

**CRANFIELD UNIVERSITY**

**Araya Sakburanapech**

**Development of a Relationship Management Framework and  
Related Performance Metrics for Outsourced Aircraft Maintenance**

**SCHOOL OF APPLIED SCIENCES**

**PhD THESIS**

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**PhD THESIS**

**Academic Year 2005-2008**

**Araya Sakburanapech**

**Development of a Relationship Management Framework and  
Related Performance Metrics for Outsourced Aircraft Maintenance**

**Supervisor: Dr. R. Greenough**

**August 2008**

**This thesis is submitted in partial fulfilment of the requirements  
for the degree of Doctor of Philosophy**

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## ABSTRACT

Driven by an intensely competitive world, the use of outsourcing is extensive and growing especially in the service business area. Outsourcing provides companies with benefits such as cost reduction and performance enhancement. Despite these advantages, companies need to be aware that successful outsourcing requires an appropriate long term strategy in managing the relationships with their providers. In turn, the providers have to develop collaborative relationships with their customers in order to improve customer satisfaction.

Although relationship management of relevance to outsourcing is recognised as an important concept, it has not received attention from both practitioners and researchers, especially with regard to aircraft maintenance outsourcing which is considered to be critical outsourcing associated with high financial and strategic risks. Therefore, the aim of this research study is “*to improve aircraft maintenance outsourcing through relationship management*”. This research has been divided into three stages to achieve the research aim.

The first stage related to an exploration of the key factors for the management of outsourcing relationship, starting with a review of the relevant literature. A multiple case study was then selected to investigate today’s practices of the management of the IT outsourcing relationship, which has similar characteristics to aircraft maintenance outsourcing. A questionnaire survey was also conducted to explore key factors of relationship management for aircraft maintenance outsourcing. With these three sources of evidence, a conclusive finding is that relationship management of relevance to outsourcing comprises six key factors which are clearly defined requirements, agreement, delivery governance, service delivery, performance evaluation and inter-organisational coordination.

The second stage focused on exploring how the relationship between an aircraft maintenance provider and an aircraft maintenance customer is managed. The three cases study relationships featuring the four case companies were selected to carry out an in-depth investigation of relationship management for aircraft maintenance outsourcing. The researcher used interview, observation and documentation to collect data from these four case companies. The findings showed that the six key factors

identified in the first stage influence the establishment and development of the relationship between the aircraft maintenance provider and customer. Moreover, external factors also have an impact on the way that both parties manage their relationship.

The third stage was to develop a proposed approach to performance measurement which is viewed as a key factor of the management of the relationship between an aircraft maintenance provider and an aircraft maintenance customer. The researcher conducted an action research in cooperation with the main subject of this research. The study discovered that the gap model is applicable for performance measurement in aircraft maintenance outsourcing. The improved version of performance measurement model includes new performance metrics that are essential for monitoring the gaps between the provider and customer.

## ACKNOWLEDGEMENTS

First of all, I would like to thank Dr. Richard Greenough, my supervisor, for his dedicating time and support throughout this research. He has offered professional and personal guidance and also encouragement. This PhD thesis would be in pieces without him. So please let me say “Thank you so much” for everything.

I also would like to thank my first supervisor, Prof. Peter J. Sackett. He gave me tremendous inspiration at the start of this research. He also introduced me to what life in UK is like. Although he cannot see me through my PhD thesis, I am very grateful to have been under his supervision.

Furthermore, I would like to thank the funding body of this research, The Government of Thailand, that provided the funding. I am also grateful to my work place, Kasetsart University, that gave me a great opportunity for completing my thesis.

The next acknowledgement goes to all of the people and organisations involved in this research. Very special thanks to Jackie and Mark who have offered tremendous support for my data collection.

I would like to thank all my colleagues and the staffs at Cranfield University, especially, Watcharawee Chandraprakaikul and Dupe Ajayi-Nasser who always support and encourage me to complete this thesis. Thank you very much for your companionship.

I also would like to thank all my close friends who have always been there whenever I want.

Last, but certainly not least, very special thanks to my family. Special thanks to my mom and dad who always support me physically and mentally. I also would like to say “Thank you” to all my sisters who always make me laugh when I am so tired from working on my thesis.

## PUBLICATIONS

- Sakburanapech, A. and Greenough, R. (2008), “The development of performance measurement for service outsourcing”, *Proceedings of the Institution of Mechanical Engineers, Part B, Journal of Engineering Manufacture*. (accepted for publication)
- Sakburanapech, A. and Greenough, R. (2008), “Developing performance measures for critical outsourcing”, In: *The 3<sup>rd</sup> World Conference on Production and Operations Management*, Tokyo, Japan, 5-8 August 2008.
- Sakburanapech, A. and Greenough R. (2008), “Relationship management for aircraft maintenance outsourcing”, *Journal of Quality in Maintenance Engineering*. (submitting)
- Sakburanapech, A. and Greenough, R. (2007), “Performance evaluation for outsourcing management”, In: *The 5<sup>th</sup> International Conference on Manufacturing Research*, De Montfort University, Leicester, United Kingdom, 11-13 September 2007.
- Sakburanapech, A. and Greenough, R. (2007), “Performance measurement in critical outsourcing”, In: *Asia-Pacific Systems Engineering Conference 2007*, Singapore, International Council on Systems Engineering, Singapore, 23-24 March 2007.
- Sakburanapech, A. and Greenough, R. and Chandraprakaikul, W.(2007), “Measuring performance of business service provider”, In: *The 2<sup>nd</sup> International Conference on Operations and Supply Chain Management*, Bangkok, Thailand, 18-20 May 2007.
- Sakburanapech, A. and Sackett, P.J. (2006), “Relationship management in critical outsourcing”, In: *Proceedings Irish Academy of Management Annual Conference*, University College Cork, Ireland, 6-8 September 2006.
- Sakburanapech, A. and Sackett, P.J. (2006), “Criterion for success in critical outsourcing”, In: *The 15<sup>th</sup> International Conference on Management of Technology*, Tsinghua University, Beijing, China, 22-26 May 2006, ISBN: 0-9712964-8-0, pp. 143-150.

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# CHAPTER 1 INTRODUCTION

## 1.1 Introduction

The continuously growing competitiveness and rapid technology innovation have placed tremendous pressure on companies to embrace outsourcing as a corporate strategy. A survey, which was conducted by Bain & Company, a business consultant firm, reports that 77% of large companies in Europe, Asia, North America and Latin America have outsourcing arrangements of some kind (Rigby and Bilodeau, 2007). These companies initiated outsourcing projects to support functions such as cleaning and catering, focusing primarily on cost reduction. They realised that the non-core functions can be outsourced to leverage the wide varieties of knowledge and expertise available in the industry and enhance their own core competencies. In this way they can use their limited resources to focus on their core competencies without compromising their performance. The increasing importance of outsourcing to sustain the competitiveness of the companies can be witnessed from the growth of the outsourcing businesses. For example, the application service provider (ASP) market is expected to grow more than 20% a year until it reaches US\$10.7 billions in 2009 (Demirkan and Chen, 2008). A survey conducted by Ehie (2001) showed that manufacturing companies tend to outsource 34% of their novelty parts - those that require sophisticated technologies, and 28% of their commodity parts - those that have a minimum contribution to the functioning of products. Kakabadse and Kakabadse (2005) conducted a survey of 747 companies on the growing trend of outsourcing human resources (HR) functions, including payroll, benefits, administrations, employee development, training and recruitment. The results showed that 55% of these companies intended to outsource their HR functions.

With an outsourcing strategy, companies can improve their value chains so that they are more elastic (Gottfredson et al., 2005). This greater flexibility enables companies to move up the value chains to gain better competitive advantages. However, companies realise that they cannot achieve these corporate benefits without the collaboration of willing and competent providers (Handfield and Nichols, 1999) to help them move from a vertically integrated model to one that is a virtual network model.

This evidence suggests that the collaborative relationship in outsourcing has a strategic importance to the companies. They tend to focus on leveraging their own resources and capabilities for competitive advantage. However, how the collaborative relationship is managed has not yet been sufficiently addressed in existing literature.

This chapter introduces the research focus and research aim. It then moves on to outline the structure of thesis.

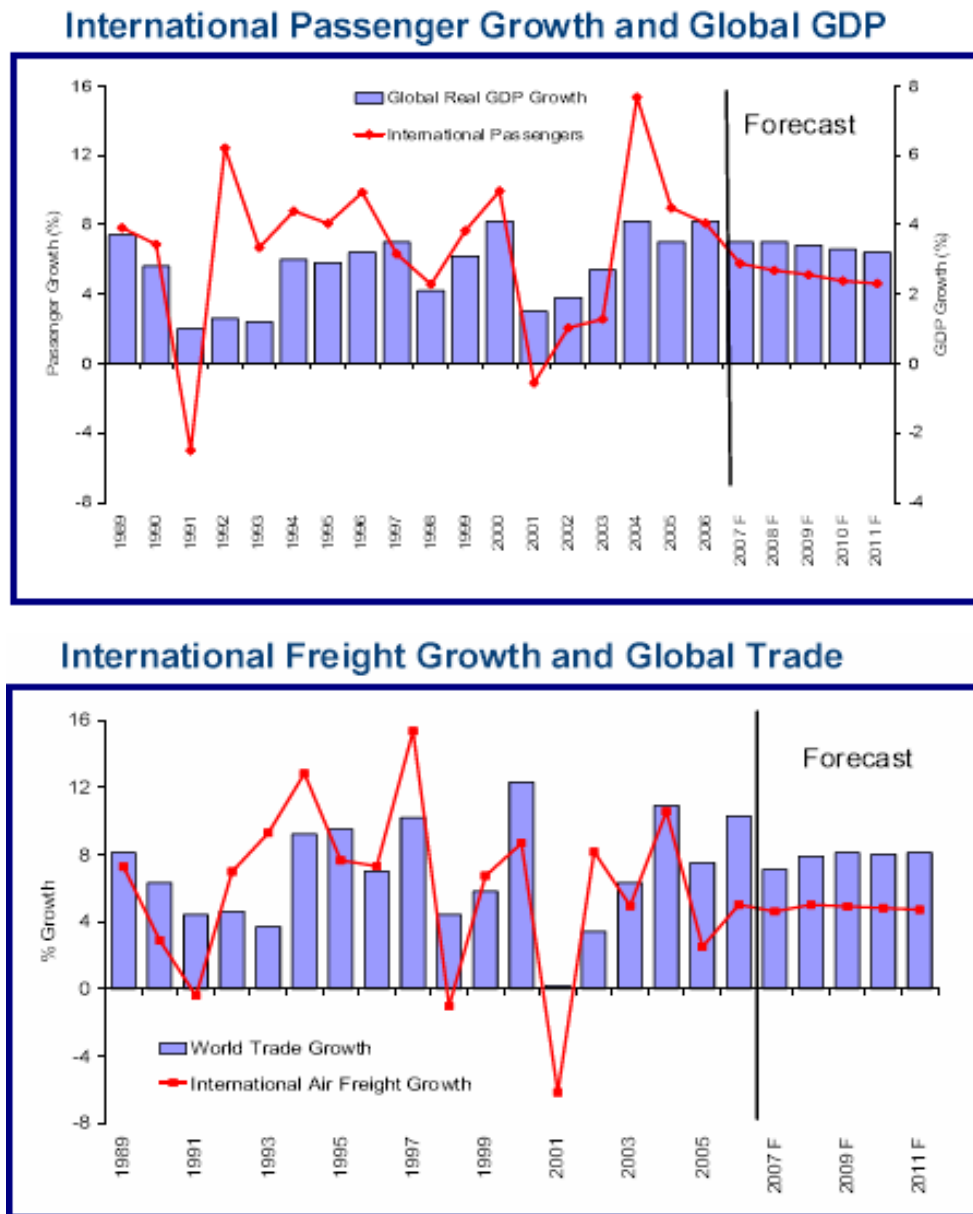
## **1.2 Research focus**

This research study focuses on the outsourcing relationship from business to business (B2B). In the context of this research, a customer is referred to as an organisation which outsources products or services to a provider. On the other hand, a provider is an organisation which provides products or services corresponding to the customer's requirements.

For this research, the aircraft maintenance business has been selected in order to carry out an in-depth investigation of the management of the outsourcing relationships between providers and customers. Aircraft maintenance refers to the operations that can restore an item back to a serviceable, safe and airworthy condition (Wu et al., 2004). The principal activities involved in aircraft maintenance include servicing, repair, modification, overhaul, inspection and determination of condition. The main objective of aircraft maintenance is to provide a full maintenance service to the aircraft when it is required by the airline at minimum cost. Aircraft maintenance, repair and overhaul (MRO) can be classified into 5 specific segments which are: engine overhaul, component maintenance, line maintenance, airframe maintenance and modifications. The cost of aircraft maintenance accounts for 10-15% of the total operating costs of the aircraft operator (Seristo, 1995). Many airlines such as Air Canada, United Airline, US Airways, BMI and Thomsonfly have therefore viewed aircraft MRO outsourcing as a main reorganisation strategy to reduce the costs. Aircraft MRO outsourcing is expected to reach 65% of aircraft MRO budget by 2010 (Rosenberg, 2004). Engine overhaul and component maintenance are the first and second most outsourced activities respectively, and line maintenance is the least outsourced activity (Al-kaabi et al., 2007). The growth of both aircraft MRO outsourcing and global aircraft MRO correspond to the growth of air passengers and air freight as shown in Figure 1-1 (IATA Economics, October 2007). International air



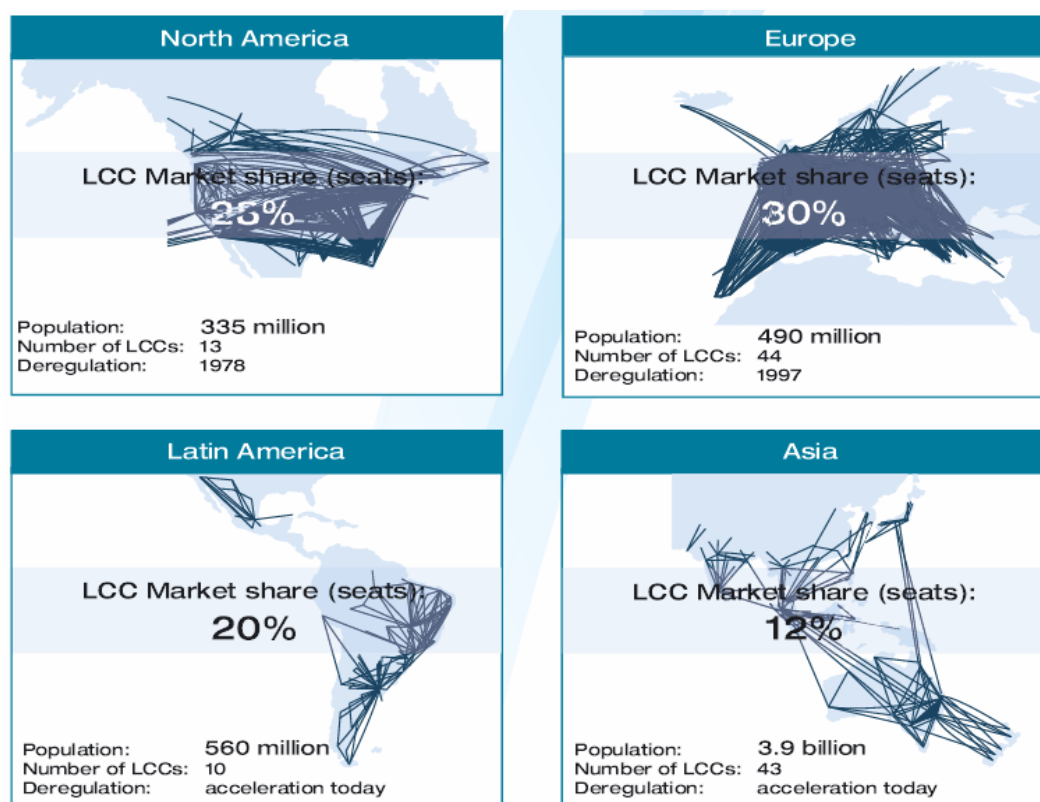
passenger numbers are forecasted to increase at an average annual growth rate (AAGR) of 5.1% between 2007 and 2011. Domestic air passenger numbers are also expected to grow 5.3% annually from 2007 and 2011, led in particular by a considerable growth in Chinese and Indian domestic markets. On the air freight side, the traffic is expected to rise 4.8% annually from 2007 to 2011.



**Figure 1-1: International passenger growth and global GDP and international freight growth and global GDP (a source: IATA Economics, October 2007)**

In addition to cost reduction, airlines embrace aircraft MRO outsourcing as a strategic approach to free up their limited resources to enable them to focus more on their core competencies, which is to fly passengers (Flint, 2007). This then enables

the airlines to maintain their competitiveness against the rapid growth of low cost carriers that recognise aircraft MRO outsourcing as a corporate strategy to penetrate the market. The low cost airlines currently represent 20% of the total global air traffic market in terms of seat availability. In particular, low cost airlines in Europe own 30% of market shares in terms of seat availability, as shown in Figure 1-2 (Airbus, 2007). The market share of low cost carriers in Asia also increases from 5%, with less than 10 airlines, to 12%, with 43 airlines in 2007.



**Figure 1-2: Great potential for low cost carriers around the world (a source: Airbus, 2007)**

Moreover, as aircraft technology becomes more advanced, in order to enhance the aircraft system availability and reliability, greater technical maintenance expertise is required along with sophisticated equipment testing and well-trained technical staffs (Esler et al., 1990). To perform in-house aircraft MRO, airlines need to invest a large amount of capital. As a consequence, aircraft MRO outsourcing is regarded as an alternative to maintain their aircraft fleet.

With regards to airlines, aircraft MRO outsourcing has been viewed as a strategic decision to reduce costs, sustain market share and to gain access to special skill and expertise available in the market. In turn, MRO providers realise that they need to

offer sophisticated aircraft maintenance programs as the airlines become more demanding in terms of services provided. In particular, low cost airlines, which are likely to outsource their maintenance systems, require the MRO providers to be their total solution providers instead of contractors. Examples of low cost airlines that require their MRO providers to provide an integrated maintenance and support bundle are Ryanair (Barrett, 2004) and easyJet (Pilling, 2005). In addition, the MRO providers are concerned that low labour cost particularly in Asia and Eastern Europe is a main contributing factor for the airlines to shift their maintenance activities to these regions. They therefore attempt to enhance their performance to improve services to the satisfaction of the airlines.

Despite the advantages of aircraft MRO outsourcing explained above, the airlines, both traditional and low-cost, realise that they have become more reliant on the MRO providers to deliver safe, airworthy aircraft. The MRO providers are also aware that, although the market values of aircraft MRO outsourcing are increasing, there is a greater competition in this business primarily due to low-labour costs in Asian and Eastern European countries. It is therefore important for the aircraft MRO customers and providers to establish, develop and sustain their relationship in the long term. However, there is very little knowledge in existing literature on managing this outsourcing relationship, which will be explained in details in Chapter 2.

### **1.3 Overview of the research aim and research program**

As explained in the previous section, it has been established that there is a lack of knowledge in managing the outsourcing relationship between an MRO provider and customer. As a result, this research aims:

***“To improve aircraft maintenance outsourcing through relationship management”.***

To deliver the research aim, the research programme has been divided to three stages. Stage I (Chapter 4) is to formulate the key factors of relationship management. Following this, Stage II (Chapter 5) will explore in detail the management of outsourcing relationship, particularly for aircraft MRO outsourcing, and construct a framework of relationship management. The focus of Stage III (Chapter 6) is to develop a proposed version of the performance measurement model

for evaluating the performance of MRO providers. It is recognised as a managerial tool to help sustain the relationship between the MRO provider and customer.

#### 1.4 Structure of the thesis

This thesis is composed of seven chapters, as shown in Figure 1-3. It starts with Chapter 1 which provides an overview of the research focus and research aim and describes the structure of the thesis. In Chapter 2, there will be a literature review, leading to the identification of the research gap and to develop a theoretical background. It will then move on to design the research methodology in Chapter 3, to respond to the research aim and research questions.

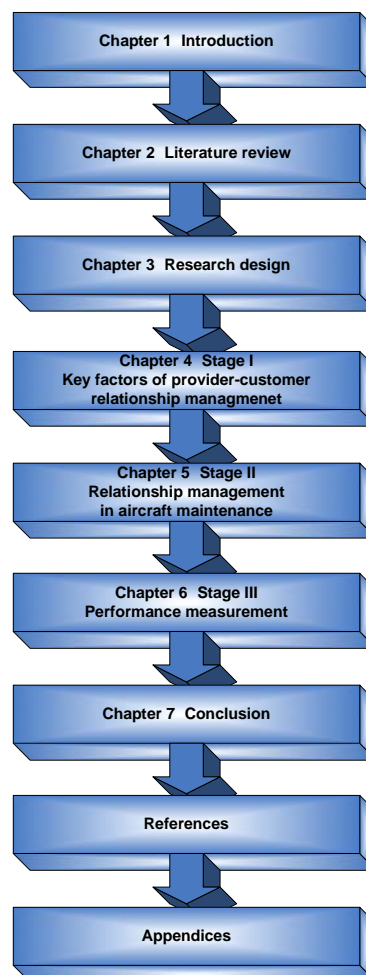


Figure 1-3: Structure of the thesis

Chapters 4-6 will then explain the three research stages in detail, including the research method, the findings and analysis discovered. Chapter 7 will conclude this

thesis corresponding to the research aim and research questions. It will also include a contribution of knowledge and the limitations of this study.

## **1.5 Summary**

This chapter highlights the fact that outsourcing has been widely used as a managerial tool not only for minimising costs but also for maximising competitive advantages. In particular, aircraft MRO outsourcing is becoming a new trend in the aircraft maintenance industry. To gain the desired benefits, MRO customers and MRO providers need to establish close collaboration and to develop a long-term relationship. However, there is a lack of research into the outsourcing relationship management especially in the area of aircraft MRO outsourcing. This research therefore focuses on addressing this problem, leading to identifying the research aim, which is *“to improve aircraft maintenance outsourcing through relationship management”*. To accomplish this aim, this research has identified three research stages, starting with stage I to provide an overview of the outsourcing relationship management, stage II to explore in-depth relationship management in aircraft MRO outsourcing, and eventually stage III to develop the performance measurement, which is essential for sustaining the relationship.

## **CHAPTER 2 LITERATURE REVIEW**

### **2.1 Introduction**

A literature review is an important part of this research investigation. This is due to the fact that it provides the theoretical background relating to the focus of the research, which is relationship management for aircraft MRO outsourcing. This chapter begins by studying existing research on outsourcing, leading to identifying a research gap which corresponds to the industrial context. It is essential at this point to explore the extent of knowledge in the broad area of relationship management as there is limited knowledge in the area of aircraft MRO outsourcing. This broad area includes the outsourcing relationship, the customer-supplier relationship, partnerships and alliances. This will enable the researcher to appreciate the management of the relationships between providers and customers. In addition, knowledge of service quality is reviewed as aircraft MRO outsourcing can be categorised as an outsourcing service. This was combined with theories of performance measurement to carry out the action research in Stage III.

### **2.2 Outsourcing**

Outsourcing has been viewed as a form of predetermined external provision with another enterprise for the delivery of products or services that would previously have been offered in-house (Gottschalk and Solli-Saether, 2005; Cullen, 2005; Domberger, 1998; Elfing and Baven, 1994). It can also be seen primarily as the transfer of the production of products or services that had been performed internally, to an external party (Van Weele, 2005). Likewise, outsourcing takes place when an organisation transfers the ownership of a business process to a provider (Bendor-Samuel, 2000).

In this research, outsourcing is defined as “the procurement of products or services from an external supplier for a defined continuous period of time, when the internalisation of the activity in question is an option to the client, and the activity’s control and decision are transferred to the supplier” (Duarte, 2005). The reason for adopting this definition is that Duarte (2005) investigated the maintenance outsourcing in the pulp and paper industry. He also claimed that the industrial maintenance outsourcing is regarded as critical outsourcing in the aspects of strategic

importance and financial impact. This is similar to the characteristics of aircraft MRO outsourcing, which will be explained in Section 2.2.1.

Outsourcing strategy has been primarily driven by cost reduction efforts (Levina and Ross, 2003; Teng et al., 1995; Chalos and Sung, 1998; Blaxill and Hout, 1991). The need for strategic flexibility and focus on core competencies also became predominant concerns in the outsourcing decision (Harland et al., 2005; Leavy, 2004; Van Laarhoven et al., 2000). In the context of the aircraft maintenance business in particular, outsourcing brings flexibility in terms of freeing up limited resources for other purposes which are crucial for the bottom line of the business (Barrett, 2004). Furthermore, leveraging on providers' skills, knowledge bases, investments and processes is regarded as a key factor for the outsourcing decision (Quinn, 1999).

Despite these outsourcing advantages, outsourcing inherently has both implicit and explicit risks. Quinn and Hilmer (1994) stated that there are three types of strategic management concerns which are: loss of critical skills, loss of cross-functional skills and loss of control over a supplier. To achieve the desired outcome of outsourcing without increasing the degree of risk, a company needs to pay more attention to relationship management (Bensaou, 1999; Willcocks et al., 1995). In other words, a company needs to focus more on establishing, developing and sustaining the relationship with providers. However, they need to consider how important an outsourcing activity is to their competitive advantage in order to allocate the right resources to manage such an outsourcing activity. Otherwise, the outsourcing company would be unable to receive the cost reduction benefits expected.

### ***2.2.1 Types of outsourcing***

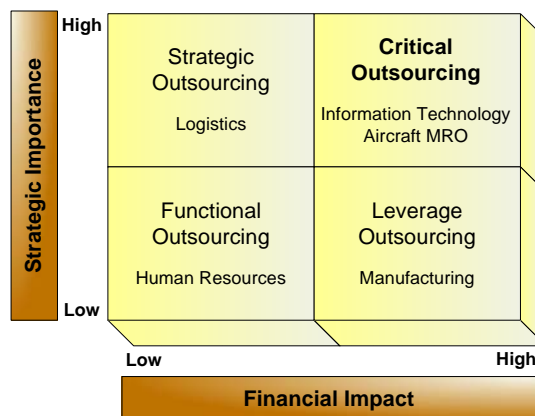
Outsourcing can be classified according to different types of management needs as shown in Figure 2-1. This classification is based on the strategic importance and financial impact to the buyer (Duarte et al., 2004).

Strategic importance is composed of two factors. They are core competencies and outsourcing risks. Firstly, core competencies can be defined as “the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies” (Hamel and Prahalad, 1994). They are not physical assets but the skills, knowledge and technologies that an organization possesses on which its success depends (McIvor, 2000). There are four main

characteristics of core competencies. They are customer value, costly-to-imitate capabilities, competitor differentiation and extendibility. Customer value relates to a core competency that enables the company to provide a fundamental customer benefit and make a contribution to customer perceived value (Arnold, 2000). Costly-to-imitate capabilities are the result of a core competency of the company that competitors cannot easily develop and duplicate (Hitt et al., 2003). Competitor differentiation is relevant to a core competency that enables the company to differentiate itself from its competitors and then gain a competitive advantage (Porter, 1990). Extendibility involves a core competency that allows the company to neutralise threats in its external environment (Quinn and Hilmer, 1994). Based on these four characteristics, it is essential for the company to determine which activities are its core competencies in order to perform them in-house (Lilly and Gray, 2005; Drejer and Sorensen, 2002). This also enables the company to manage outsourcing activities more effectively. The second factor for considering strategic importance is outsourcing risk which can be divided into six risk types. They are strategic risks, operational risks, human capital risks, financial risks, reputation risks and legal risks. Strategic risks result from opportunistic behaviours of either buyer or provider (Aron et al., 2005). Operational risks involve ongoing management of agreement (Kliem, 1999). They could be consequences from a provider that fails to provide products or services corresponding to an agreement. Human capital risks involve losing, for example, critical skills, expertise, and cross-functional skills from the outsourcing company (Sullivan, 2004). Financial risks could be caused by hidden costs incurred from outsourcing which the company does not recognise (Beasley et al., 2004). Reputation risks have impact on the image and reputation of the customers so that they wisely invest in an effort to maintain and enhance such image. Legal risks result from regulatory changes which are related to, for instance, the privacy, confidentiality and security of business transactions (Beasley et al., 2004). Based on these two factors; core competencies and outsourcing risks, activities which have high strategic impact on the company are likely to be aligned with the organisation's long-term strategies and provide outcomes which influence the company's long-term perspectives.



Financial impact refers to an impact of direct and indirect costs incurred in outsourcing on the financial status of the outsourcing company. It consists of two main types of costs which are purchase costs and transaction costs. Purchase costs are the total amount of money that a provider aims to be paid for its products or services (Farrington and Waters, 1996). It may also include key cost drivers such as shipping and handling, inventories and administrative costs and other costs related to outsourced products and services (Monczka et al., 2002). Transaction costs refer to the costs incurred in drafting, negotiating and safeguarding an agreement as well as the costs associated with managing the relationship with the external party, reaching such an agreement and implementing the outsourcing (Chen and Soliman, 2002). They consist of three attributes: asset specificity of the transaction, uncertainty encompassed in those transactions and frequency of the transaction (Williamson, 1979). Asset specificity is the degree to which an asset can be redeployed to alternative use without sacrificing the productive value, measured by differences between the cost of the asset and its value of the second utilisation (Aubert et al., 2004; Langfield-Smit and Smith, 2003). Uncertainty is defined as the inability to predict contingencies that may occur, arising from complexities in performing and delivering outsourcing activities (Van Weele, 2005; Williamson, 1985). Frequency refers to the number of times a company is likely to undertake a particular transaction with a provider or vice versa (Chandra, 2004).



**Figure 2-1: Classification of outsourcing in terms of management needs (from Duarte et al., 2004)**

As shown in Figure 2-1, the combination of strategic importance and financial impact, explained above, is the basis of the outsourcing business matrix. There are four types of outsourcing which are: functional outsourcing, leverage outsourcing,

strategic outsourcing and critical outsourcing. The matrix enables the companies to gain better understanding of the characteristics of activities that they tend to outsource and then to manage these outsourced activities more effectively and efficiently.

In the context of this research, the outsourcing business matrix was used for studying and mapping five outsourced activities which are: human resources, manufacturing, logistics, information technology and aircraft MRO, as shown in Figure 2-2. Kakabadse and Kakabadse (2005) conducted a survey of US, UK and continental European enterprises, with the objective of identifying key trends of business process outsourcing. The survey showed that the first four outsourced activities are prime candidates for the companies. In particular, the IT industry continues to be a major focus of outsourcing. With the mapping of these five activities, the researcher was able to identify which outsourced activity was in the same category as aircraft MRO outsourcing and then apply existing theories of this outsourced activity to the limited knowledge of aircraft MRO outsourcing, shown in Figure 2-4.

*Functional outsourcing:* this type of outsourcing involves non-core competencies and low risk functions that typically have low financial impact on a company's performance. They tend to be based on simple and mature techniques (Van Weele, 2005). They are most likely to be commodity products or services such as payroll, benefits and administration. Human resources, including payroll, benefits, administration, employee development, training and recruitment (Cascio, 2005), would be categorised as functional outsourcing as it is a low risk to the outsourcing company. The management and cooperation of human resources outsourcing is therefore simple (Duarte et al., 2004).

| Outsourced activity         | Core competencies |                   |                             |               | Risk of outsourcing |                  |                    |                |                 |            |
|-----------------------------|-------------------|-------------------|-----------------------------|---------------|---------------------|------------------|--------------------|----------------|-----------------|------------|
|                             | Customer value    | Costly-to-imitate | Competitor differentiations | Extendibility | Strategic risk      | Operational risk | Human capital risk | Financial risk | Reputation risk | Legal risk |
| Aircraft maintenance        | Low               | High              | Low                         | High          | Low                 | High             | High               | High           | High            | High       |
| IT/S                        | Low               | High              | Low                         | High          | High                | High             | High               | High           | High            | Low        |
| Logistics and distributions | High              | Low               | High                        | High          | Low                 | High             | High               | Low            | High            | High       |
| Human resources             | Low               | Low               | Low                         | High          | Low                 | Low              | High               | Low            | High            | High       |
| Manufacturing               | Low               | High              | Low                         | High          | Low                 | Low              | High               | Low            | Low             | High       |



| Outsourced activity        | Purchase cost    | Transaction costs |                                 |  |                          |
|----------------------------|------------------|-------------------|---------------------------------|--|--------------------------|
|                            | Purchasing costs | Asset specificity | Task complexity and uncertainty | Difficulty in measuring task performance | Frequency of transacting |
| Aircraft maintenance       | High             | Low               | High                            | High                                     | High                     |
| IT/S                       | High             | Low               | High                            | High                                     | High                     |
| Logistics and distribution | High             | Low               | Low                             | Low                                      | High                     |
| Human resources            | High             | Low               | Low                             | Low                                      | High                     |
| Manufacturing              | High             | High              | Low                             | Low                                      | High                     |

**Figure 2-2: Mapping the five outsourced activities into the outsourcing business matrix**

Leverage outsourcing: this involves the business taking advantage of a provider’s ability to leverage economies of scale to dramatically reduce the costs of delivering the service. This can include functions with a medium to high level of risk because of the potentially high financial impact but low strategic importance. Manufacturing goods or products is an example of leveraging outsourcing, as shown in Figure 2-2 (Sakburanapech and Sackett, 2006). Car manufacturers focus more on product related services. As such, they are moving towards closer relationships with a small number of providers that supply complete systems and modules (Corswant and Frediksson, 2002). This strategy also enables shorter product development time, an advantage of the providers’ knowledge regarding product development and production. However, the car manufacturers may risk loss of the car as a complete system or losing competence and resources that they define as core (Quinn and Hilmer, 1994).

Strategic outsourcing: it can only be realised from the few providers which have specific technology and expertise needed to perform the outsourced activities. Under such circumstances, the customer can feel threatened by the provider's pre-eminence. Logistics is an example of strategic outsourcing, as shown in Figure 2-2. It enables a company to distinctively position itself in the market and to enhance its competitiveness. However, the outsourcing company might struggle with complexities in their supply chains that full outsourcing cannot adequately address even though the logistics provider employs sophisticated technology and specialized skills essential for logistics operation (Bagchi and Virum, 1996). Logistics outsourcing requires the customer and provider to establish a business process synchronisation.

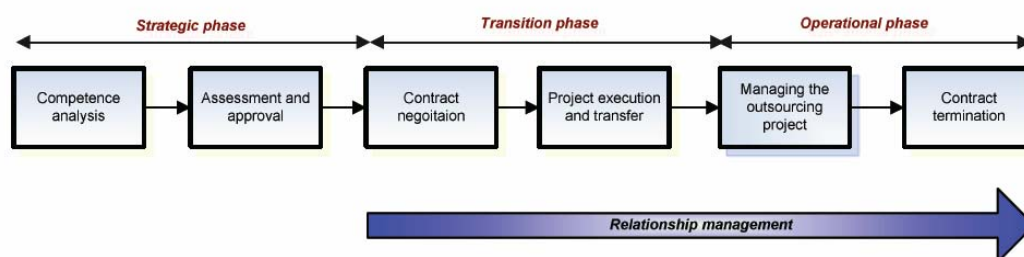
Critical outsourcing: this type of outsourcing is characterised by both high strategic importance and financial impact, which are close to the core competencies of the outsourcing company. This is sometimes referred to as transformational outsourcing, where the provider takes joint responsibility for business improvements and is rewarded in part, on the businesses performance, so called 'shared risk-shared reward'. An example of critical outsourcing is information technology, shown in Figure 2-2, which has been recognised as a key weapon for virtual businesses in an intense competitive market. It is also embedded with high risks such as opportunistic behaviour of IT providers (Lilly and Gray, 2005), lack of capabilities of providers to deliver promised level of services (Martinsons, 1993), loss of critical skill and expertise (Gonzalez et al, 2005) and excess costs and extra fees arising from hidden costs (Lacity and Willcocks, 1995). In addition to information technology outsourcing, aircraft MRO outsourcing is regarded as critical outsourcing, as shown in Figure 2-2. It has become a corporate strategy for airlines to focus on their core competence which is to fill aircraft seats. Nevertheless, the airlines that outsource their maintenance must ensure that the aircraft MRO services delivered meet the safety and airworthiness requirements according to the air regulations, as the airlines are fully accountable for quality and safety of these serviced aircraft. As such, they need to closely control the quality of MRO services delivered and also monitor the performance of aircraft MRO providers in order to prevent any catastrophic outcomes. Due to the high strategic importance and financial impact of critical outsourcing,

communication and interaction between the customer and provider become more crucial in order to achieve certain goals (Van Weele, 2005). The provider acts like a strategic partner, approaching the relationship as if it is part of the business of the outsourcing company. The outsourcing company also needs to closely monitor and manage the provider and help them in their development.

The mapping of the five outsourced activities illustrates that IT outsourcing and aircraft MRO outsourcing are positioned in the same matrix as critical outsourcing. As a result, the knowledge of IT outsourcing which has received substantial attention from researchers (Hurley, 2001) is likely to be applicable for aircraft MRO outsourcing, of which there is a limited knowledge. The outsourcing business matrix also shows that cooperation and coordination between customers and providers are essential for successful critical outsourcing due to high strategic importance and financial impact on both sides.

### 2.2.2 The outsourcing process

In addition to the four outsourcing types, it is also essential to study the outsourcing process which is general across 4 types of outsourcing explained above. This can then lead to identifying and clarifying the research gap so that research can be initiated to make a valuable contribution to knowledge. The outsourcing process can be structured into three main phases and six different activities as shown in Figure 2-3 (Momme and Hvolby, 2002).



**Figure 2-3: The outsourcing process (from Momme and Hvolby, 2002)**

Strategic phase: this phase relates to outsourcing decision and provider selection. It begins with analysing the core competencies, cost efficiency and effectiveness and financial situation of the outsourcing company (Brandes et al., 1997). The next activity involves carefully selecting the provider that is most qualified to meet their requirements. The outcome of this phase includes the right strategic reasons to

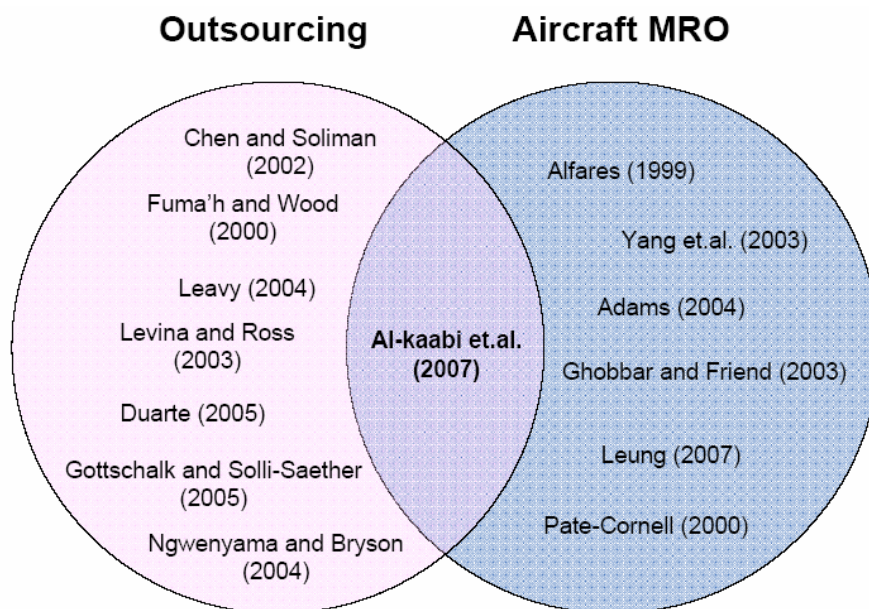
outsource, the right functions or activities to be outsourced and the right provider to outsource to (Ittner et al., 1999).

*Transition phase:* this phase involves contract negotiation and project execution and transfer. Webb and Laborde (2005) discovered that the basis for a successful outsourcing relationship is the formulation of the contract. With the signed contract, the outsourcing activity is transferred and executed by the provider with an established collaboration and interface procedure (Van Weele, 2005).

*Operational phase:* this phase relates to managing the relationship and the contract termination. Relationship management has been identified as a key factor for a successful outsourcing by a number of investigators such as Gelderman and Van Weele (2005); Chen et al. (2004); Quinn (1999); Lacity et al. (1995); Handy (1995); Dyer and Ouchi (1993). However, none of them has discussed the details of relationship management. In addition to the importance of the customer-provider relationship, the outsourcing company needs to measure and evaluate the performance of the provider against the agreed service level. This service level is identified in the contract and is used on a regular basis to benchmark against the performance of other providers (Cullen, 2005). The contract review process should be a recurring process in which the company assesses alternatives to the long-term relationship with the provider or replaces the existing provider with a new provider (Van Weele, 2005).

From the literature available on the outsourcing process, the most recent research focuses on the strategic and transition phases. For example, Leavy (2004), Levina and Ross (2003), Chen and Soliman (2002) and Fuma'h and Wood (2000) study the rationales of outsourcing and the advantages and disadvantages of outsourcing. Gottschalk and Solli-Saether (2005), Ngwenyama and Bryson (2004), McIvor (2003) and Drejer and Sorensen (2002) state that the customer generally applies core competencies and transaction cost economics theories in deciding which activities should be outsourced. However, there is limited research into outsourcing relationship management even though it contributes to successful outsourcing (McIvor et al., 2003; Langfield-Smit and Smith, 2003; McFarlan and Nolan 1995). Willcocks et al. (1995) also claimed that failure in establishing and implementing a performance measurement system to monitor the performance of the provider can cause difficulties for the company and provider in gaining the desired outcomes.

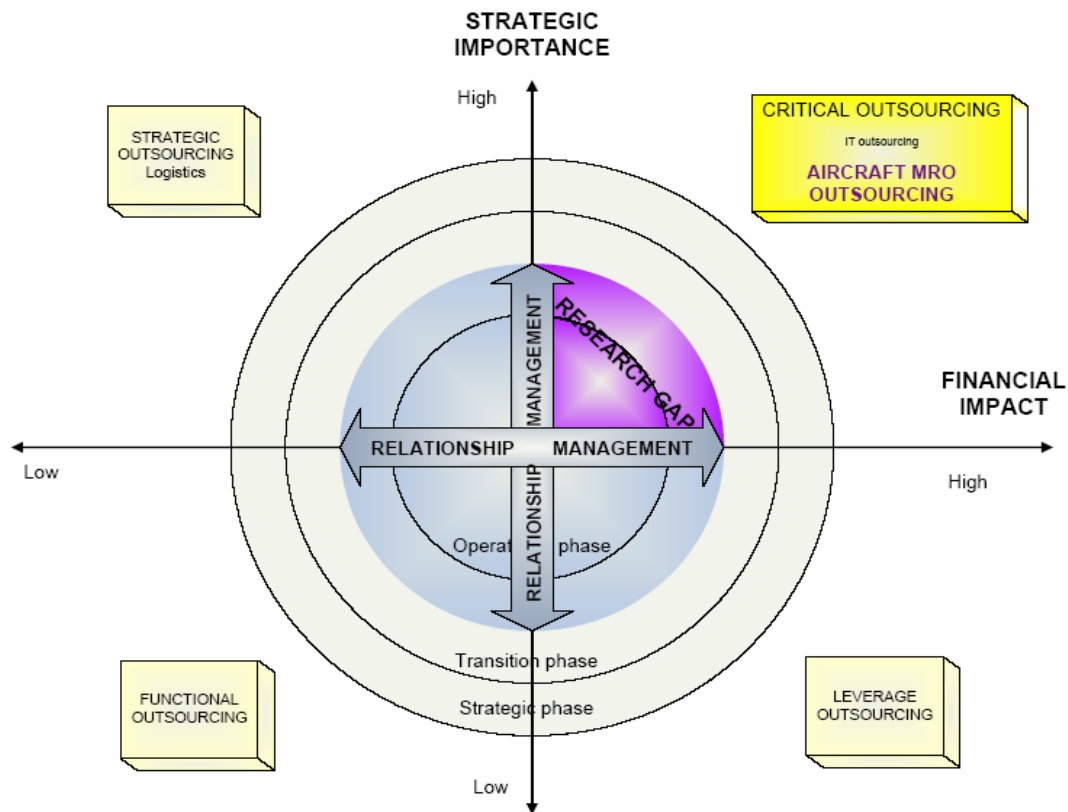
From the literature available on aircraft MRO research, there are three areas that have received most attention from investigators. They are planning and scheduling, e.g. Yang et al. (2003) and Alfares (1999) who investigated a scheduling model of aircraft maintenance manpower; inventory management, e.g. Adams (2004) and Ghobbar and Friend (2003) who investigated inventory forecasting techniques; risk and reliability, e.g. Leung et al. (2007) and Sachon and Pate-Cornell (2000) who investigated risk analysis methods for improving reliability of aircraft maintenance. This emphasizes that relationship management for aircraft MRO outsourcing has not been adequately addressed by recent research, as shown in Figure 2-4. An example of research that relates to aircraft MRO outsourcing is that done by Al-kaabi et.al. (2007) who focus on a strategic model of MRO outsourcing decision making.



**Figure 2-4: Research in outsourcing and aircraft MRO**

The review of literature relevant to outsourcing and aircraft maintenance shows that relationship management particularly for aircraft MRO outsourcing has received less attention from recent researchers, as illustrated in Figure 2-4. There is only one research relating to aircraft MRO outsourcing which was carried by Al-kaabi et.al. (2007). However, this research focuses on developing a decision making model for aircraft MRO outsourcing. Hence, a gap in the existing literature is “*relationship management*”. Moreover, based on the outsourcing business matrix explained in Section 2.2.1, relationship management is more important for critical outsourcing than other types of outsourcing as it is associated with high risks in terms of strategic

importance and financial impact. In the industrial context explained in Chapter 1, aircraft MRO outsourcing, which is regarded as critical outsourcing, is consistently growing but there is a lack of research in this field. As a result, the research gap is “*the relationship management for aircraft maintenance outsourcing*”, as shown in Figure 2-5. The research aim and research questions will be explained in Chapter 3.



**Figure 2-5: Research gap**

## 2.3 Relationship management

Based on the research gap presented above, this section sets out to study relationship management from the perspectives of outsourcing management and supply chain management. This section presents a definition of the relationship for this research and the key factors of the relationship management.

### 2.3.1 Definition of relationship

There are a multitude of different terms being used for customer-provider relationship. Some of these are coalition, working partnership, collaboration, alliance and partnership, as shown in Figure 2-6. The term of “coalition” can be used to describe long-term alliances between organisations that cooperate in specific areas



without merging the businesses (Porter and Fuller, 1986). Anderson and Narus (1990) define “working partnership” as “the extent to which there is mutual recognition and understanding that the success of each firm depends in part on the other firm, with each firm consequently taking actions to provide a coordinated effort focused on jointly satisfying the requirements of the customer marketplace”. “Collaboration” has been viewed as a mutual shared process in which two or more parties work together on the basis of common visions and goals, mutual understanding and shared resources (Schrage, 1990). Bowersox et al. (2002) explains that “the alliance goal is to cooperatively build on the combined resources of participating firms to improve the performance, quality and competitiveness of the channel”. Ellram (1991) defines “partnership” as “an agreement between a buyer and a supplier that involves a commitment over an extended time period, and includes the sharing of information along with a sharing of the risks and rewards of the relationship”.



**Figure 2-6: Relationship continuum**

All terms presented above reflect that the customer-provider relationship moves from an arm’s length transactional relationship (Heide and John, 1990) to a more collaborative relationship (Emmett and Crocker, 2006) shown in Figure 2-6. The closer and more collaborative relationship facilitates reducing costs, increasing productivity and enhancing the quality of a product or a service (Wong and Fung, 1999). In the context of outsourcing, the customer and provider are required to establish a more collaborative relationship in a particular period of time in order to achieve common goals (McFarlan and Nolan, 1995). Goles and Chin (2002) define an outsourcing relationship for IT/IS outsourcing as “an ongoing linkage between an outsourcing vendor and customer that has a long-term orientation and a mutual recognition and understanding that the benefits attained by each firm are at least in part dependent on the other firm”. This research adopts this definition as IT outsourcing has similar characteristics as aircraft MRO outsourcing, as shown in Figure 2-2.

### ***2.3.2 Key factors of relationship management***

The importance of an inter-organisational relationship has received much attention in the last two decades as there is a positive co-relationship linking a more collaborative relationship and enhanced organisational performance (Fink et al., 2006). Various theories of inter-organisational relationship have been applied in many areas such as organisational economics, organisational theory, strategic alliance and relationship marketing literature (Kim and Young-Soo, 2003). It is therefore valuable and useful to bring this knowledge to relationship management in aircraft MRO outsourcing, which has limited theories and practices. This is because outsourcing relationship involves collaboration and cooperation between at least two companies to achieve common goals and to acquire the expected benefits, according to the definition of “outsourcing relationship” defined in the previous section. Although there is a shortage of research in the area of outsourcing relationship for aircraft maintenance, nevertheless literature on outsourcing relationship management has also been reviewed. From the literature, there are eight key factors of outsourcing relationship identified, which will be explained next and shown in Table 4-1. They are mutual understanding, clearly defined agreement, commitment, flexibility, organisational linkage, performance evaluation, communication and trust.

