	
F3q15 - Dep' tal performance to reward the staff		.837			.104	.320
F3q16 - Team-based perf. to reward the managers		.693		-.107		.554
F3q17 - Team-based perf. to reward the staff		.676	.220		-.199	.464
F8q63 - You give reward to team working	.246	.618	.347	.316		
F7q49 - Demand from new customer	.270	.574		.125		
F8q62 - Top/senior management rewards team working	.187	.502	.466		.114	.151
F3q25 - Approval fro staff to join dep' tal team			.927			
F3q26 - Approval for staff to join cross-dept. teams		.141	.872	.106		.143
F5q35 - Translating customer requirement	.348	.348	.542	.256	.217	.172
F8q56 - Top/senior management time spent		.464	.476	-.174	.299	-.105
F6q39 - Solve problem together	.365	.319	.415		.244	-.132

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
F4q28 - Operations benchmark againts competitiors				.878		
F4q29 - Operations bechmark against the best				.813		
F4q32 - Bechmarking results for own organisation		.382		.732		.275
F4q33 - Own organisation well inform of benchmarking result	.190	.152	.404	.569	.347	.244
F8q54 - Top/senior management involve in objectives setting	.265		.398	.465	.323	.186
F6q42 - Easy to talk with anyone	.384			-.130	.802	
F6q41 - Objectives not conflicted each others	.390			-.100	.755	-.229
F8q53 - Top/senior management involvement	.202		.393	.428	.580	
F3q18 - Cust. satisfaction to reward the managers		.235		.167		.873
F3q19 - Cust. satisfaction to reward the staff		.223	.189		-.239	.845
F2q10 - New precaution project	-.104	.163		.220	.179	
F2q9 - Percentage members use the methods	.108		.190	.121		
F2q11 - New follow up action project	.295	.189		.139		.133
F7q48 - Customer look for new product	.195		.106	-.177	.114	
F8q55 - Your participation in group activity		.226	.284	.331		
F7q47 - Customers' preferences change over time	.585	.132	.109		-.212	
F8q57 - Your time spent to comunicate	.106	.101	.162		.139	.190
F8q58 - You make periodic evaluation of operations activities			-.115	.132	.235	
F6q44 - Members are quite accessible	.393	.144			.183	
F4q27 - Analyse the operations quality	.251	.186		.400		
F8q59 - Top/senior make periodic evaluation	.135		.208	.261	.450	
F5q37 - Important of customer visit		.163	.288	.256		
F3q23 - Percentage of staff in dep' tal teams	-.178	.112	-.192			.107

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
F3q24 - Percentage staff in cross-dept. team	-.187	.347	.205	.131		.168
F6q40 - Working team in all levels organisation	.219	.434			.105	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Rotated Component Matrix[a]

	Component					
	7	8	9	10	11	12
F7q50 - Technology is changing rapidly						-.158
F7q51 - New product possible through technology		.145		.142		-.305
F7q52 - Technology-based equipment are employed					.122	
F2q8 - Statistical/common method in day-to-day problem	.394		.215			.182
F8q60 - Top/senior management agrees on training fro future benefit	-.133			.295	.528	
F8q64 - Top/senior encourage the use of new working method			.303	.136	.496	
F6q43 - Members feel comfort to call each other	.194		.110		.157	
F2q7 - Statistical/common tech. for operations' weak link	.447	.269	.195	.159	-.107	
F5q34 - Customer requirement surveys		-.244	.153			
F5q36 - Use of customer representative				-.212	.215	.157
F4q31 - Benchmarking with other airlines		.299	-.123	.171	.279	
F3q14 - Dep' tal performance to reward the managers						.181
F3q15 - Dep' tal performance to reward the staff	.176	.153	.112		.176	.130
F3q16 - Team-based perf. to reward the managers	.202					.179
F3q17 - Team-based perf. to reward the staff	.235			.138		
F8q63 - You give reward to team working	.321	-.145		.175	.225	.101
F7q49 - Demand from new customer	.103	.425	.337		.140	
F8q62 - Top/senior management rewards team working			-.125	.234	.499	-.206
F3q25 - Approval fro staff to join dep' tal team	.112	.172			.142	
F3q26 - Approval for staff to join cross-dept. teams		.184			.120	
F5q35 - Translating customer requirement	-.153	-.228		-.354		.200
F8q56 - Top/senior management time spent			.282		.303	.238
F6q39 - Solve problem together		.142	.109	.344	-.110	.153

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Rotated Component Matrix[a]

	Component					
	7	8	9	10	11	12
F4q28 - Operations benchmark againts competitiors			-.113	.165		
F4q29 - Operations bechmark against the best	.249	-.128	.178			
F4q32 - Bechmarking results for own organisation	.187	.317				
F4q33 - Own organisation well inform of benchmarking result		-.132	.151	.325	.183	
F8q54 - Top/senior management involve in objectives setting		.100	.158	.129	.376	-.156
F6q42 - Easy to talk with anyone	.198					
F6q41 - Objectives not conflicted each others			.265			
F8q53 - Top/senior management involvement	-.126		.133	.190	.308	
F3q18 - Cust. satisfaction to reward the managers			.178			
F3q19 - Cust. satisfaction to reward the staff		.116				
F2q10 - New precaution project	.862					-.141
F2q9 - Percentage members use the methods	.811	-.125	.146			.188
F2q11 - New follow up action project	.677	.377		.195	.153	.163
F7q48 - Customer look for new product		.773				.258
F8q55 - Your participation in group activity		.695	.321			
F7q47 - Customers' preferences change over time		.591	.168	.142		
F8q57 - Your time spent to comunicate	.155		.848		.165	
F8q58 - You make periodic evaluation of operations activities			.761	.321		.169
F6q44 - Members are quite accessible	.230	.239	.116	.700	-.178	
F4q27 - Analyse the operations quality		-.237	.182	.662		.146
F8q59 - Top/senior make periodic evaluation			.307	.600	.324	
F5q37 - Important of customer visit				-.192	.718	
F3q23 - Percentage of staff in dep' tal teams		.131		.154		.838

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Rotated Component Matrix[a]

	Component					
	7	8	9	10	11	12
F3q24 - Percentage staff in cross-dept. team	.110				-.172	.699
F6q40 - Working team in all levels organisation		.270	.280		-.173	.489

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 14 iterations.

Component Transformation Matrix

Component	1	2	3	4	5	6	7
1	.529	.410	.362	.312	.272	.229	.182
2	-.565	.509	.129	.116	-.365	.379	.156
3	.209	.194	-.457	-.398	-.043	-.049	.327
4	-.047	-.217	-.430	.697	-.156	-.003	.392
5	-.417	.060	-.034	-.004	.459	-.294	-.079
6	-.285	-.202	.439	.048	.187	-.378	.502
7	-.069	-.327	.046	.286	-.118	.166	-.514
8	.101	-.198	-.065	.171	.408	.266	.139
9	-.109	-.359	.083	-.318	-.033	.523	.328
10	.004	-.297	.292	-.122	.068	.301	-.009
11	-.001	-.207	-.257	-.125	.023	.077	.114
12	.271	-.197	.317	-.012	-.578	-.321	.143

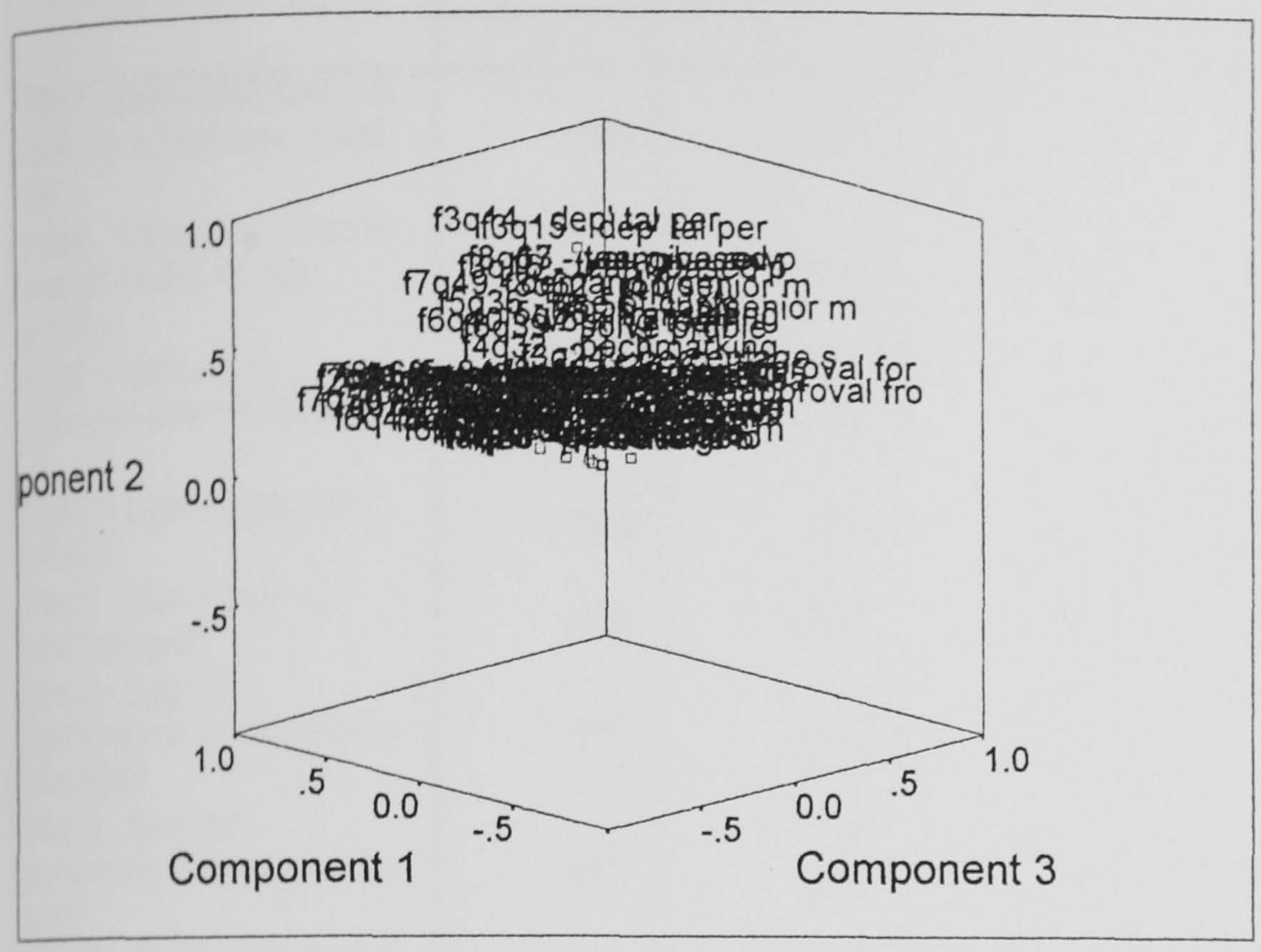
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Component Transformation Matrix

Component	8	9	10	11	12
1	.159	.212	.199	.214	.096
2	.019	-.041	-.122	-.025	.270
3	.403	.153	.113	-.394	.294
4	-.091	.012	.289	-.064	-.084
5	-.255	.494	.298	.046	.342
6	.460	-.145	-.121	-.036	-.066
7	.595	.299	-.028	-.099	.212
8	-.231	-.027	-.643	-.285	.334
9	-.051	.501	.046	.122	-.314
10	-.128	-.429	.563	-.306	.324
11	.138	-.237	-.027	.769	.435
12	-.287	.287	-.104	-.005	.392

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Component Plot in Rotated Space



Factor Analysis (Principal Components Analysis) - Appendix C

Component Score Coefficient Matrix

	Component					
	1	2	3	4	5	6
F2q7 - Statistical/common tech. for operations' weak ink	.079	-.017	-.072	-.045	.016	.037
F2q8 - Statistical/common method in day-to-day problem	.152	-.003	-.069	-.004	-.049	-.050
F2q9 - Percentage members use the methods	.045	-.112	.121	-.036	-.136	-.031
F2q10 - New precaution project	-.090	.030	-.023	.039	.130	-.028
F2q11 - New follow up action project	.003	-.066	-.036	-.029	-.009	.016
F3q14 - Dep' tal performance to reward the managers	-.010	.308	-.116	.085	.059	-.112
F3q15 - Dep' tal performance to reward the staff	-.077	.237	-.117	-.030	.098	.042
F3q16 - Team-based perf. to reward the managers	-.038	.146	-.052	-.097	.034	.187
F3q17 - Team-based perf. to reward the staff	-.001	.141	.033	-.093	-.061	.118
F3q18 - Cust. satisfaction to reward the managers	-.029	-.050	-.080	-.013	.091	.403
F3q19 - Cust. satisfaction to reward the staff	.010	-.083	.001	-.053	-.067	.348
F3q23 - Percentage of staff in dep' tal teams	-.016	-.106	-.081	-.032	-.008	.026
F3q24 - Percentage staff in cross-dept. team	-.024	-.015	.086	.041	.014	-.007
F3q25 - Approval fro staff to join dep' tal team	-.018	-.109	.361	-.063	-.097	-.047
F3q26 - Approval for staff to join cross-dept. teams	-.043	-.060	.318	-.035	-.073	-.014
F4q27 - Analyse the operations quality	.045	.005	.011	.074	-.132	-.035
F4q28 - Operations benchmark againts competitiors	-.017	-.003	-.044	.288	-.025	-.059
F4q29 - Operations bechmark against the best	.030	-.022	-.027	.264	-.106	-.118
F4q31 - Benchmarking with other airlines	.028	-.122	-.004	.071	.065	.104
F4q32 - Bechmarking results for own organisation	-.065	.085	-.090	.235	.046	.025
F4q33 - Own organisation well inform of benchmarking result	-.057	-.017	.062	.109	.105	.080
F5q34 - Customer requirement surveys	.112	-.038	.086	.067	.037	.125
F5q35 - Translating customer requirement	.103	.056	.143	.072	.012	-.036

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Component Score Coefficient Matrix

	Component					
	1	2	3	4	5	6
F5q36 - Use of customer representative	.090	.031	.037	-.005	.030	.052
F5q37 - Important of customer visit	-.029	.012	-.051	.013	-.029	-.080
F6q39 - Solve problem together	.033	.059	.170	-.046	-.005	-.116
F6q40 - Working team in all levels organisation	.052	.084	.015	.036	-.021	-.114
F6q41 - Objectives not conflicted each others	-.007	.043	-.034	-.032	.275	-.063
F6q42 - Easy to talk with anyone	-.039	.025	-.057	-.064	.358	.042
F6q43 - Members feel comfort to call each other	.064	-.039	-.076	-.016	.172	.008
F6q44 - Members are quite accessible	.010	.001	.023	-.030	.009	-.018
F7q47 - Customers' preferences change over time	.123	-.013	.057	-.005	-.209	-.064
F7q48 - Customer look for new product	-.015	-.081	.002	-.053	.068	.040
F7q49 - Demand from new customer	-.004	.192	-.072	.025	-.082	-.129
F7q50 - Technology is changing rapidly	.182	-.004	-.029	-.010	-.040	.007
F7q51 - New product possible through technology	.167	.069	.028	-.010	-.052	-.053
F7q52 - Technology-based equipment are employed	.162	-.068	-.010	-.012	.010	.057
F8q53 - Top/senior management involvement	-.061	-.041	.027	.082	.203	.028
F8q54 - Top/senior management involve in objectives setting	-.041	-.086	.031	.080	.083	.071
F8q55 - Your participation in group activity	-.081	.023	.052	.115	.006	-.038
F8q56 - Top/senior management time spent	-.063	.098	.108	-.115	.042	-.125
F8q57 - Your time spent to comunicate	-.031	-.060	.029	-.079	-.059	.051
F8q58 - You make periodic evaluation of operations activities	-.048	-.028	-.052	.025	.023	.044
F8q59 - Top/senior make periodic evaluation	-.107	-.048	-.010	-.009	.135	.061
F8q60 - Top/senior management agrees on training fro future benefit	.123	.003	-.088	-.079	-.106	-.010
F8q62 - Top/senior management rewards team working	-.039	.131	.035	-.083	.014	-.004

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Component Score Coefficient Matrix

	Component					
	1	2	3	4	5	6
F8q63 - You give reward to team working	.039	.131	.060	.028	-.110	-.120
F8q64 - Top/senior encourage the use of new working method	.141	-.052	-.027	.002	-.176	-.063

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Component Score Coefficient Matrix

	Component					
	7	8	9	10	11	12
F2q7 - Statistical/common tech. for operations' weak link	.142	.038	.047	-.001	-.042	-.043
F2q8 - Statistical/common method in day-to-day problem	.127	-.073	.066	-.079	-.037	.088
F2q9 - Percentage members use the methods	.355	-.164	.081	-.017	-.007	.111
F2q10 - New precaution project	.346	.003	-.040	-.081	-.026	-.143
F2q11 - New follow up action project	.241	.109	-.086	.040	.146	.074
F3q14 - Dep' tal performance to reward the managers	-.112	-.012	-.057	-.023	-.057	-.034
F3q15 - Dep' tal performance to reward the staff	-.006	.053	-.014	-.060	.081	-.083
F3q16 - Team-based perf. to reward the managers	.020	-.044	-.052	.057	-.033	-.035
F3q17 - Team-based perf. to reward the staff	.036	-.035	-.080	.093	-.059	-.066
F3q18 - Cust. satisfaction to reward the managers	-.047	-.007	.039	.008	-.058	-.039
F3q19 - Cust. satisfaction to reward the staff	.000	.022	.037	-.006	.022	-.014
F3q23 - Percentage of staff in dep' tal teams	.002	.030	-.069	.073	.194	.473
F3q24 - Percentage staff in cross-dept. team	-.004	-.027	-.081	.009	-.099	.338
F3q25 - Approval fro staff to join dep' tal team	.070	.035	-.019	.035	-.055	.027
F3q26 - Approval for staff to join cross-dept. teams	.033	.047	.044	.034	-.092	-.060
F4q27 - Analyse the operations quality	-.043	-.153	.017	.307	-.070	.078
F4q28 - Operations benchmark againts competitiors	-.033	.041	-.090	.037	-.040	.006
F4q29 - Operations bechmark against the best	.074	-.075	.111	-.116	-.021	.040
F4q31 - Benchmarking with other airlines	-.033	.132	-.170	.054	.110	.100
F4q32 - Bechmarking results for own organisation	-.020	.154	-.086	-.068	-.031	-.053
F4q33 - Own organisation well inform of benchmarking result	-.025	-.059	-.003	.121	-.076	-.077
F5q34 - Customer requirement surveys	-.036	-.174	.051	-.096	-.198	-.005
F5q35 - Translating customer requirement	-.076	-.163	.019	-.236	-.153	.106

