THE DETERMINANTS OF THE GOVERNANCE OF AIR CONDITIONING MAINTENANCE IN AUSTRALIAN RETAIL CENTRES

By

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Transaction costs, capability and competence, power and dependency, air conditioning maintenance, retail centres

ABSTRACT

Retail centres are a visible sign of developed capitalist societies and make an appreciable contribution to these economies. For the firms involved in supplying air conditioning maintenance to retail centres, governance structures (that incorporate the make-or-buy decision and the decision concerning the nature of the exchange relationship) are fundamental business decisions. The absence of literature in this area creates a research opportunity to undertake a theoretical and empirical investigation into *the determinants of the governance of air conditioning maintenance in Australian retail centres*. The research objectives revolve around a microeconomic theory (Transaction Cost Economics) and two related theories – one from strategic management (Resource-Based Theory) and one from a power-based perspective (Resource Dependency Theory).

In terms of the make-or-buy decision, an integrative framework of vertical integration is developed that aims to create a clearer understanding of the conditions under which Transaction Cost Economics (TCE) and Resource-Based Theory (RBT) are dominant. This approach is encouraged by the similarity of the assumptions made in TCE and RBT concerning rationality and which envisage a short term approach to profits. If a wider view is taken, that includes supply chains in which firms take a longer term approach to profits, then Resource Dependency Theory (RDT) can also be considered as a complementary theory to TCE. In order to test TCE on the issue of the nature of the exchange relationship, TCE's contractual schema is developed, along with a new type of asset specificity (Ongoing Asset Specificity).

Abstract

Case studies and a nationwide postal survey are used to collect data from multiple sources, comprising 51 interviews, the collection of documentary information, as well as 18 completed case study questionnaires and 205 useable survey questionnaires. Multiple research methods allow the relative strengths of different methods to be combined to more effectively test the hypotheses. Pattern matching and regression analysis are the main techniques used to analyse the data.

The results provide a successful testing of the integrative framework of vertical integration. That is, this framework is shown to be more powerful in accounting for the make-or-buy decisions in the supply chains in this thesis, than the singular deployment of either TCE or RBT. With regard to the nature of the exchange relationship decision, the results also support the development of TCE's contractual schema and Ongoing Asset Specificity. Through the incorporation of these developments, TCE outperforms RDT across all of the internal and external exchanges in the supply chains in this thesis. In total, it is concluded that transaction costs *and* production costs can both be key determinants of the governance of air conditioning maintenance in the chain that supplies this activity to Australian retail centres. Moreover, and in this chain, upstream exchange relationships are not determined by downstream external exchange relationships.

The implications of the results for practice - in more mainstream construction, and concerning the make-or-buy decision, particularly concern trades in close physical and intellectual proximity to the main contractor's key activity of planning and coordinating site activity. Here, the results indicate that main contractors would benefit from focusing on the possibility of hold-up and not production cost improvements. With respect to external relationships, the results show that even when clients have an ongoing requirement for an activity, a discrete exchange can be both economical and effective. This suggests that calls by some government sponsored reports for *all* clients buying services from main contractors to seek a relational exchange are not justified. In terms of the firm's internal relationships and upstream external relationships, the evidence from this thesis is that these relationships should not necessarily be determined by the firm's downstream external relationships. Here, for example, main contractors might not allow their exchanges with their staff and subcontractors to be determined by exchanges with their clients.

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More specifically, this thesis suggests that main contractors can prosper from developing relational exchanges with their staff, core subcontractors and suppliers despite engaging in discrete and arms-length exchanges with their clients. This finding may encourage main contractors to help move mainstream construction away from any "command and control" image.

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LIST OF ABBREVIATIONS

AMCA	Air Conditioning and Mechanical Contractors' Association
ACT	Australian Capital Territory
BGC	Bulky Goods Centre
BMS	Building Management System
CC	City Centre
CC	Controls Contractor
CM	Centre Manager Firm
DDCS	Direct Digital Control System
FTE	Full-Time Equivalent
GLAR	Gross Lettable Area Retail
MC	Market Centre
MRC	Major Regional Centre
MSC	Mechanical Services Contractor
NC	Neighbourhood Centre
NSW	New South Wales
NT	Northern Territory
PCA	Property Council of Australia
QLD	Queensland
RBT	Resource Based Theory
RC	Regional Centre
RDT	Resource Dependency Theory
SA	South Australia
SbRC	Sub-Regional Centre
SCP	Structure-Conduct-Performance Model
SpRC	Super Regional Centre
SRP	Scientific Research Program
TAS	Tasmania
TC	Themed Centre
TCE	Transaction Cost Economics
TCR	Trust-Commitment-Relationship trinity

VIC	Victoria
VRIO	Value, Rarity, Immitability, Organisation framework
WA	Western Australia

STATEMENT OF ORIGINAL AUTHORSHIP

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature of candidate and author:

Date:

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Adrian Bridge
Brisbane, October 2008

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[1] Friedrich Nietzsche (1844-1900)

CHAPTER 1 INTRODUCTION

1.1 BACKGROUND TO THE RESEARCH

1.1.1 Prospects for capitalism and the relevance of microeconomic research

Capitalism can seen as an evolutionary process comprising relatively stable periods, in which firms develop superior production capabilities that are interrupted by "shocks" that nullify extant sources of advantage and provide entrepreneurs with the opportunity to capitalise on new sources of advantage (Schumpeter 1942). More specifically, Schumpeter described this process as "creative destruction" and held a dim view of its long term net benefits to society (1942, 61). This view led Schumpeter to believe that capitalism cannot survive.

Capitalism does not appear to be benefiting everybody, with the gap between the rich and poor widening and which can be argued as contributing to social unrest amongst societies of different backgrounds and religious persuasions (Chowdhury 2006). Furthermore, the forces of capitalism are widely reported as causing destruction of a physical nature to out planet. Lovelock (1995), who has achieved much attention for his "Gaia" hypothesis, is convinced that without radical change in power generation, global warming will continue to accelerate and will reach an irreversible point by the end of this century that will be catastrophic for human civilisation in the remainder of this millennium.

Despite this grim picture of the current and future effects of capitalism, capitalist countries are continuing to be driven by economic competition, both within and across national borders. Through reinvestment of a sizable proportion of profits into expanding production, there is not only economic growth but compulsive accumulation, enabling capitalist nations to dominate the globe today (Harman 2004). Moreover, China and India are emerging as the fastest growing economies along with predictions that these countries be will very dominant economies by 2050 (Harman 2004). That said, a current preoccupation amongst governments of developed countries is the search for ways to reconcile the forces of capitalism with a sustainable future, for example, emissions trading. In summary, it would seem that capitalism will continue to thrive for some time yet and, as such, Schumpeter's prediction is not poised to materialise.

The nature of the research in this thesis will continue to be of value as least as long as capitalism prevails. From a theoretical perspective, the microeconomic oriented theories (concerning decision making at the level of the firm) in this thesis, assume varying levels, or strengths, of rational behaviour (which is practically synonymous with capitalism) as opposed to non-rationality or irrationality. Furthermore, although these theories are deployed using a static orientation (pertinent to Schumpeter's comparatively quiet periods), each of the theories assumes that firms observed in a cross sectional empirical study are firms that have survived through a process of competition. This competitive survival process is also strongly associated with capitalism and akin to Darwinian theory of natural selection.

1.1.2 Contribution of retail centres in developed capitalist countries

Retail centres are a visible sign of a developed capitalist society. These sophisticated markets may incorporate hundreds of speciality stores in a single centre and bring together retailers and individuals, or household buyers. In developed countries, retail centres make an appreciable contribution to the economy.

For example, the retail centre industry in Australia contributes 2.3 percent to national Gross Domestic Product, along with other contributions (Shopping Centre Council of Australia 2000).

In order to operate effectively, and particularly in hotter climates like Australia, air conditioning in retail centres is an absolute necessity. Upon installation, the maintenance of air conditioning, to ensure a non-interrupted service, becomes critical.

1.1.3 Nature and scope of air conditioning maintenance in Australian retail centres

The nature and scope of air conditioning plant and equipment to be maintained in retail centres typically comprises: chillers; air handling units; water pumps; air compressors; plantroom switchboards; package units; smoke and exhaust fans; cooling towers; boilers and a building management system (BMS). A direct digital control system (DDCS) forms an integral and critical component of a modern BMS that incorporates computer software logic in the controller system. A BMS and a DDCS are much more common in larger facilities (Martin and Oughton 1989, 585).

The nature and scope, along with the scale of air conditioning maintenance is determined largely by the size and type of retail centre. The Property Council of Australia [PCA] (2005) has developed nine categories of retail centre, as follows:

1. City Centre (CC): Retail premises within an arcade or mall development owned by one company, firm or person and promoted as an entity within a major Central Business District. Total gross retail area (GLAR) exceeds 1,000m^2;

2. Super Regional Centre (SpRC): A major shopping centre typically incorporating two full line department stores, one or more full line discount stores, two supermarkets and approximately 250 specialty shops. GLAR exceeds 85,000m^2;

3. Major Regional Centre (MRC): A major shopping centre typically incorporating at least one full line department store, one or more full line discount department stores, one or more supermarkets and approximately 150 speciality shops. GLAR ranges between 50,000 and 85,000m^2;

4. Regional Centre (RC): A shopping centre typically incorporating one full line department store, a full line discount department store, one or more supermarkets and approximately 100 speciality shops. GLAR ranges between 30,000 and 50,000m^2;

5. Sub-Regional Centre (SbRC): A medium sized shopping centre typically incorporating at least one full line discount department store, a major supermarket and approximately 40 specialty shops. GLAR ranges between 10,000 and 30,000m^2;

6. Neighbourhood Centre (NC): A local shopping centre comprising a supermarket and approximately 35 specialty shops. GLAR is less than 10,000m^2;

7. Bulky Goods Centre (BGC): A medium to large sized shopping centre dominated by bulky goods retailers (furniture, white goods and other home wares), occupying large areas to display merchandise. Typically contains a small number of specialty shops. GLAR generally greater then 5,000m^2;

8. Themed Centre (TC): A specialty shopping centre, located primarily in resort areas to cater for specialist tourist needs, which does not normally include a supermarket; and

9. Market Centre (MC): A covered centre of at least 5,000m^2 dominated by food retailing with at least 50 stalls or outlets. It operates on a permanent or irregular basis.

Table 1.1 gives the numbers of retail centres in each of these categories in Australia.

Table 1.1: Numbers of retail centre in each category and in each state and territory (Source: PCA and Yellow Pages®.com.au)

Centre	NSW	ACT	VIC	TAS	QLD	NT	WA	SA	Total
CC	43	2	21	1	25	NI	13	18	123 + NT
SpRC	8	0	4	0	2	NI	0	1	15 + NT
MRC	13	3	12	0	6	NI	4	1	39 + NT
RC	15	0	10	1	21	NI	7	5	59 + NT
SbRC	79	0	47	3	52	NI	26	17	224 + NT
NC	206	11	75	16	160	NI	213	93	774 + NT
BGC	22	1	7	0	14	NI	10	1	55 + NT
TC	4	0	4	0	12	NI	1	0	21 + NT
M	0	0	8	0	1	NI	2	0	11 + NT
Total	390	17	188	21	293	16	276	136	1,337

Key:

- *NSW*   *= New South Wales (PCA 2005)*
- *ACT*   *= Australian Capital Territory (PCA 2005)*
- *VIC*   *= Victoria (PCA 2004a)*
- *TAS*   *= Tasmania (PCA 2004a)*
- *QLD*   *= Queensland (PCA 2004b)*
- *NT*   *= Northern Territory (Yellow Pages®.com.au. 2005)*
- *WA*   *= Western Australia (PCA 2003)*
- *SA*   *= South Australia (PCA 2004c)*
- *NI*   *= Not identifiable from Yellow Pages®.com.au*

1.1.4 Definition of maintenance and types of maintenance

As there is no definition of general air conditioning maintenance pertaining to buildings in the Australian Standards, this thesis adopts the definition of maintenance given by the PCA (2000) that is, "all actions necessary to keep an item or asset in operational condition". This definition is preferred to details concerning the specification of air conditioning maintenance in *AUS-SPEC 6B-2004: Buildings and Facilities Maintenance*, on the basis that the PCA is the most influential body on the development of standards in the management of property in Australia.

An overview of the main types of maintenance is shown in Figure 1.1. This figure is adapted to suit the PCA's (2000) definitions of different types of maintenance.
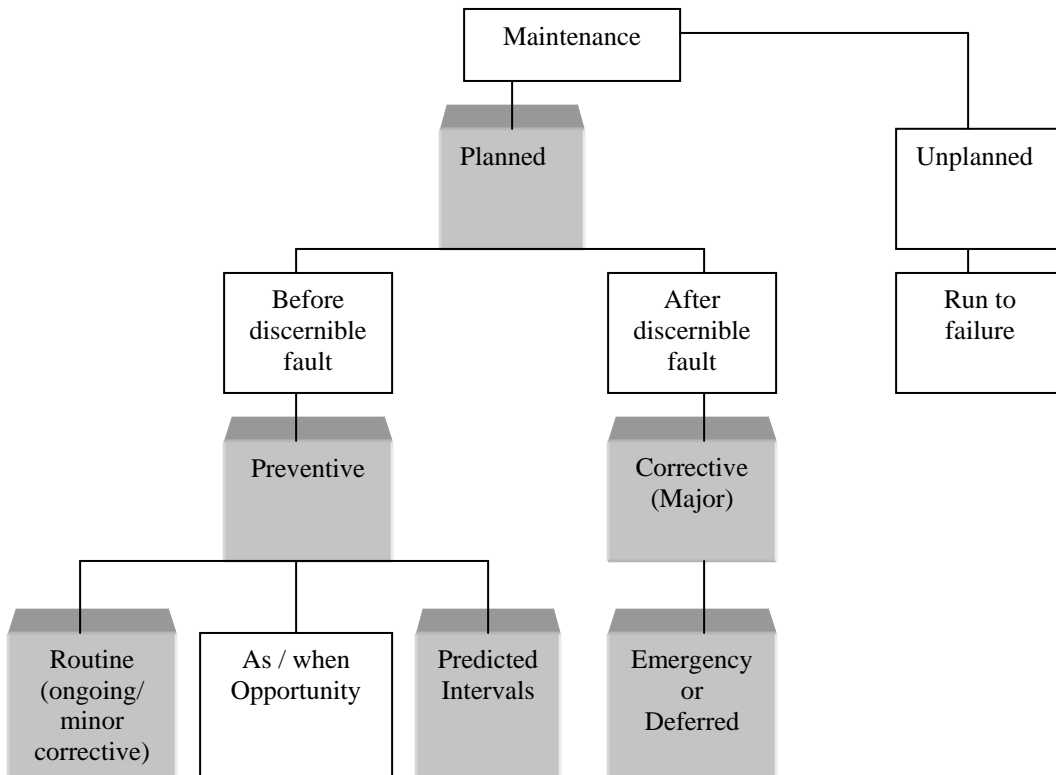
Figure 1.1: Overview of different types of maintenance
(Source: Based on The Chartered Institution of Building Services Engineers 2000, 3-2)

The principal types of maintenance tasks examined in this thesis (shaded boxes in Figure 1.1) are defined in Table 1.2.

Table 1.2: Type and definition of maintenance activity (Source: Based on PCA 2000)

Type of maintenance	Definition
Planned Maintenance	Maintenance actions which mostly recur on a predictable basis, comprising mainly preventive maintenance (programmed)
Routine Maintenance	Day-to-day operational activities to keep the plant operating and which form part of the annual operating budget.
Corrective Maintenance	The actions performed as a result of plant and equipment failure, to restore an item or asset to its original condition, as far as practicable. Corrective maintenance may or may not be programmed (including emergency and deferred maintenance).

The specialist nature, scope and scale of air conditioning maintenance across the 1,337 retail centres in Australia, create a demand and an opportunity for specialist firms to emerge to deliver this activity. Before proceeding to introduce discernable groupings of specialist firms delivering air conditioning maintenance to retail centres, the next section positions maintenance as an area of construction activity and, in doing so, adopts a sector system approach as a framework to analyse groups of specialist firms.

1.1.5 Maintenance as part of construction activity and sector system analysis

The term "construction" covers the erection, maintenance, and repair of immobile structures, the demolition of existing structures and land development (Eccles 1981, 450). The extent to which this sort of activity can be considered a single entity or an industry is questionable. That is, different *sectors* of construction use fundamentally distinct resource and skill bases. For example, sophisticated urban office buildings do not use the same resources as bridge building or *housing maintenance* (Groák 1994, 291). The focus on sectors, as opposed to one industry, as an approach to analysing the operation and function of construction activity, has recently been further developed by the International Council for Research and Innovation in Building and

Construction's Working Commission 55 and Working Commission 65 (CIB W55 and CIB W65). Here, the construction economic system is defined as " … the organised complex of commercial and non-commercial relationships, between productive and institutional actors, taking part in the production and the management of services provided by the structures used, throughout their life cycle, as the living and working environment of populations" (Carassus 2004, 10). Furthermore, within a sector of activity such as maintenance, it is possible to identify sub-sectors of firms that specialise in parts of maintenance activity and connect in a chain-like fashion to provide the total activity.

1.1.6 Supplying air conditioning maintenance to retail centres

The process that commences with the acquisition of materials (*upstream*) and culminates in the provision of goods and services (*downstream*) is known as the *vertical chain* or *supply chain*. The *vertical boundaries* of a firm delineate activities that a firm undertakes itself versus those activities it procures from other independent firms. The decision whether to locate the activity within or outside the firm is known as the *make-or-buy* decision, and it is this decision that determines the extent to which the firm is *vertically integrated* (Besenko, Dranove and Shanley 2000, 109-110). Consistent with the sector system approach, three main market sectors (that create two potential vertical boundaries) are identifiable *within* the vertical chain supplying air conditioning maintenance to retail centres in Australia.

First, there is the sector that comprises firms that specialise in the overall management of the retail centre including operations management, and which are commonly referred to as *Centre Managers* (CM). Second, is the sector whose firms incorporate within their portfolio of expertise the provision of general mechanical services that includes air conditioning maintenance, and which are generally termed *Mechanical Services Contractors* (MSC). Lastly, there is the sector in which firms specialise in the design, manufacture and installation (and some level of maintenance) of DDCSs, or *Controls Contractors* (CC).

CMs are the firm that is first to be appointed by the centre owner and, therefore, furthest most downstream in this supply chain, or at the head of this supply chain. CMs perform the following tasks (Martin 1982, 19):

1. Discharging all the obligations, legal and contractual, incurred by the owner when developing or purchasing, leasing and financing a centre;
2. Public relations, including ascertaining the extent and nature of a centres catchment and creating a favourable awareness of the centre;
3. Tenant relations, as governed by the lease and as required for satisfactory trading; and
4. Administration, with particular reference to;
    a. Accounting;
    b. Staffing;
    c. Security of the centre;
    d. Insurance of the centre;
    e. Major alterations, refurbishments and the like; and
    f. *Maintenance of the building and its equipment.*

In order to discharge its maintenance duties, the CM needs to develop a maintenance strategy that reflects the extent to which the owner wishes to preserve and / or enhance the economic usefulness of the centre (Martin 1982). This maintenance strategy expresses the types of maintenance to be deployed, along with their relative emphasis (The Chartered Institution of Building Services Engineers 2000, 3-5). CMs then translate this maintenance strategy into a tactical approach that includes matters that concern the procurement of this activity. This includes the make-or-buy decision, as well as the decision concerning the nature of the contract and exchange relationship with internal resources and / or external firms.

Table 1.3 shows the number of CMs across the states and territories (except the Northern Territory) in Australia.

Table 1.3: Numbers of CMs in each state and territory – except Northern Territory (Source: PCA 2003; 2004a; 2004b; 2004c; 2005)

	NSW	ACT	VIC	TAS	QLD	WA	SA	Total
CMs	139	11	84	16	87	83	39	459

The market sector that comprises MSCs in Australia has emerged in response to facility owners or their agents' decision to externalise mechanical services including air conditioning maintenance to retail centres. These firms take responsibility for physical implementation of air conditioning maintenance. Table 1.4 shows that there are 449 (370 plus 79) MSCs serving the commercial and industrial market including retail centres and specialist shops and outlets within retail centres. [1]

Table 1.4: Numbers of MSCs in Australia (Source: Air Conditioning and Mechanical Contractors' Association 2004 and Yellow Pages®.com.au 2004)

	Commercial & Industrial only	Commercial & Industrial and Home	Home only	Total
MSCs	370	79	302	751

Finally, the market sector comprising firms supplying DDCS maintenance has emerged in response to the facility owners or their agents' decision to externalise DDCS maintenance, either directly from CCs or as part of an externalised mechanical services contract (including the general air conditioning maintenance to retail centres). There are nine firms that account for the

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[1] In terms of the Air Conditioning and Mechanical Contractors' Association directory, firms operating in more than state were counted once and those firms that occur in the Air Conditioning and Mechanical Contractors' Association directory and Yellow Pages®.com.au were again only counted once. With regard to the Yellow Pages®.com.au, firms listed under "Air Conditioning" - "Commercial & Industrial" were searched under "Service", "Maintenance", "Repairs" and "Warranty". Also firms listed under "Installation and Service" were searched under "Commercial and Industrial". Firms appearing in more than one list were counted once. A similar search was applied to firms listed under "Air Conditioning" – "Home", with the exception that under "Installation and Service" firms were searched using "Home Residential Domestic". Firms were counted once in terms of whether they provided either commercial/industrial services only, or commercial/industrial and home services, or home services only.

entire DDCS market sector in Australia (Air Conditioning and Mechanical Contractors' Association 2004). Five of the firms design, manufacture, install and maintain their own highly proprietary DDCS , along with the provision of general air conditioning maintenance. In this sense, these five firms are part of the 370 commercial and industrial MSCs in Table 1.4. The other four firms design, manufacture, install and supply some limited level of maintenance support of their own generic DDCS. That is, these firms provide technical consultative support to the MSC, who undertakes the physical implementation of DDCS maintenance.

Just as the sector system approach has helped depict three types of firm in the air conditioning maintenance supply / vertical chain, it also highlighted two potential vertical boundaries between independent firms *within* this chain (excluding the boundary between the centre owner and the CM). That is, the interface of CMs and MSCs and the interface of MSCs and CCs. Having said this, the overview of secondary data presented in this section does not reveal the extent of internationalisation, or vertical integration, within these three types of firm. Furthermore, this secondary data does not shed any light on the nature of the exchange relationship between these firms and their internalised resources (intraorganisational relationships, or *internal relationships*) and the nature of the exchange relationship between these firms and external firms in their supply chain (interorganisational relationships, *or external relationships*).

Governance structures (or modes of governance) embody both the make-or-buy decision and the decision concerning the nature of the exchange relationship. These decisions are foundational in private commercial exchange. In turn, this type of exchange, or private ordering, is a key institution of capitalism (Williamson 1985, xii). As the data summarised in this section represents the total literature on the two governance decisions concerning the chain supplying air conditioning maintenance to retail centres in Australia, a research opportunity exists to undertake a theoretical and empirical investigation into *the determinants of the governance of air conditioning maintenance in Australian retail centres*. Accordingly, this opportunity informs the aim of this thesis.

1.2 RESEARCH AIM

The aim of this research is to investigate the following research question:

- *What are the determinants of the governance of air conditioning maintenance in Australian retail centres?*

This main research question can be expressed as two sub-research questions, as governance comprises two main and related issues. These sub-research questions are as follows:

1. *What are the determinants of the make-or-buy decision concerning air conditioning maintenance in Australian retail centres? and*
2. *What are the determinants of the nature of the exchange relationship decision concerning air conditioning maintenance in Australian retail centres?*

1.3 OUTLINE OF THE THESIS

Following this introductory chapter, this thesis comprises a further seven chapters. In the next chapter, the research objectives are developed following a survey of the literature that is the most closely related to the governance of air conditioning maintenance in retail centres. These objectives revolve around a microeconomic theory and two related theories – one from strategic management and one from a power-based perspective. Also in this chapter, the research is justified, along with the overall research philosophy.

Chapter 3 begins by explaining the origins, logic and application of each of these three theories. An assessment is then given concerning the extent to which to each theory has been successfully empirically tested. This includes, where applicable, testing pertaining to construction activity. The assessment of empirical work forms the basis of a critical review that indicates weaknesses in each theory and the potential for further development. The connection between the strengths and weaknesses of the theories is explored and this shows that the microeconomic theory and the strategic management theory are potentially complementary theories with regard to the make-or-

buy decision, whilst the microeconomic theory and power-based approach can be considered as complementary on the issue of the nature of the exchange relationship decision.

In order to develop the complementarity of theories, a pluralistic stance is required. Chapter 4 proceeds to explain the doctrine of theoretical pluralism, before developing a pluralistic stance in the deployment of the three theories on the two governance questions in this thesis.

Chapter 5 sets out and justifies the research methods, or techniques used to collect and analyse the data. First, the use of multiple methods and sources of data collection is justified. Next, the design and development of the questionnaire is described, including the manner by which this core research instrument is adapted for use in both the case studies and in the survey. Finally, an account is given of the research attributes of the case studies and the survey, as well as the administration of these methods. This account also includes a summary of the data collected and an outline of the methods and approach used to analyse the data.