#### ***Mutual understanding***

Mutual understanding requires a customer and provider to clarify requirements and expectations of products or services to each party. This clarification enables the two firms to understand and then translate these requirements into responsive product or services delivered, leading to mutual satisfaction over time (Jae-Nam Lee et al., 2003). It will provide a basic scope not only for the provider to meet the customer’s requirements but also for the customer to appreciate the provider’s efforts in doing so. Sharing common goals and visions has also been viewed as an essential process to develop a comprehensive view of the businesses of the involved parties and to sustain the relationship in the long run, especially when expected benefits are not realised (Deepen, 2007; Bullington and Bullington, 2005; Allen et al., 2001). This process of sharing goals is the focus of the senior managers of the companies to understand and then manage their cooperation effectively and efficiently (Qureshi et al., 2007;

Emmett and Crocker, 2006; Zviran et al., 2001; Konsynski and McFarlan, 1990). Moreover, the parties involved need to establish a balanced interdependence to prevent any opportunistic behaviour which is likely to be taken by the less dependent party (Chakrabarty et al., 2007; Heide and George, 1988; Frazier, 1983). The firm with less dependence can use its superior position to request changes of its partner that will possibly increase its own outcome from the relationship (Anderson and Narus, 1990). With a balanced interdependence, the parties involved are able to receive benefits that could not otherwise be obtained through independent action and to mitigate risks associated with their cooperation (Zineldin and Bredenlow, 2003; Mohr and Spekman, 1994; Henderson, 1990).

### ***Clearly defined agreement***

Based on the requirements above, it is essential for the customer and provider to include all of these products or services specifications in an agreement (Emmett and Crocker, 2006; Langfield-Smit and Smith, 2003; Zviran et al., 2001). A relationship could not be developed into the type of partnership, as shown in Figure 2-6, unless there is a motivating contract and measurement framework in place (Webb and Laborde, 2005; Willcocks and Fitzgerald, 1994). This agreement is then used as a guideline by the parties involved as to what they need to contribute to the collaboration and then as a monitoring framework to measure the delivered products or services against the specifications (Kumar and Snavely, 2004). In addition to the clearly detailed agreement, the process of contract drafting is also as important as the agreement (McFarlan and Nolan, 1995). This is due to the fact that a party is able to gain insight into the value of the other party and to have the ability to respond to changes occurred due to dynamic environments.

### ***Commitment***

This refers to the willingness of trading partners to exert effort on behalf of the relationship (Porter et al., 1974). It can be reflected by the signed contract, incentive and penalty system (Henderson, 1990). The commitment, based on trust, ensures that both the customer and provider will not exploit the relationship at the expense of the long-term collaboration (Chakrabarty et al., 2007; Zineldin and Bredenlow, 2003). In fact, commitment should be made at all levels of management from the customer and

provider especially at the beginning of the cooperation, thus leading to its success (McFarlan and Nolan, 1995). It should be emphasised that the involvement of the stakeholders from the strategic, business and operational levels of management is vital to create the agreement at the initial stage, and then to actually fulfil this agreement (Lasher and Ives, 1991). In particular, a commitment from the strategic level is crucial as it reflects the willingness and appropriateness in allocating resources required for the project and in establishing the closeness and cohesiveness of the long-term relationship (McIvor et al., 2003).

### ***Flexibility***

This refers to the smooth alterations in practices and policies under changing circumstances (Boyle et al., 1992). This can be reflected by the agreement between a customer and provider particularly when the agreement is a long term arrangement (Richmond and Seidmann, 1993). This is because flexibility is required to cope with evolving technology and changes from both internal and external factors (Webb and Laborde, 2005; McIvor et al., 2003; Kim and Young-Soo, 2003; Lacity et al., 1995). It is also difficult to capture every possible scenario in the initial agreement (Qureshi et al., 2007; Lynch, 2004; Jae-Nam Lee et al., 2003).

### ***Organisational linkage***

This refers to joint planning, inter-organisational process integration, team-based cooperation and conflict resolution (Henderson, 1990). Joint planning involves an ongoing, iterative planning process for both the strategic thinking and the translation of that strategy into action plans (Webb and Laborde, 2005; Zviran et al., 2001; Maloni and Benton, 1997). This then produces interface procedures and standards between a customer and provider to ensure that their cooperation is carried out according to the joint planning and to solve conflicts that might occur (Qureshi et al., 2007; Deepen, 2007; Kumar and Snavely, 2004; Konsynski and McFarlan, 1990). The team-based cooperation provides a means to access and share a diversity of knowledge essential for the cooperation (McIvor et al., 2003). This team also engages in joint problem solving to lead both parties to a more constructive and integrative solution (Bullington and Bullington, 2005; Emmett and Crocker, 2006; Mohr and Spekman, 1994; Cummings, 1984). With these coordination mechanisms, the

organisations are able to share and leverage knowledge and skills of each other to better understand how they should work together (Zineldin and Bredenlow, 2003; Lasher and Ives, 1991).

### ***Performance evaluation***

Performance evaluation refers to monitoring and supervisory actions that a customer undertakes to ensure satisfactory provider performance in executing the agreement (Noordewier et al., 1990). This implies that performance measurement is usually one way from the customer to provider. It involves three main activities including developing performance standards, measuring products or services delivered against those standards, and interpreting them continuously (McFarlan and Nolan, 1995; Henderson, 1990). This performance measurement has been viewed as a key factor for successful collaboration in the long term (Emmett and Crocker, 2006; Kishore et al., 2003; Kim and Young-Soo, 2003; Zviran et al., 2001). This performance measurement framework provides a guideline for the customer and provider to discuss the quality of products or services delivered and to improve the long-term collaboration between the customer and provider (Qureshi et al., 2007; Jae-Nam Lee et al., 2003). It also brings the involved parties together to resolve problems. In addition, the performance measurement has an influence on the development of trust over time (Langfield-Smit and Smith, 2003).

### ***Communication***

Communication can be defined as “the formal as well as informal sharing of meaningful and timely information between the firms” (Anderson and Gerbing, 1985). Timely, accurate and relevant information is essential for managing and sustaining the inter-organisational collaboration (Chakrabarty et al., 2007; Bullington and Bullington, 2005; Lynch, 2004; Mohr and Spekman, 1994). In the initial stage of collaboration, establishing communication protocols, including contact points, between the companies is required for identifying the ground rules and requirements of each company (Webb and Laborde, 2005; Langfield-Smit and Smith, 2003). These contact points will further be used for day-to-day collaboration in addition to meetings. Furthermore, communication also includes discussions of any changes in product or service specifications and standards and a review of the performance of

each party. These channels of communication facilitate exchanging valuable information for the collaboration and increasing the degree of trust, which will be explained below (Deepen, 2007; Zineldin and Bredenlow, 2003; McIvor et al., 2003).

### ***Trust***

Trust has been defined and classified in many ways in the sociological or economics perspectives. Most definitions of trust involve exposing oneself to vulnerability. In this research, trust is defined as one party's confidence that the other party in the exchange relationship will not exploit its vulnerabilities (Dyer, 2000; Sako and Helper, 1998). It has been categorised into three groups relevant to managing outsourcing and these are; contractual trust, competence trust and goodwill trust. Contractual trust is based on the moral standard of honesty and rests on the assumption that the other party will honour the agreement, whether the agreement is in writing or not (Van der Meer-Kooistra and Vosselman, 2000). Competence trust relates to a partner's ability to perform according to the specified agreement or contract (Nooteboom, 1996). Goodwill trust refers to perceptions of a partner's intention to perform in accordance with those agreements (Ring and Ven, 1992). Das and Teng (2001) suggest that goodwill trust is associated with integrity, responsibility and dependability.

Trust leads a customer and provider to more open communication, higher quality decision making, risk taking, cooperation and satisfaction in the decision making process. In particular, there is a substantial link between trust and communication (Langfield-Smit and Smith, 2003; Tomkins, 2001; Zand, 1972; Henderson, 1990). Sethuraman et al. (1988) point out that meaningful communication between the involved parties is an important antecedent of trust. In turn, growing trust brings better communication. Trust will be developed over time as the relationship matures (Lasher and Ives, 1991). This will enable the organisations to manage greater stress and display greater adaptability (Chakrabarty et al., 2007; Sako, 1992; Williamson, 1985). It also decreases the possibility of opportunistic behaviour (Birnberg, 1998). In more collaborative relationships, trust becomes an important mechanism to ensure that the provider's interests are allied with the customer's interests and to increase the commitment of both parties to the relationship (Zineldin and Bredenlow, 2003; Kishore et al., 2003; Allen et al., 2001).

The review of literature explained above shows that a successful outsourcing relationship management requires a customer and a provider to develop mutual understanding particularly in the aspects of specifications and expectations of products or services. This leads both parties to construct a clearly defined agreement. This agreement is also associated with a certain degree of flexibility to cope with changes that might occur. To manage the agreement, the customer and provider attempt to develop interface procedures for their daily collaboration. In addition, performance evaluation is recognised as a key factor for collaborative relationship in the long term. This could be due to the fact that quality of products or services delivered is now driving the competitiveness of companies, which will be explained in details in the next section.

#### **2.4 Service quality**

Service quality has been defined by a number of researchers and practitioners (Seth et al., 2006b; Vuorinen et al., 1998; Philip and Hazlett, 1997; Parasuraman et al., 1994; Lewis, 1993). These definitions focus on meeting the customers' requirements and how well the service delivered matches the customers' expectations. Expectations are "pre-trial beliefs about a product or service" (Boulding et al., 1993). In this research, service quality can be defined as the discrepancy between what the customer feels a service provider should offer and his/her perceptions of what the service firm offers. This definition does not suggest that the customer is always correct in its demands for service quality, merely that they have power over the provider.

Unlike the manufacturing sector which can measure goods in an objective way in regards to their physical and technical specifications, the service sector has encountered challenges for controlling and improving the quality of services because of their inherent characteristics. These are inseparability of production and consumption, intangibility, perishability and heterogeneity (Ghobadian et al., 1994): The first feature arises from an involvement of the customers in a delivery process. Secondly, it is difficult for the service companies to describe a service and for the customers to ascertain its likely virtues. Perishability occurs when services cannot be stored over a period of time for consumption later on. Heterogeneity is a consequence

of explicit and implicit service elements, relying on individual preferences and perceptions (Dotchin and Oakland, 1994).

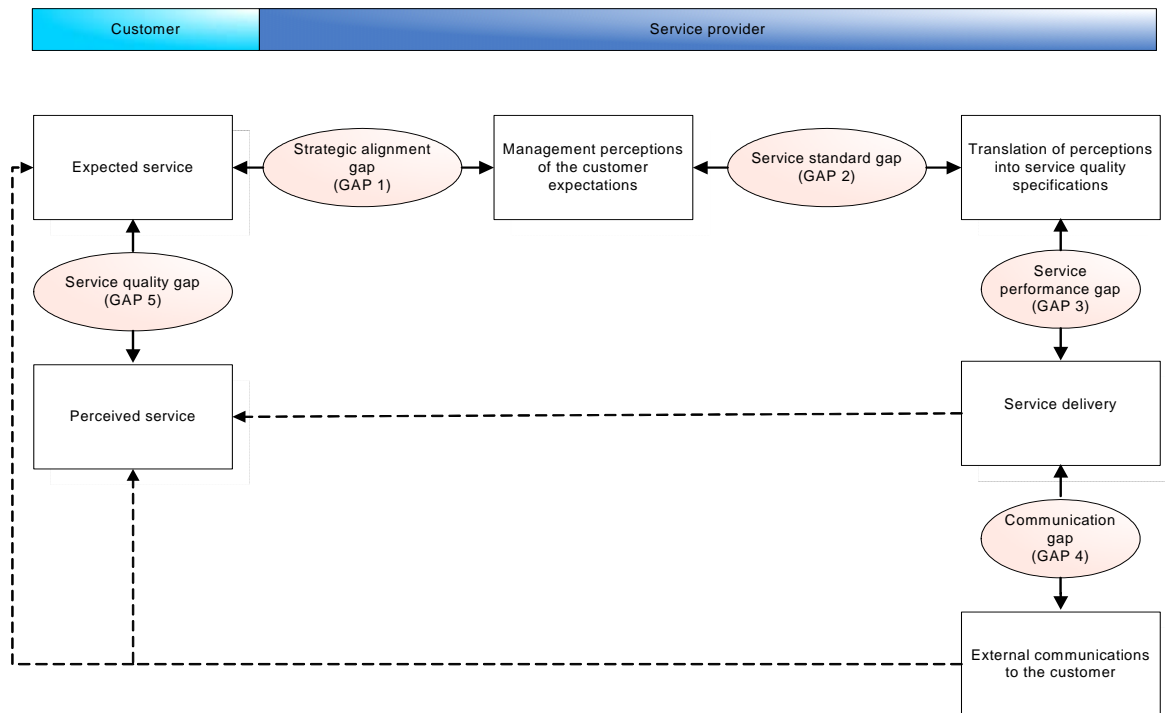
Based on the definition and characteristics of service, measurement of service quality is a considerably important instrument for ensuring the customer's requirements are met and for enhancing the performance of delivered services. Service quality has received attention from a number of researchers in the past two decades. There are for example four models of service quality which have been widely accepted. Gronroos (1984) proposed a service quality model which consists of three main elements: technical quality, functional quality and image. However, this model does not explain how to measure these three attributes. Parasuraman et al. (1985) develop the gap model based on the differences between expectations and performance along the quality dimensions. Based on the gap model, SERVQUAL has been constructed to measure customer perceptions of service quality (Parasuraman et al., 1988). The gap model has also been adapted to create the next two service quality models. The performance-based model (SERVPERF) illustrates that service quality is a form of customer attitude and the performance-only measure of service quality is an enhanced means of measuring service quality (Brady et al., 2002; Cronin and Taylor, 1992). Antecedents and mediator model is suitable for determining meaningful and actionable links between service quality, customer satisfaction, service process and service outcomes (Zhou, 2004; Dabholkar et al., 2000). Hence, the gap model is selected as a fundamental concept for developing a performance measurement model for aircraft MRO outsourcing which can be categorised into service.

#### ***2.4.1 Gap model***

The gap model is constructed as shown in Figure 2-7. The gaps visualized in the model are:

- Gap 1: a discrepancy between executive perceptions and customer expectations. In the context of aircraft MRO outsourcing, it is essential for the customer to clearly identify their expectations and then communicate these expectations to the service provider. In turn, the senior managers of the service provider need to establish an understanding of what the customer actually expects.





**Figure 2-7: The gap model (a source: Parasuraman, 1998)**

- Gap 2: a difference between management’s perceptions of customers’ expectations and service quality specifications. To minimize the size of this gap, it requires accurate translation and identification of service-quality standards.
- Gap 3: although the service quality standards are determined correctly, service quality may be destroyed by the firm’s employees. This is the difference between the service quality specifications and service actually delivered, which is called the service performance gap.
- Gap 4: a discrepancy between service delivery and external communications to the customer about service delivery. The external communication can affect not only customer expectations about a service but also customer perceptions of the delivered service.
- Gap 5: a difference between the customer’s expectations and the perceived service. This gap is influenced by the size and direction of the four previous gaps inherent with the delivery of service quality. This is due to the fact that the four previous gaps are essential for producing the service outcomes that the customer expects.

The gap model has been widely accepted and tested with regards to service quality by investigators such as Santos (2003) and Frost and Kumar (2000). Although the gap model is rooted primarily in business-to-customer (B2C) there are a number of researchers who have adapted this service quality concept for business-to-business (B2B) for instance Seth et al. (2006a), who studied the 3PL logistics industry, Sigala, (2004), who developed ASP-QUAL and Parasuraman et al. (1994), who investigated the business-computer-service industry.

#### ***2.4.2 Principles of performance measurement***

The importance of performance measurement in outsourcing has been recognised by a number of investigators as explained in Section 2.3.2. Domberger (1994) explains that performance measurement appears to encapsulate three main areas: assuring the service delivered by the provider is qualified according to the contract terms, determining the extent of variation in quality and its relationship to cost factors and identifying whether customers are satisfied with the service. Willcocks and Choi (1995) also claim that inappropriate performance measurement used for controlling and monitoring the outsourcing performance is the main cause of large hidden costs and the failure of outsourcing. The performance measurement should therefore be designed and developed in accordance with service scopes, specifications and requirements with the aim of monitoring and enhancing the providers' performance. This measurement provides a constructive management framework to meet standards, service requirements and outsourcing objectives and to improve efficiencies and effectiveness of outsourcing (Nuthall, 2003). It also facilitates communication between the customer and provider and ensures the achievement of value for money through outsourcing. However, the actual mechanisms for monitoring and evaluating the performance of service provided by the provider have been less developed (Fernandez, 2007; Dean and Kiu, 2002). As such, it is essential to review general theories of performance measurement. This will be used as a further guideline in conjunction with the gap model to design the performance measurement for aircraft MRO outsourcing.

There are five key principles for developing performance metrics identified in the literature review and these are highlighted below.

### ***Link to objective and strategies***

Designing performance measurement starts with the setting of objectives from the beginning of an outsourcing project (Sparrow, 2003). These objectives are then translated into service requirements and performance metrics. The alignment of the objectives and performance metrics has been viewed as the main characteristic of performance measurement development (Varma et al., 2006; Lapide, 2000). This is because performance measurement can be employed as a powerful motivational tool driving decisions and actions that are consistent with the objectives and strategies (Tsang et al., 1999).

### ***Clear distinction of metrics at strategic, tactical and operational levels***

The performance metrics need to be classified according to the management levels where they would be employed most appropriately, as they influence decisions made at the strategic, business and operational levels (Gunasekaran et al., 2001). Strategic metrics are used to ensure the achievement of the company's objectives and strategies (Kaplan and Norton, 2005). Business metrics are selected to examine and address whether a business basic's tactics are accomplishing the planned objectives (Dreyer, 2000). Operational metrics are used to monitor and control the day-to-day operations. However, the metrics of these three management levels must be linked together (Tsang et al., 1999), otherwise, the company is not able to gain insight into the underlying causes of the improvement or deterioration.

### ***Financial and non-financial metrics***

Traditional models of performance measurement focused on financial metrics as they have been viewed as important for strategic decisions (Maskel, 1991). However, they have been criticised by a number of researchers (Neely et al., 2005; Toni and Tonchia, 2001). They argued that the financial metrics focus on short-term and on profit orientation and fail to support continuous improvement. As such, it is essential to develop a balanced mix of financial and non-financial metrics (Varma et al., 2006; Chan and Qi, 2003). This balanced mix enables the company to anticipate both "the result of management action and organisational performance and the cause of it" (Eccles and Pyburn, 1992).

### ***Input and output metrics***

In addition to the balanced mix of financial and non-financial metrics, the company should combine both input and output metrics into the performance measurement (Tsang et al., 1999). Output metrics provide an “innovative objective” to the service providers to improve the services delivered and service quality without compromising their profits (Centre for Facilities Management, 1999). They should be monitored at the strategic level. Input metrics are also important for ensuring innovation and development of the service by the provider and customer (Heavisides and Price, 2001). They are usually focused at the operational level (Brignall and Ballantine, 1996).

### ***Encouragement***

The performance measurement provides motivation and inspiration to the provider in fulfilling the customer’s requirements and in improving the services delivered, in addition to monitoring the provider’s performance (Neely et al., 2005; Sparrow, 2003). It might be attached with incentives to magnify the impact of performance measurement (Eckerson, 2006).

## **2.5 Summary**

The literature has been reviewed in order to identify the research gap. Based on the extent of literature relating to outsourcing, relationship management has received less attention on the issue of “how to” do relationship management from researchers although it is recognised as a key factor of successful outsourcing. Relationship management is particularly important for critical outsourcing due to its high strategic importance and financial impact. Aircraft MRO outsourcing, which can be categorised as critical outsourcing, is considered as a strategic approach for airlines to sustain their competitiveness. However, there is a lack of research in aircraft MRO outsourcing particularly in the area of relationship management. Hence, the gap in this research is “the relationship management for aircraft maintenance outsourcing”, as shown in Figure 2-5. In addition to identifying the research gap, the literature review was used to construct the theoretical background in the field of relationship management. The relationship between the customer and provider is defined. The eight key factors of customer-provider relationship were investigated from the

literature and will be used as a knowledge background to explore in-depth the outsourcing relationship management. These key factors are mutual understanding, clearly defined agreement, commitment, flexibility, organisational link, performance evaluation, communication and trust. Moreover, theories of service quality particularly relating to the gap model were explored. This will then be applied in conjunction with the five general principles of performance measurement to develop a proposed approach to performance measurement for aircraft MRO outsourcing. These five principles include a link to objectives and strategies, clear distinction of performance metrics at the strategic, business and operational levels, a balanced mix of financial and non-financial metrics, input and output metrics and motivational instrument for the provider.

## CHAPTER 3 RESEARCH DESIGN

### 3.1 Introduction

This chapter presents the design of the research. It describes the objectives of the research as well as introducing the research questions. This is followed by an explanation of the philosophical paradigm underlying this study after which the methodology applied for conducting the research is then described.

### 3.2 Research aim

The literature as explained in Chapter 2 shows that there is limited knowledge in the area of relationship management, particularly in aircraft MRO outsourcing. Therefore the aim of the research is:

*“To improve aircraft maintenance outsourcing through relationship management”.*

This research focuses on establishing, developing and sustaining the relationship between a provider and a customer particularly in the field of aircraft MRO outsourcing. The research aim enables the researcher not only to identify the research questions, which will be explained next, but also to select an appropriate research philosophy. Therefore a suitable research methodology is designed.

### 3.3 Research questions

Based on the research aim explained above, three research questions are determined:

- 1. What are the key factors for outsourcing relationship management?*
- 2. How might the relationship between an MRO provider and an MRO customer established and developed?*
- 3. What are good practices that an MRO customer measures the performance of an MRO provider?*

These three questions correspond to the three research stages as shown in Figure 3-1. Each question is then addressed using a set of objectives. These research

questions and research objectives enable the researcher to design an appropriate methodology for the research.

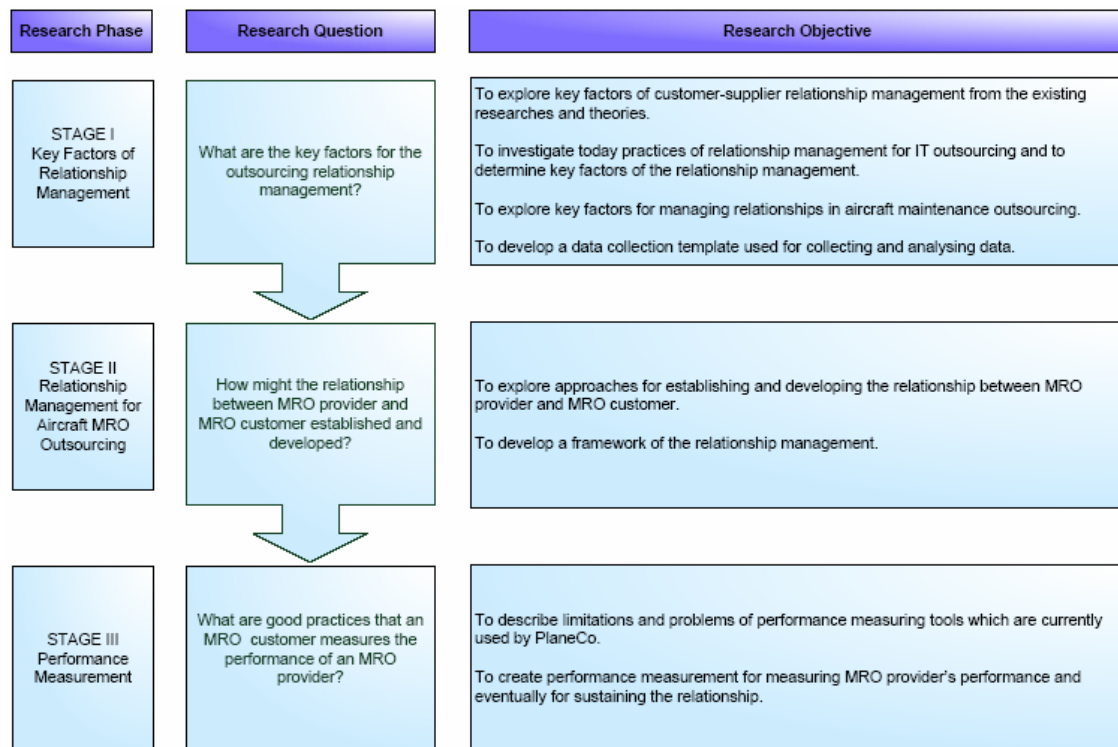


Figure 3-1: A three-stages research process

### 3.3.1 Stage I

This stage was carried out with the aim of determining the key factors for managing the outsourcing relationship. This stage was divided into three main parts: a literature review, an exploration of IT outsourcing and an investigation of the aircraft MRO outsourcing. Existing literature was reviewed not only to use as a theoretical background but also to find the key factors of relationship management in the wider area of outsourcing. Next, a study of IT outsourcing was then selected to explore the key factors of cooperation management. This is because its characteristics are similar to that of the aircraft MRO outsourcing which is the main focus of this research, as shown in Figure 2-2. Based on these two sources of evidence, the key factors of relationship management for aircraft MRO outsourcing were initially explored. These three studies were therefore utilised to construct a data collection template, as shown in Figure 4-10, which was be used for data collection in Stage II.

### 3.3.2 Stage II

This stage focused on gaining insights into relationship management in aircraft MRO outsourcing. This stage investigated the establishment and development of the relationship between an MRO provider and an MRO customer. In this study, the unit of analysis (Yin, 1994) is the relationship between an MRO provider and an MRO customer. This was investigated by studying three relationships featuring the four companies, as shown in Figure 3-2.

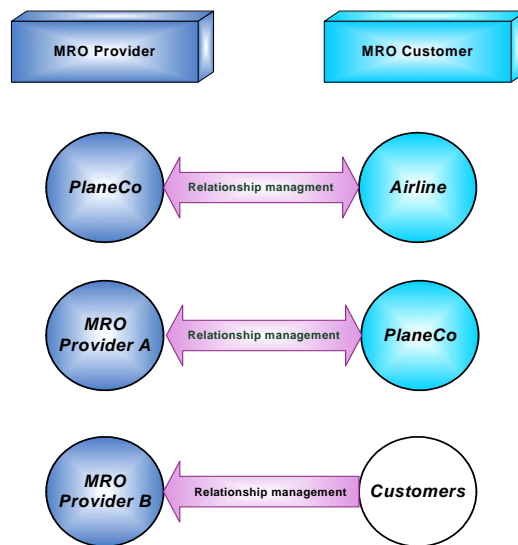


Figure 3-2: Relationship management of the four selected case companies

The four companies selected include PlaneCo, Airline, MRO Provider A and MRO Provider B. PlaneCo, which is the main subject of this study, has extreme roles as the company which plays the role of an MRO provider - to offer a wide range of aircraft maintenance services to airlines, including Airline. It also plays the role of an MRO customer to outsource the maintenance services to MRO providers, including MRO provider A, as shown in Figure 3-2. This type of company, known as an intermediate company, provides a great advantage to the researcher in gaining a better understanding of relationship management from the perspective of both the MRO provider and customer. Airline and MRO Provider A were also studied to ensure the reliability and validity of the data collected from PlaneCo as these three cases are in the same supply chain. In addition, MRO Provider B was selected to investigate their relationships with the customers although they are not positioned in PlaneCo's supply chain. This case study facilitates improving generalisation of the research outcomes.



The investigations of these three case study relationships featuring the four case companies were guided by the data collection template which resulted from Stage I. However, the researcher attempted to find out new variables of the relationship management for aircraft MRO outsourcing to gain a better understanding in this particular area. Stage II therefore produced a framework for managing the relationship of aircraft MRO outsourcing. It also addressed a key component for sustaining the relationship in the long run for an in-depth investigation in Stage III.

### 3.3.3 Stage III

According to the results of Stage II, stage III focused on studying and investigating the limitations and weaknesses of performance measurement which were used for evaluating the performance of the MRO provider. This study was carried out with the cooperation of the company from Stage II, namely PlaneCo. The analysis was also based on existing theories which are relevant to service quality and performance measurement. As a result, the researcher was able to construct a proposed version of the performance measurement model.

### 3.4 Research paradigm

In order to address the research questions, it is important to find out what is happening (Robson, 2002) in the relationship between an MRO provider and an MRO customer. Correspondingly, this research is an exploratory research focusing on the outsourcing relationship management, as illustrated in Table 3-1.

**Table 3-1: Enquiry purpose (from Robson, 2002; Hart, 1998)**

| Enquiry purpose | Goals of research   | Research question type     |
|-----------------|---|----------------------------|
| Exploratory     | To find out what is happening, particularly in little-understood situations             | How, what , when and where |
| Descriptive     | To portray an accurate profile or persons, events and situations.                       | How and what               |
| Explanatory     | To explain the cause and non-occurrence of a phenomenon and to show causal connections. | Why                        |

Exploratory research is qualitative in nature and involves examining and reflecting on concepts in order to gain an understanding of the social and human activities (Hussey and Hussey, 1997). The study attempts to generate ideas and theories without assuming the existence of any hypothesis. Moreover, it is unlikely to separate

theories, knowledge background and values of the researcher from the research. As a result, phenomenological paradigm, as shown in Table 3-2, is the underpinning research assumption to provide guidelines on how the researcher should conduct the research. It is concerned with understanding human behaviour from the participant's own frame of reference (Hussey and Hussey, 1997).

With this paradigm, the researcher focuses on the meaning and understanding and insights into the relationship between the MRO provider and customer throughout the three stages of establishing, developing and sustaining. The researcher also develops ideas through induction from multiple sources of data gathered from various methods based on the appropriate research strategies.

### 3.5 Selected research strategies

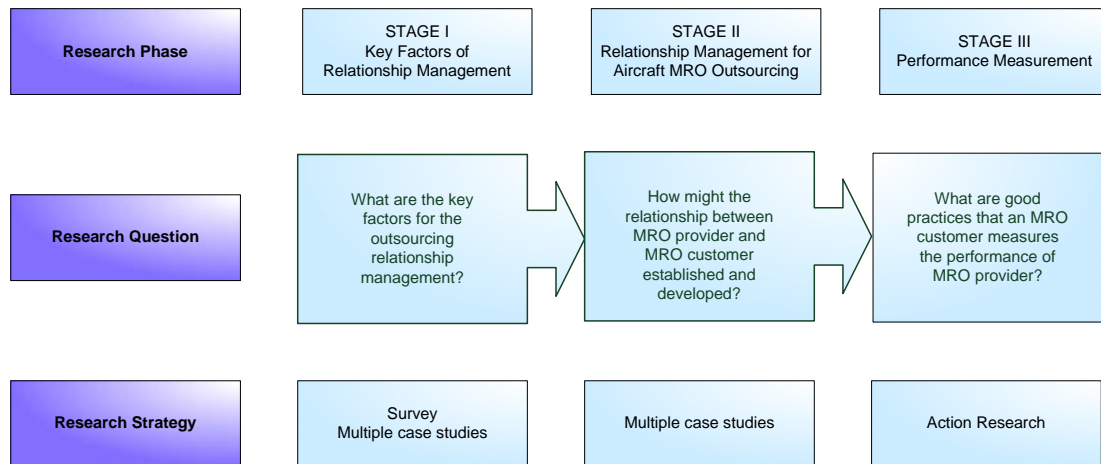
Research strategy refers to a method of enquiry that defines the way the researcher is collecting data (Walsh, 2001). In fact, there are a number of research strategies relating to the research philosophies, as shown in Table 3-2.

**Table 3-2: Research strategies (from Hussey and Hussey, 1997; Galliers, 1992)**

| <b>Positivism</b>      | <b>Phenomenological</b> |
|------------------------|-------------------------|
| Laboratory experiments | Case studies            |
| Field experiments      | Survey                  |
| Surveys                | Action research         |
| Case studies           | Ethnographic            |
| Theorem proof          | Field experiments       |
| Forecasting            | Grounded theory         |
| Simulation             | Hermeneutics            |

A phenomenological paradigm was selected as the philosophy for this research. The research strategies which are highlighted in the right column above seem to be suitable for this philosophy.

According to the highlighted research strategies as shown in Table 3-2, it is essential to decide which strategies are suitable for each of the three research stages relating to key features of each strategy. Figure 3-3 shows a selection of the research strategies for the three different stages. Survey and multiple case studies were found to be suitable for Stage I. For Stage II, multiple case studies was used for exploring relationship management for aircraft MRO outsourcing. The last stage was carried out based on action research.



**Figure 3-3: Selected research strategy**

### 3.5.1 Survey

This is a method for collecting data by asking a set of pre-formulated questions in a predefined sequence in a structured questionnaire to a sample of individuals drawn so as to be representative of a defined population (Hutton, 1990). There are a number of rationales for selecting a survey as a research strategy for Stage I. Firstly, a survey provides a means of gaining access, over a shorter time, to a number of respondents who are highly experienced in managing aircraft maintenance and in gathering a large amount of statistical data (Maylor and Blackmon, 2005). This access will subsequently enable the research to improve on the generalisation of this collected data. Secondly, the researcher is confident of the type of information to be gathered from the survey and the type of questions to be asked of the respondents, as the aim of the survey is clearly defined corresponding to the research objectives and research question of Stage I (Robson, 2002). Lastly, as the survey produces statistical data (Neuman, 2003), the researcher can make this data more visible and understandable to readers who are not familiar with qualitative data (Hakim, 1987).

There are two major categories of surveys: analytic survey and descriptive survey. According to the research question and research objectives, a descriptive survey was preferred for finding facts on relationship management in the aircraft maintenance industry. It explains how many members of the population have a certain opinion and how often certain events occur together (Oppenheim, 1992). Designing the descriptive survey depends on the ways to collect survey data. Robson (2002) offers three main methods for collecting survey data: self completion questionnaire; face-to-

face interview and telephone interview. Determined by time and budget constraints, the self-completion survey was selected and conducted on the basis of a group-administered questionnaire. This survey questionnaire is designed systematically and logically in order to overcome limitations such as an inexperienced researcher, unclear questions and non-representative samples.

### ***3.5.2 Case study***

This is a strategy for doing research which involves the empirical investigation of a particular phenomenon within its real-life context using multiple sources of evidence (Yin, 1994). The focus is on an in-depth comprehension of the phenomenon and its context (Eisenhardt, 1989). As the research questions of Stage I and Stage II are “what” and “how” respectively, a case study is qualified as a research strategy for these two research stages (Yin, 1994). Case study also provided the researcher with an opportunity to discover a number of variables and contextual conditions for managing the outsourcing relationship where there is a deficiency of relevant theories (Hussey and Hussey, 1997). Moreover, to improve the validity and credibility of the case study, the researcher collected data from multiple sources of evidence including interviews, observation and documentation (Cosley and Lury, 1987).

There are two types of case study research and these are: single case study and multiple case studies. With regard to Stage I and Stage II, it is more appropriate to study and explore what is going on in the relationship management for IT outsourcing and aircraft MRO outsourcing using a multiple case studies strategy. This method enabled the researcher to gain a replication of results from a number of case studies and then to develop a theoretical framework particularly in the context of the outsourcing relationship (Yin, 1994). Moreover, the evidence from the multiple cases is more compelling for the theoretical building and accordingly the study is considered as being more robust (Herriott and Firestone, 1983).

### ***3.5.3 Action research***

Action research was selected as a strategy for carrying out Stage III by a joint collaboration of the researcher and PlaneCo which is the main subject of this study. Action research enabled the researcher to contribute knowledge to the academic community as there is a lack of theories relating to inter-organisational performance

measurement and outsourcing relationship management. It also provided the means for PlaneCo to improve its performance measurement which was currently used to evaluate its providers' performance and to enhance its incorporation and integration with the providers (Hussey and Hussey, 1997).

When carrying out the action research, it was essential for the researcher to become more facilitative and less directive (Stringer, 1999). The researcher helped the members of action research group, shown in Table 6-1, to analyse their situation relating to a current approach to performance measurement and then to support them to find effective solutions. There are two main limitations associated with action research and these are: reliability and validity of the action research arising from the involvement of the researcher and action research members (Eden and Huxman, 1996) and generalisation of the action research resulting from the valid transfer from the selected case to other cases (Argyris and Schon, 1989). To overcome these limitations, a rigorous cycle for conducting the action research was applied, which will be explained in details in Section 6.2.

### **3.6 Data collection methods**

This section focuses on selecting techniques for sampling and for data collection regarding the three selected research strategies explained above.

#### ***3.6.1 Sample selection techniques***

It is important for the researcher to select samples from the whole population in a systematic and logical way. This is due to the fact that good systematic sampling techniques can not only help to increase generalisability or external validity of the research but also to decrease the degree of bias of the collected data (Robson, 2002). With the good selection methods, the researcher is able to save time and resources by collecting data without damaging the reliability and validity of the research (May, 1993). There are two main types of sampling techniques: probability sampling and non-probability sampling. The probability sampling technique is applicable where the probability of selection of each respondent is known (Robson, 2002). It can be divided into four categories, as shown in Table 3-3. As this research investigation is not intended to produce statistical generalisation, it was found that the probability sampling technique would not be suitable for this study.

**Table 3-3: Key features of probability sampling (from Walliman, 2005; Neuman, 2003; Robson, 2002; Burns, 2000)**

| Types of probability sampling | Key features  |
|-------------------------------|---|
| <i>Simple random sampling</i> | <ul style="list-style-type: none"> <li>• Similar characteristics of all elements of the population</li> <li>• Each element of the population has an equal chance for being selected</li> <li>• Selection at random from a list of the population</li> <li>• Requires a full list of the population</li> </ul> |
| <i>Systematic sampling</i>    | <ul style="list-style-type: none"> <li>• Very large population and unknown characteristics</li> <li>• Selection of a starting point in the sampling frame at random and then select every <i>nth</i> number</li> </ul>  |
| <i>Stratified sampling</i>    | <ul style="list-style-type: none"> <li>• Divide the population into a number of groups where members of the group has similar characteristics</li> <li>• Select randomly members from each group</li> </ul>   |
| <i>Cluster sampling</i>       | <ul style="list-style-type: none"> <li>• Divide the population into a number of clusters, each of them containing a range of characteristics</li> <li>• The clusters are chosen on random basis</li> <li>• Widely dispersed and large population</li> </ul>   |

The non-probability sampling technique involves non-statistical inferences in selecting samples from the population, in contrast to probability sampling. It enables the researcher to make a judgment to achieve a particular purpose without the intention of making statistical generalisation (Robson, 2002). As such, the research is still qualified in the aspect of external validity or generalisability. There are five types of non-probability sampling, which are: convenience sampling, quota sampling, dimensional sampling, purposive sampling and snowball sampling, as shown in Table 3-4.

In the context of this research that focuses on relationship management of critical outsourcing, purposive sampling and snowball sampling, shown in Table 3-4, are most likely to be suitable for selecting cases in this particular area. This is due to the fact that with the clearly defined research objectives the researcher has a clear idea of which types of cases or samples are appropriate for the in-depth investigation. The researcher attempted to select cases that can provide valuable and reliable data relating to the provider-customer relationship management both in IT outsourcing and aircraft MRO outsourcing. Furthermore, it is impossible for the researcher to know all the members who are directly and indirectly relevant to the provider-customer relationship. Therefore, the researcher preferred to use a third party to identify other members who are associated with the provider-customer relationship. This then

enabled the researcher to cover most of the aspects of such relationship management within the time and budget constraints.

**Table 3-4: Key features of non-probability sampling (from Neuman, 2003; Robson, 2002; Blaikie, 2000; May, 1993)**

| <b>Types of non-probability sampling</b> | <b>Key features</b>  |
|--|--|
| <i>Convenience sampling</i>              | <ul style="list-style-type: none"> <li>• Select the most convenient respondents</li> <li>• No guarantee that the respondents are representative to the population</li> <li>• One of the most extreme and unsatisfactory methods</li> </ul> |
| <i>Quota sampling</i>                    | <ul style="list-style-type: none"> <li>• An extension version of convenience sampling</li> <li>• Dividing the sample along dimensions</li> <li>• A traditional application for survey sampling</li> </ul>                                  |
| <i>Dimensional sampling</i>              | <ul style="list-style-type: none"> <li>• An extension version of quota sampling</li> <li>• Various dimensions in selecting samples to cover every possible combination of these dimensions</li> </ul>                                      |
| <i>Purposive sampling</i>                | <ul style="list-style-type: none"> <li>• Judgement of the researcher in selecting cases to achieve a particular goal</li> <li>• A common method for case studies</li> </ul>  |
| <i>Snowball sampling</i>                 | <ul style="list-style-type: none"> <li>• Interconnected network of people is used for identifying cases being studied</li> <li>• Common use in case studies</li> </ul>   |

### **3.6.2 Selected data collection methods**

Key characteristics of data collection techniques were reviewed, as shown in Table 3-5. In considering the research questions and the selected research strategies of the three research stages, it is found that a questionnaire was suitable for achieving the survey aim, which is to explore the key factors of relationship management in aircraft MRO outsourcing. Interviews, observation and documentation were also selected for collecting data throughout the three research stages. Figure 3-4 shows the data collection techniques selected along with sampling techniques for this research study.

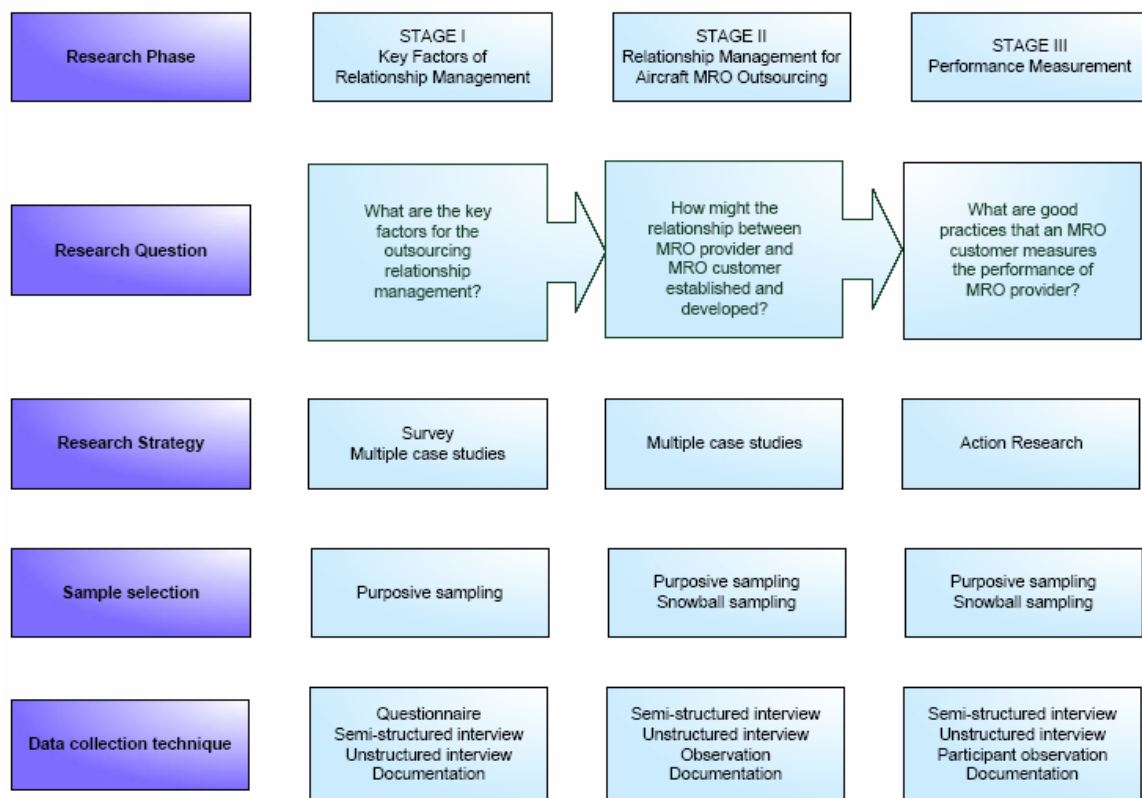


Figure 3-4: A selection of sampling technique and data collection method

### *Questionnaire*

This is generally regarded as an instrument of a survey. It can be used to collect generalisable information from a group of people who have experiences in managing aircraft MRO outsourcing. The researcher found that the group-administered questionnaire is highly likely to be appropriate for collecting the statistical data relating to the key factors of outsourcing relationship management. The group of respondents were gathered at the forum meeting of the International Federation of Airworthiness (IFA) in Paris, France, in 2006 and completed individual questionnaires. Help or support was available from the researcher who was there to distribute and collect the questionnaires (Oppenheim, 1992). With this method of data collection, the researcher was able to ensure high response rates within time and budget constraints and to prevent any bias. The survey questionnaire was designed and conducted using the questionnaire design process created by Frazer and Lawley (2000), which will be explained in details in Section 4.5.1.



**Table 3-5: Key features of data collection techniques (from Walliman, 2005; Robson, 2002; Hussey and Hussey, 1997; Yin 1994; Oppenheim, 1992)**

| <b>Data collection techniques</b>   | <b>Key features</b>   | <b>Advantages</b>  | <b>Disadvantages</b>  |
|---|---|--|---|
| <i>Questionnaire: it can be conducted in three different methods below</i>    | General <ul style="list-style-type: none"> <li>• Use of a fixed, quantitative design</li> <li>• Collection of a small amount of data in standardized form</li> <li>• Selection of representative samples of individuals from known populations</li> </ul> | General <ul style="list-style-type: none"> <li>• A simple and straightforward approach to the study of attitudes, values, beliefs and motives</li> <li>• A collection of generalizable information from almost any human population</li> <li>• High amounts of data standardization</li> </ul> | General <ul style="list-style-type: none"> <li>• Impacts of characteristics of the respondents on the data collected</li> <li>• Social desirability response bias (i.e. people responds in a way that shows them in good light)</li> </ul>  |
| <ul style="list-style-type: none"> <li>• <i>Mailed</i></li> </ul>             | <ul style="list-style-type: none"> <li>• Mail distribution</li> <li>• Mainly closed questions</li> </ul>  | <ul style="list-style-type: none"> <li>• Save costs and times</li> <li>• Avoid biases resulting from interviewers</li> </ul>   | <ul style="list-style-type: none"> <li>• Low response rates</li> <li>• Misunderstanding of the questions</li> </ul>   |
| <ul style="list-style-type: none"> <li>• <i>Self administered</i></li> </ul>  | <ul style="list-style-type: none"> <li>• Present and distribute the questionnaire by an interviewer</li> <li>• Individually complete the questionnaire by the respondents</li> </ul>  | <ul style="list-style-type: none"> <li>• High response rates</li> <li>• Minimum of interviewer bias</li> </ul>   | <ul style="list-style-type: none"> <li>• Sample bias</li> </ul>   |
| <ul style="list-style-type: none"> <li>• <i>Group administered</i></li> </ul> | <ul style="list-style-type: none"> <li>• Gather the respondents in the same place at the same time</li> <li>• Request any helps from an interviewer when needed</li> </ul>  | <ul style="list-style-type: none"> <li>• High response rates</li> <li>• Less time</li> <li>• Accuracy of questionnaire completeness</li> <li>• Minimum of biases</li> </ul>  | <ul style="list-style-type: none"> <li>• Access to an appropriate group of the respondents</li> </ul>   |
| <i>Interview</i>  | <ul style="list-style-type: none"> <li>• Focus on the meaning of particular phenomena</li> <li>• Develop an understanding of the interviewee's perceptions</li> </ul>   | <ul style="list-style-type: none"> <li>• In-depth information from more complex questions and follow-up questions</li> <li>• Information from non-verbal communications such as attitude and behaviour</li> <li>• Insightful (i.e. provide perceived causal inferences)</li> </ul>             | <ul style="list-style-type: none"> <li>• Time consuming and expensive</li> <li>• Access to an appropriate sample</li> <li>• Bias due to poorly constructed questions</li> <li>• Response bias</li> <li>• Reflexivity (i.e. interviewee gives what interviewer wants to hear)</li> </ul> |
| <i>Observation</i>  | General <ul style="list-style-type: none"> <li>• Observe and record actions and behaviour of people</li> </ul>  | General <ul style="list-style-type: none"> <li>• Reality (i.e. covers events in real time)</li> <li>• Contextual (i.e. covers context of event)</li> </ul>   | General <ul style="list-style-type: none"> <li>• Time consuming</li> <li>• Selectivity</li> <li>• Expensive</li> </ul>  |
| <ul style="list-style-type: none"> <li>• <i>Non-participant</i></li> </ul>    | <ul style="list-style-type: none"> <li>• No involvement of the researcher</li> </ul>  | [Same as above]  | [Same as above]   |
| <ul style="list-style-type: none"> <li>• <i>Participant</i></li> </ul>        | <ul style="list-style-type: none"> <li>• Involvement of the researcher</li> </ul>   | [Same as above] <ul style="list-style-type: none"> <li>• Insightful into interpersonal behaviour</li> </ul>  | [Same as above] <ul style="list-style-type: none"> <li>• Bias due to investigator's manipulation of events</li> </ul>   |
| <i>Documentation</i>  | <ul style="list-style-type: none"> <li>• Corroborate and augment evidence from other sources</li> </ul>   | <ul style="list-style-type: none"> <li>• Stable (i.e. can be reviewed repeatedly)</li> <li>• Precise, quantitative and broad coverage</li> </ul>   | <ul style="list-style-type: none"> <li>• Low retrievability</li> <li>• Reporting bias (i.e. reflect bias of author)</li> <li>• Access restriction</li> </ul>  |
| <i>Archival records</i>   | [Same as "Documentation"] <ul style="list-style-type: none"> <li>• An object of extensive retrieval and analysis</li> </ul>   | [Same as "Documentation"]  | [Same as "Documentation"]   |

### ***Interview***

As explained in Section 2.2.2, there is little knowledge of the relationship management of critical outsourcing, including IT outsourcing and aircraft MRO outsourcing. It is important for the researcher to investigate and discover a number of aspects relating to relationship management. As such, conducting an interview seems to be an effective primary method of case study strategy in collecting the in-depth data and in understanding the meaning of this particular phenomenon. A semi-structured interview and an unstructured interview were selected as the interviewing techniques, as shown in Figure 3-4. The semi-structured interview provided the researcher with an opportunity to develop predefined questions, as shown in Table 5-1, and to include more open-ended questions. The unstructured interview focused on expressing and exploring the interviewees' perspectives and experiences in relationship management of aircraft MRO outsourcing. These two types of interview led the researcher to explore what is really happening in relationship management of critical outsourcing. Moreover, semi-structured and unstructured interviews were used for collecting data of Stage III which focuses on performance measurement of aircraft MRO outsourcing. This enabled the researcher to discover limitations of the performance measurement which is currently used by PlaneCo and to develop a proper solution to these limitations. The design of carrying out interview throughout the three research stages will be explained in details in Section 4.4.1, 5.2 and 6.2.