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Component Score Coefficient Matrix

	Component					
	7	8	9	10	11	12
F5q36 - Use of customer representative	-.029	-.017	-.065	-.164	.040	.082
F5q37 - Important of customer visit	.054	.023	.036	-.166	.415	.016
F6q39 - Solve problem together	-.043	-.013	-.026	.158	-.178	.039
F6q40 - Working team in all levels organisation	-.071	.041	.092	-.121	-.105	.186
F6q41 - Objectives not conflicted each others	-.030	.002	.038	-.072	-.040	.013
F6q42 - Easy to talk with anyone	.066	.018	-.078	-.009	-.062	-.078
F6q43 - Members feel comfort to call each other	.071	.002	-.031	-.093	.073	.038
F6q44 - Members are quite accessible	.017	.041	-.059	.339	-.144	-.001
F7q47 - Customers' preferences change over time	-.054	.186	.076	.030	-.064	-.013
F7q48 - Customer look for new product	-.013	.329	-.114	-.034	.077	.122
F7q49 - Demand from new customer	-.038	.159	.154	-.056	.056	-.164
F7q50 - Technology is changing rapidly	-.020	-.039	.011	-.045	-.045	-.054
F7q51 - New product possible through technology	-.063	.007	-.065	.032	-.131	-.151
F7q52 - Technology-based equipment are employed	.017	-.018	-.109	-.029	.019	.047
F8q53 - Top/senior management involvement	-.073	-.007	-.043	.042	.048	.050
F8q54 - Top/senior management involve in objectives setting	-.029	.073	.025	.010	.100	-.066
F8q55 - Your participation in group activity	-.073	.298	.135	-.048	-.092	-.100
F8q56 - Top/senior management time spent	-.010	-.057	.084	.014	.114	.080
F8q57 - Your time spent to comunicate	.073	-.017	.456	-.093	.058	-.082
F8q58 - You make periodic evaluation of operations activities	-.060	.007	.343	.071	-.075	-.013
F8q59 - Top/senior make periodic evaluation	-.012	.018	.034	.264	.099	-.042
F8q60 - Top/senior management agrees on training fro future benefit	-.063	-.020	-.050	.099	.301	.054
F8q62 - Top/senior management rewards team working	.003	-.003	-.129	.118	.191	-.132

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Component Score Coefficient Matrix

	Component					
	7	8	9	10	11	12
F8q63 - You give reward to team working	.089	-.132	-.009	.025	.029	.016
F8q64 - Top/senior encourage the use of new working method	-.034	-.045	.119	-.034	.251	.115

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Component Score Covariance Matrix

Component	1	2	3	4	5	6	7
1	1.000	.000	.000	.000	-1.509E-16	.000	.000
2	.000	1.000	.000	-1.544E-16	.000	-3.419E-16	-3.539E-16
3	.000	.000	1.000	2.004E-16	-2.036E-16	-1.412E-16	.000
4	.000	-1.544E-16	2.004E-16	1.000	.000	-3.029E-16	.000
5	-1.509E-16	.000	-2.036E-16	.000	1.000	2.242E-16	.000
6	.000	-3.419E-16	-1.412E-16	-3.029E-16	2.242E-16	1.000	.000
7	.000	-3.539E-16	.000	.000	.000	.000	1.000
8	.000	-1.468E-16	.000	.000	.000	.000	.000
9	.000	.000	-1.195E-16	.000	.000	.000	.000
10	.000	.000	.000	.000	-1.896E-16	.000	.000
11	.000	-1.694E-16	2.019E-16	-1.469E-16	.000	.000	.000
12	1.020E-16	.000	.000	.000	.000	-1.380E-16	.000

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Component Score Covariance Matrix

Component	8	9	10	11	12
1	.000	.000	.000	.000	1.020E-16
2	-1.468E-16	.000	.000	-1.694E-16	.000
3	.000	-1.195E-16	.000	2.019E-16	.000
4	.000	.000	.000	-1.469E-16	.000
5	.000	.000	-1.896E-16	.000	.000
6	.000	.000	.000	.000	-1.380E-16
7	.000	.000	.000	.000	.000
8	1.000	.000	.000	-1.366E-16	-1.616E-16
9	.000	1.000	.000	.000	.000
10	.000	.000	1.000	.000	.000
11	-1.366E-16	.000	.000	1.000	.000
12	-1.616E-16	.000	.000	.000	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
Mean of Quality of Flight factor (process output)	3.7507	.6149	50
F1 - TECHNOLOGY USAGE & ORIENTATION	3.6918	.7485	50
F2 - REWARD SYSTEM	3.4154	.7903	50
F3 - TEAM BUILDING	3.3410	.7062	50
F4 - BENCHMARKING	3.4560	.7363	50
F5 - INTERDEPARTMENTAL INTERACTION	3.5933	.8089	50
F6 - CUSTOMER ORIENTED MOTIVATION	3.3200	1.1462	50
F7 - PROCESS IMPROVEMENT TECHNIQUE	3.3567	.8398	50
F8 - QUALITY DEMAND AWARENESS	3.8800	.6273	50
F9 - MANAGER-STAFF COMMUNICATION	3.5400	.8562	50
F10 - IMPROVEMENT PROGRAMME EVALUATION	3.7667	.7198	50
F11 - CUSTOMER FEEDBACK HANDLING	3.4694	1.0429	49
F12 - MEMBERS' PARTICIPATION	3.3333	.8220	50

Criterion-related Validity Test - Appendix C

Correlations

		Mean of Quality of Flight factor (process output)	F1 - TECHNOLOGY USAGE & ORIENTATION	F2 - REWARD SYSTEM	F3 - TEAM BUILDING
Mean of Quality of Flight factor (process output)	Pearson Correlation	1.000	.654**	.082	.089
	Sig. (2-tailed)	.	.000	.571	.537
	N	50	50	50	50
F1 - TECHNOLOGY USAGE & ORIENTATION	Pearson Correlation	.654**	1.000	.447**	.503**
	Sig. (2-tailed)	.000	.	.001	.000
	N	50	50	50	50
F2 - REWARD SYSTEM	Pearson Correlation	.082	.447**	1.000	.565**
	Sig. (2-tailed)	.571	.001	.	.000
	N	50	50	50	50
F3 - TEAM BUILDING	Pearson Correlation	.089	.503**	.565**	1.000
	Sig. (2-tailed)	.537	.000	.000	.
	N	50	50	50	50
F4 - BENCHMARKING	Pearson Correlation	.440**	.539**	.440**	.441**
	Sig. (2-tailed)	.001	.000	.001	.001
	N	50	50	50	50
F5 - INTERDEPARTMENTAL INTERACTION	Pearson Correlation	.440**	.670**	.208	.445**
	Sig. (2-tailed)	.001	.000	.147	.001
	N	50	50	50	50
F6 - CUSTOMER ORIENTED MOTIVATION	Pearson Correlation	.086	.286*	.542**	.276
	Sig. (2-tailed)	.555	.044	.000	.052
	N	50	50	50	50
F7 - PROCESS IMPROVEMENT TECHNIQUE	Pearson Correlation	.321*	.392**	.470**	.245
	Sig. (2-tailed)	.023	.005	.001	.086
	N	50	50	50	50
F8 - QUALITY DEMAND AWARENESS	Pearson Correlation	.359*	.506**	.367**	.372**
	Sig. (2-tailed)	.010	.000	.009	.008
	N	50	50	50	50
F9 - MANAGER-STAFF COMMUNICATION	Pearson Correlation	.178	.370**	.345*	.333*
	Sig. (2-tailed)	.216	.008	.014	.018
	N	50	50	50	50
F10 - IMPROVEMENT PROGRAMME EVALUATION	Pearson Correlation	.364**	.602**	.406**	.368**
	Sig. (2-tailed)	.009	.000	.003	.008
	N	50	50	50	50
F11 - CUSTOMER FEEDBACK HANDLING	Pearson Correlation	.169	.264	.330*	.421**
	Sig. (2-tailed)	.245	.067	.020	.003
	N	49	49	49	49
F12 - MEMBERS' PARTICIPATION	Pearson Correlation	-.073	.146	.514**	.348*
	Sig. (2-tailed)	.614	.313	.000	.013
	N	50	50	50	50

Criterion-related Validity Test - Appendix C

Correlations

		F4 - BENCHMARKING	F5 - INTERDEPARTMENTAL INTERACTION	F6 - CUSTOMER ORIENTED MOTIVATION	F7 - PROCESS IMPROVEMENT TECHNIQUE
Mean of Quality of Flight factor (process output)	Pearson Correlation	.440**	.440**	.086	.321*
	Sig. (2-tailed)	.001	.001	.555	.023
	N	50	50	50	50
F1 - TECHNOLOGY USAGE & ORIENTATION	Pearson Correlation	.539**	.670**	.286*	.392**
	Sig. (2-tailed)	.000	.000	.044	.005
	N	50	50	50	50
F2 - REWARD SYSTEM	Pearson Correlation	.440**	.208	.542**	.470**
	Sig. (2-tailed)	.001	.147	.000	.001
	N	50	50	50	50
F3 - TEAM BUILDING	Pearson Correlation	.441**	.445**	.276	.245
	Sig. (2-tailed)	.001	.001	.052	.086
	N	50	50	50	50
F4 - BENCHMARKING	Pearson Correlation	1.000	.416**	.317*	.413**
	Sig. (2-tailed)	.	.003	.025	.003
	N	50	50	50	50
F5 - INTERDEPARTMENTAL INTERACTION	Pearson Correlation	.416**	1.000	.004	.248
	Sig. (2-tailed)	.003	.	.979	.083
	N	50	50	50	50
F6 - CUSTOMER ORIENTED MOTIVATION	Pearson Correlation	.317*	.004	1.000	.250
	Sig. (2-tailed)	.025	.979	.	.080
	N	50	50	50	50
F7 - PROCESS IMPROVEMENT TECHNIQUE	Pearson Correlation	.413**	.248	.250	1.000
	Sig. (2-tailed)	.003	.083	.080	.
	N	50	50	50	50
F8 - QUALITY DEMAND AWARENESS	Pearson Correlation	.306*	.300*	.253	.318*
	Sig. (2-tailed)	.030	.035	.076	.025
	N	50	50	50	50
F9 - MANAGER-STAFF COMMUNICATION	Pearson Correlation	.268	.328*	.257	.242
	Sig. (2-tailed)	.060	.020	.072	.090
	N	50	50	50	50
F10 - IMPROVEMENT PROGRAMME EVALUATION	Pearson Correlation	.592**	.581**	.171	.396**
	Sig. (2-tailed)	.000	.000	.236	.004
	N	50	50	50	50
F11 - CUSTOMER FEEDBACK HANDLING	Pearson Correlation	.464**	.245	.172	.129
	Sig. (2-tailed)	.001	.090	.236	.377
	N	49	49	49	49
F12 - MEMBERS' PARTICIPATION	Pearson Correlation	.180	.113	.314*	.296*
	Sig. (2-tailed)	.211	.437	.026	.037
	N	50	50	50	50

Correlations

		F8 - QUALITY DEMAND AWARENESS	F9 - MANAGER-STAFF COMMUNICATION	F10 - IMPROVEMENT PROGRAMME EVALUATION
Mean of Quality of Flight factor (process output)	Pearson Correlation	.359*	.178	.364**
	Sig. (2-tailed)	.010	.216	.009
	N	50	50	50
F1 - TECHNOLOGY USAGE & ORIENTATION	Pearson Correlation	.506**	.370**	.602**
	Sig. (2-tailed)	.000	.008	.000
	N	50	50	50
F2 - REWARD SYSTEM	Pearson Correlation	.367**	.345*	.406**
	Sig. (2-tailed)	.009	.014	.003
	N	50	50	50
F3 - TEAM BUILDING	Pearson Correlation	.372**	.333*	.368**
	Sig. (2-tailed)	.008	.018	.008
	N	50	50	50
F4 - BENCHMARKING	Pearson Correlation	.306*	.268	.592**
	Sig. (2-tailed)	.030	.060	.000
	N	50	50	50
F5 - INTERDEPARTMENTAL INTERACTION	Pearson Correlation	.300*	.328*	.581**
	Sig. (2-tailed)	.035	.020	.000
	N	50	50	50
F6 - CUSTOMER ORIENTED MOTIVATION	Pearson Correlation	.253	.257	.171
	Sig. (2-tailed)	.076	.072	.236
	N	50	50	50
F7 - PROCESS IMPROVEMENT TECHNIQUE	Pearson Correlation	.318*	.242	.396**
	Sig. (2-tailed)	.025	.090	.004
	N	50	50	50
F8 - QUALITY DEMAND AWARENESS	Pearson Correlation	1.000	.313*	.308*
	Sig. (2-tailed)	.	.027	.029
	N	50	50	50
F9 - MANAGER-STAFF COMMUNICATION	Pearson Correlation	.313*	1.000	.501**
	Sig. (2-tailed)	.027	.	.000
	N	50	50	50
F10 - IMPROVEMENT PROGRAMME EVALUATION	Pearson Correlation	.308*	.501**	1.000
	Sig. (2-tailed)	.029	.000	.
	N	50	50	50
F11 - CUSTOMER FEEDBACK HANDLING	Pearson Correlation	.043	.104	.123
	Sig. (2-tailed)	.767	.476	.398
	N	49	49	49
F12 - MEMBERS' PARTICIPATION	Pearson Correlation	.317*	.391**	.257
	Sig. (2-tailed)	.025	.005	.072
	N	50	50	50

Correlations

		F11 - CUSTOMER FEEDBACK HANDLING	F12 - MEMBERS' PARTICIPATION
Mean of Quality of Flight factor (process output)	Pearson Correlation	.169	-.073
	Sig. (2-tailed)	.245	.614
	N	49	50
F1 - TECHNOLOGY USAGE & ORIENTATION	Pearson Correlation	.264	.146
	Sig. (2-tailed)	.067	.313
	N	49	50
F2 - REWARD SYSTEM	Pearson Correlation	.330*	.514**
	Sig. (2-tailed)	.020	.000
	N	49	50
F3 - TEAM BUILDING	Pearson Correlation	.421**	.348*
	Sig. (2-tailed)	.003	.013
	N	49	50
F4 - BENCHMARKING	Pearson Correlation	.464**	.180
	Sig. (2-tailed)	.001	.211
	N	49	50
F5 - INTERDEPARTMENTAL INTERACTION	Pearson Correlation	.245	.113
	Sig. (2-tailed)	.090	.437
	N	49	50
F6 - CUSTOMER ORIENTED MOTIVATION	Pearson Correlation	.172	.314*
	Sig. (2-tailed)	.236	.026
	N	49	50
F7 - PROCESS IMPROVEMENT TECHNIQUE	Pearson Correlation	.129	.296*
	Sig. (2-tailed)	.377	.037
	N	49	50
F8 - QUALITY DEMAND AWARENESS	Pearson Correlation	.043	.317*
	Sig. (2-tailed)	.767	.025
	N	49	50
F9 - MANAGER-STAFF COMMUNICATION	Pearson Correlation	.104	.391**
	Sig. (2-tailed)	.476	.005
	N	49	50
F10 - IMPROVEMENT PROGRAMME EVALUATION	Pearson Correlation	.123	.257
	Sig. (2-tailed)	.398	.072
	N	49	50
F11 - CUSTOMER FEEDBACK HANDLING	Pearson Correlation	1.000	.002
	Sig. (2-tailed)	.	.991
	N	49	49
F12 - MEMBERS' PARTICIPATION	Pearson Correlation	.002	1.000
	Sig. (2-tailed)	.991	.
	N	49	50

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Factor Analysis for Technology Usage & Orientation

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
F7q50 - Technology is changing rapidly	4.1111	.9822	45
F7q51 - New product possible through technology	4.0000	.9293	45
F7q52 - Technology-based equipment are employed	3.9333	.9630	45
F2q8 - Statistical/common method in day-to-day problem	3.4444	1.2533	45
F8q60 - Top/senior management agrees on training fro future benefit	4.0889	.9001	45
F8q64 - Top/senior encourage the use of new working method	3.6889	.7926	45
F6q43 - Members feel comfort to call each other	3.8889	1.0707	45
F2q7 - Statistical/common tech. for operations' weak link	3.8000	1.0787	45
F5q34 - Customer requirement surveys	3.4667	1.2173	45
F5q36 - Use of customer representative	2.9333	1.1755	45
F4q31 - Benchmarking with other airlines	3.3556	1.0693	45

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.866
Bartlett's Test of Sphericity	Approx. Chi-Square	351.118
	df	55
	Sig.	.000