The objective of both Chapter 6 and Chapter 7 is to facilitate an assessment of the extent to which the data either supports or contradicts the hypotheses. The analysis of the case study data is presented first in Chapter 6, followed by the analysis of the survey data in Chapter 7.

Finally, Chapter 8 summarises the reconciliation of the data and the hypotheses across all case studies and the survey, including a review of the extent to which the case studies and the survey provide converging results, in order to more fully address the hypotheses and draw conclusions. This chapter also considers the implications of the results in terms of theoretical development, research methods, practice and future research.

1.4 DELIMITATIONS OF SCOPE AND KEY ASSUMPTIONS

To summarise Section 1.1.6 and the boundaries of the main research question in Section 1.2, the research findings in this thesis are limited to:

1. CMs that manage retail centre(s) with at least partial responsibility for air conditioning maintenance;
2. MSCs that undertake some level of commercial and industrial work and that are at least capable of undertaking air conditioning maintenance to a small retail centre; and
3. Make-or-buy decisions and exchange relationships that lie between (and include) the CM's make-or-buy decision and exchange relationship decision concerning operations management and the upstream MSC's make-or-buy decision and exchange relationship decision concerning DDCS maintenance.

Additionally, the total theoretical perspective in this thesis is represented by the three theories introduced in the next chapter and, therefore, the assumptions adopted in each of the three theories are invoked in this research.

1.5 SUMMARY

This chapter has introduced the main research problem and has outlined the context of the research, as well as indicating the path taken towards the conclusions.

CHAPTER 2 RESEARCH OBJECTIVES AND METHODOLOGY

2.1 INTRODUCTION

This chapter proceeds to develop research objectives by surveying the literature that is the most closely related to the governance of air conditioning maintenance in retail centres. Having established the objectives, the research is then justified in terms of potential implications for theory, research methods and practice. Finally, the overall research philosophy adopted in this thesis, within which the research aim and objectives are addressed, is identified and justified in this chapter.

2.2 RELATED LITERATURE

2.2.1 Building services maintenance

"Good practice" guides exist that provide normative advice on the advantages and disadvantages of appointing an external mechanical contractor to perform building services maintenance (including air conditioning maintenance) and that comment on aspects of the management of the contract with this external firm. For example, Chartered Institution of Building Services Engineers (2000) and Armstrong (1987).

With regard to the make-or-buy decision, the principal limitation with the advantage / disadvantage approach, or *relative merits approach*, is that the same merits are generated by *both* internationalisation and externalisation (Owen 1994).

Yik and Lai (2005) developed the advantages and disadvantages of externalising building services maintenance within their own stylised *transaction cost framework*. This can be considered as going beyond the simple relative merits approach, as this framework envisages that the likelihood of superior knowledge, skills and costs secured via internalisation or externalisation is determined by the range, scale and complexity of the building services demanded by users. However, these determinants are not fully operationalised and no empirical evidence is presented. Lai and Yik (2007a; 2007b) also develop a mathematical model of transaction costs on the issue of externalisation that is designed to *directly* measure these costs.

With respect to the decision concerning the nature of the exchange relationship, Lai and Francis (2006, 333) consider the application of the *indirect* approach taken by Transaction Cost Economics (TCE) and with respect to external relationships with maintenance contractors. However, this work does not focus on the full operationalisation of the TCE dimensions and lacks any empirical component in terms of the TCE dimensions. No guidance exists on the management of internal relationships. Furthermore, there are no examples of theoretical and empirical work that concern multiple vertical boundaries and multiple external exchanges in a supply chain.

2.2.2 General facilities and building maintenance

Again, "good practice" guides exist that provide normative advice on the advantages and disadvantages of appointing external contractors to perform a comprehensive range of building maintenance including the building's services. Also, these guides mostly comment on aspects on the management of contracts with external firms. For example, Chanter and Swallow (1996), Currie & Brown and Facility Management Australia (2005), Jones (2002), Milne (1985), The Chartered Institute of Building (1990) and Wordsworth (2001).

This time, however, a much clearer link is made to mainstream social science theory. On the make-or-buy decision, Bon (1991) clearly connects the potential applicability of TCE to explain the tendency of firms to internalise maintenance activity and externalise new construction activity. In doing so, Bon expressly mentions the influence of asset specificity as one of the key and well established TCE dimensions. More specifically, Bon explains that maintenance activity carries a greater site specificity and associated human knowledge specific requirement. However, this work does not set out to achieve a full operationalisation of the TCE dimensions and does not carry an empirical component. In contrast, Frost (1996; 1997) not only acknowledges the relevance of TCE with respect to the make-or-buy decision, but also considers the influence of *competencies*, from the strategic management literature and as an alternative approach to this decision. Additionally, Frost develops a concern for a wider range of services, including building maintenance, and undertakes an empirical study as part of her doctoral study. However, instead of testing the main prescriptions of TCE and a competence-based approach, Frost adopts grounded theory and, in doing so, is unable to comment directly on the applicability of any particular theory. Rather, Frost appears to revert back to more of a relative merits approach and finds limited support for the main advantages of externalisation and concludes that the study raises more questions than it answers.

With respect to the nature of the exchange relationship, Ventovuori, Lehtonen and Miettinen (2004) made the link again with TCE and the type of facility services (including building services). However, their work only concerns external relationships, lacks a full operationalisation of these different types of relationships and lacks a full operationalisation of the TCE dimensions. Furthermore, there is no evidence of any treatment of multiple vertical boundaries and multiple external exchanges in a supply chain.

In order to identify examples of empirical work that comprise a more complete operationalisation of mainstream social science theory and that are accompanied by empirical work, it is necessary to go beyond the building service maintenance literature and beyond the general facilities and building maintenance literature, into the related sector of installation / new construction activity.

2.2.3 Installation / new construction activity

2.2.3.1   Generally

In common with maintenance researchers, construction researchers have also employed the relative merits approach to both the make-or-buy decision (for example, Buckley and Enderwick 1989 and Hillebrandt 2000) and the external relationship decision. Construction researchers have also applied TCE to address governance issues. Indeed, the acceptance of TCE amongst the construction research community has not gone unnoticed (Bang 2002; Chang and Ive 2000; Costantino, Pietroforte and Hamill 2001; Lai 2000; McDermott and Alsagoff 1996). Construction researchers have also started to develop alternative theories to TCE, namely competence-based theories (such as Resource-Based Theory) in relation to the make-or-buy decision and power-based theories (for example, Resource Dependency Theory) in terms of the nature of the exchange relationship decision.

2.2.3.2   The make-or-buy decision

The literature that concerns the make-or-buy decision in the installation / construction of new facilities has progressed beyond the maintenance literature in terms of theory and empirical work. That is, there are a greater number of examples of work that not only employ TCE but, in doing so, develop a far higher level of sophistication with respect to this theory's operationalisation. The installation / new construction literature also generates a few examples of empirical work.

With regard to the application of TCE, in terms of the vertical boundaries between the client (or client's agent) and the main contractor, examples are provided by, Bon (1991), Casson (1987), Hillebrandt (2000), Reve and Levitt (1984), and Winch (1989; 2001; 2002). Whereas, examples of the application of TCE in relation to the vertical boundaries between the main contractor and the subcontractor include, Bang (2002), Bon (1991), Bröchner, (1990), Casson (1987), Chau and Walker (1994), Costantino and Pietroforte (2004), Constantino, Pietroforte and Hamill (2001), Eccles (1981a; 1981b), González, Arrunada and Fernández (1999), Gunnarson and Levitt (1982), Hillebrandt (2000), Walker (1996) and Winch (1989; 2001; 2002). Of these examples, those that

incorporate empirical data are all drawn from vertical boundary between the main contractor and subcontractor. That is, Bang (2002), Costantino and Pietroforte (2004), Constantino, Pietroforte and Hamill (2001), Eccles (1981) and González, Arruñada and Fernández (1999).

Eccles (1981a; 1981b) is the first construction related empirical study to appeal to TCE. Eccles (1981a) considers that he shows that main contractors subcontract highly skilled / technologically complex work due to the inherent uncertainty that arises out of the peculiar characteristics of construction. Eccles goes on to connect this type of uncertainty to TCE. In doing so, he asserts that his work disproves Stinchcombe's (1959) thesis that subcontracting is a response to the type of uncertainty that arises from fluctuations or variability of workload. However, questions can be raised regarding the extent to which Eccles (1981a) has actually deployed the TCE variables, as well as his interpretation of TCE's approach to uncertainty and, therefore, the validity of his findings when viewed through the lens of TCE. [1]

Eccles' (1981b) study (that is essentially a companion study to Eccles' 1981a study) establishes a much closer link with the TCE variables. In particular, Eccles (1981b) adopts a version of uncertainty that is consistent with TCE and that concerns the potential for contractual disturbances (that may give rise to negative opportunistic behaviour). Here, the most vivid example Eccles (1981b, 354) gives concerns basic trades comprising the carpentry-based aspects of a project. These trades are in such close intellectual and physical proximity to the main contractor's task of planning and coordinating on-site activity that they are often internalised to reduce the main contractor's exposure to negative opportunistic behaviour. Having said this, Eccles' (1981b) study still does not measure any of the TCE variables directly and at the level of the individual firm. Furthermore, and even after having adhered more closely to the TCE framework, Eccles (1981b, 348) finds that improvements in production costs are just as important as the influence of transaction costs, in determining the extent of subcontracting.

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[1] Section 3.2.5.4 provides a more detailed critique of Eccles' and Stinchcombe's work.

Constantino, Pietroforte and Hamill (2001) undertake a replication of Eccles' (1981b) study and, in doing so, include commercial / non-residential construction firms, as well as residential construction firms. Constantino, Pietroforte and Hamill (2001, 444) also find that production cost improvements are an important reason for subcontracting. For example, improvements in production costs that flow from subcontracting include reduced overhead costs, reduced overall construction costs, faster construction time, reduced equipment / maintenance cost and value to the owner and better workmanship. Later, Constantino and Pietroforte (2004) report on a study by Finke (2002) that is again closely related to Eccles (1981b) and that also finds similar production cost improvements are amongst the critical determinants of subcontracting. As with Eccles (1981b), these studies do not measure any of the TCE variables directly and at the level of the individual firm.

On the other hand, Bang (2002, 251-253) appears to revert back to Eccles' (1981a) study in finding support for TCE, in terms of the importance of the type of uncertainty associated with future resource requirements. However, Bang also observes the importance of lower production costs that obtain from subcontracting. Again, Bang (2002) does not fully operationalise TCE and generate data concerning the TCE dimensions at the level of the individual firm.

González, Arruñada and Fernández (1999) appears to be the only empirical study that clearly measures each of the TCE dimensions at the level of the firm. This makes the findings of this study particularly noteworthy. González, Arrunada and Fernández (1999) find that firms tend to subcontract fewer tasks when asset specificity is high and the risk of negative opportunistic behaviour is high. This is consistent with Eccles' (1981b) observations, in particular concerning basic trades. On the other hand, the other findings are inconsistent with Eccles (1981a; 1981b). First, the effect of geographical dispersion is found not to be significant and second, uncertainty did not show any significant effect on subcontracting. With regard to uncertainty, González, Arruñada and Fernández (1999) recommend further research, employing a more precise measure of this variable.

In all of the above examples concerning the application of TCE with respect to the make-or-buy decision and which incorporate empirical data relating to the vertical boundary between the main contractor and subcontractor, the emphasis is very much on externalisation or the *buy* decision. Whilst it is recognised, in most of these studies, that subcontracting may generate certain production cost improvements, there is a complete absence of analysis from the subcontracting firm's perspective - to determine why it is this firm internalises the activity that main contractors choose to externalise. If this is connected to superior production competence, then an alternative approach beyond TCE would need to be considered.

The first sign of construction researchers identifying a link between competence-based approaches and the make-or-buy decision seems to have been made by Pietroforte and Costantino (2002, 595). These authors refer to a competence-based theory, namely, Resource-Based Theory (RBT), in suggesting that the construction firm may externalise resources that are not relevant to core operations and / or target new market areas which match the firm's strategic assets. However, there is no attempt to operationalise this theory and there is no empirical component to this work. In fact, examples of empirical studies that apply RBT to the make-or-buy decision are in areas of commercial activity quite distinct from construction activity.

2.2.3.3   The nature of the exchange relationship decision

The installation / new construction literature has also progressed beyond the maintenance literature with regard to the nature of the exchange relationship decision. Here again, there are a greater number of examples of work that not only employ mainstream social science theory but, in doing so, develop a far more complex approach to the operationalisation of these theories. The installation / new construction literature also generates a few examples of empirical work.

In the installation / new construction literature, often the theories that concern the nature of the exchange are deployed within the context of supply chain management (SCM). With regard to the difference between SCM and traditional channels perspective, Ellram (1991, 13) explains "first, supply chain management has a broader goal, managing inventory and relationships to

achieve a high level of customer service rather than accomplishment of specific marketing objectives. Second, the supply chain management approach attempts to manage both upstream and downstream activity within the supply chain". Given that SCM incorporates a concern for the management of relationships, there is a connection between the SCM literature and the literature that concerns developing partnerships between the buyer and the supplier (Khalfan, McDermott and Cooper, 2004).

In the installation / new construction literature, two approaches feature prominently on the issue of managing aspects of the exchange relationships, and often within the context of SCM and partnering. Once again, TCE is one of these popular theories, with the other being the power-based approach (London and Kenley, 2001). With regard to the application of some aspect of TCE pertaining to the nature of the exchange relationship between the client (or client's agent) and the main contractor, examples are provided by, Chang and Ive (2002), Hughes et al. (2001), Hughes et al. (2002), Lingard, Hughes and Chinyio (1998), Pietroforte (1997), Reve (1990), Smyth (2005) and Winch (2001; 2002). Additionally, examples of this kind of external relationship, which also incorporate an empirical component, include, Alsagoff (1996), Alsagoff and McDermott (1994), Bajari and Tadelis (2001), Dorée (1997), Kashiwagi and Savicky (2003), Hughes (2003), Lynch (1996), McDermott and Alsagoff (1996), Puddicombe (1998) and Rahman and Kumaraswamy (2002).

Whilst in terms of the application of some aspect of TCE pertaining to the nature of the exchange relationship between the main contractor and subcontractor, the vast majority of examples incorporate an empirical component, including, Alsagoff (1996), Alsagoff and McDermott (1994), Cheung and Lenard (1997), Cho (2003), Constantino, Pietroforte and Hamill (2001), Eccles (1981b), Hughes (2003), Kale and Arditi (2001), Miller (2000; 2003), Miller, Packham and Williams (1999), Miller, Packham and Thomas (2002).

Of these examples, Alsagoff (1996), Constantino, Pietroforte and Hamill (2001), Dorée (1997), Eccles (1981b) and McDermott and Alsagoff (1996) adhere closest to the TCE framework and its dimensions. However, in each of these studies there is scope to undertake a more detailed

operationalisation of TCE, as well as a more detailed operationalisation of the focal external relationship. Moreover, TCE has not yet been applied to address internal relationships within firms in the construction supply chain.

In terms of the application of power-based approaches to the nature of the exchange relationship, these generally encompass external relationships in the supply chain, including the relationship between the client (or client's agent) and the main contractor, and between the main contractor and subcontractor. In the installation / new construction literature, this approach is led by the work of Cox (1999), Cox and Townsend (1998) and Lamming and Cox (1999), although other authors have also developed the perspective of one firm attempting to control other firms in its supply chain (Green and Lenard 1999; Miller 1999). With regard to mainstream social science theories pertaining to power-based approaches, the work of Cox and his colleagues most closely resembles Resource Dependency Theory (RDT), in so far as, these scholars promote the following view:

> The key, however [to controlling supply chains], is always the ability to understand how to retain power over suppliers, through the ability to achieve effective *control over, and to avoid dependency on*, those to whom formerly insourced resources are outsourced" (Author's emphasis). (Cox 1999, 174)

Having noted the connection between the work of Cox and his colleagues and RDT, no attempt has been made to fully operationalise the dimensions of RDT in order to address exchange relationships. As with RBT on the make-or-buy decision, in order to find empirical studies that apply RDT to the nature of the exchange relationship decision, it is necessary to consider other areas of commercial activity distinct from construction activity.

2.2.3.4   Summary

Figure 2.1 provides a summary of the literature that is most closely related to the governance of air conditioning maintenance in Australian retail centres. Although the installation / new construction literature has developed and empirically tested mainstream social science theory to a much greater extent than the maintenance literature (depicted by the lesser incidence of full dark

cloud symbols), there is the opportunity to shed more light and *from a construction perspective,* on both the two governance issues and across multiple vertical boundaries and exchange relationships in a supply chain.

	"Good Practice" Guides (Relative Merits Approach)	Social Science Theory	Empirical Component
Aspects Specific to the Governance of AC *Maintenance* in Retail Centre Supply Chains	●	●	●
Building Services *Maintenance* (including AC)			
Make-or-Buy applied to			
Internalisation	○	●	●
Externalisation	○	● *(Transaction Costs)*	●
Exchange applied to			
Internal relationships	●	●	●
External relationships	○	● *(TCE)*	●
Supply Chain	●	●	●
General Facilities and Building *Maintenance* (including AC)			
Make-or-Buy			
Internalisation	○	● *(TCE)*	●
Externalisation	○	● *(TCE and Competence-Based Approach)*	●
Exchange applied to			
Internal relationships	●	●	●
External relationships	○	● *(TCE)*	●
Supply Chain	●	●	●
Installation / New Construction			
Make-or-Buy			
Internalisation	○	☛ *(TCE)*	●
Externalisation	○	☛ *(TCE and RBT)*	● *(TCE)*
Exchange			
Internal relationships	●	●	●
External relationships	○ *(TCE and RDT)*	☛ *(TCE)*	●
Supply Chain	●	●	●

Key: AC   = Air Conditioning
     ○   = Well Developed   ☛ = Reasonably Well Developed
     ●   = Beginning to be Developed   ● = No Development / Practically No Development

Figure 2.1: Literature most closely related to the governance of air conditioning maintenance in Australian retail centres

First, with regard to the make-or-buy decision, and viewed using the lens of TCE, there is scope to undertake a more comprehensive operationalisation of TCE. In particular, this operationalisation could address González, Arruñada and Fernández (1999) concern for a more precise measure of uncertainty. There is also the opportunity to operationalise and test RBT across both internalisation and externalisation.

Second, and in terms of the nature of the exchange relationship decision, there is an absence of any social science theory being brought to bear on internal relationships. Whilst, with regard to external relationships, again, there is room to undertake a more comprehensive operationalistion of TCE, along with the opportunity to operationalise and test RDT.

Finally, there is the prospect of investigating how the relative importance of transaction costs and production costs might change in make-or-buy decisions at different vertical boundaries in the same supply chain and how exchange relationships, and their determinants, may vary between different firms and within firms in the same supply chain.

2.3 RESEARCH OBJECTIVES

Given the progress that has been made in the application of TCE with regard to both sub-research questions, and in both the maintenance literature and in the installation /new construction literature, it seemed a natural step to test this theory in air conditioning maintenance in retail centres. Despite TCE's ongoing popularity amongst researchers in construction activity, this chapter has already touched on some controversy in this theory's application - concerning the relative importance of transaction costs versus production costs and in the application of uncertainty. Construction researchers are also beginning to employ related theories concerning governance. That is, RBT on the make-or-buy decision and RDT on the nature of the exchange relationships decision.

Mindful of this progress, and in order to address the research aim, the objectives of this research are to:

1. Establish the incidence of the internalisation versus externalisation of air conditioning maintenance activity by the firms in the supply chain described in Section 1.1.6;

2. Establish the incidence of the various exchange relationships between these firms and within these firms, in the supply chain described in Section 1.1.6; and

3. Test TCE, RBT and RDT in terms of the extent to which these theories explain and predict the incidence of the governance decisions revealed by the first two objectives. That is, TCE and RBT are applied to the make-or-buy decision and, TCE and RDT are deployed with regard to the nature of the exchange relationship. More specifically, the hypotheses that are tested are as follows:

   a. TCE: "...transaction costs are economised by assigning transactions (which differ in their attributes) to governance structures (the adaptive capacities and associated costs of which differ) in a discriminating way". (Williamson 1985, 18)

   b. RBT: "When another firm has valuable, rare and costly to imitate resources and capabilities that are too costly to acquire, non-hierarchical [externalisation] may be preferred in spite of significant threats of opportunism. Firms should vertically integrate into business functions [internalise] where they enjoy a competitive advantage". (Barney 2002, 208)

   c. RDT: "An organisation's attempts to satisfy the demands of a given group are a function of its dependence on that group relative to other groups and the extent to which the demands of one group conflict with the demands of another". (Pfeffer and Salancik 1978, 45); and

4. Test the following hypotheses with regard to a supply chain:

   a. Either transaction costs *or* production costs are the key determinants of internalisation (the make decision) in a supply chain; and

   b. Upstream internal and external relationships are determined by downstream external relationships (Costantino, Pietroforte and Hamill 2001, 446).

2.4 JUSTIFICATION FOR THE RESEARCH

2.4.1 Theory

At the level of the individual theory, this thesis represents the first testing of:

1. TCE on the issue of the make-or-buy decision and within the context of general facilities and building maintenance;
2. TCE on the issue of the internal exchange relationships in any sector of construction activity;
3. TCE on the issue of external exchange relationships within the context of general facilities and building maintenance;
4. RBT on the issue of the make-or-buy decision in any sector of construction activity; and
5. RDT on the issue of the internal and external exchange relationships in any sector of construction activity.

Having critically reviewed the literature concerning each theory in the next chapter, the need to adopt a pluralistic stance in the application of the three theories became apparent. In brief, this is based on the complementary strengths of the theories, anomalies in empirical work and unequivocal advice from the chief proponent of TCE (Williamson). Furthermore, this stance has appeal when consideration is given to the fundamental view that any theory only yields a partial account of the phenomenon it seeks to address.

With regard to the make-or-buy decision, a pluralistic approach is taken that treats TCE and RBT as superior under *different prevailing conditions* (concerning information symmetry and asymmetry but under similar conditions in respect of an efficiency orientation) and, therefore, complementary. Here, an integrative framework of vertical integration is developed that aims to create a clearer understanding of the conditions under which TCE and RBT are dominant. This approach is encouraged by the similarity of the assumptions made in TCE and RBT concerning rationality and a short term approach to seeking profits. That is, TCE and RBT are seen as belonging to the same family of theories or Scientific Research Program (SRP).

In contrast, TCE and RDT differ on the matter of rationality and which is expected to be the basis of these theories performing differently under different conditions pertaining to an efficiency and an effectiveness orientation. The fundamental matter of different assumptions concerning rationality causes each of these theories to reside in different SRPs. Therefore, and within the particular type of supply chain investigated in this thesis (that displays conditions pertaining to a short term approach to maximising profits) these theories are treated as competing theories. However, a wider view is taken that envisages supply chains in which firms that take a longer term approach to developing profits, such that, RDT may be a complementary theory to TCE – on the basis of complementary SRPs.

In summary, the theoretical core of this thesis is TCE, mainly because this theory straddles both sub-research questions and is the prominent theory on these questions within research conducted in construction activity. Beyond this, a pluralistic approach provides the opportunity to more rigorously test not only TCE but the two other theories that are beginning to show themselves as highly relevant to the sub-research questions. Additionally, a whole-of-supply chain approach permits the testing of the relative importance of transaction costs and production costs, as well as the extent to which upstream exchange relationships are determined by downstream exchange relationships. At the level of multiple theories, this thesis also presents the first attempt to develop and test an integrative framework of TCE and RBT on the issue of the make-or-buy decision within any sector of construction activity. Here, the opportunity is also taken to develop the general influence of transaction costs as envisaged by Coase (1932), as opposed to the specific TCE application of transaction costs that concerns the influence of negative opportunistic behaviour. Whilst, at the level of the supply chain, this thesis provides the first construction related study to investigate more than one vertical boundary, as well as more than one internal and external relationship in the same supply chain.

Following the critical review of the three theories in this thesis in Chapter 3 and the development of these theories in Chapter 4, the following seven hypotheses emerged as the focus of the data collection and analysis:

- *Hypothesis Number 1*: The greater the potential for hold-up associated with an activity, the greater the internalisation of the activity with a relational exchange and the lesser the potential for hold-up associated with an activity, the greater the externalisation of the activity with a lesser relational exchange than that associated with internalisation;

- *Hypothesis Number 2*: The greater the potential for an activity to create a competitive advantage, the greater the internalisation of the activity and the greater the potential for an activity to create a competitive disadvantage the greater the externalisation of the activity;

- *Hypothesis Number 3*: The integrative framework of vertical integration is represented by patterns of TCE and RBT variables shown in Table 4.2; and

- *Hypothesis Number 4*: Either transaction costs *or* production costs are the important determinants of the internalisation (make) decision in a supply chain;

- *Hypothesis Number 5*: With regard to an internalised activity, and when the resource is taken as the object of the transaction, the greater the potential for the non-conventional weaker form of hold-up associated with the exchange, the greater the relational exchange and the lesser the potential for the non-conventional weaker form of hold-up associated with the exchange, the greater a discrete exchange. In terms of an externalised activity, and when the activity is taken as the object of the transaction, the greater the potential for the conventional strong form of hold-up, the more likely a relational exchange will ensue (in the presence of a moderate level of frequency) and the more likely an inefficient discrete exchange will ensue (in the presence of a low level of frequency), and the lesser the potential for the conventional strong form of hold-up, the more likely an efficient discrete exchange will ensue;

- *Hypothesis Number 6*: The greater the degree of bilateral dependence (two-way interdependence and balanced both ways) associated with the exchange, the greater the relational exchange that is based on credible commitments (as positive balancing measures). The greater the degree of unilateral dependence (one-way interdependence and unbalanced) associated with the exchange, the greater the discrete exchange with uncompetitive prices, or

credible threats as negative balancing measures (in addition to the tacit threat of using some other exchange partner or use of simple termination clauses). The greater the degree of independence (two-way and balanced) associated with the exchange, the greater the discrete exchange with competitive prices and an absence of credible threats (with a reliance on the tacit threat of using some other exchange partner or simple termination clauses only); and

- *Hypothesis Number 7*: Upstream internal and external relationships are determined by downstream external relationships.