### ***Observation***

This is the method that the researcher used to observe and then record events, circumstances and conditions of an occurrence in which the researcher is interested. There are two main types of observation and they are non-participant observation and participant observation. For Stage II, the researcher did not take part in any circumstances of the event, hence is known as an observer. For Stage III, it is essential for the researcher to become a member of the group under investigation to carry out the action research, which is a principle of action research. This led the researcher to generate knowledge from an experience of the situation (Maylor and Blackmon, 2005). With observation, the researcher is able to appreciate what is actually happening in the provider-customer relationship management and

performance measurement development by observing a number of meetings and recording them. This gave the researcher insights into what kind of atmosphere and environment encouraged or fostered such cooperation. Moreover, the researcher was still able to establish close relationships with the participants to explore the various aspects of relationship management. Another advantage of observation is to reduce discrepancies between what interviewees said, what they have done or will do, and what they actually did (Robson, 2002). Despite these benefits, the researcher is aware that there are biases resulting from the researcher being known as an instrument of such data collection. As such, it is necessary for the researcher to keep an open mind.

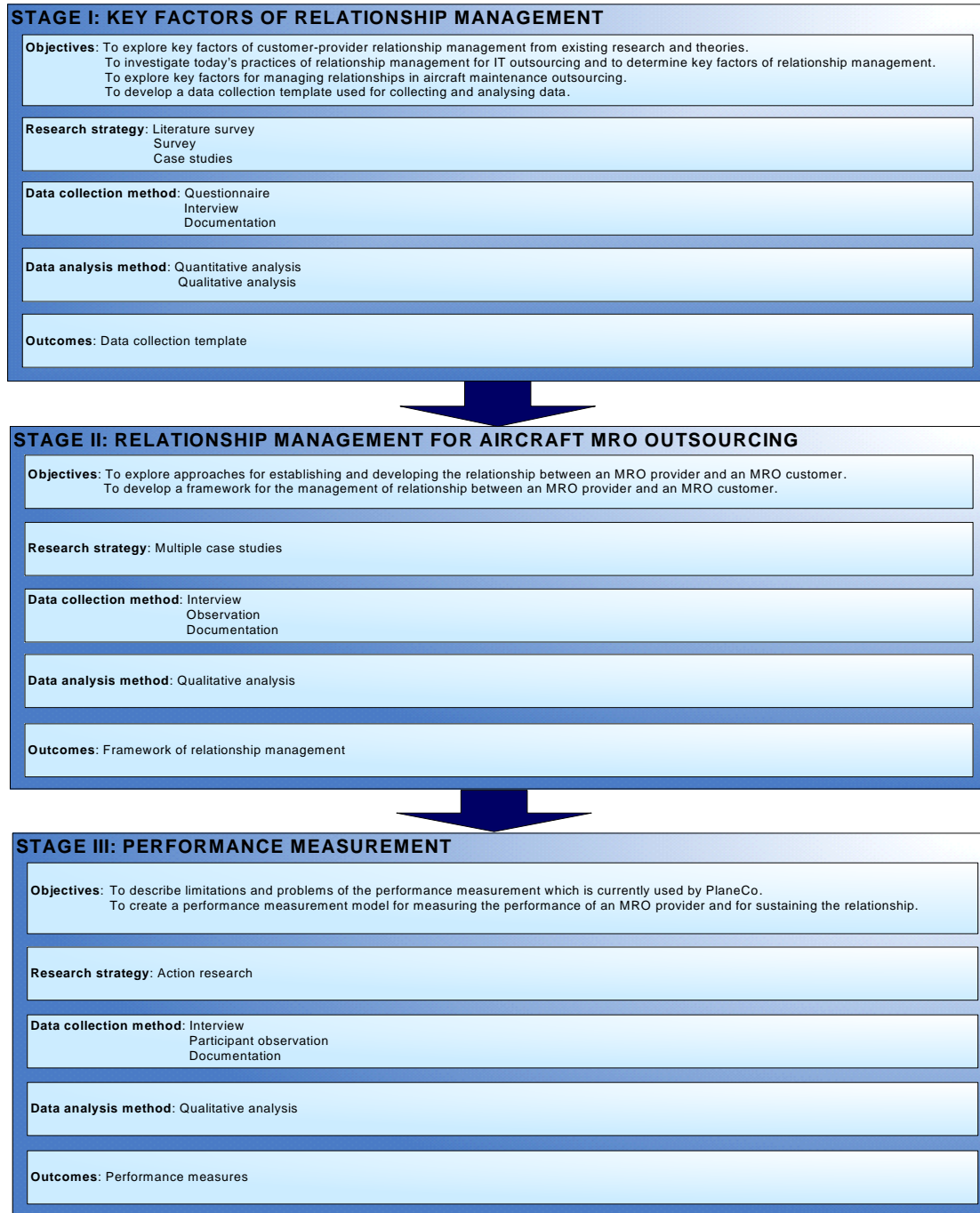
### ***Documentation***

This research uses documents alongside the multiple methods of data collection. The researcher compares the collected data from the various sources with that recorded in relevant documents to ensure its accuracy and validity. The researcher is able to acquire exact details of the outsourcing relationship which the interviewees cannot retrieve and to review such details repeatedly without any changes and uncertainty. Documentary information can take many forms such as contract, minutes of meetings, company processes, reports and regulations.

### **3.7 Summary**

This research investigation has been divided into three stages with regard to the research aim and research questions. Figure 3-5 shows the research objectives, the selected research strategies and the methods of data collection for each research stage. Stage I is an initial stage exploring the key factors of relationship management from the literature, IT outsourcing and aircraft MRO outsourcing. It was carried out by using surveys and multiple case study strategies. Semi-structured and unstructured interviews were used for collecting data from three case studies in IT outsourcing. Group-administered questionnaires were conducted in a study of the aircraft MRO outsourcing. For stage II, the three case study relationships of the aircraft MRO outsourcing by using the four case companies were studied to understand approaches for establishing and developing the provider- customer relationship. The researcher played the roles of interviewer and observer. For Stage III, action research was selected as a research approach for developing a proposed version of the performance

measurement model in cooperation with PlaneCo. The researcher collected the data mainly by using the techniques of interviews, participant observation and documentation reviews.



**Figure 3-5: Research framework**

This systematic design of research methodology from Stage I to Stage III improve the generalizability, reliability and validity of the findings. It also enables the researcher to achieve the research aim and answer the three research questions logically and systematically.

## **CHAPTER 4 STAGE I: KEY FACTORS OF RELATIONSHIP MANAGEMENT**

### **4.1 Introduction**

This chapter focuses on Stage I of the research which is to explore key factors for managing the relationship between provider and customer in outsourcing.

Stage I consists of the following four objectives:

1. To explore key factors of the customer-provider relationship management from existing research and theories.
2. To investigate today's practices of relationship management for IT outsourcing and to determine key factors of relationship management.
3. To explore key factors for managing relationships in aircraft maintenance outsourcing.
4. To develop a data collection template for collecting and analysing data.

Upon achieving the objectives of stage I, the researcher is able to answer the first research question which is "what are the key factors for outsourcing relationship management?", as shown in Figure 3-1.

### **4.2 Research methodology**

To address the research objectives of Stage I, a research methodology was designed, as shown in Figure 4-1. Three sources of evidence were exploited for generating the data collection template. Firstly, the relevant literature was reviewed, with the purpose of identifying key factors of customer-provider relationship management. This literature review was used as a theoretical background in carrying out in-depth investigations in IT outsourcing and aircraft MRO outsourcing. Secondly, multiple case studies of IT outsourcing were carried out to develop an insight into relationship management as it has similar characteristics to aircraft MRO outsourcing, as shown in Figure 2-2. Semi-structured and unstructured interviews and documentation were used to collect data from three IT organisations which will be explained in Section 4.4.1. This led the researcher to develop a conceptual framework of IT outsourcing relationship management. Lastly, a survey in aircraft MRO outsourcing was conducted to gain a better understanding of key factors in the

management of relationships between MRO providers and MRO customers. The results and the findings from these three sources were consequently used for constructing a data collection template which was essential for carrying out Stage II of this research.

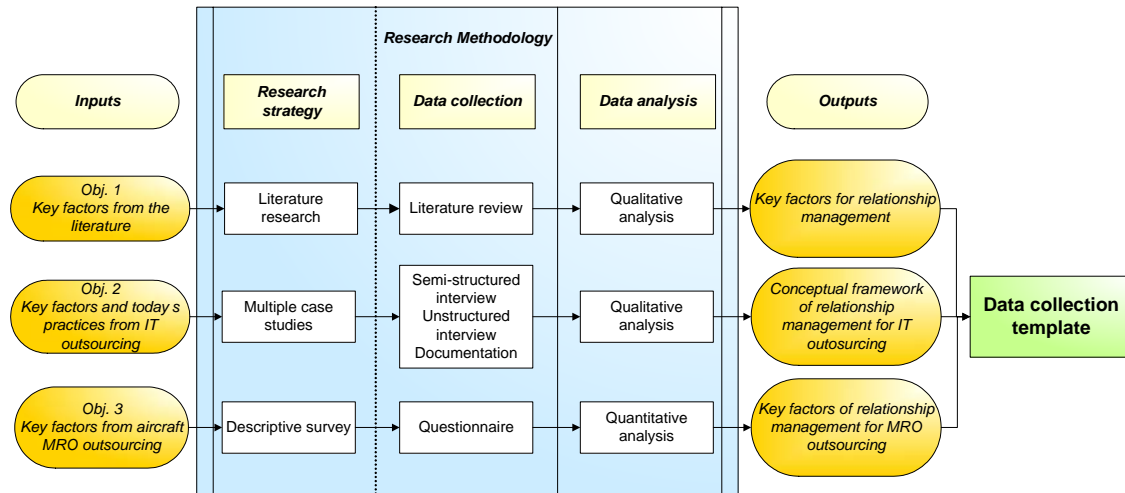


Figure 4-1: Research methodology of Stage I

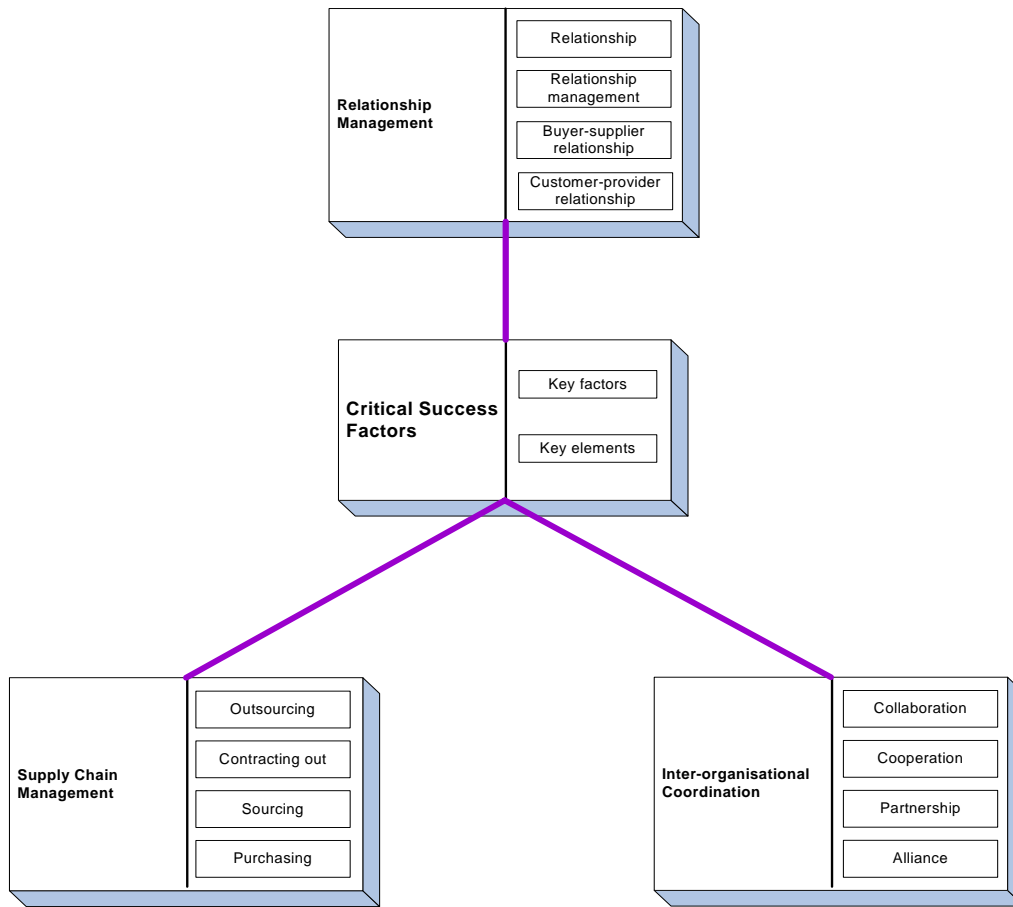
### 4.3 Literature research

This section presents the methodology for conducting the literature review and findings from this review.

#### 4.3.1 Design of literature research

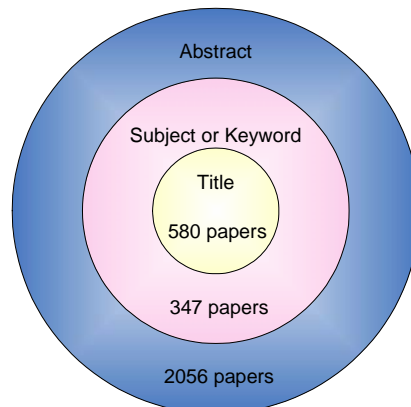
**Literature research:** this is an important first step for the data collection as the relevant literature is used for designing another two research strategies in the later part of Stage I. The review of literature was based on an identification of three key areas which relate to outsourcing relationship management. They are relationship management, inter-organisational coordination and supply chain management. They were then used as a scheme for specifying various words which have similar meanings with each key word, as shown in Figure 4-2. These synonyms were changed over time as the researcher obtained more knowledge and a better understanding of outsourcing relationship management throughout the period of research. For example, a term of “outsourcing” is only the search term used for reviewing the relevant literature in the beginning. Another three terms, “contracting out”, “sourcing” and “purchasing”, were identified later as they have similar

meanings to “outsourcing”. In addition, these three keywords were searched in a field of aircraft maintenance but there is no hit found.



**Figure 4-2: Keywords for literature review**

Four databases were used for searching; namely, EBSCO, PROQUEST, EMERALD and SCIENCEDIRECT. The search started from a field of “title”, which is the narrowest search field in these four databases, to a field of “abstract”, as shown in Figure 4-3.



**Figure 4-3: Searching field used for the review of literature**

Based on the key search terms and the searching technique, there were 2983 papers found in total. However, there were only 159 papers relevant to the key factors of the management of outsourcing relationship which is the objective of this literature review. These relevant papers were reviewed to identify key factors for managing the outsourcing relationship. The eight key factors of the management of outsourcing relationship were generally specified and described by the authors of the papers, as shown in Table 4-1. The outcomes of this literature review were also used for designing multiple case studies of IT outsourcing and surveys in MRO outsourcing in the later step of Stage I.

#### ***4.3.2 Results of literature research***

A summary of factors which are vital for the success of outsourcing relationship management is illustrated in Table 4-1. These key factors are generalised for any outsourcing businesses as there is limited knowledge on aircraft MRO outsourcing in particular. The details of each key factor were described in Section 2.3.2.

Most researchers recognise that mutual understanding is a key factor for successful outsourcing relationship management. This implies that a provider and a customer need to appreciate each other's requirements and develop their cooperation and coordination from the strategic level to the operational level. This will lead both parties to share the risks and benefits from outsourcing. A "Clearly defined agreement" is also considered, particularly from recent research, to be one of the key factors for the integration and cooperation of the provider and customer, as it is used as a basic structure for managing the outsourcing project. In addition, communication is another key factor for managing the relationship successfully. The provider and customer need to exchange and transfer information verbally and electronically, as this is essential for producing the outsourced products or services. Interestingly, most of the recent researchers from 2001 have recognised performance evaluation as one of the key factors of the management of the outsourcing relationship. This could be due to the fact that the quality of products or services is now driving the competitiveness of companies instead of costs, which used to be the main focus. These findings will be verified with another two research strategies which are case studies of IT outsourcing and a survey in MRO outsourcing.



**Table 4-1: Key factors of outsourcing relationship management**

| Key factors  | Researchers               |                  |                         |                           |                           |                     |                      |                           |                                 |                          |               |                               |                |                          |              |                         |                                  |                           |               |                           |
|--|---------------------------|------------------|-------------------------|---------------------------|---------------------------|---------------------|----------------------|---------------------------|---------------------------------|--------------------------|---------------|-------------------------------|----------------|--------------------------|--------------|-------------------------|----------------------------------|---------------------------|---------------|---------------------------|
|  | Anderson and Narus (1990) | Henderson (1990) | Mohr and Spekman (1994) | Willcocks and Choi (1995) | McFarlan and Nolan (1995) | Allen et al. (2001) | Zviran et al. (2001) | Jae-Nam Lee et al. (2003) | Langfield-Smit and Smith (2003) | Kim and Young-Soo (2003) | McIvor (2003) | Zineldin and Bredenlow (2003) | Delaney (2004) | Kumar and Snavely (2004) | Lynch (2004) | Webb and Laborde (2005) | Bullington and Bullington (2005) | Emmett and Crocker (2006) | Deepen (2007) | Chakrabarty et al. (2007) |
| <b>1. Mutual understanding</b> (i.e. clearly defined requirements, shared goals and visions and interdependence balance)                           | ●                         | ●                | ●                       | ●                         | ●                         | ●                   | ●                    | ●                         | ●                               | ●                        | ●             | ●                             | ●              | ●                        | ●            | ●                       | ●                                | ●                         | ●             | ●                         |
| <b>2. Clearly defined agreement</b>  |                           |                  |                         | ●                         |                           |                     | ●                    | ●                         | ●                               |                          | ●             | ●                             |                | ●                        |              | ●                       |                                  | ●                         |               |                           |
| <b>3. Commitment</b>   |                           | ●                |                         | ●                         |                           |                     |                      |                           |                                 | ●                        | ●             | ●                             |                |                          |              |                         | ●                                |                           | ●             | ●                         |
| <b>4. Flexibility</b>  |                           |                  |                         |                           | ●                         |                     | ●                    |                           |                                 | ●                        | ●             |                               |                | ●                        | ●            | ●                       |                                  | ●                         |               |                           |
| <b>5. Organisational linkage</b> (i.e. joint planning, interface structure, team-based cooperation, joint problem resolution and shared knowledge) | ●                         | ●                |                         | ●                         | ●                         | ●                   |                      | ●                         |                                 |                          | ●             | ●                             | ●              |                          | ●            | ●                       | ●                                | ●                         | ●             | ●                         |
| <b>6. Performance evaluation</b> (i.e. developing performance standards, measuring products or services delivered and interpreting the outcomes)   |                           |                  |                         | ●                         | ●                         |                     | ●                    |                           | ●                               | ●                        |               | ●                             | ●              | ●                        | ●            | ●                       | ●                                | ●                         | ●             | ●                         |
| <b>7. Communication</b>  | ●                         | ●                | ●                       |                           |                           |                     |                      | ●                         | ●                               |                          | ●             | ●                             |                | ●                        | ●            | ●                       | ●                                | ●                         | ●             | ●                         |
| <b>8. Trust</b>  | ●                         | ●                |                         |                           |                           | ●                   |                      |                           |                                 |                          | ●             | ●                             |                |                          | ●            |                         |                                  | ●                         | ●             | ●                         |

#### 4.4 IT outsourcing case studies

The methodology used for carrying out multiple case studies in IT outsourcing is described below. The findings of this exploratory study are then presented.

##### 4.4.1 Design of case studies in IT outsourcing

This section explains the method for carrying out IT outsourcing multiple case studies. It will use interviews and documentation as the two main data collection techniques. The collected data is then analysed on the basis of qualitative data analysis.

**Multiple case studies:** these were used to study and investigate current practices of relationship management in IT outsourcing. The use of multiple case studies enables the researcher to generalise and verify the findings of IT outsourcing. A process for carrying out the multiple case studies is shown in Figure 4-4.

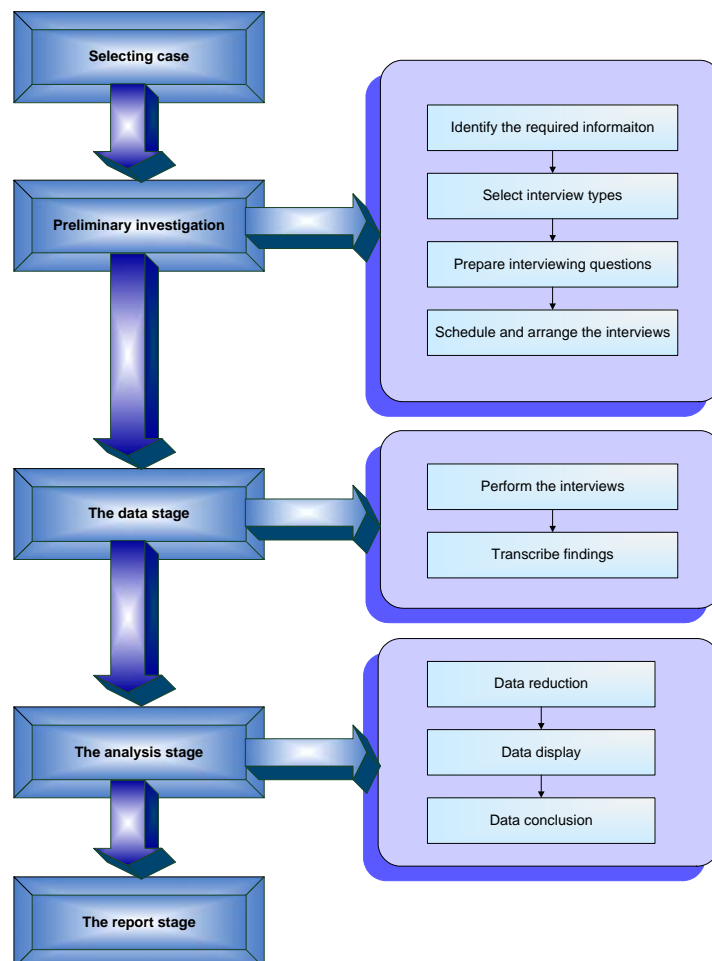


Figure 4-4: Case study design process (adapted from Maylor and Blackmon, 2005; Robson, 2002; Hussey and Hussey, 1997; Babbie, 1990)

*Selecting cases:* this involves selecting three cases of IT outsourcing for the study with regards to the research question and research objectives described in Stage I. These three cases were selected by performing purposive sampling and snowball sampling which were explained in Section 3.6.1. One of them is a mobile phone network company which has contracted out its IT systems, including infrastructure and applications. The other two are companies which provide IT integration solutions globally. The data collected from these three cases is most likely to be regarded as reliable and valuable from customer and provider’s perspectives.

*Preliminary investigation:* this started with reviewing the existing theories relating to relationship management particularly in IT outsourcing, which was explained above. Based on this literature review, the researcher then was able to determine the information required from the three case studies. The required information focused on key factors and today’s practices for managing the relationships between IT service providers and IT customers. Semi-structured interviews and unstructured interviews were selected as techniques for collecting data from the three case studies. Interview questions were then determined beforehand on the basis of the eight key factors of relationship management from the literature review, shown in Table 4-1. In addition, the researcher allowed the conversations with the interviewees, shown in Table 4-2, to develop freely to capture some of issues which are not known in the literature and would also prevent bias. Examples of the new issues found are personal relationships, dynamic situations arising from an innovation of IT technology and an inter-organisational team for constructing a contract. With the predefined interview questions, the researcher then selected the key people who are able to answer these questions, as shown in Table 4-2. This identification was based on the job duties and responsibilities of these people. The interviews with these participants were scheduled and arranged according to their availability.

**Table 4-2: A list of job positions of the interviewees from the three IT case studies**

| <b>Case studies</b>   | <b>Job position</b>   |
|-----------------------|---|
| IT Service Provider A | <ul style="list-style-type: none"> <li>• Contract manager</li> <li>• Customer account manager</li> <li>• Project manager</li> </ul> |
| IT Service Provider B | <ul style="list-style-type: none"> <li>• Project manager</li> </ul>   |
| IT Customer A         | <ul style="list-style-type: none"> <li>• IT manager</li> </ul>  |

The data stage: this step focuses on collecting data from the three case studies by using semi-structured and unstructured interview techniques. The interviews scheduled in the previous step were carried out. The interviews took on average 1 hour as a longer interview might have deterred the interviewees who were busy senior managers. During the interview, the researcher asked for permission from the interviewees to use a tape recording machine. The recordings were used for transcribing the data collected, as most of data is in the form of text which is easy to misinterpret and misunderstand.

The analysis stage: this involves organising, clustering and analysing the collected data, most of which is in qualitative form, to draw reliable conclusions regarding the research question and research objectives of Stage I. The data collected were transcribed into text and then clustered into the eight key factors of relationship management arising from the literature review, shown in Table 4-1. New issues from the transcript were also identified to capture all aspects of provider-customer relationship management. For example, an inter-organisational team which is responsible for requirement clarification and contract construction is composed of employees at the strategic, business and operational levels of an IT service provider and an IT customer. This led the researcher to cover all aspects of the management of the relationships between IT service providers and IT customers. The key factors of relationship management were then identified and investigated further to gain a better understanding of what is actually happening in the management of the relationships of IT service providers and IT customers. A conceptual framework of relationship management for IT outsourcing was consequently created. The similarities and differentiations among the three case studies were found upon. Finally, the conclusions of relationship management for IT outsourcing were drawn in order to answer the first research question which is “what are the key factors for outsourcing relationship management?”, particularly in the aspects of IT outsourcing.

The report stage: the researcher reported the key factors of the management of the relationships between IT service providers and IT customers as well as the approaches that both parties used to manage each key factor. The researcher also demonstrated that the first research question was answered logically and systematically.

**Documentation:** this was used to support the data collected from the interviews. The researcher gained access to the relevant documents of the three IT case study companies. These documents include contract, service level agreement (SLA), agendas of the provider-customer meeting and performance measurement. They were reviewed and clustered into the key factors of relationship management which were derived from the interview data as explained above. In addition, documents from the three IT case study organisations were also cross checked to find similarities and differences.

Well designed multiple case studies and the review of relevant documents explained above ensure that the findings and conclusions are generalised, reliable and valid.

#### **4.4.2 Results of case studies in IT outsourcing**

Based on the three case studies of IT outsourcing, the six key factors for managing the relationships between IT service providers and IT customers were found and it was noted that they are similar to the key factors identified in the literature review. They are requirements, agreement, delivery governance, service delivery, performance evaluation and inter-organisation coordination. These key factors are also influenced by external factors such as IT technology innovation. The details of the six key factors and the external variable are described below.

**Requirements:** in the initial stage of the outsourcing project, an IT service provider and an IT customer attempt to understand each other's requirements and limitations, as stated by the interviewees of three case companies. To do this, an inter-organisational team could be used. This team generally comprises a number of people who are involved in the IT outsourcing project from the strategic, business and operational levels, with the aim to define the requirements as clearly as possible.

*“An interfirm team consists of multilevel people of both parties from top management level to operations management level. This team includes, for example, CEO, procurement people, lawyers and operations people”. (IT Customer A)*

This team seems to be a crucial starting point in developing the relationships at the later stage as the provider and customer establish personal relationships and contractual relationships.

“... in fact, the relationships begin during the procurement process where the right level of contact between the team is established. Equally important is ensuring a high degree of cultural alignment between the organisations”. (*IT Service Provider B*)

Moreover, the inter-organisational team attempt to understand each company’s goals and visions relevant to the outsourcing project during this stage, as explained by the interviewees of IT Service Provider B and IT Customer A. It also realise the importance of establishing a win-win situation from the beginning. This would enable the IT service provider and the IT customer to achieve the goodwill through interpersonal trust.

**Agreement:** in the context of IT outsourcing, the agreement can be divided into a contract and a service level agreement (SLA). They are constructed according to the requirements clearly defined from the previous stage, as stated by the interviewees.

“SLA development is based on contract. The SLA likely contains the same issues as in the contract but has more details”. (*IT Customer A*)

The interviewees of IT Service Provider A explained that an SLA is frequently an annex to the signed contract. The main contents of these two types of agreement are shown in Table 4-3, as explained by the interviewees.

**Table 4-3: Contents of agreement**

| Contract  | Service Level Agreement or Annex  |
|---|---|
| <ul style="list-style-type: none"> <li>• Service definition</li> <li>• Provisions of service</li> <li>• Charges and payment</li> <li>• Warranties and correction of defects</li> <li>• Contract change control procedures</li> <li>• Intellectual property rights</li> <li>• Liability</li> <li>• Change of law</li> <li>• Insurance of policies</li> <li>• Confidentiality</li> <li>• Force majeure</li> <li>• Termination</li> <li>• Consequence of termination</li> <li>• Law</li> <li>• Jurisdiction</li> <li>• Dispute resolution procedure</li> </ul> | <ul style="list-style-type: none"> <li>• Baseline and additional services</li> <li>• Representatives</li> <li>• Contacting points</li> <li>• Procedures of problem escalation and problem solving</li> <li>• Service delivery process</li> <li>• Performance measurement</li> <li>• Incentives and penalties</li> </ul> |

The inter-organisation team is responsible for negotiation and forming these two parts of agreement. With the signed agreement, the provider and customer developed a shared understanding of commitments and service expectations.

*“At the end of the day, the customer and provider must have mutual understandings, commitments and expectations”. (IT Customer A)*

The agreement will become more refined over time as both parties develop both trust and knowledge of the service to be offered, as stated during an interview with IT Customer Provider B.

***Delivery governance:*** when the agreement is signed, the inter-organisation team transfer the outsourcing project to the direct counterparts of the provider and customer, as explained by an interviewee of IT Service Provider B. Nevertheless, this team needs to *“work together through the outsourcing project”*, as said by an interviewee of IT Customer A. The direct counterparts of both parties are responsible for identifying a structure to oversee the service delivery defined in the agreement. This delivery governance structure is primarily based on meetings between the provider and customer.

*“Delivery governance usually involves a communication plan. The customer and provider agree on meetings that they need to have”. (IT Customer A)*

*“In the beginning of the contract, the client and provider have daily meetings”. (IT Service Provider A)*

In addition to the direct counterpart cooperation, the IT customers allocate their representatives to closely coordinate with the provider and to monitor the performance of the IT service provider.

*“The client assigns a mirror person from their side for looking into the provider and working closely with the provider in order to get results expected”. (IT Service Provider A)*

In turn, the IT service providers also allocate customer account people to maintain close cooperation and frequent communication with the customer, as interviewees of the three case companies explained. With this governing structure, the counterparts of both parties cooperate together to ensure that the service delivered meets the service specifications identified in the agreement.

**Service delivery:** this involves procedures and processes that need to be undertaken in order to complete the job.

*“Service delivery usually consists of a reporting process, problem escalation, security and new request process. It seems to be relevant to all processes and functions which both parties have to perform together or have some kinds of links between both parties”. (IT Customer A)*

These procedures naturally involve communication between the provider and customer, just as if they were between two internal departments. If the expectations, SLA, governance structure and formal commitments are clearly understood and followed, then the delivery staff of both provider and customer should work as one and almost forget that they work for two different companies.

*“It is inevitable that relationships are created at all levels within the respective businesses”. (IT Service Provider B)*

**Performance evaluation:** the performance of IT services delivered and the performance of providers are evaluated according to the service specifications agreed in the agreement, as explained by interviewees of the three case studies. The basic performance metrics used for doing this include the quality of services, revenue and productivity.

*“Key dimensions of performance measures are financial, quality of service, productivity, improvement and compliances of regulation and standards”. (IT Customer A)*

IT Service Provider A recognises availability, response times, fix times and costs as metrics in reporting its performance to its customers. IT Customer A performs the performance evaluation on a monthly, quarterly and annual basis. The outcomes of performance reviews provide both the customer and the provider with essential feedback for improving their collaboration, as explained by interviewees of IT Service Providers A and B. It also enables the parties involved to refine the SLA, resolving existing issues and enhancing performance. These activities are generally performed by an inter-organisational team which was created at the beginning of the outsourcing project. With the results of performance monitoring, the senior managers of both parties meet regularly to revisit the strategic requirements of the organisations.



*“The vendor could possibly have an annual performance assessment with top management level. This depends on how important the outsourcing is”.* (IT Customer A)

**Inter-organisational coordination:** in the context of IT outsourcing, the provider and customer generally attempt to build cooperation and integration from the strategic level to the operational level to manage the outsourcing project. This coordination officially started when an inter-organisational team was set up to define the requirements and limitations and to work out the agreement. The members of the team include employees from the strategic level to the operational level from the two companies. The interviewees stated that the same team will manage the entire outsourcing project until it is completed. This will enable the provider and customer to gain the benefits expected and to solve strategic problems. They also said that when the agreement was signed, the team hands over the project to the managers of business areas that are involved in managing the agreement. Accordingly, the counterparts of both parties govern the services delivered to ensure such services meet the requirements and agreement. People who are involved in performing and delivering the services coordinate and work together with their managers overseeing the whole project.

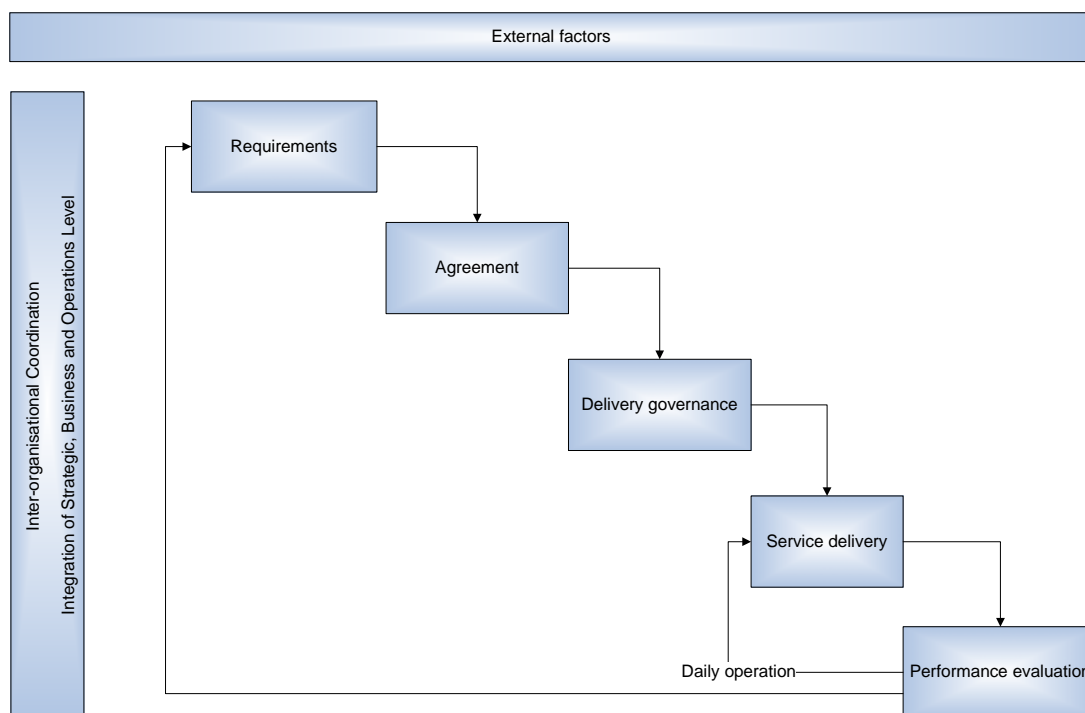
**External factors:** external factors can influence the accomplishment of the outsourcing project. The interviewees supported the view that external factors seem to be one of the main drivers in changing the requirement. An interview of IT Service Provider B stated that:

*“Both the external and internal factors are always changing and they affect the implementation of the IT system, which takes a long time, on average 5 years, to complete”.* (IT Service Provider B)

This is specifically true for the customer side as an interviewee of IT Customer A explained that, *“we need to keep ourselves competitive”*. These external factors include end-customer needs, market shares, competitors and regulations. These changes subsequently require flexibility in managing and executing the outsourcing project and the relationship.

Based on insights into the six key factors of the management of IT outsourcing relationship and the external variables, a conceptual framework of relationship management has been developed, as shown in Figure 4-5. The relationship of the IT

service provider and the IT customer is established when an inter-organisation team, which include employees of the two companies at the multiple management levels, clarify and identify requirements to each other. The team then constructs an agreement based on the clearly defined requirements. With the agreement, the managers of IT service provider and the IT customer, in conjunction with the customer support team and customer representatives, develop a structure for governing IT services delivered. The direct counterparts of both parties coordinate with each other on a daily basis to deliver the IT services. The performance of the services delivered and the performance of the IT service provider are then evaluated against service specifications identified in the agreement. The results of this performance evaluation are fed back to the direct counterparts of the provider and customer as well as the inter-organisational team. This leads the involved parties of two organisations from the strategic level to operational level to solve problems or conflicts and to improve the performance of IT services. It also helps them to sustain their relationships. In contrast, the findings from MRO outsourcing case studies, Stage III, shows that outcomes of performance evaluation are fed back to the managers of involved business areas of an MRO provider and an MRO customer. This is likely to be carried out without an involvement of the relevant people in the strategic level.



**Figure 4-5: A framework of relationship management for IT outsourcing**

## 4.5 Aircraft MRO outsourcing survey

This section focuses on a methodology for designing a survey questionnaire in aircraft MRO outsourcing and a process for analysing the quantitative data gathered from this survey. The results are then described.

### 4.5.1 Design of aircraft MRO outsourcing survey

As shown in Figure 4-1, the survey was used as a strategy for initiating an exploration of key factors of relationship management for aircraft MRO outsourcing. The survey questionnaire was designed regarding this objective. The data gathered were then analysed by applying a quantitative data analysis process.

**Survey:** the purpose of the survey is to explore key factors of the management of relationships between MRO providers and MRO customers. The descriptive survey was conducted with a group of people who have experience in aircraft MRO outsourcing, at a certain time and place, which will be described in detail next. Purposive sampling techniques were used to save time and costs in the survey construction.

**Questionnaire:** the design of the survey questionnaire was based on questionnaire design which was created by Frazer and Lawley (2000), as shown in Figure 4-6.

**Define purpose of questionnaire:** based on the research question and research objectives of Stage I, the purpose of questionnaire is to explore key factors of relationship management for aircraft MRO outsourcing.

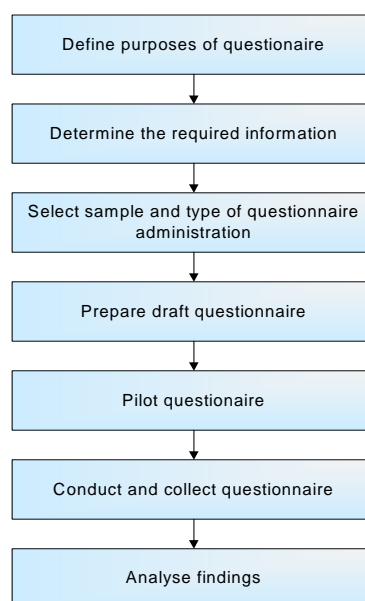


Figure 4-6: A process of questionnaire design (from Frazer and Lawley, 2000)

Determine the required information: this involves determining the information to be collected from the questionnaire with regard to the purpose of the questionnaire purpose (Babbie, 1990). The main information required is the key factors for managing the relationships between MRO providers and MRO customers. The data gathered also covers key elements of agreement, penalties and incentives, and key performance dimensions, which are considered to be key factors of outsourcing relationship management from the literature review and the three case studies of IT outsourcing.

Select sample and type of questionnaire administration: in this research context, samples were drawn on the basis of the purposive sampling technique. The selected samples were those people who have expertise and experience in aircraft MRO outsourcing. They were gathered in a forum meeting which will be further explained.

Prepare draft questionnaire: closed questions (Babbie, 1990) which were derived from the literature review and IT case studies were used for designing the questionnaire. Each question had a number of choices for the respondents to answer. An example of the closed questions is “please indicate the top five factors that you consider are critical for MRO outsourcing relationship”. This form of closed question eased the respondents to answering the questions and maximised response rates (Brace, 2004). The questionnaire started with a general enquiry about the respondents to gain a better understanding of the nature of their answers. The questions then moved to key factors of relationship management, key components of a service level agreement, the importance of incentives and key performance dimensions. The questionnaire ended with contact details of the respondents.

Pilot questionnaire: the questionnaire was tested and piloted to identify whether the questions were answerable and understandable by the respondents (Frazer and Lawley, 2000). The researcher selected three experts who work in the aircraft MRO outsourcing business for the pilot. Two of them are from aircraft operating companies and another one works in an aircraft maintenance company. They specifically verified technical terms used in the questionnaire to ensure that the terms were used correctly. Accordingly, the researcher re-modified the questionnaire to make it more suitable.

Conduct and collect questionnaire: the questionnaire was conducted and distributed in the forum meeting of the International Federation of Airworthiness (IFA) in Paris, France, in 2006. The topic of meeting was “Airworthiness in Outsourcing”. The respondents were gathered in the meeting to complete the questionnaires which were distributed and collected by the researcher. There are 18 respondents out of 25 attendees, as shown in Table 4-4.

**Table 4-4: Questionnaire respondents**

| <b>Groups of respondents</b>                    | <b>Numbers of respondents</b> |
|---|-------------------------------|
| Aircraft operator                               | 4                             |
| Maintenance, repair and overhaul, MRO, provider | 6                             |
| Aircraft manufacturers                          | 2                             |
| Aircraft MRO outsourcing consulting             | 3                             |
| Authority                                       | 1                             |
| MRO association                                 | 2                             |
| <b>Total</b>                                    | <b>18</b>                     |

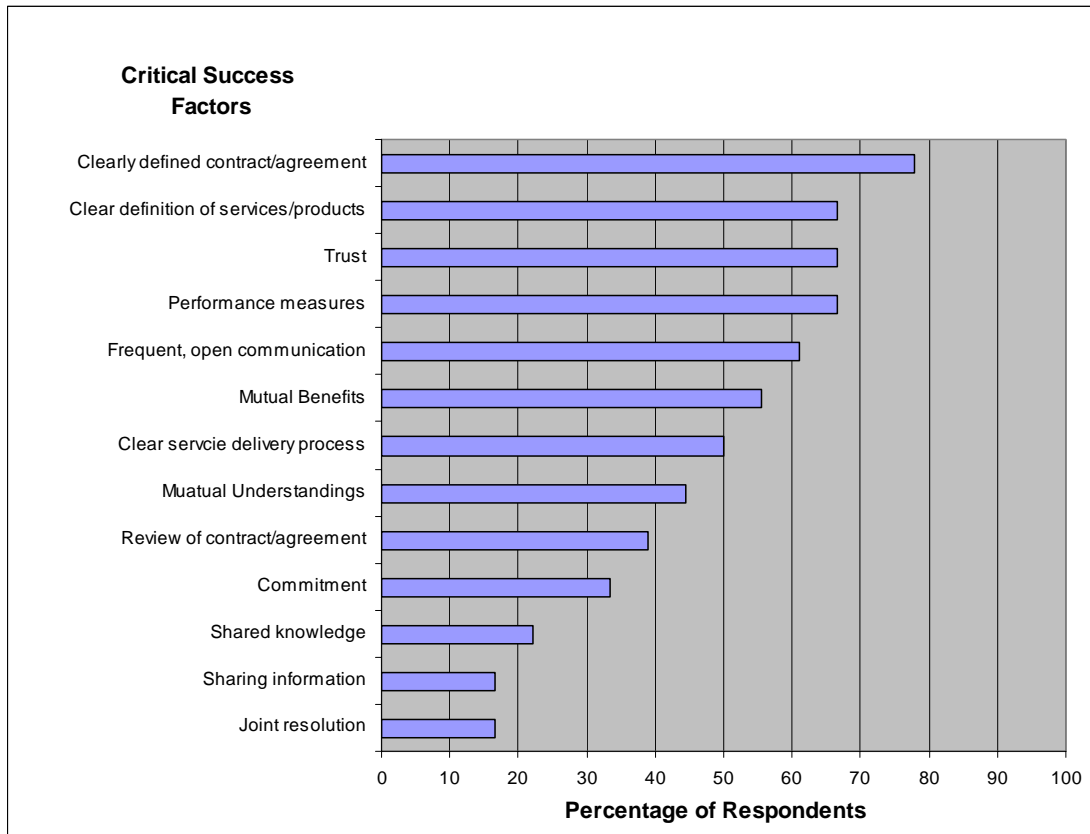
Analyse findings: the quantitative data from the survey were transferred into meaningful and manageable information. The data collected were clustered into each question of the survey by using Microsoft Excel (Microsoft, 2003). The clustered data were analysed and interpreted based on the number of respondents. This led the researcher to identify the top five key factors of relationship management for MRO outsourcing, the top five key components of the service level agreement, the importance of incentives and key performance dimensions. The percentage of respondents of each question was calculated and displayed in the form of a bar chart and table. A bar chart is a type of histogram where the bars are separated from each other instead of being joined together (Robson, 2002). The critical level of each variable which had an effect on those issues being investigated was analysed to gain a better understanding of the provider-customer relationship management. The researcher was also able to see the differences between what the respondents answered and what was in the literature and IT outsourcing.

#### **4.5.2 Results of aircraft MRO outsourcing survey**

The outcomes of the survey questionnaire which was conducted at the forum meeting of the International Federation of Airworthiness (IFA) are presented below. This questionnaire explored key factors of relationship management for aircraft MRO

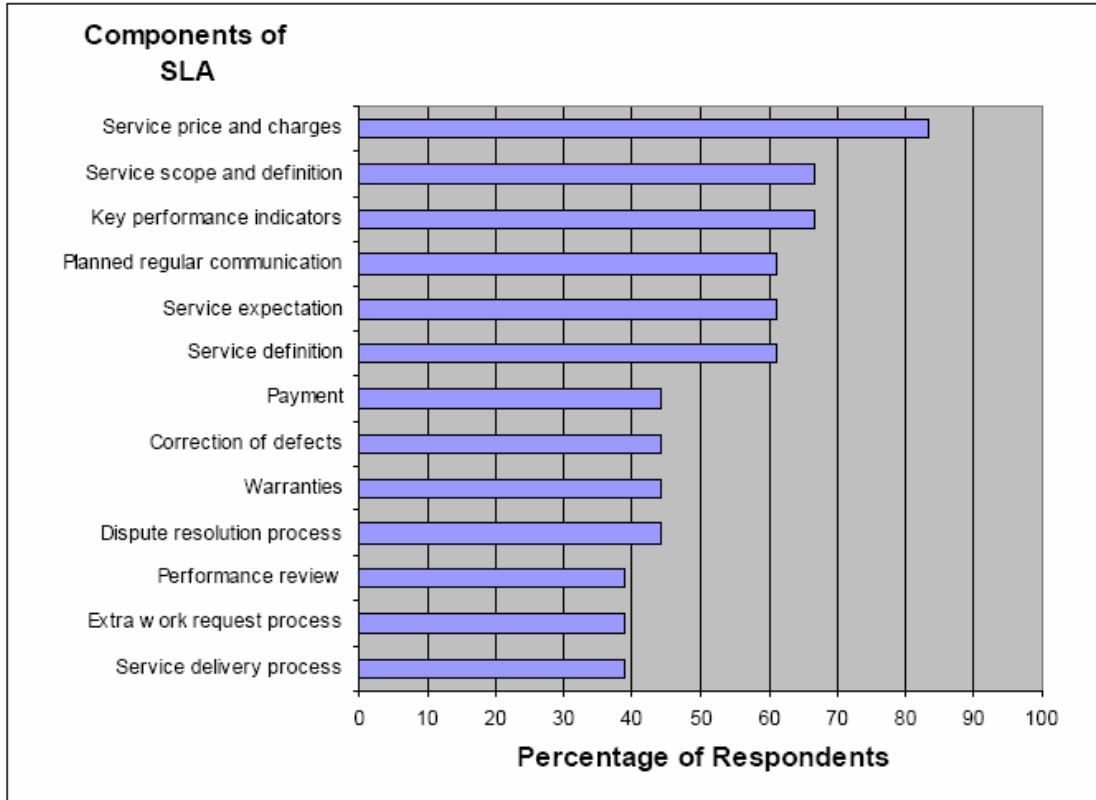
outsourcing. It also investigated major components of the agreement, the importance of incentives and penalties, and key performance dimensions to gain an overview of aircraft MRO outsourcing particularly relating to relationship management. The results of these four main questions are calculated and presented on the basis of percentage of respondents.