Communalities

	Initial	Extraction
F7q50 - Technology is changing rapidly	.845	.742
F7q51 - New product possible through technology	.741	.630
F7q52 - Technology-based equipment are employed	.807	.786
F2q8 - Statistical/common method in day-to-day problem	.699	.563
F8q60 - Top/senior management agrees on training fro future benefit	.506	.415
F8q64 - Top/senior encourage the use of new working method	.669	.680
F6q43 - Members feel comfort to call each other	.602	.567
F2q7 - Statistical/common tech. for operations' weak link	.759	.894
F5q34 - Customer requirement surveys	.665	.602
F5q36 - Use of customer representative	.675	.622
F4q31 - Benchmarking with other airlines	.582	.572

Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.431	58.461	58.461	6.086	55.331	55.331
2	1.288	11.712	70.172	.988	8.980	64.311
3	.848	7.712	77.884			
4	.607	5.521	83.405			
5	.486	4.414	87.819			
6	.394	3.578	91.398			
7	.291	2.645	94.042			
8	.239	2.169	96.211			
9	.185	1.683	97.895			
10	.132	1.198	99.093			
11	9.978E-02	.907	100.000			

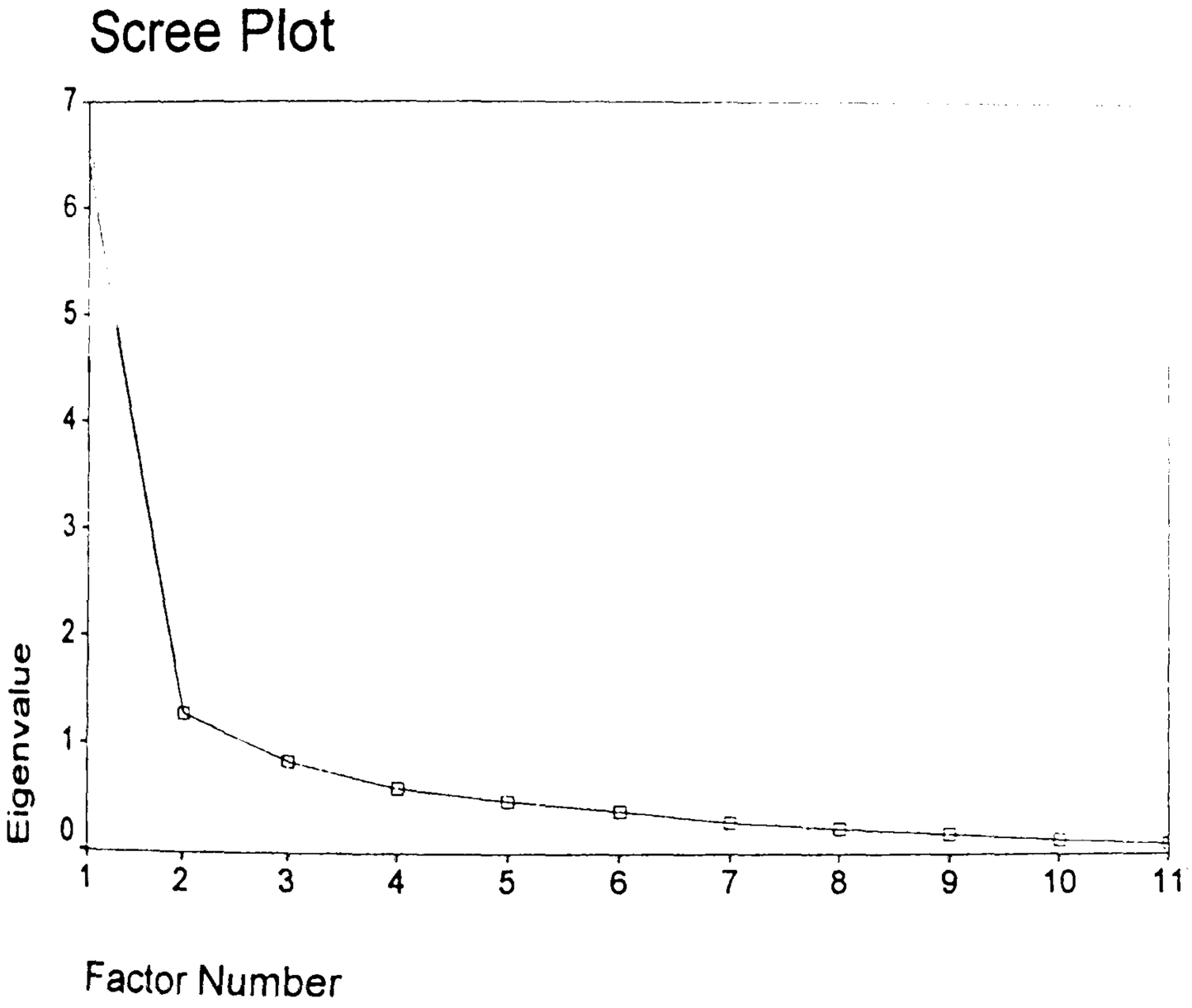
Extraction Method: Principal Axis Factoring.

Construct Validity Test - Appendix C

Total Variance Explained

Factor	Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	3.890	35.362	35.362
2	3.184	28.949	64.311
3			
4			
5			
6			
7			
8			
9			
10			
11			

Extraction Method: Principal Axis Factoring.



Factor Matrix[a]

	Factor	
	1	2
F7q52 - Technology-based equipment are employed	.885	
F7q50 - Technology is changing rapidly	.856	
F7q51 - New product possible through technology	.788	
F8q64 - Top/senior encourage the use of new working method	.787	.247
F6q43 - Members feel comfort to call each other	.743	-.121
F4q31 - Benchmarking with other airlines	.727	.208
F5q34 - Customer requirement surveys	.705	.324
F5q36 - Use of customer representative	.699	.365
F2q7 - Statistical/common tech. for operations' weak link	.684	-.653
F2q8 - Statistical/common method in day-to-day problem	.667	-.345
F8q60 - Top/senior management agrees on training fro future benefit	.594	.250

Extraction Method: Principal Axis Factoring.

a. 2 factors extracted. 19 iterations required.

Rotated Factor Matrix[a]

	Factor	
	1	2
F5q36 - Use of customer representative	.767	.183
F8q64 - Top/senior encourage the use of new working method	.756	.330
F5q34 - Customer requirement surveys	.745	.219
F4q31 - Benchmarking with other airlines	.685	.320
F7q52 - Technology-based equipment are employed	.630	.623
F8q60 - Top/senior management agrees on training fro future benefit	.612	.201
F2q7 - Statistical/common tech. for operations' weak link		.942
F2q8 - Statistical/common method in day-to-day problem	.276	.698
F7q50 - Technology is changing rapidly	.582	.635
F7q51 - New product possible through technology	.530	.591
F6q43 - Members feel comfort to call each other	.481	.579

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

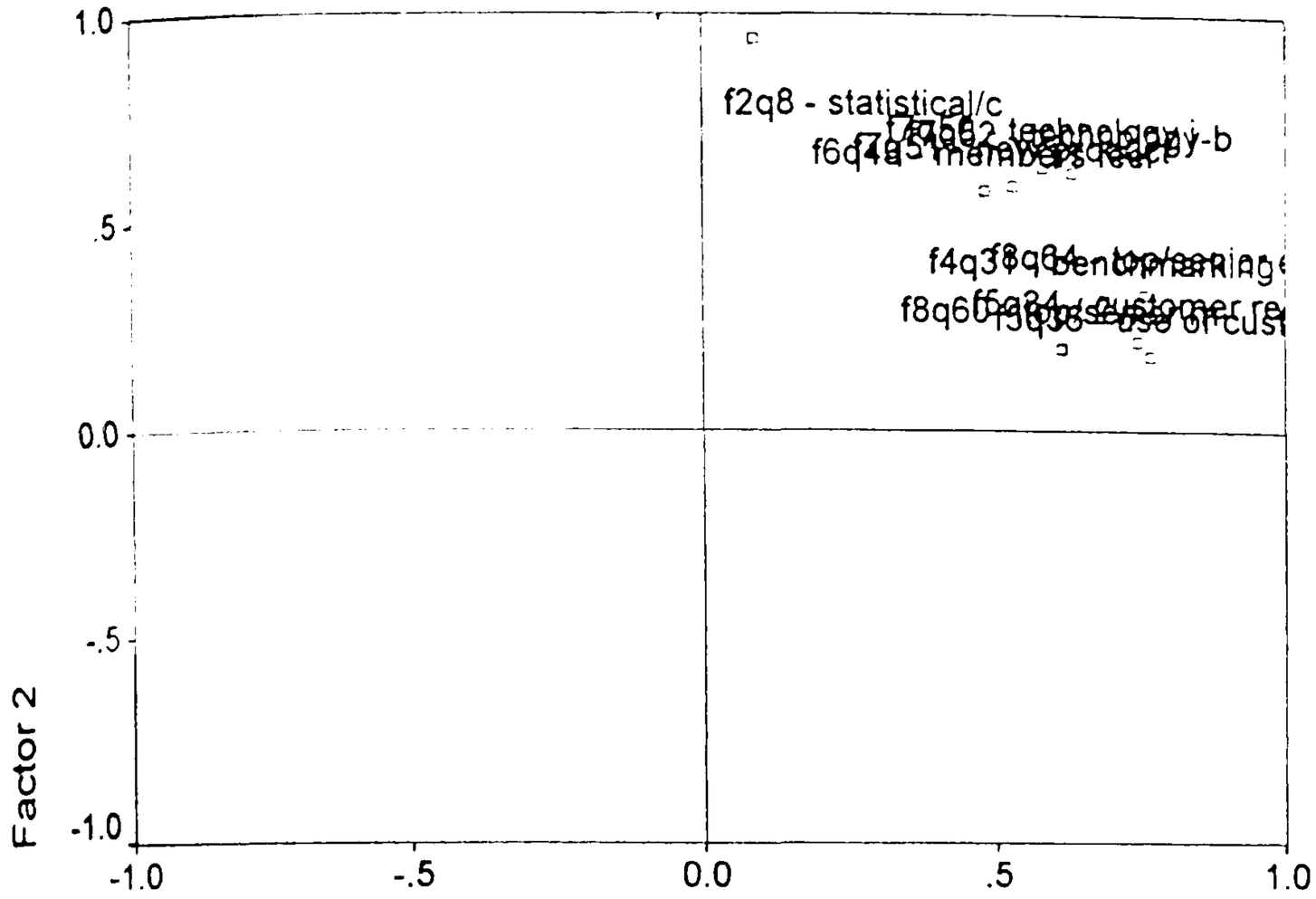
a. Rotation converged in 3 iterations.

Factor Transformation Matrix

Factor	1	2
1	.754	.656
2	.656	-.754

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Plot in Rotated Factor Space



Factor Score Coefficient Matrix

	Factor	
	1	2
F7q50 - Technology is changing rapidly	.089	.140
F7q51 - New product possible through technology	.058	.031
F7q52 - Technology-based equipment are employed	.184	.103
F2q8 - Statistical/common method in day-to-day problem	.104	-.099
F8q60 - Top/senior management agrees on training fro future benefit	.037	.059
F8q64 - Top/senior encourage the use of new working method	.288	-.088
F6q43 - Members feel comfort to call each other	.116	-.032
F2q7 - Statistical/common tech. for operations' weak link	-.561	.960
F5q34 - Customer requirement surveys	.135	.028
F5q36 - Use of customer representative	.284	-.169
F4q31 - Benchmarking with other airlines	.138	-.027

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.
Factor Scores Method: Regression.

Factor Score Covariance Matrix

Factor	1	2
1	.887	4.555E-02
2	4.555E-02	.937

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.
Factor Scores Method: Regression.

Factor Analysis for Reward System

Warnings

Only one factor was extracted.
Factor plots cannot be produced.

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
F3q14 - Dep' tal performance to reward the managers	3.3265	1.0080	49
F3q15 - Dep' tal performance to reward the staff	3.3061	1.0841	49
F3q16 - Team-based perf. to reward the managers	3.2653	1.1686	49
F3q17 - Team-based perf. to reward the staff	3.2449	1.0110	49
F8q63 - You give reward to team working	3.5918	.8396	49
F7q49 - Demand from new customer	3.8571	.7638	49
F8q62 - Top/senior management rewards team working	3.4898	.8690	49

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.827
Bartlett's Test of Sphericity	Approx. Chi-Square	252.933
	df	21
	Sig.	.000

Communalities

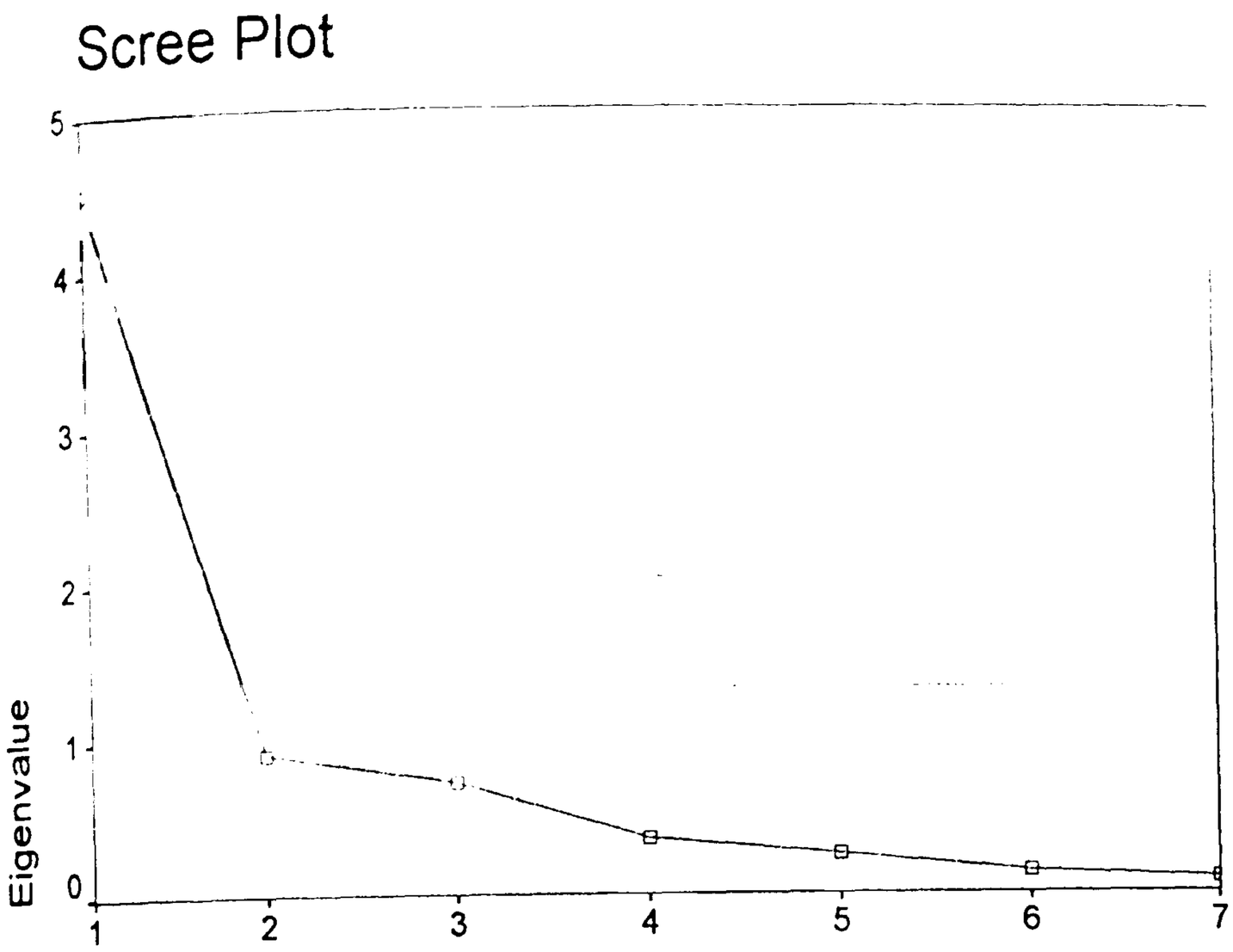
	Initial	Extraction
F3q14 - Dep' tal performance to reward the managers	.668	.608
F3q15 - Dep' tal performance to reward the staff	.839	.901
F3q16 - Team-based perf. to reward the managers	.834	.644
F3q17 - Team-based perf. to reward the staff	.810	.710
F8q63 - You give reward to team working	.659	.626
F7q49 - Demand from new customer	.429	.261
F8q62 - Top/senior management rewards team working	.519	.422

Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.523	64.614	64.614	4.172	59.603	59.603
2	.908	12.966	77.581			
3	.721	10.297	87.878			
4	.360	5.137	93.015			
5	.257	3.666	96.681			
6	.139	1.980	98.661			
7	9.373E-02	1.339	100.000			

Extraction Method: Principal Axis Factoring.



Factor Matrix[a]

	Factor
	1
F3q15 - Dep' tal performance to reward the staff	.949
F3q17 - Team-based perf. to reward the staff	.843
F3q16 - Team-based perf. to reward the managers	.802
F8q63 - You give reward to team working	.791
F3q14 - Dep' tal performance to reward the managers	.780
F8q62 - Top/senior management rewards team working	.650
F7q49 - Demand from new customer	.511

Extraction Method: Principal Axis Factoring.

a. 1 factors extracted. 6 iterations required.

Rotated Factor Matrix[a]

a. Only one factor was extracted. The solution cannot be rotated.

Factor Score Coefficient Matrix

	Factor
	1
F3q14 - Dep' tal performance to reward the managers	.077
F3q15 - Dep' tal performance to reward the staff	.607
F3q16 - Team-based perf. to reward the managers	-.067
F3q17 - Team-based perf. to reward the staff	.247
F8q63 - You give reward to team working	.173
F7q49 - Demand from new customer	-.016
F8q62 - Top/senior management rewards team working	.054

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Score Covariance Matrix

Factor	1
1	.955

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Analysis for Team Building

Warnings

Only one factor was extracted.
Factor plots cannot be produced.