2.4.2 Research methods

This thesis incorporates, for the first time, the operationalisation of the following:

1. TCE within a general facilities and building maintenance context; and
2. RBT and RDT within any sector of construction activity;

Moreover, and with regard to TCE, this thesis develops a more precise measure of TCE's uncertainty variable (as called for by González, Arruñada and Fernández, 1999), as well as an alternative approach to the operationalisation of the TCE's variables in pursuance of more accurately addressing internal relationships.

Finally, and on the nature of the exchange relationship, this thesis operationalises this dependent variable for the first time within a general facilities and building maintenance context.

2.4.3 Practical applications

2.4.3.1   Financial imperative

Table 2.1 provides an order of cost of air conditioning maintenance in Australian retail centres - in the sum of $62,000,000 per annum (excluding 10 per cent Goods and Services Tax). [2] Moreover, and from the exploratory interviews, Operations Managers working for CMs report that air conditioning maintenance would normally fall into the top three categories of expense in their operations budget. Hence, it is important for CMs to seek to minimise these costs and maximise the performance of the maintenance service in order to pass these benefits directly or indirectly to tenants (assuming profit maximisation is one of the firm's key objectives). In doing so, the CM helps to fulfil a number of its duties in terms of improving tenant relations, maximising rents and minimizing vacant space – all of which benefit the owner of the centre.

Table 2.1: Order of cost of maintaining retail centres in Australia (Based on PCA 2004d)

Code & Cost	CC	MRC	RC	SbRC	NC	Total
A 304000 $/m² GLAR per annum	9.25	2.85	2.97	3.36	2.19	
B 409000 $/m² GLAR per annum	1.68	0.35	1.73	1.63	n/a	
C Total $/m² GLAR per annum	10.93	3.2	4.7	4.99	2.19	
D m² GLAR (mid-point in size category – see section 1.1.3)	Say 5,000	67,5000	40,000	20,000	Say 5,000	
E Number of centres (see Table 1.1)	123 + say 4 NT = 127	54 + say 1 NT = 55 (includes SpRC and MRC)	59 + say 1 NT = 60	224 + say 5 NT = 229	861 + say 5 NT = 866	1,337
F = D x E Total m² GLAR	635,000	3,712,500	2,400,000	4,580,000	4,330,000	
G = C x F Total $ per annum	6,940,550	11,880,000	11,280,000	22,854,200	9,482,700	62,437,450

[2] PCA cost codes 304000 Air-Conditioning / Ventilation and 409000 Building Management Systems (including controls) are the most relevant categories of cost analysed by PCA.

With respect to the market for MSCs and CCs, the Facility Management Association of Australia (1999, 18) estimate that the total industry annual turnover (across all types of facilities) for air conditioning and heating maintenance services is $0.518billion ($518,000,000).

In the allocation and administration of these monies, Barney (2002, 193) considers that governance decisions are amongst the most fundamental of all strategic management decisions faced by the firm. The contributions of this thesis should be useful to any practitioner responsible for the make-or-buy decision and the nature of the exchange relationship decision but, in particular, practitioners responsible for these decisions and residing in CMs and MSCs, as well as in other construction related settings.

2.4.3.2 The make-or-buy decision

On the make-or-buy decision, Eccles (1981b, 354) reported the difficulties faced by construction firms concerning whether or not to subcontract basic trades. Around a third of the firms interviewed had previously subcontracted these trades but had changed to in-house provision, and vice-versa. This thesis should also help construction practitioners more clearly understand transaction costs and production costs and the competing trade-offs to be obtained via internalisation or externalisation.

2.4.3.3 The nature of external exchange relationships

In terms of the nature of external relationships, it is well reported that construction activity in many developed countries is blighted by a history and trajectory of adversarial relations (for example, Murray and Langford 2003). This critique often focuses on a lack of trust as part of a negative cycle that is associated with a reduction in the level of commitment and new investment, before proceeding to suggest that this is connected to underperformance and client dissatisfaction. In response to this, recommendations from numerous government sponsored reports often point towards industry participants changing their attitudes towards trust in the near term (National Public Works Council1990;Gyles Royal Commission 1992; Construction Industry Development

Agency 1995; Australian Construction Industry Council 1995; Construction Queensland 1997; Cole Royal Commission 2003).

The particular characteristics pertaining to construction activity can be applied in order to explain the lack of success in terms of industry reform (evident from the similar and recurring themes in these government reports). That is, the temporal and fragmented nature of the organisations involved to deliver a bespoke product and the difficulties these characteristics create can be considered as a possible explanation as to why the construction industry has been slow to employ supply chain collaboration and management (for example, Akintoye, McIntosh and Fitzgerald 2000, 160). More precisely though, the bespoke nature of the final product and the fact that the industry is highly fragmented and relies heavily on subcontracting, demonstrates that the essential knowledge and skills required to construct the final product is actually *not generally specific* to any particular client or project (Eccles 1981; Reve 1990; González, Arruñada and Fernández 1999).

Given that the resources necessary to construct projects generally require little adaptation and that clients are able to readily source these resources, via an elaborate supply chain comprising a main contractor and many subcontractors and suppliers, then this acts to substantially reduce the motivation for clients to directly invest in construction firms in these construction supply chains. This lack of motivation to invest in construction firms is exacerbated by the fact that there may be a limited opportunity for a client to recover a return on any such investment, in the case that a client procures construction services infrequently. Furthermore, this lack of opportunity for repeat business denies a main contractor the ability to show their firm as a worthy investment partner. Hence, there may be situations in which clients and / or main contractors may, at best, waste resources in developing a temporal relational exchange or may, at worst, face a substantial loss if one of these parties invests more heavily (in say new technology) in an exchange and mistakenly relies on relational norms to support this exchange (given an absence of an ongoing requirement).

In contrast, there may well be grounds to be much more optimistic about the prospect of replicating the innovations in procurement in the UK in terms of the supply chain upstream of the contractor (Khalfan and McDermott 2006; McDermott and Khalfan 2006). That is, the situation faced by the main contractor in its relationships with subcontractors appears to be significantly different than that between the client and main contractor. That is, the potential for economic gains through the alignment of resources controlled by subcontractors with those resources controlled by the main contractor may be more readily envisaged.

This is particularly the case with those subcontractors that are closest to the main contractor's *core activity* of planning and coordinating construction works. Kale and Arditi (2001, 544) suggest the highly specific nature of these kinds of relationships, in terms of organisational learning at inter-organisational boundaries, enabling firms to address the coordination and integration of complex construction requirements in a timely fashion. Kale and Arditi (2001, 544) state "such interorganisational learning that grows over the course of frequent relationships makes the transaction between the general contractor and subcontractor highly asset specific". Here, there appears to be a genuine high level of specificity that may motivate a main contractor to invest in those subcontractors upon which it has a heavy dependence in terms of site planning and coordination and that are engaged on a frequent basis. This time, and *prima facie*, those government sponsored reports that also call for main contractors to develop more broadly stronger relations with subcontractors seem to have merit, particularly in terms of the main contractor's core subcontractors. Improvements in performance arising from more relational exchanges between main contractors and subcontractors can then be expected (Miller, Packham and Thomas 2003).

Given that main contractors face a different proposition in their relationships with their clients than in their relationships with subcontractors, this then raises a question concerning the virtue of the position that main contractor-subcontractor exchanges need to be dependent on the client-main contractor exchange (Research Objective 4b and Hypothesis 7). The alternative position is that it may be more logical to consider that a main contractor is better placed to deal with problems created by poor relations with its clients if it has good relations with its subcontractors.

This alternative position is consistent with evidence that indicates that those contractors that do maintain strong relationships with subcontractors demonstrate higher levels of profitability and overall performance (Kale and Arditi 2001).

Given the current transitional state of the development in relational approaches to procurement, this thesis should provide some timely guidance to construction practitioners (either representing a client or a contractor) in determining the most appropriate nature of external exchanges in pursuance of avoiding mistaken relational exchange or an unduly arms length exchange.

2.4.3.4 The nature of internal exchange relationships

With regard to internal exchange relationships, some of the government sponsored reports mentioned previously include recommendations that the construction industry develop stronger and closer relationships within the firm. These recommendations may be, at least in part, a response to the industry's culture of "command and control" and its predominantly "hard" model of human resource management (for example, and in the UK, Coffey and Langford 1998; Cully et al. 1999; Druker et al. 1996; Hillbrandt and Cannon 1990). Moreover, the continued impetus for "lean thinking" in the industry, seems to heighten the need to ensure that these processes be developed without worsening any regressive policies of human resource management (Hampson, Ewer and Smith 1994; Rehder 1994; Turnbull 1988).

Again, this thesis should help construction practitioners in avoiding extreme and inappropriate relationships, but this time within their firm.

2.5 METHODOLOGY

2.5.1 Methodology versus methods

Research Objective 3 and the associated hypotheses revolve around the testing of TCE, RBT and RDT. This section sets out the approach or *methodology* in this thesis in pursuance of this objective and the related hypotheses. There is an important difference between methodology and methods (Runeson and Skitmore 1999, 39). On the one hand, methodology pertains to principles

and procedures of orderly thought or processes applied to a particular scientific discipline. On the other hand, methods have a closer connection to techniques used to collect and analyse data. Runeson and Skitmore (1999, 39) consider these words to be largely mistreated and estimate that the majority of writers in construction management use the word methodology, when they should use the word method. In a similar way Edum-Fotwe, Price and Thorpe (1996) and Root, Fellows and Hancock (1997) have also observed the difference between the terms methodology and methods and the confusion on the use of these terms in construction management research.

The various theories deployed in this thesis belong to the social sciences. For the social scientist, more so than the researcher in the natural sciences, the fundamental methodological issue concerning ontology needs to be addressed. That is, whether reality is objective or the product of individual perceptions.

2.5.2 Ontological perspective

2.5.2.1   Realism

In its deployment of TCE, RBT and RDT, this thesis adopts the same ontological perspective as that adopted by the vast majority of other social scientists that have applied these theories. That is, this thesis takes a position that is commonly termed *rationalism* or *realism*, and which sees the truth or reality as objective. This seems a reasonable approach given that the common denominator across the phenomena that these theories seek to address, is the survival of the firm via at least normal profits. As financial outcomes are a tangible measure of the performance of the firm, an objective approach to the truth or reality seems appropriate.

However, although the survival of the firm and its financial performance are observable, the means by which this outcome is achieved depends on behavioural attributes that are not so observable. The distinguishing trait of realism is the belief that theories of science are able to yield knowledge about the *unobservable* and that, under certain circumstances, statements about unobservable entities are able to be taken as approximately true. The social science theories being tested in this thesis are based on assumptions concerning motivations or intentions that are largely unobservable and cannot be falsified. As an example of an unobservable motivation /

intention, one of the key assumptions in TCE concerns opportunism. As Godfrey and Hill (1995, 521) explain, "…opportunism is a purely *ex post* [based on, or determined by, actual results rather than forecasts or expectations] phenomenon – it cannot be observed until it has occurred, and yet it is the perceived risk of opportunism that facilitates the calculation of *ex ante* [based on predicted or expected results] transaction costs."

At the heart of realism, therefore, is an acceptance that *A* (representing theories such as TCE, RBT and RDT) cannot be known to be true, as *A* incorporates unobservable elements. However, the fact that *B* (the outcomes predicted by *A*) is true, is consistent with and increases the probability that *A* is true (Runeson and Skitmore 1999, 40). This approach is known as the *inference to the best explanation* (Aronson 1984), and as Godfrey and Hill (1995, 527) observe "realists also point out, with some justification, that the inference to the best explanation is the only common sense position to take. After all, our design of bridges, airplanes, atomic power stations, computers, and space vehicles is guided by theories that we believe to be approximately true, even if we cannot ever conclusively prove them to be so".

2.6 SUMMARY

This chapter has developed research objectives that are informed by progress made in literature most closely related to air conditioning maintenance and justified these objectives in terms of potential theoretical applications, research methods and practical applications.

This chapter also mentioned the important difference between methodology and methods, and highlighted ontology, or the researcher's approach to reality, as one of the most fundamental methodological concerns.

In pursuance of justifying realism as the ontological approach, reference was made to the popularity of this approach associated with the kinds of social science theories being developed in thesis, as well as its appropriateness given the phenomena being investigated - whose manifest outcome is tangible (financial performance) but which is determined by individuals and firms whose behaviour is not always observable.

CHAPTER 3 LITERATURE REVIEW

3.1 INTRODUCTION

Having established TCE as the core theory in this thesis, in terms of its application to both governance questions and, RBT and RDT as emerging approaches with regard to the make-or-buy decision and the nature of the exchange relationship decision respectively, this chapter begins by explaining the origins, logic and application of each theory. The operation of each theory is then presented within the Scientific Research Program (SRP) framework (Lakatos 1978). This presentation is used to highlight the relationship of each theory to the other theories and, in doing so, establish each theory within its more general disciplinary field. An assessment is then given concerning the extent to which each theory has been successfully empirically tested. This includes, where applicable, testing pertaining to construction activity. The assessment of empirical work forms the basis of a critical review that indicates weaknesses in each theory and the potential for further development. [1]

3.2 TCE

3.2.1 Origin, logic and application of transaction costs and TCE

For his discovery and clarification of the significance of transaction costs (and property rights) in relation to the traditional structure and functioning of the economy, Ronald Coase was awarded The Nobel Prize for Economics in 1991. In his studies of vertical and horizontal integration,

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[1] This chapter draws heavily from Bridge (1999; 2000; 2001; 2002; 2004; 2005; 2007; 2008) and Bridge and Tisdell (2004; 2006).

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Coase set out to discover why a firm emerges in a specialised exchange economy. He concluded that the main reason why it was profitable to establish a firm would seem to be that there is a cost of using the price mechanism (Coase 1937).

Furthermore, and from the viewpoint of the boundaries of an extant firm, Coase (1937) considers that the greater the transaction costs involved in obtaining the supply of a resource from the market, the more incentive (other things being equal) the firm has to internalise this resource. At the same time, and at least so far as the number of employees are concerned, as the firm expands it begins to experience diminishing returns to management, along with increases in the supply price of factor(s) of production. The make-or-buy decision then becomes a function of the *comparison* of "management costs" (Demsetz 1991) or *internal transaction costs* pertaining to the cost of organising resources within the firm, versus market transaction costs or *external transaction costs*.

Despite being recognised as an important insight, Coase's idea was for a long period "much cited and little used" (Coase 1972, 63). Coase agrees with the view that up to the mid-1970s the non-use of his idea was due to the fact that it had not been made operational (Coase 1991). Williamson began to operationalise transaction costs in the early 1970s (Williamson 1970; 1971; 1973; 1974) and this work culminated in the publication of his book, "The Economic Institutions of Capitalism" in 1985. In this book and elsewhere, Williamson (1985, 18; 2005, 378) hypothesises that "transaction costs are economised by assigning transactions (which differ in their attributes) to governance structures (the adaptive capacities and associated costs of which differ) in a discriminating way".

More specifically, Williamson's (1985, 93) heuristic model shows that internalising an activity is advantageous to the firm when asset specificity is substantial, as the market is less able to aggregate demand in pursuance of generating economies of scale *and*, in any case, problems associated with the appropriation of *quasi-rents*, or *hold-up* will ensue. [2] As Klein, Crawford and

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[2] The expression "hold-up" can be attributed to Goldberg (1976).

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Alchian (1978, 298) explain, "assume an asset is owned by one individual and rented to another individual. The quasi-rent value of the asset is the excess of its value over its salvage value. That is, its value in its next best *use* to another renter. The potentially appropriable specialised portion of the quasi rent is that portion, if any, in excess of its value to second highest-valuing user". In contrast, the market has advantages in both scale economy and high-powered incentives when asset specificity is minimal.

In the end, Williamson (1985, 41) argues that his hypothesis applies to any situation that can be posed directly or indirectly as a contracting problem. Indeed, Williamson (1999, 1088; 1996, 153-154) observes that his first transaction cost article in 1971, on the make-or-buy issue, turned out to be prototypical and that TCE can be applied to a wide range of other problems.

At least since the time of the publication of his book in 1985, Williamson has been much more concerned with issues other than vertical integration. Indeed, Williamson sees vertical integration as appropriate in a very narrow range of circumstances and as an extreme safeguarding measure designed to ensure that an investment in special purpose technology is made. As such, Williamson (1991, 83) advocates that "vertical integration is the organization form not of the first but last resort …for which the condition of bilateral dependency is substantial".

3.2.2   Definition of make-or-buy and the nature of the exchange relationship

Thus far, the definition of make-or-buy and the nature of the exchange relationship has only been alluded to in Section 1.1.6. These definitions are now developed using the lens of TCE.

As mentioned in Section 1.1.6, the make-or-buy decision is commonly used to describe the choice the firm faces between undertaking an activity itself, or procuring the same activity from an alternative firm. Although the boundaries of the firm may become blurred, as contiguous firms can be seen as forming part of an organisational continuum, in this thesis, a clear distinction is made concerning the boundaries of the firm in terms of its economic characteristics (Bon 1991; Coase 1937; Lai 2000). More specifically, the *make* decision, or internalisation, is taken as the mode of governance in which the firm is able to exert direct control over resources and is wholly

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responsible for an activity. As such this definition would include a contract of employment and a wholly owned subsidiary. Whereas, the *buy* decision, or externalisation, comprises all other modes of governance.

Beyond the initial make-or-buy decision, the firm then needs to craft an entire governance structure that includes the nature of the exchange relationship with the internalised resource or the external firm, in order to oversee the completion of the particular activity. Williamson adopts Macneil's (1974; 1978) three-way classification of contracts. Specifically, Williamson (1985) develops a map of efficient governance in which each of four modes of governance (market, trilateral, bilateral and unified governance) can be assigned to either classical, neoclassical or relational contracting and matched with transactions that differ in their specificity and frequency (assuming the presence of uncertainty to a non-trivial degree).

3.2.3 TCE expressed in terms of the SRP framework

3.2.3.1   Hard core and protective belt

An SRP represents a cluster of approximately related theories and comprises a hard core (*H*) and a protective belt of auxiliary hypothesis (*B*). Table 3.1 summarises TCE in terms of its SRP attributes.

Table 3.1: TCE as an SRP (Source: Based on Bang, 2000)

SRP Attribute	TCE
H_i	Bounded Rationality
H_{ii}	Opportunism
B_a	Asset Specificity
B_b	Uncertainty
B_c	Frequency

The two hard core attributes are both behavioural assumptions that pertain to what Williamson (1985, 43) has termed the "contractual man". On the one hand, bounded rationality is considered to be a semi-strong form of rationality in which economic actors are assumed to be *intendedly* rational, but to a *limited* extent. This type of rationality falls short of a full maximising

orientation, whilst having a higher level of regard for planning than in procedural or process types of rationality, in which events are seen as being allowed to unfold. (Williamson 1985, 44-47). On the other hand, opportunism is more of an extreme form of self-interest seeking, in which economic actors deploy guile in pursuance of their own interests. This mostly includes subtle forms of deceit (for example, efforts to mislead, distort, disguise, obfuscate or otherwise confuse), but also includes lying, stealing and cheating. Opportunism is, therefore, a troublesome source of behavioural uncertainty. In contrast, the moderate form of self-interest seeking presumes that bargains are struck on terms that reflect original positions and the weakest form of self-interest seeking is obedience (Williamson 1985, 47-49).

Turning to the protective belt, first and foremost is the asset specificity of an investment. This refers to the extent to which an investment is durable and transaction specific, and thus cannot be *redeployed* without sacrifice of productive value should the transaction be terminated prematurely (Williamson 1985, 53-56). Currently, six types of asset specificity are well established and widely recognised. Five of the types of asset specificity have been developed by Williamson (1981; 1985; 1989) and one (temporal specificity) by Masten, Meehan and Synder (1991). These are summarised as follows (based on Bang 2000, 57):

1. Site specificity: investments in one particular location with inherent limitations of mobility, for example, on-site production of concrete;
2. Physical asset specificity: investments in specialised production equipment and technology for products with special physical characteristics;
3. Human asset specificity: investments in specific knowledge and external relationships such as product specific or customer specific training and learning-by-doing;
4. Dedicated asset specificity: investment in additional capacity, in the form of additional production units, for a particular customer;
5. Trademark specificity: investments in building and protecting reputation, for example, regarding a special group of products or a particular market segment; and
6. Temporal specificity: timely deliveries of assets and competencies at the right place in order to avoid hold-up problems in the production process.

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Temporal specificity is applied in this thesis in respect of the supply of DDCSs maintenance services to the MSC. That is, in terms of the DDCS supplier defaulting in the timely delivery of its service to the MSC (that performs a role much closer to the main contractor than the client in new construction activity).

Returning to matters more generally concerning TCE's protective belt, Williamson (1985, 56) describes asset specificity as the "big locomotive" to which TCE owes much of its predictive content. Nonetheless, Williamson (1985, 52) considers that the other two variable assumptions in the protective belt, that is uncertainty and frequency, play significant roles.

TCE invokes uncertainty, along with asset specificity and its behavioural assumptions, to the extent that this variable assumption creates the need for *adaptive, sequential decision making*. This dimension goes beyond *strategic* behavioural uncertainty that is associated with TCE's assumption of opportunism, and comprises *primary* and *secondary* uncertainty. Primary uncertainty concerns exogenous and random acts of nature and unpredictable changes in demand, whereas, secondary uncertainty relates to the lack of information a decision maker has regarding the activities of others (Williamson 1985, 56-60). Thus, secondary uncertainty is more endogenous and pertinent to the sort of uncertainty arising within the firm. In particular, endogenous uncertainty may arise out of technical difficulties, maintenance / coordination problems and difficulties in implementing orders (Menard 1997, 36). Having said this, the incidence and severity of the exercise of opportunism (strategic behavioural uncertainty) is likely to be exacerbated by the presence of exogenous *and/or* endogenous disturbances.

Finally, TCE employs frequency to the extent that the cost of specialised governance (of which internalisation is considered to be the most costly) is more easily recovered across *large transactions* and of a *recurring kind*. This follows classical production principles associated with Smith's (1776) division of labour theorem. Thus, in the presence of asset specificity, uncertainty and a low level of frequency, externalisation is predicted with a lesser level of relational exchange than that envisaged within the firm.

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3.2.3.2   Relationship between the variable assumptions

It is unclear whether the variable assumptions are independent (Bang 2000, 67). However, and as a minimum, asset specificity as the "big locomotive" would need to be in place in the presence of an observed internalised activity or an observed relational exchange in order to support TCE.

3.2.3.3   Refining TCE's hypothesis with respect to governance decisions

Having explained TCE's variable assumptions, TCE's general hypothesis that pertains to any contracting problem (as detailed in Section 3.2.1) can be refined to more closely reflect the make-or-buy decision and the nature of the exchange relationship decision, as shown in Figure 3.1 and described as follows:

- *The greater the potential for hold-up, the more likely the activity will be internalised with a relational exchange; and*
- *The lesser the potential for hold-up, the more likely that the activity will be externalised with a lesser relational exchange than that associated with internalisation.*

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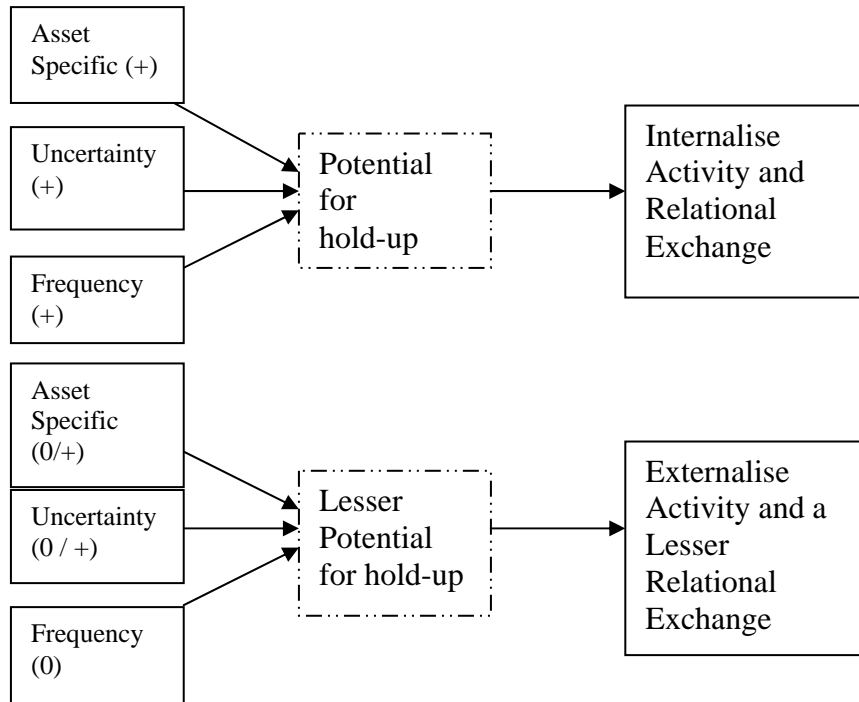
Key: 0 = Low
       + = High
       0 / + = Low to High

Figure 3.1: TCE's theoretical framework

3.2.4 Empirical testing

3.2.4.1   Williamson's declaration

Williamson has declared TCE as an empirical success (1996, 154; 1999, 1092; 2000, 607, 2002). In the publication containing his latest declaration, Williamson (2002) notes that estimates of TCE empirical studies are in excess of 600 in the year 2000. In making this declaration, Williamson refers to reviews of empirical testing on TCE by Shelanski and Klein (1995), Crocker and Masten (1996), Lyons (1996) and Rindfleisch and Heide (1997). However, even in the reviews that Williamson chooses to rely on, there is sufficient evidence to cast doubt over TCE's hypothesis. Of these reviews, Shelanski and Klein (1995) and Rindfleisch and Heide

(1997) appear to provide the clearest calls for further development and testing of TCE, based on anomalies generated by the empirical studies reviewed.