The results showing the key factors of the management of the relationships between MRO providers and MRO customers are presented in Figure 4-7. 78% of respondents said that a “clearly defined contract/agreement” is the most important factor for managing the relationship and this was further supported from the literature review and IT case studies. Performance measurement and trust were found to be the next key factors in developing and sustaining the relationship. Similarly, most of the current research recognises such factors as being crucial for successful relationship management, as shown in Table 4-1. These factors were also mentioned by most of the interviewees from the IT case studies. In addition, the MRO providers and MRO customers need to have frequent, open communications not only at the operational level but also at the strategic level, which are similar to the findings from the literature and IT case studies. The long lasting relationship requires both parties to share risks and benefits achieving a “win-win situation”. Otherwise, they might not be able to develop the honesty and trust which are vital for the relationship. In addition, there were two respondents who recognised all factors, identified in the survey, as the key factors of the management of relationships between MRO providers and MRO customers. This might be because they are not directly involved in the aircraft MRO business; which one of them is a consultant and another one is an aircraft designer. As such, they are unlikely to experience the impact of the key factors of relationship management. In contrast, a respondent from an aircraft maintenance company indicated that “clearly defined contract” is the most important factor of the management of relationships between MRO providers and MRO customers. The respondent also regarded frequent, open communication and mutual benefits as the top five key factors. Interestingly, the respondent said that, “*partnership approach [is] the end goal of good customer satisfaction*”. This implies that MRO providers and MRO customers are likely to develop more collaborative relationships in order to gain benefits desired.



**Figure 4-7: Percentage of respondents who rated each key factor as one of the top 5 most important**

Figure 4-8 illustrates that there are six main key components that need to be clearly identified in an agreement between MRO providers and MRO customers. They are service charges, scope and specification of MRO services, key performance indicators, service definition, service expectation and regular communication. The price of aircraft maintenance services delivered is considered as the most important element that needs to be clearly identified in the agreement, according to 84% of respondents. Key performance indicators and service specification are also found to be important for constructing the agreement, according to 67% of respondents. In addition, 60% of respondents said that the MRO customers and MRO providers need to plan their regular communication. Moreover, there was a respondent from an aircraft maintenance company identified that service price and service scope are regarded as the first two key components of a service level agreement, respectively. The respondent also recognised that planned regular communication is one of the top five key components of a service level agreement.



**Figure 4-8: Percentage of respondents who rated each component of service level agreement as one of the top 5 most important**

Table 4-5 shows the importance of incentives and penalties to successful aircraft MRO outsourcing. The findings reveal that 84% of respondents agreed that incentives are essential for motivating the MRO providers in fulfilling the MRO customers’ requirements and in improving the quality of maintenance services. In addition, 67% of respondents recognise the impact of financial penalties on successful outsourcing management. There was a respondent from an aircraft maintenance company who explained that, “*we try not to have financial penalties as they are always open to argument, however, we do have them with some customers and there is always a big debate as to what is in our control and what is not*”. This implies that financial penalties might not provide as much benefit in managing MRO outsourcing to MRO providers as to MRO customers.

**Table 4-5: Incentives and penalties**

| Incentives/penalties | % of respondents |
|----------------------|------------------|
| Incentives           | 84%              |
| • Financial rewards  | 28%              |
| • Contract extension | 56%              |
| Financial penalties  | 67%              |



Figure 4-9 presents the key performance dimensions that are used for evaluating the performance of aircraft maintenance services and the performance of MRO providers. The main finding seems to be that productivity is the least important dimension from the perspective of MRO providers and MRO customers. This might be due to the fact that safety and airworthiness of aircraft serviced are the key concerns of aircraft maintenance industry. It might also be that the MRO customers assume an MRO provider will be more productive. The results also show that the MRO providers and customers are not likely to differentiate between the importance of the first four key performance dimensions which are: quality of service, costs, responsiveness and resource availability. The quality of MRO services relates to the safety and reliability of the aircraft being serviced by measuring, for example, the number of defects which have occurred and number of recurring defects. Costs include both direct and indirect costs incurred from the MRO services. Responsiveness refers to the length of time that MRO providers take to respond with regards to acknowledging the customers' requirements, solving problems and correcting defects. Resource availability implies that resources necessary for the MRO services are available when they are required. Examples of these required resources are human resources, materials and components, tools and equipment and maintenance manuals. This might be because these four dimensions have a substantial contribution to the safety and airworthiness of the aircraft serviced.

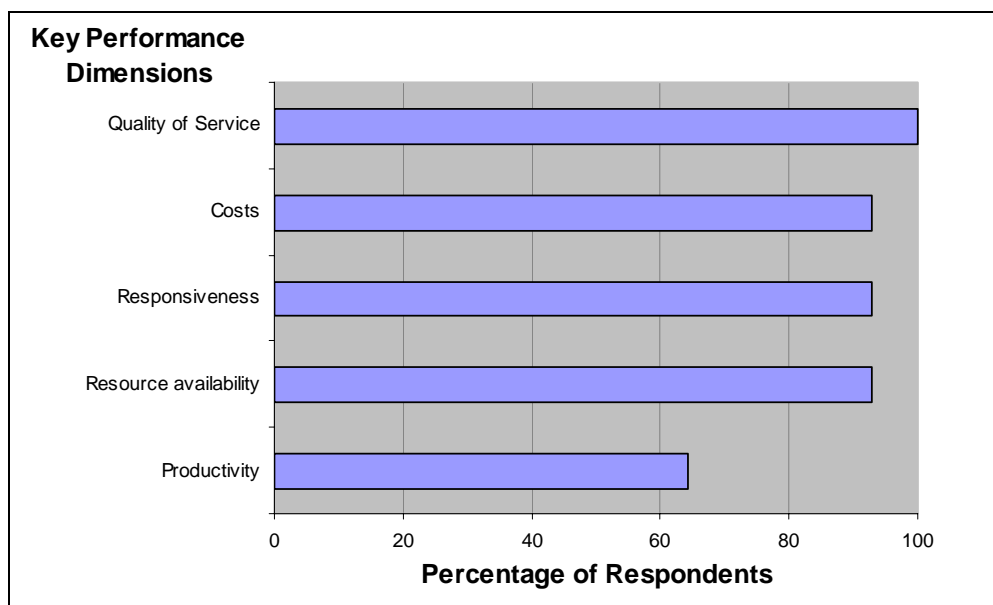


Figure 4-9: Key performance dimensions

To sum up, the key components of the SLA and key performance dimensions tend to match the findings of the IT outsourcing case studies presented in Section 4.4.2. More importantly, the key factors for managing relationships between MRO providers and MRO customers support the findings from the literature review and the IT case studies. As a result, the key factors from these three sources of evidence were used to develop a data collection template essential for the data collection and analysis in Stage II.

#### **4.6 Data collection template**

The findings of the three sources of evidence, which are literature review, IT outsourcing case studies and the MRO outsourcing questionnaires, are congruent with each other. They show that there are five key factors of outsourcing relationship management; namely, clear service specifications and definitions, an agreement document, delivery governance structure, service delivery procedures and performance measurement. In order for the five key factors to be present, customers and providers in the relationship must address three common issues: namely, mutual coordination, mutual dependence and communication. This is due to the fact that effectively managing and operating each of these key factors requires customers and providers to cooperate closely and communicate frequently. This therefore enables both parties to develop and sustain the relationship in the long term.

Based on these findings, a mind map of a data collection template was constructed, as shown in Figure 4-10. This was used to develop interview questions in Stage II and for analysing the data collected.

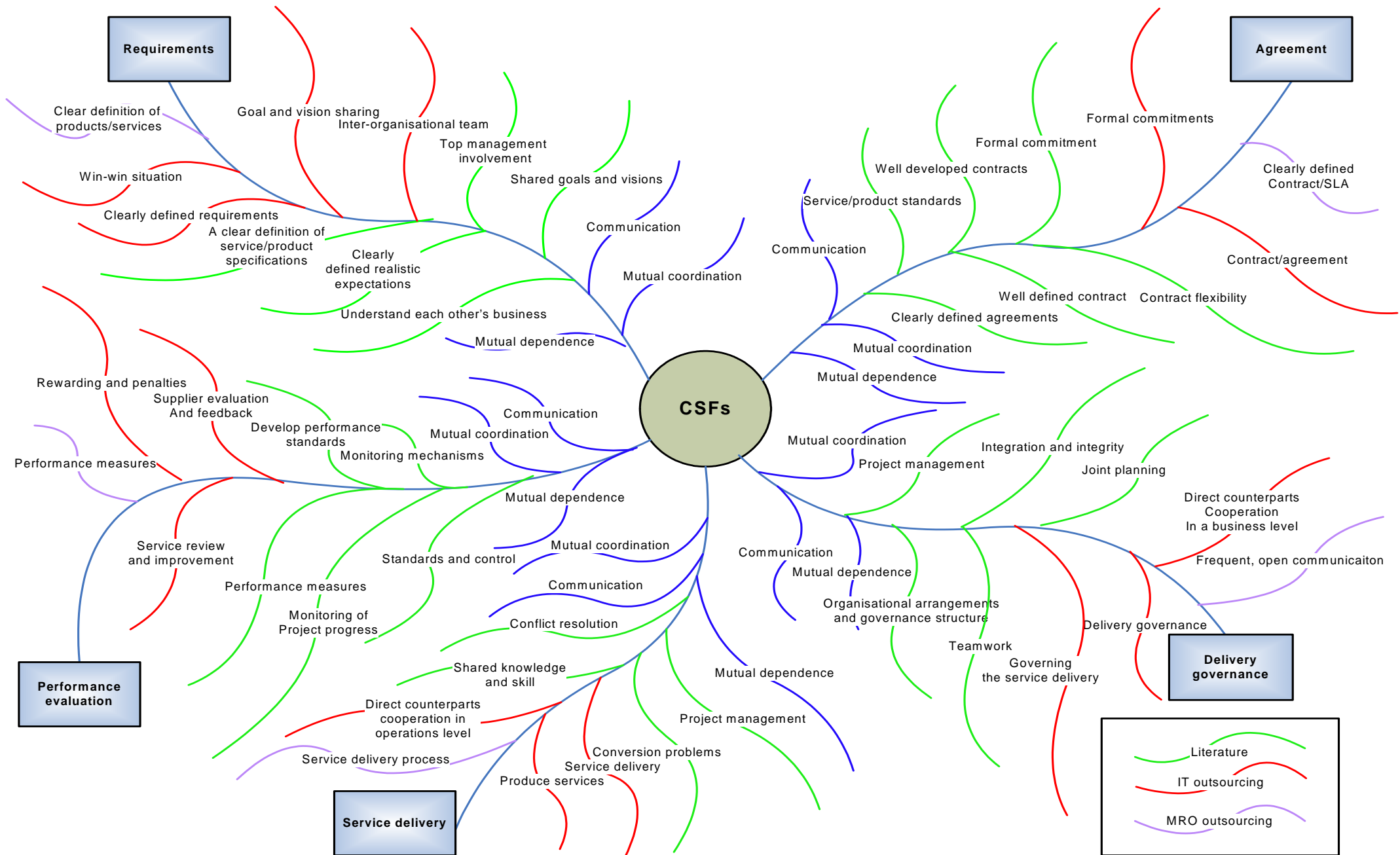


Figure 4-10: Data collection protocol

## **4.7 Summary**

Based on the findings from the literature survey, IT outsourcing case studies and aircraft MRO outsourcing questionnaire, the provider-customer relationship management is most likely to comprise common issues which are: mutual coordination, mutual dependence and communication. It also requires the provider and customer to manage the five key factors in order to develop the long-term relationship. They include a clearly defined requirement, fair agreement, effective delivery governance, incorporated service delivery and sophisticated performance evaluation. This enables the researcher to complete the first research question which is “what are the key factors for outsourcing relationship management?”. It is subsequently used as the inputs to Stage II and III, as shown in Figure 5-1.

### ***4.7.1 New knowledge***

- An involvement of employees from strategic to operational levels into an inter-organisational team might influence on defining the requirements of IT outsourcing project as clearly as possible.
- An involvement of strategic people throughout the periods of IT outsourcing project could have an impact on directing an IT outsourcing team to achieve the outcomes desired and to solve strategic problems.
- A feedback of performance evaluation to the direct counterparts of the IT provider and customer as well as to the inter-organisational team might facilitate solve problems or conflicts and to improve the performance of IT services effectively.

# CHAPTER 5 STAGE II: RELATIONSHIP MANAGEMENT IN AIRCRAFT MAINTENANCE

## 5.1 Introduction

This chapter focuses on exploring the management of the relationship between an MRO provider and an MRO customer. The following two objectives are addressed:

1. To explore approaches for establishing and developing the relationship between an MRO provider and an MRO customer.
2. To develop a framework for the management of the relationship between an MRO provider and an MRO customer.

With these two objectives, the researcher generated a model of relationship management which is particularly suitable for aircraft MRO outsourcing.

## 5.2 Research methodology

The research methodology of Stage II was designed as shown in Figure 5-1. This stage investigated three case study relationships featuring the four case companies. They are the relationships between PlaneCo and Airline, between MRO Provider A and PlaneCo and between MRO Provider B and its customers. Interviews, observation and documentation were used for collecting data from these three case study relationships. As a result, the framework of relationship management for aircraft MRO outsourcing was developed.

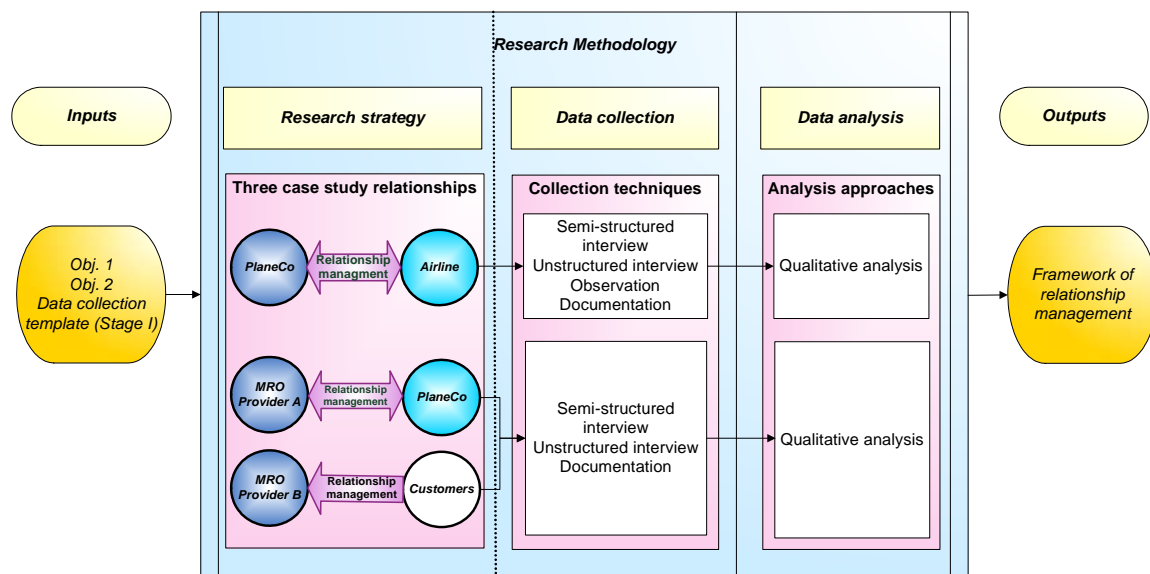


Figure 5-1: Research methodology for Stage II

***Multiple case studies:*** the three case studies were designed on the basis of a case study design process, shown in Figure 4-4.

***Selecting cases:*** the three case study relationships, shown in Figure 5-1, were selected for gaining insight into relationship management for aircraft MRO outsourcing. PlaneCo is a valuable case study company in which to explore relationship management since it plays the roles of provider and customer simultaneously. To ensure the reliability and validity of the data collected from PlaneCo, Airline and MRO Provider A also provided data as these three case companies are in the same supply chain. Moreover, MRO Provider B facilitates the generalisation of the research outcomes as it is not positioned in the same supply chain as the first three case companies.

***Preliminary investigation:*** a mind map of the key factors of outsourcing relationship management, shown in Figure 4-10, was used for identifying the information required from the four case companies. The required information relates to requirements, agreement, delivery governance, service delivery, performance evaluation and inter-organisational coordination. This led the researcher to define interview questions, as shown in Table 5-1. In addition, the researcher included open-ended questions in the interviews. This led the researcher to discover some of issues which were not found from Stage I. In particular, problems relevant to the management of the relationship between an MRO provider and an MRO customer were identified. Examples of these problems include the difficulty of involving employees from both parties in MRO outsourcing and an imbalance of power between providers and customers. Rectification of these problems was also investigated to understand how the relationship between MRO provider and customer should be improved. With the predefined interview questions, the researcher then selected suitable key people to interview. This selection, which will be explained in detail in Section 5.3, was based on job duties and responsibilities. The interviews with the informants of the four case companies were scheduled and arranged according to their convenience.

**Table 5-1: A list of interview questions**

| <b>Data collection protocol</b> | <b>Interview questions</b>   |
|---------------------------------|--|
| <b>Requirements</b>             | What are requirements of the outsourcing project?  |
|                                 | What are your expectations of the outsourcing project?   |
|                                 | What is a strategy for managing outsourcing and relationship?  |
|                                 | How do you understand each other's requirements and expectations?  |
|                                 | How do you translate those needs to a service specification?   |
|                                 | Is it necessary to have an inter-organisational team to execute the outsourcing project in the early stage and to produce the agreement? |
|                                 | Why is understanding requirements important for the ongoing relationship management?   |
| <b>Agreement</b>                | What are the contents of the contract?   |
|                                 | What are the contents of the service level agreement?  |
|                                 | How you develop the contract and agreement?  |
|                                 | Who are involved in creating the contract and agreement?   |
|                                 | What are significant outcomes of the contract and agreement?   |
|                                 | What kind of commitments does each party give to the others?   |
|                                 | How long is the contract on average?   |
|                                 | Why is a clear contract and agreement important for relationship management?   |
| <b>Delivery governance</b>      | How do you manage the contract?  |
|                                 | How do you corporate and coordinate with other parties in the management level?  |
|                                 | How do you coordinate internally to get the service done on time?  |
|                                 | How often do you have a meeting with the other parties?  |
|                                 | Who attends those meetings?  |
|                                 | How does the customer monitor the provider's performance in the long term?   |
|                                 | Why delivery governance is important for relationship management?  |
| <b>Service delivery</b>         | How do you coordinate with each other on a daily basis to deliver the service?   |
|                                 | How do you ensure the service meets the standards and requirements?  |
|                                 | How do you coordinate internally to ensure the on-time service delivery?   |
|                                 | What kinds of communication methods you use for the daily coordination?  |
|                                 | Why service delivery is important for ongoing relationship management?   |
| <b>Performance measurement</b>  | What performance measurement is used for measuring the provider's performance?   |
|                                 | How you develop this measurement?  |
|                                 | What kind of measuring tools are used for evaluating the provider's performance?   |
|                                 | How does the customer monitor and measure the provider's performance?  |
|                                 | What kinds of complaints have you made to other parties?   |
|                                 | How often do you review either the contract or agreement?  |
|                                 | What kind of reward and penalty you have?  |
|                                 | How does the reward and penalty affect the relationship?<br>Why performance evaluation is important for relationship management?         |

The data stage: the data were collected from the four case companies by using both semi-structured and unstructured interviews. The interviews scheduled in the previous step were carried out. The interviews took on average 1 hour as a longer interview might have deterred the interviewees which most of them were busy

managers. During the interview, the researcher asked for permission from the interviewees to use a tape recording machine. The recordings were used for transcribing the data collected, as most of data is in the form of verbal responses which are easy to misinterpret and misunderstand.

*The analysis stage:* the data collected from the previous stage were categorised into the questions shown in Table 5-1. New issues were also discovered which helped to capture all aspects of the management of the relationship between MRO provider and customer. Examples of these new issues are the importance of involvement of senior managers throughout the period of the MRO outsourcing project and a lack of MRO capabilities particularly in Europe. This led the research to cover all aspects of relationship management for MRO outsourcing. Based on the clustered data, the insights into each key factor of relationship management were described. Problems in each key factor were also addressed. Examples of problems are a win-lose situation and a lack of involvement of employees from multiple management levels in the outsourcing project. Solutions of these problems were also explained. Differences and similarities of the three case study relationships were found and reflected upon. This led the researcher to draw reliable conclusions about the management of the relationship between MRO provider and customer.

*The report stage:* the researcher reported the details and problems of each key factor of relationship management for aircraft MRO outsourcing. Differences in relationship management in MRO outsourcing and IT outsourcing were also described. A framework of relationship management for aircraft MRO outsourcing was consequently constructed and presented, as shown in Figure 5-12. This led the researcher to answer the second research question logically and systematically.

**Observation:** in addition to the interviews, the researcher observed and recorded the environment and behaviour in the case study relationship between PlaneCo and Airline. The researcher had a number of field visits to the main site of PlaneCo in United Kingdom during a period of approximately 10 months, from September 2006 to June 2007. During this period, the researcher attended a number of meetings which were held between these two companies as an observer only. Examples of these meetings are pre-input meetings and wash-up meetings, as shown in Table 5-2. This ensured that the researcher did not influence any actions.



**Documentation:** the researcher gained access to a wide range of documents relating to the three case study relationships. They include, for example, agreements, minutes of meetings, quality audits, performance measurement, project plans, company process and reports. They were reviewed and categorised into the key factors of relationship management which were derived from the interview data explained above. In addition, the same types of documents of the four case study companies were also cross checked to find similarities and differences.

The well-constructed design of the three case study relationships, the observation and the review of documentation improve the generalisability, reliability and validity of the findings and conclusions.

### **5.3 Characteristics of the case companies**

This section explains and describes the characteristics of the four case companies selected.

#### **5.3.1 PlaneCo**

PlaneCo is one of the world's leading providers of technical solutions to MRO customers such as airlines, aircraft leasing companies, Original Equipment Manufacturers (OEMs) and component trading companies. One of the services provided is outsourced maintenance support for the whole aircraft, engine and components. This support is bundled into tailor-made packages which are provided by experienced MRO partners. As an intermediate company, PlaneCo needs to manage relationships with its MRO providers and its relationships with its own customers.

A typical contract that PlaneCo signs with its customers has a duration of about 5 years. An example of one of the most valuable contracts is a 10 year contract that the company has signed with a rapidly growing low-cost airline, here referred to as Airline. According to the contract, PlaneCo has to provide a complete outsourcing package for base maintenance services. This package starts from service planning to service delivery. In other words, Airline is accountable only for monitoring the performance of PlaneCo to meet its requirements. PlaneCo is responsible for all coordination and cooperation with its MRO providers in order to perform the maintenance services and then deliver the services to Airline.

PlaneCo has well developed relationships with both its MRO providers and its MRO customers since they play the roles of customer and provider simultaneously. For this reason, PlaneCo is a valuable case company in which to explore relationship management. In addition, PlaneCo offered the researcher wide access to its staff at different levels. The researcher spent approximately 10 months at the company's UK facility to collect data. The researcher conducted a number of interviews with the people involved as shown in Table 5-2. Each interview lasted approximately 1 hour.

**Table 5-2: Sources of evidence from PlaneCo**

| <b>Data collection technique</b> | <b>Sources of evidence</b> |
|----------------------------------|----------------------------|
| <b><i>Interview</i></b>          | Customer account manager   |
|                                  | Service delivery manager   |
|                                  | Planning manager           |
|                                  | Base representatives       |
|                                  | Planner                    |
|                                  | Engineer                   |
|                                  | Inventory staff            |
|                                  | Quality assurance staff    |
| <b><i>Observation</i></b>        | Pre-input meetings         |
|                                  | Daily meetings             |
|                                  | Wash-up meeting            |
| <b><i>Documentation</i></b>      | Contract                   |
|                                  | Interface document         |
|                                  | Base maintenance process   |
|                                  | Gantt chart                |
|                                  | Pre-input documents        |
|                                  | Performance measurement    |

In addition to the interviews, the researcher observed different types of meeting between PlaneCo and Airline. They include pre-input meetings, daily meetings and post-check meetings. The researcher also gained access to various documents relevant to relationship management. They are, for example, contracts, agreements and performance measurement. According to these three techniques, the data collected are believed to be sufficient to describe the management of the relationship between MRO provider and customer. The data collected are also valuable and reliable for constructing the framework of relationship management for aircraft MRO outsourcing.

### 5.3.2 Airline

Airline is one of Europe's leading low-cost airlines, offering a choice of 188 routes to 58 key airports throughout Europe, particularly in the United Kingdom. With a fleet of 122 aircraft, it carries over 24 million passengers a year and is continuing to expand, providing low-cost access to the most popular destinations in Europe.

As a low-cost carrier, Airline needs to keep its operating costs as low as possible. Airline decided to outsource its maintenance activities to PlaneCo for a period of 10 years. This contract covers a full range of services such as line, light and base maintenance, maintenance operations control, engineering and technical services, as well as component repair and logistics management.

As one of the biggest customers of PlaneCo, Airline is suitable for ensuring the validity and reliability of the findings from the case study relationship between Airline and PlaneCo. Furthermore, this case company provides the researcher with a chance to cross check what is exactly going on in the management of the relationship between Airline and PlaneCo.

The base maintenance manager and representatives who are based at PlaneCo's UK facility had been interviewed for approximately 1 hour. The researcher also had the opportunity to access documents relevant to the relationship between Airline and PlaneCo, as shown in Table 5-3.

**Table 5-3: Sources of evidence from Airline**

| <b>Data collection techniques</b> | <b>Sources of evidence</b> |
|-----------------------------------|----------------------------|
| <i>Interview</i>                  | Base maintenance manager   |
|                                   | Representatives            |
|                                   | Quality assurance manager  |
| <i>Documentation</i>              | Contract                   |
|                                   | Agreement                  |
|                                   | Pre-input documents        |
|                                   | Performance measurement    |
|                                   | Scheduled meetings         |

### 5.3.3 MRO Provider A

MRO Provider A is a maintenance company which provides maintenance services to PlaneCo, as shown in Figure 5-1. It offers a variety of maintenance services including: heavy maintenance, structural modifications, Aircraft On Ground (AOG), repairs and interior reconfiguration. It is capable of servicing Boeing 737,

757, 727, 767 and DC8 and Airbus 319, 320 and 321. It has two main facilities located in the United Kingdom. Its customers are mainly VIP aircraft operators and budget airlines.

The length of a typical contract between MRO Provider A and PlaneCo is typically about 1 year. However, these two companies have a long history of cooperation. As such, this case company provided insight into the management of a long standing relationship with PlaneCo. This assures a validity and reliability of the findings from the case study relationship between PlaneCo and MRO Provider A.

The researcher conducted semi-structured interviews with the management team which is accountable for managing MRO outsourcing, as shown in Table 5-4. The interviews lasted approximately 1 hour at the interviewees' work place. The interviewees also provided documents relevant to MRO outsourcing to the researcher, such as the contract and customer survey.

**Table 5-4: Sources of evidence from MRO Provider A**

| <b>Data collection techniques</b> | <b>Sources of evidence</b> |
|-----------------------------------|----------------------------|
| <i>Interview</i>                  | Customer account manager   |
|                                   | Outsourcing manager        |
| <i>Documentation</i>              | Contract                   |
|                                   | Agreement                  |
|                                   | Customer survey            |
|                                   | Performance measurement    |

#### **5.3.4 MRO Provider B**

MRO provider B is a subsidiary of a global aircraft maintenance company with more than 6,000 employees around the world. The company offers a wide range of maintenance services to operations of commercial and military aircraft. These services are for aircraft depot maintenance, modification and specialist upgrades. It also provides one-stop maintenance services for commercial and military aircraft. A principal facility, which is located in South East Asia, has a total of eight maintenance hangars. It also has international offices and facilities located in key aviation hubs in Asia Pacific, Europe, the Middle East and the United States, to serve and meet the needs of its customers. In addition, the company has a long history of success as a third party aircraft MRO provider. An indication of these achievements is that the company has sophisticated knowledge and expertise in managing relationships with its customers, as well as in controlling the maintenance services provided by its MRO

providers. Because of these well developed relationships, data supplied by MRO Provider B is believed to be reliable. This also improves the generalisation of the research.

Table 5-5 shows a list of people who were interviewed. In addition, MRO Provider B offered the opportunity to access documents relating to the management of relationships with its customers. They include, for example, contracts, customer surveys and quality audits.

**Table 5-5: Sources of evidence from MRO Provider B**

| <b>Data collection techniques</b> | <b>Sources of evidence</b> |
|-----------------------------------|----------------------------|
| <i><b>Interview</b></i>           | Logistics manager          |
|                                   | Customer account manager   |
|                                   | Purchasing                 |
|                                   | Inventory                  |
| <i><b>Documentation</b></i>       | Contract                   |
|                                   | Agreement                  |
|                                   | Customer survey            |
|                                   | Performance measurement    |
|                                   | Quality audit              |

## **5.4 Investigating the framework of relationship management**

This section focuses on exploring the key factors of the management of the relationship between an MRO provider and an MRO customer by carrying out an in-depth investigation of the three case study relationships using the four case companies described above.

### **5.4.1 Requirements**

Clarifying the requirements of an MRO provider and an MRO customer with each party is seen as an important starting point in the execution of the MRO outsourcing project, as confirmed by all informants. The basic requirements of the MRO customer are on-time delivery, good service quality and financial advantage, as described by the interviewees of PlaneCo and Airline and shown in Figure 5-2. In turn, the MRO provider attempts to inform its customers about its practical limitations and capabilities in performing and delivering MRO services, as explained during interviews with MRO Provider A and MRO Provider B.

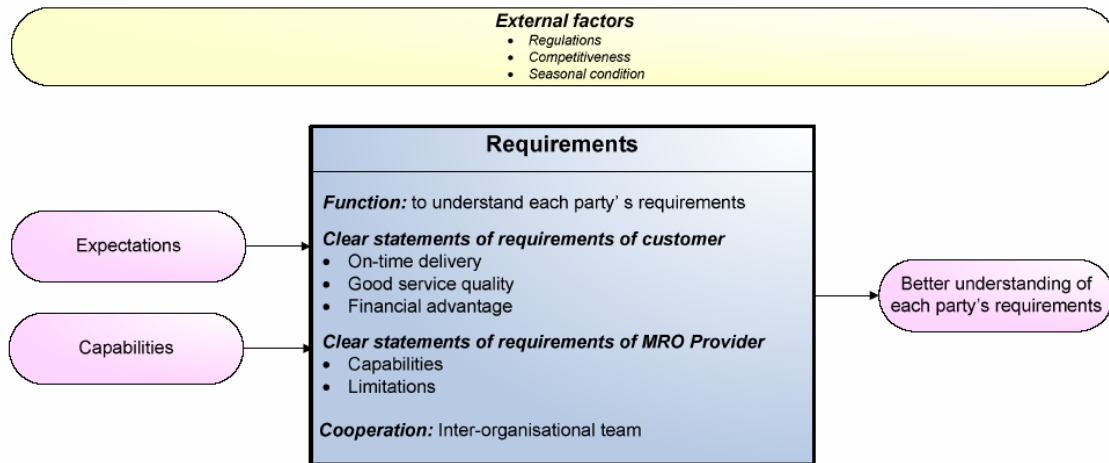


Figure 5-2: “Requirements” within the relationship management framework

The results of the interviews show that all three MRO providers pay close attention to understanding their customers’ requirements.

*“You have to keep in mind that the customer contract is a big contract. So you have to be aware how much you can argue with the customer, as you cannot upset them. Otherwise you will get complaints from the customer and they can give the contract to someone else. You therefore have to try to play a balanced role”.* (PlaneCo)

*“The customer will tell us what their requirements are. We can only advise them on certain issues or suggest alternatives if it does not fit our capabilities for some reason”.* (MRO Provider A)

*“We need to pay attention and put in more effort to understand the needs of the customers.... Otherwise, the customers are able to go to other MRO providers, especially when there is more supply than demand in Asia. ...But there is a certain limit that the customers can ask for. This is identified clearly in the agreement and contract...”.* (MRO Provider B)

In contrast, the MRO customer does not seem to be aware of the importance of understanding the MRO provider’s capabilities. This is reflected from the case of PlaneCo and Airline in which Airline requested PlaneCo to fulfil additional requirements to the contract without considering the limited resources of PlaneCo. An interviewee of PlaneCo explained that, “[Airline] is a massive customer. They are a bit too big for their boots, really. This means they are in a far stronger position than us”. In consequence, this caused a number of conflicts and disputes between Airline and PlaneCo at a later stage.

Requirement clarification is performed by an inter-organisational team which comprises personnel from the MRO provider and customer, as explained by the interviewees of the four case companies. The MRO customer includes a wide range

of employees from the strategic to operational levels in the inter-organisational team. They can be from maintenance, engineering, planning, materials, quality, information systems, technical records and finance. This enables the MRO customer to define its requirements, plans and strategies and then to transfer these issues to the MRO provider effectively. However, the MRO provider does not allocate as wide a range of personnel to the team. These team members are generally from the Sales and Marketing Department at the strategic level. If the sales and marketing team of the MRO provider does not actually understand its company's capabilities, this may bring difficulties in performing the services and in fulfilling the customer requirements. It could also damage the relationship with the MRO customer. This problem has occurred when the sales and marketing team of PlaneCo negotiated and signed a contract with Airline.

*“Sometimes if I can only get involved at the initial stage of signing the contract, it will be much better, as it is better to have someone who knows exactly what we can do and what we cannot do. There will be less arguments later on”. (PlaneCo)*

However, MRO Provider A and MRO Provider B did not encounter this difficulty, as their sales and marketing teams seemed to have a clear view of their companies' capabilities.

In executing the MRO outsourcing project, the MRO provider maintains frequent, open communication with its MRO customers in order to constantly understand the customers' requirements, as supported by all interviewees. This is because these requirements are influenced by external factors such as changes of maintenance regulations governed by the authority and changes of seasonal travelling conditions. In particular, a lack of maintenance supply in Europe has received more attention from PlaneCo which needs to find aircraft slots for its aircraft to be serviced, without interrupting availability of the aircraft and decreasing a level of customer dissatisfaction. More importantly, if PlaneCo receives financial penalties from its MRO customers, it would feel that the company is unable to pass these penalties on to its MRO providers.

*“MRO providers are in a far stronger position than us as there are limited maintenance slots available in the industry.... We are in a difficult position because there are limited capable MRO*

*providers in aviation maintenance. We sign a big contract with a big and well known customer in the industry and they can be very demanding. The MRO provider could possibly pull the customer aircraft out as they are in the far stronger position than us. They could also possibly tell another MRO provider not to take this aircraft”. (PlaneCo)*

The requirement identification is used as a basis for creating specifications of MRO services, as stated by the respondents of the four case companies. It also seems to provide the MRO provider and customer with a better understanding of what they can expect to receive from each other.

#### **5.4.2 Agreement**

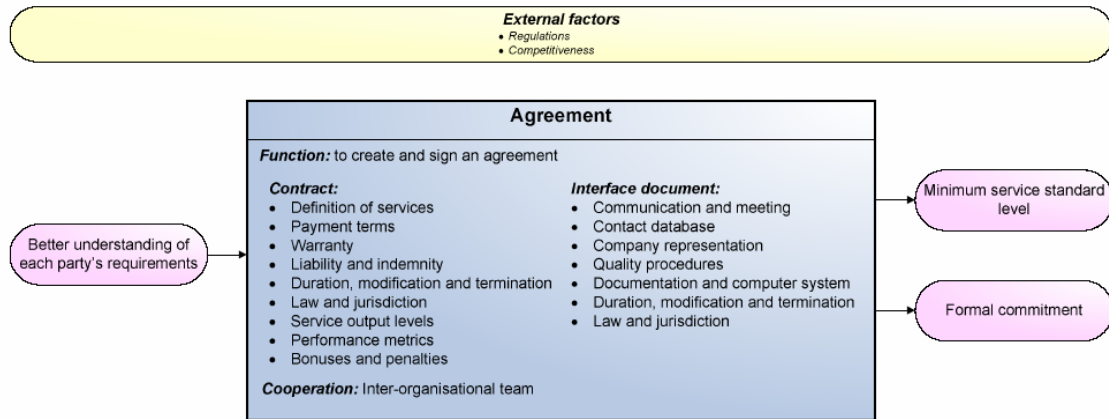
The agreement is basically developed on the basis of the requirements of the MRO provider and customer, explained above, as supported by interviewees. The results of the interviews showed that the four case companies regarded the agreement as a key factor in managing the relationship between MRO provider and customer.

*“The Contract is the basic framework for controlling and monitoring [PlaneCo]. If [PlaneCo] are able to meet the requirements identified in the contract, our relationship will be improved very much well”. (Airline)*

*“The contract is the focal point. If the contract is not written properly, the company will suffer”. (MRO Provider B)*

The findings of the four case companies demonstrated that there are two main parts of the agreement, as shown in Figure 5-3. They are the contract and the interface document. The contract, which is legal document, consists of two main sections. These are a General Term Agreement (GTA) and an Annex. The General Term Agreement covers standardised legal issues such as definition of service, payment, warranty and liability.





**Figure 5-3: “Agreement” within the relationship management framework**

The annex captures basic and additional services provided by the MRO provider within the specific time. It also includes service levels and performance metrics, which will be explained in depth in Section 5.4.5. These two issues are accompanied with bonuses and penalties. PlaneCo found that if the service levels and performance metrics were not understood by all involved parties, this might cause penalty debates. This penalty was unfortunately not passed back to its MRO providers due to the shortages of aircraft maintenance supply, particularly in Europe, as explained above. In contrast, MRO Provider B recognised bonuses and penalties as motivators for improving its performance continuously.

*“[Bonuses and penalties] are very important for the relationship. You need to understand that we perform to meet the service specification and anything above is the bonus. This is because it costs more to provide additional services. So I will naturally perform to meet the contract rather than beyond the contract. Why should I do more unless this contract is a big contract and is my core business?”. (MRO Provider B)*

Furthermore, the typical MRO provider and customer, in this study, including Airline, MRO Provider A and MRO Provider B, prefer to have a long-term contract, over an average of 3 to 5 years.

*“We prefer a long term contract because it is easy to manage, with good coordination, and you are familiar with the organisation. We can then build a good relationship with the customer”. (MRO Provider A)*

Although, as an intermediary, PlaneCo realised the benefits of a long-term contract, it was unable to sign the long-term contract with its MRO providers,

including MRO Provider A. This is because PlaneCo needs to maintain flexibility to keep its customers satisfied.

*“Long-term contract with the supplier does not work for us. ...this is most likely not good for us as we do not want to be tied down too much with one supplier. Our customers are always changing so we need to have a certain level of flexibility. Contracts which are 2 to 3 years are not good unless they are carried out internally.” (PlaneCo)*

The short-term contract would bring difficulties in developing partnerships between PlaneCo and its MRO providers.

The second part of agreement is called an “interface document” which is a non-legal agreement. The findings of the four case companies showed that the interface document primarily covers interface procedures between the MRO provider and customer on a daily basis, as described by the interviewees of the four case companies. It includes, for example, a contact database, communication methods and a company representative, as shown in Figure 5-3. The contact database is a list of people for the provider and customer who are involved in the outsourcing project. This database is important for introducing the people involved from the two companies, who might not even know each other before, to work together as a unit, as explained by the interviewees of PlaneCo. It is also used as a reference when problems occurred. In addition to the context of the interface document, the length of the interface document impacts on practicality and applicability of the document. This is reflected from the fact that the interface document of PlaneCo and MRO Provider B, which is 90 pages long, seems to be impractical for use in day-to-day operations.

*“[PlaneCo] just put too much information in it. They do not even think about how to read it. It was unfortunate because it is impossible to find important information on maintenance services in the thick document [gestures to show thickness]. If you have a short and concise interface procedure, then everybody can understand because you can see the important information clearly. But in the current interface document there are huge charts and many more complicated things that are very difficult to follow. They just make our life very difficult.” (MRO Provider A)*

MRO Provider B created a short, concise interface document with its customers as it realised that the long document is not applicable for the daily operations.

The results of the interviews show that an inter-organisational team of the MRO provider and customer is responsible for negotiating and signing the contract and interface document, in addition to requirement clarifications, explained in Section 5.4.1. This team used generic templates of the contract and interface document and then amended them to be more suitable for a particular outsourcing project. It also ensured that the interface document must be based on the contract. In particular, PlaneCo seems to put more effort into aligning the contract and interface document of its MRO providers with that of its MRO customers. PlaneCo's service delivery manager stated that, "*we are a translator between the customer's requirements and the MRO provider's procedures*". In addition, PlaneCo encountered a problem where its inter-organisational team with Airline did not understand the company's capabilities, as explained earlier. As such, the contract between PlaneCo and Airline was regarded as vague and ambiguous by the managers of PlaneCo. This ambiguity in the contract caused difficulties at the operational level of PlaneCo in fulfilling its commitments. It also resulted in the penalties debates between PlaneCo and Airline as the service levels were not clearly defined.

The two parts of agreement provide boundaries to the MRO provider and customer for performing their own jobs and cooperating with each other, as explained by all interviewees. It would also be viewed as a formal commitment of the contributions from both parties to run the outsourcing project. In addition, the interviewees of the four case companies reported that the contract is rarely amended, compared to the interface document. This might be due to the fact that interface procedures are likely to be influenced by internal and external factors of the business. Examples of these external factors are aircraft maintenance regulations and imbalances of the demand-supply aircraft maintenance market particularly in Europe. The latter variable was particularly seen as an obstacle for PlaneCo in managing the relationship with its partners.

### **5.4.3 Delivery governance**

When an agreement is signed, an inter-organisational team from the MRO provider and customer transfers the MRO outsourcing project to managers of business areas of the two companies who are involved in managing the contract, as described by all interviewees. Examples of these business areas are planning, engineering,

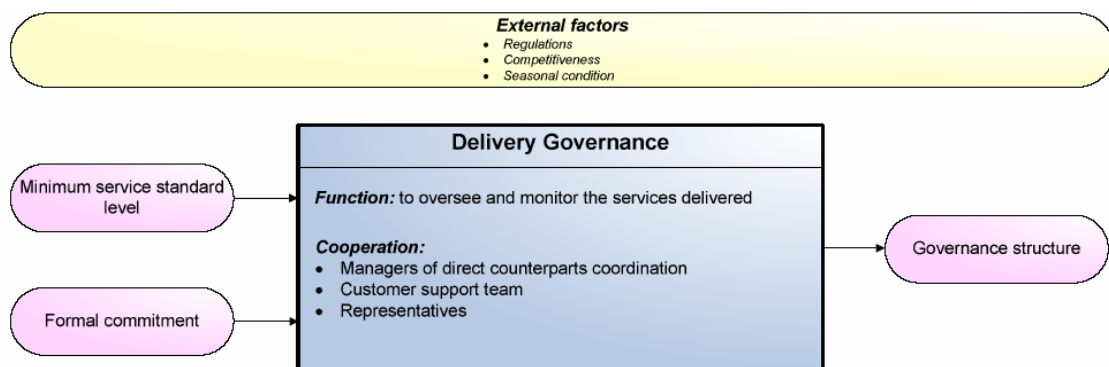
materials and marketing. These managers are responsible for designing a structure of coordination between the two companies to ensure that the aircraft services delivered fulfil the commitment defined in the agreement. This structure seems to be composed of approaches for strengthening communication between the MRO provider and customer. This might be because the MRO provider and customer are aware that communication highly influences the effectiveness and efficiency of their coordination in monitoring the services delivered.

*“Most of the time, we have face-to-face communication and meetings with [PlaneCo] in order to ensure ontime delivery and good service quality”. (Airline)*

*“We promote communication [with the customers] throughout the organisations rather than communicating through only one person....Our planning people talk directly to the people in [Country A] for instance, and this is happening all the time”. (MRO Provider A)*

*“Although we have the Marketing Department to take care of the customers, for day-to-day operation, we leave everything to individual department to take care of the needs and feelings of the customers. That is why we have formal meetings, informal meetings, forums and talks with them”. (MRO Provider B)*

The results of the interviews show that the four case companies deployed three main coordination mechanisms, as shown in Figure 5-4. They are direct counterpart cooperation, customer support team and representatives.



**Figure 5-4: “Delivery governance” within the relationship management framework**

Firstly, managers of the MRO provider and customer, who are directly involved, cooperate with each other as their duties and responsibilities directly contribute to a completion of aircraft service. Secondly, the MRO provider tends to allocate a customer support team for taking care of a particular customer. This customer support team needs to keep an eye on what is going on in the contract. It also has a

monitoring role in integrating and coordinating the direct counterparts to ensure an on-time delivery. This team is likely to be led by a senior person who is able to come to the involved business areas to resolve any problems that might occur. Thirdly, the MRO customer tends to assign representatives to be located at the provider's facility particularly when an aircraft service is performed. These representatives ensure that communication and cooperation with the provider are effective. They are also responsible for monitoring the MRO provider's performance when the aircraft service is run, as explained by the interviewees of PlaneCo. In other words, the representatives seem to play a major role as coordinators with the MRO provider, which is similar to that of the customer support people from the provider site. However, these representatives seem to be aware that they cannot intervene in the internal system of the MRO provider as it would destroy the relationship with them.

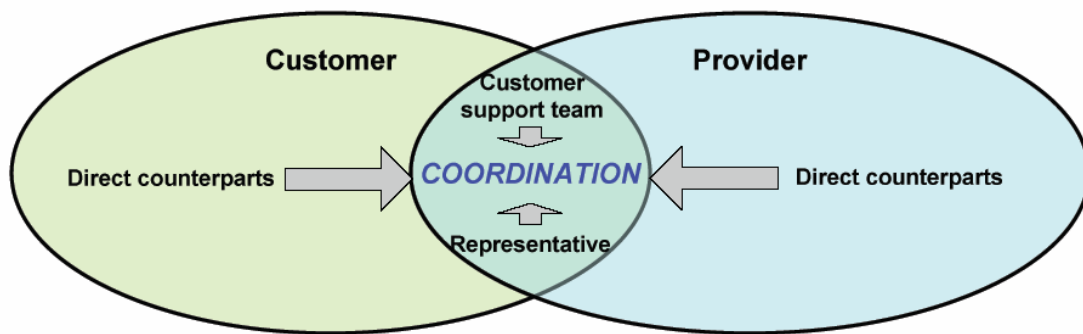
*"The company representatives cannot argue or debate too much with the provider because they need to keep the relationship going until the maintenance check is completed". (PlaneCo)*

Despite of the benefits of having the representatives on the provider's site, they might cause difficulties for the MRO provider in managing the MRO outsourcing project. This problem has been encountered by the case study relationship between PlaneCo and Airline. This might be due to the fact that the representatives always change their requirements which are not clearly identified in the agreement.

*"The coordination with the customer is in fact difficult because the customer representatives, who are located in the [PlaneCo] facility, always change their requirements." (PlaneCo)*

This situation seems to become more difficult to deal with when the signed contract is not well constructed, as explained earlier. Moreover, as one interviewee stated, sometimes the representatives *"try to manage outsourcing and not allow [PlaneCo] to do that"*.

Based on these three coordination mechanisms used by the four case companies, an overview of the cooperation between the MRO provider and customer can be shown in Figure 5-5. The managers of involved business areas directly coordinate with each other. The customer support team from the provider site and representatives from the customer site also support these business areas to bridge their coordination gaps.



**Figure 5-5: Contributions of the three cooperation mechanisms to the inter-firm coordination**

Moreover, the deployment of these three mechanisms in the four case companies is done via a number of communication channels such as meetings, email, telephone and facility visiting. In particular, these companies regarded meetings as a primary communication method.