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
F3q25 - Approval fro staff to join dep' tal team	3.1875	1.0243	48
F3q26 - Approval for staff to join cross-dept. teams	3.2708	1.0051	48
F5q35 - Translating customer requirement	3.0000	.9893	48
F8q56 - Top/senior management time spent	3.2292	.7506	48
F6q39 - Solve problem together	4.0625	.8850	48

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.717
Bartlett's Test of Sphericity	Approx. Chi-Square	123.595
	df	10
	Sig.	.000

Communalities

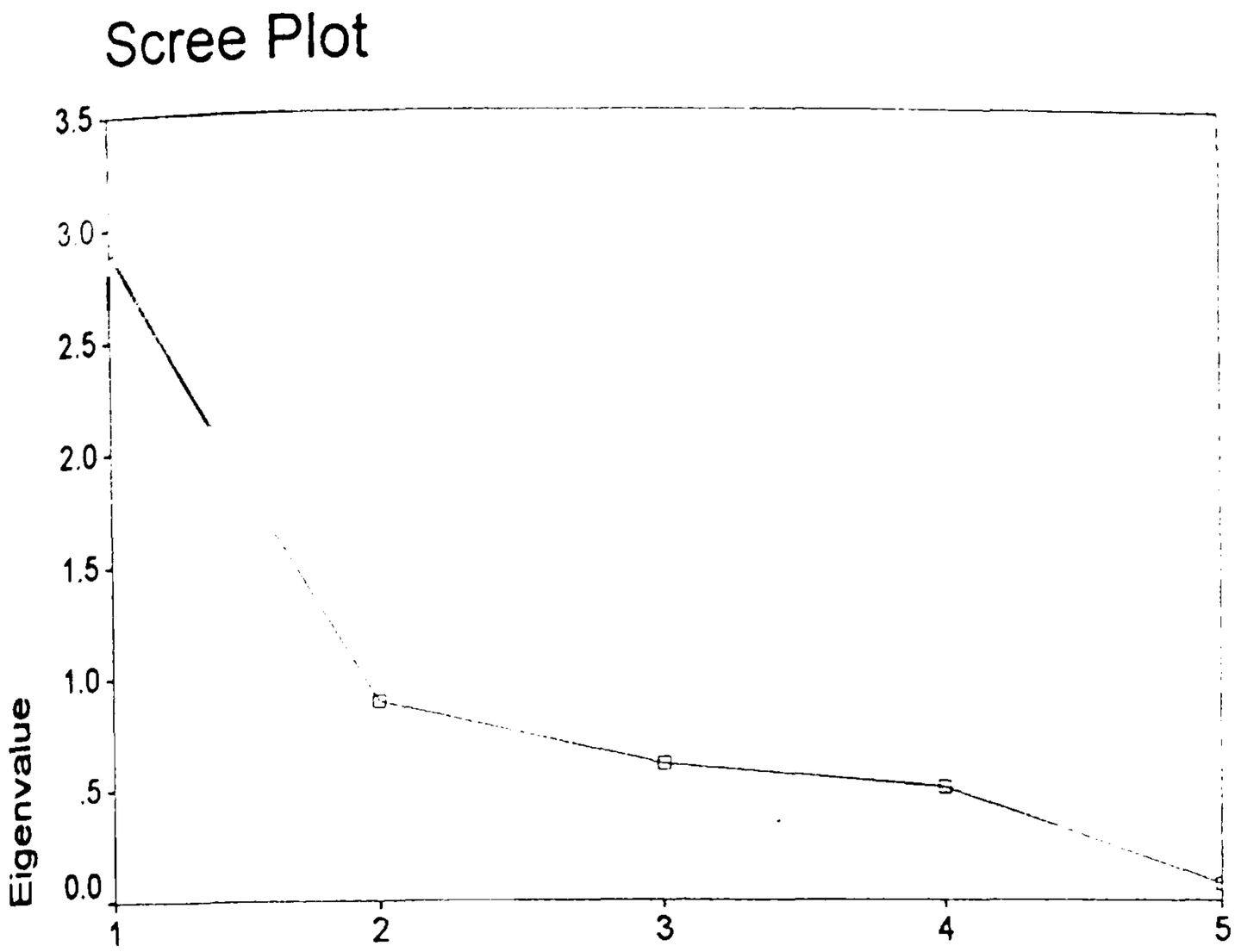
	Initial	Extraction
F3q25 - Approval fro staff to join dep' tal team	.855	.830
F3q26 - Approval for staff to join cross-dept. teams	.852	.807
F5q35 - Translating customer requirement	.352	.379
F8q56 - Top/senior management time spent	.367	.389
F6q39 - Solve problem together	.152	.137

Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.917	58.347	58.347	2.542	50.839	50.839
2	.889	17.789	76.135			
3	.611	12.218	88.353			
4	.505	10.092	98.445			
5	7.777E-02	1.555	100.000			

Extraction Method: Principal Axis Factoring.



Factor Matrix[a]

	Factor
	1
F3q25 - Approval fro staff to join dep' tal team	.911
F3q26 - Approval for staff to join cross-dept. teams	.898
F8q56 - Top/senior management time spent	.624
F5q35 - Translating customer requirement	.616
F6q39 - Solve problem together	.370

Extraction Method: Principal Axis Factoring.

a. 1 factors extracted. 7 iterations required.

Rotated Factor Matrix[a]

a. Only one factor was extracted. The solution cannot be rotated.

Factor Score Coefficient Matrix

	Factor
	1
F3q25 - Approval fro staff to join dep' tal team	.454
F3q26 - Approval for staff to join cross-dept. teams	.325
F5q35 - Translating customer requirement	.126
F8q56 - Top/senior management time spent	.146
F6q39 - Solve problem together	.072

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Score Covariance Matrix

Factor	1
1	.900

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Analysis for Benchmarking

Warnings

Only one factor was extracted.
Factor plots cannot be produced.

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
F4q28 - Operations benchmark againts competitiors	3.5400	.8855	50
F4q29 - Operations bechmark against the best	3.3600	.9424	50
F4q32 - Bechmarking results for own organisation	3.3800	.8053	50
F4q33 - Own organisation well inform of benchmarking result	3.3400	1.0422	50
F8q54 - Top/senior management involve in objectives setting	3.6600	.8947	50

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.754
Bartlett's Test of Sphericity	Approx. Chi-Square	125.896
	df	10
	Sig.	.000

Communalities

	Initial	Extraction
F4q28 - Operations benchmark againts competitiors	.649	.641
F4q29 - Operations bechmark against the best	.605	.573
F4q32 - Bechmarking results for own organisation	.530	.596
F4q33 - Own organisation well inform of benchmarking result	.623	.593
F8q54 - Top/senior management involve in objectives setting	.542	.414

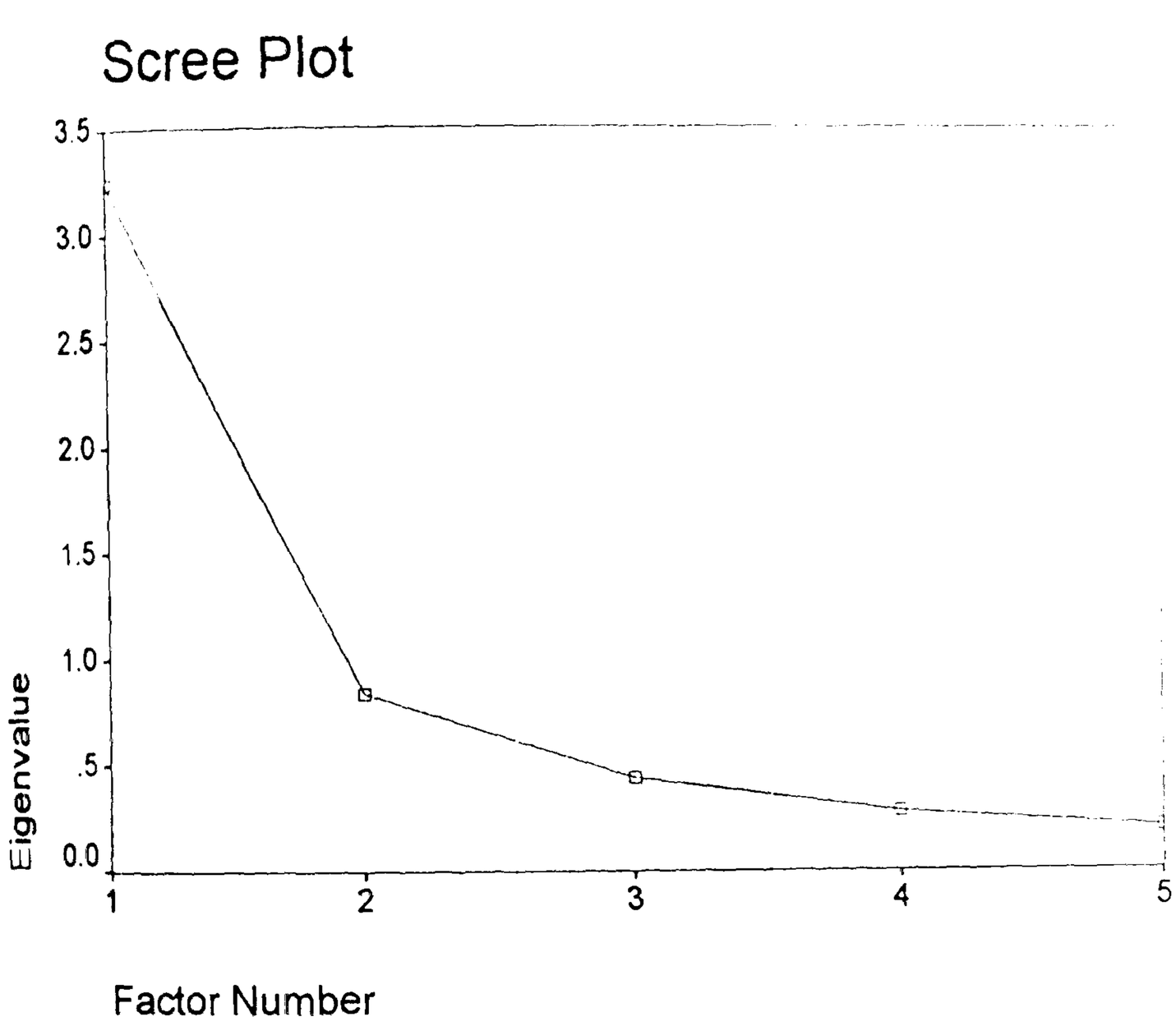
Extraction Method: Principal Axis Factoring.

Construct Validity Test - Appendix C

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.244	64.878	64.878	2.816	56.320	56.320
2	.838	16.763	81.640			
3	.439	8.772	90.413			
4	.279	5.571	95.984			
5	.201	4.016	100.000			

Extraction Method: Principal Axis Factoring.



Factor Matrix[a]

	Factor
	1
F4q28 - Operations benchmark againts competitiors	.801
F4q32 - Bechmarking results for own organisation	.772
F4q33 - Own organisation well inform of benchmarking result	.770
F4q29 - Operations bechmark against the best	.757
F8q54 - Top/senior management involve in objectives setting	.643

Extraction Method: Principal Axis Factoring.

a. 1 factors extracted. 6 iterations required.

Rotated Factor Matrix[a]

a. Only one factor was extracted. The solution cannot be rotated.

Factor Score Coefficient Matrix

	Factor
	1
F4q28 - Operations benchmark againts competitiors	.296
F4q29 - Operations bechmark against the best	.191
F4q32 - Bechmarking results for own organisation	.241
F4q33 - Own organisation well inform of benchmarking result	.297
F8q54 - Top/senior management involve in objectives setting	.117

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor **Score Covariance Matrix**

Factor	1
1	.872

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Analysis for Interdepartmental Interaction

Warnings

Only one factor was extracted.
Factor plots cannot be produced.

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
F6q42 - Easy to talk with anyone	3.7400	1.0063	50
F6q41 - Objectives not conflicted each others	3.6000	.9258	50
F8q53 - Top/senior management involvement	3.4400	.9071	50

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.663
Bartlett's Test of Sphericity	Approx. Chi-Square	57.287
	df	3
	Sig.	.000

Communalities

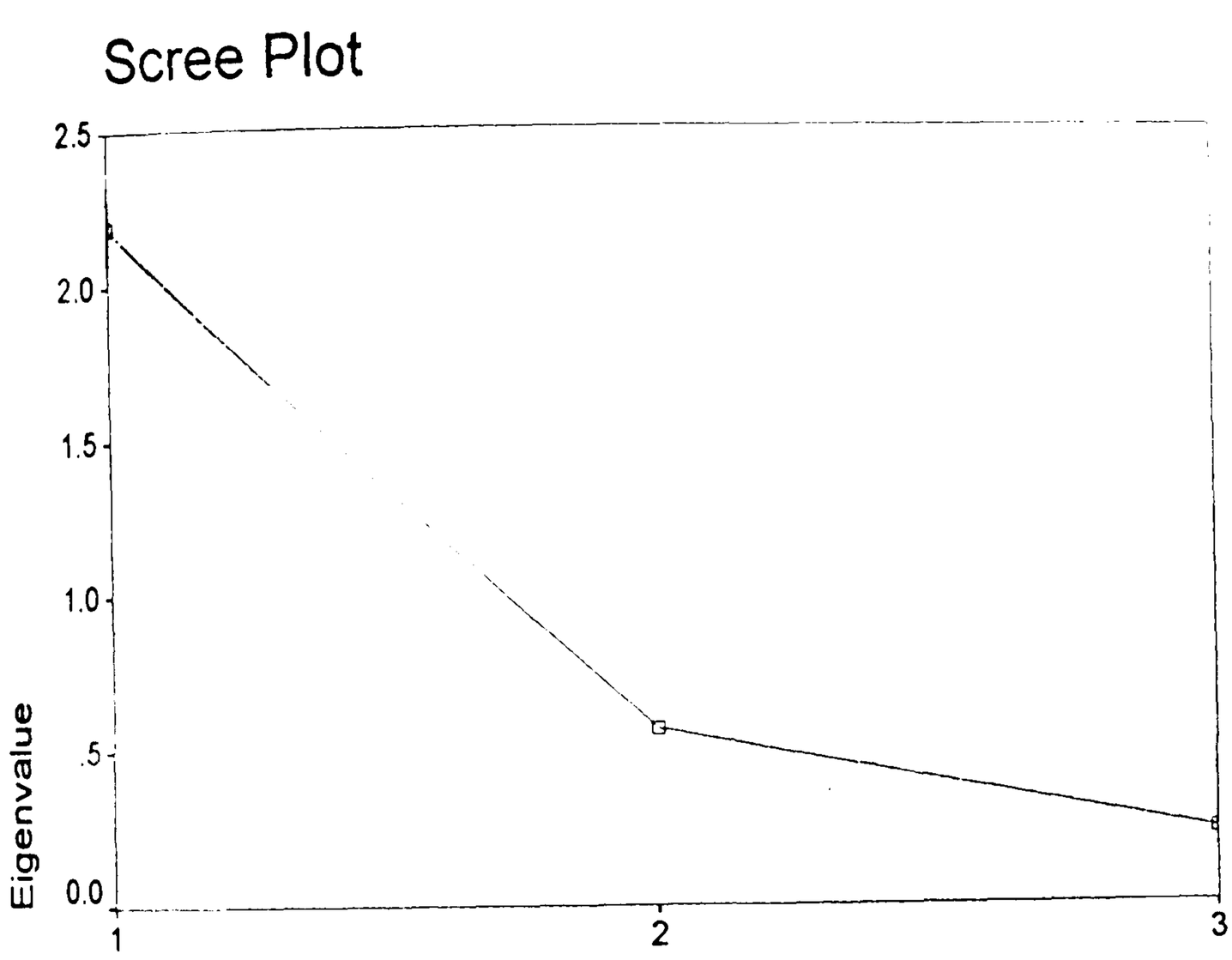
	Initial	Extraction
F6q42 - Easy to talk with anyone	.601	.765
F6q41 - Objectives not conflicted each others	.600	.758
F8q53 - Top/senior management involvement	.291	.337

Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.193	73.093	73.093	1.860	62.013	62.013
2	.570	18.984	92.077			
3	.238	7.923	100.000			

Extraction Method: Principal Axis Factoring.



Factor Matrix[a]

	Factor
	1
F6q42 - Easy to talk with anyone	.874
F6q41 - Objectives not conflicted each others	.871
F8q53 - Top/senior management involvement	.581

Extraction Method: Principal Axis Factoring.

a. 1 factors extracted. 8 iterations required.

Rotated Factor Matrix[a]

a. Only one factor was extracted. The solution cannot be rotated.

Factor Score Coefficient Matrix

	Factor
	1
F6q42 - Easy to talk with anyone	.470
F6q41 - Objectives not conflicted each others	.456
F8q53 - Top/senior management involvement	.111

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Score Covariance Matrix

Factor	1
1	.873

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Analysis for Customer Oriented Motivation

Warnings

Only one factor was extracted.
Factor plots cannot be produced.