3.2.4.2   Shelanski and Klein's review of empirical testing of TCE

Table 3.2 summarises the sample of 118 empirical studies reviewed by Shelanski and Klein (1995).

Table 3.2: Summary of TCE empirical studies reviewed by Shelanski and Klein (1995)

Area of TCE Application	Number of Empirical Studies
Comparative Contracting – Vertical integration: A broad spectrum of industries and methods covered. Some focus on asset specificity, some on uncertainty or small-numbers exchange conditions and some on a combination of these variables.	14 (single-industry) 8 (multi-industry data) 6 (forward integration into marketing and distribution) 2 (company towns and company stores)
Comparative Contracting - Complex contracting and hybrid modes: Research into how transaction costs determine the structure of exchange relations that lie between market and hierarchy.	22 (long-term commercial contracts) 3 (exclusive dealing, tie-ins and specific leases) 4 (land tenure agreements) 8 (informal exchange relations) 1 (labor market contracts) 1 (auctions)
Comparative Contracting – Price adjustment in long term contracts: Designed to protect fixed investments and to limit the extent to which either side can benefit from market changes not anticipated at the time of bargaining.	7
Comparative Contracting – Multinational corporations and the structure of foreign trade: Exchange agreements often take apparently peculiar forms	10
Effects of organisation form - Effects of vertical integration	8 (performance effects of vertical integration) 3 (financial market effects of vertical integration)
Effects of organisation form – Comparative studies of organisation form: M-form versus U-form versus H-form of internal organisation.	16
Effects of organisation form – Firm ownership and governance	5

Overall, Shelanski and Klein (1995, 339-352) observe that the studies surveyed *generally* support the TCE predictions. However, these authors also note that there are results in each area that contradict the fundamental and important TCE arguments, and others that provide only weak support for the framework. The main conceptual problem questioned by Shelanski and Klein's review concerns ambiguity in the treatment of uncertainty in some of the studies surveyed. In the end, Shelanski and Klein (1995, 352) conclude "… much remains to be done, both in applying those approaches already developed to additional data, and in further refining and developing the methods used to test transaction cost hypotheses".

3.2.4.3   Rindfleisch and Heide's review of empirical testing of TCE

Table 3.3 summarises the sample of 45 empirical studies reviewed by Rindfleisch and Heide (1997).

Table 3.3: Summary of TCE empirical studies reviewed by Rindfleisch and Heide (1997)

Area of TCE Application	Number of Empirical Studies
Vertical Integration	12 (manufacturing firm's decision to backward integrates into supply of materials or components and forward integrate into distribution and sales) 13 (forward integration by manufacturers into distribution in both domestic and international contexts)
Vertical external relationships including hybrid governance mechanisms	13
Horizontal external relationships	4
Tests of assumptions	3

On each of TCE's variable assumptions, the survey by Rindfleisch and Heide (1997) highlights doubt over TCE's hypothesis:

1. Asset specificity: In a study by Masten, Meehan and Snyder (1989) involving automotive components, only human-specific assets were positively related to the percentage of components produced within the firm. Here, TCE is insufficient to explain the effects of different types of asset specificity. In a further investigation by Masten, Meehan and Snyder

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(1991), this time concerning components for a naval ship building project, asset specificity was positively related to internal production of components, but this was mainly due to a reduction in the cost of internal organisation. Additionally, in Walker and Weber's (1984) work, again involving automotive components, it was found that comparative production costs are the strongest predictor of make-or-buy decisions and that both volume uncertainty and supplier market competition have small but significant effects;

2. Uncertainty: A few of the studies surveyed find that environmental uncertainty is positively associated with vertical integration. However, a greater number show that environmental uncertainty either has no impact on vertical integration (for example, Anderson and Schmittlein, 1984; Maltz, 1994) or acts as a disincentive against integration (for example, technological obsolescence demonstrated in Heide and John, 1990 and in Balakrishnan and Wernerfelt, 1986). Environmental uncertainty is also shown to be a multidimensional construct (Walker and Weber, 1984). Here, some types of uncertainty may promote vertical integration (for example, unpredictability), whilst other types of uncertainty (complexity associated with technology change) may deter vertical integration. [3] On the question of which type of uncertainty provides the most appropriate approach for analysing TCE, Rindfleisch and Heide (1997, 42) recommend that if a researcher has reason to expect that key elements of the external environment could possibly act as a disincentive for internalisation, then a multidimensional scale may be appropriate. Whilst, in the absence of any such concern, the traditional unpredictability approach may be sufficient; and

3. Frequency: Rindfleisch and Heide (1997, 31) observe that researchers have been largely unsuccessful in confirming the hypothesised effects of frequency, in so far as frequency has not been shown to be positively associated with internalisation (for example, Anderson and Schmittlein, 1984; Maltz 1994).

Again, and in a similar manner to Shelanski and Klein (1995), Reinfleisch and Heide (1997, 51) conclude that "… the basic theory [TCE] is still in need of further development".

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[3] There is a connection to be made here with Real Options theory. Such that, if uncertainty about the future value of an ivestment is high, then the value of flexibility in the transaction is very high. In turn this may promote externalisation, particularly for activities that are not the firm's core business (Barney 2002, 214-215).

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3.2.5 Critique

3.2.5.1   Two related critiques

Two related critiques are presented that are highly relevant to the two governance questions in this thesis. The first critique (provided by Williamson), concerns differential production and largely affects the make-or-buy decision. Whilst the second critique, (which is initiated by the first critique), concerns TCE's contractual schema and has a greater bearing on the nature of the exchange relationship decision.

3.2.5.2   Williamson's "constructive critiques"

As mentioned previously, the mixed results from empirical testing raises questions about the extent to which TCE, comprising a complete SRP, is able to account for any contracting problem as claimed by Williamson. Therefore, this warrants a careful scrutiny of TCE. Indeed, Williamson (1999) has himself provided such a scrutiny, under the label "constructive critiques" and prompted by the strengths of competence-based approaches. These critiques concern differential production (associated with anomalies relating to the role of asset specificity) and which correspond to the strengths of the competence-based approaches, like RBT. In brief, these critiques see Williamson conceding the possibility that internalisation may be selected as the first choice organisational form and not as the last resort, as mentioned in Section 3.2.1.

More fundamentally, Coase (1991) argues that economists have tended to neglect the main activity of a firm, that being running a business. As such, Coase (1991) believes that a more comprehensive theory would incorporate interrelationships between the costs of transacting and the costs of organising, and that this would *eventually* make his approach in "The Nature of the Firm" operational. Coase (1991, 73) concludes that "in the 'Nature of the Firm' the job was half done – it explained why there were firms but not how the functions which are performed by firms are divided up among them".

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3.2.5.3   TCE's contractual schema

Williamson's constructive critiques represent a major change in the stance from that Williamson had previously taken, and serve to change the logic of TCE's contractual schema that informs an important part of the TCE program. In brief, TCE's contractual schema had envisaged that internalisation is chosen as a means to deliver a highly relational exchange that attenuates the possibility of hold-up. However, if internalisation is chosen for purposes other than to avoid hold-up, then it seems feasible that a relational exchange may not necessarily always materialise. This would then lead to the possibility of relaxing one, albeit implied, heuristic embedded in TCE's contractual schema. That is, the requirement that TCE should account simultaneously for the make-or-buy decision *and* the nature of the exchange relationship with respect to internalisation. In other words, and when contemplating internalisation, there appears to be the opportunity to explore treating the make-or-buy decision and the nature of the exchange relationship decision as two genuinely separate decisions (as with externalisation), as opposed to TCE's conventional approach of rolling-up these two decisions into one-simultaneous decision. In turn, this would affect the operation of all the TCE variables.

Additionally, TCE's contractual schema is incomplete in its explanation of trust and commitment and their interaction with the nature of the exchange relationship. Indeed, Williamson (1985, 406) concedes that trust "places real strains on the contractual schema". TCE proceeds to merely combine trust and commitment and overlays a "quasi-calculative orientation" on these behaviours as examples of protective mechanisms designed to safeguard specific assets. In TCE, trust and commitment are treated as latent variables and the focus is on the measurement of the tangible attributes of the exchange relationship, from which trust and commitment can be inferred.

3.2.6 Summary

Williamson is to be credited with the development of Coase's idea, in terms of deductive reasoning behind TCE and the operationalisation of this theory. In doing so, however, Williamson has effectively shifted the attention away from the more general assessment of the comparison of all types of external transaction costs with the costs of organising internally, to the

more specific comparative assessment of the threat of hold-up by either party to the transaction, versus the costs of internal organisation. These differences in emphasis reflect a more fundamental difference in the philosophy of the firm. On the one hand, Coase effectively sees the firm as acting opportunistically in seeking to expand, on the basis that it is more efficient at organising an activity than the market. On the other hand, Williamson considers that the firm seeks to attenuate the negative effects of opportunistic behaviour in its decision to reluctantly undertake an additional activity.

Despite their differences, both Coase and Williamson see the firm and market as alternative modes of bringing about the same result. These scholars also acknowledge that this assumption generates an important weakness. Specifically, neither the approach taken by Coase nor Williamson is able to account for vertical integration in pursuance of production benefits beyond the market. Although Coase's thesis is able to explain why firms exist and the extent to which they may expand, it is yet to be operationalised to comprehensively explain and predict which firm will establish itself and what activities it will internalise. Whilst, Williamson's TCE is able to explain and predict this phenomena but within a *restricted range* of conditions pertaining to hold-up.

Indeed, although TCE can be said to have started out as progressive research program, anomalies generated from empirical testing are threatening to turn TCE into a degenerating program. In order to address this weakness and embrace differences in production across both the firm *and* the market, Williamson and Coase are now *both* pointing to the need to incorporate into the analysis greater attention to the firm's differences and inherent idiosyncrasies. The impression is that Williamson is reaching out to the competence-based approaches as a possible complementary theoretical perspective within the same SRP as TCE. In doing so, Williamson has encouraged, albeit perhaps inadvertently, the reconsideration of TCE's contractual schema.

These developments have a great bearing on the two governance questions in this thesis. With regard to the make-or-buy decision, there is now the encouragement to explore the extent to which TCE and RBT can be integrated to better explain and predict this issue. Whilst, in terms of

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the nature of the exchange decision, there is now the motivation to explore how the operationalisation of the TCE variables may be affected by a change in TCE's contractual schema and how this may enhance TCE's predictive powers relative to rival power-based theories, such as RDT. Notwithstanding any improvement in the predictive powers of TCE relative to RDT under certain conditions, there may remain other conditions for which RDT may be better suited. Hence, Williamson is not ruling out the possibility of a combined efficiency (read TCE) and power-based (read theories like RDT) hypothesis.

Before proceeding to explore these developments, however, an account of RBT and RDT is now given and which follows a similar structure used to present TCE.

3.3 RBT

3.3.1 Origin, logic and application of competence and RBT

Competence concerns the idiosyncratic knowledge of the firm that underpins its ability to solve problems in different ways and more efficiently than other firms. Firms then become repositories of competence that generate source(s) of competitive advantage. This version of competence may be seen as rediscovery of Smith's (1776) proposition that specialisation yields production advantages. In contrast, this "modern" perspective emphasises specialisation in terms of competences (Foss 1996, 1).

A competitive advantage accrues when a firm earns a higher rate of economic profit than its rivals. In order to achieve a competitive advantage the firm needs to create more economic value than its competitors. Value created is the difference between perceived benefit to the final customer and the costs of inputs. Benefits relate to the product's attributes deemed desirable by the customer. Costs of inputs would comprise the average cost of production and transaction costs, including the opportunity cost of inputs (Besanko, Dranove and Shanley 2000). This concept of competitive advantage stands in contrast to TCE, that fixes the benefits side of the equation, and simplifies the reasons for the existence of the firm and its vertical boundaries as a function of minimising the sum of transaction costs and production costs.

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In terms of the nature of a core competence, this concept has both an organisational / economic and a technical dimension, as explained by Teece et al.:

> Organisational / economic competence involves: (1) allocative competence – deciding what to produce and how to price it; (2) transactional competence – deciding to make or buy,…; and (3) administrative competence – how to design organisational structures and policies to enable efficient performance. Technical competence, on the other hand, includes the ability to develop and design new products and processes, and to operate facilities effectively. (1994, 17)

The concept of competence and core competence is now most commonly associated with RBT and evolutionary economics (for example, Nelson and Winter 1982). This thesis develops RBT on the basis that this theory is emerging within a construction context (as described in Section 2.2.3.2) and is widely considered to be the current dominant perspective in strategic management (Wernerfelt 1984; Hoskisson et al. 1999; Barney, Wright and Ketchen 2001). Moreover, RBT is more compatible with TCE's behavioural assumptions, than evolutionary economics.

RBT began in the mid-1980s with Wernefelt (1984), Rumelt (1984) and Barney (1986). Subsequently, the key developments concerning the operationalisation of this approach are provided by Barney (1991; 2002) and Peteraf (1993). The approach adopted in this thesis is that provided by Barney. On the basis that there is more empirical testing of this approach and that Barney has made explicit attempts to develop closer relations with TCE.

In his 1991 article, Barney developed the starting point and an outline to operationalise RBT in response to a lack of regard for the internal strength and weaknesses of the firm. Up until this time, much of the research concerned an external analysis comprising the Structure-Conduct-Performance (SCP) attributes of industry, of which Bain (1956; 1968), Mason (1939) and Porter (1980) are leading proponents. In this external analysis, the proposition is that firms analyse their competitive environment, choose their strategies and then acquire the resources needed to implement their strategies. Thus, firms are assumed to have access to the same resources. In contrast, Barney developed the view that firms may be heterogeneous with respect to strategic resources and that these resources may not be perfectly mobile. Hence, Barney also aims to contribute a better understanding of the firm's strengths and weakness. In doing so, Barney aims

to contribute to the "strengths-weaknesses-opportunities-threats" analysis that sees a firm obtaining a sustainable competitive advantage by implementing strategies that exploit its internal strengths, through responding to environmental opportunities, while neutralising external threats and avoiding internal weaknesses.

Fundamentally, RBT holds the strategic management position that the reason for the existence of the firm is the search for, and sustainability of, economic rents (Bowman 1974; Mahoney 1995; Moon and Lado 2000). Beyond the existence of the firm, the pursuit of economic rents is also considered as determining the firm's boundaries and degree of diversification (Foss 1996, 1-2). Additionally, RBT has been applied to other applications including finance, entrepreneurship, marketing and international business (Barney, Wright and Ketchen 2001).

3.3.2 RBT expressed in terms of the SRP framework

3.3.2.1 Hard core and protective belt

Table 3.4 expresses RBT based on Barney's approach (1991; 2001a; 2002) in terms of its SRP attributes.

Table 3.4: RBT expressed using SRP attributes

SRP Attribute	RBT
H_i	Bounded Rationality
B_a	Resource Heterogeneity
B_b	Resource Immobility
B_c	Value
B_d	Rarity
B_e	Imitability
B_f	Organisation

The hard core assumption concerning bounded rationality was absent in Barney's 1991 article. Subsequently, Barney has developed RBT by adopting closer ties to neoclassical economics (Barney 2001a, 644-646). Barney now sees RBT as an extension of neoclassical economics, by virtue of changes in its behavioural assumptions that include firms being seen as boundedly rational (in the same way as TCE - described in Section 3.2.3.1). Indeed, numerous scholars

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consider TCE and RBT to be similar in terms of deploying bounded rationality, along with the adoption of a static and equilibrium orientation (for example, Foss 1993; 2000; Foss, Knudsen and Montgomery 1995; Knudsen 1993; Williamson 1999).

Whether or not opportunism can be considered a second hard core assumption remains a controversial component of RBT. Much of what is written on the competence-based literature is silent on the issue of the assumed nature of self-interest (Williamson 1999, 1094). Moreover, although Barney (2002, 215) mentions the issue of opportunism, he does so as means to promoting the strengths of TCE under conditions associated with a high transaction specific investment and uncertainty. In contrast, it could be that firms possess superior competencies over the market because of opportunism. That is, having initially internalised an activity to avoid the threat of negative opportunistic behaviour, the firm, over time, develops these superior competencies (Mahoney 2001, 654). These contrasting views demonstrate, at least, that RBT is compatible with theories like TCE that incorporate opportunism.

With regard to the protective belt, Barney notes that RBT has two fundamental assumptions:

> First, building on Penrose, this work assumes that firms can be thought of as bundles of productive resources and that different firms possess different bundles of these resources. This is the assumption of *resource heterogeneity*. Second, drawing from Selznick and Ricardo, this approach assumes that some of these resources are either very costly to copy or inelastic in supply. This is the assumption of *resource immobility*. (2002, 155)

These two fundamental assumptions are preconditions for the other variable assumptions in the protective belt. These other variables (value, rarity, imitabilty and organisation) are seen as observable consequences of resource heterogeneity and immobility. Barney (1991, 2002) develops questions relating to the value, rarity, imitability and organisation of the resource as a framework ("VRIO framework") for analysing a resource within a firm, in terms of it being either a strength or a weakness. This framework aims to identify resources that are potential sources of competitive strength, as well as indicating resources that are a potential source of weakness and that may place the firm at a competitive disadvantage if deployed. Four competitive levels are discernible when applying the VRIO framework. These levels are pertinent

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to the make-or-buy decision and can be related to stereotypical market structures, as well as connected to Williamson's critique of TCE and transaction costs more generally. In making these connections, however, the variable assumption concerning organisation (including organisational structure, management control systems and compensation policies) is omitted. This variable is omitted on the basis that it does not contribute towards predicting the potential of a resource to generate competitive advantage. Rather, it represents more of a moderating effect on the extent to which competitive advantage can be achieved, and which is determined by the other variable assumptions in the VRIO framework.

In summary, the VRIO framework provides the starting point for operationalising resources. That is, researchers are able to begin by searching for attributes of resources that make them valuable, rare, costly to imitate. Section 3.3.4 concerning RBT empirical testing, shows a wide range of approaches to fully operationalising the VRIO framework. Some of these approaches may be more direct and stick more closely to the literal meaning of the value, rare and costly to imitate variables initially developed by Barney. This may be in instances, in particular, in which rarity and costly to imitate are more readily observed with a more straightforward link to the dependent variable. Some other approaches, may seek to supplement measures of VRIO. For example, Barney recommends the use of SCP analysis in conjunction with other measures of "value" (as is the approach taken in this thesis).

3.3.2.1.1 Connecting competitive parity to perfect competition, Williamson's "Learning" critique and Coase's

At one level, the firm is able to achieve competitive parity and normal economic profit by exploiting resources that are "valuable". Barney (2002, 162) considers that resources are valuable "…if, and only if, they reduce a firm's net costs or increase its revenues compared to what would have been the case if this firm did not possess those resources". At this level, the entrepreneur chooses to invest in the organisation of tradable resources. Thus, the firm's organisational / economic resources, along with its other internalised resources, become valuable to the extent that they contribute towards achieving the lowest point on the average cost curve. If "valuable" resources are the basis of the firm's competitive positioning, then the firm's conduct is more

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likely to resemble that of a *price taker*, and its industry more closely depicted by *perfect competition.*

These conditions can be connected to Williamson's TCE critique that concerns learning and Coase's assertion that economists have tended to neglect the main activity of the firm, that is, running a business. In the above example, establishing the firm along with the extent to which it is initially vertically integrated, is in response to an opportunity to receive a minimum of a normal economic return, via competitive parity. This is in contrast to vertical integration arising out of a desire to attenuate possible negative opportunistic behaviour. Therefore, RBT that incorporates organisational / economic heterogeneity takes us closer to Coase's concern relating to the need to uncover the reasons why the cost of organising differs among firms.

3.3.2.1.2 Connecting temporary competitive advantage to monopolistic competition and Williamson's "Beyond Generic" critique

At another competitive level, the firm is able to achieve a temporary competitive advantage and above normal profit by exploiting resources that are not only valuable but also "rare". Barney (2002, 163) considers that "in general, as long as the number of firms that possess a particular valuable resource or capability is less than the number of firms needed to generate perfect competition dynamics in an industry, that resource or capability can be considered rare and a potential source of competitive advantage". Barney (2002) goes on to clarify that the nature of this competitive advantage is at least likely to be temporary. Here, a new or existing firm, chooses to invest in special purpose technology and resources. The specificity and / or complexity of these investments afford the firm the opportunity to reduce its economic costs below its competitors and / or increase the perceived benefit of its products relative to rival firms. Porter (1980) refers to these strategies as "cost leadership" and "differentiation" respectively. At this level, although the firm's organisational / economic competence remains important, its technical competence, particularly the ability to develop and design new products and processes, plays a more significant role in helping the firm to achieve a temporary competitive advantage (Teece et al. 1994). If this is the firm's principal source of competitive positioning, then the

firm's conduct and performance is likely to be closer to the industry structure depicted by *monopolistic competition*.

These conditions can be linked to Williamson's critique that relaxes TCE's assumption that specialised investments needed to support a transaction have not yet been made, and that the firm may have at least a temporary specialised under-utilised capacity. Thus, the firm having chosen to invest in "X", may also vertically integrate into activities which are in close physical and / or intellectual proximity to its specialised investments. Moreover, these investments simultaneously prevent the market aggregating demand and developing economies of scale in and around the focal activity.

3.3.2.1.3 *Connecting sustainable competitive advantage to oligopoly or monopoly and Williamson's "Beyond Piecemeal" critique*

A further competitive level is discernible when applying the VRIO framework, in so far as the firm has the ability to attain a sustained competitive advantage and above normal profit by exploiting resources that are not only "valuable" and "rare", but which at the same time are also "costly to imitate". In at least the short-run, these resources are largely inelastic in their supply. In pursuance of cost leadership and / or product differentiation, these resources typically appear to have a substantial "tacit" component and pervade most of the firm's activities. They may also not be fully understood, even by the organisation that possesses them (Barney 2002). At this level, the firm may achieve a sustainable competitive advantage by developing resources out of its organisational / economic and / or technical competence in a manner that goes beyond the observable contribution of any of its individual and tradable resources. If this is the firm's principal source of competitive positioning, then its conduct may include tacit collusion and / or the exercise of market power. Furthermore, this firm's industry structure may well lie closer to that depicted by an *oligopoly or monopoly*. These conditions can be connected to Williamson's critique that concerns the limitations of TCE's microanlytics and the need to better reflect the entire system, by adopting a more holistic view.

3.3.2.1.4 Connecting competitive disadvantage to TCE

Finally, Barney (2002) notes that resources that are not "valuable" are a source of weakness. These resources would increase the firm's costs and / or decrease its revenue if employed, and contribute towards placing the firm at a competitive disadvantage. Firms at a competitive disadvantage are likely to earn below normal economic profit. Barney (2002) considers that the firm either has to "fix" (dispossess) itself of these "non-valuable" resources or avoid using them. This view is consistent with TCE. In order to be a "valuable" resource (increase the firm's revenue and / or decrease the firm's net cost) the resource needs to be closely aligned with the firm's core competence (organisational / economic and / or technical competence). As this alignment diminishes, the resource begins to lose its specificity and is more easily captured by the market, which is then able to aggregate demand and develop a superior competence around this resource. The point of departure between TCE and RBT with regard to vertical *disintegration*, concerns the need to balance the value created by the market against the possibility of expropriation of quasi-rents. In the extreme, the threat of negative opportunism becomes practically irrelevant when the firm has no choice but to work with an alternative firm in an activity in which it is, in the short-run, incapable of performing.

3.3.2.1.5 Relationship between the variable assumptions

The four competitive levels described in the previous section indicate that the variable assumptions can be independent. However, in the same way that asset specificity is the "big locomotive" in TCE, the value variable in RBT is the principal variable and would need to be in place in the presence of an observed competitive advantage (or absent in terms of competitive disadvantage) to support RBT (Foss and Knudsen 2003, 294).