*“Meeting seems to be the main method of cooperation and coordination between us and our customers. A series of meetings, which are essential for good cooperation, has been set up that deal with the daily operations and long term coordination.” (PlaneCo)*

A list of meetings that run between the cases companies and their partners is shown in Table 5-6. These meetings tend to oversee and monitor the progress of the aircraft MRO outsourcing project. They also focus on how to lead the MRO outsourcing project to a success. PlaneCo have meetings with Airline more frequently than with MRO Provider A. This might be due to the fact that PlaneCo will be financially penalised if they cannot fulfil Airline’s requirements regarding the agreement. PlaneCo is also unable to impose this financial penalty on MRO Provider A due to the shortage of capabilities in Europe. In addition, the observation made in the meetings run between PlaneCo and Airline shows that both parties used the meetings to communicate information relating to MRO services and to ensure that their cooperation was progressing effectively. The two companies also addressed problems that had already occurred or might occur and then find proper solutions. Moreover, the meetings of MRO Provider B and its customers seem to have similar objectives to that of PlaneCo and Airline and PlaneCo and MRO Provider A. These common objectives are to align the two parties so that they manage the contract effectively and lead to successful MRO outsourcing.

**Table 5-6: Lists of meetings of the three case study relationships for monitoring MRO outsourcing**

| <b>Case study relationships</b>       | <b>Meeting frequency</b> | <b>Description</b>  |
|---------------------------------------|--------------------------|---|
| <b>PlaneCo and Airline</b>            | 5 year plan              | To determine a long-term planning in the strategic level  |
|                                       | 6 months                 | To review the contract regarding to the past performance and changes which result from internal factors and external factors. |
|                                       | Monthly                  | To update and address any commercial issues   |
| <b>PlaneCo and MRO Provider A</b>     | 60 days                  | To transfer and communicate the end-customer's requirements to MRO Provider A   |
| <b>MRO Provider B and the airline</b> | Annual                   | To summarise the service performance for the whole year and contractual issues<br>To negotiate bonuses and penalties.         |
|                                       | Quarterly                | To summarise the issues in the management and operations levels<br>To solve current problems and sustain the relationship     |

With the three cooperation mechanisms primarily via a number of meetings, the MRO provider and customer seem to cooperate with each other more effectively, particularly in the business level. The two companies are able to establish a governance structure which is important for the delivery of aircraft service, which will be explained next.

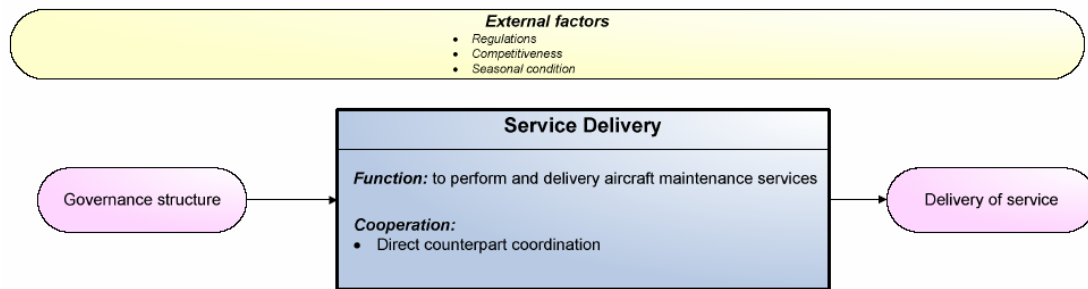
The findings of the three case study relationships show that the four case companies are aware that their cooperation with their partners is influenced by external factors such as regulations, and seasonal conditions. In particular, the MRO provider and the customer tend to increase their levels of cooperation in summer to ensure the availability of aircraft during the peak season of air travel.

#### **5.4.4 Service delivery**

The results of the interviews show that the four case companies viewed service delivery as the procedures for carrying out and delivering aircraft MRO services successfully, as shown in Figure 5-6. These procedures require close cooperation between the MRO provider and the customer. This daily cooperation seems to be managed by each direct counterpart of both parties without interference from the customer support team and customer representative.

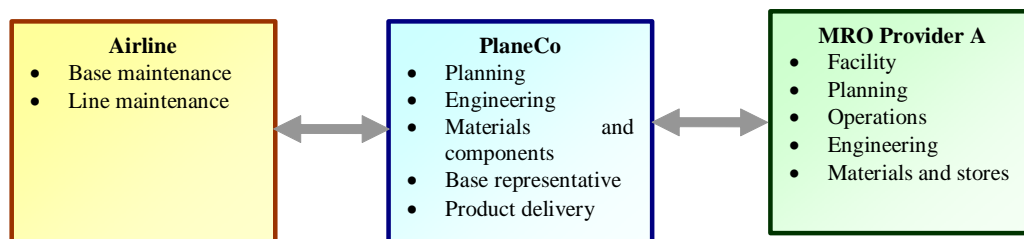
“For the daily operations, each business area between us and our customer, such as the Components Department and Planning Department, works quite well together and have good cooperation. For all the involved business areas, we usually do not stipulate what to do and how they have to do their jobs”. (PlaneCo)

“...for the day-to-day operations, we leave everything to each department to take care of the needs and feelings of the customers”. (MRO Provider B)



**Figure 5-6: “Service delivery” within the relationship management framework**

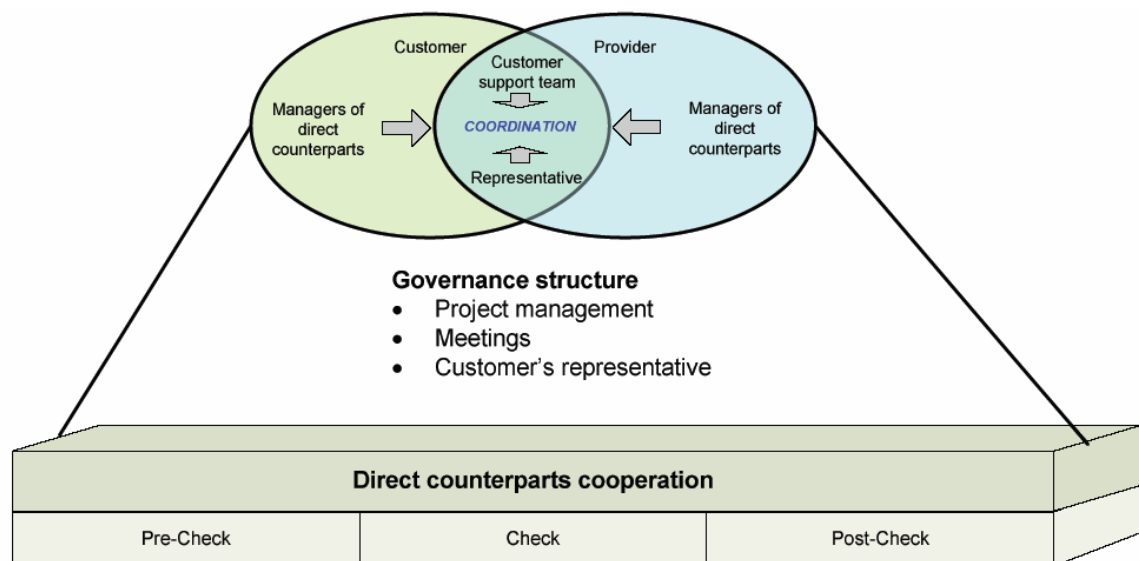
The daily cooperation of the involved business areas would be divided into three stages which are: pre-check stage, check stage and post-check stage. Examples of the business areas of Airline, PlaneCo and MRO Provider A which are involved in the three stages of the MRO service are illustrated in Figure 5-7. These three companies have PlaneCo as a focal point of their cooperation. In other words, Airline cannot have cooperation directly with MRO Provider A. In turn, MRO Provider A communicates only with PlaneCo. This might be because PlaneCo attempts to prevent any miscommunication that might occur between the three companies, as the managers at PlaneCo explained. Particularly in the post-check stage where Airline evaluates the performance of the service, PlaneCo compromised some of the feedback which is further used for assessing MRO Provider A’s performance. This could be due to the fact that this feedback might damage the relationship between PlaneCo and MRO Provider A, as stated by the managers of PlaneCo.



**Figure 5-7: Direct counterpart cooperation in the pre-check, check and post-check stages**



In addition, the results from the three case study relationships show that there are three governance structures used by the involved business areas of the MRO provider and the customer. These structures include project management, meetings and a customer representative, as shown in Figure 5-8. They are used for assuring that the daily cooperation of the involved business areas is going as effective as it should be, as explained by the interviewees of the four case companies. In this way, they can deliver the MRO service successfully.



**Figure 5-8: Governing the direct counterparts cooperation in delivering the service**

Firstly, project management seems to be applicable to control the progress of the MRO service from the pre-check to post-check stages, as stated by interviewees. The deployment of project management might be due to the fact that the MRO service requires a specific amount of resources, shown in Figure 6-8, to complete it within a particular period of time and within the budget. In particular, PlaneCo found that a Gantt chart is an effective tool to ensure that the MRO service is running as it should be.

*“In fact, a Gantt chart should be a good tool for managing and monitoring the maintenance check. This is especially when we performed the check in-house and we produced the Gantt chart which was a good management tool”. (PlaneCo)*

Secondly, the MRO provider and customer tend to have a number of meetings running throughout the three stages of MRO service.

*“Meeting is the main cooperation method for our company and customers on a daily basis. Each business area of both parties runs the meeting themselves, trying to deal with daily operations and daily problems by themselves.” (PlaneCo)*

This implies that the involved business areas of the MRO provider and the customer run their own meetings. There are also meetings that include people from all these business areas. Examples of these meetings which were run by the three case study relationships are shown in Table 5-7. In the pre-check stage, the meetings would be used to clarify the workscope of the MRO service and to highlight issues that might affect the service, as said by interviewees. Examples of these issues are availability of components required and accessibility of maintenance manuals. In the check stage, the meetings tend to focus on monitoring a progress of the service according to the project planning explained above. In the post-check stage, the meetings would be used for reviewing the performance of the service delivered and the performance of the MRO provider. These meetings are also important for bringing the MRO provider and customer together to rectify problems which have occurred and to prevent a repetition of any problems. This leads both parties to improve their cooperation.

Interestingly, there are meetings that include Airline, PlaneCo and MRO Provider A, as shown in Table 5-7. In fact, PlaneCo does not want these meetings to be held because PlaneCo plays a role of a middle man between these three parties. This suggests that PlaneCo might be afraid of missing any information that is directly communicated between Airline and MRO Provider A, as shown in Figure 5-7. The company might also not be able to transfer information provided by Airline to MRO Provider A effectively. Alternatively, Airline might try to intervene in the cooperation of PlaneCo and MRO Provider A. An interviewee of PlaneCo said that, *“[Airline] try to manage outsourcing and not allow [PlaneCo] to do that”*. In addition, the numbers of meetings that PlaneCo run with either Airline or MRO Provider A are higher than the number of meetings that MRO Provider B has with its customers. This might be due to the fact that PlaneCo will be financially penalised by Airline if the service performed by MRO Provider A does not meet Airline’s requirements.

**Table 5-7: List of inter-organisational meetings throughout the aircraft maintenance services**

| <b>Case study relationships</b>            | <b>Service stage</b> | <b>Meeting frequency</b> | <b>Description</b>   |
|--|----------------------|--------------------------|--|
| <b>PlaneCo and Airline</b>                 | Pre-check            | 180 days                 | To update and inform all involved business areas about the outsourcing project and planning that will happen in the near future.   |
|  |                      | 90 days                  | To do and update capacity planning associated with how the customer utilizes their aircraft. PlaneCo and Airline need to ensure which aircraft are going to be checked and when they are going to be completed. They agree on all issues essential for the aircraft input. |
|  |                      | 60 days                  | To manage and cooperate the inputs and to ensure services are delivered according to the agreed downtime, service specifications and standard compliances.   |
|  | Check (daily)        | 12.00 am                 | To verbally update the status of serviced aircraft to Airline's representative based at PlaneCo's facility   |
|  |                      | 13.30 pm                 | End of lease meeting via conference call. It relates to discussing critical paths/issues before an aircraft is going to the end of the leasing contract.   |
|  | Post-check           | Wash-up                  | To assess the performance of the services provided and PlaneCo's performance.  |
| <b>PlaneCo and MRO Provider A</b>          | Pre-check            | 60 days                  | To ensure an accuracy of the workscope of the services and to manage the inputs required.  |
|  | Post-check           | Wash-up                  | To evaluate the performance of services delivered and MRO Provider A's performance.  |
| <b>PlaneCo, Airline and MRO Provider A</b> | Pre-check            | 30 days                  | To manage the inputs for the services and to highlight issues crucial for on-time delivery   |
|  |                      | 7 days                   | To ensure the inputs ready for the services, to highlight any critical issues and to address problems that might be occurred   |
|  | Check (daily)        | 9.45 am                  | To update a progress of the check on a daily basis   |
| <b>MRO Provider B and the airline</b>      | Pre-check            | Weekly                   | To update and review services provided   |
|  | Check                | Daily                    | To update the progress of the services and resolve problems.   |
|  | Post-check           | Weekly                   | To review and evaluate service performance   |

The third governance structure used for supporting daily cooperation of the three case study relationships is the assignment of representatives by the MRO customer. These representatives are based at the MRO provider's facility particularly when the MRO service is run. They are basically responsible for assuring the progress of the services according to the project plan shown above, as described by the representatives of PlaneCo and Airline. They also facilitate resolving problems or disputes that occurred during the check.

It can be concluded from the three case study relationships that with these three governance structures the involved business areas of the MRO provider and the customer seem to be able to carry out and deliver the MRO service according to the service specifications identified in the agreement. Nevertheless, the findings of the interviews show that the four case companies are aware of the impact of external factors on the MRO service. These factors include for example rules and regulations and seasonal conditions.

#### 5.4.5 Performance evaluation

The results of the interviews support the view that the four case companies considered performance evaluation as a key factor for managing the relationship between the MRO provider and the customer. A customer account manager of PlaneCo explained that:

*“If we can trend the data, it will be better because we can trace back our performance and see what was wrong”.* (PlaneCo)

The four case companies deploy two performance measuring tools which are performance metrics and survey, as shown in Figure5-9.

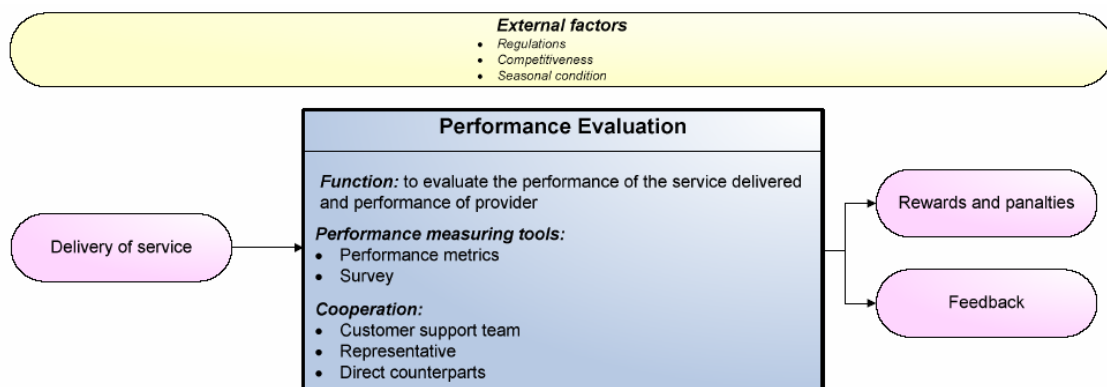


Figure 5-9: “Performance evaluation” within the relationship management framework

Performance metrics are generally identified in an agreement between the MRO provider and customer, as stated by the interviewees of the four case companies. Table 5-8 and 5-9 show the performance metrics that these four companies have with their partners. Airline, MRO Provider A and MRO Provider B tend to focus more on output metrics, unlike PlaneCo which captures both input and output metrics. The basic output metrics of these three case companies are aircraft downtime, reliability

and revenue. Aircraft downtime refers to an amount of time from servicing an aircraft until releasing the aircraft. Reliability can be reflected by the number of defects which occurred after an aircraft is serviced within a specific period of time. This might be because the MRO customer prefers to keep an aircraft in the sky rather than on the ground. Revenue has two purposes from different perspectives between the MRO provider and the customer. From the perspective of MRO provider, revenue relates to the amount of money that it can generate. On the other hand, revenue refers to an amount of money which is subtracted from the total cost incurred when the MRO customer performs aircraft maintenance in-house.

**Table 5-8: Output performance metrics of Airline, MRO Provider A and MRO Provider B**

| Case companies        | Performance metrics   |
|-----------------------|---|
| <b>Airline</b>        | <ul style="list-style-type: none"> <li>• Technical availability: percentage of aircraft availability</li> <li>• Technical despatch reliability: percentage of on-time aircraft delivery</li> <li>• Acceptable deferred defects (ADDs): number of defects</li> <li>• Supporting service output: percentage of completeness of supporting data</li> </ul> |
| <b>MRO Provider A</b> | <ul style="list-style-type: none"> <li>• Turn around time of aircraft: total hours of aircraft on ground</li> <li>• Financial benefits: revenues</li> </ul>   |
| <b>MRO Provider B</b> | <ul style="list-style-type: none"> <li>• Turn around time of aircraft: total hours of aircraft on ground</li> <li>• Defects: number of defects</li> <li>• Service quality complaints: number of complaints</li> </ul>   |

By contrast, PlaneCo pays attention to both input and output performance metrics, as shown in Table 5-9. This might be because these input and output performance metrics enable PlaneCo to match what its customer requires with what its provider delivers. In addition, these metrics are used not only for evaluating the performance of PlaneCo’s providers but also for assessing the performance of PlaneCo itself. This could be due to the fact that PlaneCo tends to ensure that coordination with its provider is sufficiently effective for fulfilling the end customer’s requirements, as the managers of PlaneCo explained.

**Table 5-9: Performance metrics of PlaneCo and MRO Provider**

| Performance metrics  |   | Responsible party |
|--|---|-------------------|
| <i>Identified in an agreement between PlaneCo and MRO provider</i>     |   |                   |
| <i>Input</i>   | Workscope: percentage of completeness   | PlaneCo           |
|  | Materials requirements sheet: percentage of completeness  | PlaneCo           |
|  | Workpack: percentage of ontime  | PlaneCo           |
|  | Pre input meeting: percentage of ontime   | PlaneCo           |
|  | Agreed aircraft downtime: percentage of compliance  | MRO Provider      |
| <i>Output</i>  | Actual aircraft downtime: percentage of ontime  | MRO Provider      |
|  | Additional Deferred Defects (ADDs): number of defects occurring when the MRO service is delivered | MRO Provider      |
|  | Aircraft records: percentage of completeness  | MRO Provider      |
| <i>Not identified in an agreement between PlaneCo and MRO provider</i> |   |                   |
| <i>Input</i>   | Pre-check meetings: percentage of ontime  | PlaneCo           |
|  | Gantt chart pre-input: percentage of completeness   | MRO Provider      |
|  | Daily reports: percentage of completeness   | MRO Provider      |
|  | Post check survey: percentage of completeness   | MRO Provider      |
| <i>Output</i>  | Workpack return: percentage of completeness   | MRO Provider      |

The first two outputs, which are identified in an agreement between PlaneCo and its MRO providers, are derived from the performance metrics of PlaneCo and its customers, such as Airline, which are identified in an agreement and shown in Table 5-8. Other outputs also seem to relate to the customer’s additional requirements to the agreement. Moreover, the input performance metrics seem to be developed on the basis of critical paths of the aircraft maintenance process which were identified during project planning. An interviewee explained that, “[these input measures] are not necessarily critical but are quite essential to the success of the check from the point of view of [PlaneCo] and [Airline]”. The implication is that these performance metrics are the essential inputs for performing the MRO service.

The second measuring tool that the four case companies use is a survey. The purpose of this survey is to evaluate the performance of an MRO provider from the

perspective of an MRO customer. The survey is scored from 1 to 5, where 5 means ‘extremely satisfied’. Contents of the survey are shown in Table 5-10. The outputs capture metrics which are identified in an agreement between the MRO provider and the customer. The customer requirements, which are additional to the agreement, are also included. In particular, communication is seen as an important performance metric from the perspective of the MRO provider and customer, as stated by the interviewees of the four case companies. This might be because communication is significant for assuring that coordination between the MRO provider and the customer is adequately effective. It also seems to be a subjective dimension which is difficult to measure by a proper numerical method, as explained by the interviewees of PlaneCo. In consequence, communication is scaled from 1-5 where 5 means ‘extremely satisfied’.

**Table 5-10: Contents of survey**

| <b>Case study relationships</b>         | <b>Contents of survey (scoring 1-5)</b>   |   |
|---|---|---|
|   | <i>Inputs</i>   | <i>Outputs</i>  |
| <b>PlaneCo and Airline</b>              | <ul style="list-style-type: none"> <li>• Aircraft input activities</li> <li>• Aircraft receipt and preparation</li> <li>• Material provision</li> </ul> | <ul style="list-style-type: none"> <li>• Turn around time</li> <li>• PlaneCo performance</li> <li>• MRO performance</li> <li>• MRO Workshop performance</li> <li>• Costs</li> </ul> |
| <b>MRO Provider A and its customers</b> | <ul style="list-style-type: none"> <li>• Material support</li> <li>• Technical support</li> </ul>   | <ul style="list-style-type: none"> <li>• Turn around time</li> <li>• Performance</li> <li>• Documentation</li> <li>• Communication</li> <li>• Overall product rating</li> </ul>     |
| <b>MRO Provider B and its customers</b> | <ul style="list-style-type: none"> <li>• Technical competence</li> <li>• Facilities</li> </ul>  | <ul style="list-style-type: none"> <li>• Quality</li> <li>• Timely delivery</li> <li>• Confidence in the system</li> <li>• Communication</li> <li>• Level of service</li> </ul>     |

The survey is basically constructed by the MRO provider, as explained during the interviews with MRO Provider A and MRO Provider B. Exceptionally, the survey of PlaneCo and Airline was developed on the basis of their cooperation.

*“I am quite happy with the post-check survey as I have been involved in developing the survey. I changed a lot of items in the survey but it still needs to be continuously improved”.* (Airline)

*“[the survey] has been modified in conjunction with [Airline]. [Airline] is quite happy with the survey. They actually amend the survey”. (PlaneCo)*

This implies that PlaneCo understands that the way to keep its customer satisfied is to involve the customer in the internal system of the MRO service. However, this seems to be done at a certain level, as a manager of PlaneCo explained, that *“[PlaneCo] needs to make sure that [the customer] does not interfere so much that it could possibly affect the system between [PlaneCo] and [MRO provider]”. In turn, the customer tends to gain more satisfaction if it can be involved in the management of the MRO service.*

The results of the three case study relationships show that performance metrics and survey provide feedback to the MRO provider and the customer. Both parties then attend to a post-check meeting to thoroughly discuss the feedback.

*“One thing that is crucial for outsourcing is a post-check meeting with regards to [the] post check survey....We try to have a wash-up meeting. An objective of the wash up-meeting is to address problems affecting the check and try to solve them. So we are able to continuously improve our process”. (Airline)*

This implies that feedback from the performance measurement seems to be important not only for improving the performance of MRO services but also for gaining a better understanding of how the MRO provider and customer should work together. In other words, the relationship between these two companies is improved by collaboration. Moreover, the feedback tends to be used to diminish the blaming culture between the MRO provider and the customer. This might be due to the fact that with the feedback the MRO provider can prove to the MRO customer that it has performed up to the level of customer satisfaction. A manager of PlaneCo said:

*“We actually tend to show that our performance is consistently scoring 5. So we can argue that there [are] just only, 2 things, for example you are not happy with but for the rest of that you are scoring 5. The reality is that it is only a bit here that you are not happy with”. (PlaneCo)*

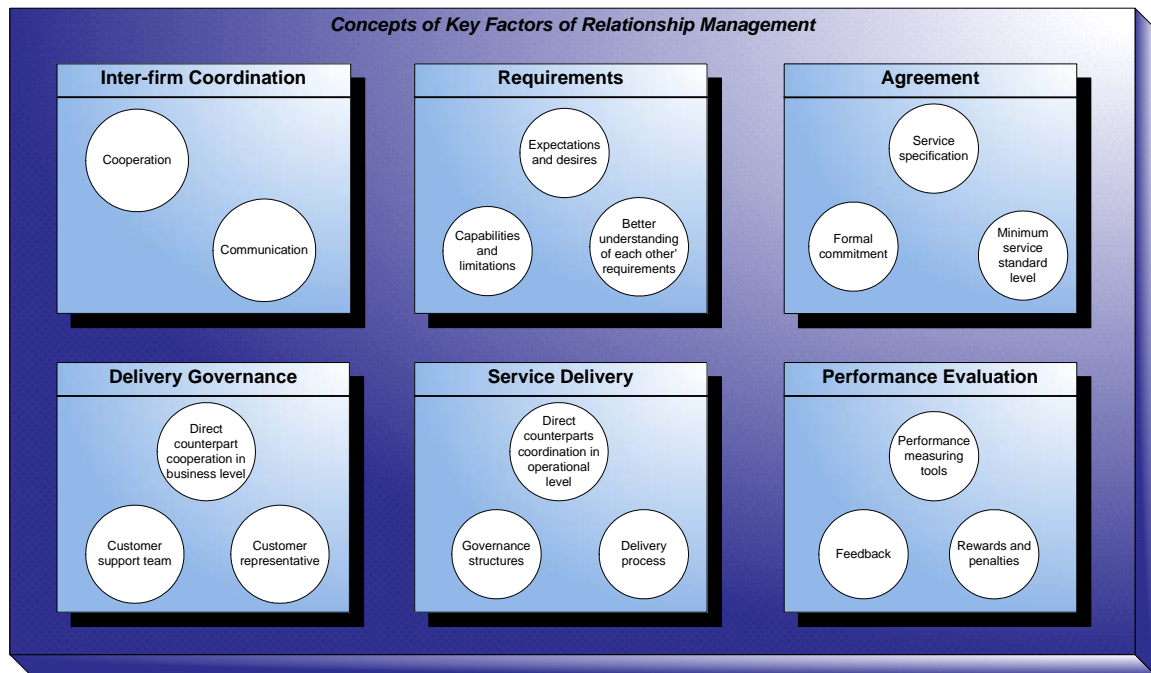
Furthermore, the feedback seems to provide a means for bringing the management of the MRO provider and customer together to discuss strategic directions and commands for successfully managing MRO outsourcing.



In addition, the findings from the interviews show that the four case companies use the feedback to justify whether the MRO provider is able to receive financial rewards or penalties. An interviewee of Airline explained that, “*the bonuses and penalties are important in order for the contract to be commercially efficient*”. MRO Provider A and MRO Provider B also recognised that the rewards and penalties seem to be a motivator for the providers in improving their performance. However, PlaneCo argued that the rewards and penalties are not a benefit to the outsourcing project unless they are clearly defined in the contract. This could be due to the fact that PlaneCo can not have financial penalties with its MRO providers especially where there is an imbalance of demand and supply particularly in Europe.

### **5.5 Description of key factors**

The investigation of three case study relationships by using the four case companies shows that there are six key factors for managing the relationship between MRO provider and customer. These are clearly defined requirements, a well-constructed agreement, a delivery governance structure, service delivery process, performance evaluation and inter-organisational coordination. These six key factors, shown in Figure 5-10, are almost the same as those for IT outsourcing, which was explained in Section 4.4.2. There are four main differences between MRO outsourcing and IT outsourcing.



**Figure 5-10: Concepts of key factors of relationship management for aircraft MRO outsourcing**

The first two differences are in the area of inter-organisational coordination. Here the MRO provider is unlikely to include a wide range of employees who are involved in MRO outsourcing from multiple management levels into an inter-organisational team from the beginning. This inter-organisational team is basically responsible for clarifying requirements of the MRO provider and the customer with each party and then signing an agreement. The MRO customer seems to select employees for the team from the strategic to operational levels. This enables the team members from the customer side to clearly identify the company's requirements. However, the MRO provider tends to allocate strategic people from the Sales and Marketing Department into this team. If this sales and marketing team does not actually understand the company's capabilities, it may not be able to clearly identify what the company can and cannot do and to construct the agreement properly. This might then cause difficulties for the people at the business and operational levels who might not be capable of fulfilling the requirements. This problem was uncovered from the case study relationship between PlaneCo and Airline. The sales and marketing team of PlaneCo did not clearly identify the company's capabilities, leading to the unclearly defined agreement with Airline. When the outsourcing project was executed, the managers of PlaneCo faced difficulties in cooperating with Airline.

Secondly, when the agreement was signed, the team members from the MRO provider did not coordinate effectively with the company's managers who are directly responsible for performing and delivering the MRO service. These managers would not have a clear view of what they needed to deliver to meet the requirements of the MRO customer. However, the team members from the customer side tended to work with people from departments which are involved in MRO outsourcing. This ensured that the outsourcing project ran according to the clearly defined agreement. This scenario was found in the case study relationship between PlaneCo and Airline. Airline assigns coordinators from the beginning to ease communication and cooperation with PlaneCo throughout the period of the project. In contrast, the sales and marketing team of PlaneCo handed over the outsourcing project without any formal consultation with the involved business areas.

Thirdly, the MRO provider and customer might not be aware of the importance of sharing their goals and visions relevant to the MRO outsourcing project with each other. This might be because both parties pay more attention on the individual benefits that they desire. It could cause difficulties for the MRO provider and customer in establishing approaches that they should work together as a unit and in developing a win-win situation from the beginning of the project. These problems were particularly revealed in the case relationship between PlaneCo and Airline in which they attempted to benefit from each other with less concern about impact on the other.

*“Every time we are trying to improve or work hard. The customer tries to force us to increase our performance. So we do not want to improve too much, otherwise [our customer] will try to get more things from us”. (PlaneCo)*

The last difference of relationship management for MRO outsourcing and IT outsourcing relates to the outcomes of performance measurement in which these outcomes are unlikely to be fed back to the senior managers of the MRO provider and the customer. Only, the outcomes which are a relevance of contractual issues seem to be provided to the senior managers of these two companies. The managers of the involved business areas, customer support people and customer representatives tend to be responsible for solving any problems which may have occurred and improving

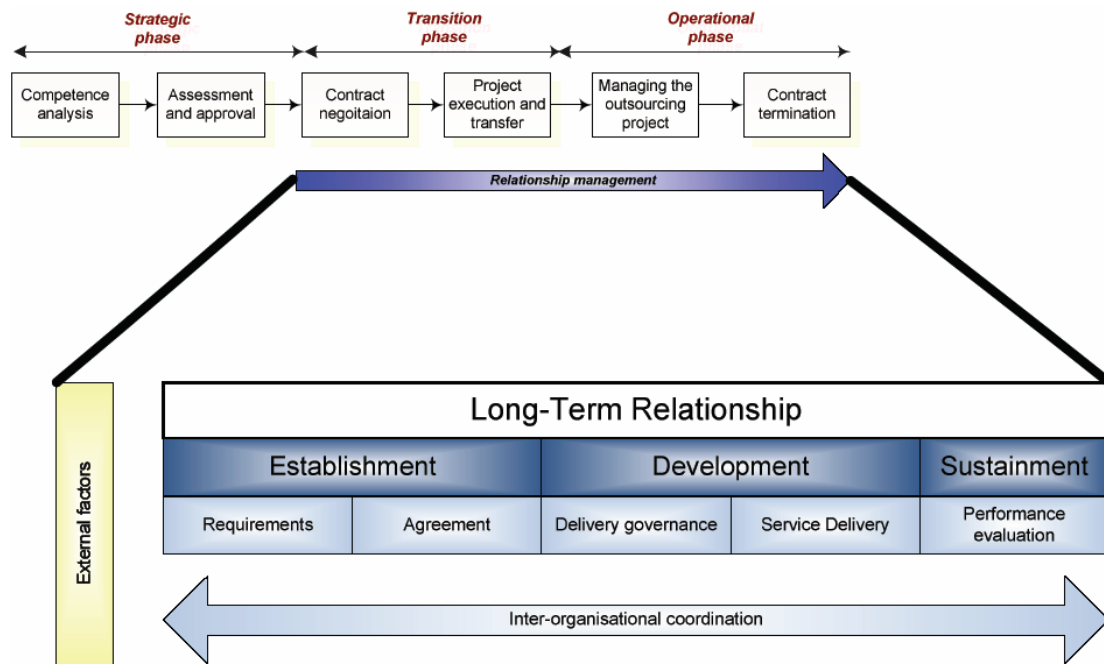
cooperation between the two companies. As a consequence, these involved parties might not be able to make the MRO outsourcing project succeed.

Taking into consideration the six key factors of relationship management for MRO outsourcing and the four differences from IT outsourcing, it is essential to explore how these concepts are derived from the aspect of aircraft MRO outsourcing.

## **5.6 Derivation of the relationship management framework**

Based on the three case study relationships featuring the four case companies, the researcher gained a better understanding of the concepts of the six key factors of relationship management for aircraft MRO outsourcing, which was explained in Section 5-4. The researcher was then able to describe how these key factors had an impact on establishing, developing and sustaining the relationship between the MRO provider and customer.

The data collected from the four case companies were clustered into each key factor and then descriptions of each key factor were drawn, as explained in Section 5.4. The findings show that inter-organisational coordination seems to be a bridge between the MRO provider and the customer in achieving the other five key factors which are: requirements, agreement, delivery governance, service delivery and performance evaluation, as illustrated in Figure 5-11. This is supported from the fact that the four case companies establish interaction and cooperation via a number of communication channels, such as meetings and facility visits, with their partners throughout a period of agreement. Moreover, the results also demonstrate that requirements, agreement, delivery governance, service delivery and performance evaluation are related to each other in terms of timing sequence in managing MRO outsourcing. This can be divided into three stages which are: establishment, development and sustainment, as shown in Figure 5-11. In addition, external factors seem to have an influence on managing these six key factors. Examples of these external variables are an imbalance of demand and supply in MRO industry and air regulations.

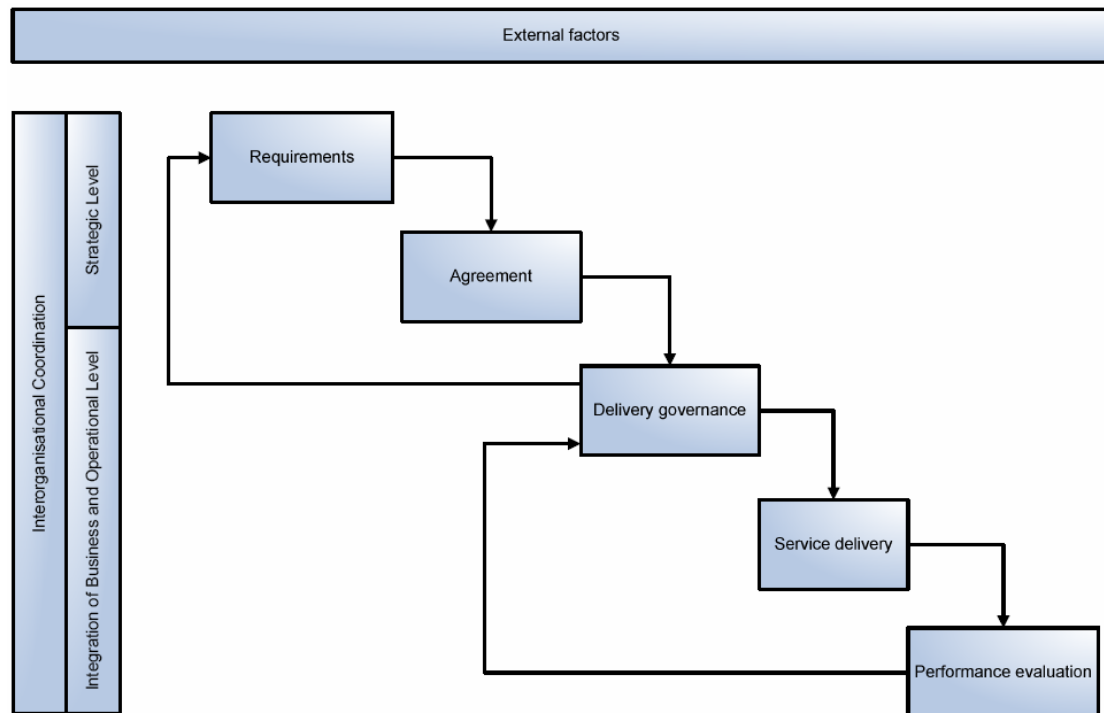


**Figure 5-11: Derivation of framework of relationship management**

Therefore, a proposed framework for the management of the relationship between the MRO provider and the MRO customer is constructed, as shown in Figure 5-12. Although this framework looks similar to that for IT outsourcing, shown in Figure 4-5, it has four differences. They are the involvement of employees from multiple management levels in an inter-organisational team, the transfer of the MRO outsourcing project to the direct counterparts, the importance of goal and vision sharing and win-win situation and the provision of feedback to the management of the MRO provider and customer, as explained in Section 5-5. The relationship management framework for aircraft MRO outsourcing was validated and verified by all interviewees from the four case companies. The results demonstrate that the framework is valid and reliable for the management of the relationship between the MRO provider and customer.

*“The framework makes sense for MRO people. It is reasonable and logical for MRO outsourcing and it covers all issues occurring in outsourcing”.* (PlaneCo)

*“The framework makes sense to us”.* (Airline)



**Figure 5-12: Framework of relationship management for aircraft MRO outsourcing**

The relationship management framework shows that the relationship between the MRO provider and the customer begins with the clarification of their requirements with each other. This enables both parties to gain a better understanding of each other's business in managing the MRO outsourcing project. Based on the clearly defined requirements, the MRO provider and the customer construct an agreement with clearly defined service specifications. The agreement is then used as a basis for constructing a governance structure to ensure that the services delivered will meet the minimum service standard level identified in the agreement. This governance structure provides a means for the direct counterparts of the two companies to cooperate with each other to deliver MRO services. The performance of services and the performance of the MRO provider are then evaluated. The outcomes of performance measurement will be fed back to the managers of involved business areas of the two companies to improve the performance of the MRO services and to sustain their relationship. The strategic issues will be raised with the relevant people to give strategic directions to improve the service. The MRO provider and the customer introduce and then implement close coordination between themselves to achieve all these factors requires. In addition to these six key factors, external

variables have an influence on the management of the relationship between the MRO provider and the customer.

## **5.7 Discussion of findings**

This section presents the main enquiry findings of Stage II by comparing with the literature and IT outsourcing case studies. A new knowledge of relationship management for aircraft MRO outsourcing is generated.

*Requirements:* the research findings demonstrate that an MRO provider and an MRO customer recognise the importance of having clearly defined requirements from the beginning of an MRO outsourcing project. This is due to the fact that these requirements are used for creating clear specifications for MRO service. Jae-Nam Lee et al. (2003) also supported that the clarification of requirements enables both parties to understand and then to translate these requirements into delivering responsive services. However, the MRO provider might not clarify their capabilities of what they can actually provide to its customers. This could be because the MRO provider attempts to build an impression without understanding its limitations. This causes difficulties for people at the business and operational levels in fulfilling the customer's requirements and then sustaining the relationship. In contrast, the findings from IT outsourcing case studies show that IT providers do not encounter problems of clarifying their companies' capabilities to their customers. This enables the providers to fulfil the customers' expectations with less debate. Moreover, sharing goals and visions facilitate establishing and strengthening the relationship of provider and customer especially in the strategic level (Qureshi et al., 2007). The research shows that the management of the MRO provider and the customer do not tend to recognise the importance of goal sharing as they focus more on the individual benefits that they expect. They also do not discuss that a win-win situation might provide them with benefits that can not be obtained through their individual actions. This contrasts with the findings from IT outsourcing case studies which suggest that goal sharing and mutual benefits are significant for relationship management and eventually lead to the success of the outsourcing project. With these two factors, the IT provider and the customer can have confidence in a commitment that each party will invest and allocate the resources required for managing the outsourcing project successfully.

Chakrabarty et al. (2007) also claimed that a win-win situation is important for preventing the provider and customer from behaving opportunistically.

Agreements: the research shows that a well constructed agreement is recognised as a key factor of developing the relationship between the MRO provider and the customer. This is similar to the findings of the IT outsourcing case studies. Willcocks and Fitzgerald (1994) also found that a relationship could not be developed into a type of partnership unless there is a motivating contract. The MRO provider and customer regard the agreement as a formal commitment of what each party will contribute to the collaboration to affect the success of MRO outsourcing. This formal commitment ensures that neither the provider nor customer will behave opportunistically (Zineldin and Bredenlow, 2003). Moreover, the MRO provider and customer realise that a long-term contract enables them to manage their collaboration more effectively and then to strengthen the relationship in the long term. However, both parties are concerned that this long-term contract is likely to be inherit with flexibility which is important for coping with dynamic changes. The significance of contract flexibility is viewed as a key enabler for the IT provider and the customer to respond to the evolution of IT technologies (Lynch, 2004). In addition, the research findings demonstrate that the applicability and practicality of an interface document, which is known as a non-legal agreement, depends on the length of the document. The thick document causes difficulties for people, particularly at the operational level, in finding relevant information and in following interface procedures essential for the completion of services.

Delivery governance and service delivery: the research demonstrates that in order to deliver MRO outsourcing services requires the MRO provider and customer need to work as a team. This team involves the cooperation of direct counterparts of both companies with support from customer support staff, allocated by the provider, and customer representatives, assigned by the customer. The team is accountable for addressing and solving problems, in addition to delivering MRO services. Bullington and Bullington (2005) and Mohr and Spekman (1994) also described the fact that team-based cooperation provides the customer and provider with a means for joint planning and joint problem solving. This leads both parties to more constructive and integrative solutions. In addition, the research shows that the MRO provider and



customer recognise the importance of communication, not only for exchanging relevant information but also for developing their collaborative relationship. This is similar to the results from the IT outsourcing case studies. It might be due to the fact that communication is an essential channel between the provider and customer for exchanging information valuable for their collaboration and increasing a degree of trust (Deepen, 2007). Meetings are viewed as a primary communication method of the MRO provider-customer collaboration. Despite the benefits of close collaboration, the MRO provider and the customer are aware that internal intervention impacts the sustainability of their relationship. Quinn (1999) explained that to take advantage of the provider's skill and expertise the customer needs to shift its outlook to manage "what" results are expected, instead of "how" these results are produced.

*Performance evaluation:* it has been viewed as a key factor for improving long-term collaboration (Qureshi et al., 2007; Langfield-Smith and Smith, 2003). The research findings demonstrated that performance evaluation provides feedback to the MRO provider and customer for resolving problems and improving the performance of MRO services. This then enables both parties to gain a better understanding of how they should work together and implies that the collaborative relationship of the two companies will be improved. The importance of performance evaluation is also indicated from the IT outsourcing case studies. Cousins et al. (2008) supported that performance evaluation can be used to promote a climate of interaction for both parties and improve the health of their relationship. The research shows that the survey enables the MRO provider and customer to capture some aspects of the delivered services which are difficult to measure numerically. The wide utilisation of a survey particularly in IT outsourcing is seen by the number of investigators who focus on designing and developing customer satisfaction surveys, such as Barnes et al. (2001) and Pitt et al. (1995). Sigala (2004) stated that the survey has been viewed as an effective tool for assessing service quality and customer satisfaction due to the inherent characteristics of service. Moreover, although the output performance metrics are a focus of the MRO providers and customers, input performance metrics have received attention from an intermediary. This might be because the intermediary tends to ensure that the MRO service delivered by its provider meets its end customer's requirements. Heavisides and Price (2001) supported that a balanced mix

of both inputs and outputs would be a more appropriate measurement for outsourcing. Additionally, to maximise the benefits of performance evaluation the MRO provider and the customer are required to implement an incentive system, including rewards and penalties, as this incentive is viewed as a motivator for improving the performance of the services. However, the penalties would cause debates between the MRO provider and the customer which would damage their relationship unless they are clearly defined and anticipated by both parties. The importance of an incentive system is also uncovered in the IT outsourcing case studies.

*Inter-organisational cooperation:* the research shows that the MRO provider and customer do not seem to realise the impact of involving a wide range of employees at multiple management levels in an inter-organisational team. This might cause problems in capturing all aspects of each party's requirements and then translating these needs into the service specifications. It would then generate difficulties for people at business and operational levels in carrying out and delivering the services. This finding is different from that of IT outsourcing case studies. IT providers and customers tend to include people from the strategic to operational levels from the beginning of the outsourcing project. Zhu et al. (2007) also stated that the business relationship between the provider and customer should be clarified to all parties at the multiple management levels prior to a completion of agreement. In addition, the research demonstrates that senior managers do not tend to continue their involvement throughout the period of agreement to direct the MRO outsourcing team to achieve the outcomes desired and to solve strategic problems. Zviran et al. (2001) and Lasher and Ives (1991) argued that top management involvement is important for the success of outsourcing. The findings from IT outsourcing case studies also indicate the importance of top management involvement. Moreover, this study supported the significance of socialisation mechanisms on strengthening the collaborative relationship between the MRO provider and the customer. Examples of these mechanisms are meetings and site visits. This is similar to the findings from the IT outsourcing case studies. It might be due to the fact that the socialisation mechanisms allow both parties to have clearer and more open communication and facilitate joint problem solving and informal integration (Prahinski and Benton, 2004; Cannon and

Perreault, 1999). This would eventually lead to improving the performance of MRO services and the performance of the MRO provider (Cousins et. al., 2008).

Trust: this will be developed over time as the relationship matures (Lasher and Ives, 1991). The research shows that trust is important for managing aircraft MRO outsourcing.

*“Trust is very important in the business. I think trust is something that will develop automatically. They know what they can expect after talking with me...as long as you keep contact with them and have a personal relationship, trust will come automatically”.* (MRO Provider B)

However, the MRO provider needs to improve its performance and to maintain its competitiveness.

*“The bottom line is money. At the end of the day, if your prices are not competitive, even if you have a lot of trust; your businesses also cannot survive”.* (MRO Provider A)

In consequence, consistent communication and continuous performance improvement leads the MRO provider and customer to develop trust throughout the period of the contract. Tomkins (2001) also claimed that there is a substantial link between trust and communication.

External factors: the research findings show that external factors influence the management of relationship between the MRO provider and the customer. In particular, an imbalance of demand and supply in the MRO market, particularly in Europe, causes difficulties for the party which has less power in compromising their advantages. This also forces the company to invest more resources to balance the power. McIvor (2000) said that the customer and provider would have more to gain by pursuing a relationship where both parties hold the balance of power.

## **5.8 Summary**

The management of the relationship between the MRO provider and customer was explored by using the three case study relationships featuring the four case companies. They are the relationships between PlaneCo and Airline, PlaneCo and MRO Provider A and MRO Provider B and its customers. There were three techniques used for collecting data from the three case study relationships. They were interviews, observation and documentation reviews. Observation was also used for recording the

environment and behaviour in the case study relationship between PlaneCo and Airline. PlaneCo is the main subject of this study. It is a company which provides a total solution maintenance program to the airlines, including Airline, while outsource the aircraft maintenance services to its MRO providers, including MRO Provider A. MRO Provider B, which is a global MRO outsourcing company, is used for increasing generalisability and validity of the research outcomes as it is not positioned in the same supply chain as the first three companies.

Based on these three case study relationships using the four case companies, the framework for the management of the relationship between the MRO provider and the MRO customer, shown in Figure 5-12, was constructed. The exploration and derivation of this framework show that relationship management for IT outsourcing, shown in Figure 4-5, is similar to that for aircraft MRO outsourcing. The research also demonstrates that where the MRO provider and customer fail to follow best practices of IT outsourcing, which has received substantial attention from both practitioners and researchers, it is likely to cause problems. There are four main failures that might result in difficulties for the MRO provider and customer in managing their relationship. Firstly, if the MRO provider does not include a wide range of employees at multiple management levels in an inter-organisation team to capture all aspects of their capabilities, the team might be unable to clearly identify service specifications in an agreement. This could then cause difficulties for the people at the business and operational levels in fulfilling the commitments identified in the agreement and satisfying the customer's requirements. It might also result in penalty debates between the MRO provider and customer. Secondly, in the situation where there is a lack of involvement of strategic people throughout the period of agreement, the managers of the involved business areas of the two companies might not be able to achieve the goals and the strategies of the MRO outsourcing project. These managers would not be aware of those issues which required strategic decisions. Thirdly, if the MRO provider and customer are not aware of the importance of goal and vision sharing, this might hinder their progress in establishing collaboration and developing their relationship. Lastly, if the MRO provider and customer do not attempt to develop a win-win situation, this might prevent both parties building their collaborative relationship. The two companies would then miss

out receiving benefits which they cannot receive through their individual operations. In addition to these four differences compared to IT outsourcing, the management of the relationship between the MRO provider and customer is influenced by external factors. For example, a lack of MRO capacities in Europe meant that PlaneCo had difficulty in negotiating with its MRO providers. In turn, MRO Provider B encountered challenges in maintaining its customer satisfaction due to an oversupply in Asia such as airframe heavy maintenance services. The degree of these difficulties was also increased where the demand for air travel is growing. Moreover, regulations play an important part in monitoring the MRO outsourcing project as the MRO services are associated highly with safety and airworthiness.

### ***5.8.1 New knowledge***

- An involvement of employees from a multiple management levels of an MRO provider and an MRO customer into an inter-organisational team could influence on clarifying all aspects of each party's requirements and then translating these needs into the service specifications.
- A top management involvement might be a continuous process throughout the period of contract in order to direct the MRO outsourcing team to achieve outcomes desired and to solve strategic problems.
- An importance of goal sharing and win-win situation is unlikely to be recognised by the MRO provider and customer as they tend to focus more on their individual benefits.
- The length of interface document seems to have an impact on practicality and applicability of the document
- Meeting might be considered as a primary communication channel between the MRO provider and customer.
- There is no meeting held between an MRO provider, a middle man and an MRO customer unless the middle man plays an effective role in transferring and communicating information throughout the chain.
- Input and output metrics could be applied by an intermediary company in monitoring MRO providers' performance. This might be due to the fact that

the intermediary company is able to match what its customers require with what its providers deliver.