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
F3q18 - Cust. satisfaction to reward the managers	3.3800	1.2103	50
F3q19 - Cust. satisfaction to reward the staff	3.2600	1.1572	50

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.500
Bartlett's Test of Sphericity	Approx. Chi-Square	68.956
	df	1
	Sig.	.000

Communalities

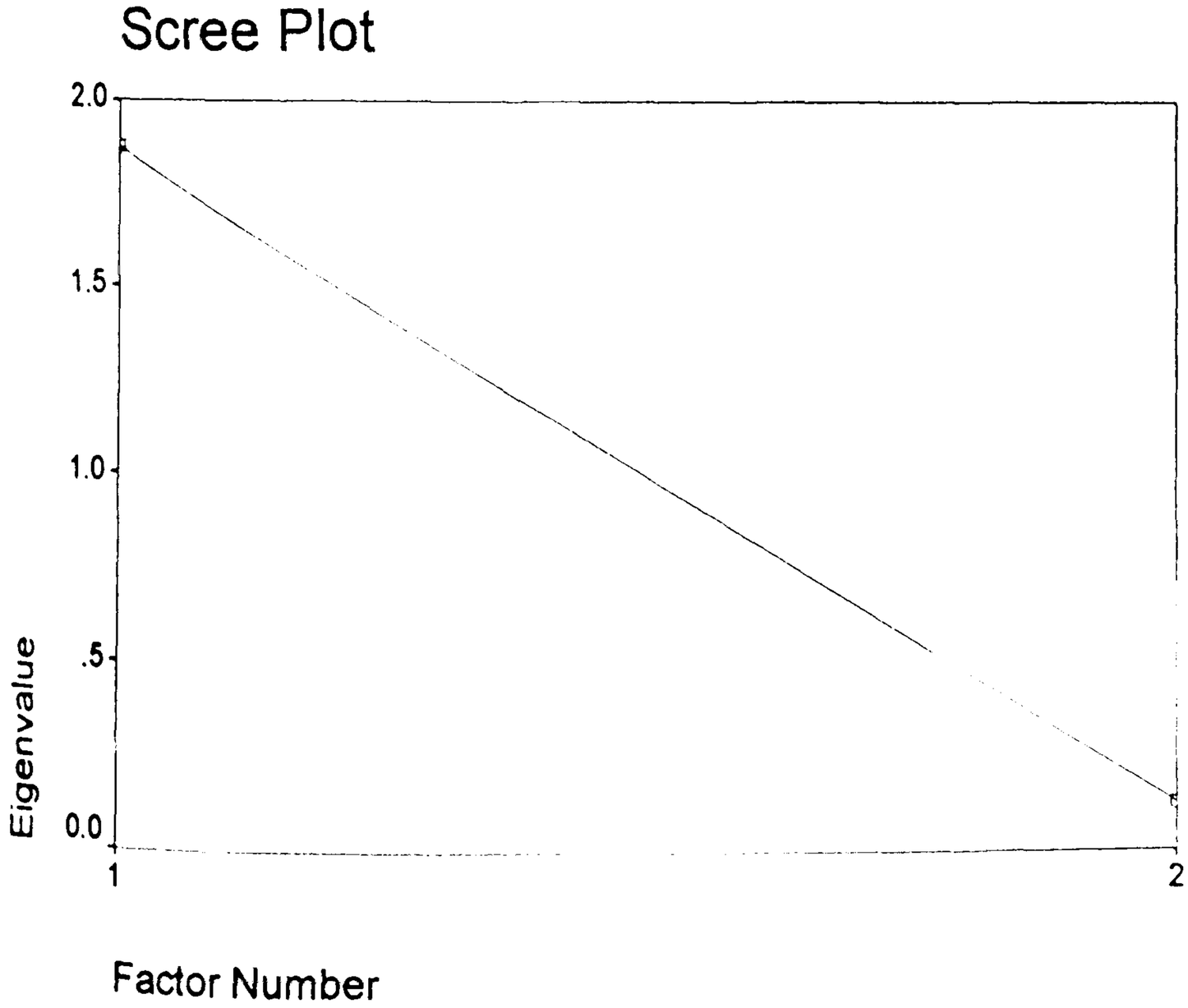
	Initial	Extraction
F3q18 - Cust. satisfaction to reward the managers	.766	.874
F3q19 - Cust. satisfaction to reward the staff	.766	.874

Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.875	93.756	93.756	1.749	87.426	87.426
2	.125	6.244	100.000			

Extraction Method: Principal Axis Factoring.



Factor Matrix[a]

	Factor
	1
F3q19 - Cust. satisfaction to reward the staff	.935
F3q18 - Cust. satisfaction to reward the managers	.935

Extraction Method: Principal Axis Factoring.

a. 1 factors extracted. 7 iterations required.

Rotated Factor Matrix[a]

a. Only one factor was extracted. The solution cannot be rotated.

Factor Score Coefficient Matrix

	Factor
	1
F3q18 - Cust. satisfaction to reward the managers	.499
F3q19 - Cust. satisfaction to reward the staff	.499

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Score Covariance Matrix

Factor	1
1	.932

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Analysis for Process Improvement Technique

Warnings

Only one factor was extracted.
Factor plots cannot be produced.

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
F2q10 - New precaution project	3.6458	1.0208	48
F2q9 - Percentage members use the methods	3.2292	.9507	48
F2q11 - New follow up action project	3.2083	.9884	48

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.725
Bartlett's Test of Sphericity	Approx. Chi-Square	52.635
	df	3
	Sig.	.000

Communalities

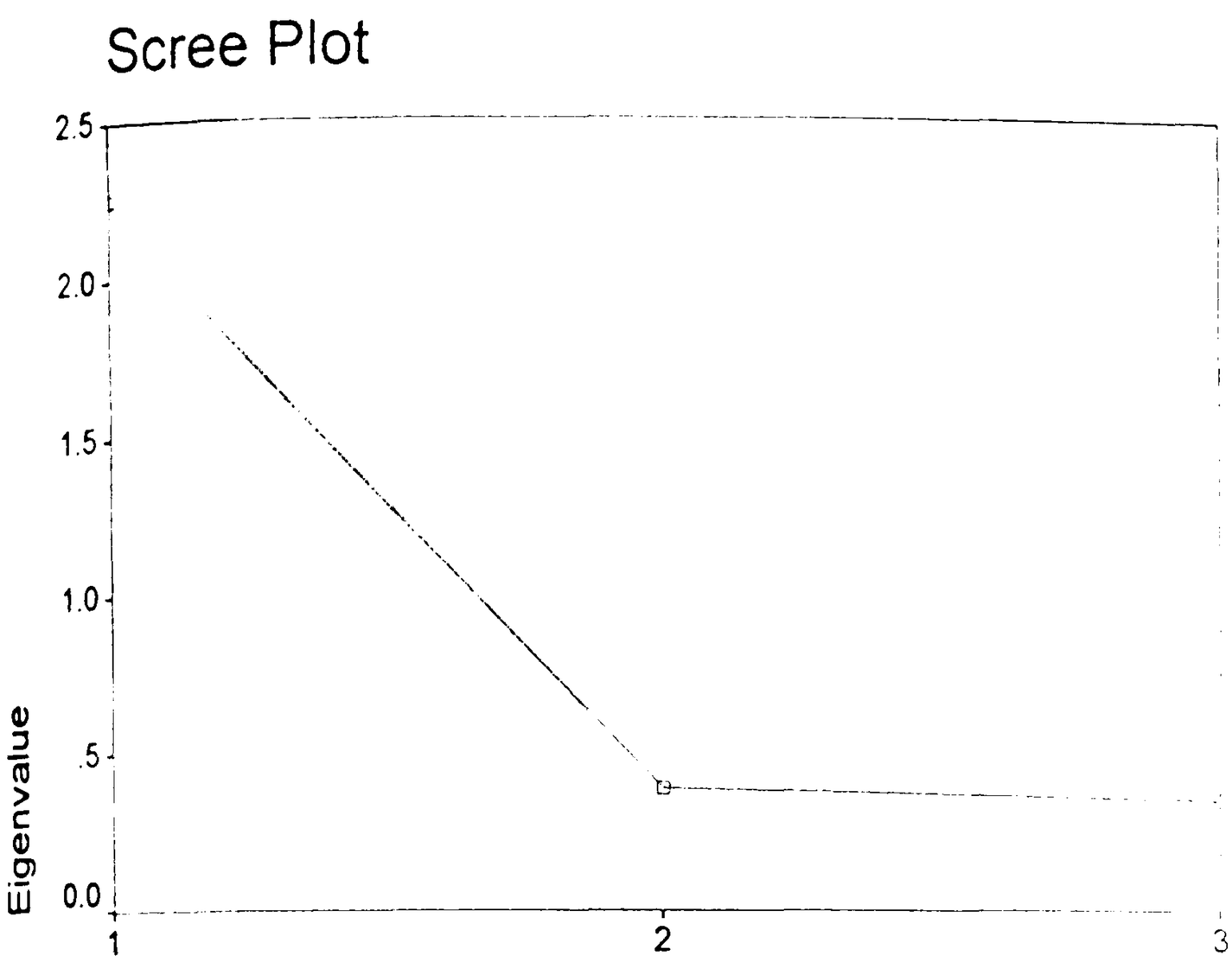
	Initial	Extraction
F2q10 - New precaution project	.486	.628
F2q9 - Percentage members use the methods	.467	.597
F2q11 - New follow up action project	.502	.659

Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.255	75.180	75.180	1.884	62.798	62.798
2	.391	13.034	88.215			
3	.354	11.785	100.000			

Extraction Method: Principal Axis Factoring.



Factor Matrix[a]

	Factor
	1
F2q11 - New follow up action project	.812
F2q10 - New precaution project	.792
F2q9 - Percentage members use the methods	.772

Extraction Method: Principal Axis Factoring.

a. 1 factors extracted. 7 iterations required.

Rotated Factor Matrix[a]

a. Only one factor was extracted. The solution cannot be rotated.

Factor Score Coefficient Matrix

	Factor
	1
F2q10 - New precaution project	.349
F2q9 - Percentage members use the methods	.314
F2q11 - New follow up action project	.390

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Score Covariance Matrix

Factor	1
1	.836

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Analysis for Quality Demand Awareness

Warnings

Only one factor was extracted.
Factor plots cannot be produced.

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
F7q48 - Customer look for new product	3.8800	.7461	50
F8q55 - Your participation in group activity	3.6600	.8478	50
F7q47 - Customers' preferences change over time	4.1000	.7890	50

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.672
Bartlett's Test of Sphericity	Approx. Chi-Square	24.401
	df	3
	Sig.	.000

Communalities

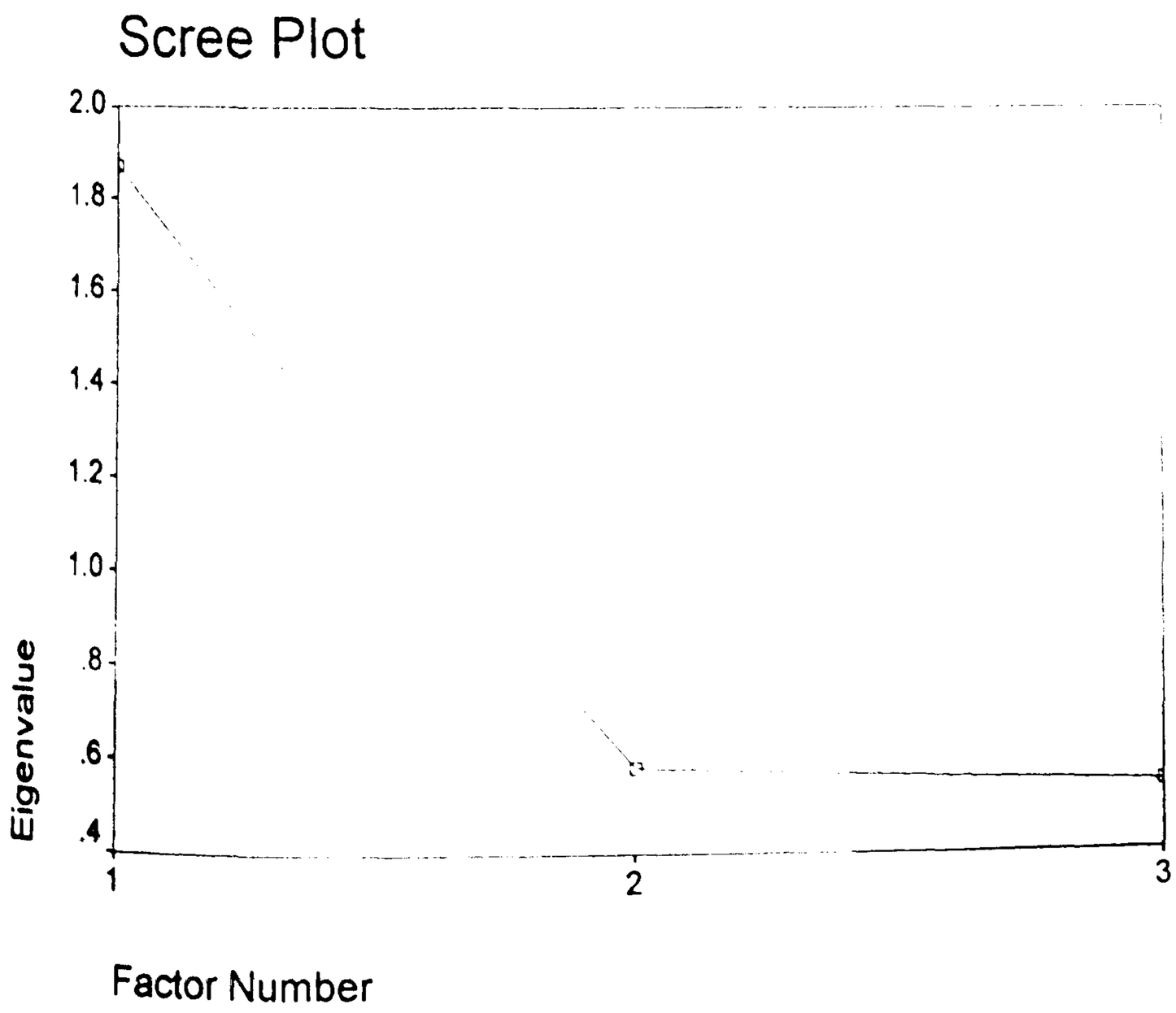
	Initial	Extraction
F7q48 - Customer look for new product	.278	.469
F8q55 - Your participation in group activity	.263	.431
F7q47 - Customers' preferences change over time	.252	.406

Extraction Method: Principal Axis Factoring.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.870	62.342	62.342	1.307	43.559	43.559
2	.584	19.455	81.797			
3	.546	18.203	100.000			

Extraction Method: Principal Axis Factoring.



Factor Matrix[a]

	Factor
	1
F7q48 - Customer look for new product	.685
F8q55 - Your participation in group activity	.657
F7q47 - Customers' preferences change over time	.637

Extraction Method: Principal Axis Factoring.

a. 1 factors extracted. 8 iterations required.

Rotated Factor Matrix[a]

a. Only one factor was extracted. The solution cannot be rotated.

Factor Score Coefficient Matrix

	Factor
	1
F7q48 - Customer look for new product	.387
F8q55 - Your participation in group activity	.347
F7q47 - Customers' preferences change over time	.323

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Score Covariance Matrix

Factor	1
1	.699

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Analysis for Manager-Staff Communication

Warnings

Only one factor was extracted.
Factor plots cannot be produced.

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
F8q57 - Your time spent to comunicate	3.4600	.9304	50
F8q58 - You make periodic evaluation of operations activities	3.6200	.9234	50

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.500
Bartlett's Test of Sphericity	Approx. Chi-Square	32.834
	df	1
	Sig.	.000

Communalities

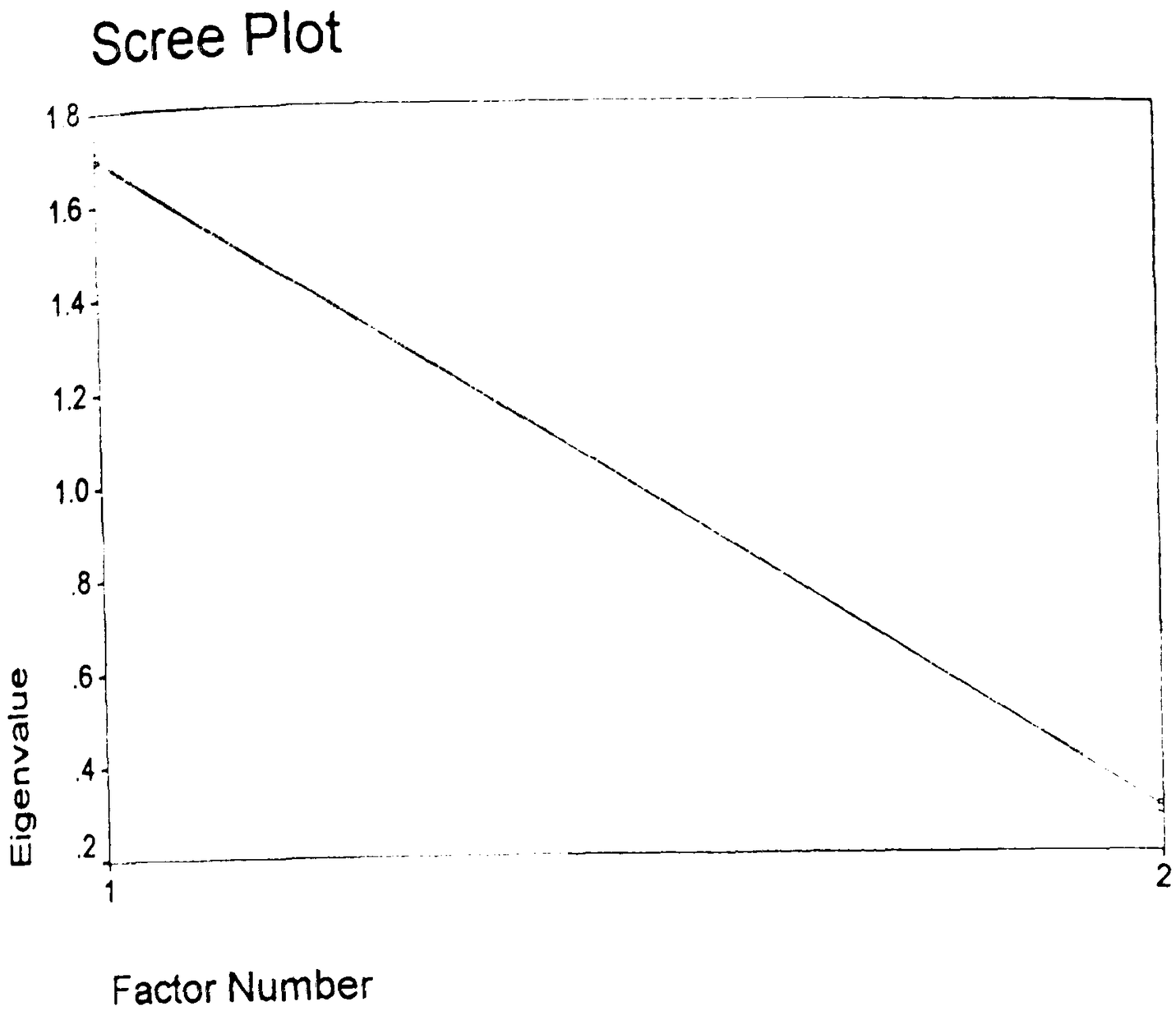
	Initial	Extraction
F8q57 - Your time spent to comunicate	.499	.706
F8q58 - You make periodic evaluation of operations activities	.499	.706

Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.706	85.322	85.322	1.411	70.562	70.562
2	.294	14.678	100.000			

Extraction Method: Principal Axis Factoring.