3.3.2.1.6 Refining RBT's hypothesis with respect to the make-or-buy decision

Given the predictive necessity and logic behind the value variable being in place in the presence of an observed competitive advantage (or absent, in terms of competitive disadvantage), RBT would seem to lack application on the issue of the nature of the exchange relationship. That is, having made a make-or-buy decision and in favour of externalisation, the firm has decided not to

possess the resources required to perform the activity concerned and, therefore, forgoes the opportunity to generate directly a competitive advantage out of that activity. In this case, the value variable would be expected to be negative, and yet either a relational or discrete exchange relationship may prevail. Thus, both the logic of the value variable and its variance would not be consistent with the varying outcomes associated with the nature of the exchange relationship.

This means that the focus of RBT, in terms of governance, is on the make-or-buy issue. The initial RBT hypothesis that was given in Section 2.3, can be refined to more closely reflect the VRIO framework and the four competitive levels (detailed in the previous section) as shown in Figure 3.2 and described as follows:

- *The greater the potential for an activity to create a competitive advantage, the more likely that this activity will be internalised; and*
- *The greater the potential for an activity to create a competitive disadvantage, the more likely that this activity will be externalised.*

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| Value (+) |
| Rare (+) |
| Costly to Imitate (+) |

Sustainable Competitive Advantage → Internalise Activity

| Value (+) |
| Rare (+) |
| Costly to Imitate (0) |

Temporary Competitive Advantage → Internalise Activity

| Value (+) |
| Rare (0) |
| Costly to |

Competitive Parity → Internalise Activity

| Value (-) |
| Rare (0/+) |
| Costly to Imitate (0/+) |

Competitive Disadvantage → Externalise Activity
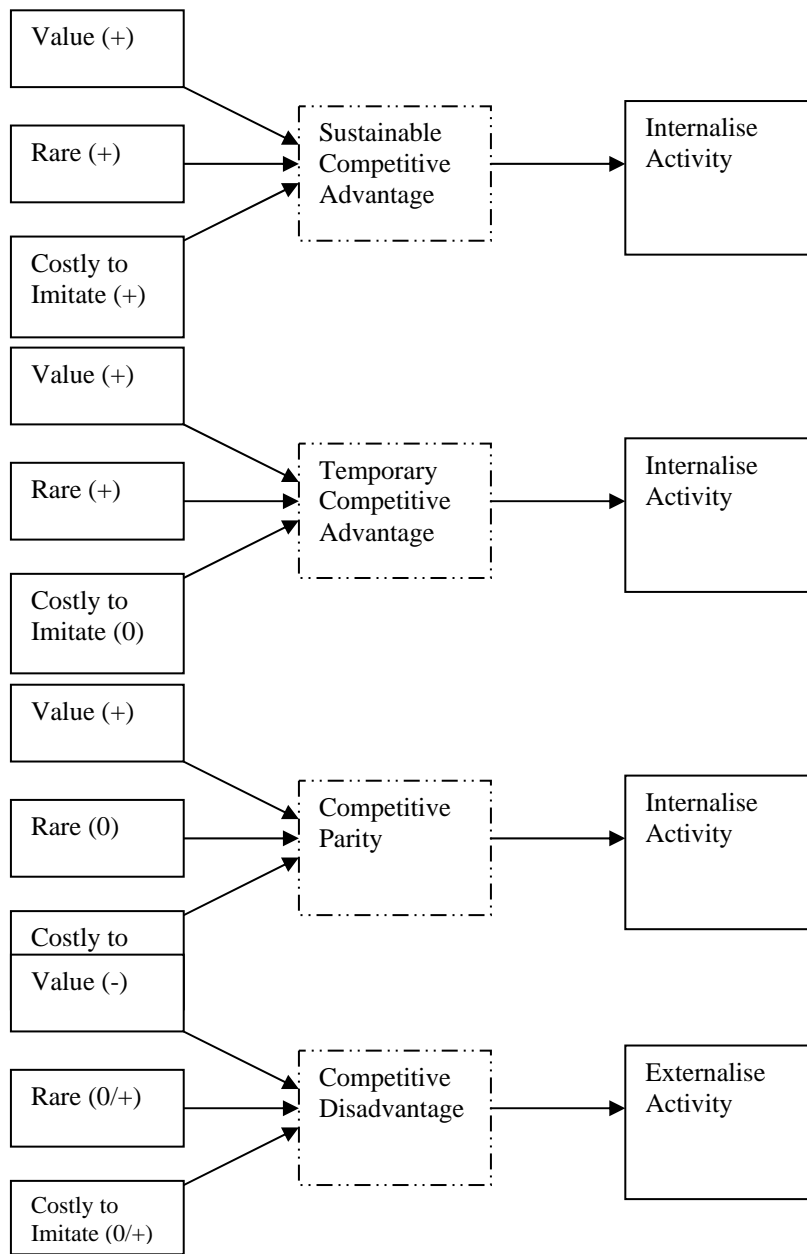
Key: *0 = Low*   *+ = High*   *0/+ = Low to High*   *- = Negative*

Figure 3.2: RBT's theoretical framework

3.3.3 RBT's relationship with neoclassical economics and TCE

RBT can be considered as an extension of neoclassical economics in much the same way as TCE. That is, mainly on the basis that these theories incorporate an efficiency orientation along with comparative statics and equilibrium analysis. More specifically, RBT and TCE emphasis

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economising *over* strategising(Williamson 1999). Economising is mainly internally oriented and concerned with maximising the firm's productive performance, whilst strategising is more external in its focus, incorporating attempts to undermine rivals (Peteraf and Barney 2003, 311-312). Both TCE and RBT can be seen as operating in the Chicago School tradition, rather than the market-power approach of industrial economics, new and old (Conner 1991).

Again, like TCE, the assumption of bounded rationality is part of the reason that RBT departs from neoclassism. However, and specific to RBT, the assumption of heterogeneity in the distribution of resources is another reason to distinguish RBT from neoclassism. Although some neo-classical micro-economists have examined the profitability implications of a few factors of production that are inelastic in supply (for example, Ricardo in respect of fertile land), RBT extends this, by asserting that there are many factors of production that are inelastic in supply (Peteraf 1993; Barney 2001a).

The similarity of TCE and RBT's hard core assumptions, along with the compatibility of their assumptions in the protective belt (that emphasises homogeneity and heterogeneity respectively) would explain why Williamson (1999, 1106) has singled out the competence-based approach as being more complementary than rival to TCE and potentially part of the same SRP as TCE.

3.3.4 Empirical testing

As mentioned in Section 3.3.2.1, there have been a wide range of approaches to operationalising the VRIO framework – some more direct / literal than others. There is now a significant body of empirical support for RBT (Barney, 2001) and, indeed, Williamson (1999) also makes reference to the significant extent of RBT empirical work. In pursuance of the VRIO framework, empirical studies typically measure the value of the focal resource by estimates of its impact on the performance of the firm. As recommended by Barney, some studies have also supplemented this approach by an SCP analysis (as is the approach in this thesis). Whilst, the rarity of the resource is often measured by showing that its incidence varies within firms competing in the same market. Whereas, imitability is commonly measured by showing that differences in the level of the resource within firms are relatively stable (for example, Henderson and Cockburn 1994,

Makadok 1999). Irwin (1994) adopts a similar approach to the measurement of value and rarity, but then measures imitability by estimates of the difficulty in acquiring and implementing medical technologies. On the other hand, Maijoor and van Witteloostuijn (1996) measure the value and rarity of the human resource of registered accountants by changes in the demand for their services (other things being equal). They then measure imitability as a function of the supply of registered accountancy services not met by an increase in the number of firms, but rather by an increase in the ratio of employees to partners. As a further example, Zander and Kogut (1995) measure imitability by developing four elements of this construct that pertain to the ease by which the resource can be communicated and understood.

The above examples of empirical work are consistent with the VRIO framework and have generally been used to explain and predict the influence of the focal resource on the performance of the firm. There is also VRIO empirical work that is directed towards explaining and predicting vertical integration. For example, Okada (1999) adopts measures of imitability that relate to the tacit nature of new technology developed by universities and finds that this is positively associated with new venture creation (as opposed to licensing to existing firms). In a similar manner, Kogut and Zander (1993) show that less codifiable and harder to teach technology is more likely to be transferred internally to wholly owned operations.

As yet, however, there does not seem to have been any attempt to test RBT and the VRIO framework from a construction perspective.

3.3.5 Critique

3.3.5.1 Two critiques

Two critiques are presented. The first of these critiques concerns RBT's weakness relative to TCE (internal transaction costs and opportunism) and the second critique relates to the extent to which RBT assertions are refutable. The second critique seems to be the most important and frequent criticism of RBT (Barney 2001b, 41; Peteraf and Barney 2003, 320).

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3.3.5.2   Internal transaction costs and opportunism

Whilst the value dimension of the VRIO framework incorporates the reduction of the firm's net costs, that would include transaction costs, it is conventional when considering the construction of value created and consumer surplus to allow for external / market transaction costs (beyond the purchase price) as detracting from the perceived benefit of the product / intermediary product (Besenko, Dranove and Shanley 2000). The VRIO framework is not explicit about the role of internal / management costs emphasised by Coase. Indeed, Williamson observes that "the burdens of bureaucracy are curiously slighted by the competence literature" (1999, 1097). Moreover, with regard to its inclusion of external / market costs, the VRIO framework appears much less sensitive to the issue of potential costs arising out of opportunism. Again, Williamson (1999, 1094) comments that "the competence literature is chary on the subject of self- interest". In fact, Barney (2002) acknowledges the relative strength of TCE on the influence of opportunism and particularly in the absence of a "unified field theory" of vertical integration.

3.3.5.3   Refutablity

Priem and Butler (2001) have provided the most detailed refutability charge against RBT. In summary, Priem and Butler comment:

> The underlying problem in the statement "that valuable and rare organisational resources can be a source of competitive advantage (Barney, 1991: 107) is that competitive advantage is defined in terms of value and rarity, and the resource characteristics argued to lead to competitive advantage are value and rarity. Instead, the characteristic and outcomes must be conceptualised independently to produce a synthetic statement. (2001, 28)

In response, Barney (2001b, 44-45) considers this critique to be unfounded, on the basis that RBT is operationalised in ways that do generate refutable hypotheses. In particular, Barney notes that Priem and Butler largely ignore the variable assumption concerning imitability that Barney considers is most clearly developed in terms of refutability. Here, for example, a firm that possesses valuable and rare resources that are obtained in unique historical circumstances, or through causal ambiguity or through social complexity can gain a sustained competitive

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advantage. Barney notes that he had given this variable the most attention because he felt this represented what was most new about the RBT. That is, the ability to specify conditions under which firms would possess competitive advantage in equilibrium. Indeed, in their discussion of the limits of RBT, Priem and Butler indicate that the imitability does have prescriptive implications and, thus, is not tautological (Barney 2001b, 45).

In terms of the rarity variable, Barney (2001b, 43) considers that this is not as well developed as the imitability variable, but is nevertheless sufficiently developed. That is, as long as the number of firms that possess a particular valuable resource is less than the number of firms needed to generate perfect competition dynamics, then the resource has the potential of generating a competitive advantage. Barney (2001b, 44) then goes on to provide more sophisticated examples of refutable assertions of rarity and which include the number of firms and an approach in which a firm with a rare resource engages in activities that the other firms do not.

Finally, Barney acknowledges that the value variable is the least well developed, as the determination of value is exogenous in RBT. Even with this variable, however, Barney notes that at least some guidance has been given. That is, researchers must begin by addressing the value of resources with theoretical tools that specify the market conditions under which different resources will and will not be valuable. Here, for example, Barney suggests that the Structure-Conduct-Performance (SCP) framework may be one such theoretical lens on market conditions.

Preim and Butler (2001) then make some further comments and conclude that RBT is a theory of sustainability but not a theory of *how* competitive advantage is created. This later position by Preim and Bulter appears much closer to Barney's previous response in which he felt that the ability to specify conditions under which firms would possess competitive advantage in equilibrium was the novel contribution being made by RBT. More recently, Barney has developed the distinction between attempting to explain and predict sources of competitive advantage closer to the short run and how competitive advantage may be created in the long run. For example, Barney (2001a, 648) asserts "neoclassical economic resource based theory may be appropriate for studying rents generated by the ability to develop new capabilities, while

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evolutionary resource-based theory may be appropriate for studying the process by which [read how] these new capabilities are developed". Moreover, Makadok (2001) refer to the neoclassical type of RBT as a "resource picking" theory and the evolutionary type of RBT as a "capability building theory". Again, in the same spirit, Locket and Thompson (2001, 745) summarise the strength of RBT as "…a form of theory of the firm in the medium-run, a time interval long enough to encompass strategic decisions over market entry and so forth, but sufficiently short that its opportunity set is determined by the resources bundles currently available to it".

This more resent position described by Barney (2001a), Makadok (2001) and Locket and Thompson (2001) indicates that RBT may also be used from a normative perspective, in terms of guiding firms to developing those resources most likely to yield a competitive advantage from those resources *already possessed* by the firm or those *currently available* via vertical integration. Related to this, the measurement of the VRIO variables *ex ante*, and at least to the extent that these variables capture non-redeployability, is no more difficult than that faced in measuring asset specificity in TCE.

Ultimately, the significant body of successful empirical work on RBT, and which has also been recognised by RBT critics like Williamson, is a robust defence to a charge of tautology.

3.3.6 Summary

The strength of RBT lies in its ability to account for differential production benefits and costs that may give rise to sustained or temporary competitive advantage. Barney has been able to develop refutable assertions pertaining to the rarity and imitability variable that predict competitive advantage. In contrast, RBT's weakness is found in situations in which competitive parity and homogeneity prevails in terms of production benefits and costs. This time, RBT relies on the value variable only to do most of the explanatory and predictive work and there remains some doubt about the extent to which this explanatory variable resembles the dependent variable, which gives some concern regarding the possibility of a tautology. To counter this, Barney stresses the need to incorporate market analysis as a means to corroborating which resources will be deemed valuable.

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The clearest weakness of RBT, however, and again with respect to competitive parity and homogeneity, concerns the requirement for an *ex post* specific investment that may create the opportunity for hold-up. Here, RBT is currently lacking in its treatment of opportunism as part of its behavioural assumptions and its variable assumptions are less attuned to hold-up than are the TCE variables. The net result is that RBT presents itself as a complementary theory to TCE on the issue of the make-or-buy decision. Recalling Section 3.2.6, TCE's strength is hold-up, while its weakness is differential production.

However, RBT appears to offer little on the issue of the nature of the exchange relationship. That is, RBT appears to be neither complementary nor rival. That is, having made a make-or-buy decision and in favour of externalisation, the firm has decided not to possess the resources required to perform the activity concerned and, therefore, forgoes the opportunity to generate directly a competitive advantage out of that activity. In this case, the value variable would be expected to be negative, and yet either a relational or discrete exchange relationship may prevail. Thus, both the logic of the value variable and its variance would not be consistent with the varying outcomes associated with the nature of the exchange relationship. By the same token, RBT is not purporting to offer a rival explanation of the nature of the exchange relationship.

In contrast, RDT does specifically address many of the same issues as TCE, including the nature of the exchange relationship. Therefore, and at one level, RDT represents an alternative and rival perspective to TCE on the nature of the exchange relationship. However, it is possible to understand Williamson's speculative combined efficiency and power-based hypothesis in terms of seeing TCE as complementary to a power-based theory like RDT. In order to achieve this though, a much wider view, than that taken to understand the complementarity between TCE and RBT, needs to be taken.

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3.4 RDT

3.4.1 Origin, logic and application of power, dependency and RDT

Power can be defined both as a force and as a social exchange, which can be mobilised to achieve desired outcomes (Bass 1990). Related to this, empowerment, or the sharing of power, has been viewed as both a relational and a motivational construct, although much of the literature emphasises the relational perspective, involving delegation of authority (Rudolph and Peluchette 1993). Hence, the concept of power is highly relevant to the nature of the exchange relationship.

Emerson (1962, 32) develops a theory of the power aspects of social relations. Here, the theory is that power resides implicitly in the other actor's dependency (individual, firm or any other discernable entity), such that "the dependency of actor A upon actor B is (1) directly proportional to A's *motivational investment* in goals mediated by B, and (2) inversely proportional to the *availability* of those goals to A outside of the A-B relation".

Emerson (1962) goes on to consider that an imbalance in dependency and, therefore, power, is unstable, as it encourages the use of power that leads to *cost reduction processes* or *balancing operations*. Cost reduction involves the dependent party yielding to their more powerful partner, including economic concessions that would incorporate the transfer of quasi-rents. This is the same phenomenon as hold-up addressed by TCE. Balancing operations seek to address directly the power imbalance. This might include withdrawal from the relationship, the development of alternative partners in addition to the initial partner, giving status to the more powerful partner in ways that avoid having to make unwanted concessions and, finally, developing coalitions.

The notion of power and dependency is developed in RDT. The following account of RDT is based on Pfeffer and Salancik (1978) and Pfeffer (1997; 2003). In RDT, organisations are seen as a coalition of support and facing conflicting demands from different groups such as owners, employees, customers, suppliers, creditors, local community and government. Pfeffer and Salancik (1978, 45) hypothesise that "an organisation's attempts to satisfy the demands of a

given group are a function of its dependence on that group relative to other groups and the extent to which the demands of one group conflict with the demands of another".

RDT envisages a number of different ways by which a firm may choose to respond to demands made on it from a discernable group that may be internal or external to the firm. The firm may perhaps choose to *concede and comply* with the demands being made. However, this is unlikely to be in the best interests of the firm in the longer term as the firm may be subject to further similar or enhanced demands having been exploited successfully by the focal group making the demands. Alternatively, the firm may take action to *avoid dependence* on the focal exchange. Avoiding strategies range from attempts to undermine the development of the demands in the first place (or mitigate their severity) to alter the structural properties of the exchange and / or the firm itself and, finally, to much more extreme measures to control the resource being provided by the groups that may be threatening to make the unwanted demands. As a further option, the firm may choose to *adapt* to the demands.

In terms of avoiding dependence and attempts to undermine the development of demands (or mitigate their severity) RDT includes an organisation conceding to demands but in a sequential fashion. Although this is not quite full compliance, as not all demands from different groups are being met at the same time, it is essentially a compliance strategy. The idea is that different groups develop an expectation that they need to wait for their turn. Again, this strategy may not be in the firm's long term interest. More subtlety the firm may seek to put-off or mitigate demands through the nondisclosure of information. For example, the firm may endeavour to make employees feel that they are receiving the best offer relative to other stakeholders by maintaining secrecy of dealings with other stakeholders. Even more subtly, the firm may employ guile in playing one group off against another. The impression is that these particular avoidance strategies may be effective in the short to medium term as a holding strategy and when the demands are being made concern not so important exchanges and / or by not overly powerful groups.

When the exchange is important and / or the demand group is more powerful than the firm, the firm may need to avoid dependence by undertaking more severe action that alters the structural properties of the exchange or the firm itself. Here, the firm seeks to develop substitutes to inputs that reduce its relying on certain suppliers and / or the firm seeks to diversify in terms of what it produces in order to access different buyers. However, when it is not possible to develop substitutes or diversify, the firm may seek to grow by merger or vertical integration. In doing so, the firm directly takes control of the input and / or output exchange. Moreover, the firm becomes more powerful as it now possesses more resources and more resource control itself.

In the circumstances in which the firm is dealing with an important exchange, is not able to develop substitutes nor diversify, and is unable to undertake a relevant merger or vertically integrate, then the firm is faced with the remaining strategy of attempting to adapt by mediating the exchange through some kind of formal and / or informal social coordinating mechanism. These mechanisms are agreements to behave in certain ways, or *social norms*, ranging from explicit agreements (for example, cooption, trade associations, cartels, reciprocal trade agreements, coordinating councils, advisory boards, boards of directors, joint ventures) to tacit agreements. Indeed, it will be seen in the next chapter that the development of social norms is a means to operationalising the nature of the exchange relationship. Ultimately, all of these coordinating mechanisms represent a way of sharing power and a social agreement which stabilizes and induces *mutual* dependence. That is, in this sort of exchange the nature of the interdependence between the parties is closer to a symbiotic and symmetrical exchange. Thus, in the presence of a balanced and high level of dependency between both parties, RDT predicts an exchange characterised by some sort of social coordinating mechanism. Conversely, social coordinating mechanisms are expected to be absent is an exchange in which either one or both parties are largely independent of their partner. In this latter instance, the interdependence is symmetrical and "competitive".

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3.4.2 RDT expressed in terms of the SRP framework

3.4.2.1   Hard core and protective belt

Table 3.5 expresses RBT in terms of its SRP attributes. Of the three theories in this thesis, RDT is the least well developed in terms of SRP characteristics. The two behavioural assumptions in the hard core are discernable, but not explicitly developed. The variables assumption in the protective belt are explicitly developed, however, there is lack of development in terms of the relative importance and relationship between these variables.

Table 3.5: RDT expressed using SRP attributes

SRP Attribute	RDT
H_i	Adaptive / Organic Rationality
H_{ii}	Opportunism
B_a	Relative Magnitude of Resource (Exchange) (Importance)
B_b	Criticality of the Resource (Exchange) (Importance)
B_c	Discretion Over Resource (Exchange) Allocation and Use
B_d	Few Alternatives

As mentioned in the previous section, RDT considers organisations as competing coalitions of interests and draws on the contribution of behaviourists, including Cyert and March (1963), who have based their perception of the firm as a *political coalition and as an adaptive institution*. As an adaptive institution the firm's behaviour is determined by "standard operating procedures" that effectively represents an organisational memory. In terms of problem solving, the search is "simple minded", in the sense that the organisation searches for alternatives that "satisfies" the goal, or adjusts goals to the alternatives available. Nelson and Winter (1982) have also developed the view of the firm as an adaptive institution. Williamson (1985, 46-47) considers this to be a weaker form of "organic" rationality than TCE's bounded rationality, and a much weaker form of rationality than that associated with maximising in neoclassical economics.

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Opportunism in RDT appears to be very similar to that assumed in TCE (Rindfleisch and Heide 1997, 31; Besanko, Dranove and Shanley 2000). Indeed, Pfeffer and Salancik (1978) have developed their approach based on Emerson (1962), and Emerson's work explicitly incorporates the possibility of hold-up. Moreover, Pfeffer and Salancik (1978, 96-97) envisage that the focal firm may be opportunistic and deploy guile in meeting the conflicting demands of different groups.

With regard to the variable assumptions in the protective belt, the importance of the resource is determined by its relative magnitude of exchange and criticality. The relationship between these variables and importance is left a little vague by Pfeffer and Salancik (1978, 46) who simply note that "these two dimensions are not completely independent". The relative magnitude of a resource / exchange is measured by the proportion of total inputs or the proportion of total output accounted for by the resource / exchange. Whilst, the criticality is measured by the ability of the organisation to continue functioning in the absence of the resource / exchange.

Discretion, or control, over resource allocation and use of a resource possessed by another social actor is also considered to be a major source of influence. This control may be gained by ownership of the resource or the ability to make rules or regulate the ownership and / or access to the resource. Pfeffer and Salancik (1978) point out, however, that control by ownership is not always straightforward. Firms may own some resources but may still not be able to control the benefits these resources generate. Knowledge possessed by individuals may be particularly troublesome and difficult to control. For example, employees using their understanding of working procedures to hold-up their firm and achieve their demands.

Finally, dependence is also determined by the concentration of resource control, or the extent to which input or output are attributable to relatively few groups. Here, the number of suppliers or buyers is not necessarily the issue, but whether the focal firm has access to additional sources, or suppliers or buyers (Pfeffer and Salancik 1978, 50).

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3.4.2.2   Refining RDT's hypothesis with respect to the nature of the exchange decision

The initial RDT hypothesis given in Section 3.4.1 can be refined to more closely reflect bilateral dependence, unilateral dependence and independence.