- Performance measurement seems to be a two-way approach between the MRO provider and customer. It implies that performance measurement can be used not only for evaluating the performance of the MRO provider but also for assessing the performance of the MRO customer itself. This could result in a better coordination between these two parties.
- Survey might be applicable for capturing subjective aspects of performance which are difficult to numerically measure, such as communication.
- There might be a link between communication and continuous performance improvement and trust.

As explained above, performance measurement has been recognised as an important issue for sustaining the collaborative relationship between the MRO provider and customer. In consequence, performance measurement was selected to be a focus of Stage III, which will be explained in the next chapter.

## **CHAPTER 6 STAGE III: PERFORMANCE MEASUREMENT**

### **6.1 Introduction**

A number of researchers, such as Hsu et al. (2005), Langfield-Smit and Smith (2003), Kim and Young-Soo (2003), Dean and Kiu (2002) and McFarlan and Nolan (1995), consider performance evaluation to be a key factor of outsourcing relationship management, as shown in Table 4-1. Performance evaluation ensures that the provider meets the minimum requirements identified in the contract (Domberger, 1994; Hall and Rimmer, 1994). It also increases communication between the provider and customer and decreases the number of disputes and the resulting costs (Charron, 2006). More importantly, Stage II found that performance evaluation is a key factor for managing the relationship between an MRO provider and an MRO customer, as shown in Figure 5-12. It can also be deployed as an approach for improving the collaborative relationship in the long run. However, there is a lack of knowledge on inter-organisational performance measurement particularly relating to the contracting services as most recent research has focused on intra-organisational performance measurement (Cousins et. al., 2008). This then led the researcher to study performance measurement of aircraft MRO outsourcing, which is the focus of this chapter. This study was carried out in cooperation with PlaneCo. It presents “*what are good practices that an MRO customer measure the performance of an MRO provider*”. There are two objectives and these are:

1. To describe the limitations and problems of the performance measurement which is currently used by PlaneCo.
2. To create a performance measurement model for measuring the performance of an MRO provider and for sustaining the relationship.

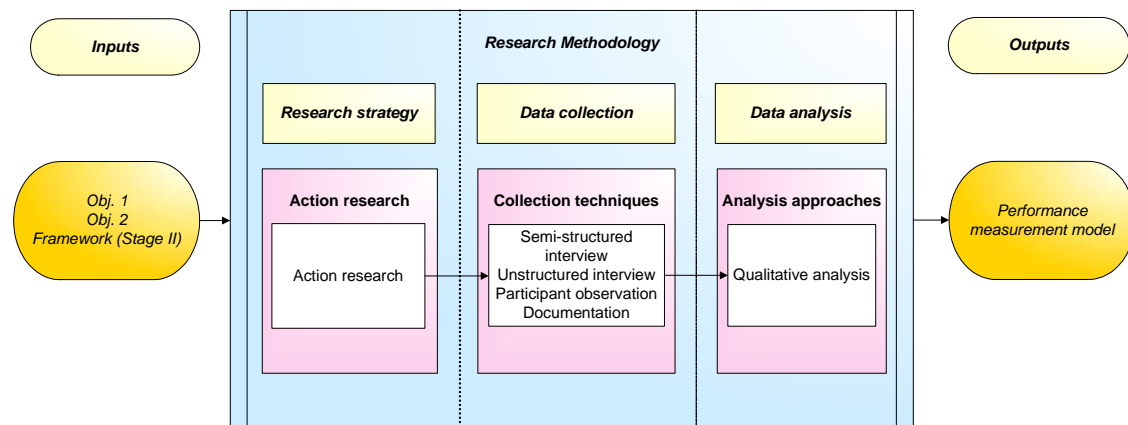
### **6.2 Research methodology**

Stage III was initiated with cooperation between the researcher and PlaneCo, the main subject of this study. This is to improve performance measurement which is considered to be a key factor for managing and sustaining the MRO provider-customer relationship as explained in Stage II. PlaneCo also realised that the

performance measurement which is currently used to measure its providers' performance seems not to be sufficiently effective.

*“The weakest area is performance measurement. But other parts of the contract and interface document have been developed and changed from time to time. Performance measurement is the only part left”. (PlaneCo Customer Account Manager)*

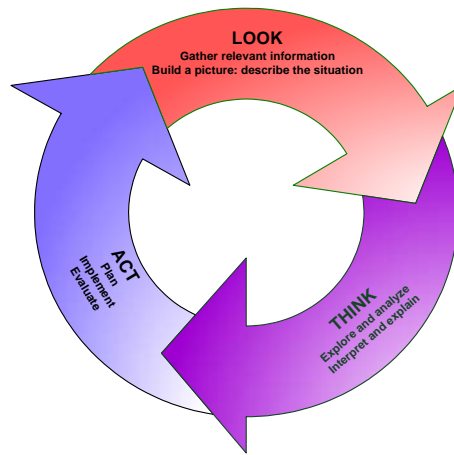
The researcher gained an opportunity to become a member of the group to construct a proposed version of the performance measurement model. For this reason, action research was selected as the main strategy of this stage, as shown in Figure 6-1. Semi-structured and unstructured interviews and participant observation were used for collecting data from the members of action research group, as shown in Table 6-1. This led the action research group to identify limitations of the current approach to performance measurement and then to develop a new solution. The researcher contributed theories and knowledge of performance measurement while the rest of the action research group provided access to their processes and expertise. In addition, documents relating to the development of performance measurement were gathered as supporting evidence.



**Figure 6-1: Research methodology of Stage III**

**Action research:** based on the research background explained above, the design of action research was based on a rigorous cycle of action research which is created by Stringer (1999), as illustrated in Figure 6-2. Action research consists of three steps: look, think and act.





**Figure 6-2: Cycle of action research (from Stringer, 1999)**

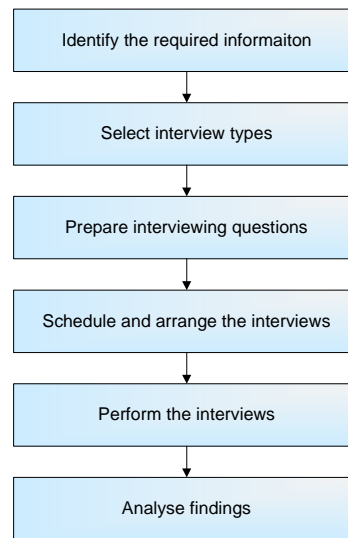
Look: this focused on describing and explaining the current approach to performance measurement at PlaneCo. This stage was carried out by methods of interview, observation and documentation. The weaknesses of the current approach to performance measurement were then determined.

Think: this involved describing and clarifying the context of the limitations and problems which were already identified in the “Look” stage. This gave a clearer view to the researcher and the members of the action research group of why the current approach to performance measurement was not seen as an effective tool for assessing the providers’ performance and consequently for sustaining the relationship and how it should be improved.

Act: this is the stage for constructing practical solutions to the problems and limitations. The proposed approach to performance measurement was developed and then implemented for one of PlaneCo’s providers. The result is that this new approach to performance measurement is applicable and suitable for assessing the provider’s performance and then for sustaining the collaborative relationship. But due to the time constraints, the researcher is unable to follow up on the outcomes in the long-term.

**Interview:** this was used throughout the three stages of action research to investigate the current approach to performance measurement. The researcher interviewed the members of the action research group, shown in Table 6-1, to find out the limitations of the performance measurement and to discover their perceptions of this measurement. Both semi-structured and unstructured interviews were employed

to cover many aspects of the performance measurement. The design of the interview was based on the interview framework, shown in Figure 6-3.



**Figure 6-3: A design process of interview (adapted from Robson, 2002; Maylor and Blackmon, 2005; Babbie, 1990)**

Identify the required information: the key areas of performance measurement were identified to investigate the limitations according to the general principles of performance measurement and the gap model. Examples of the key areas are a relevance of managerial structure and performance measurement, input and output metrics, customer requirements, management perception, aircraft maintenance operations system and resources required for MRO services.

Select interview types: semi-structured and unstructured interviews were used for the data collection regarding the research objectives to capture many aspects of performance measurement.

Prepare interviewing questions: the “what”, “why” and “how” questions relating to the weaknesses of the performance measurement were predetermined regarding the specified key areas. The researcher also attempted to develop conversations with the interviewees freely in order to discover new issues relating to the current approach to performance measurement.

Schedule and arrange the interviews: the members of the action research group were identified, as shown in Table 6-1. They are the key people who are involved in operating the performance measurement. The interviews were scheduled according to their convenience.

Perform the interviews: the scheduled interviews were conducted at the interviewees' workplace. The interviews were recorded by a tape recording machine with permission from the interviewees, so as to ease transcribing and analysis of the data collected.

**Table 6-1: Sources of evidence for carrying out the action research study with PlaneCo**

| <b>Data collection technique</b>      | <b>Sources of evidence</b>     |
|---------------------------------------|--------------------------------|
| <b><i>Interview</i></b>               | Customer account manager       |
|                                       | Service delivery manager       |
|                                       | Planning manager               |
|                                       | Base representatives           |
|                                       | Planner                        |
|                                       | Engineer                       |
|                                       | Inventory staff                |
|                                       | Quality assurance staff        |
| <b><i>Participant observation</i></b> | Meeting                        |
| <b><i>Documentation</i></b>           | Performance measurement matrix |
|                                       | Maintenance process            |
|                                       | Project planning               |
|                                       | Quality documents              |

Analyse findings: the data collected which related to the general principles of performance measurement and the gap model were analysed. The data were clustered into the appropriate gap of the gap model, shown in Figure 6-4. This led the action research group to gain a better understanding of the limitations corresponding to each gap and to analyse causes of these limitations. The action research group was then able to identify solutions to the limitations of each gap. A proposed version of the performance measurement model was consequently created.

***Participant observation:*** the researcher must be a member of the action research group according to the principles of action research. The researcher and the members of the action research group had a number of brainstorming meetings which aim for develop the performance measurement. In these meetings, the researcher contributed theories relevant to performance measurement while other group members contributed their experiences and practices in operating the performance measurement. This led the action research group to construct the proposed version of performance measurement model. The participant observation was carried out during the field visits of Stage II.

**Documentation:** this was used to support the data collected from the interviews and observation. It included documents relating to the performance measurement such as performance measurement matrix, performance audits and project planning.

The proposed version of performance measurement model was developed, using the methodology for carrying out the action research as explained above. This led the researcher to answer the research question and to achieve the research objectives of Stage III.

### **6.3 Performance measurement and the gap model**

As a key factor of relationship management in the context of aircraft MRO outsourcing, shown in Figure 5-12, performance evaluation seems to be a constructive management framework to meet standards, service requirements and outsourcing objectives. It also facilitates the communication and coordination of an MRO provider and an MRO customer and ensures the achievement of value-for-money through outsourcing. The performance measurement provides both parties with a means for improving the efficiency and effectiveness of outsourcing.

Aircraft MRO outsourcing can be categorised as a contracting service by nature as it tends to be more intangible and more importantly involves customers in its creation (Parasuraman, 1998; Grover et al., 1981). Because of these unique features, evaluating the service quality of aircraft maintenance has been especially challenging. There are some subjective aspects, such as cleanliness of the serviced aircraft, which are likely based on individual perceptions, as PlaneCo service delivery manager stated, “...*this will come down to personal perceptions...*”. However, performance measurement is essential particularly for an intermediate company, in this study PlaneCo, to ensure its MRO providers are able to meet the requirements and expectations of its end customers without destroying its relationships with the MRO providers. This is due to the fact that the end customers are highly demanding while there are limited capabilities particularly in the European region.

*“[our customer] is a massive customer. They are a bit too big for their boots, really. This means they are in a far stronger position than us ...the MRO are [also] in a far stronger position than us to negotiate with us as there are limited maintenance slots available in the industry...”. (PlaneCo Customer Account Manager)*

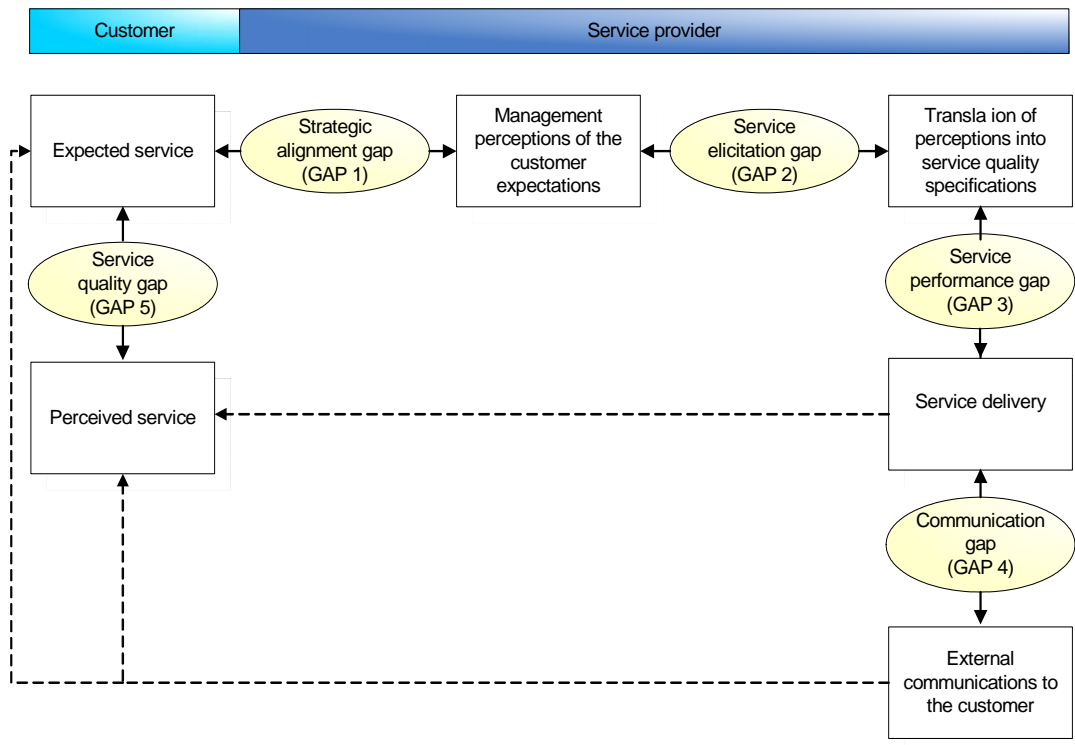
Moreover, performance measurement can be used as evidence to support PlaneCo in negotiating and cooperating with its MRO providers.

*“...for future contracts, we can use our previous experiences with the MRO to discuss and negotiate with them. We need the information to go back to the MRO. When monitoring the check, we can use that information to talk with the MRO if the same problems or mistakes happened again...”.* (PlaneCo Service Delivery Manager)

This situation causes difficulties to PlaneCo, which plays the role of intermediary, in constructing the performance measurement and implementing it. As a consequence, it is essential to analyse the current approach to performance measurement. This was done using the gap model developed by Parasuraman et al. (1985). The gap model has been widely accepted and tested in service quality by several investigators such as Santos (2003), who investigated an e-service quality model, Zhu et al. (2002), who investigated a quality of service delivery and Frost and Kumar (2000), who investigated internal service quality measurement. Although the gap model is rooted primarily on business-to-customer (B2C) relationships, there are a number of researchers who adapted this service quality concept for business-to-business (B2B) relationships, for instance Seth et al. (2006a), who researched the third-party logistics industry and Parasuraman et al. (1994), who researched the business-computer-service industry. In particular, the gap model is used as a fundamental concept of service quality in IT/IS outsourcing to develop measurement criteria such as ASP-QUAL by Sigala (2004), Web-Qual by Barnes et al. (2001) and IS-SERVQUAL by Pitt et al. (1995). As IT/IS outsourcing has similar characteristics to aircraft MRO outsourcing, shown in Figure 2-2., the gap model, shown in Figure 6-4, is a logical basis for developing the proposed version of the performance measurement model in the context of this research.

*“...in an ideal world, we should follow the gap model to eventually meet the customer’s requirements...”.* (PlaneCo Customer Account Manager)

The gap model indicates that customers’ perceptions in the aspect of service quality are influenced by a series of four distinct gaps, as shown in Figure 6-4. The implication of the gap model is that a company that wishes to improve its service quality must close these four gaps (Parasuraman, 1998).



**Figure 6-4: Gap model applied in aircraft maintenance outsourcing (adapted from Parasuraman et al., 1998)**

In addition to the gap model, the researcher also applied knowledge of performance measurement for initially analysing the current approach to the performance measurement of PlaneCo. This is due to the fact that the gap model has been widely accepted in B2C relationships but this action research focuses on the B2B context which involves PlaneCo and its MRO providers. These companies consist of three management levels which are: strategic level, business level and operational level. However, the gap model does not include this managerial structure, which is considered to be important for performance measurement (Gunasekaran et al., 2001). In addition, the gap model does not provide a means for the researcher to understand the impact of a balanced mix of input and output metrics which is regarded as a principle of well-constructed performance measurement (Tsang et al., 1999). With these principles of performance measurement, the researcher was likely to gain a comprehensive overview of how the proposed approach to performance measurement should be developed and how this new approach could lead PlaneCo to cooperate with its MRO providers more effectively.

## 6.4 Initial study of performance measurement

This section presents an initial analysis of the current approach to performance measurement that PlaneCo used to evaluate its MRO providers' performance. This analysis was carried out on the basis of the general principles of performance measurement particularly relevant to a managerial structure and a balanced mix of input and output metrics. The current approach to performance measurement consisted of three measuring tools which are: performance metrics identified in the agreement between PlaneCo and its MRO providers, post check survey and daily performance metrics not identified in the agreement, as explained in Section 5.4.5. These three measuring tools were categorised into the three management levels: strategic level, business level and operational level, as shown in Figure 6-5. Varma et al. (2006) claimed that performance measurement should be designed for a particular level of the managerial structure. This is because the performance measurement influences decisions to be made at each of these three managerial hierarchies (Gunasekaran et al., 2001). They can also be used to set the performance goals at each level particularly in the aspect of collaboration with the provider.

|  | Strategic level |                   | Business level  |   | Operational level   |                 |
|--|-----------------|-------------------|---|---|---|-----------------|
|  | Input focus     | Output focus      | Input focus   | Output focus  | Input focus   | Output focus    |
| Performance metrics identified in the contract           | None            | Aircraft downtime | Agreed aircraft downtime  | Additional deferred defects<br>Actual aircraft downtime<br>Aircraft records | None  | None            |
| Post check survey  | None            | Costs             | Aircraft pre-input activities<br>Aircraft receipt and preparation | Costs<br>MRO performance<br>MRO workshop performance                        | None  | None            |
| Daily performance metrics not identified in the contract | None            | None              | None  | None  | Gantt chart pre-input<br>Daily reports<br>Post check survey | Workpack return |

**Figure 6-5: Performance metrics at strategic, business and operations levels**

Measuring results receives more attention from strategic level while evaluating determinants of those results is a focus of the operational level (Euske et al., 1993). In the context of this study, the senior managers of PlaneCo focused on two outcomes of the aircraft services delivered which are aircraft downtime and costs, as shown in

Figure 6-5. PlaneCo's customer account manager explained that, "*the top management is interested only in costs and financial things*". However, these managers failed to capture certain aspects of the expectations of PlaneCo's end customer, such as dependability of the aircraft serviced and cleanliness and tidiness of the serviced aircraft. These undefined output performance metrics could give the MRO provider more scope in innovating the delivered services and in improving the quality of service without rising costs (Centre for Facilities Management, 1999). In addition, the financial performance metric which is the focus of the senior managers of PlaneCo has been widely criticized as short-term, profit-oriented and failing to support continuous improvement, by a number of investigators such as Kaplan and Norton (2005), Toni and Tonchia (2001) and Holmberg (2000). It would also be insufficient for ensuring that the senior managers of the MRO provider anticipate what PlaneCo actually needs to receive particularly in the aspects of service quality.

For the business level, most of the performance metrics are categorised into output-based specifications, as shown in Figure 6-5. However, the input metrics which were not covered by the business level seem to be vital for shaping the desired outcomes. Heavisides and Price (2001) claimed that a balanced approach, which includes both input and output metrics, would be a more appropriate vehicle for outsourcing. Otherwise, the performance measurement is unlikely to provide a means to bridge the gap of translating the customer's requirements to the proper service specifications. However, the current approach to performance measurement did not include performance metrics of the resources allocation which is important for completing the maintenance check in a safe and airworthy manner.

The operational level focuses on determinants of the desired outcomes, shown in Figure 6-5, which were derived from the key activities of the maintenance process. They are essential for ensuring daily cooperation between PlaneCo and the MRO provider, leading to a success of the maintenance check. PlaneCo's service delivery manager explained that the company "*does not stipulate [to the MRO provider] what [to do] and how they have to do their job*". As a consequence, PlaneCo and the MRO provider "*work quite well together and have good cooperation*". This implies that the input metrics would be appropriate for daily cooperation of both parties without interrupting the internal operations of each other. Brignall and Ballantine (1996)



supported an influence of the determinants of the expected results on the day-to-day operations. Nevertheless, the one output performance metric is significant for PlaneCo's representatives who are based at the MRO facility to fulfil the company's requirements which are not identified in the agreement, as stated by the members of the action research group. These requirements are basically derived from the requirements of PlaneCo's end-customers. The action research group correspondingly decided to maintain all daily performance dimensions.

## 6.5 Current model

With the initial analysis of the current approach to performance measurement that PlaneCo used to evaluate its MRO providers, the researcher and the members of the action research group gained a better understanding of the overview of this current approach. The weaknesses of the current approach to performance measurement are then identified corresponding to each gap of the gap model.

### 6.5.1 Gap 1: strategic alignment

This gap reflects the difference between what the customer company expects and what the management of the service provider think they expect (Gronroos, 1982). This implies that this discrepancy is a responsibility of senior managers of the customer and provider companies, as shown in Figure 6-12. In the case of PlaneCo, the two performance metrics, aircraft downtime and costs, seem to be insufficient to ensure that the right management perception of PlaneCo's requirements was created within the MRO provider. This is represented with a red-highlighted box, as shown in Figure 6-6. There are two factors of this weakness.

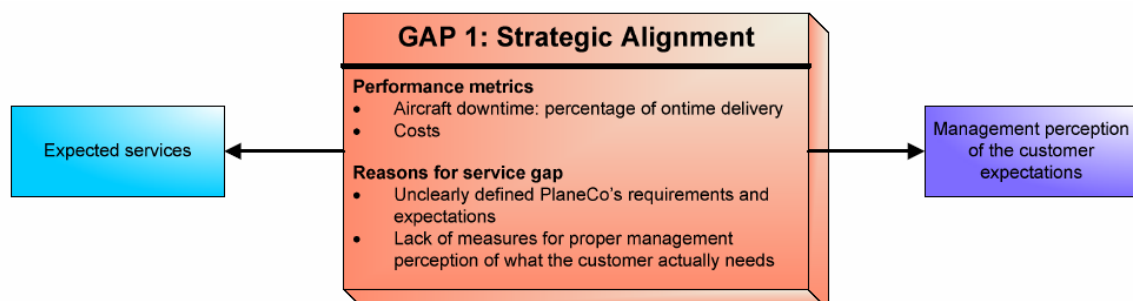


Figure 6-6: Current model for gap 1

Firstly, PlaneCo failed to capture and transfer certain aspects of its requirements to its MRO provider. These requirements are basically derived from requirements of PlaneCo's end-customer.

*“[PlaneCo] try to meet the requirements of [the customer] even if the requirements are not identified in the contract because they are requested [for example] by CAA. The customer sometimes uses these unspecified requirements to measure our performance...”. (PlaneCo Customer Account Manager)*

Examples of these undefined requirements are internal and external cosmetic appearances of the serviced aircraft. Platz and Temponi (2007) stated that requirements of customer are important not only for scoping service specifications in the early stage of a contract design but also for evaluating the service quality delivered. In particular, PlaneCo, which plays the role of intermediary, needs to pay more attention to translate its end-customers' requirements to its MRO providers and then to ensure the aircraft services are delivered in a form that the customers expect. These undefined requirements might cause a number of debates especially in the wash-up meeting between PlaneCo and the MRO provider which is used for discussing the outcomes of the services delivered and the performance of the MRO provider.

Secondly, PlaneCo realised that the company needs to ensure that the strategic personnel of the MRO provider understand what PlaneCO actually expect, as explained by the interviewees. Parasuraman and Zeithaml (1983) and Langeard et al. (1981) claimed that the executives of the provider might not appreciate what features signify high quality to their customers, what attributes a service must have to fulfil the customer needs, and what levels of performance on those features are important for delivering high quality service. However, PlaneCo failed to address major issues which are essential for an alignment with the management of the MRO provider.

*“...many issues that we have with the MRO result from [the fact that] we do not talk with the management of the MRO properly. So we need to build a strategic relationship with more meetings and face to face communication. We have not visited [the MRO] as much as we want...”. (PlaneCo Customer Account Manager)*

The strategic alignment between PlaneCo and the MRO provider is influenced by the size of the MRO service firm (Zeithaml et al., 1988). The members of the action

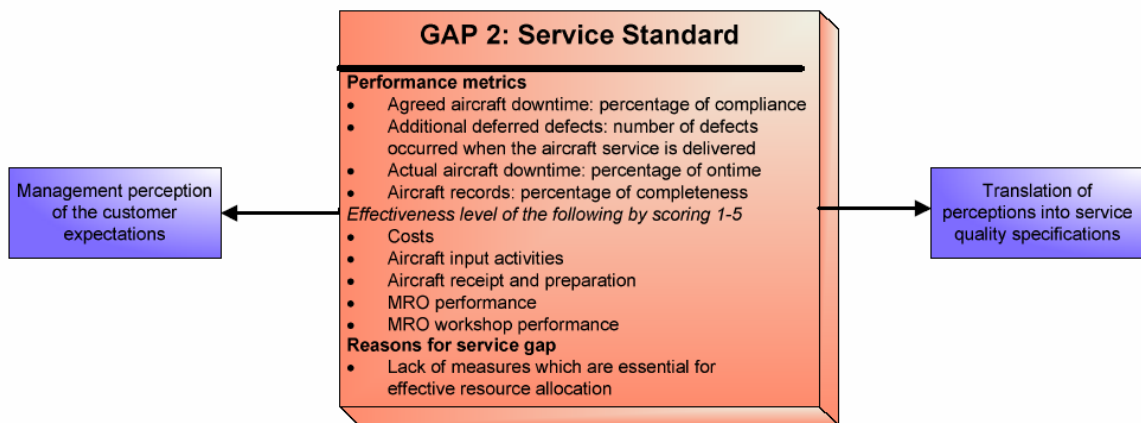
research group explained that communication within the MRO provider might not be effective for transferring the messages relating to PlaneCo's requirements from the strategic to operational levels. This is especially for the big MRO company which have many layers of management that could inhibit communication flows from the top to bottom within the company effectively. This would also prohibit the senior managers of the MRO provider from gaining a better understanding of PlaneCo's requirements.

*“...but if you look at smaller companies, we deal directly with their managing director, technical director. But for the bigger organisations, we are dealing with the sales team rather than their management team...”. (PlaneCo Service Delivery Manager)*

A lack of strategic alignment between PlaneCo and the MRO provider seemed to have an impact on the outcomes of MRO services delivered, as stated by the members of the action research group. The delivered services might not meet PlaneCo's requirements although PlaneCo clearly defined its requirements.

### **6.5.2 Gap 2: service elicitation**

This represents “the difference between management perceptions of customer expectations and service quality specifications”, as defined by Zeithaml et al. (1988). This gap is typically the responsibility of customer account managers, as shown in Figure 6-12. PlaneCo needs to ensure that the senior managers of the MRO provider are actually capable of translating and communicating PlaneCo's requirements into the service specification. This is due to the fact that the service specification has an impact on the difficulty and reluctance of the managers of the service provider to match or exceed the customer requirements (Seth et al., 2005; Parasuraman et al., 1985). The performance metrics, shown in Figure 6-7, are inadequate for assuring that the service specification of MRO services provided by the MRO provider is correctly identified.



**Figure 6-7: Current model for gap 2**

The inappropriate service specification seemed to be a result of an absence of management commitment to service quality, as explained by the members of the action research group. This can be reflected from the proportion of resources contributing to the aircraft maintenance services in order to meet at least the minimum service standards (Zeithaml et al., 1988). Performing an in-service line particularly in conjunction with an end-of-lease check consumes *“more resources than people imagine which causes the problem”*, as explained by the PlaneCo service delivery manager. There are seven major resources required for performing an aircraft check, as shown in Figure 6-8.



**Figure 6-8: Resources required for running an aircraft service**

Although at the strategic level, the senior managers of the MRO provider give a commitment to allocate resources, but their managers at the business level might not

follow this commitment as they focus on short-term profit which benefits them in financial terms. This inadequate resource allocation might be caused by communication barriers between the management layers of the MRO provider, as explained above. It might also be the result from shortages of capabilities especially in the European region.

*“What we have put forward is that [the MRO provider] needs to put a person who is dedicated to manage [the aircraft service]. And under that they need to have dedicated management who are responsible for the different areas so that they can actually have responsibilities to make sure that their sides run efficiently”. (PlaneCo customer account manager)*

An implication is that the proposed version to performance measurement could cover performance metrics to ensure more effective resource allocation, which was not included in the current approach to performance measurement.

### **6.5.3 Gap 3: service performance**

This refers to the discrepancies between the service quality specifications and the service actually delivered. When using an outsourcing strategy, the buyer must shift their attitude and outlook to managing “what” result is desired, rather than managing “how” the result is produced, according to Quinn (1999). Otherwise, the customer is unable to gain benefit from the provider’s skills, knowledge and innovation, which is one of the primary rationale for outsourcing.

In the context of aircraft MRO outsourcing, PlaneCo currently plays the role of inspector rather than operator. The company does not specify how the service provider performs the maintenance check in detail as the production process is the responsibility of the service provider

*“We do not stipulate [the MRO provider] what [to do] and how they have to do their job”. (PlaneCo Service Delivery Manager)*

In consequence, the performance metrics for this gap, illustrated in Figure 6-9, were felt to be adequate for ensuring that the desired outcomes would be delivered without excessive interference in the provider’s operations.

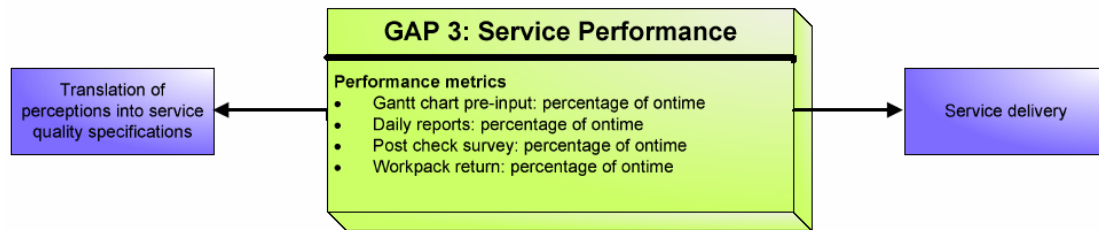


Figure 6-9: Current model for gap 3

#### 6.5.4 Gap 4: communication gap

This represents the “difference between the service delivery and what is communicated about the service to customer”, as described by Zeithaml et al. (1988). There are four main communication channels between PlaneCo and its MRO providers, as illustrated in Figure 6-10.

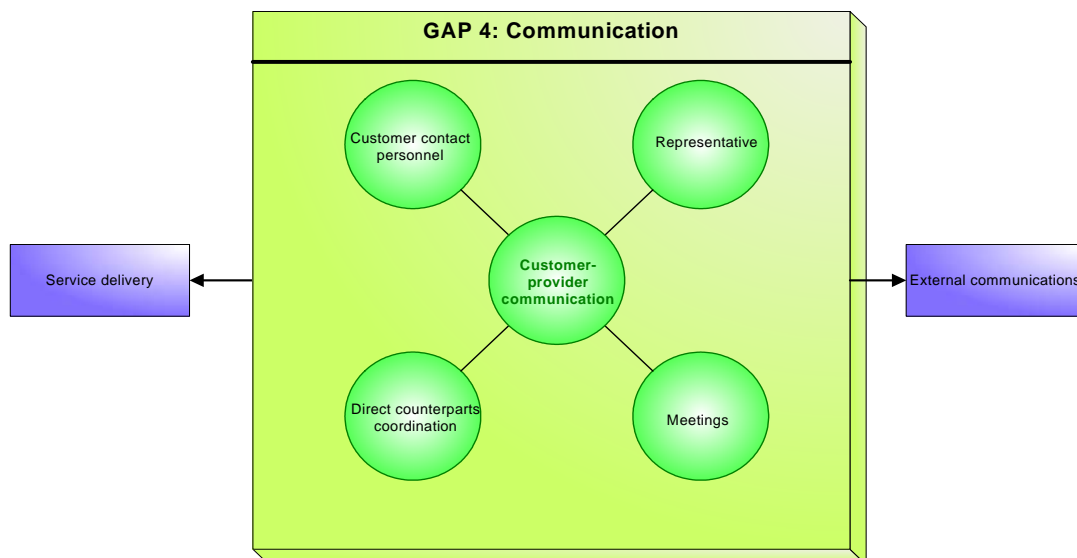
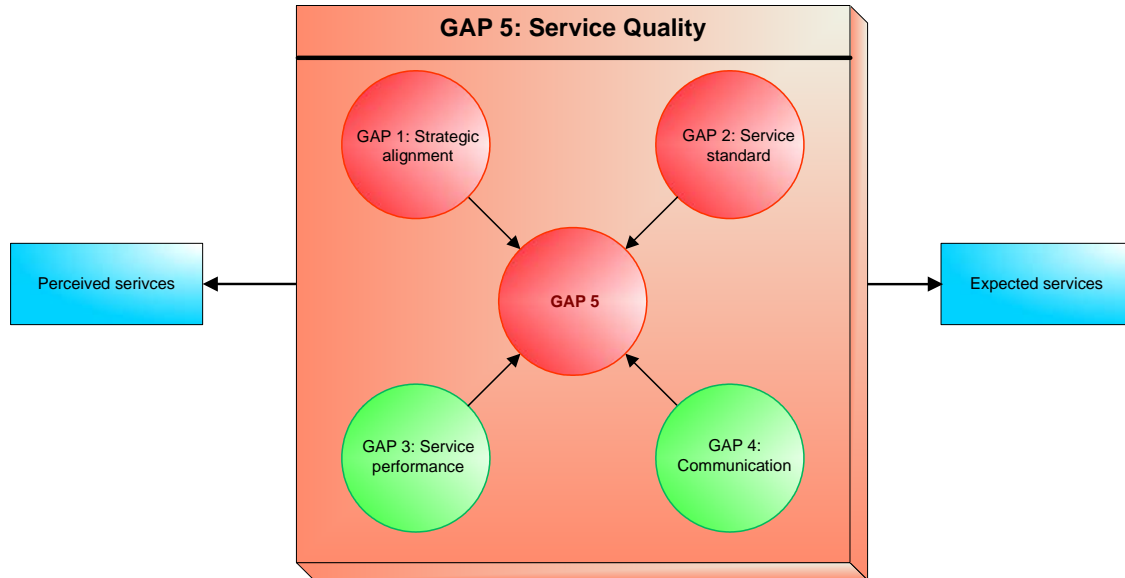


Figure 6-10: Current model for gap 4

When the outsourcing project commenced, the service provider assigned customer account personnel to regularly communicate with the customer on subjects including the services offered and specific requirements. The direct counterparts of both companies “*directly cooperate and work together*”, according to a planning manager at PlaneCo. Moreover, when the maintenance check runs, PlaneCo bases its representative at the provider’s facility. The involved parties also have a number of meetings before, during and after the check, shown in Table 5-6 and 5-7. These four channels are recognised by PlaneCo to be primary methods for minimising the size of gap 4. As a result, PlaneCo felt that the quality of its communication with its MRO provider is assured and does not need to be measured.

### 6.5.5 Gap 5: service quality gap

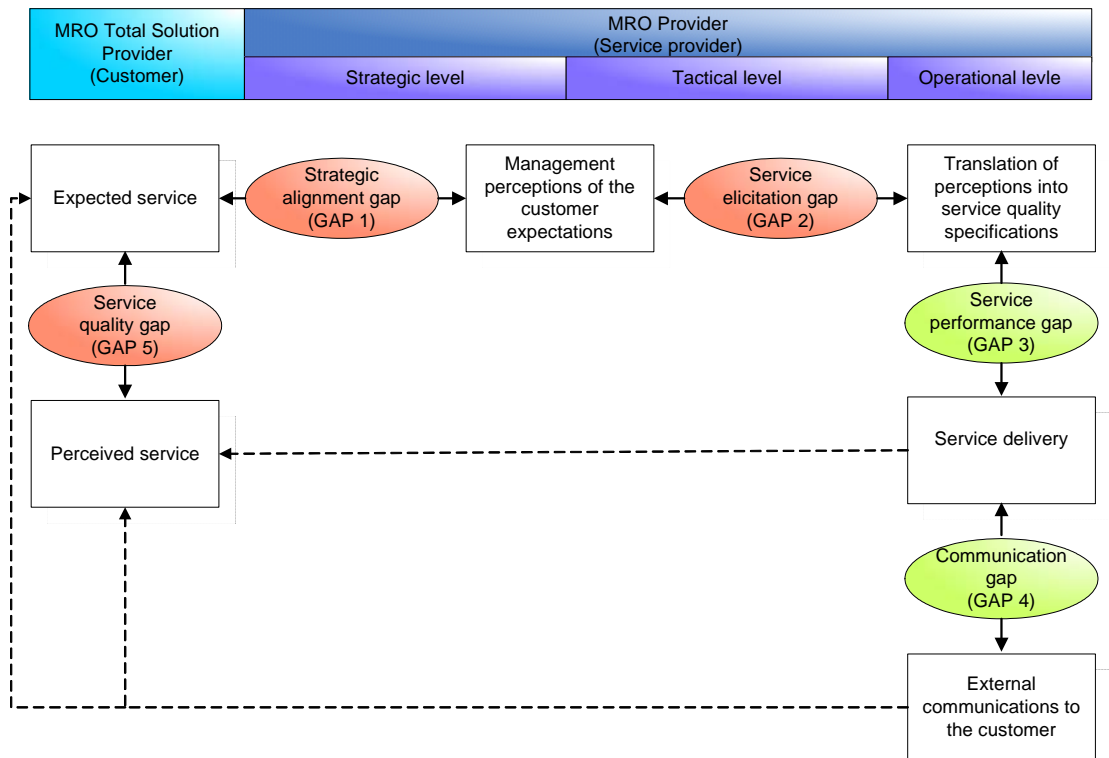
This refers to the difference between customer expectations and perceptions. It is influenced by the size and direction of the four distinct gaps described above, as shown in Figure 6-11 (Parasuraman et al., 1985).



**Figure 6-11: Current model for gap 5**

This implies that minimising gap 5 would be achieved by minimising gaps 1, 2, 3 and 4. In considering aircraft MRO outsourcing, PlaneCo used the performance metrics of gap 1, gap 2 and gap 3 for evaluating the discrepancies between what it expected and what it actually perceived. As gap 1 and gap 2 were associated with the weaknesses explained above, gap 5 was also affected by these weaknesses, as shown in Figure 6-11.

Based on the initial study and the gap analysis of the current approach to performance measurement that PlaneCo used to evaluate its MRO providers' performance, the current model of performance measurement on the gap model is illustrated in Figure 6-12. It shows that the improved version of the performance measurement model might provide a means to reduce the size of gap 1 and gap 2 in particular. This leads to a decrease of the differences between PlaneCo's perception of the MRO provider's services and PlaneCo's expectations. These weaknesses are represented by the red-highlighted boxes.



**Figure 6-12: Current model of performance measurement on the gap model (adapted from Parasuraman, 1998)**

## 6.6 Proposed model

Based on the current model of performance measurement of PlaneCo presented above, the researcher developed a new set of performance metrics in conjunction with the members of action research group, as illustrated in Table 6-1. This development will be explained on the basis of the structure of the five service gaps, as shown in Figure 6-12.

### 6.6.1 Gap 1: strategic alignment

In developing the new performance metrics, it was essential to solve the two problems observed in gap 1, which were explained above. For the first weakness which is unclearly defined requirements, the action research group identified what they actually expect to receive from the MRO provider. This was carried out primarily based on the requirements and expectations of PlaneCo's end-customer as "[PlaneCo] are the voice of [the airline]", as stated by a service delivery manager at PlaneCo. The airline representative who is based at PlaneCo's facility said that "KPIs



[used to] measure [PlaneCo] are on time delivery, engineering standards, reliability, clean and tidy aircraft and deferred defects”.

**Table 6-2: Performance metrics to ensure fulfilling PlaneCo’s requirements**

| Customer’s requirements | AS-IS model       | TO-BE model       |  |
|-------------------------|-------------------|-------------------|--|
|                         |                   | Dimension         | Definition   |
| On-time delivery        | Aircraft downtime | Availability      | Availability of aircraft fleet for revenue service during the operating day.   |
| Low costs               | Costs             | Costs             | Total costs which are incurred in a check.   |
| Reliability             | ✘                 | Dependability     | Dependability of aircraft, which is measured by number of deferred defects, warranty claims and major defects occurring during the 3 months following the check. |
| Deferred defects        | ✘                 |                   |  |
| Engineering standard    | ✘                 |                   |  |
| Clean and tidy aircraft | ✘                 | Service condition | Cosmetic appearance of serviced aircraft.  |

Table 6-2 presents the new set of performance metrics used to stimulate the MRO provider to deliver the outcomes desired, as these metrics are more relevant to the requirements of PlaneCo’s end-customer. It is composed of the two previous metrics (availability and costs) and two new metrics (dependability and service condition). In the context of this research, availability refers to the percentage of time that an aircraft will be ready or available compared to the agreed flight schedule (Chan and Qi, 2003). This particular dimension is crucial for PlaneCo to mitigate risks of receiving financial penalties, which it feels unable to pass back to the MRO provider. This is because of a current imbalance of supply and demand particularly in Europe. In addition, the financial performance metric is essential for PlaneCo to anticipate the profitability of the outsourcing project although it has been widely criticised for not reflecting the stakeholder’s needs (Neely, 2005; Brignall and Ballantine, 1996; Lynch and Cross, 1991). As such, the proposed approach to performance measurement includes both financial and non-financial performance metrics, unlike the traditional approach to performance measurement (Tsang et al., 1999). Dependability is vital for ensuring safety and airworthiness of the serviced aircraft as it is reflected by the performance and capacity of the aircraft (Campbell, 1995). A reason that the current approach to performance measurement did not include dependability might be

because it is considered to be a soft performance metric that cannot be directly evaluated. As a consequence, dependability is transformed into a number of defects and warranty claims occurring during the 3 months following the check. The last performance metric is service condition which can be primarily reflected by cleanliness and tidiness of the internal and external appearance of the serviced aircraft. It seems to be a personal requirement of the airline representative which plays a big part in managing the maintenance outsourcing project, according to a customer account manager and service delivery manager at PlaneCo.

The second limitation of the current model for gap1 is a lack of performance metrics of MRO provider's perception of customer needs, as shown in Figure 6-6. In fact, the importance of strategic alignment for inter-organisational coordination has been emphasized by a number of investigators such as Kumar and Snavely (2004), Kim and Young-Soo (2003) and Anderson and Narus (1990). Strategic alignment can be measured by scoring the effectiveness of the strategic management of the MRO company and of the deployment of the strategy through this organisation. In considering the strategic management, there are four main issues which PlaneCo needs to consider. They are business vision and strategy, service philosophy, organisational culture and organisational structure. PlaneCo should ensure that each MRO provider's vision, strategy and philosophy are aligned with the objectives and strategies of the outsourcing project (Cross, 1995) as this match would provide means of cooperation. PlaneCo is also concerned about a distinct difference of organisational culture which might cause difficulties of inter-organisational communication (Langfield-Smit and Smith, 2003). In addition, PlaneCo pay attention to the organisational structure of the MRO provider as it affects the way that both parties establish and manage their cooperation through the three levels of management. “[PlaneCo] has a flat management structure when we are doing [the outsourcing project]”, as explained by the PlaneCo customer account manager. An MRO provider with a hierarchical management structure would probably cause more difficulties in the daily cooperation and joint dispute resolution.

Secondly, strategic alignment relates to how the managers of the MRO provider direct and govern its maintenance system, based on the company's strategies and philosophies, in order to gain an achievement of the outsourcing project. The new set

of performance metrics probe for information from the MRO provider about a policy of its maintenance management (Kumar and Snavely, 2004), and quality control system (Zeithaml et al., 1988), as they are seen as primary governance structures for ensuring the quality of aircraft services provided.

*“...MRO must comply with EASA 145. MRO need to have a system in place to have approved data necessary for the maintenance. They need to have [the system] to demonstrate the control of this data. The system must also be accessible for everyday operations in their companies”. (PlaneCo Quality Personnel)*

In addition, PlaneCo realised that a maintenance planning system is crucial for the success of the on-time maintenance service. *“All maintenance inputs go through the planning procedure”*, according to a planning manager at PlaneCo. It is therefore essential to consider the effectiveness of the MRO provider’s planning system in managing the check. PlaneCo is also concerned that the inventory system of the MRO provider is capable of sourcing and allocating aircraft parts required for the check. These three systems, the quality control system, planning system and inventory system, seem to be the main drivers when MRO services are performed, according to an aircraft MRO process of PlaneCo, as explained by the members of the action research group.

The new performance metrics are introduced to ensure that the senior managers of the MRO provider clearly understand what PlaneCo actually expects, as shown in Figure 6-13. These new performance metrics would also improve the cooperation of the two organisations from the strategic level to the operational level or *“working as a unit”* in the words of the PlaneCo service delivery manager. The performance metrics for assuring that the senior managers of the MRO provider perceive PlaneCo’s expectations correctly are assessed in terms of effectiveness levels from 1 to 5 with 5 being ‘extremely effective’. This might be due to the fact that these performance metrics are subjective, as stated by the members of action research group. PlaneCo is also aware that it cannot directly quantify these new metrics.

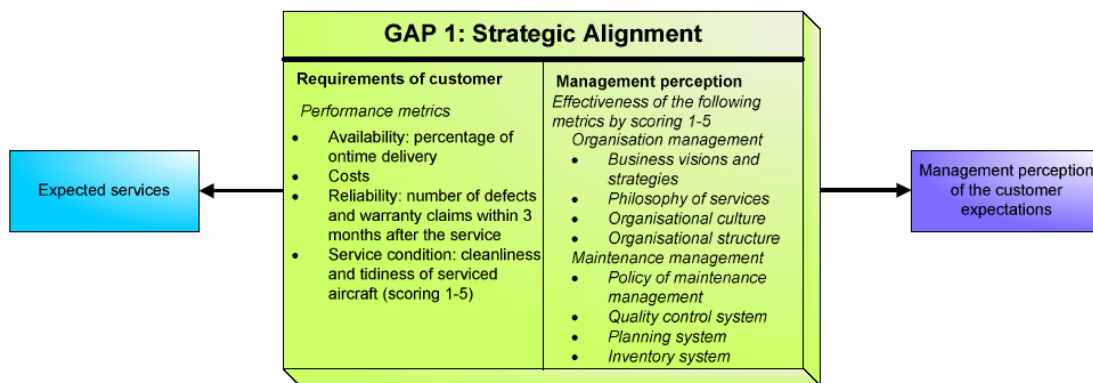


Figure 6-13: Proposed model for measuring gap 1

### 6.6.2 Gap 2: service standard

According to gap 2, which relates to the discrepancies between management perceptions of customer expectations and service quality specifications, the members of the action research group realised that the quality of the interface document could be evaluated. This is because the interface document is utilised as “*basic quality procedures*” in carrying out the maintenance services. PlaneCo’s service delivery manager also explained that, “*all the requirements [which are] transferred to the management of MRO are supposed to be identified in the interface document*”. Parasuraman (1998) claimed that a customer-provider agreement in business-to-business often explicitly determines the standards of service.

Moreover, PlaneCo needs to ensure that the MRO provider is capable of performing the maintenance service and therefore of delivering the outcomes desired. PlaneCo was also aware of the potential problem of allocating resources required, as PlaneCo service delivery manager explained that servicing an aircraft requires “*more resources than people imagine, which causes the problem*”. The resources essential for the check include qualified technical personnel, special tools, hangars and documentation, as shown in Figure 6-8. However, these resources were not monitored, as shown in Figure 6-7. Seth et al. (2006a) and Parasuraman (2004) stated that resource allocation influences the standard of service offered.

The new performance metrics relevant to resource allocation could be included in the proposed approach to performance measurement, as shown in Figure 6-14. However, PlaneCo still utilise the existing performance metrics, shown in Figure 6-7, as they are legally bound by the signed agreement with its MRO provider. These performance metrics are assessed in terms of effectiveness levels from 1 to 5, where 5

means ‘extremely effective’. This is because they are subjective, which was explained by the members of the action research group. PlaneCo also realises that the management of MRO services, including resources allocation, is the responsibility of the MRO provider.