Factor Matrix[a]

	Factor
	1
F8q58 - You make periodic evaluation of operations activities	.840
F8q57 - Your time spent to comunicate	.840

Extraction Method: Principal Axis Factoring.

a. 1 factors extracted. 8 iterations required.

Rotated Factor Matrix[a]

a. Only one factor was extracted. The solution cannot be rotated.

Factor Score Coefficient Matrix

	Factor
	1
F8q57 - Your time spent to comunicate	.492
F8q58 - You make periodic evaluation of operations activities	.492

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Score Covariance Matrix

Factor	1
1	.827

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Analysis for Improvement Programme Evaluation

Warnings

Only one factor was extracted.
Factor plots cannot be produced.

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
F6q44 - Members are quite accessible	3.7800	.8154	50
F4q27 - Analyse the operations quality	4.0400	.8562	50
F8q59 - Top/senior make periodic evaluation	3.4800	.9311	50

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.692
Bartlett's Test of Sphericity	Approx. Chi-Square	38.766
	df	3
	Sig.	.000

Communalities

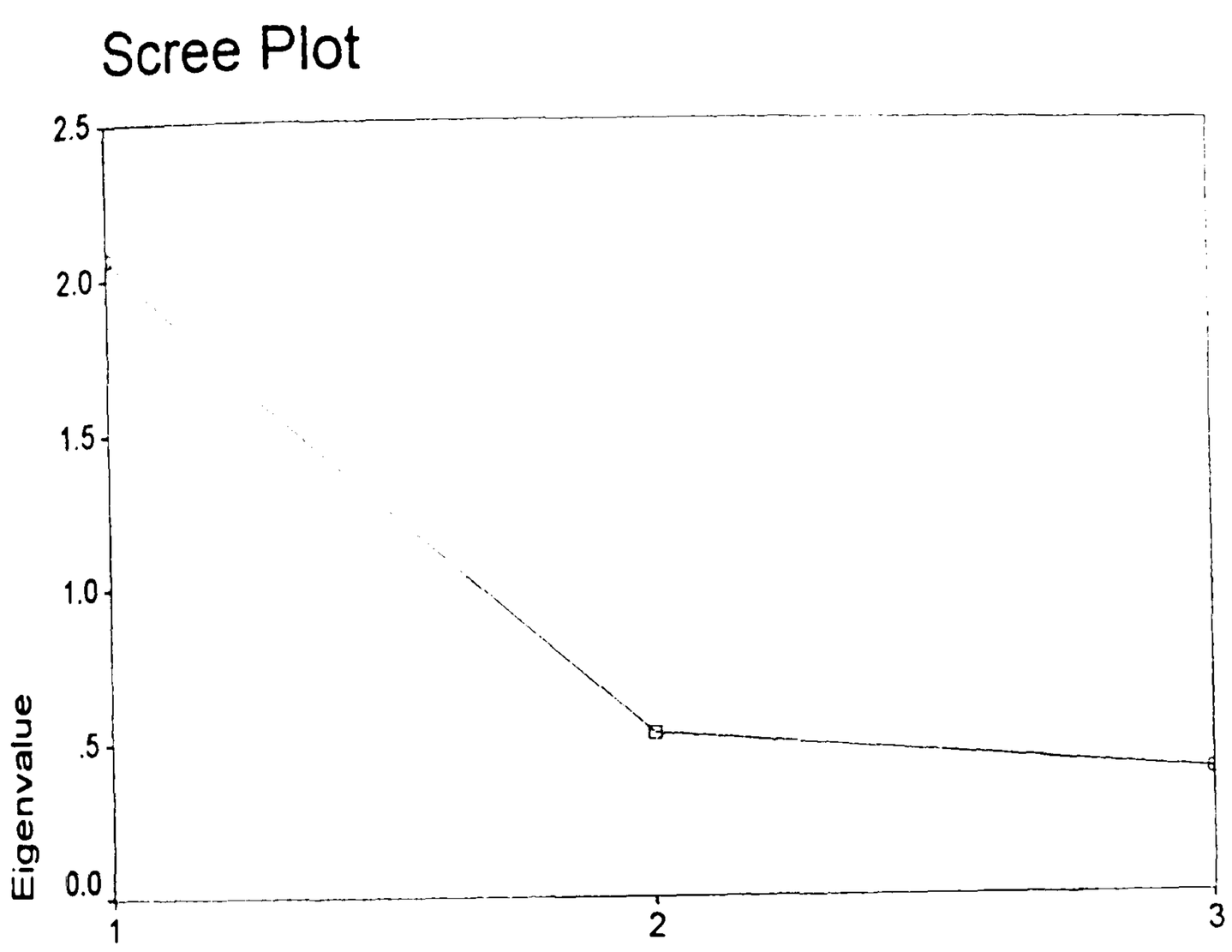
	Initial	Extraction
F6q44 - Members are quite accessible	.403	.573
F4q27 - Analyse the operations quality	.420	.621
F8q59 - Top/senior make periodic evaluation	.316	.423

Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.069	68.976	68.976	1.617	53.916	53.916
2	.530	17.651	86.627			
3	.401	13.373	100.000			

Extraction Method: Principal Axis Factoring.



Factor Matrix[a]

	Factor
	1
F4q27 - Analyse the operations quality	.788
F6q44 - Members are quite accessible	.757
F8q59 - Top/senior make periodic evaluation	.650

Extraction Method: Principal Axis Factoring.

a 1 factors extracted. 9 iterations required.

Rotated Factor Matrix[a]

a. Only one factor was extracted. The solution cannot be rotated.

Factor Score Coefficient Matrix

	Factor
	1
F8q44 - Members are quite accessible	.376
F4q27 - Analyse the operations quality	.441
F8q59 - Top/senior make periodic evaluation	.239

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Score Covariance Matrix

Factor	1
1	.788

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Analysis for Members' Participation

Warnings

Only one factor was extracted.
Factor plots cannot be produced.

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
F3q23 - Percentage of staff in dep' tal teams	3.3000	1.1112	50
F3q24 - Percentage staff in cross-dept. team	2.8400	1.0568	50
F8q40 - Working team in all levels organisation	3.8600	.7827	50

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.655
Bartlett's Test of Sphericity	Approx. Chi-Square	41.861
	df	3
	Sig.	.000

Communalities

	Initial	Extraction
F3q23 - Percentage of staff in dep' tal teams	.458	.581
F3q24 - Percentage staff in cross-dept. team	.498	.766
F6q40 - Working team in all levels organisation	.258	.313

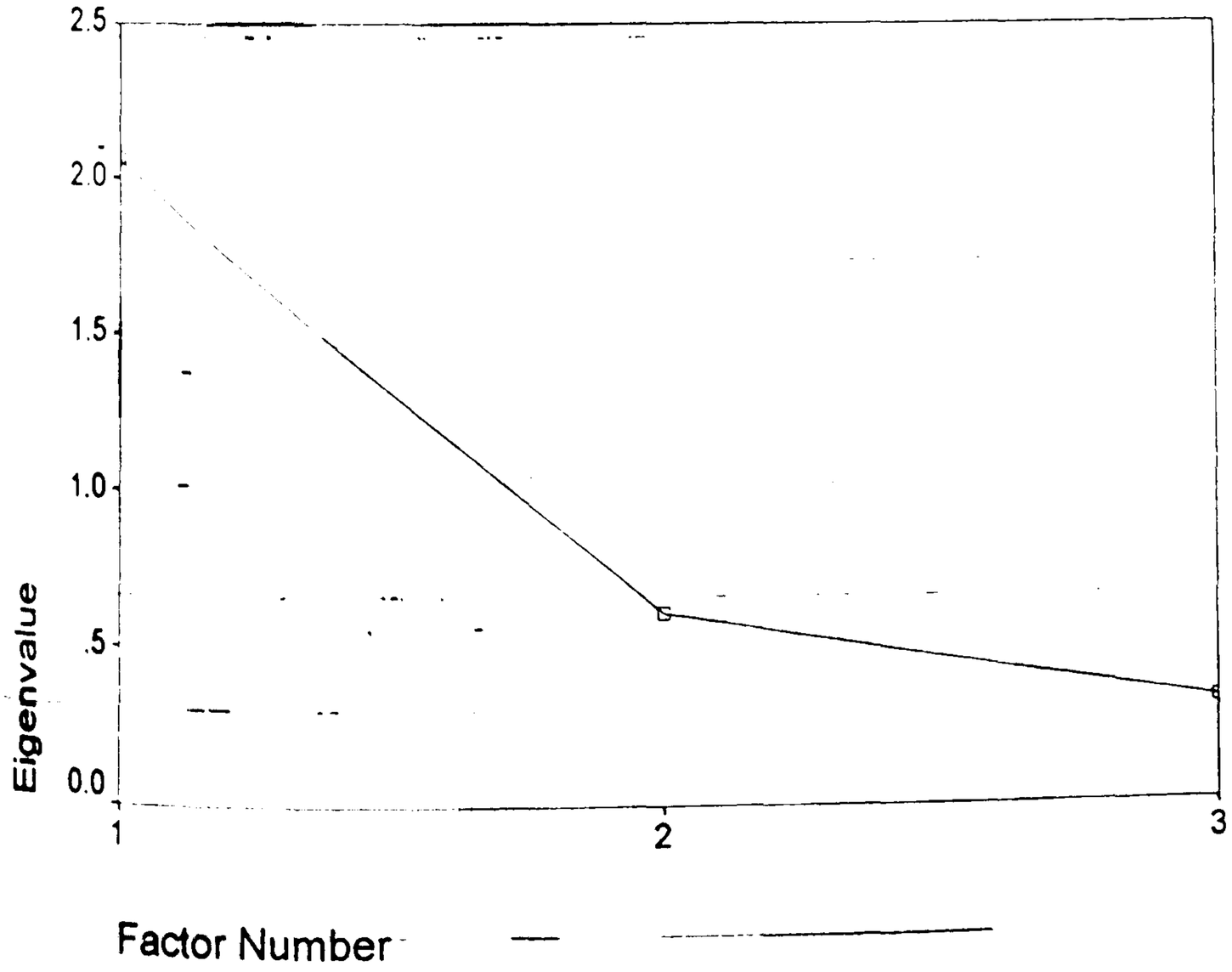
Extraction Method: Principal Axis Factoring.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.062	68.738	68.738	1.660	55.319	55.319
2	.611	20.374	89.113			
3	.327	10.887	100.000			

Extraction Method: Principal Axis Factoring.

Scree Plot



Factor Matrix[a]

	Factor
	1
F3q24 - Percentage staff in cross-dept. team	.875
F3q23 - Percentage of staff in dep' tal teams	.762
F6q40 - Working team in all levels organisation	.559

Extraction Method: Principal Axis Factoring.

a. 1 factors extracted. 16 iterations required.

Rotated Factor Matrix[a]

a. Only one factor was extracted. The solution cannot be rotated.

Factor Score Coefficient Matrix

	Factor
	1
F3q23 - Percentage of staff in dep' tal teams	.297
F3q24 - Percentage staff in cross-dept. team	.612
F6q40 - Working team in all levels organisation	.133

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

Factor Score Covariance Matrix

Factor	1
1	.836

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

Factor Scores Method: Regression.

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Reliability - Management Involvement (sub-factor)

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D5Q36	18.4898	14.6718	.7348	.8524
D8Q64	17.7959	17.0825	.7596	.8543
D5Q34	18.0612	14.6420	.7077	.8587
D4Q31	18.1429	15.6667	.7069	.8562
D7Q52	17.5510	16.2942	.7201	.8549
D8Q60	17.4082	17.6633	.5656	.8780

Reliability Coefficients

N of Cases = 49.0 N of Items = 6

Alpha = .8801

Reliability - Technology Usage and Management

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D5Q36	37.7778	61.4949	.6665	.9178
D8Q64	37.0222	64.8404	.7596	.9148
D5Q34	37.2444	60.8707	.6745	.9176
D4Q31	37.3556	62.2343	.6986	.9158
D7Q52	36.7778	61.4495	.8470	.9094
D8Q60	36.6222	66.2404	.5538	.9220
D2Q7	36.9111	63.4465	.6142	.9199
D2Q8	37.2667	61.1091	.6372	.9200
D7Q50	36.6000	61.7000	.8101	.9109
D7Q51	36.7111	63.2556	.7472	.9141
D6Q43	36.8222	61.9222	.7178	.9149

Reliability Coefficients

N of Cases = 45.0 N of Items = 11

Alpha = .9232

Reliability - Technology Usage Orientation (sub-factor)

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D2Q7	15.4348	12.1623	.7698	.8413
D2[illegible]	15.8043	11.7164	.6796	.8683
[illegible]	15.1304	12.7382	.7714	.8431
[illegible]1	15.2174	13.4184	.6960	.8603
[illegible]3	15.3696	12.6826	.6856	.8615

Reliability Coefficients

N of Cases = 46.0 N of Items = 5

Alpha = .8804

Reliability - Reward Systems

***** Method 1 (space saver) will be used for this analysis *****

RELIABILITY ANALYSIS - SCALE (ALPHA)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D3Q14	20.7551	21.6888	.7452	.8898
[illegible]	20.7755	19.8444	.8989	.8706
[illegible]6	20.8163	20.3614	.7561	.8902
[illegible]7	20.8367	21.1811	.8058	.8827
D6Q63	20.4898	22.9218	.7556	.8902
D7Q49	20.2245	25.3861	.4849	.9145
D8Q62	20.5918	23.7466	.6140	.9035

Reliability Coefficients

N of Cases = 49.0 N of Items = 7

Alpha = .9065

Reliability - Team Building

***** Method 1 (space saver) will be used for this analysis *****

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D3Q25	13.5625	7.2726	.7621	.7218
[illegible]6	13.4792	7.4038	.7529	.7256
D5Q35	13.7500	8.2766	.5756	.7846
D8Q56	13.5208	9.2336	.5996	.7815
D6Q39	12.6875	9.7939	.3529	.8430

Reliability Coefficients

N of Cases = 48.0 N of Items = 5

Alpha = .8126

Reliability - Benchmarking

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D4Q28	13.7400	8.9718	.7157	.8246
D4Q29	13.9200	8.8506	.6801	.8333
D4Q32	13.9000	9.4388	.7003	.8306
D4Q33	13.9400	8.1800	.7191	.8246
D8.54	13.6200	9.4241	.6059	.8513

Reliability Coefficients

N of Cases = 50.0 N of Items = 5

Alpha = .8619

Reliability - Interdepartmental Interaction

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D6Q42	7.0400	2.5290	.7335	.6714
D6Q41	7.1800	2.7629	.7373	.6713
[illegible]3	7.3400	3.2902	.5398	.8634

Reliability Coefficients

N of Cases = 50.0 N of Items = 3

Alpha = .8142

Reliability - Customer Oriented Motivation

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
[illegible]	3.2600	1.3392	.8751	.
[illegible]	3.3800	1.4649	.8751	.

Reliability Coefficients

N of Cases = 50.0 N of Items = 2

Alpha = .9329

Reliability - Process Improvement Technique

***** Method 1 (space saver) will be used for this analysis *****

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D2Q10	6.4375	3.0598	.6963	.7707
D2Q9	6.8542	3.3187	.6831	.7832
D2.11	6.8750	3.1330	.7084	.7578

Reliability Coefficients

N of Cases = 48.0 N of Items = 3

Alpha = .8346

Reliability - Quality Demand Awareness

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D7048	7.7600	1.9004	.5270	.5885
D7055	7.9800	1.6935	.5116	.6074
D7047	7.5400	1.8453	.5008	.6176

Reliability Coefficients

N of Cases = 50.0 N of Items = 3

Alpha = .6961

Reliability - Manager-Staff Communication

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
[illegible]57	3.6200	.8527	.7064	.
D .58	3.4600	.8657	.7064	.