In terms of bilateral dependence, the refined hypothesis is shown in Figure 3.3 and described as follows:

- *The greater the degree of bilateral dependence (two-way interdependence and balanced both ways), the greater the likelihood that the exchange is relational and based on credible commitments (as positive balancing measures).*

_____

Buyer (A)		Supplier (B)

Importance:

Critical (+)
Magnitude (+)

Lack of
Discretion
(+)

Few
Alternatives
(+)

Exchange

Bilateral
Dependence
(A = B)

Relational
Exchange

Importance:

Critical (+)
Magnitude (+)

Lack of
Discretion
(+)

Few
Alternatives
(+)
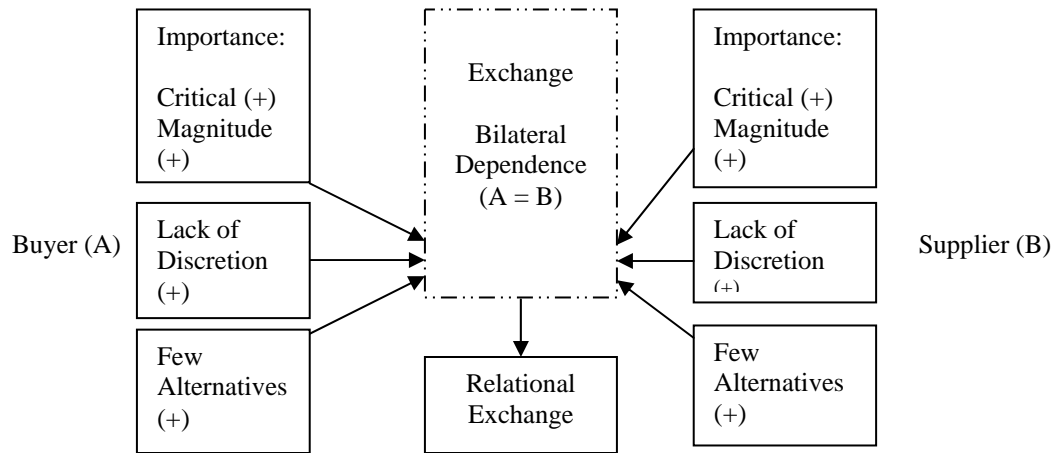
Key: 0 = Low
*   + = High*

Figure 3.3: RDT's theoretical framework (on bilateral dependence)

With regard to unilateral dependence, the refined hypothesis is shown in Figure 3.4 and described as follows:

- *The greater the degree of unilateral dependence (one-way interdependence and unbalanced), the greater the likelihood that the exchange is discrete with uncompetitive prices or credible threats as negative balancing measures (in addition to the tacit threat of using some other exchange partner or use of simple termination clauses).*

_____

Importance:

Critical (0)
Magnitude (0)

Buyer (A)

Lack of
Discretion (0)

Few
Alternatives (0)

Exchange

Unilateral
Dependence
(B more
dependent
on A)

Discrete
Exchange
(high price)

Importance:

Critical (+)
Magnitude (+)

Lack of
Discretion (+)

Supplier (B)

Few
Alternatives (+)

Importance:
Critical (+)
Exchange
Magnitude (+)

Buyer (A)

Lack of
Discretion (+)

Few
Alternatives (+)

Exchange

Unilateral
Dependence
(A more
dependent
on B)

Discrete
Exchange
(credible threats)

Importance:
Critical (0)
Exchange
Magnitude (0)

Lack of
Discretion (0)

Supplier (B)

Few
Alternatives (0)

Key: 0 = Low
*   + = High*

Figure 3.4: RDT's theoretical framework (on unilateral dependence)

With regard to independence, the refined hypothesis is shown in Figure 3.5 and described as follows:

- *The greater the degree of independence (two-way and balanced), the greater the likelihood that the exchange is discrete with competitive prices and an absence of credible threats (reliance on tacit threat of using some other exchange partner or simple termination clauses only).*

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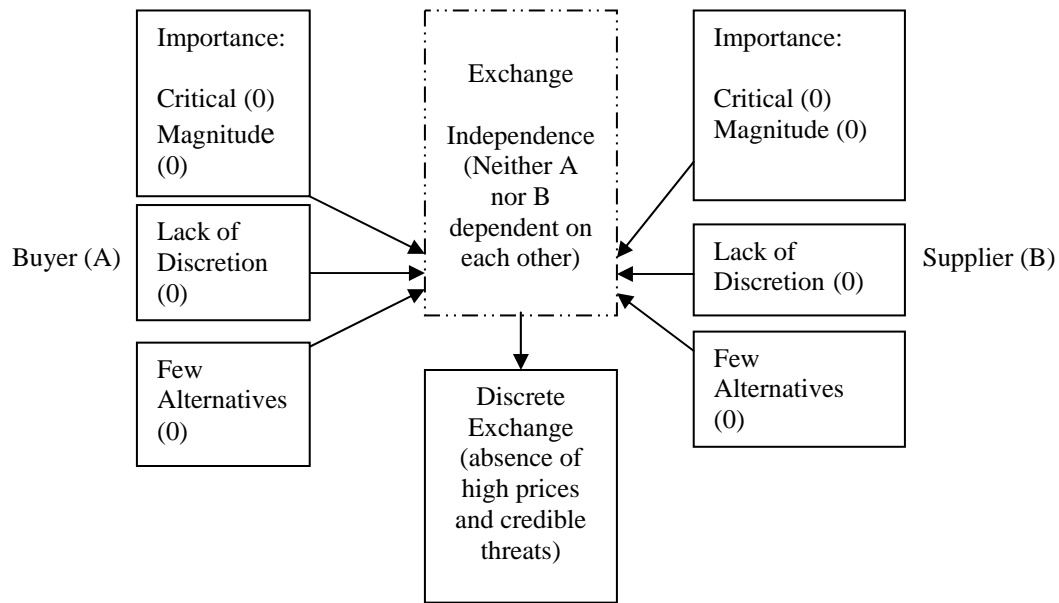
Key:	0 = Low
	+ = High

Figure 3.5: RDT's theoretical framework (independence)

3.4.3 RDT's relationship with TCE

RDT covers many of the same issues as TCE, in so far as, both these approaches incorporate a major concern for the negative effects of opportunism and hold-up in complex situations that cannot be controlled easily by the contract alone (Rindfleisch and Heide 1997, 31; Besanko, Dranove and Shanley 2000).

However, TCE treats asset specificity as a situation of resource dependency that independent and voluntary agents deliberately take recourse to, whilst the power approach typically assumes such a situation to be unanticipated and unwanted by the dependant party (Groenewegen and Vromen 1996, 376). This situation is illustrated in Figure 3.6 that concerns the presence of *special purpose investments*.

TCE and RDT both endeavour to explain the existence of relational exchange (as shown in the mid-point of Figure 3.6) by appealing to the influence of dependency. However, in the case of

special purpose investments, the point of departure between TCE and RDT concerns the nature of motivation surrounding the relational mid-point in Figure 3.6. On the one hand, TCE sees the parties to the exchange actively seeking this position in the interests of efficiency, with the dominant party willing to share some of its power. On the other hand, RDT considers that the parties have reached this position reluctantly. For time being, neither party is able to attain more power in the relationship, such that almost a stalemate ensues.

Power of
Economic Actors
(A = Buyer)
(B = Supplier)   Dependence

Nature of
Exchange
(Special Purpose)   TCE   RDT

A > B   Unbalanced   Discrete   Avoid
                                                   (High Price from B)   Dependence

Closer to   More   Relational   Seek
A = B   Balanced   (Credible Commitments) Dependence
(Power Share)

B > A   Unbalanced   Discrete   Avoid
                                              (Credible Threats from A)   Dependence
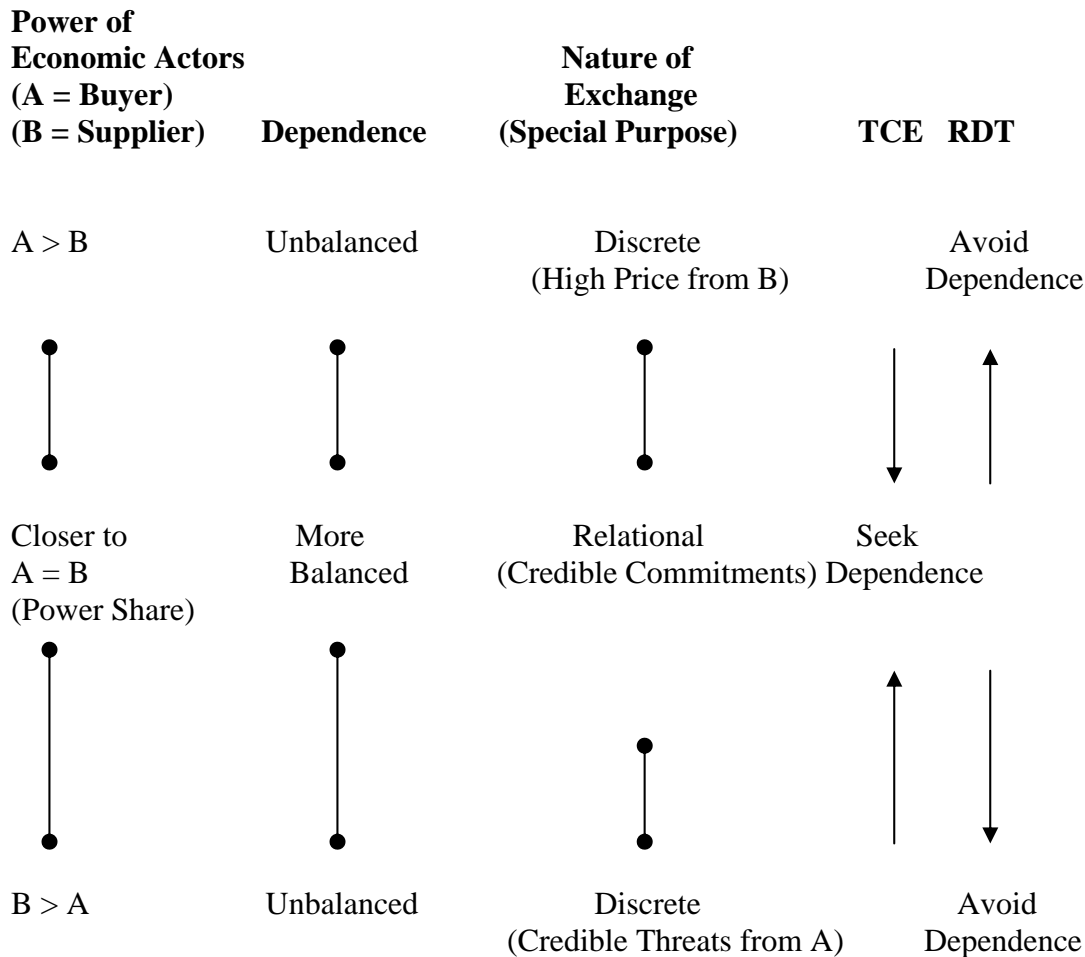
Figure 3.6: The case of special purpose investments: Seeking dependency in pursuance of efficiency versus avoiding dependency in pursuance of power (Source: Bridge 2007)

Without a move to the mid-point, inefficient outcomes may ensue. At one end of the scale, when the buyer is more powerful, then this could lead to higher prices (as the supplier prices the risk of the buyer appropriating profits from the supplier). In the extreme, the buyer may have to consider

vertical integrating to ensure the supply as the supplier becomes unwilling to take the risk. In contrast, when the supplier is more powerful, this could lead to credible threats (as the buyer may attempt to pre-empt the suppliers *ex post* bargaining advantage). In the extreme, the buyer may choose not to take the risk of transacting with the supplier. Here, the supplier may need to source other buyers that would be less dependent on the supplier and willing to engage the supplier. For TCE these inefficient outcomes are significant and unnecessary. Hence, TCE sees actors attempting to mitigate and / or avoid these outcome by *seeking dependencies* and dependency balancing that includes developing harmonious relations, as a preferred course of action. In contrast, RDT is much less concerned with these outcomes, choosing instead to view these developments as short term inefficiencies, and which are much less important than the longer term survival of the firm. The survival characteristic that RDT emphasises is *size*. In so far as, larger firms are considered to be more resilient than smaller firms in the face of environmental changes. RDT concedes that as firms grow in size (as part of the process of *avoiding dependencies* and in pursuance of power accumulation), this may well *not* be attended by gains in profitability. Sacrificing short term profits is considered to be a small price for longer term survival.

The fundamental differences in the objectives of the firm in TCE and RDT and illustrated in Figure 3.6, can be traced to different assumptions concerning rationality. As explained in Section 3.2.3.1, TCE adopts a semi-strong form of rationality or bounded rationality as one of its behavioural assumptions. Such that, decision makers seek to optimise, within the bounds of their knowledge, the match between the governance structure and attributes of the transaction, in order to minimise transaction costs. Here, the firm is seen as focusing on each transaction in isolation and developing governance structures that deal with *ex post* and temporal dependencies. Thus, the operationalistion in TCE centres on the individual transaction.

In contrast, Section 3.4.2.1 explained that RDT considers organisations as coalitions and, in doing so, promotes a weaker form of adaptive rationality. In this approach, whilst efficiency is still relevant, the emphasis is on the effective management of the firm's coalitions. In dealing with conflicting demands from its coalition partners, the firm may concede, avoid or adapt. The

development of coordinating mechanisms, that include relational exchange, is one such adaptive mechanism.

3.4.4 Empirical testing

Most of the empirical work relating to RDT builds on Pfeffer and Salancik (1978) and their operationalisation of power in terms of net dependence and the effect this has on external relationships. For example, Proven et al. (1980), Burt (1980; 1983), Saidel (1991), Yager (1993), Finkelstein (1997), Schuler, Rebein and Cramer (2002), Beckman, Haunschild and Phillips (2004), Kim, Hoskisson and Wan (2004) and Wisnieski and Soni (2004). However, it is difficult to find examples of empirical work employing a power-based approach to explain and predict internal relationships.

Again, it is difficult to find empirical work in construction that investigates either internal relationships *or* external relationships using explanatory and predictive power-based approaches like RDT. Although, in terms of mainly external relationships in supply chains and extending this work to construction, the work of Cox (1997; 1998, 1999a; 1999b) and Cox and Townsend (1998) is highly relevant in developing a power-based approach. As Cox (1999b, 172) notes "it can be argued that companies are only successful if they possess power over something or someone. This is because only by having the ability to appropriate value from relationships with others – whether these are with customers, employees or suppliers – can business success be sustained". Cox (1999b, 174) goes on to refer to case study by Lonsdale, and states that "the key, however, is always the ability to understand how to retain power over suppliers, through the ability to achieve effective control over, and to avoid dependency on, those to whom formerly insourced resources are outsourced".

3.4.5 Critique

Of the three theories in this thesis, RDT is by far the least well developed theory in terms of its behavioural assumptions and heuristics. Related to this, RDT has been be subjected to much less testing in comparison to TCE and RBT. In the absence of substantial testing, the major critique of RDT reverts to the limitations created in its assumptions and their correspondence with the

current business environment. In terms of the nature of the exchange relationship, these limitations would be exposed under conditions in which the firm's market puts pressure on the firm to maximise on each transaction.

3.4.6 Summary

The strength of RDT relative to TCE would be demonstrated under conditions in which the firm's market allows the firm the ability not to have to maximise on each transaction. Rather, this firm is able to take a more holistic stance, as a less than optimal individual transaction might be an important part of a longer term strategy to ensure the firm's survival. More specifically, the firm may be facing *ex ante* and ongoing dependencies that require a process of concession and / or avoidance and / or adaptation in order to restore the balance of power in favour of the focal firm. Thus, the operationalisation in RDT goes beyond the characteristics of the individual transaction and focuses more on the *entire* exchange, and possible multiple transactions between the parties. More specifically, the importance of the transaction is considered relative to the entire portfolio of the firm's transactions, as well as the extent of discretion and alternatives open to the firm. This includes the full extent of resources the firm is able to draw on to influence its exchange partner, and which could well extend beyond the bounds of the actual transaction and include invoking its coalition or network of firms. As mentioned in the previous section, and in terms of the nature of the exchange relationship, the weakness of RDT would be exposed under conditions in which the firm's market puts pressure on the firm to maximise on each transaction.

On the issue of the nature of the exchange relationship, TCE and RDT provide alternative explanations. However, these explanations can be considered as complementary, providing the possibility of different competitive conditions is accepted. That is, in some markets firms exist that emphasis efficiency and short term maximising on each transaction, whilst firms in other markets exist that prioritise the longer term and forego maximising on each transaction. This would explain why Williamson (1981, 573; 1985, 236-238) feels that the power-based approach may be able to make a contribution and notes that a combined efficiency-power hypothesis is not able to be rejected. This combination, perhaps represented by TCE and RDT, would require the coexistence of different SRPs, since TCE and RDT could not be part of the same SRP given their

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different assumptions concerning rationality. Thus, the complementarity between TCE and RDT requires a wider view than the complementarity between TCE and RBT, as TCE and RBT may be developed within the same SRP.

3.5 SUMMARY

Through the presentation of each of the three theories in this thesis, this chapter has demonstrated the relative strengths and weaknesses of each of these theories.

Across both the make-or-buy decision and the nature of the exchange decision, TCE has, by far, undergone the most development and testing. RBT has similar behavioural assumptions as TCE and has complementary assumptions concerning heterogeneity and differential production. Therefore, RBT presents itself as the clearest related theory upon which to develop perhaps a new SRP that incorporates both TCE and RBT and concerns firms operating in competitive markets. RBT can be applied to the make-or buy decision and is an emerging theory in construction activity. However, RBT seems to offer little in terms of the nature of the exchange relationship decision.

Whereas, RDT does seem to offer an important contribution on the nature of the exchange relationship decision and whose theory of power and dependency avoidance has been employed in construction activity. This time, however, differences in behavioural assumptions mean that TCE and RDT can't be developed as part of the same SRP. Therefore, a much wider view needs to be taken if TCE and RDT are to be seen as complementary. That is, these theories may be seen as representing complementary SRPs that can account for decision making in firms operating in different kinds of markets that display different competitive conditions associated with the extent to which information symmetry prevails or information asymmetries prevail. (Groenewegen and Vromen 1996, 372).

Indeed, Williamson is now emphasising the limitations of TCE and urges researchers to explore the complementarity of theories as part of a pluralistic stance in the development of the theory of the firm, and which includes the two governance issues in this thesis. Williamson (2000, 595)

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considers that "…awaiting a unified theory, we should be accepting of pluralism…". Beyond Williamson, there seems to be an increasing groundswell of support for theoretical pluralism. Numerous readers have recently been published exploring pluralism, and amongst some of the most vocal editors and researchers who emphasise the theoretical merits of pluralism are Foss (2000), Knudsen (1995), Lockett and Thompson (2001), Montgomery (1995). Tisdell has also long been an advocate of theoretical pluralism (Tisdell 1972; 1995a; 1995b; 1996; Bruce 2000). Additionally, a growing body of empirical work similarly supports pluralism. Typically, researchers test-out theories like TCE and RBT and find either or both approaches to be wanting in certain respects, and then go on to conclude that pluralism holds the promise for better explanations and more accurate predictions (for example, James 1998; Ojode 2000; Poppo and Zenger 1998; Rasheed and Geiger 2001; White 2000). Indeed, given the current stance of the chief protagonists from theories like TCE and RBT, along with others and empirical work, the case for progressing theoretical pluralism now appears to be compelling.

CHAPTER 4
THEORETICAL DEVELOPMENT

4.1 INTRODUCTION

The connections between the strengths and weaknesses of TCE, RBT and RDT were explored in the previous chapter. The previous chapter showed that the relationship between TCE and RBT is very close, on the basis that these theories share the same behavioural assumptions. This gives rise to the possibility that these two theories may be developed as complementary theories and within the same SRP, which reflects firms seeking to ensure their survival by focusing on lowering costs and / or creating increased net benefits in the near term. In contrast, and in terms of rationality, RDT adopts a different behavioural assumption. This enables RDT to account for firms that seek to ensure their survival through efforts to increase their power relative to other firms and, therefore, enhancing external effectiveness. In order to increase power, RDT sees the focal firm seeking to avoid dependency on discernable groups (both internal and external to the firm) and / or enhancing the dependency of these groups on the focal firm. The time horizon over which the firm may secure the benefits of this strategy is longer than that in TCE and RBT. In brief, this means that whilst TCE and RDT are not sufficiently close to be considered as complementary theories within the same SRP, the different SRPs in which they reside may be complementary. That is, in order to see the complementarity between TCE and RDT a much wider view of the prevailing economic conditions needs to be taken, than that necessary to see the completmentarity between TCE and RBT.

In order to develop the complementarity of theories a pluralistic stance is required. As mentioned in the summary of the previous chapter, this stance is called for by Williamson and other leading scholars. This chapter proceeds to explain the doctrine of theoretical pluralism, before developing a pluralistic stance on the two governance questions in this thesis. More precisely, this chapter develops and combines the relative strengths of TCE and RBT on the issue of the make-or-buy decision, in terms of an integrative framework of vertical integration that shows how these two theories may coexist and be selectively deployed to greater effect and within the same SRP. This chapter also develops TCE's contractual schema and the operationalisation of its variables, as a knock-on effect of an acceptance of the complementarity of TCE and RBT on the issue of the make-or-buy decision. Additionally, the relationship between TCE and the nature of the exchange is clarified. The development concerning TCE's contractual schema and the clarification regarding the nature of the exchange, may allow the more successful application of TCE on the issue of the nature of the exchange relationship decision that would also be consistent with the notion of TCE and RDT representing different but complementary SRPs. [1]

4.2 THE DOCTRINE OF THEORETICAL PLURALISM

Theoretical pluralism approves of a plurality of irreconcilable theories for a given set of phenomenon not as a transitory state but as an enduring state. This stands in contrast to theoretical monism, which posits that there exists only one theory for any set of phenomenon and that the aim of science is to find the unique and true theory. By adopting theoretical pluralism, the researcher entertains the idea that the total understanding of the given set of phenomenon can be enhanced by the coexistence and deployment of more than one theory. This idea is based on the view that any single theory inevitably only gives a partial account by virtue of its assumptions. Moreover, a pluralistic approach reflects a certain pragmatism, in so far as, it is questionable whether grand unifying theories are possible, and particularly in the social sciences (Elster 1989). Attempts to combine the variable assumptions of alternative theories does not unify theories, if the logic of the respective theories needs to be changed and potentially

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[1] Section 4.2 draws heavily from Groenewegen and Vromen (1996) whilst, the remainder of this chapter again draws heavily from Bridge (1999; 2000; 2001; 2002; 2004; 2005; 2007; 2008) and Bridge and Tisdell (2004; 2006).

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weakened. Also, from a pragmatic perspective, pluralists accept the limitations of scientific procedures that may lack sufficient scrutiny to single out any one unique theory. In summary, theoretical pluralism is consistent with Lakatos' ideas on the progressiveness of SRPs.

That said, pluralists do not accept any combination of theories. Theories with contradictory, or rival claims, cannot be simultaneously entertained. That is, an acceptance of one theory implies a rejection of the other theories. In order to distinguish a complementary theory from a rival theory, the theories need to offer a better account of a known fact, *or issue*, under different conditions and / or account for some novel issue under similar conditions. Thus, theoretical pluralism can be considered on two planes comprising, similar / different conditions and similar / different issues. This approach to pluralism is shown in Table 4.1, with TCE as the point of reference. This table shows the greater distance between RDT and TCE, in terms of conditions, than that between RBT and TCE. Thus, and as mentioned, in order to see the complementarity between RDT and TCE a wider view of the prevailing conditions needs to be taken than that necessary to see the complementarity between RBT and TCE.

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Table 4.1: Distinguishing complementary and rival theories with TCE as the reference theory (Source: Based on Groenewegen and Vromen 1996, 375)

TCE (Reference Theory)	Similar Issue	Different Issue
Similar Conditions	Property rights theory Agency Theory *Issue*: Static aspects of Governance *Main Conditions*: Information symmetry/contestable and competitive markets and efficiency orientation	Evolutionary Approaches *Issue:* Dynamics and development of firms
Different Conditions	RBT *Main Conditions*: Information symmetry and asymmetry *(*with same efficiency orientation) Power-Based Approach (e.g. RDT) *Main Conditions*: Information asymmetry and effectiveness orientation	Of no interest Any theory that addresses a different issue and under different conditions than TCE could be entered in this quadrant.

4.3 FOCUS OF THEORETICAL PLURALISM AND DEVELOPMENT

Given that this thesis fixes the investigation along the plane that concerns issues (the two governance decisions), the focus of theoretical pluralism and development in this thesis is the means by which the three complementary theories can be combined under different conditions.

In order to make sense of progressing pluralism under the *different theories for different conditions* approach, and to help create an assemblage of order across research in the theory of the firm, Groenwegen and Vromen (1996, 372) suggest "the best that we could do probably is to classify conditions under which we can expect any of the variables to be dominant". Indeed, and with specific reference to RBT and TCE, Barney (2002, 214) also advocates that the logic of

alternative theories should dominate, contingent on the conditions surrounding the activity. A framework that classifies the conditions in which a combination of theories and their variables is expected to be dominant, and at the same time maintains the integrity of individual theories, amounts to integration.

On the issue of the make-or-buy decision, this thesis attempts to develop and test an integrative framework of vertical integration that combines the relative strengths of TCE and RBT. Based on the brief analysis of the vertical chain that supplies air conditioning maintenance to retail centres in Australia (described in Section 1.1.6), this seemed possible as these various sectors are populated by a sufficient number of firms to generate a reasonably high level of competition (indicating an efficiency orientation) and, at the same time, the various sectors display wide differences in the populations of the firms (indicating the presence of both information symmetry and asymmetry or, heterogeneously and homogeneously distributed resources). If, upon further analysis of the sectors in the supply chain in this thesis, this is found to be so, then it would be possible to begin to fill a theoretical and empirical void that appears to be created by a lack of empirical work that sets out to test TCE *and* RBT under these different conditions. This would then stand in contrast to the bulk of the empirical work that tests both TCE and RBT by focusing on one industry or on one sector of the vertical supply chain. In doing so, this type of work often demonstrates that one approach is more powerful than the other, but does not permit alternative theories to show their compensating strengths. A more complete attempt to test TCE and RBT, in the context of vertical integration and in relation to different conditions, is presented by Steensma (1996) and Steensma and Corley (2001). This empirical work investigated the conditions in which a firm is more likely to choose a particular method of procuring technology innovation. However, the range of conditions were restricted given the focus on practically the same activity and on the basis that all of the firms are likely to display an extremely high level of heterogeneity – that would heighten the explanatory and predictive power of RBT. Indeed, support was found for RBT, whilst TCE was found to be inconclusive. Moreover, Steensma's (1996) integrative framework was insufficiently constructed to discern procurement arising out of different levels of competitive advantage. Furthermore, Steensma's approach did not completely shed light on the more general role played by transaction costs as envisaged by Coase. Thus, there appears to be an

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opportunity to develop and test a more comprehensive integrative framework that includes, amongst its classifications, the four competitive levels associated with the VRIO framework, as well as those circumstances that promote hold-up.