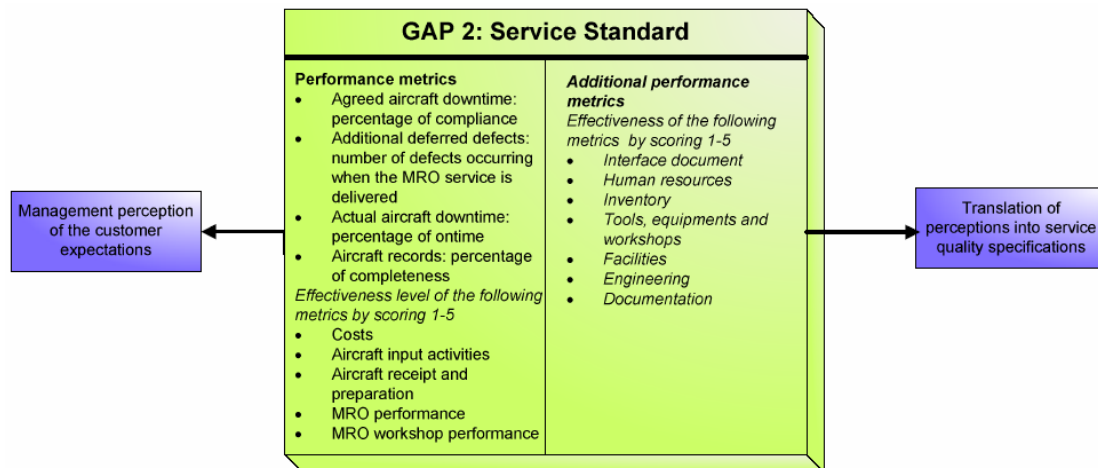


Figure 6-14: Proposed model for measuring gap 2

### 6.6.3 Gap 3 & 4: Service performance and communication

As explained in Section 6.5.3 and 6.5.4, the performance metrics for daily operation, shown in Figure 6-9, and the four communication channels, shown in Figure 6-10, were felt to be sufficient to ensure effectiveness of the cooperation between PlaneCo and the MRO provider on a daily basis. The action research group members also stated that they do not intend to run the maintenance check, preferring to leave this to the MRO provider. It is emphasised that there is no need to include any new performance metric for minimising the sizes of gap 3 and gap 4.

### 6.6.4 Gap 5: service quality

PlaneCo is required to accurately translate its end-customer’s requirements to its MRO providers and ensure that the capability of the providers are sufficient to meet these requirements in order to improve the quality of the aircraft MRO services delivered. PlaneCo is also aware that this governance structure must be used without excessively interfering the internal operations of the MRO providers. Otherwise, it will become a barrier to innovation and creativity for the providers. To eliminate these weaknesses, the proposed version of the performance measurement model has been developed by using the performance metrics and mechanisms of gap 1 to gap 4,

as shown in Figure 6-15. In particular, the performance metrics of gap 1 and 2, in the right hand columns, seem to be broad functions within the MRO provider. However, these performance metrics seem to be important for ensuring that the managers of the MRO provider actually understand PlaneCo's requirements and accurately translate these requirements into service specifications from the strategic level to operational level. PlaneCo also realises that these subjective performance metrics have a substantial contribution to the quality of service. Nevertheless, PlaneCo cannot directly measure these performance metrics. The members of the action research group therefore decided to score the effectiveness of the new performance metrics of gap 1 and 2 from 1 to 5, where 5 means 'extremely effective'. The deployment of this scaling system might be because of the inherent characteristics of MRO service which are intangibility, inseparability of production and consumption, perishability and heterogeneity (Ghobadian et al., 1994; Grover et al., 1981). In addition, the members of the action research group agreed that the performance metrics of gap 1 and gap 2 would be used to measure the performance of the MRO providers annually and quarterly respectively. This is because these metrics have a contribution to monitoring the overview of the performance of the MRO provider and the performance of the aircraft services received. The action research group members also explained that the performance metrics of gap 3 and the communication channels of gap 4 would be deployed on a daily basis particularly when the aircraft service is run.

The proposed approach to performance measurement is clearly divided into the three management levels of the MRO provider company. A result is that PlaneCo is able to closely monitor the MRO provider's performance from the top to bottom. Moreover, this approach to performance measurement consists of both input and output performance metrics, unlike the current approach to performance measurement which is more focused on the output performance metrics.

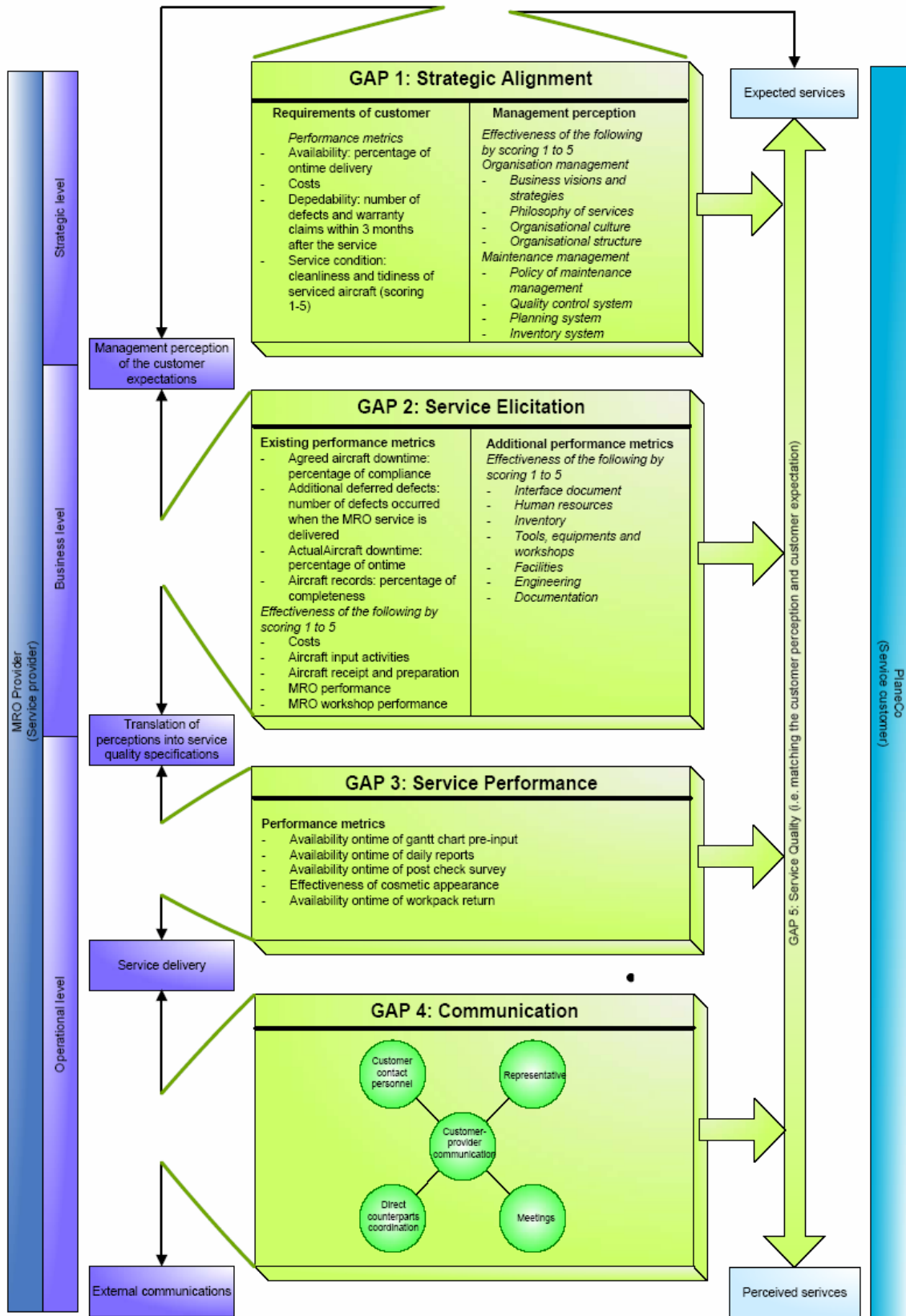


Figure 6-15: Proposed model for performance measurement

The improved version of the performance measurement model provides PlaneCo with feedback corresponding to each gap of the gap model. This enables PlaneCo to identify where problems arise and how these problems should be rectified. It also enables PlaneCo to develop close collaboration with the MRO providers in improving the performance of MRO services. It facilitates communication of both parties and ensures the achievement of value for money through outsourcing. As a result, PlaneCo will be able to sustain the collaborative relationship not only with its providers but also with its end-customers. The risk of losing control over the MRO providers will be likely to be mitigated.

## **6.7 Summary**

Performance measurement is the focus of Stage III as it is considered to be a key factor for managing and sustaining the relationships between MRO customers and MRO providers. The researcher carried out action research in cooperation with PlaneCo which plays the role of intermediary. The objective was to develop a new set of performance metrics for assessing the quality of service received and the performance of PlaneCo's MRO providers in terms of communication and collaboration. The gap model which has been invented by Parasuraman et al. (1985) was applied in this research for analysing the current approach to performance measurement and developing the proposed approach to performance measurement. There were three main limitations inherent in the current approach which are: unclearly defined end-customer's requirements, improper management perception and insufficient resource allocation. The first two weaknesses were associated with gap 1 which refers to differences between the actual customer's expectations and the perception of the management provider. The third weakness was associated with gap 2 which refers to differences between management perception and service specifications. With these limitations, the proposed model for performance measurement has been constructed with the new set of performance metrics. They cover the customer's requirements, strategic management of the MRO provider, the deployment of the strategy through the MRO organisation and resource allocation. More importantly, the improved model for performance measurement is now in use by PlaneCo. The company is satisfied with this new model, as PlaneCo customer



account manager stated that, “*this is the way that we should work to keep the customer happy*”.

### **6.7.1 New knowledge**

- The gap model might be applicable to relationship management in aircraft maintenance outsourcing. It also seems to be used as a basis for developing a proposed approach to performance measurement.
- Performance metrics that seem to be subjective dimensions might be measured by a scaling approach. This provides a quantified evidence for an MRO provider and an MRO customer to ensure the quality of MRO services delivered.
- Strategic alignment could be important for assuring that the MRO provider actually understands what the MRO customer wants. This might be reflected from the effectiveness of the strategic management of the MRO provider and the deployment of the strategy through this organization.
- An ineffective allocation of resources which are required for MRO services might influence on the differences between management perceptions of customer expectations and service quality specification.

## CHAPTER 7 CONCLUSION

### 7.1 Introduction

This chapter presents the discussion and conclusion of this research study, which is drawn from the research findings. It also explains the contribution to knowledge as well as the limitations of this research. Finally, this chapter closes with a section on suggestions for further research.

### 7.2 Research problem and research method

A company pursues outsourcing as a competitive strategy to release its scarce resources for improving its core competencies. To gain these desired benefits, the company is required to develop its collaborative relationships with its providers. Although the management of the relationships between customers and providers is considered to be the critical success factor of outsourcing, it has not received sufficient attention from both practitioners and researchers. In particular, relationship management has a substantial contribution to the success of critical outsourcing as this type of outsourcing is associated with high strategic importance and financial impact. Examples of critical outsourcing are IT outsourcing and aircraft MRO outsourcing, as shown in Figure 2-2. The latter business domain was selected for carrying out an in-depth investigation of the management of the relationship between an MRO provider and an MRO customer.

The literature review undertaken shows that outsourcing relationship management has not been adequately addressed by previous research which primarily focuses on make-or-buy decisions, supplier selection, and the advantages and disadvantages of outsourcing. In particular, aircraft MRO research focuses on three main areas which are: planning and scheduling, inventory management and risk and reliability. There is only one recent research relating to aircraft MRO outsourcing which was done by Al-kaabi et.al. (2007), as shown in Figure 2-4. However, this research focuses on a strategic model of MRO outsourcing decision making. Based on this initial review, the research aim was clearly determined, which is “*to improve aircraft maintenance outsourcing through relationship management*”. This then led to the identification of three research questions:

1. *What are the key factors for outsourcing relationship management?*
2. *How might the relationship between an MRO provider and an MRO customer established and developed?*
3. *What are good practices that an MRO customer measures the performance of an MRO provider?*

To address the first question, multiple cases studies and survey questionnaire were used for investigating the relationship management for IT outsourcing and aircraft MRO outsourcing respectively. This led to the in-depth study of the management of relationship between an MRO provider and an MRO customer by using a multiple case study strategy. Action research was then regarded as a main approach for developing a proposed version of the performance measurement model. Based on these three strategies, this research investigation was carried out through the three stages. This eventually enabled the researcher to complete the three research questions and to achieve the research aim, which will be presented in the next section.

### **7.3 Research discussion**

This section presents the discussion of the research findings, corresponding to each of the research questions.

#### ***7.3.1 Key factors for outsourcing relationship management***

The research findings from the three sources of evidence, including literature survey, multiple case studies in IT outsourcing and questionnaire survey in MRO outsourcing, demonstrate that relationship management is recognised as an enabler of successful outsourcing management. In particular, the provider and customer must understand each other's requirements. This then lead both parties to create a sophisticated agreement which is correspondingly used as a basic framework for delivering the services outsourced. In addition, the day-to-day operations require a structure for governing the interface procedures between the two organisations to deliver the services successfully. More interestingly, performance evaluation becomes a focal point for the provider and customer to improve the delivered services and then to develop closeness and cohesiveness of their cooperation. This therefore enables both parties to sustain their relationship throughout the period of agreement.

These key factors can be implemented based on frequent and open communication between the provider and customer. They are also influenced by external factors surrounding the outsourcing project such as regulations, technology changes and market competition.

### ***7.3.2 Establishment and development of the relationship between an MRO provider and an MRO customer***

The research shows that the key factors of outsourcing relationship management, which were explained above, influence the way that an MRO provider and an MRO customer establish and develop their relationship in the long term, as shown in Figure 5-12. The relationship of the MRO provider and customer begins with a clarification of each party's requirements. The customer's requirements relate to the outcomes of services desired while the provider's requirements are based on its capabilities in delivering the services. Requirement clarification is carried out by an inter-organisational team from these two companies. This team might be composed of a wide range of people at the multiple management levels from the MRO provider and customer. Otherwise, the team might not be able to clearly identify service specifications in an agreement. This could make it difficult for people particularly at the business and operational levels in fulfilling the commitments identified in the agreement. Moreover, the results from the three case study relationships show that goal and vision sharing from the beginning of the MRO outsourcing project has not received attention from the MRO provider and customer, unlike IT outsourcing case studies. This might affect both parties in establishing collaboration in order to achieve the outcomes of the outsourcing project they desired. In addition, the research findings show that the four case companies are unaware of the importance of a win-win situation which would provide them with benefits that they can not receive through their individual operations. The win-win situation also might make it easier for the MRO provider and customer to develop better collaborative relationship.

Based on the clearly defined requirements explained, the inter-organisational team of the MRO provider and customer construct the contract, a legally-binding document agreement, and interface document, a non legally-bonded agreement. These two parts of agreement are viewed as a formal commitment from both parties to ensure that the services delivered meet the defined requirements. It might also provide the two

companies with flexibility in responding to changes arising from both external and internal factors. When the agreement is signed, strategic people from the MRO provider and customer is unlikely to continue their involvement in commanding the MRO outsourcing project to a successful conclusion. This might cause problems when the managers are unaware of any strategic decisions that may be required.

To deliver the maintenance services, the MRO provider and customer assign a project team which include managers of the business areas from the two companies who are involved in the project, customer support people from the provider and representatives from the customer. The last two members of the team are accountable for bridging the communication and coordination gaps of the involved business areas, as shown in Figure 5-5. This team is basically responsible for constructing structures for ensuring that the services delivered meet the service specifications identified in the agreement. There are three types of these governance structures: project management, meetings and representatives. In particular, the findings demonstrate that the four case companies considered meeting as a primary communication channel for streamlining collaboration with their partners. The representatives are also important particularly for daily cooperation between the MRO provider and customer when the aircraft is in maintenance service, as they ensure that the service is carried out according to the project planning. These governance structures facilitate strengthening communication between the MRO provider and customer. This could also lead both parties to develop trust automatically. Trust is not regarded as a contributing factor of the ongoing relationship unless the services provided meet the service specifications. Despite the importance of close inter-organisational cooperation, the MRO provider and customer realise that the boundary of each company might be clearly drawn to prevent excessively interfering with their internal operations and destroying their relationship.

When the services are delivered, the performance of the delivered services is evaluated against the service specifications identified in the agreement between the MRO provider and customer. The performance of the MRO provider is also assessed to consider whether the MRO provider is capable of fulfilling the commitments identified in the agreement with the MRO customer. This performance evaluation provides feedback to the managers of the involved business areas, customer support

people and customer representatives for rectifying problems occurred and for improving the maintenance services.

In addition to the key factors of relationship management described above, the MRO provider and customer realise that their relationship is influenced by external factors. In particular, the lack of MRO capabilities in Europe causes an imbalance of power between the MRO provider and customer. The aircraft maintenance regulations which are issued by, for example, CAA and EASA have impact on controlling the quality of services as the unairworthy aircraft can cause catastrophic results.

### ***7.3.3 Performance measurement***

The research findings show that the gap model would be applicable for the development of performance measurement in aircraft maintenance outsourcing as the aircraft maintenance is viewed as a contracting service. Based on the initial study and the gap analysis of the current approach to performance measurement that PlaneCo used for evaluating its MRO providers' performance, the weaknesses of this current approach was analysed and identified. It found that gap 1 and gap 2 were associated with several weaknesses. In considering gap 1, costs and aircraft downtime, shown in Table 7-1, were not sufficient for ensuring that the right management perception of PlaneCo's requirements was created within the MRO provider. This is because PlaneCo failed to identify certain aspects of its requirements to its MRO providers. An example of these requirements is the cleanliness and tidiness of the serviced aircraft. PlaneCo also did not capture major issues for ensuring that the MRO providers were able to transfer PlaneCo's requirements from the strategic to operational levels, although PlaneCo found that the communication within the MRO companies was not sufficiently effective to do so.

**Table 7-1: Current performance metrics of gap 1 and gap 2**

| <b>Management level</b> | <b>Gap model</b>                  | <b>Performance criteria</b>      |
|-------------------------|-----------------------------------|----------------------------------|
| <i>Strategic level</i>  | <i>Gap 1: strategic alignment</i> | Aircraft downtime                |
|                         |                                   | Costs                            |
| <i>Business level</i>   | <i>Gap 2: service standard</i>    | Agreed aircraft downtime         |
|                         |                                   | Additional deferred defects      |
|                         |                                   | Actual aircraft downtime         |
|                         |                                   | Aircraft records                 |
|                         |                                   | Costs                            |
|                         |                                   | Aircraft input activities        |
|                         |                                   | Aircraft receipt and preparation |
|                         |                                   | MRO performance                  |
|                         |                                   | MRO performance workshop         |

In considering gap 2, the current performance metrics, shown in Table 7-1, were inadequate for assessing the effectiveness of resource allocation which has a substantial contribution to decreasing differences between management perceptions of PlaneCo’s requirements and service specifications. Moreover, the current approach to the performance measurement of gap 3 and 4 was found to be suitable for controlling the daily operations and supporting inter-organisational communication. In consequence, gap 5 was influenced by the weaknesses of gap 1 and gap 2 in particular.

Based on the weaknesses inherent in gap 1 and 2 and strengths of gap 3 and 4, a proposed version of the performance measurement model is developed, as shown in Figure 6-15. The new set of performance metrics of gap 1 covers all aspects of PlaneCo’s requirements. It is also used to measure the effectiveness of the strategic management of the MRO company and the deployment of this strategy through this organisation. Moreover, the proposed approach to performance measurement includes the metrics for assuring that the MRO provider is capable of fulfilling PlaneCo’s requirements particularly in the aspect of resource allocation.

As a consequence, the improved version of the performance measurement model provides feedback to PlaneCo and its MRO providers. This allows both parties to rectify problems and to improve the quality of maintenance services received. It also strengthens their communication and collaboration. It would also lead these two organisations to sustain their relationship with less debate.

#### **7.4 Research conclusion**

Based on the research aim and the three research questions, this research was divided into three stages, as shown in Figure 3-5. For Stage I, the literature review, multiple case studies in IT outsourcing and questionnaire survey in MRO outsourcing were investigated to understand and identify the key factors for outsourcing relationship management. The outcomes of this stage show that the management of relationship between a provider and a customer is most likely to comprise three common issues which are: mutual coordination, mutual dependence and communication. It also requires the provider and customer to manage the five key factors which are a clearly defined requirement, fair agreement, effective delivery governance, incorporated service delivery and sophisticated performance. This was then used as a fundamental knowledge for carrying out Stage II and III.

For Stage II, the three case study relationships featuring the four case companies, shown in Figure 3-2, were used for exploring how the relationship between an MRO provider and an MRO customer might be developed. They are the relationships between PlaneCo and Airline, PlaneCo and MRO Provider A and MRO Provider B and its customers. Interviews, observation and documentation reviews were selected for collecting data from these three case study relationships. Observation was also used for recording the environment and behaviour in the case study relationship between PlaneCo and Airline. As a result, the framework for managing the relationship between the MRO provider and the MRO customer, shown in Figure 5-12, was developed and then validated all interviewees from the four case companies.. It is comprised of six key factors which are: requirement clarification, well-constructed agreement, delivery governance mechanism, service delivery process, performance evaluation and inter-organisational coordination. These key factors seem to be affected by external factors such as an imbalance of demand and supply in MRO industry. The results also demonstrate that where the MRO provider and customer fail to follow best practices of IT outsourcing, it is likely to cause problems. There are four main failures that might cause difficulties for the MRO provider and customer in managing their relationship. They are the involvement of employees from strategic to operational levels in an inter-organisational team, the contribution of



strategic people to a successful MRO outsourcing throughout the period of agreement, the importance of goal and vision sharing and the impact of win-win situation.

For Stage III, performance measurement was selected to do an in-depth investigation as it is considered as a key factor for sustaining the relationship between an MRO provider and an MRO customer. The researcher carried out action research in cooperation with PlaneCo which is an intermediary company. The objective was to develop a new set of performance metrics for evaluating the quality of service received and the performance of PlaneCo's MRO providers. The gap model was found to be applicable in this research for analysing the current approach to performance measurement and developing the proposed approach to performance measurement. There were three main limitations inherent in the current approach which are: unclearly defined end-customer's requirements, improper management perception and insufficient resource allocation. As a result, the proposed model of performance measurement, shown in Figure 6-15, has been created with a new set of performance metrics. They include the customer's requirements, strategic management of the MRO provider, the deployment of the strategy through the MRO organisation and resource allocation. This proposed model is now in use by PlaneCo.

## **7.5 Contribution to knowledge**

The research presented in this thesis provides a comprehensive view of relationship management in aircraft MRO outsourcing. It has made three primary contributions to the body of knowledge.

Firstly, although the existing research regards relationship management as a key enabler of successful outsourcing management, there is a shortage of knowledge exploring how the outsourcing relationship might be managed. This shortage is identified particularly in the area of aircraft MRO outsourcing in which there is only one research study (Al-kaabi et al., 2007) that focuses on the MRO outsourcing decision, as shown in Figure 2-4. To address this gap, this research produced a relationship management framework for this type of outsourcing which is consisted of six key factors, as shown in Figure 5-12. This research also demonstrated how these key factors are currently managed and implemented in the context of aircraft MRO outsourcing. More importantly, the relationship management framework for aircraft maintenance outsourcing strongly represents how the relationship between the MRO

provider and customer might be improved. In addition, the research shows that the MRO provider and customer can develop more collaborative relationship by following good practices in relationship management for IT outsourcing, shown in Figure 4-5. As well as being relevant to aircraft MRO outsourcing, the relationship management framework is also likely to be valid for other outsourcing situations besides aircraft MRO as long as they can be categorised as critical outsourcing. This is indicated by the similarity between the relationship management framework for IT outsourcing, shown in Figure 4-5, which was validated by the IT case studies and that for aircraft maintenance outsourcing, shown in Figure 5-12.

Secondly, the gap model (Parasuraman et al., 1985) has been widely accepted and tested in the area of service marketing particularly in relation to business-to-customer (B2C) relationships. However, there are far fewer documented applications of the gap model to business service outsourcing management, such as IT service outsourcing. This research demonstrates that the gap model is applicable to relationship management in aircraft MRO outsourcing. In the context of this research, the gap model is used as a framework for developing a proposed version of the performance measurement model. The improved model might enable the MRO customer to ensure the quality of maintenance services provided by the MRO provider and to sustain their relationship.

Lastly, the research shows that performance evaluation is regarded as a key factor for outsourcing relationship management. However, there is a lack of research in the field of development of inter-organisational performance measurement particularly in the context of aircraft MRO outsourcing. To address this gap, this research has analysed the current approach to performance measurement by PlaneCo to identify its strengths and weaknesses. The research shows how this current approach can be evolved not only to improve the quality of aircraft maintenance service but also to strengthen the relationship between the MRO provider and customer. The proposed version of the performance measurement model is in use by the case company, PlaneCo, to solve particular problems. The problem was that a current approach to performance measurement covered only general information from the MRO providers, such as corporate information and capabilities. This did not provide particular quantified evidence for PlaneCO to demonstrate its capabilities not only in

monitoring its MRO partners' performance but also in fulfilling its end customers' requirements. The result of this improved model of performance measurement is that PlaneCo has successfully rectified this problem and has improved its relationship with its MRO providers and its customers.

In addition, the following list is a summary of new knowledge that has been derived from relationship management for IT outsourcing and MRO outsourcing, Stage I and II, and a proposed version of performance measurement model, Stage III.

*Stage I: key factors of relationship management*

- An involvement of employees from strategic to operational levels into an inter-organisational team might influence on defining the requirements of IT outsourcing project as clearly as possible.
- An involvement of strategic people throughout the periods of IT outsourcing project could have an impact on directing an IT outsourcing team to achieve the outcomes desired and to solve strategic problems.
- A feedback of performance evaluation to the direct counterparts of the IT provider and customer as well as to the inter-organisational team might facilitate solve problems or conflicts and to improve the performance of IT services effectively.

*Stage II: relationship management for aircraft MRO outsourcing*

- An involvement of employees from a multiple management levels of an MRO provider and an MRO customer into an inter-organisational team could influence on clarifying all aspects of each party's requirements and then translating these needs into the service specifications.
- A top management involvement might be a continuous process throughout the period of contract in order to direct the MRO outsourcing team to achieve outcomes desired and to solve strategic problems.
- An importance of goal sharing and win-win situation is unlikely to be recognised by the MRO provider and customer as they tend to focus more on their individual benefits.
- The length of interface document seems to have an impact on practicality and applicability of the document

- Meeting might be considered as a primary communication channel between the MRO provider and customer.
- There is no meeting held between an MRO provider, a middle man and an MRO customer unless the middle man plays an effective role in transferring and communicating information throughout the chain.
- Input and output metrics could be applied by an intermediary company in monitoring MRO providers' performance. This might be due to the fact that the intermediary company is able to match what its customers require with what its providers deliver.
- Performance measurement seems to be a two-way approach between the MRO provider and customer. It implies that performance measurement can be used not only for evaluating the performance of the MRO provider but also for assessing the performance of the MRO customer itself. This could result in a better coordination between these two parties.
- Survey might be applicable for capturing subjective aspects of performance which are difficult to numerically measure, such as communication.
- There might be a link between communication and continuous performance improvement and trust.

Stage III: performance measurement

- The gap model might be applicable to relationship management in aircraft maintenance outsourcing. It also seems to be used as a basis for developing a proposed approach to performance measurement.
- Performance metrics that seem to be subjective dimensions might be measured by a scaling approach. This provides a quantified evidence for an MRO provider and an MRO customer to ensure the quality of MRO services delivered.
- Strategic alignment could be important for assuring that the MRO provider actually understands what the MRO customer wants. This might be reflected from the effectiveness of the strategic management of the MRO provider and the deployment of the strategy through this organization.

- An ineffective allocation of resources which are required for MRO services might influence on the differences between management perceptions of customer expectations and service quality specification.

## **7.6 Limitations of research**

This section addresses the limitations of this research study. Most of the limitations resulted from the research methodology selected for the three research stages.

There were 25 attendees at the forum meeting in which the questionnaire survey was conducted. The number of attendees might not be sufficient to claim statistical significance although the response rate was 72%. The reason that this questionnaire was distributed only in this group was because of time and budget constraints. The purpose of this questionnaire was not to generate considerable statistical data but to gain a better understanding of relationship management in aircraft MRO outsourcing, about which there was limited knowledge. Moreover, the results of the questionnaire were compared to the findings from another two sources of evidence which were literature survey and multiple case studies in IT outsourcing. This improves validity and reliability of the research findings.

This research was carried out to gain insight into relationship management particularly for aircraft MRO outsourcing. The results therefore might not be entirely replicable in a wide variety of outsourcing industries. In other words, the research outcomes might not be adequately generalised for other types of outsourcing that have different characteristics to aircraft MRO outsourcing. However, they can most likely be generalised for other service outsourcing as long as they can be categorised as critical outsourcing, shown in Figure 2-2. This can be shown from similarities of the findings from IT outsourcing (Stage I) and aircraft MRO outsourcing (Stage II). These research findings are also validated with the literature review.

Time and budget are considered as research constraints that prevent the researcher collecting more evidence from a larger number of case companies. This could lead a better generalisation being drawn from the research findings. As an attempt to resolve this drawback, the researcher selected the three case companies which are in the same supply chain to cross check the data collected in order to improve validity of the findings. In addition, MRO Provider B, which is not in the same supply chain as

these three case companies, was investigated to ensure that the research findings can be sufficiently generalised across a sector of aircraft MRO outsourcing.

This research developed the proposed version of performance measurement model in cooperation with the main subject of this study, PlaneCO, by using the principles of action research. As such, it is difficult to transfer the research outcomes to other settings. It might also weaken the reliability of the research because there is less opportunity for a future investigator to arrive at the same findings and conclusions. However, the researcher attempted to generalise and validate the findings, including the current approach and the proposed approach to performance measurement, with the broader theories which relate to, for example, general principles of performance measurement and the gap model.

During the period of data collection at PlaneCo, the researcher performed a participant observation to collect in-depth data from PlaneCo for developing the proposed version of the performance measurement model. It is then difficult for the researcher to avoid biases. To resolve this problem, the rigorous cycle of action research, shown in Figure 6-2, was adopted. This enabled the researcher to remain unbiased.

Despite the limitations acknowledged above, the researcher was still able to draw reliable and valuable conclusions. The research aim and research questions were successfully addressed.

## **7.7 Recommendations for further research**

During the period of this research study, new research questions emerged not only from the limitations explained above but also from the research findings. This thesis ends with a presentation of where future researchers might like to direct their attention.

- The findings from the literature review show that there are eight key factors of relationship management of relevance to outsourcing. The questionnaire results do not provide statistical significance to support these key factors. This suggests that the questionnaire survey across the aircraft maintenance outsourcing industry should be conducted with a larger number of respondents which would then provide a thorough view of this industry.

- The framework of relationship management was constructed and validated in the context of aircraft MRO outsourcing. It is suggested that this framework should be tested in other outsourcing services particularly for the one categorised as critical outsourcing.
- As aircraft MRO outsourcing was selected as a business activity for this research, a larger number of cases should be investigated in depth, especially for the cases that have different characteristics from the case studied in this research. This will then improve the validity and generalisation of the research findings.
- The proposed approach to performance measurement is developed and validated only for the main subject of this study, PlaneCo. It is then suggested that this model should be tested in airlines and MRO providers. This will then confirm that this model is applicable beyond the case company which plays the role of intermediary.
- The research presents a new set of performance metrics. A descriptive survey to generalise these metrics across aircraft MRO outsourcing is suggested.
- This research shows that the gap model is applicable for the development of performance measurement in the context of aircraft MRO outsourcing. It is recommended that an application of the gap model in other outsourcing services such as IT outsourcing should be explored and investigated.

## REFERENCES

- Adams, C. M. (2004), "Inventory optimization techniques, system vs. item level inventory analysis", In: *Proceedings of Annual Reliability and Maintainability Symposium*, Los Angeles, California, 26-29 Jan 2004, pp. 55-60.
- Airbus (2007), *Global market forecast 2007-2026*, available at: [http://www.airbus.com/store/mm\\_repository/pdf/att00011423/media\\_object\\_file\\_GMF\\_2007.pdf](http://www.airbus.com/store/mm_repository/pdf/att00011423/media_object_file_GMF_2007.pdf) (accessed 16<sup>th</sup> April 2008).
- Alfares, H. K. (1999), "Aircraft maintenance workforce scheduling: a case study", *Journal of Quality in Maintenance Engineering*, vol. 5, no. 2, pp. 1355-2511.
- Al-kaabi, H., Potter, A. and Naim, M. (2007), "An outsourcing decision model for airlines' MRO activities", *Journal of Quality in Maintenance Engineering*, vol. 13, no. 3, pp. 217-227.
- Allen, B. A., Juillet, L., Paquet, G. and Roy, J. (2001), "E-Governance & government on-line in Canada: partnerships, people & prospects", *Government Information Quarterly*, vol. 18, no. 2, pp. 93-104.
- Anderson, J. C. and Narus, J. A. (1990), "A model of distributor firm and manufacturer firm working partnerships", *Journal of Marketing*, vol. 54, no. 1, pp. 42-58.
- Anderson, J. C. and Gerbing, D. W. (1985), "The effect of sampling error on convergence, improper solutions and goodness of fit indices for maximum likelihood confirmatory factor analysis", *Psychometrika*, vol. 20, no. 3, pp. 255-271.
- Argyris, C. and Schon, D. A. (1989), "Participatory action research and action science compared", *American Behavioural Scientists*, vol. 32, no. 5, pp. 612-623.
- Arnold, U. (2000), "New dimensions of outsourcing: a combination of transaction cost and the core competencies concept", *European Journal of Purchasing and Supply Management*, vol. 6, pp. 23-29.
- Aron, R., Clemons, E. K. and Reddi, S. (2005), "Just right outsourcing: understanding and managing risk", *Journal of Management Information System*, vol. 22, no. 2, pp. 37-55.
- Aubert, B. A., Rivard, S. and Patry, M. (2004), "A transaction cost model of IT outsourcing", *Information & Management*, vol. 41, no. 921, pp. 921-932.



- Babbie, E. (1990), *Survey research methods*, 2nd ed, Wadsworth Publishing Company, Belmont, California.
- Bagchi, P. K. and Virum, H. (1996), "European logistics alliances: a management model", *The International Journal of Logistics Management*, vol. 7, no. 1, pp. 93-108.
- Barnes, S., Liu, K. and Vidgen, R. (2001), "Evaluating WAP sites: the WebQual/m", In: *Proceedings of the 9th European Conference on Information Systems*, Bled, Slovenia, June 27-29 2001, pp. 344-355.
- Barrett, S. D. (2004), "The sustainability of the Ryanair model", *International Journal of Transport Management*, vol. 2, no. 2, pp. 89-98.
- Beasley, M., Bradford, M. and Pagach, D. (2004), "Outsourcing? at your own risk", *Strategic Finance*, vol. 86, no. 1, pp. 23-29.
- Bendor-Samuel, P. (2000), *Turning lead into gold: the demystification of outsourcing*, Publishers Press, United States.
- Bensaou, M. (1999), "Portfolios of buyer-supplier relationships", *Sloan management review*, vol. 40, no. 4, pp. 35-44.
- Birnberg, J. G. (1998), "Control in interfirm co-operative relationships", *Journal of Management Studies*, vol. 35, no. 4, pp. 421-428.
- Blaikie, N. W. H. (2000), *Designing social research*, Polity Press, Cambridge.
- Blaxill, M. F. and Hout, T. M. (1991), "The fallacy of the overhead quick fix", *Harvard Business Review*, vol. 69, no. 4, pp. 93-101.
- Boulding, W., Kalra, A., Staelin, R. and Zeithaml, V. A. (1993), "A dynamic process model of service quality: from expectations to behavioral intentions", *Journal of Marketing Research*, vol. 30, no. 1, pp. 7-27.
- Bowersox, , Donald J., Closs, D., J. and Cooper, M. B. (2002), *Supply chain logistics management*, The International ed, Mc-Graw Hill, New York.
- Boyle, B., Dwyer, R. R., Robicheaus, R. A. and Simpsons, J. T. (1992), "Influence strategies in marketing channels: measures and use in different relationship structures", *Journal of Marketing Research*, vol. 29, no. 4, pp. 462-473.
- Brace, I. (2004), *Questionnaire design: how to plan, structure and write survey material for effective market research*, Kogan Page Limited, United Kingdom.

- Brady, M. K., Cronin, J. J. and Brand, R. R. (2002), "Performance-only measurement of service quality: a replication and extension", *Journal of Business Research*, vol. 55, no. 1, pp. 17-31.
- Brandes, H., Lilliecreutz, J. and Brege, S. (1997), "Outsourcing-success or failure?", *European Journal of Purchasing and Supply Management*, vol. 3, no. 2, pp. 63-75.
- Brignall, S. and Ballantine, J. (1996), "Performance measurement in service businesses revisited", *International Journal of Service Industry Management*, vol. 7, no. 1, pp. 6-31.
- Bullington, K. and Bullington, S. F. (2005), "Stronger supply chain relationships: learning from research on strong families", *An International Journal of Supply Chain Management*, vol. 10, no. 3, pp. 192-197.
- Burns, R. B. (2000), *Introduction to research methods*, 4th ed, SAGE Publications Ltd., London, UK.
- Campbell, J. D. (1995), *Uptime: strategies for excellence in maintenance management*, Productivity Press, Portland.
- Cannon, J. and Perreault, W. D. J. (1999), "Buyer-seller relationships in business markets", *Journal of Marketing Research*, vol. 36, no. 4, pp. 439-460.
- Cascio, W. F. (2005), "From business partner to driving business success: the next step in the evolution of HR management", *Human resource management*, vol. 44, no. 2, pp. 159-163.
- Centre for Facilities Management (1999), *CFM briefing*, Quadrant Strathclyde Limited, Strathclyde.
- Chakrabarty, S., Whitten, D. and Green, K. (2007/2008), "Understanding service quality and relationship quality in IS outsourcing: client orientation & promotion, project management effectiveness and the task-technology-structure fit", *Journal of Computer Information Systems*, vol. 48, no. 2, pp. 1-15.
- Chalos, P. and Sung, J. (1998), "Outsourcing decision and managerial incentives", *Decision Science*, vol. 29, no. 4, pp. 901-919.
- Chan, F. T. S. and Qi, H. J. (2003), "Feasibility of performance measurement system for supply chain: a process based approach and measures", *Integrated Manufacturing Systems*, vol. 14, no. 3, pp. 179-190.
- Chandra, R. and Shankar, V. (2004/Autumn), "Business process outsourcing: a cost perspective", *European Business Forum*, no. 19, pp. 50-53.

- Charron, K. G. (2006), "Why KPIs belong in supply chain contracts", *Supply Chain Management Review*, vol. 10, no. 2, pp. 22-28.
- Chen, I. J., Paulraj, A. and Lado, A. A. (2004), "Strategic purchasing, supply management and firm performance", *Journal of Operations Management*, vol. 22, no. 5, pp. 505-523.
- Chen, L. and Soliman, K. S. (2002), "Managing IT outsourcing: a value-driven approach to outsourcing using application service providers", *Logistics Information Management*, vol. 15, no. 3, pp. 180-191.
- Corswant, F. V. and Fredriksson, P. (2002), "Sourcing trends in the car industry: a survey of car manufacturers' and suppliers' strategies and relations", *International Journal of Operations & Production Management*, vol. 22, no. 7, pp. 741-758.
- Cosley, D. J. and Lury, D. A. (1987), *Data collection in developing countries*, 2nd ed, Clarendon Press, Oxford.
- Cousins, P. D., Lawson, B. and Squire, B. (2008), "Performance measurement in strategic buyer-supplier relationships: the mediating role of socialization mechanisms", *International Journal of Operations & Production Management*, vol. 28, no. 3, pp. 238-258.
- Cronin, J. J. and Taylor, S. A. (1992), "Measuring service quality: a reexamination and extension", *Journal of Marketing*, vol. 56, no. 3, pp. 55-68.
- Cross, J. (1995), "IT outsourcing: British petroleum's competitive approach", *Harvard Business Review*, vol. 73, no. 3, pp. 94-102.
- Cullen, S. (2005), "Technology and offshore outsourcing strategies", in Brudenall, P. (ed.) *Designing successful outsourcing relationships-selected techniques from a lifecycle perspective*, Palgrave Macmillan, Basingstoke, pp. 187-207.
- Cummings, T., G. (1984), "Transorganizational development", *Research in Organizational Behavior*, vol. 6, pp. 367-422.
- Dabholkar, P. A., Shepherd, C. D. and Thorpe, D. I. (2000), "A comprehensive framework for service quality: an investigation of critical conceptual and measurement issues through a longitudinal study", *Journal of Retailing*, vol. 76, no. 2, pp. 139-173.
- Das, T. K. and Teng, B. (2001), "Trust, control and risk in strategic alliances: an integrated framework", *Organization Studies*, vol. 22, no. 2, pp. 251-283.

- Dean, A. M. and Kiu, C. (2002), "Performance monitoring and quality outcomes in contracted services", *International Journal of Quality & Reliability Management*, vol. 19, no. 4, pp. 396-413.
- Deepen, J. M. (2007), *Logistics outsourcing relationships: measurement, antecedents and effects of logistics outsourcing performance*, Physica-Verlag, Heidelberg.
- Delaney, E. (2004), "Relationship counseling", *Utility Week*, vol. 21, no. 8, pp. 22.
- Demirkan, H. and Chen, H. K. (2008), "The risk and information sharing of application services supply chain", *European Journal of Operational Research*, vol. 187, no. 3, pp. 765-784.
- Domberger, S. (1994), "Public sector contracting: does it work?", *The Australian Economic Review*, vol. 3rd Quarter, no. 107, pp. 91-96.
- Domberger, S. (1998), *The contracting organization: a strategic guide to outsourcing*, Oxford University Press, Great Britain.
- Dotchin, J. A. and Oakland, J. S. (1994), "Total quality management in services: Part 1: Understanding and classifying services", *International Journal of Quality & Reliability Management*, vol. 11, no. 3, pp. 9-26.
- Drejer, A. and Sorensen, S. (2002), "Succeeding with sourcing of competencies in technology-intensive industries", *International Journal of Benchmarking*, vol. 19, no. 4, pp. 388-408.
- Dreyer, D. E. (2000), "Performance measurement: a practitioner's perspective", *Supply Chain Management Review*, vol. 4, no. 4, pp. 62-68.
- Duarte, G. M. (2005), *A study of the process and problems of strategic outsourcing on-going management* (unpublished Doctor of Philosophy thesis), Cranfield University, Cranfield, United Kingdom.
- Duarte, G. M., Sackett, P. J. and Evans, S. (2004), "One style does not fit all", *Manufacturing Engineer*, vol. 83, no. 4, pp. 44-48.
- Dyer, J. H. and Chu, W. (2000), "The determinants of trust in supplier-automaker relationships in the U.S., Japan and Korea", *Journal of International Business Studies*, vol. 31, no. 2, pp. 259-285.
- Dyer, J. H. and Ouchi, W. G. (1993), "Japanese-style partnership: giving companies a competitive edge", *Sloan Management Review*, vol. 35, no. 1, pp. 51-63.
- Eccles, R. G. and Pyburn, P. J. (1992), "Creating a comprehensive system to measure performance", *Management Accounting*, vol. 74, no. 4, pp. 41-44.

- Eckerson, W. W. (2006), *Performance dashboard: measuring, monitoring and managing your business*, John Wiley & Sons, Inc, USA.
- Eden, C. and Huxman, C. (1996), "Action research for management research", *British Journal of Management*, vol. 7, pp. 75-86.
- Ehie, I. C. (2001), "Determinants of success in manufacturing outsourcing decisions: a survey study", *Production and Inventory Management Journal*, vol. 42, no. 1, pp. 31-39.
- Eisenhardt, K. M. (1989), "Building theories from case study research", *Academy of Management Review*, vol. 14, no. 4, pp. 532-550.
- Elfing, T. and Baven, G. (1994), "Outsourcing technical services: stages of development", *Long Range Planning*, vol. 27, no. 5, pp. 42-51.
- Ellram, L. M. :. (1991), "A managerial guideline for the development and implementation of purchasing partnerships", *International Journal of Purchasing and Materials Management*, vol. 27, no. 3, pp. 2-8.
- Emmett, S. and Crocker, B. (2006), *The relationship-driven supply chain: creating a culture of collaboration throughout the chain*, Gower, Aldershot.
- Esker, E. A., Simpson, W. R. and Sheppard, J. W. (1990), "An embedded maintenance subsystem", In: *AUTOSECTION 90 IEEE Systems Readiness Technology Conference*, San Antonio, Texas, 17-21 Sept 1990, pp. 331-336.
- Euske, K. J., Lebas, M. J. and McNair, C. J. (1993), "Performance measurement in an international setting", *Management Accounting Research*, vol. 4, pp. 275-299.
- Farrington, B. and Waters, D. W. F. (1996), *A practical guide to world-class buying*, Chapman & Hall, London.
- Fernandez, S. (2007), "What works best when contracting for service?: an analysis of contracting performance at the local level in the US", *Public Administration*, vol. 85, no. 4, pp. 1119-1141.
- Fink, R. C., Edelman, L. F., Hatten, K. J. and James, W. L. (2006), "Transaction cost economics, resource dependence theory and customer-supplier relationships", *Industrial and Corporate Change*, vol. 15, no. 3, pp. 497-529.
- Flint, P. (2007), "Balancing act", *Air Transport World*, vol. 44, no. 11, pp. 47-54.
- Frazer, L. and Lawley, M. (2000), *Questionnaire design & administration*, John Wiley & Sons Australia, Ltd, Brisbane.

- Frazier, G. L. (1983), "Interorganizational exchange behavior in marketing channels: a broadened perspective", *Journal of Marketing*, vol. 47, no. 4, pp. 68-78.
- Frost, F. A. and Kumar, M. (2000), "INTSERVQUAL-an internal adaptation of the GAP model in a large service organisation", *Journal of Services Marketing*, vol. 14, no. 5, pp. 358-377.
- Fuma'h, A. H. and Wood, D. (2000), "Outsourcing implications on companies' profitability and liquidity: a sample of UK companies", *Work Study*, vol. 49, no. 7, pp. 265-275.
- Galliers, R. (1992), *Information systems research: issues, methods, and practical guidelines*, Blackwell Scientific, Oxford.
- Gelderman, C. J. and Van Weele, A. J. (2005), "Purchasing portfolio models: a critique and update", *Journal of Supply Chain Management: A Global Review of Purchasing & Supply*, vol. 41, no. 3, pp. 19-28.
- Ghobadian, A., Speller, S. and Jones, M. (1994), "Service quality: concepts and models", *International Journal of Quality & Reliability Management*, vol. 11, no. 9, pp. 43-66.
- Ghobbar, A. A. and Friend, C. H. (2003), "Evaluation of forecasting methods for intermittent parts demand in the field of aviation: a predictive model", *Computers & Operations Research*, vol. 30, no. 14, pp. 2097-2114.
- Goles, T. and Chin, W. (2002), "Relational exchange theory and IS outsourcing: developing a scale to measure relationship factors", in Hirschheim, R. H. and Dibbern, J. (eds.) *Information systems outsourcing: enduring themes, emergent patterns and future directions*, Springer Verlag, Berlin, pp. 221-250.
- Gonzalez, R., Gasco, J. and Llopis, J. (2005), "Information systems outsourcing risks: a study of large firms", *Industrial management & Data Systems*, vol. 105, no. 1, pp. 45-62.
- Gottfredson, M., Puryear, R. and Philips, S. (2005), "Strategic sourcing: from periphery to the core", *Harvard Business Review*, vol. 83, no. 2, pp. 132-139.
- Gottschalk, P. and Solli-Saether, H. (2005), "Critical success factors from IT outsourcing theories: an empirical study", *Industrial Management & Data Systems*, vol. 105, no. 6, pp. 685-702.
- Gronroos, C. (1982), *Strategic management and marketing in the service sector*, Swedish School of Economics and Business Administration, Helsingfors.
- Gronroos, C. (1984), "A service quality model and its marketing implications", *European Journal of Marketing*, vol. 18, no. 4, pp. 36-44.