Reliability Coefficients

N of Cases = 50.0 N of Items = 2

Alpha = .8280

Reliability - Improvement Programme Evaluation

***** Method 1 (space saver) will be used for this analysis *****

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
Q44	7.5200	2.4180	.6232	.6766
Q27	7.2600	2.2780	.6393	.6551
Q59	7.8200	2.2322	.5622	.7475

Reliability Coefficients

N of Cases = 50.0 N of Items = 3

Alpha = .7715

Reliability - Members' Participation

****** Method 1 (space saver) will be used for this analysis ******

RELIABILITY ANALYSIS - SCALE (ALPHA)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
D3Q23	6.7000	2.5408	.6510	.6387
D3Q24	7.1600	2.5861	.6999	.5713
D6Q40	6.1400	3.9188	.5002	.7999

Reliability Coefficients

N of Cases = 50.0 N of Items = 3

Alpha = .7689

CASE_LBL	AIRLINES	FAC1_1A	FAC1_1B	FAC1_2	FAC1_3	FAC1_4	FAC1_5	FAC1_6	FAC1_7	FAC1_8
SEA	1.00	-.03	#NULL!	37	-.23	49	-.79	-1.15	-.42	.14
SEA	1.00	.53	.44	1.06	.97	.73	50	1.02	-.01	69
SEA	1.00	.95	1.04	1.82	.65	-.38	1.35	1.02	1.92	-.31
SEA	1.00	-.81	-1.31	-1.28	.71	-1.24	.50	-1.15	-.02	18
SEA	1.00	-1.42	.56	-.80	-1.59	-3.10	-.27	-2.02	-1.59	-.81
SEA	1.00	.01	#NULL!	.37	.37	.24	-.73	.59	#NULL!	23
SEA	1.00	.12	#NULL!	1.43	-.23	-.37	-.29	.59	1.12	15
SEA	1.00	-.08	.60	1.23	-1.33	.74	.52	1.02	35	-.39
SEA	1.00	-.79	-1.43	-.57	-.42	-.62	-.73	-.28	-.42	-1.41
SEA	1.00	.79	-.33	1.28	1.57	.74	.06	.59	.75	-.31
SEA	1.00	.27	-.34	1.06	1.57	.74	-.35	.59	#NULL!	-.31
SEA	1.00	.46	-.31	-.03	.48	-.90	.11	1.02	-.42	-.31
SEA	1.00	.30	-.72	-.34	.11	.19	-.73	-.70	.75	-.31
SEA	1.00	-1.21	.22	-1.16	.31	-1.70	-.27	-.28	-.42	.79
SEA	1.00	.12	#NULL!	.72	.37	-.37	.56	1.47	.35	.18
SEA	1.00	-.79	-1.62	.15	-.42	-.62	-.73	.59	.74	-1.41
SEA	1.00	-.56	.16	-.04	.18	-1.18	-.73	.59	-.82	-.31
SEA	1.00	.27	-2.07	.72	.67	.74	-1.20	.59	-2.76	.18
SEA	1.00	-2.44	-1.56	1.24	-1.68	.07	-3.20	1.47	1.92	1.78
SEA	1.00	-.08	.06	.31	-.23	-.02	-1.14	-.28	-.82	-.43
SEA	1.00	-1.84	-2.17	#NULL!	-1.83	-2.23	-1.97	-.28	-1.59	-1.38
SEA	1.00	-.50	-1.17	-.22	.01	-1.13	.50	-.28	-1.59	.18
SEA	1.00	-.56	1.12	.71	1.16	-1.12	.58	-2.02	.34	1.78
SEA	1.00	-1.54	-1.20	-1.28	-.68	-.07	-.73	-1.15	-.43	-1.41
SEA	1.00	-1.54	-1.20	-1.28	-.68	-.07	-.73	-1.15	-.43	-1.41
SEA	1.00	-1.54	-1.20	-1.28	-.68	-.07	-.73	-1.15	-.43	-1.41
SEA	1.00	-1.54	-1.20	-1.28	-.68	-.07	-.73	-1.15	-.43	-1.41
SEA	1.00	-1.54	-1.20	-1.28	-.68	-.07	-.73	-1.15	-.43	-1.41
SEA	1.00	.56	1.04	-.36	-.03	.77	.50	-.28	1.92	.68
SEA	1.00	1.80	1.04	2.00	2.35	2.11	1.29	1.04	1.53	1.78
SEA	1.00	.01	-.23	.31	.97	.48	.50	1.47	-.83	-.34
SEA	1.00	1.61	.88	.55	1.50	1.24	.88	1.47	.75	1.78
SEA	1.00	1.26	.88	.22	1.50	.37	1.73	-1.15	-.43	1.78
WE	2.00	.35	.23	.00	.07	-.89	.11	-.28	-1.19	.71
WE	2.00	.74	1.30	-1.87	-1.23	.99	.90	-1.17	-.82	.22
WE	2.00	1.20	1.30	1.12	.56	.65	1.73	.59	.36	.14
WE	2.00	.92	.63	.35	-.17	-.07	-1.18	1.47	-.42	-.31
WE	2.00	-.25	.22	-2.63	-1.81	-.61	.11	.59	-.82	1.78
WE	2.00	#NULL!	.00	-.02	#NULL!	.14	.90	.15	-.04	.22
WE	2.00	1.32	1.04	.72	#NULL!	2.11	1.73	59	1.15	1.29
WE	2.00	-.18	.33	-.57	-1.55	-.31	.08	-.28	.34	-.31
WE	2.00	.47	.78	.18	.86	1.59	1.73	.15	.75	1.21
WE	2.00	.93	1.12	.17	.56	-.13	-.33	1.47	1.53	.14
WE	2.00	.92	.67	-.36	-.38	-.33	.11	-.28	-.42	-.31
WE	2.00	1.61	1.30	.95	.88	1.80	-.32	.59	-.02	.14
WE	2.00	.43	.44	-1.11	-1.62	-.33	-.29	.59	-.79	-.31
WE	2.00	.11	.25	-1.29	.56	-.37	-.33	-.70	-.02	-.89
WE	2.00	.59	1.07	-.16	-1.02	.50	.90	-2.02	1.13	-.31
WE	2.00	.77	.53	.37	-.03	.22	-.33	-.70	1.12	1.29
WE	2.00	-.18	-.01	-.16	.22	.66	1.73	-.30	-.04	-1.94

FAC1_9	FAC1_10	FAC1_12
.54	-.67	.79
.54	.31	.02
1.12	1.70	1.17
-.04	-.11	.79
1.12	-.11	-.05
.54	-.19	.79
1.12	-.19	1.26
.54	.79	-.39
-.63	-1.09	-.45
.54	.79	1.57
.54	.31	1.57
-.05	-2.00	.48
1.12	-.67	-1.22
-1.80	-1.48	-.76
.54	-.19	1.23
-.63	-1.09	-.07
-.63	-1.09	.33
-.04	-.19	.39
-.04	.46	2.03
-.63	.37	.42
-1.80	-2.48	-2.46
-1.21	-.18	.02
.54	-1.00	1.26
-.63	-.61	-.85
-.63	-.61	-.85
-.63	-.61	-.85
-.63	-.61	-.85
-.63	-.61	-.85
.54	-.18	1.26
1.70	1.70	1.63
.54	-.61	.02
-.05	.31	.39
-.05	1.70	-.76
1.70	-.11	-.76
.54	1.70	-.94
1.12	1.70	-.30
-1.22	-.52	-1.22
1.70	-.59	-.39
-1.80	-.11	-.39
-.04	1.29	.02
-1.80	-1.50	-1.22
1.12	1.20	.85
1.70	1.70	-1.22
-1.21	.37	1.17
-.04	-.13	-.76
-.04	.37	1.23
-1.22	.37	-.76
-1.21	.39	-.76
-1.21	.31	-1.63
1.12	1.70	.05

T-Test

Group Statistics

	CASE_LBL	N	Mean	Std. Deviation	Std. Error Mean
FAC1_1A	SEA	27	-.3116	1.0986	.2114
	WE	15	.5618	.5356	.1383
FAC1_1B	SEA	27	-.3217	1.0119	.1947
	WE	15	.6769	.4471	.1154
FAC1_2	SEA	27	1.357E-02	1.0230	.1969
	WE	15	-.3341	1.0219	.2638
FAC1_3	SEA	27	.1498	1.0131	.1950
	WE	15	-.2714	.9427	.2434
FAC1_4	SEA	27	-.1533	1.0425	.2006
	WE	15	.2258	.7913	.2043
FAC1_5	SEA	27	-.1369	1.0111	.1946
	WE	15	.3098	.8908	.2300
FAC1_6	SEA	27	-8.49E-02	1.0970	.2111
	WE	15	-1.82E-02	.9457	.2442
FAC1_7	SEA	27	-4.79E-02	1.1116	.2139
	WE	15	4.737E-02	.8183	.2113
FAC1_8	SEA	27	-6.69E-02	1.1275	.2170
	WE	15	8.294E-02	.9206	.2377
FAC1_9	SEA	27	-2.54E-02	.8012	.1542
	WE	15	7.091E-02	1.2912	.3334
FAC1_10	SEA	27	-.1746	.9436	.1816
	WE	15	.4645	.9750	.2517
FAC1_12	SEA	27	.1422	.9051	.1742
	WE	15	-.4435	.8939	.2308

Independent Samples Test

		Levene's Test for Equality of Variances	
		F	Sig.
FAC1_1A	Equal variances assumed	9.585	.004
	Equal variances not assumed		
FAC1_1B	Equal variances assumed	17.297	.000
	Equal variances not assumed		
FAC1_2	Equal variances assumed	.138	.712
	Equal variances not assumed		
FAC1_3	Equal variances assumed	.018	.895
	Equal variances not assumed		
FAC1_4	Equal variances assumed	.445	.508
	Equal variances not assumed		
FAC1_5	Equal variances assumed	.159	.692
	Equal variances not assumed		
FAC1_6	Equal variances assumed	1.620	.210
	Equal variances not assumed		
FAC1_7	Equal variances assumed	.943	.337
	Equal variances not assumed		
FAC1_8	Equal variances assumed	1.577	.216
	Equal variances not assumed		
FAC1_9	Equal variances assumed	9.997	.003
	Equal variances not assumed		
FAC1_10	Equal variances assumed	.024	.878
	Equal variances not assumed		
FAC1_12	Equal variances assumed	.057	.813
	Equal variances not assumed		

Independent Samples Test

		t-test for Equality of Means			
		t	df	Sig. (2-tailed)	Mean Difference
FAC1_1A	Equal variances assumed	-2.883	40	.006	-.8734
	Equal variances not assumed	-3.457	39.558	.001	-.8734
FAC1_1B	Equal variances assumed	-3.616	40	.001	-.9986
	Equal variances not assumed	-4.411	38.625	.000	-.9986
FAC1_2	Equal variances assumed	1.056	40	.297	.3477
	Equal variances not assumed	1.056	29.078	.300	.3477
FAC1_3	Equal variances assumed	1.322	40	.194	.4211
	Equal variances not assumed	1.350	30.884	.187	.4211
FAC1_4	Equal variances assumed	-1.224	40	.228	-.3791
	Equal variances not assumed	-1.324	35.994	.194	-.3791
FAC1_5	Equal variances assumed	-1.429	40	.161	-.4467
	Equal variances not assumed	-1.483	32.303	.148	-.4467
FAC1_6	Equal variances assumed	-.198	40	.844	-6.6657E-02
	Equal variances not assumed	-.207	32.866	.838	-6.6657E-02
FAC1_7	Equal variances assumed	-.290	40	.773	-9.5287E-02
	Equal variances not assumed	-.317	36.669	.753	-9.5287E-02
FAC1_8	Equal variances assumed	-.439	40	.663	-.1498
	Equal variances not assumed	-.465	34.248	.645	-.1498
FAC1_9	Equal variances assumed	-.299	40	.766	-9.6353E-02
	Equal variances not assumed	-.262	20.134	.796	-9.6353E-02
FAC1_10	Equal variances assumed	-2.078	40	.044	-.6390
	Equal variances not assumed	-2.059	28.243	.049	-.6390
FAC1_12	Equal variances assumed	2.018	40	.050	.5857
	Equal variances not assumed	2.026	29.361	.052	.5857

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
FAC1_1A	Equal variances assumed	.3029	-1.4856	-.2612
	Equal variances not assumed	.2526	-1.3842	-.3626
FAC1_1B	Equal variances assumed	.2762	-1.5568	-.4404
	Equal variances not assumed	.2264	-1.4566	-.5406
FAC1_2	Equal variances assumed	.3293	-.3179	1.0133
	Equal variances not assumed	.3292	-.3255	1.0209
FAC1_3	Equal variances assumed	.3185	-.2226	1.0648
	Equal variances not assumed	.3119	-.2150	1.0573
FAC1_4	Equal variances assumed	.3098	-1.0052	.2471
	Equal variances not assumed	.2864	-.9598	.2017
FAC1_5	Equal variances assumed	.3126	-1.0784	.1851
	Equal variances not assumed	.3013	-1.0601	.1667
FAC1_6	Equal variances assumed	.3370	-.7478	.6145
	Equal variances not assumed	.3228	-.7235	.5902
FAC1_7	Equal variances assumed	.3280	-.7582	.5677
	Equal variances not assumed	.3007	-.7047	.5141
FAC1_8	Equal variances assumed	.3413	-.8395	.5399
	Equal variances not assumed	.3219	-.8037	.5041
FAC1_9	Equal variances assumed	.3221	-.7474	.5547
	Equal variances not assumed	.3673	-.8622	.6695
FAC1_10	Equal variances assumed	.3074	-1.2604	-1.77E-02
	Equal variances not assumed	.3104	-1.2746	-3.43E-03
FAC1_12	Equal variances assumed	.2902	-8.47E-04	1.1722
	Equal variances not assumed	.2891	-5.38E-03	1.1767

Reliability for SEA & WE

..... Method 2 (covariance matrix) will be used for this analysis .....

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	A1	4.2632	.7600	38.0
2.	A2	4.6316	.4889	38.0
3.	A3	4.3158	.7391	38.0
4.	A4	4.3421	.8471	38.0
5.	A5	4.3421	.7081	38.0
6.	A6	3.8421	.9161	38.0
7.	A7	4.5526	.6450	38.0

N of Cases = 38.0

Inter-item Correlations	Mean	Minimum	Maximum	Range	Max/Min	Variance
	.3917	.1797	.6287	.4489	3.4976	.0165

Reliability Coefficients 7 items

Alpha = .8156 Standardized item alpha = .8184

Reliability for SEA & WE

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

		Mean	Std Dev	Cases
1.	B1	3.2895	.9273	38.0
2.	B2	3.3684	.7857	38.0
3.	B3	3.4474	1.0053	38.0
4.	B4	3.5526	.9781	38.0
5.	B5	3.3947	.9455	38.0
6.	B6	3.2632	.8909	38.0
7.	B7	3.3421	.9380	38.0

N of Cases = 38.0

Inter-item Correlations	Mean	Minimum	Maximum	Range	Max/Min	Variance
	.4670	.2904	.6350	.3446	2.1864	.0068

Reliability Coefficients 7 items

Alpha = .8572 Standardized item alpha = .8598

Reliability for SEA

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
A1	26.6522	7.6008	.4020	.8031
A2	26.3913	8.0672	.4016	.8008
A3	26.5217	6.9881	.6744	.7568
A4	26.5217	6.2609	.7277	.7402
A5	26.5217	7.4427	.5130	.7839
A6	26.9565	6.6798	.5510	.7789
A7	26.4348	7.1660	.5216	.7823

Reliability Coefficients

N of Cases = 23.0 N of Items = 7

Alpha = .8048

Reliability for SEA

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
B1	19.7826	23.0870	.6492	.9136
B2	19.8261	22.9684	.8238	.8966
B3	19.8696	22.3004	.7250	.9056
B4	19.6522	21.7826	.8293	.8941
B5	19.5652	22.1660	.7322	.9049
B6	19.8261	23.3320	.7731	.9014
B7	19.7391	22.9289	.7000	.9079

Reliability Coefficients

N of Cases = 23.0 N of Items = 7

Alpha = .9161

Reliability for WE

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
A1	25.0667	11.7810	.6562	.7693
A2	24.5333	13.5524	.8218	.7725
A3	25.1333	12.2667	.5969	.7807
A4	25.0667	11.6381	.6102	.7787
A5	25.0667	14.0667	.3167	.8271
A6	25.6667	11.0952	.6406	.7736
A7	24.6667	14.3810	.4023	.8114

Reliability Coefficients

N of Cases = 15.0 N of Items = 7

Alpha = .8136

Reliability for WE

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
B1	21.2667	7.4952	.5326	.4956
B2	21.0000	9.2857	.2224	.5969
B3	20.7333	9.3524	.0971	.6391
B4	20.8000	8.1714	.2761	.5860
B5	21.3333	8.8095	.2310	.5968
B6	21.2667	7.2095	.4543	.5152
B7	21.2000	7.4571	.4540	.5180

Reliability Coefficients

N of Cases = 15.0 N of Items = 7

Alpha = .6060

Reliability for SEA & WE

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
A1	49.6842	31.7895	.4488	.7674
A2	49.3158	34.8165	.2007	.7843
A3	49.6316	33.3741	.2685	.7814
A4	49.6053	32.0292	.3615	.7745
A5	49.6053	34.5156	.1438	.7899
A6	50.1053	30.2589	.5075	.7608
A7	49.3947	34.2454	.2056	.7849
B1	50.6579	30.0690	.5196	.7595
B2	50.5789	31.0612	.5178	.7613
B3	50.5000	30.6351	.4104	.7708
B4	50.3947	30.0292	.4877	.7625
B5	50.5526	30.8485	.4257	.7688
B6	50.6842	29.1949	.6465	.7473
B7	50.6053	31.5427	.3598	.7753

Reliability Coefficients

N of Cases = 38.0 N of Items = 14

Alpha = .7840

Reliability for SEA

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
A1	49.6957	33.5850	.3446	.7916
A2	49.4348	36.8024	-.0764	.8121
A3	49.5652	35.6206	.0871	.8062
A4	49.5652	34.6206	.1669	.8039
A5	49.5652	35.5296	.1001	.8055
A6	50.0000	31.8182	.4830	.7812
A7	49.4783	35.4427	.0897	.8075
B1	50.7826	29.0870	.5951	.7689
B2	50.8261	29.4229	.6983	.7616
B3	50.8696	29.5731	.5321	.7755
B4	50.6522	28.8735	.6347	.7649
B5	50.5652	28.8933	.5925	.7690
B6	50.8261	29.0593	.7423	.7575
B7	50.7391	30.2016	.5081	.7779

Reliability Coefficients

N of Cases = 23.0 N of Items = 14

Alpha = .7984

Reliability for WE

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
A1	49.6667	31.2381	.5956	.7610
A2	49.1333	34.1238	.6682	.7692
A3	49.7333	32.2095	.5165	.7688
A4	49.6667	30.2381	.6383	.7554
A5	49.6667	35.3810	.2112	.7943
A6	50.2667	29.9238	.6142	.7572
A7	49.2667	34.7810	.3949	.7805
B1	50.4667	33.6952	.4019	.7790
B2	50.2000	35.6000	.2877	.7871
B3	49.9333	33.9238	.3657	.7819
B4	50.0000	33.7143	.3268	.7862
B5	50.5333	36.1238	.1468	.7986
B6	50.4667	31.4095	.5311	.7667
B7	50.4000	35.8286	.1390	.8020

Reliability Coefficients

N of Cases = 15.0 N of Items = 14

Alpha = .7910

Appendix D
Questionnaires

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QUESTIONNAIRE

Quality Practices

In

Airlines' Operations

Cranfield UNIVERSITY

College of Aeronautics

Your response to this questionnaire would be very much appreciated.