On the issue of the nature of the exchange relationship decision, the intention in this thesis is to at least partially confirm the complemantarity of TCE and RDT (when assuming the wider view of complementary SRPs). If it turns out that the sectors in the supply chains in this thesis display information symmetry and asymmetry as well as an efficiency orientation only, then it is not possible to completely test for complementarity of TCE and RDT within the particular supply chains studied, as the conditions pertaining to an effectiveness orientation would be absent. However, the intention is to develop TCE's contractual schema and the operationalisation of its variable assumptions, in order to give this theory a better opportunity to out-perform RDT under the conditions in which it is expected to dominate. If this is demonstrated, then this would promote further research that would again test TCE and RDT but under conditions in which information asymmetry and effectiveness prevail. In this case, and if RDT is found to dominate as expected, then the complementarity of TCE and RDT (as representative theories of different SRPs) would be supported.

4.4 THE MAKE-OR-BUY DECISION AND AN INTEGRATIVE FRAMEWORK OF VERTICAL INTEGRATION

4.4.1 From a capability and competence spectrum to an integrative framework of vertical integration

In order to classify the conditions under which the TCE and RBT variables can be expected to be dominant (and make sense of pluralism, as suggested by Groenewegen and Vromen, 1996), a *capability and competence spectrum* is developed in this thesis and which is based on Williamson's (1985) efficient boundaries problem, Barney's (2002) capabilities approach to vertical integration and the structure-conduct-performance (SCP) model (Bain 1956; 1968; Mason 1939). [2]

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[2] Williamson (1985) notes that the term "efficient boundaries" was first introduced by Ouchi (1980).

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This spectrum sees the focal firm as displaying different levels of capability and competence relative to other firms in its vertical chain. That is, both upstream suppliers and downstream buyers. More specifically, the spectrum classifies seven conditions that pick-up competitive advantage (sustainable and temporary) and competitive parity, as well as the circumstances pertaining to hold-up, as shown in Figure 4.1. These seven conditions are derived from four logical differences between the focal and alternative firms. First, levels 1 and 7 represent extreme focal firm / alternative upstream and downstream firm heterogeneity in terms of organisational / economic and / or technical capability. Here, the respective focal firm and the alternative upstream and downstream firms are not capable of performing each other's activities in the short run at this level. Second, levels 2 and 6 are indicative of focal firm / alterative upstream and downstream firm heterogeneity, arising predominantly out of technical differences. This time, although the respective firms are each capable of performing each other's activities at these levels, the focal firm holds superior technical competencies pertaining to its activities relative to alternative upstream and downstream firms and visa versa. Third, levels 3 and 5 reflect focal firm / alternative upstream and downstream firm heterogeneity, but this time arising mainly out of organisational / economic differences. Again, although the respective firms are capable of performing their respective activities at these levels, the focal firm holds superior organisational competencies pertaining to its activities relative to alternative upstream and downstream firms and visa versa. Fourth, Level 4 is closer to a state of focal firm / upstream and downstream firm homogeneity.

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Level	Type of Industry and Competition (SCP) and Competitive Position	Type of firm: Resources pertaining to:
1	*Oligopoly / monopoly*: • S: Small number of competitors etc • C: Tacit collusion / market power • P: Above normal economic returns *Sustainable competitive advantage*	*Product Capability*
2	*Monopolistic competition:* • S: Many competitors etc • C: Cost leadership/product differentiation • P: Above normal economic returns *Temporary competitive advantage*	*Predominantly Technical Competence*
3	*Perfect competition:* • S: Many competitors • C: Price taking • P: Normal economic returns *Competitive parity*	*Predominantly Organisational / Economic Competence*
4	*Competitive and organisational parity*	*Predominantly Transactional / Economic Competence*
5	See Level 3	See Level 3
6	See Level 2	See Level 2
7	See Level 1	See Level 1

Focal Firm

Alternative Firms (Upstream / Downstream

Figure 4.1: Capability and competence spectrum
(Based on Williamson 1985; Barney 2002; SCP Model;
Bridge 1999; 2002; Bridge and Tisdell 2004; 2006)

Figure 4.2 reconfigures Figure 4.1 to depict the focal firms as sitting between an upstream supplier and downstream buyer in the same vertical chain.

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1	2	3	4	3	2	1	2	3	4	3	2	1
7	6	5	4	3	2	1	2	3	4	5	6	7

Upstream Firm (Supplier)	Focal Firm	Downstream Firm (Buyer)
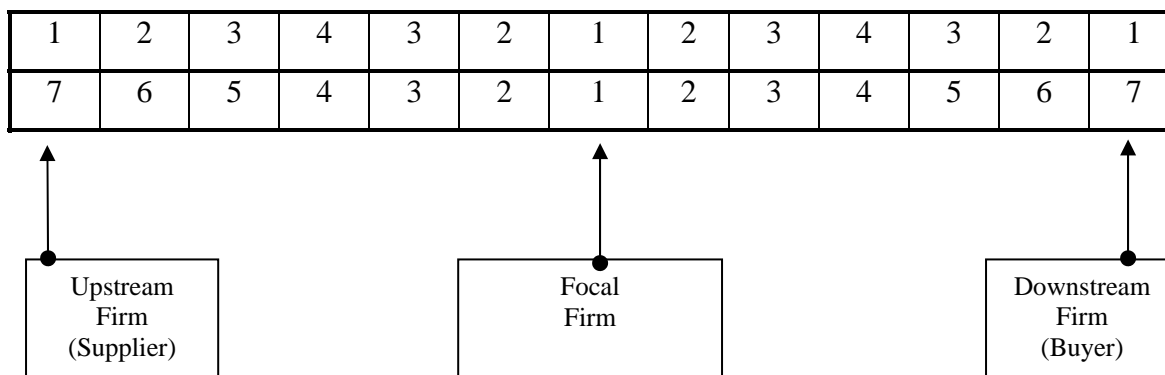
Figure 4.2: Capability and competence spectrum:
Focal firm's position relative to upstream firms and downstream firms

The top row of Figure 4.2 shows the four logical differences between the focal firm and alternative firms, whilst the bottom row shows the seven classifications that these four logical differences generate. In terms of the bottom row and the focal firm, levels 5, 6 and 7 are performed by the upstream and downstream firms, although future changes in capabilities and competences could lead to the focal firm undertaking backward or forward integration respectively into activities at these levels.

Figure 4.1 indicates that consideration of the SCP surrounding the focal firm and its product, should at least approximately reveal in advance (without knowing what activities the focal firm actually internalises) the type of firm in question. That is, the broad nature of its internalised *core* capabilities / competencies, in terms of whether the focal firm relies more heavily on organisational resources or technical resources as its principal source of competitive positioning. A distinguishing feature of a core competence is that it is germane to all the firm's activities and pervades all the firm's goods or services (Javidan 1998). Indeed, Barney (2001b, 43) recommends that, "…, researchers must begin by addressing the value of resources with theoretical tools that specify the market conditions under which different resources will and will not be valuable."

Thus, the SCP is only able to indicate the broad nature of activities that are internalised and that pertain to the focal firm's core competence. The SCP would not be able to predict the exact nature and scope of internalised activities within the broad organisational and technical category.

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Moreover, the SCP may give spurious indications when the focal firm is in transition from one core competence to another. Finally, the SCP would not give any indications as to the nature and scope of internalised activity that are not related to the focal firm's core competence.

In contrast, the microanalytics of TCE and RBT on the issue of vertical integration are designed to explain and predict whether an activity is internalised and externalised by the focal firm. Table 4.2 is the result of operationalising the levels in Figure 4.1. More specifically, Table 4.2 combines the TCE and the RBT variables in an attempt to translate each of the levels classified in Figure 4.1 into TCE and RBT logic. Each cell in Table 4.2 is considered from the perspective of the *focal firm*. Additionally, levels 4b to 7 predict externalisation and, therefore, Table 4.2 is constructed relative to alternative upstream firms (suppliers) in the vertical chain.

Table 4.2: Integrative framework of vertical integration (Based on Williamson 1985; Barney 2002; Bridge 1999; 2002; Bridge and Tisdell 2004; 2006)

Level	Logic	Asset Specific (TCE)	Uncertainty (TCE)	Frequency (TCE)	Value (RBT)	Rare (RBT)	Costly To Imitate (RBT)	Mode of Govern'
1	Capability	+ / + + +	0 / + + +	+ / + + +	+ + +	+ / + + +	+ / + + +	Internal
2	Capability	0 / + + +	0 / +	+ / + + +	+ +	+ / + +	0	Internal
3	Transaction Costs/ Capability	0 / + + +	0	+ / + + +	+	0	0	Internal
4a	TCE	+ / + + +	+ / + + +	+ / + + +	0	0	0	Internal
4b	TCE	+ / + + +	+ / + + +	0	0	0	0	External
5	Transaction Costs/ Capability	0	0	0	-	0	0	External
6	Capability	0 / + + +	0 / + + +	0 / +	- -	+ / + +	0	External
7	Capability	0 / + + +	0 / + + +	0 / +	- - -	+ / + + +	+ / + + +	External

Key:
+   = Extent to which variable is expected to be high
0   = Variable expected to be low
-   = Extent to which variable is expected to be negative
0 / +   = Variable may range from low to high

In summary, each level represents a band of activities, relative to the focal firm and upstream alternative firms, which differ in cost and benefit attributes and that are reflected by a pattern of TCE and RBT variables for that level. Table 4.2 amounts to an integrative framework of vertical integration that shows the conditions in which the logic of the alternative theories and their

variables are expected to dominate. In doing so, the integrity of the individual theories is maintained. Specifically, this table indicates that the capabilities logic and RBT variables dominate at levels 1, 2, 6 and 7 – under conditions of focal firm / alternative upstream firm heterogeneity (organisational / economic and / or technical). Whereas, in relation to levels 3 and 5, a combined transaction costs and capabilities logic dominate under conditions of heterogeneity (organisational / economic only). Here, this logic is more accurately reflected by certain variables from both TCE and RBT. Finally, the logic of TCE and its variables dominate at Level 4, under conditions of focal firm / alternative upstream firm homogeneity (both organisational and technical) *and* potentially harmful opportunistic behaviour.

4.4.2 Heuristics of the integrative framework of vertical integration

4.4.2.1   Refutability

As it is configured, Table 4.2 represents a set of refutable predictions in relation to the internalisation or externalisation of an activity that would involve the following steps:

1. Choose an observable activity from the focal firm's position and/or upstream in the focal firm's vertical chain that may itself be the subject of analysis, or a proxy for an unobservable activity;

2. Assign a classifying level to the activity by describing it as a pattern of TCE and RBT variables and matching this description to a level comprising the best-fit pattern of variables;

3. Assign a governance mode to the activity, that is, either internalisation or externalisation, by virtue of having classified the level of the activity;

4. In the case that the activity is a key source of competitive positioning / competitive advantage in the focal firm, seek to corroborate the predicted mode of governance by assigning an SCP to the focal firm that corresponds to the level of this activity; and

5. Test empirically whether the predicted mode of governance exists and is corroborated by the existence of the predicted SCP.

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The predictions arising out of Table 4.2 may be refuted if:

1. An empirical pattern of TCE and RBT variables is able to be described that is appreciably different than any of the patterns shown at levels 1 to 7; and/or

2. A predicted pattern of TCE and RBT variables exists that, whilst matching one of the empirical patterns, does not predict the actual mode of governance; and/or

3. In the case that the activity is a key source of competitive positioning for the focal firm, the predicted focal firm's SCP does not exist.

Although it was shown in Section 3.3.5.3 how RBT generates refutable assertions and avoids the charge of tautology, it was noted that there remains the potential to improve the strength of the value variable in respect of conditions pertaining to competitive parity. In Table 4.2, levels 3 and 5 represent competitive parity and rely on the valuable variable to do most of the predictive work. However, Table 4.2 indicates that the frequency variable might be added to the RBT variables as a means to improve the predictive power of RBT particularly at these levels. This still does not amount to a synthesis TCE and RBT. Rather, this represents an attempt to develop closer relations between RBT and transaction costs (of the more general kind envisaged by Coase) whilst maintaining the competence-based logic of RBT. When incorporating the frequency variable in RBT, this would be measured from a classical production perspective and need only be measured in terms of the continuity or recurrence of the activity. It need not necessarily be a large transaction (in the sense of large magnitude of exchange relative to the firm's total revenues / costs). That is, any activity that has the potential to increase revenue and/or reduce net costs becomes valuable. At the margin, even previously trivial transactions can become valuable when the firm is under financial pressure.

The operation of each level shown in Table 4.2 can be illustrated and is supported by extant theoretical and empirical evidence from the installation / new construction literature, in terms of the location of the boundary between the main contractor and the subcontractor (Bridge and Tisdell 2004).

4.4.2.2   An ontological perspective

As explained and justified in Section 2.5.2, this thesis sees reality as objective and adopts a realism, as an ontological perspective across all of the three theories employed. This approach is justified on the basis that all the theories concern the survival of the firm (including its financial performance) and which is an objective phenomenon. Moreover, the behaviour attributes of decision makers in pursuance of the firm's survival are largely unobservable and here realism offers a view of science that theories can yield knowledge about unobservables. Finally, the leading proponents of these theories can be seen as realists. Thus, there should be no question of ontological dissonance when combining TCE and RBT in an integrative framework.

4.4.2.3   Type of rationality and equilibrium analysis

As explained in Section 3.3.2.1, numerous scholars consider TCE and RBT to be similar in terms of deploying bounded rationality, along with the adoption of a static and equilibrium orientation (for example, Foss 1993; 2000; Foss, Knudsen and Montgomery 1995; Knudsen 1993; Williamson 1999). In fact, it is precisely the consistency of these two theories with respect to this behavioural attribute that makes these two theories very closely related and gives rise to the potential to develop these two theories as part of the same SRP.

A related issue, however, concerns the extent to which the approach taken in Table 4.2 eschews the make-or-buy decisions on the boundaries of the levels. More specifically, further consideration may be required to be given to the extent to which aggregating benefits and, production costs and transaction costs are actually undertaken as part of decision making. However, difficulties in the direct measurement of the phenomena concerned with TCE and RBT (Masten, Meehan and Snyder 1991; Chang and Ive 2000; Hughes et al. 2002; Costantino, Pietroforte and Hamill 2001; Godfrey and Hill 1995; Rouse and Daellenbach 1999; 2002; Levitas and Chi 2002) would suggest that this weakness is more apparent than real. That is, if researchers encounter difficulties in making their observations then decision-makers may face similar challenges. Indeed, this is consistent with the logic of bounded rationality, which considers that the decision maker normally only constructs approximate comparative estimates of costs and

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benefits, and then becomes preoccupied with, and persuaded by, the most prominent category of cost or benefit. Rarely, in this case, would make-or-buy decisions be perceived to fall on the boundaries of the various levels.

4.4.2.4   Avoidance of mulitcollinearity

There is some overlap between the TCE's asset specificity variable and the RBT variables. Indeed, the likelihood that these variables are all prominent is shown at Level 1 in Table 4.2. This relationship is necessarily the case, since the RBT variables are designed to capture the firm's differences and, at the same time, these differences create transaction costs (for example, Langlois 1991). Thus, the firm acquires superiority over the market in terms of production costs and, in doing so, creates the potential to generate rents from internalisation. This covers part of the junction of RBT with Coase's more general approach to the influence of transaction costs (Madhok 2002).

The set of RBT variables represents a more refined and powerful calibration of the measurement of the firm's differences / general transaction costs, than does TCE's asset specificity variable alone. This should generate some variance in the resultant and respective measurements. Also, the likelihood that asset specificity (emphasising non-redeployability) does not cover the full range of the firm's differences (when value and rarity are emphasised), would further reduce the correlation between asset specificity and the RBT variables. However, Table 4.2 does not require that the asset specificity variable be added to *any* of the RBT variables in the same regression equation.

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4.5 TCE'S CONTRACTUAL SCHEMA AND EXPLANATION OF THE NATURE OF THE EXCHANGE RELATIONSHIP

4.5.1 Developing TCE's contractual schema and variable assumptions and further refining TCE's hypothesis with respect to the nature of the exchange relationship

As mentioned in Section 3.2.6.2, Williamson's "constructive critiques" effectively concede the possibility that internalisation may be selected as the first choice organisational form (in pursuance of improvements in production costs) and not as the last resort. This represents a major change in the stance from that Williamson had previously taken and changes the logic of TCE's contractual schema that informs an important part of TCE program. The logic of TCE's contractual schema is summarised in Table 4.3.

Table 4.3: TCE's contractual schema and efficient governance (Source: Adapted from Williamson 2005, 380-381 and Williamson, 1985, 79)

Contractual Hazard (*H*)	Investment Safeguard (*S*)	Outcome
H = 0	S = 0	Node A: Unassisted market • Externalisation • Exchange relationship: Classical contracting
H > 0	S = 0	Node B: Unrelieved hazard • Externalisation • Exchange relationship: Classical contracting
H > 0	S > 0	Node C: Hybrid / credible contracting • Externalisation • Exchange relationship: Trilateral governance/neoclassical contracting or bilateral contracting/relational contracting
H > 0	S > 0	Node D: Hierarchy / administrative • Internalisation • Exchange relationship: Unified governance/relational contracting

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In summary, TCE's contractual schema envisages that internalisation is chosen as a last resort and as a means to deliver a highly relational exchange that attenuates the possibility of hold-up in the presence of higher levels of asset specificity and uncertainty. However, if internalisation is chosen for purposes other than to avoid hold-up, then relational exchange may not be necessarily be part of the rationale for internalisation and, therefore, may not always be an observable consequence of internalisation. Indeed, it seems reasonable to expect just as much a wide range of exchange relationships within the firm as might be found between firms (as shown in Nodes A and C in Table 4.3).

This would then lead to the possibility of relaxing an implied heuristic embedded in TCE's contractual schema. That is, the requirement that TCE should account simultaneously for the make-or-buy decision *and* the nature of the exchange relationship decision *with respect to internalisation*. In other words, and with respect to internalisation, there are appears to be the opportunity to explore the effect on the operation of the TCE variables of maintaining the integrity of the two governance decisions and not rolling them up into one-simultaneous decision. That is, by treating the make-or-buy decision and the nature of the exchange relationship as two genuinely separate and sequential decisions with respect to internalisation (as is the case with externalisation), the focus of the transaction changes from the *activity* (on the issue of the make-or-buy decision) to the *resource* (on the issue of the nature of the exchange relationship decision) having selected internalisation. This would then require modifications to the approach taken to measure asset specificity, uncertainty and frequency – as described in the following sections. As indicated, relaxing TCE's contractual schema to treat the make-or-buy decision and the nature of the exchange relationship as two genuine separate and sequential decisions would not affect the focus of the transaction when externalisation is selected. Here, the conventional approach of assuming the activity as the object of the transaction and measuring the TCE variables in respect of the activity would continue.

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4.5.1.1 Measuring asset specificity when internalisation has been selected and the resource is the object of the transaction

As previously explained in Section 3.2.3.1, the asset specificity of an investment refers to the extent to which an investment is durable and transaction specific, and thus cannot be redeployed without sacrifice of productive value should the transaction be terminated prematurely. It was also noted that six types of asset specificity have been established and widely recognised. Of the six types of asset specificity, human asset specificity is highly relevant in this thesis, given that nature of the service supplied in the air conditioning maintenance vertical chain selected for study. With regard to human resources, however, the nature of the internal exchange relationship is reflected by the employment contract. In conjunction with the attributes of the employment contract, a new type of asset specificity is now developed in respect of internalisation and when the resource is the object of the transaction, followed by implications for the uncertainty and frequency variables.

The analysis of the resource as the transaction (between the firm and an employee) reveals at least two non-conventional instances, *with respect to TCE*, in which employees are able to exercise a degree of opportunism. These instances would remain *shrouded* when the activity is the object of the transaction (in which asset specificity is measured between two potential independent firms).

The first instance concerns the situation in which the firm has made non-trivial investments in its human resources that are non-specific and able to be deployed by a rival firm – should a rival firm subsequently employ one or more of these human resources. Here, the firm has an interest in these employees delivering a better than perfunctory performance and maintaining their employment with the firm, in order that the firm may at least recover its investments and avoid having to make these investments again, simply to maintain the same level of capability and competence. This would question Williamson's (1985, 242) claim that "…skills acquisition is a necessary but not sufficient condition for asset specificity". He then goes on to illustrate that whilst physicians, engineers and lawyers and the like have valuable skills, these skills do not pose governance problems unless deepened and specialised to a particular employer. Whilst this may

hold at the level of the activity (between potential independent firms) and when referring to the conventional form of hold-up, this may not apply at the level of the resource (between the firm and employee). That is, investments made by an employer in an employee's knowledge and skills are, by definition, asset specific (given the ability of the employee to quit the firm). Thus, governance problems may ensue, *notwithstanding* the extent to which these skills are firm specific. In fact, the opposite could apply. That is, the greater the deployability of these skills, the greater the governance problems for the employer having invested in these skills.

In the second instance, the firm is not able to completely meet its current commitments and / or planned commitments through training less than fully competent staff (due to cost and time lags) - should one of its fully competent members of staff leave. In this instance, there may have been no direct investment by the employer in the employee's skills, however, the employer still remains vulnerable to employees threatening perfunctory performance and / or threatening to quit by virtue of the employer's investment in the business and in the infrastructure surrounding the employee. Indeed, Marshall (1948) regards nearly the whole income of a business as a quasi-rent. This is exacerbated when the employer faces a significant cost / difficulty in replacing the employee. Again, this is linked to skills acquisition and is also likely to be associated with scarcity of skills, which in turn may be related to task complexity and the time it takes to develop these skills. Once more, governance problems may ensue *notwithstanding* the extent to which these skills are firm / customer specific. Here again, the firm has an interest in fully competent employees maintaining their employment with the firm.

In both these instances, the employee gains some bargaining power and may, to some extent, act opportunistically (perhaps by choosing to work at a perfunctory level only and / or threatening to leave the firm) in order to extract higher wages and / or better working conditions. Given that the employment contract may be more loosely defined than contracts with external firms, the employer is more likely to rely on developing consensus through a relational exchange, rather than relying on coercion, in order to attenuate the negative effects of the employee's possible opportunistic behaviour. These non-conventional instances are *distinct from and may be in addition to* the possibility of conventional human asset specificity arising out of customisation of

the employer's good / service to suite a particular client / project or some other idiosyncrasy represented by the firm's good / service. For example, human asset specificity is designed to reflect an employee's time involved in understanding and developing specific skills.

The two non-conventional instances described above represent a *weaker form* of potential hold-up than that conventionally described in TCE. On the basis that while this form of strategic behavioural uncertainty (emanating from the individual, *at the level of the resource*) is unlikely to be sufficient to explain the firm's decision to internalise an activity associated with the human resource, it may, however, be able to explain the nature of the exchange relationship with the internalised human resource.

Of the established types of asset specificity, Temporal Specificity appears closest to the two instances described above. However, the type of specificity described in the two instances above is not temporal and does not depend on the "fundamental transformation". It is, therefore, a distinctly different type of asset specificity than temporal specificity and the other five established types of asset specificity. Henceforth, this new type of asset specificity is termed *Ongoing Asset Specificity* and seeks to capture hold-up created by an individual human resource within a firm. In terms of measuring Ongoing Asset Specificity at the level of the human resource, this might include time to train an employee in terms of generally deployable skills and / or the complexity of the employee's duties. It may also include the potential to cause delays and damage through difficulties likely to be experienced in replacing human resources, due to their scarcity. It is also distinct from the measurement of rarity in RBT, as this RBT variable seeks to ascertain differences in the level of a resource *across firms*. Whereas, Ongoing Asset Specificity includes the effect of general skills shortages on all firms. Although, retaining staff could be a source of competitive advantage, the methods to achieve this seem unlikely to be a source of a sustainable competitive advantage as they are likely to be reasonably well understood and widely disseminated. Moreover, as previously mentioned in Section 3.3.6, the operation of RBT's key variable - "value", would demonstrate an inconsistency in terms of RBT's logic towards explaining internal relational and external relational exchanges. That is, this variable is expected to turn negative upon externalisation and yet relational exchanges may still be observable with

external firms. Related to this, RBT concerns competitive advantage achieved by firms arising from resources in the firm's possession. RBT would then falter in attempting to explain an external relational exchange, as this exchange is not strictly "owned" by the firm and since other rival firms may engage the firm's focal supplier. Fundamentally then, the logic of the effect of the scarcity of skills on the exchange relationship is *prima facie* hold-up and, therefore, TCE and not RBT.