- Grover, V. and Cheon, M. J. (1996), "The effect service quality and partnership on the outsourcing of information systems functions", *Journal of Management Information Systems*, vol. 12, no. 4, pp. 89-116.
- Gunasekaran, A., Patel, C. and Tirtiroglu, E. (2001), "Performance measures and metrics in a supply chain environment", *International Journal of Operations & Production Management*, vol. 21, no. 1, pp. 71-87.
- Hakim, C. (1987), *Research design: strategies and choices in the design of social research*, Allen & Unwin, London.
- Hall, C. and Rimmer, S. J. (1994), "Performance monitoring and public sector contracting", *Australian Journal of Public Administration*, vol. 53, no. 4, pp. 453-461.
- Hamel, G. and Prahalad, C. K. (1994), "Competing for the future", *Harvard Business Review*, vol. 72, no. 4, pp. 122-128.
- Handfield, R. B. and Nichols, E. L. (1999), *Introduction to supply chain management*, Prentice Hall, Upper Saddle River, NJ.
- Handy, C. (1995), "Trust and the virtual organisation", *Harvard Business Review*, vol. 73, no. 3, pp. 40-50.
- Harland, C., Knight, L., Lamming, R. and Walker, H. (2005), "Outsourcing: assessing the risks and benefits for organisations, sectors and nations", *International Journal of Operations & Production Management*, vol. 25, no. 9, pp. 831-850.
- Hart, C. (1998), *Doing a literature review*, SAGE Publications Ltd., London.
- Heavisides, B. and Price, I. (2001), "Input versus output-based performance measurement in the NHS-the current situation", *Facilities*, vol. 19, no. 10, pp. 344-356.
- Heide, J. B. and John, G. (1990), "Alliances in industrial purchasing: the determinants of joint action in buyer-supplier relationships", *Journal of Marketing Research*, vol. 27, no. 1, pp. 24-36.
- Heide, J. B. and George, J. (1988), "The role of dependence balancing in safeguarding transactional-specific assets in conventional channels", *Journal of Marketing*, vol. 52, no. 1, pp. 20-35.
- Henderson, J. C. (Spring90), "Plugging into strategic partnerships: the critical IS connection", *Sloan management review*, vol. 31, no. 3, pp. 7-18.
- Herriot, R. E. and Firestone, W. A. (1983), "Multisite qualitative policy research: optimizing description and generalizability", *Educational Researcher*, vol. 12, no. 14-19.

- Hitt, M. A., Ireland, R. D. and Hoskisson, R. E. (2003), "The internal environment: resources, capabilities and core competencies", in Hitt, M. A., Ireland, R. D. and Hoskisson, R. E. (eds.) *Strategic management: competitiveness and globalization*, 5th ed, Thomson South-Western, Ohio, pp. 72-105.
- Holmberg, S. (2000), "A system perspective on supply chain measurement", *International Journal of Physical Distribution & Logistics Management*, vol. 30, no. 10, pp. 847-868.
- Hsu, C., Wu, C. and Hsu, J. C. (2005), "Performance evaluation of information system outsourcing in Taiwan's large enterprise", *Journal of American Academy of Business*, vol. 6, no. 2, pp. 255-259.
- Hurley, M. (2001), "IT outsourcing-managing the key asset", *Information Management and Computer Security*, vol. 9, no. 5, pp. 243-249.
- Hussey, J. and Hussey, R. (1997), *Business research: a practical guide for undergraduate and postgraduate students*, PALGRAVE, United States.
- Hutton, P. F. (1990), *Survey research for managers: how to use surveys in management decision-making*, 2nd ed, Macmillan, Basingstoke, Hampshire.
- IATA Economics (October 2007), *IATA economic briefing passenger and freight forecasts 2007 to 2011*.
- Ittner, Christopher D., Larcker, David F., Nagar, V. and Rajan, Madhav V. (1999), "Supplier selection, monitoring practices and firm performance", *Journal of Accounting and Public Policy*, vol. 18, pp. 253-281.
- Jae-Nam Lee, Huynh, M. Q., Ron Chi-Wai Kwok and Shih-Ming Pi (2003), "IT outsourcing evolution: past, present and future", *Communications of the ACM*, vol. 46, no. 5, pp. 84-89.
- Jap, S. D. and Anderson, E. (2003), "Safeguarding interorganizational performance and continuity under ex post opportunism", *Management Science*, vol. 49, no. 12, pp. 1684-1701.
- Kakabadse, A. and Kakabadse, N. (2005), "Outsourcing: current and future trends", *Thunderbird International Business Review*, vol. 47, no. 2, pp. 183-204.
- Kaplan, R. S. and Norton, D. R. (2005), "The balanced scorecard: measures that drive performance (cover story)", *Harvard business review*, vol. 83, no. 7, pp. 172-180.



- Kim, S. and Young-Soo, C. (2003), "Critical success factors for IS outsourcing: implementation from an interorganizational relationship perspective", *Journal of Computer Information Systems*, vol. 43, no. 4, pp. 81-90.
- Kishore, R., Rao, H. R., Nam, K., Rajagopalan, S. and Chaudhury, A. (2003), "A relationship perspective on IT outsourcing", *Communications of the ACM*, vol. 46, no. 12, pp. 86-92.
- Kliem, R. L. (1999/Summer), "Managing the risks of outsourcing agreements", *Information Systems Management*, vol. 16, no. 3, pp. 91-93.
- Konsynski, B. R. and McFarlan, F. W. (1990), "Information partnerships-shared data, shared scale", *Harvard business review*, vol. 68, no. 5, pp. 114-120.
- Kumar, S. and Snavely, T. (2004), "Outsourcing and strategic alliances for product development: a case of Banta Digital Group", *Technovation*, vol. 24, no. 12, pp. 1001-1010.
- Lacity , Mary C., Willcocks , Leslie P. and Feeny , David F. (1995), "IT outsourcing: maximize flexibility and control", *Harvard Business Review*, vol. 73, no. 3, pp. 84-93.
- Langeard, E., Bateson, John E. G., Lovelock, C. H. and Eiglier, P. (1981), *Services marketing: New insights from consumers and managers*, Marketing Science Institute, Cambridge.
- Langfield-Smit, K. and Smith, D. (2003), "Management control systems and trust in outsourcing relationships", *Management Accounting Research*, vol. 14, pp. 281-307.
- Lapide, L. (2000), "True measures of supply chain performance", *Supply Chain Management Review*, vol. 4, no. 3, pp. 25-28.
- Lasher, D. R. and Ives, B. (1991), "USAA-IBM partnerships in information technology: managing the image project", *MIS Quarterly*, vol. 15, no. 4, pp. 551-565.
- Leavy, B. (2004), "Outsourcing strategies: opportunities and risks", *Strategy & Leadership*, vol. 32, no. 6, pp. 20-25.
- Leung, T., Carroll, T., Hung, M., Tsang, A. and Chung, W. (2007), "The carroll-hung method for component reliability mapping in aircraft maintenance", *Quality and Reliability Engineering International*, vol. 23, no. 1, pp. 137-154.
- Levina, N. and Ross, J. W. (2003), "From the vendor's perspective: exploring the value proposition in information technology outsourcing", *MIS Quarterly*, vol. 27, no. 3, pp. 331-364.

- Levitt, T. (1981), "Marketing intangible products and product intangibles", *Harvard Business Review*, vol. 59, no. 3, pp. 94-102.
- Lewis, B. R. (1993), "Service quality measurement", *Marketing Intelligence & Planning*, vol. 11, no. 4, pp. 4-12.
- Lilly, J. D. and Gray, D. A. (2005), "Outsourcing the human resources function: environmental and organizational characteristics that affect HR performance", *Journal of Business Strategies*, vol. 22, no. 1, pp. 55-73.
- Lynch, C. F. (2004), *Logistics outsourcing: a management guide*, 2nd ed, CFL Publishing, Memphis.
- Lynch, R. L. and Cross, K. (1991), *Measure up!: yardsticks for continuous improvement*, Blackwell, Cambridge.
- Maloni, M. J. and Benton, W. C. (1997), "Supply chain partnerships: opportunities for operations research", *European Journal of Operational Research*, vol. 101, no. 3, pp. 419-429.
- Martinsons, M. G. (1993), "Outsourcing information systems: a strategic partnership with risks", *Long range planning*, vol. 26, no. 3, pp. 18-25.
- Maskel, B. H. (1991), *Performance measurement for world class manufacturing*, Productivity Press, Portland.
- May, T. (1993), *Social research: issues, methods and process*, Open University Press, Buckingham, United Kingdom.
- Maylor, H. and Blackmon, K. (2005), *Researching business and management*, PALGRAVE MACMILLAN, Hampshire.
- McFarlan, F. W. and Nolan, R. L. (1995), "How to manage an IT outsourcing alliance", *Sloan Management Review*, vol. 36, no. 2, pp. 9-23.
- McIvor, R., Humphreys, P. and McCurry, L. (2003), "Electronic commerce: supporting collaboration in the supply chain?", *Journal of Materials Processing Technology*, vol. 139, no. 1, pp. 147-152.
- McIvor, R. (2000), "A practical framework for understanding the outsourcing process", *An International Journal of Supply Chain Management*, vol. 5, no. 1, pp. 22-36.
- McIvor, R. (2003), "Outsourcing; insights from the telecommunications industry", *An International Journal of Supply Chain Management*, vol. 8, no. 4, pp. 380-394.
- Microsoft, (2003), *Microsoft Excel (Windows)*, Microsoft Corporation, United States.

- Miles, M. B. and Huberman, A. M. (1994), *Qualitative data analysis*, 2nd ed, SAGE Publications, Inc., Thousand Oaks, California.
- Misra, R. B. (2004), "Global IT outsourcing: Metrics for success of all parties", *Journal of Information Technology Cases and Applications*, vol. 6, no. 3, pp. 21-34.
- Mohr, J. and Spekman, R. (1994), "Characteristics of partnership success: partnership attributes, communication behavior and conflict resolution techniques", *Strategic Management Journal*, vol. 15, no. 2, pp. 135-152.
- Momme, J. and Hvolby, H. (2002), "An outsourcing framework: action research in the heavy industry", *European Journal of Purchasing and Supply Management*, vol. 8, no. 4, pp. 185-196.
- Monczka, R., Trent, R. and Handfield, R. (2002), *Purchasing and supply chain management*, South-Western, Mason.
- Neely, A. (2005), "The evolution of performance measurement research: developments in the last decade and a research agenda for the next", *International Journal of Operations & Production Management*, vol. 25, no. 12, pp. 1264-1277.
- Neely, A., Gregory, M. and Platts, K. (2005), "Performance measurement system design: a literature review and research agenda", *International Journal of Operations & Production Management*, vol. 25, no. 12, pp. 1228-3577.
- Neuman, W. L. (2003), *Social research methods: qualitative and quantitative approaches*, Pearson Education Inc, United States of America.
- Ngwenyama, O. K. and Bryson, N. (1999), "Making the information systems outsourcing decision: a transaction cost approach to analyzing outsourcing decision problem", *European Journal of Operational Research*, vol. 115, pp. 351-367.
- Noordewier, T. G., George, N. and John, R. (1990), "Performance outcomes of purchasing arrangements in industrial buyer-vendor relationship", *Journal of Marketing*, vol. 54, no. 4, pp. 83-93.
- Nooteboom, B. (1996), "Trust, opportunism and governance: a process and control model", *Organization Studies*, vol. 17, no. 6, pp. 985-1010.
- Nuthall, L. (2003), "Supply chain performance measures and systems", in Gottorna, J. L., Ogulin, R. and Reynolds, M. W. (eds.) *Gower handbook of supply chain management*, 5th ed, Gower Publishing, Aldershot, England.
- Oppenheim, A. N. (1992), *Questionnaire design, interviewing and attitude measurement*, 2nd ed, Continuum, London.

- Parasuraman, A. (1998), "Customer service in business-to-business markets: an agenda for research", *Journal of Business & Industrial Marketing*, vol. 13, no. 4, pp. 309-321.
- Parasuraman, A. (2004), "Assessing and improving service performance for maximum impact: insights from a two-decade-long research journey", *Performance Measurement and Metrics*, vol. 4, no. 2, pp. 45-52.
- Parasuraman, A. and Zeithaml, V. A. (1983), "Differential perceptions of suppliers and clients of industrial services", in Berry, L., Shostack, G. L. and Upha, G. (eds.) *Emerging perspectives on services marketing*, American Marketing Association, Chicago, pp. 35-39.
- Parasuraman, A., Zeithaml, V. A. and Berry, L. L. (1985), "A conceptual model of service quality and its implications for future research", *Journal of Marketing*, vol. 49, no. 4, pp. 41-50.
- Parasuraman, A., Zeithaml, V. A. and Berry, L. L. (1988), "SERVQUAL: a multiple item scale for measuring consumer perception of service quality", *Journal of Retailing*, vol. 64, no. 1, pp. 12-37.
- Parasuraman, A., Zeithaml, V. A. and Berry, L. L. (1994), "Alternative scales for measuring service quality: a comparative assessment based on psychometric and diagnostic criteria", *Journal of Retailing*, vol. 70, no. Fall, pp. 201-230.
- Philip, G. and Hazlett, S. (1997), "The measurement of service quality: a new P-C-P attributes model", *International Journal of Quality & Reliability Management*, vol. 14, no. 3, pp. 260-286.
- Pilling, M. (2005), "Turning the screw", *Airline Business*, vol. 21, no. 10, pp. 44-49.
- Pitt, L. F., Watson, R. T. and Kavan, C. B. (1995), "Service quality: a measure of information systems effectiveness", *MIS Quarterly*, vol. 9, no. 2, pp. 173-187.
- Platz, L. A. and Temponi, C. (2007), "Defining the most desirable outsourcing contract between customer and vendor", *Management Decision*, vol. 45, no. 10, pp. 1656-1666.
- Porter, L. W., Steers, R., M., Mowday, R. T. and Boulian, P. V. (1974), "Organizational commitment, job satisfaction and turnover among psychiatric technicians", *Journal of Applied Psychology*, vol. 59, no. 5, pp. 603-609.
- Porter, M. E. (1990), "The competitive advantage of nations", *Harvard Business Review*, vol. 68, no. 2, pp. 73-93.
- Porter, M. E. and Fuller, M. B. (1986), "Coalitions and global strategy", in Porter, M. E. (ed.) *Competition in Global Industries*, Harvard Business School Press, Boston, pp. 315-343.

- Prahinski, C. and Benton, W. C. (2004), "Supplier evaluations: communication strategies to improve supplier performance", *Journal of Operations Management*, vol. 22, no. 1, pp. 39-62.
- Quinn, J. B. (1999), "Strategic outsourcing: Leveraging knowledge capabilities", *Sloan management review*, vol. 40, no. 4, pp. 9-21.
- Quinn, J. B. and Hilmer, G. F. (1994), "Strategic outsourcing", *Sloan management review*, vol. 35, no. 4, pp. 43-55.
- Qureshi, M. N., Kumar, D. and Kumar, P. (2007), "Modeling the logistics outsourcing relationship variables to enhance shippers' productivity and competitiveness in logistics supply chain", *International Journal of Productivity and Performance Management*, vol. 56, no. 8, pp. 689-714.
- Richmond, W. B. and Seidmann, A. (1993), "Software development outsourcing contract: structure and business value", *Journal of Management Information Systems*, vol. 10, no. 1, pp. 57-72.
- Rigby, D. and Bilodeau, B. (2007), "Bain's global 2007 management tools and trends survey", *Strategy & Leadership*, vol. 35, no. 5, pp. 9-16.
- Ring, P. S. and Ven, V. D. (1992), "Structuring cooperative relationships between organizations", *Strategic Management Journal*, vol. 13, no. 7, pp. 483-498.
- Robson, C. (2002), *Real world research: a resource for social scientists and practitioner-researchers*, 2nd ed, Blackwell Publishing, Oxford.
- Rosenberg, B. (2004), *Everybody's doing it; airline maintenance strategies are diverse, but all include an element of outsourcing*, Aviation Week & Space Technology.
- Sachon, M. and Pate-Cornell, E. (2000), "Delays and safety in airline maintenance", *Reliability Engineering and System*, vol. 67, no. 3, pp. 301-309.
- Sakburanapech, A. and Sackett, P. J. (2006), "Criterion for success in critical outsourcing", in Wu, G., Zie, w. and von Zedtwitz, M. (eds.), In: *15th International Conference on Management of Technology*, Tsinghua University, Beijing, China, Vol. 15, 22-26 May 2006, pp. 143-150.
- Sako, M. (1992), *Prices, quality and trust: inter-firm relationships in Britain and Japan*, Cambridge Universtiy Press, Cambridge.
- Sako, M. and Helper, S. (1998), "Determinants of trust in supplier relations: evidence from the automotive industry in Japan and the United States", *Journal of Economic Behavior & Organization*, vol. 34, no. 3, pp. 387-417.

- Santos, J. (2003), "E-service quality: a model of virtual service quality dimensions", *Managing Service Quality*, vol. 13, no. 3, pp. 233-246.
- Schrage, M. (1990), *Shared minds: the new technologies of collaboration*, Random House, New York.
- Seristo, S. H. (1995), *Airline performance and costs: an analysis of performance measurement and cost reduction in major airlines* (unpublished Ph.D. thesis), Helsinki School of Economics, Helsinki.
- Seth, N., Deshmukh, S. G. and Vrat, P. (2006a), "A conceptual model for quality of service in the supply chain", *International Journal of Physical Distribution & Logistics Management*, vol. 36, no. 7, pp. 547-575.
- Seth, N., Deshmukh, S. G. and Vrat, P. (2006b), "A framework for measurement of quality of service in supply chains", *An International Journal of Supply Chain Management*, vol. 11, no. 1, pp. 82-94.
- Seth, N., Deshmukh, S. G. and Vrat, P. (2005), "Service quality models: a review", *International Journal of Quality & Reliability Management*, vol. 22, no. 9, pp. 913-949.
- Sethuraman, R., Anderson, J. C. and Narus, J. A. (1988), "Partnership advantage and its determinants in distributor and manufacturer working relationships", *Journal of Business Research*, vol. 17, no. 4, pp. 327-347.
- Sigala, M. (2004), "The ASP-Qual model: measuring ASP service quality in Greece", *Managing Service Quality*, vol. 14, no. 1, pp. 103-114.
- Sparrow, E. (2003), *Successful IT outsourcing*, Springer-Verlag London Limited, Great Britain.
- Stringer, E. T. (1999), *Action research*, 2nd ed, SAGE Publications Ltd., United States of America.
- Sullivan, L. (2004), "The O world outsourcing overseas", *Risk Management*, vol. 51, no. 7, pp. 24-30.
- Teng, J. T. C., Cheon, M. I. and Grover, V. (1995), "Decisions to outsource information systems functions: testing a strategy-theoretic discrepancy model", *Decision Science*, vol. 26, no. 1, pp. 75-103.
- Tomkins, C. (2001), "Interdependencies, trust and information in relationships, alliances and networks", *Accounting, Organizations & Society*, vol. 26, no. 2, pp. 161-191.

- Toni, A. D. and Tonchia, S. (2001), "Performance measurement systems: models, characteristics and measures", *International Journal of Operations & Production Management*, vol. 21, no. 1/2, pp. 46-70.
- Tsang, A. H. C., Jardine, A. K. S. and Kolodny, H. (1999), "Measuring maintenance performance: a holistic approach", *International Journal of Operations & Production Management*, vol. 19, no. 7, pp. 691-715.
- Van der Meer-Kooistra, Jeltje and Vosselman, E. G. J. (2000), "Management control of interfirm transactional relationships: the case of industrial renovation and maintenance", *Accounting, Organizational and Society*, vol. 25, no. 1, pp. 51-77.
- Van Laarhoven, P., Berglund, M. and Peters, M. (2000), "Third-party logistics in Europe-five years later", *International Journal of Physical Distribution and Logistics Management*, vol. 30, no. 5, pp. 425-442.
- Van Weele, Arjan J. (2005), *Purchasing and supply chain management: analysis, strategy, planning and practice*, Thomson Learning, London.
- Varma, S., Wadhwa, S. and Deshmukh, S. G. (2006), "Implementing supply chain management in a firm: issues and remedies", *Asia Pacific Journal of Marketing and Logistics*, vol. 18, no. 3, pp. 223-243.
- Vuorinen, I., Javinen, R. and Lehtinen, U. (1998), "Content and measurement of productivity in the service sector: a conceptual analysis with an illustrative case from the insurance business", *International Journal of Service Industry Management*, vol. 9, no. 4, pp. 377-396.
- Walliman, N. (2005), *Your research project*, 2nd ed, SAGE Publications Ltd., London.
- Walsh, M. (2001), *Research made real: A guide for students*, Nelson Thornes Ltd., Cheltenham.
- Webb, L. and Laborde, J. (2005), "Crafting a successful outsourcing vendor/client relationship", *Business Press Journal*, vol. 11, no. 5, pp. 437-443.
- Willcocks, L. and Fitzgerald, G. (1994), *A business guide to outsourcing IT: a study of European best practice in the selection, management and use of external IT services*, Business Intelligence, London.
- Willcocks, L. and Choi, C. J. (1995), "Co-operative partnership and 'total' IT outsourcing: from contractual obligation to strategic alliance", *European Management Journal*, vol. 13, no. 1, pp. 67-78.

- Willcocks, L., Lacity, M. and Fitzgerald, G. (1995), "Information Technology outsourcing in Europe and the USA: assessment issues", *International Journal of Information Management*, vol. 15, no. 5, pp. 333-351.
- Williamson, O. E. (1979), "Transaction-cost economics: the governance of contractual relations", *Journal of Law and Economics*, vol. 22, no. 2, pp. 233-261.
- Williamson, O. E. (1985), *The economic institutions of capitalism*, Free Press, New York.
- Wong, A. and Fung, P. (1999), "Total quality management in the construction industry in Hong Kong: a supply chain management perspective", *Total Quality Management*, vol. 10, no. 2, pp. 199-208.
- Wu, H., Liu, Y., Ding, Y. and Liu, J. (2004), "Methods to reduce direct maintenance costs for commercial aircraft", *Aircraft Engineering and Aerospace Technology*, vol. 76, no. 1, pp. 15-18.
- Yang, T., Yan, S. and Chen, H. (2003), "An airline maintenance manpower planning model with flexible strategies", *Journal of Air Transport Management*, vol. 9, no. 4, pp. 233-239.
- Yin, R. K. (1994), *Case study research: design and methods*, Sage, Beverly Hills.
- Zand, D. E. (1972), "Trust and managerial problem solving", *Administrative Science Quarterly*, vol. 17, no. 2, pp. 229-239.
- Zeithaml, V. A., Berry, L. L. and Parasuraman, A. (1988), "Communication and control processes in the delivery of service quality", *Journal of Marketing*, vol. 52, no. 2, pp. 35-48.
- Zhou, L. (2004), "A dimension-specific analysis of performance-only measurement of service quality and satisfaction in China's retail banking", *Journal of Services Marketing*, vol. 18, no. 7, pp. 534-546.
- Zhu, F. X., Wymer, W. J. and Chen, I. (2002), "IT-based services and service quality in consumer banking", *International Journal of Service Industry Management*, vol. 13, no. 1, pp. 69-90.
- Zhu, Z., Hsu, K. and Lillie, J. (2001), "Outsourcing-a strategic move: the process and the ingredients for success", *Management Decision*, vol. 39, no. 5/6, pp. 373-378.
- Zineldin, M. and Bredenlow, T. (2003), "Strategic alliance: synergies and challenges: a case of strategic outsourcing relationship "SOUR"", *International Journal of Physical Distribution & Logistics*, vol. 33, no. 5, pp. 449-464.



Zviran, M., Ahituv, N. and Armoni, A. (2001), "Building outsourcing relationships across the global community: the UPS-Motorola experience", *Journal of Strategic Information Systems*, vol. 10, no. 4, pp. 313-333.

## APPENDIX A: SURVEY QUESTIONNAIRE

### 1.1 Questionnaire survey

This section presents the questionnaire which was conducted in the forum meeting of the International Federation of Airworthiness (IFA) in Paris, France, in 2006 to discuss “Airworthiness in Outsourcing”. The respondents were gathered in the meeting to complete the questionnaires which were distributed and collected by the researcher. There are 18 respondents out of 25 attendees.

The survey consists of 6 main sections. It started with general information about the respondents. It then explored key factors of relationship management, key components of service level agreement, incentives and penalties respectively. It ends with an exploration of key performance dimensions that are used for evaluating the performance of aircraft maintenance services and the MRO providers.

### 1. General Information

In today’s competitive age, aircraft operators attempt to reduce costs and then to sustain their competitiveness. In doing so, aircraft maintenance outsourcing (MRO outsourcing) has emerged as a sweeping trend. Aircraft maintenance outsourcing refers to the procurement of aircraft maintenance services from an aircraft maintenance provider (MRO provider) for a defined continuous period of time.

This survey is being conducted as part of a research that aims to study and explore relationship management and performance measurement in the field of aircraft maintenance outsourcing. The objectives of the questionnaire is to study key factors of aircraft maintenance outsourcing, significant components of an agreement, sometimes called a Service Level Agreement, and key performance dimensions required for monitoring performance of aircraft maintenance providers.

**1.1 Name of company:** \_\_\_\_\_

**1.2 Are you an aircraft operator?** YES  NO

**If YES, please go to question number 1.3.**

**If NO, please go to question number 2.**

**1.3 What types of aircraft maintenance activities are outsourced?** (please tick all boxes that apply and please estimate an approximate percentage of the activities performed by outsourcers)

**Line maintenance** (e.g. on-call maintenance, pre-flight services, daily checks, weekly checks, periodic line checks, Aircraft On Ground Services, cleaning)

\_\_\_\_\_ % of line maintenance performed by the outsourcer

**Base maintenance** (e.g. periodic base checks, modifications, external aircraft painting and structural repair)

\_\_\_\_\_ % of base maintenance performed by the outsourcer

**Engine**

\_\_\_\_\_ % of engine maintenance performed by the outsourcer

**Component** (including avionics and mechanical components)

\_\_\_\_\_ % of component maintenance performed by the outsourcer

**Interior workshop** (e.g. interior design & refurbishment, cabin outfitting)

\_\_\_\_\_ % of interior workshop performed by the outsourcer

**Material supply and logistics services**

\_\_\_\_\_ % of supply and logistics service performed by the outsourcer

**Others (please specify)** \_\_\_\_\_

**2. Critical Success Factors** (please indicate the top **five** factors that you consider are critical for MRO outsourcing relationship)

|                                       |                          |                                |                          |
|---------------------------------------|--------------------------|--------------------------------|--------------------------|
| Mutual understanding                  | <input type="checkbox"/> | Trust                          | <input type="checkbox"/> |
| Mutual benefits                       | <input type="checkbox"/> | Shared knowledge               | <input type="checkbox"/> |
| Commitment                            | <input type="checkbox"/> | Joint resolution               | <input type="checkbox"/> |
| Clearly defined contract/agreement    | <input type="checkbox"/> | Clear service delivery process | <input type="checkbox"/> |
| Clear definition of services/products | <input type="checkbox"/> | Performance measures           | <input type="checkbox"/> |
| Frequent, open communication          | <input type="checkbox"/> | Review of contract/agreement   | <input type="checkbox"/> |
| Sharing information                   | <input type="checkbox"/> |                                |                          |
| Others (please specify)               | _____                    |                                |                          |

\_\_\_\_\_

**3. Service Level Agreement** (please indicate what you consider are the top **five** most important features of a service level agreement)

|                                 |                          |                            |                          |
|---------------------------------|--------------------------|----------------------------|--------------------------|
| Service definition              | <input type="checkbox"/> | Correction of defects      | <input type="checkbox"/> |
| Service scope and specification | <input type="checkbox"/> | Service price and charges  | <input type="checkbox"/> |
| Service expectation             | <input type="checkbox"/> | Payment                    | <input type="checkbox"/> |
| Planned regular communication   | <input type="checkbox"/> | Extra work request process | <input type="checkbox"/> |
| Contacting points               | <input type="checkbox"/> | Incentives                 | <input type="checkbox"/> |
| Service delivery process        | <input type="checkbox"/> | Penalties                  | <input type="checkbox"/> |
| Dispute resolution process      | <input type="checkbox"/> | Performance review         | <input type="checkbox"/> |
| Warranties                      | <input type="checkbox"/> | Key performance indicators | <input type="checkbox"/> |
| Review of contract/SLA          | <input type="checkbox"/> |                            |                          |
| Others (please specify) _____   |                          |                            |                          |

**4. Incentives**

What types of rewards do you use for motivating the outsourcers to improve their performance? (Please prioritize incentives in boxes provided)

- Financial incentives (e.g. bonuses) \_\_\_\_\_
- Extension of contract \_\_\_\_\_
- Others (please specify) \_\_\_\_\_

**5. Penalties**

If the outsourcers perform services below the standard levels agreed in contract/ agreement, do they suffer financial penalties?    YES                       NO

If NO, please specify other types of penalties that are applied to the outsourcers.  
\_\_\_\_\_

**6. Key Performance Dimensions**

What are the key dimensions of performance measurement? (please indicate performance measures used to judge MRO outsourcers, against the dimensions of productivity, resource utilization, quality of service, responsiveness and costs)

**Productivity**

Please indicate the measures that you use for capacity or volume of work

- Number of scheduled maintenance checks (eg. A-Check and C-Check)
  - Number of unscheduled maintenance tasks (eg. ADs, SBs, modifications and defects)
  - Time to complete maintenance tasks/checks
  - Others (please specify) \_\_\_\_\_
- 

**Resource availability**

Please indicate the measures that you use for resource utilization

- Availability of qualified staff (e.g. aircraft type rated certifying staff, component certifying staff and task trained certifying staff)
  - Availability of maintenance data necessary for performing maintenance tasks (e.g. applicable procedure and standard issued by the competent authority, airworthiness directives and applicable instructions for continuing airworthiness issued by type certificate holders)
  - Data accessibility
  - Availability of occurrence reporting
  - Availability of materials, parts and components required for maintenance services
  - Availability of equipments and tools
  - Availability of facilities (e.g. hangar and component workshop)
  - Others (please specify) \_\_\_\_\_
- 

**Quality of service**

Please indicate the measures that you use for quality of service

- Safety and airworthiness
  - Number of warranty claims
  - Number of defects due to outsourcers
  - Number of recurring defects due to outsourcers
  - Number of rolling defects
  - Mean Time Between Failure (MTBF)
  - Mean Time Between Repair (MTBR)
  - Reliability
  - Service satisfaction
  - Others (please specify) \_\_\_\_\_
-

### Responsiveness

Please indicate the measures that you use for responsiveness.

- Time to implement request
- Time to correct defect
- Time to resolve problem (including technical and managerial problems)
- Time to acknowledgement
- Number of recurring defects
- Number of unsolved problems
- Others (please specify) \_\_\_\_\_

### Costs

Please indicate the measures that you use for costs

- Direct costs of additional works outside the terms and scopes of agreement
- Indirect costs of additional works outside the terms and scopes of agreement (e.g. travel expenses and administrative work expenses)
- Others (please specify) \_\_\_\_\_

**Do you use any other key performance measures?** YES  NO

**If YES, please give brief details** \_\_\_\_\_

**Name** \_\_\_\_\_

**Job title:** \_\_\_\_\_ **Department:** \_\_\_\_\_

**Email:** \_\_\_\_\_ **Tel no:** \_\_\_\_\_

Thank you very much for taking the time to fill in this questionnaire.

If you have any queries please contact:

Araya Sakburanapech

Ph.D. Student

Manufacturing Systems Department, Cranfield University

United Kingdom MK43 0AL

Tel: +44 (0)781 848 6423

Fax: +44 (0)123 475 2159

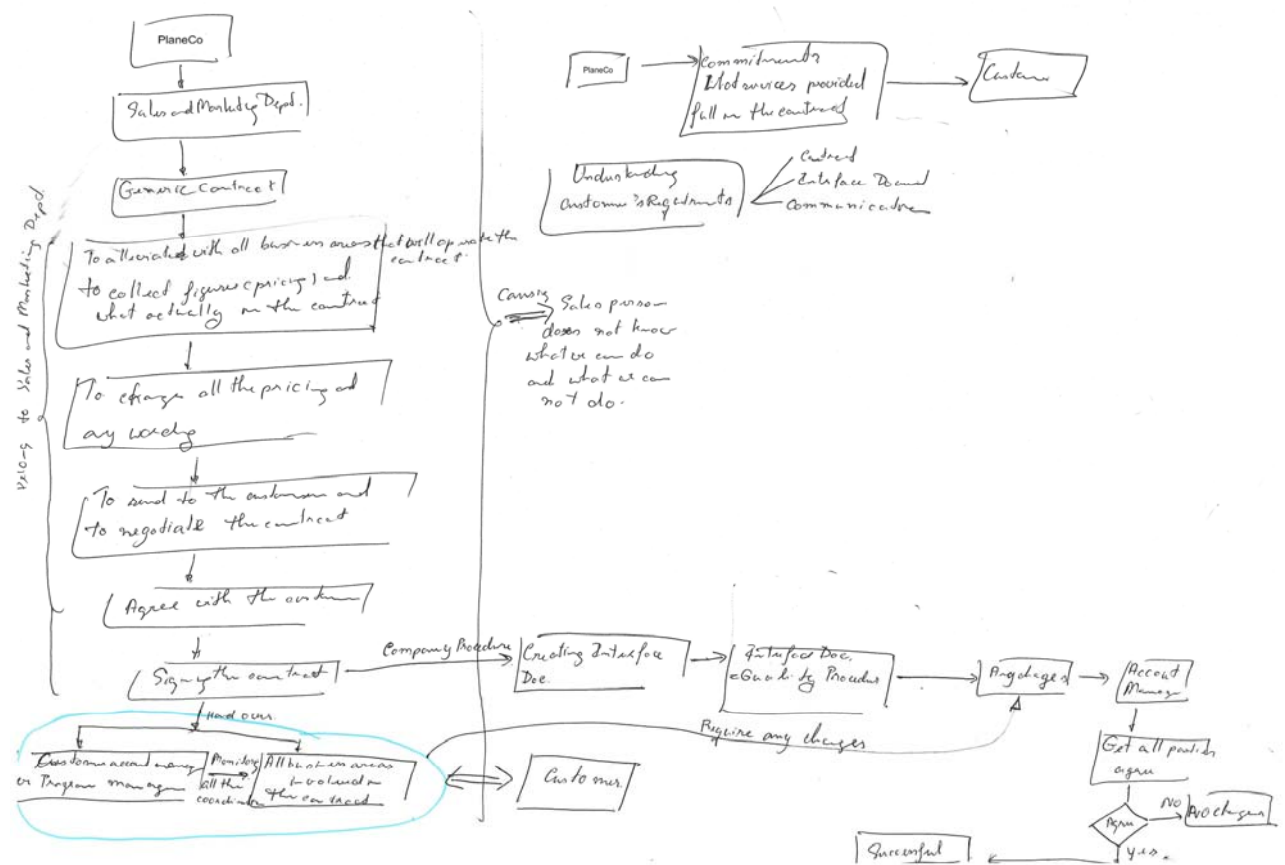
Email: [a.sakburanapech@cranfield.ac.uk](mailto:a.sakburanapech@cranfield.ac.uk) OR [oays@ku.ac.th](mailto:oays@ku.ac.th)

Please note: the details you supply will be recognized as a confidential data. If the researcher intends to publish any information, the researcher will ask for your permission.

## APPENDIX B: DATA ANALYSIS IN STAGE II

This section presents an analysis of the data collected from the three case study relationships featuring the four case companies in Stage II. This led the researcher to understand insights into the management of relationship between an MRO provider and an MRO customer.

As the interview questions, shown in Table 5-1, were determined beforehand on the basis of the key factor of outsourcing relationship management, the data collected were clustered into each question. This was then grouped into each key factor of relationship management. Figure B-1 shows an example of the process that PlaneCo and Airline clarified their requirements to each other and negotiate the contract. The problem which relates to an involvement of people from multiple management levels of PlaneCo was also identified.

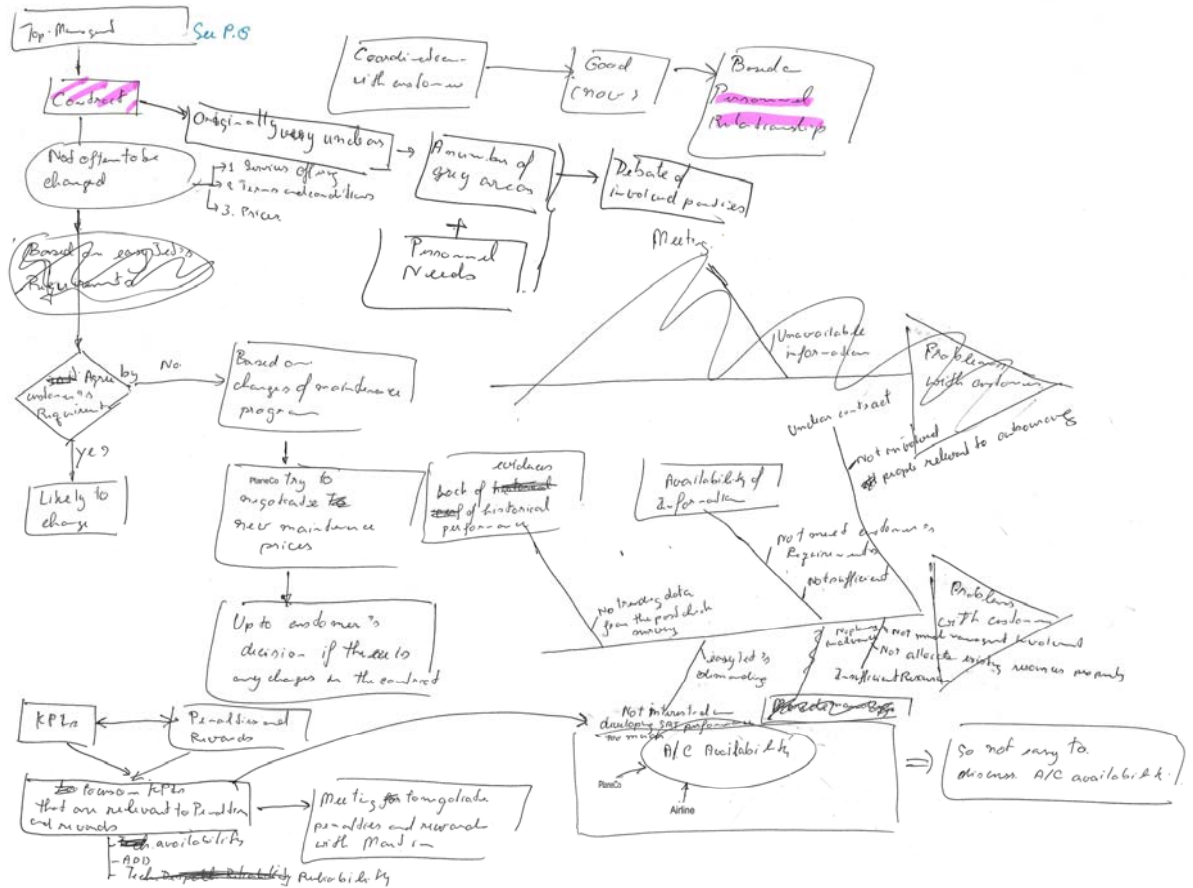


**Figure B-1: Requirement clarification between PlaneCo and Airline**

Based on the clearly defined requirements explained above, the details of agreement for example between PlaneCo and Airline were analysed and interpreted, as shown in Figure B-2. In addition, the interface procedures between PlaneCo and



Airline for governing the services delivered were revealed. In particular, the purposes of the meetings between both parties were revealed.



**Figure B-2: Agreement and interface procedures in the case study relationship between PlaneCo and Airline**

The findings of the case study relationships between PlaneCo and Airline and PlaneCo and MRO Provider A show that the way that these three companies cooperate with each other is different from the case study relationship between MRO Provider B and its customer, as shown in Figure B-3. Moreover, performance measurement that Airline used to evaluate PlaneCo's performance was explored.

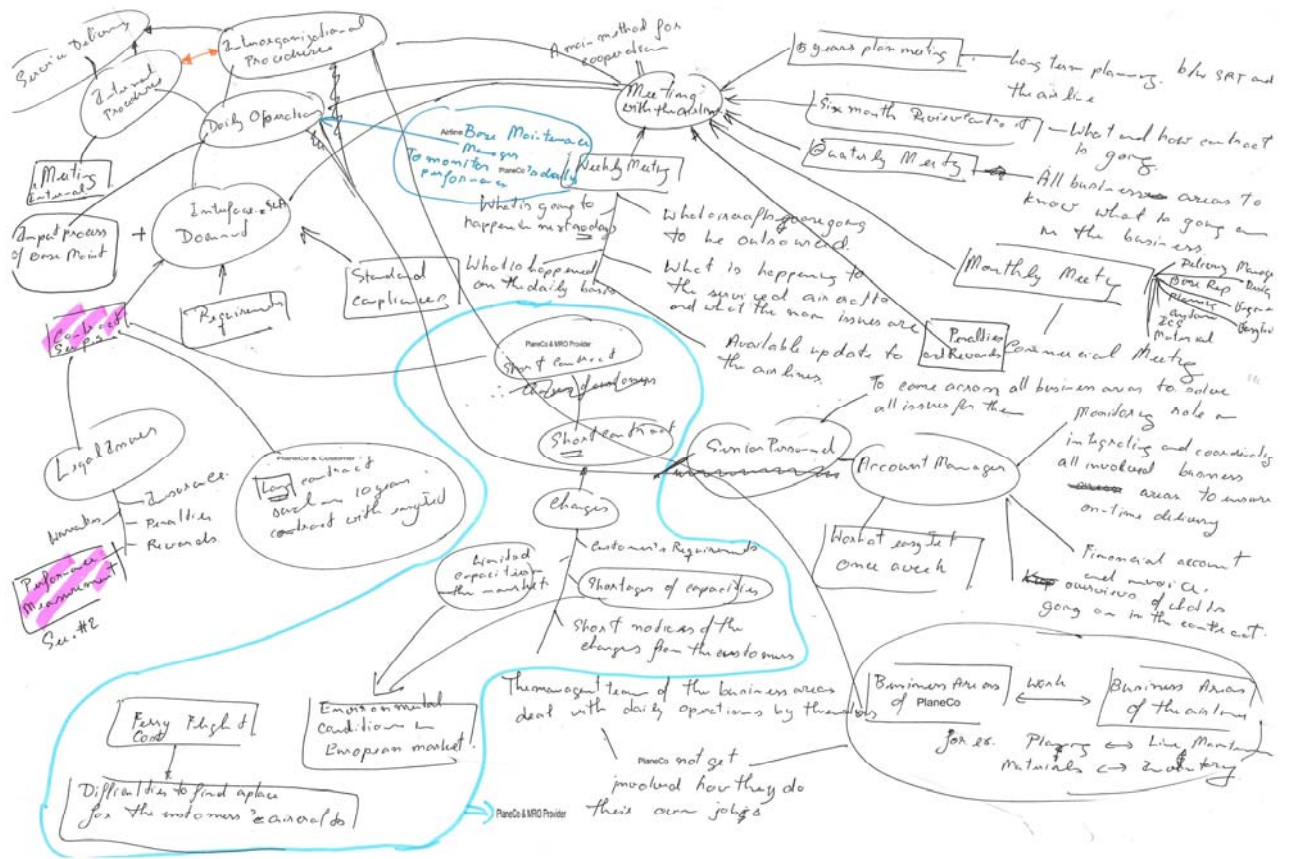
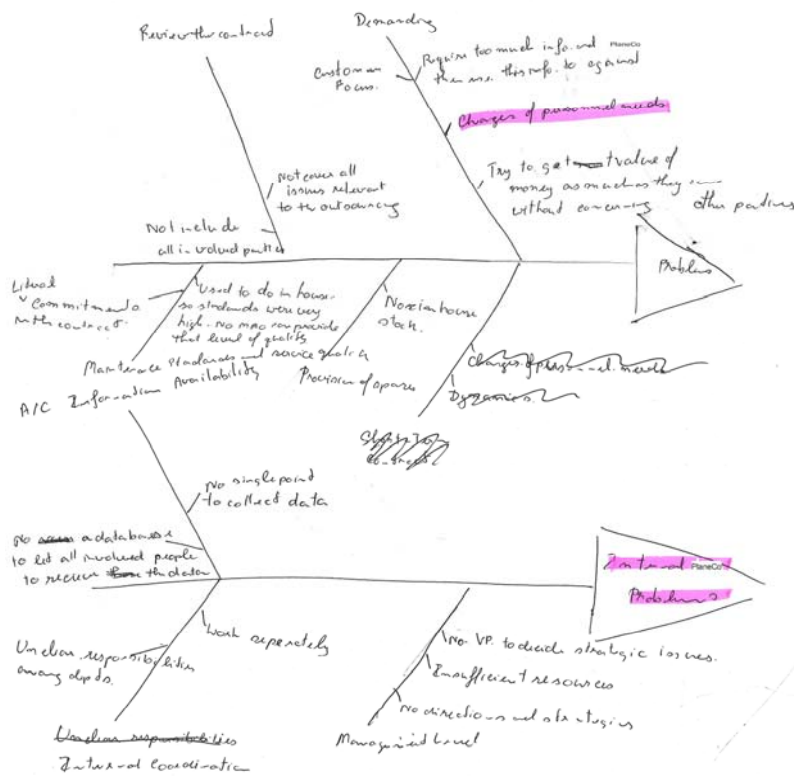


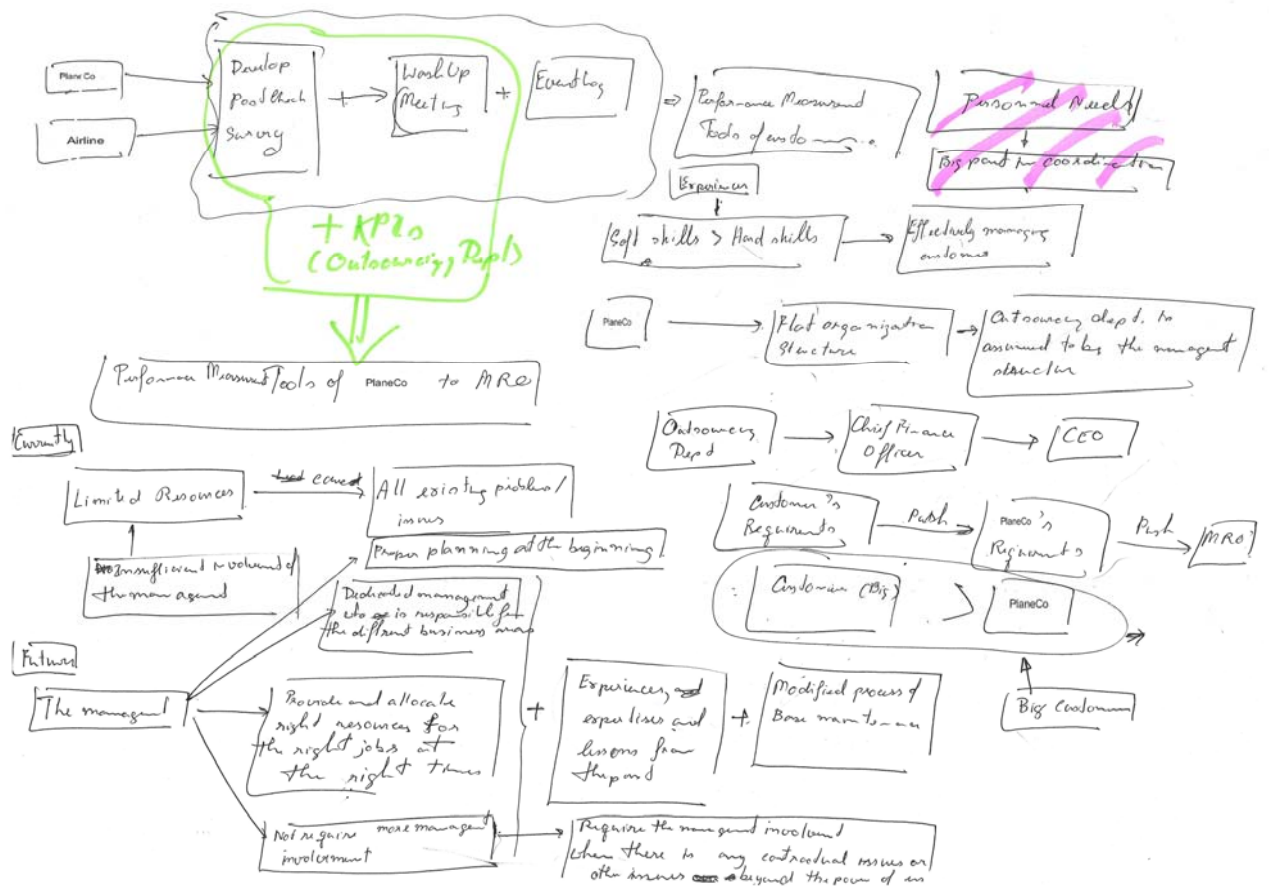
Figure B-3: Coordination of the three case study relationships and performance evaluation in the case study relationship between PlaneCo and Airline

As the researcher did not prevent the conversations with the interviewees to develop freely, the problems in managing the relationship between MRO provider and customer were found by using for example a fish bone as a tool in addressing these problems, as shown in Figure B-4.



**Figure B-4: Problems addressed from the case study relationship between PlaneCo and Airline**

This led the researcher to gain better understanding of how the relationship between the MRO provider and customer should be improved by studying today practices of the three case study relationships, as shown in Figure B-5.



**Figure B-5: Improvement of relationship between PlaneCo and Airline**

Based on the data analysis described above, the researcher was able to develop the relationship management framework for aircraft MRO outsourcing. This also led the researcher to achieve the research objectives and to answer the research question of Stage II.