This questionnaire consist of three Sections:

Section A: RESPONDENT DATA

This section aims to get brief information about the respondent of this questionnaire. The data gathered from this section will be used in the questionnaire process of validation.

Section B: QUESTION ITEMS

This is the main section of the questionnaire. This section aims to measure current practices of quality in the airlines' operations as perceived by the managers.

Section C: FACTOR PRIORITY

This section aims to gather the opinion of the managers regarding the priority of the critical success factors that have to be put into practice to the success of quality practices in their operations activities.

It will take approximately 25 minutes to complete this questionnaire. When it finish, please use the return envelope provided. All the information and answers will be treated in confidence.

Thank you for helping this research study.

22 December, 2001

Section A

RESPONDENT DATA

Please response to the following questions.

1. The name of your airline.

2. What is your current position in the operations organisation?

3. How many years have you been in this position?

4. How long have you been involved with the operations activities in your airline?

5. Please state briefly your current responsibility in your airline operations activities.

Thank you very much.

Section B

QUESTION ITEMS

In order to measure the *current* quality practices in your airlines' operations activities, would you kindly fill in this following 64 questions by making a circle (O) in the appropriate scale (1 to 5) for each item.

Quality of Flight

These items are to measure the output quality of airlines' operations activities, i.e. punctuality as perceived by passengers and safety measures.

1. Our passengers praise our punctuality of flight.
   1 = Never 2 = Seldom 3 = Sometimes 4 = Usually 5 = Often

2. The punctuality of our flight is better than that of our major competitors.
   1 = Never 2 = Seldom 3 = Sometimes 4 = Usually 5 = Often

3. Our passengers demonstrate their satisfaction with our punctuality of flight by repeat business.
   1 = Never 2 = Seldom 3 = Sometimes 4 = Usually 5 = Often

4. I could indicate that our flights meet all applicable directives and regulations of related airline industry regulatory bodies. (e.g. CAA, JAA, FAA, and ICAO, etc.)
   1 = Seldom 2 = Sometimes 3 = Usually 4 = Often 5 = Always

5. I could indicate that our flights fully comply with our airlines operating specifications.
   1 = Seldom 2 = Sometimes 3 = Usually 4 = Often 5 = Always

6. Awards/Prizes have been given to our airline for recognition of its punctuality of flight in the last 3 years by an independent international body.
   1 = Never 2 = Seldom 3 = Sometimes 4 = Usually 5 = Often

Process Orientation and Technique

These items are to measure the use of problem solving and process improvement techniques and tools as a management technique to improve the output quality of operations activities.

7. How often do you use statistical methods or other common techniques to identify the weak link in the operations activities chain as improvement practices?
   1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

8. How often do you use statistical methods or other common techniques to solve the problems in the day-to-day activities?
   1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

9. What percentage of members of your organisation unit regularly uses statistical methods or other common techniques to solve operations-related problems?
   1 = Almost none 2 = 1%-25% 3 = 26%-50% 4 = 51%-90% 5 = > 90%

10. How often do you start a new project as a precaution to prevent the solved-problem from re-occurring?
    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

11. How often do you start a new process improvement project in operations as a follow-up project related to previous finished project?
    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

Skills and Motivation

These items are to measure the effort that has been put into the improvement of skills and motivation of the members to ensure consistency in pursuing quality in the operations activities.

12. What is the average numbers of hours per year spent in quality management-related training programme by managers?
    1 = < 10 hrs 2 = 10-20 hrs 3 = 21-30 hrs 4 = 31-40 hrs 5 = > 40 hrs

13. What is the average numbers of hours per year spent in quality management-related training programme by all of the staff?
    1 = < 10 hrs 2 = 10-20 hrs 3 = 21-30 hrs 4 = 31-40 hrs 5 = > 40 hrs

14. How important is departmental performance in practicing quality in the assessment criteria used for a reward, recognition, or compensation of its managers?
    1 = Not at all 2 = Slightly 3 =Secondary 4 = Major 5 = Primary

15. How important is departmental performance in practicing quality in the assessment criteria used for a reward, recognition, or compensation of its staff?

    1 = Not at all 2 = Slightly 3 = Secondary 4 = Major 5 = Primary

16. How important is team-based performance in the assessment criteria used for a reward, recognition, or compensation of managers?

    1 = Not at all 2 = Slightly 3 = Secondary 4 = Major 5 = Primary

17. How important is team-based performance in the assessment criteria used for a reward, recognition, or compensation of staff?

    1 = Not at all 2 = Slightly 3 = Secondary 4 = Major 5 = Primary

18. Customer satisfaction assessment influence the criteria used for a reward, recognition, or compensation of managers.

    1 = Not at all 2 = Slightly 3 = Secondary 4 = Major 5 = Primary

19. Customer satisfaction assessment influence the criteria used for a reward, recognition, or compensation of staff.

    1 = Not at all 2 = Slightly 3 = Secondary 4 = Major 5 = Primary

20. Our operations objective is challenging to be pursued.

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

21. Our operations objective in quality is specific and clearly defined.

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

22. To what degree are you empowered to make decisions within your realm of activity without your superior prior approval?

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

23. What percentage of your staff member is involved in departmental process improvement teams?

    1 = Almost none 2 = 1%-25% 3 = 26%-50% 4 = 51%-90% 5 = > 90%

24. What percentage of your staff member is involved in cross-departmental process improvement teams?

    1 = Almost none 2 = 1%-25% 3 = 26%-50% 4 = 51%-90% 5 = > 90%

25. Do you have to approve your staff members to be involved in departmental process improvement teams?

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

26. Do you have to approve your staff members to be involved in cross-departmental process improvement teams?

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

Information Utilisation and Analysis

These items are to measure the effort that has been put into the analysis of the operations activities, and the use of the analysis results through out the relevant organisation units.

27. How often do you analyse the quality of your operations activities?

    1 = Never 2 = Rarely 3 = Quite often 4 = Frequently 5 = Regularly

28. We benchmark our operations activities efficiency against our competitors.

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

29. We benchmark our operations activities efficiency against the best performer not necessarily direct competitors.

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

30. How often is benchmarking of customer satisfaction used to monitor the position of the airline?

    1 = Never 2 = Rarely 3 = Quite often 4 = Frequently 5 = Regularly

31. How often is benchmarking of operations activities with other airlines or similar businesses used to improve efficiency?

    1 = Never 2 = Rarely 3 = Quite often 4 = Frequently 5 = Regularly

32. I always use the result of benchmarking to improve the working process in my organisation unit.

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

33. This organisation unit is well informed of the benchmarking results that are related to our operations activities.

    1 = Never 2 = Rarely 3 = Quite often 4 = Frequently 5 = Regularly

Customer Relationship

These items are to measure how far the customers' views are taken into account in the operations activities as a restlessness effort in pursuing quality delivered to the customer.

34. Extent to which customer requirements survey are being carried out by the airline as part of operations activities improvement.

    1 = Never 2 = Rarely 3 = Quite often 4 = Frequently 5 = Regularly

35. Extent to which customer requirements are translated into airline operating specifications by a team including those customer.

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

36. Extent to which customer representatives on the review team are used to verify that the design of the airline operating specifications meets the customer requirements.

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

37. How important are customer visits to the development of new airline operating specifications?

    1 = Not at all 2 = Slightly 3 = Secondary 4 = Major 5 = Primary

38. How important are feedback offered by current customer?

    1 = Not at all 2 = Slightly 3 = Secondary 4 = Major 5 = Primary

Interdepartmental Interaction

These items are to measure the interaction between the related organisation units and its members in the operations to ensure continuity of the workflow.

39. The best way to solve problems is for a group of people to work together including both managers and staff members.

    1 = Strongly Disagree -- 2 -- 3 -- 4 -- 5 = Strongly Agree

40. The activities of working-teams from related functions on problem solving and/or process improvement are taken in almost all levels of this department.
    1 = Not at all 2 = Some 3 = Quite a few 4 = Most 5 = Almost all

41. Department's objectives are in harmony with each other.
    1 = Strongly Disagree -- 2 -- 3 -- 4 -- 5 = Strongly Agree

42. It is easy to talk with anyone you need to, regardless of rank or position.
    1 = Strongly Disagree -- 2 -- 3 -- 4 -- 5 = Strongly Agree

43. Members from different organisation units feel comfortable calling each other when the need arises.
    1 = Strongly Disagree -- 2 -- 3 -- 4 -- 5 = Strongly Agree

44. Members of this organisation unit are quite accessible to those in other organisation unit.
    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

45. Communications from one organisation unit to another are expected to be routed through 'certain channels' according to hierarchy of our operation's organisation.
    1 = Strongly Disagree -- 2 -- 3 -- 4 -- 5 = Strongly Agree

46. Managers discourage the staff members from discussing work-related matters with those who are not their immediate superiors or subordinates.
    1 = Strongly Disagree -- 2 -- 3 -- 4 -- 5 = Strongly Agree

Technology and Market Turbulence Awareness

These items are to measure the degree of awareness amongst operations members with regard to changes in the external environment.

47. In airline business, customers' preferences change over time.
    1 = Strongly Disagree -- 2 -- 3 -- 4 -- 5 = Strongly Agree

48. Our customers tend to look for new products/services all the time.
    1 = Strongly Disagree -- 2 -- 3 -- 4 -- 5 = Strongly Agree

49. We are witnessing demand for our products/services from customers who never bought them before.

    1 = Strongly Disagree -- 2 -- 3 -- 4 -- 5 = Strongly Agree

50. The technology we use in this business is changing rapidly.

    1 = Strongly Disagree -- 2 -- 3 -- 4 -- 5 = Strongly Agree

51. A large number of new product/service ideas have been made possible through technological breakthrough in our business.

    1 = Strongly Disagree -- 2 -- 3 -- 4 -- 5 = Strongly Agree

52. Technology-based equipment are employed by this airline in regular basis responses to the industry need

    1 = Never 2 = Rarely 3 = Quite often 4 = Frequently 5 = Regularly

Management Behaviour

These items are to measure how the top management or senior executive and the managers lead quality practices in operations activities.

53. Extent to which top management / senior executive is physically involved in operations activities improvement.

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

54. Extent to which top management / senior executive is physically involved in operations objectives setting.

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

55. To what extents do you participates physically in problem solving and/or process improvement group activity.

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

56. The percentages of top management / senior executive time spent to communicate with customer, supplier, and organisation's members enforcing quality principles in operations activities.

    1 = Less than 1% 2 = 1%-20% 3 = 21%-50% 4 = 51%-90% 5 = > 90%

57. The percentages of your time spent to communicate with customer, other organisation unit, and staff members enforcing quality principles in operations activities.

    1 = Less than 1% 2 = 1%-20% 3 = 21%-50% 4 = 51%-90% 5 = > 90%

58. Extent to which you make periodic evaluation of quality practices in operations activities within your organisation unit.

    1 = Never 2 = Rarely 3 = Quite often 4 = Frequently 5 = Regularly

59. Extent to which top management / senior executive makes periodic evaluation of quality practices in operations activities.

    1 = Never 2 = Rarely 3 = Quite often 4 = Frequently 5 = Regularly

60. Top management / senior executive agrees that members must be properly trained to perform their tasks and retrained for future benefit to our airline.

    1 = Strongly Disagree -- 2 -- 3 -- 4 -- 5 = Strongly Agree

61. Extent to which investment in the training facilities is accepted.

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

62. Extent to which top management / senior executive gives reward and recognition to encourage team working.

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

63. Extent to which you give reward and recognition to encourage team working in your organisation unit.

    1 = Never 2 = Seldom 3 = Occasionally 4 = Usually 5 = Almost always

64. Top management / senior executive encourages the development or use of innovative or new working method/technique.

    1 = Strongly Disagree -- 2 -- 3 -- 4 -- 5 = Strongly Agree

Thank you very much.

Section C

FACTOR PRIORITY

Please response to the following questions.

A - Rate the following factors according to their importance to the success of the quality practices in your operations activities *(1 for least important, 5 for most important).*

B - Rate the effort that have been put into each of the following factors in your airlines' operations *(1 for the least effort, 5 for the most effort).*

Critical Success Factors	**A** **Importance of factors** (1 = Least to 5 = Most)	**B** **Effort currently put into** (1 = Least to 5 = Most)
1. Process Orientation and Technique	1 2 3 4 5	1 2 3 4 5
2. Skills and Motivation	1 2 3 4 5	1 2 3 4 5
3. Information Utilisation and Analysis	1 2 3 4 5	1 2 3 4 5
4. Customer Relationship	1 2 3 4 5	1 2 3 4 5
5. Interdepartmental Interaction	1 2 3 4 5	1 2 3 4 5
6. Technology and Market Turbulence Awareness	1 2 3 4 5	1 2 3 4 5
7. Management Behaviour	1 2 3 4 5	1 2 3 4 5
8.... *(Please state any other factor)*	1 2 3 4 5	1 2 3 4 5
9.... *(Please state any other factor)*	1 2 3 4 5	1 2 3 4 5

Thank you very much.

Return address:

Toto Hardiyanto

PhD Research Programme

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Cranfield College of Aeronautics

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Fax.: +44 (0) 1234 752207

Thank you very much for helping this research.

22 December, 2001

<date>

< name>
<address 1>
<address 2>
<town>
<county> <post code>
<country>

Dear <name>,

I am conducting a research as part of my PhD programme in Air Transport at College of Aeronautics, Cranfield University in England. The focus of my study is on quality practices in airlines' operations function process/activities. The purpose of this study is as follows:

1. to develop an instrument to identify critical success factors of quality practices in operations activities of airlines, and
2. to analyze the differences in quality practices between the profitable and non-profitable airlines.

In order to find the suitability of my line of research for the airline industry I am currently engaged in discussion with leading airline quality specialists. As such I have been given your name by <name> to send in my questionnaire.

For evaluation of practices undertaken by various airlines I have aimed at those airlines, which have been able to maintain their operating profit for the last ten years. These airlines are included in the study as profitable carriers. The research covers airlines operation in three regions, namely, North America, Western Europe, and Southeast Asia.

The operations activities in this study is defined as the activities performed by the airline line departments to provide a safe, punctual, and efficient transportation of passenger on the ground and in the air. The activities include:

1. Aircraft Routing and Line Maintenance
2. Crew Scheduling and Monitoring
3. Aircraft Loading and Ground Services
4. Catering Uplift
5. Passenger On the Ground and In flight Handling
6. Flight Planning and Documentation
7. Flight Operations Planning and Control

The 'quality management practices' framework, which is employed in this study, addresses eight critical factors of quality practices in airlines' operations activities, as follows:

1. Quality of Flight
2. Process Orientation and Technique
3. Skills and Motivation
4. Information Utilization and Analysis
5. Customer Relationship
6. Interdepartmental Interaction
7. Technology and Market Turbulence Awareness
8. Management Behaviour

At the current stage of my study, there is a set of question items that need to be evaluated for its content. Please see the attachment. If you have any queries regarding the questionnaire please feel free to contact me.

The finalised questionnaire will be sent to the first, second, and third level of management within Flight & Ground Operations/Services, and Engineering & Maintenance departments who are directly involve in the airline operations function process/activities. <airline> is one of the airlines I would include in this study.

I look forward to hearing from you soon. Once again thanks for your time, your input is appreciated and valued. It will definitely help to evaluate the applicability of the question items to measure quality practices in airlines' operations activities.

Sincerely yours,

Toto Hardiyanto

<date>

< name>
<address 1>
<address 2>
<town>
<county> <post code>
<country>

Dear <name>,

Few weeks ago a letter proposing a survey on Quality Practices in Airlines' Operations was sent to your company. Since the proposed survey is about quality in operations the success of this survey would be very much depend on participation from the selected airline companies, including your organisation. Additional to that, time to finish the survey also become the concern of my letter.

Considering the above matter your respond to my proposal that allow me to conduct the survey would be very much appreciated. I would like to thank you in advance for your favour, and look forward to hearing from you soon.

Sincerely yours,

Toto Hardiyanto