In summary, the operationalisation of asset specificity in internal exchange relationships would need to be modified to consider both Human Asset Specificity - representing the investment in skills that are deepened and specialised to a particular employer, as well as Ongoing Asset Specificity that concerns the acquisition of skills and the related issue of the scarcity of skills.

4.5.1.2 Measuring uncertainty when internalisation has been selected and the resource is the object of the transaction

Again, as explained in Section 3.2.3.1, TCE invokes uncertainty, along with asset specificity and its behavioural assumptions, to the extent that this dimension creates the need for adaptive, sequential decision making. This dimension goes beyond *strategic behavioural* uncertainty that relates to TCE's assumption of opportunism, and comprises *primary* and *secondary* uncertainty. Primary uncertainty concerns exogenous and random acts of nature and unpredictable changes in demand, whereas, secondary uncertainty relates to the lack of information a decision maker has regarding the activities of others (Williamson 1985). Thus, secondary uncertainty is more endogenous and pertinent to the sort of uncertainty arising within the firm. Endogenous disturbances give rise to additional problems when difficulties exist in the calculation of output or *meterability* (Williamson 1985; Battu et al. 2002). Specifically, tasks that are non-separable lead to difficulty in assessing individual productivity and create metering problems. Indeed, most empirical studies seeking to measure this construct have focused on measuring the difficulty in assessing the performance of transaction partners (Rindfleisch and Heide 1997).

The employment contract is different from other contractual arrangements, in so far as, the exact nature of the tasks is deliberately undefined. The employer purchases a capacity to work, such

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that if the employer can organise to extract a higher level of productivity from the employee then no cheating has occurred (Marginson 1993). This is consistent with the decision to internalise an activity in pursuance of rents / profits arising out of a competitive advantage (and embodied in RBT). If the firm has the ability to create a sustained and / or temporary competitive advantage, then it is logical to assume that the firm would want to explore the full extent to which this advantage can be exploited, namely, by leaving the terms of the employment contract unspecified. Therefore, adaptability is purchased by the employer for its own sake, and not as a mechanism to avoid negative opportunistic behaviour. In this sense, the influence of exogenous uncertainty is much reduced by virtue of the nature of the adaptability built into the employment contract. Thus, employers are largely insulated from the affect that these disturbances may have on their human assets. In fact, authority relations are more likely to create the structural preconditions for the exercise of opportunism by the employer, rather than the employee (Dow 1987; Winch 2001).

This would challenge Williamson's (1985, 59) claim that "to be sure, behavioural uncertainties would not pose contractual problems if transactions were *known* to be free from exogenous disturbances, since there would be no occasion to adapt…". Sequential adaptive decision making to attenuate negative opportunistic behaviour is not the issue at stake here, given that adaptability (via the employment contract) has already been secured. Rather, the concern is to craft the nature of the exchange relationship to protect the investment made by the employer in the employee's skills and / or other potential losses from the employee's actions, *notwithstanding* exogenous disturbances.

However, although the weaker form of hold-up by human resources may occur in the absence of uncertainty, its incidence and severity is likely to be *exacerbated* by the presence of exogenous *and / or* endogenous disturbances. In summary, when analysing internal exchange and taking the resource as the transaction, the approach would need to ensure that *both* exogenous uncertainty and endogenous uncertainty are continued to be considered.

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4.5.1.3 Measuring frequency when internalisation has been selected and the resource is the object of the transaction

Once again, as explained in Section 3.2.3.1, TCE employs frequency to the extent that the cost of specialised governance is more easily recovered across large transactions and of a recurring kind. Having internalised an activity, the firm may choose a myriad of different employment contracts to oversee its completion. In relation to a core business activity, although the firm may chose to perform this by using a large proportion of highly relational more permanent / ongoing contracts, it may also resort to more discrete temporary / intermittent employment contracts to cope with fluctuations in workload. This would question Williamson's approach to the analysis of internal exchange relationships, in which he sets aside frequency (on the basis that internalised transactions are normally recurrent) and then proceeds to focus on asset specificity and uncertainty in terms of their influence on the exchange relationship (Williamson 1985, 242). In this case, the measurement of frequency variable would need to be modified by noting the frequency of different levels of workload pertaining to the same activity in order to help predict (along with the other variables) resources employed on different terms and conditions but in relation to the same activity. Whilst Williamson's approach may be appropriate when the transaction is completed by a single resource and is, therefore, effectively able to be analysed in the same way as the activity, it may become less accurate when there are multiple resources performing the activity.

4.5.1.4 Further refining TCE's hypothesis with respect to the nature of the exchange decision

The proposed modifications in the approach to measuring the TCE variables, when the activity is internalised and the resource is taken as the transaction, may help to overcome some of the obstacles that TCE researchers have faced. In particular, there is some confusion concerning how human asset specificity is to be measured (for example, Poppo and Zenger 1998). This confusion has centred on whether the conventional non-redeployable approach (that focuses on non-redeployability in respect of firm / customer / project specificity at the level of the activity) *or* an approach that reflects the more general influence of skills (including task complexity) is more appropriate.

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Having relaxed an implied heuristic in the contractual schema in order to treat the make-or-buy decision and the nature of the exchange decision as two genuinely separate and sequential decisions, it is proposed that *both* the conventional non-redeployable approach *and* the more general influence of skills are considered – when internalisation has been chosen and the proposed alternative approach of selecting the resource as the object of the transaction is followed. TCE's general hypothesis that was refined in Section 3.2.3.3, can now be further refined in respect of the nature of the exchange relationship decision, as shown in Figure 4.3. With regard to an internalised activity and when the resource is taken as the object of the transaction, this is described as follows:

- *the greater the potential for the non-conventional weaker form of hold-up, the more likely a relational exchange will ensue; and*
- *the lesser the potential for the non-conventional weaker form of hold-up, the more likely a discrete exchange will ensue.*

Whilst, in terms of an externalised activity, and when the activity is taken as the object of the transaction, this is described as follows:

- *the greater the potential for the conventional strong form of hold-up, the more likely a relational exchange will ensue; and*
- *the lesser the potential for the conventional strong form of hold-up, the more likely a discrete exchange will ensue.*

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Asset Specificity (+)		Internal Resource Weak Hold-up		Relational Exchange
Uncertainty (0 / +)	→		→	
Frequency (+)				

Asset Specificity (0)		Internal Resource Lack of Weak Hold-up		Discrete Exchange
Uncertainty (0 / +)	→		→	
Frequency (+)				

Asset Specificity (+)		External Activity Strong Hold-up		Relational Exchange
Uncertainty (+)	→		→	
Frequency (0/+)				

Asset Specificity (0)		External Activity Lack of Strong Hold-up		Discrete Exchange
Uncertainty (0 / +)	→		→	
Frequency (0)				
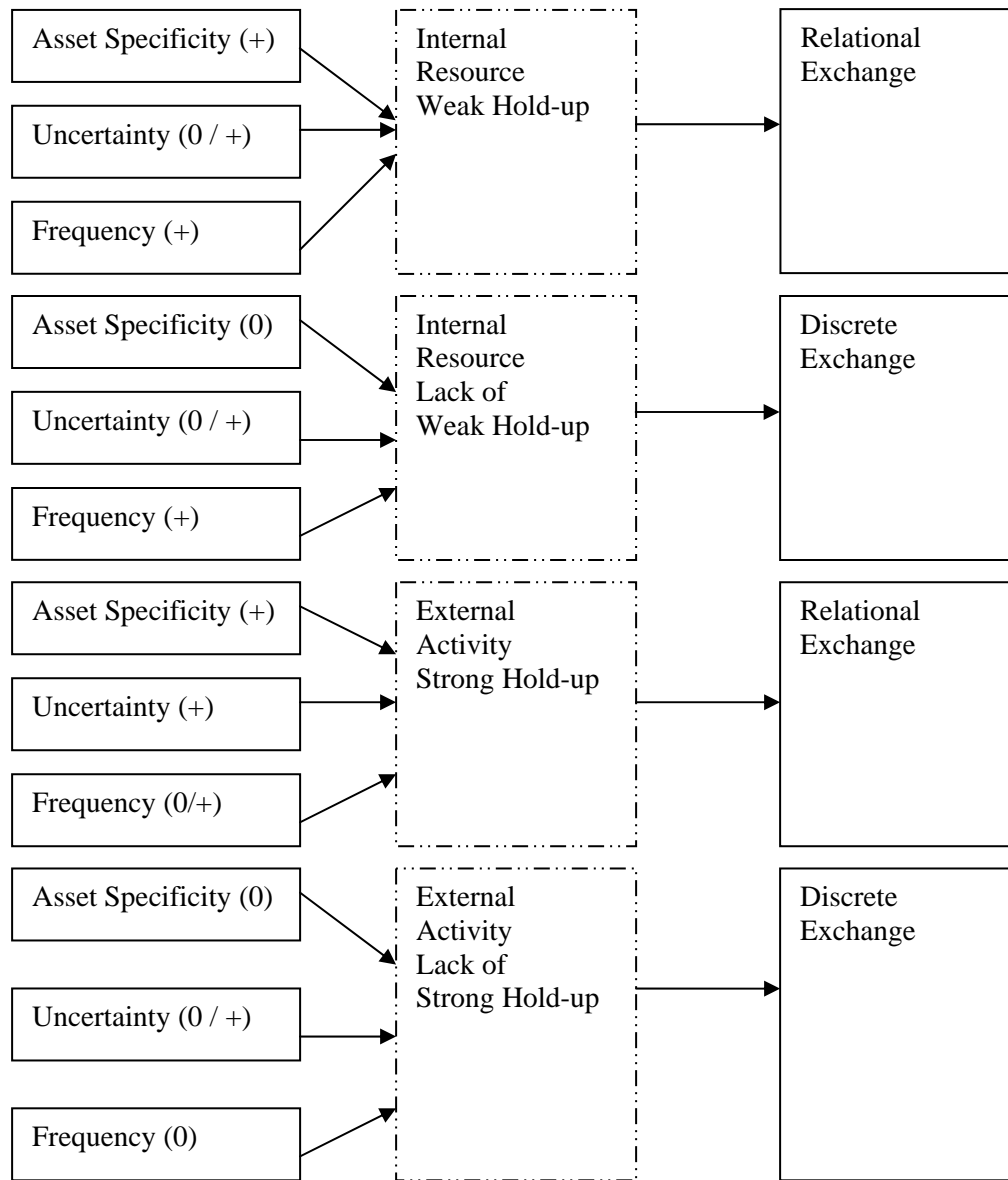
Key: *0 = Low*
        + = High
        0 / +   Low to High

Figure: 4.3 TCE's refined theoretical framework –
on the nature of exchange relationship decision

However, this further refinement still does not anticipate the situation in which the focal firm is not able to develop a relational exchange with an externalised firm and as a check to opportunistic behaviour by virtue of the focal firm's relatively low level of demand of the activity (measured by the frequency variable). That is, the external firm may be supplying a Level 6 or 7

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activity that is practically impossible for the focal firm to internalise in the short term. Williamson's "constructive critiques" now make it legitimate to consider within the TCE framework that under these circumstances the focal firm would need to resort to a discrete exchange accompanied with credible threats over the external firm. In order to understand this situation more clearly, the relationship between TCE and the trust-commitment-relationship trinity can be developed. This will explain how an efficient discrete exchange without credible threats can be distinguished from an inefficient discrete exchange with credible threats on the basis of the operation of the TCE variables.

4.5.2 Developing the relationship between TCE and the trust-commitment-relationship trinity

TCE's contractual schema is incomplete in its explanation of trust and commitment and their interaction with the nature of the exchange relationship. The trinity between trust-commitment-relationship (TCR) is now clarified and the relationship between TCE and the TCR trinity is developed.

In a special issue of the *Journal of Business Research*, the influence of the highly interrelated concepts of trust and commitment are explored as a contribution towards advancing the understanding of how a relational exchange may develop in pursuance of economic value. In particular, Gounaris (2005) develops the notion that trust is a fundamental building block towards creating enduring relationships and is critical in economic exchange (Ring 1996). Gounaris goes on to adopt Högberg's (2002) suggestion that trust develops successively through mutual adaptation that acts to deepen the relationship and that in turn, reduces *frictions* that arise out of inherent faults in commercial exchange. In the end, Gounaris (2005, 127) notes in his study that "trust is conceptualised as the confidence of exchange actors in the goodwill of each other. It is a noncalculative reliance in the moral integrity and goodwill of others on whom the exchange actors depend". Turning his attention towards commitment, Gounaris considers that commitment is the desire for continuity manifested by the willingness to invest resources into the relationship. Moreover, Gounaris picks-up on the idea of two different types of commitment (Mathieu and Zajac 1990; Konovsky and Cropanzano 1991; Geyskens et al. 1996). The first type is termed

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affective commitment and motivated by positive mutual regard between parties to the exchange. The second type is described as *calculative commitment*, arising out of a more negative contemplation of high termination, or switching costs, that would be incurred in exiting the relationship. Finally, Gounaris (2005) develops two antecedents of trust, namely bonding and service quality. Bonding includes structural and social bonds , that if broken will cause costs to be incurred. Out of these two types of bonding, social bonding is easier to break. On the other hand, service quality incorporates reputation effects (Ganesan 1994), reliability effects (Parasuraman et al. 1985) and credibility of delivery (Meldrum and Milman 1991).

However, a number of deficiencies can be anticipated if the approach taken by Gounaris (2005) were to be tested as an explanatory and predictive framework. First, the outcome of absenting either bonding or service quality, or both, does not seem to be completely explored. Thus, it is not clear whether the lower levels of trust, commitment and relationship actually descend to a distrusting environment, that would provoke the use of credible threats (as opposed to a credible commitment) and as an indicator of an extremely discrete relationship. Also, the conditions that lead to a more neutral and indifferent level of trust (neither trustworthy nor distrusting environment), commitment and relationship are not clearly addressed. Second, the approach does not incorporate the influence of uncertainty on the exchange.

In contrast, TCE maintains the integrity of the TCR trinity, whilst catering for the deficiencies suggested above. That is, TCE also picks-up on the idea that transactions, as private commercial exchange activity, are the economic equivalent of *friction* in physical systems. The essence of TCE is that there exists economic value in harmonising certain types of exchange. A clear parallel is able to be drawn between the influence of asset specificity in TCE and the influence of bonding in the TCR trinity. Like bonding, asset specificity covers invested time and effort that is non-redeployable. Furthermore, TCE identifies frequency as a factor by which transactions differ. TCE's explication of frequency amounts to a very similar factor to that of service quality in the TCR trinity. In so far as, a recurrent exchange is necessary in order for a trading partner to demonstrate aspects of service quality, including reputation and reliability effects. However, it is TCE's incorporation of uncertainty as the third factor (that also distinguishes transactions), as

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well as its explicit behavioural assumptions (that includes opportunism) that enables TCE to overcome the deficiencies anticipated in the TCR trinity. In doing so, it is thought that TCE is able to account for a much fuller range of outcomes in relationships than the approach taken in the TCR trinity. This range would include strong relationships that have deepened over time, through neutral / indifferent relations through extremely discrete relations that display distrust amongst parties to the exchange. TCE's alignment with the TCR trinity is shown in Figure 4.4.

Figure 4.4 illustrates that in the presence of at least high levels of asset specificity and frequency, TCE predicts a high relational exchange will ensue, and that this is likely to be developed out of a high level of trust and commitment (with a much lesser reliance on contractual protective mechanisms). Such that, at least one of the parties to that exchange is willing to accept dependence on the other (perhaps through an irrevocable choice of its exchange partner and / or an investment in some costly technology whose purpose is specially designed for the exchange) and crucially at a price that makes any investment in special purpose technology viable. After Gounaris (2005), it is expected that this triadic outcome becomes almost self-perpetuating, as a climate of trust and positive commitment encourages further asset specific investment, which in turn further deepens the relationship, and so on.

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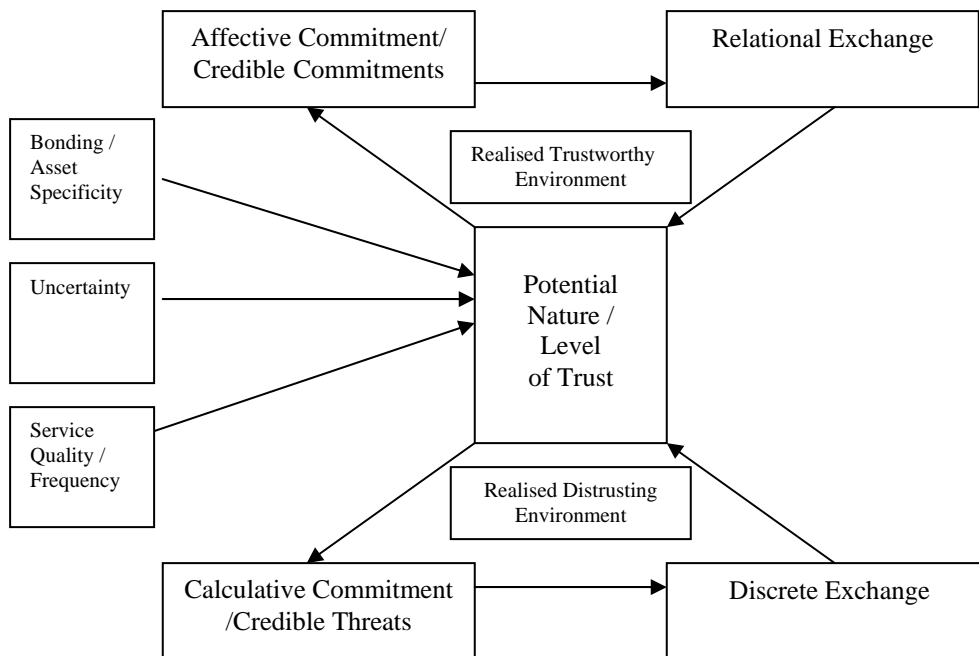
Figure 4.4: Alignment of TCE with the trust-commitment-relationship trinity
(Based on Gounaris 2005 and Williamson 1985)

At the other extreme, and in the presence of a high level of asset specificity and uncertainty, but this time a low level of frequency, TCE predicts that discrete relations will develop. This is generated by an atmosphere of distrust (in the presence of opportunism) and quite possibility heightened by credible threats (for example, penalties for non-performance/premature termination) that are introduced as a means to pre-empt an *ex post* bargaining advantage of one of the exchange partners. Again, after Gounaris (2005), it is expected that this triadic outcome will further deepen, but this time in a negative and antisocial sense. Finally, in the absence of a high level of asset specificity, TCE predicts that a relationship somewhere between the two extremes shown in Figure 4.4. This might tend towards a discrete exchange, but this time would not be accompanied by either any strong credible commitment or credible threat. For example, even when a buyer has a requirement for future similar exchanges, but that involves no specific investment, then the buyer can efficiently engage alternative sellers of the general purpose technology at each subsequent exchange, without the need to incur the cost of developing a relational exchange. In this case, and if the exchange is terminated prematurely, either party is able to exit the exchange with a pro-rata return for work completed without any loss of profit

(zero quasi-rents). Ultimately, in addition to the capacity to require an ongoing exchange, the exchange needs to incorporate at least some specific investment in order to induce an economic rationale for trust, which justifies credible commitments and that culminates in a manifest relational exchange.

In summary, TCE appears to benefit from the idea of the TCR trinity, in so far as, Williamson (1985, 406) concedes that trust "places real strains on the contractual schema". TCE proceeds to merely roll-up trust and commitment and overlays a "quasi-calculative orientation" on these behaviours as examples of protective mechanisms designed to safeguard specific assets. In TCE, trust and commitment are treated as latent variables and the focus is on the measurement of the tangible attributes of the exchange relationship, from which trust and commitment can be inferred. Incorporating the TCR trinity into the analysis also clarifies the directional relationship from trust to commitment and from commitment to relationship. The TCE hypotheses in respect of externalisation (when the activity is taken as the object of the transaction) and which was further refined in this section, can receive one further refinement as follows:

- *the greater the potential for the conventional strong form of hold-up, the more likely a relational exchange will ensue (in the presence of a moderate level of frequency) and the more likely an inefficient discrete exchange will ensue (in the presence of a low level of frequency); and*
- *the lesser the potential for the conventional strong form of hold-up, the more likely an efficient discrete exchange will ensue.*

Incorporating the TCR trinity into the analysis also promotes an approach to measuring the nature of the exchange that treats the exchange as a discrete / relational continuum and which incorporates elements of each of the three dimensions in the TCR trinity. This would then suggest a more sophisticated continuous approach to capturing the nature of the exchange – as opposed to Macneil's three-way stereotypical classification of contractual exchange (that was endorsed by Williamson). This approach is illustrated by Kaufmann and Stern (1988) and used to measure the nature of the exchanges in this thesis (see Appendix 8).

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Figure 4.5 now brings together the outcome of treating the make-or-buy decision and the nature of the exchange decision as two genuinely separate and sequential decisions - when internationalisation is selected. In particular, this figure incorporates the two kinds of discrete exchange (efficient exchange and inefficient exchange) that may ensue, and all in conjunction with a continuous approach to observing exchange relationships. For ease of future reference, RDT's theoretical framework (summarised in Figures 3.3, 3.4 and 3.5) is also added to Figure 4.5. This shows *internal exchange* ranging from an extremely relational exchange to an extremely efficient discrete exchange and *external exchange* ranging from a relational exchange to both an extremely efficient discrete exchange and an extremely inefficient discrete exchange.
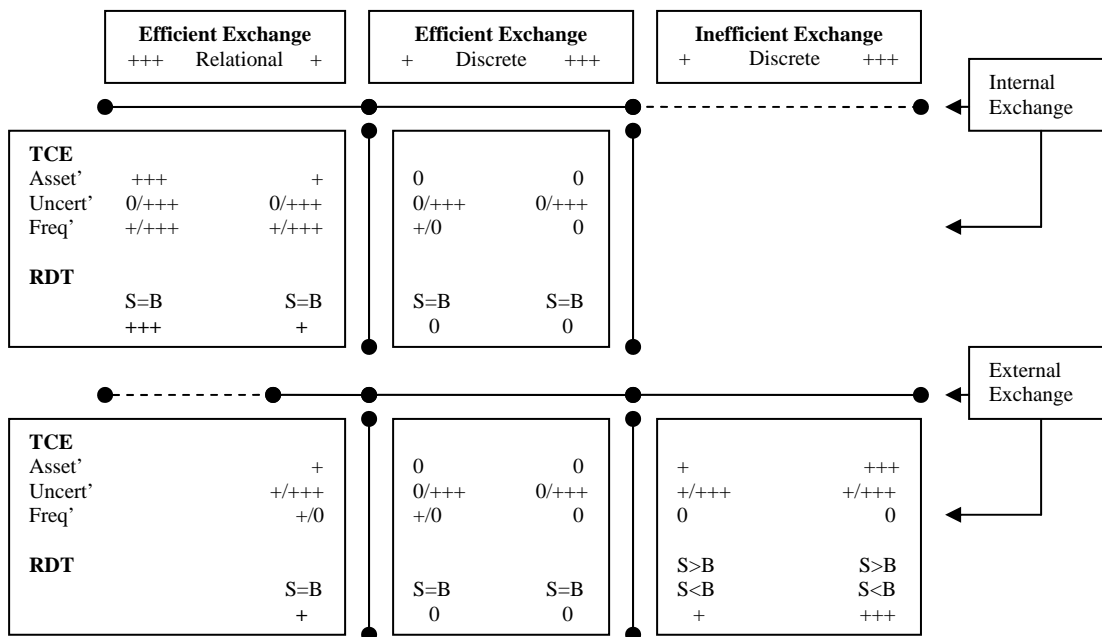
Key:
- +++ = *Extremely high incidence of variable*
- ++ = *Very high incidence of variable*
- + = *High incidence of variable*
- 0 = *Low high incidence of variable*
- S = *Supplier and B = Buyer*
- > = *More dependent than and <= Less dependent than*

Figure 4.5: Summary of TCE and RDT variables with respect to exchange relationships

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4.6 SUMMARY

This chapter has developed the strengths and weaknesses of the three theories that were highlighted in the previous chapter. The rationale behind these developments is theoretical pluralism and a view that sees these theories as complementary.

More specifically, and on the issue of the make-or-buy decision, the relative strengths of RBT (on differential production) and TCE (on hold-up) are combined into an integrative framework of vertical integration. This framework develops the classification of conditions under which the variables pertaining to each of these theories are expected to dominate. In order to construct this integrative framework, the concept of a capability and competence spectrum was developed.

In terms of the nature of the exchange relationship decision, this thesis develops TCE's contractual schema in order to treat the make-or-buy and the exchange relationship decision as two genuinely separate and sequential decisions when internalisation is selected. As a result of this, modifications to the TCE variables are developed. Finally, the trust-commitment-relationship trinity is clarified and the relationship between TCE and this trinity is developed. This time, the developments are intended to enhance TCE's explanatory and predictive powers relative to RDT, within TCE's expected dominant conditions on the issue of the exchange relationship. This would then promote further testing of TCE and RDT under conditions expected to suit RDT. If the respective theories out-perform each other under different conditions as expected, then their complementarity would be supported. Although, in the case of TCE and RDT a much wider view needs to be taken to see this complementarity than that necessary to see the complementarity between TCE and RBT.

In the next chapter, the attention turns to the research methods used to test these three theories – incorporating the theoretical developments presented in this chapter.

CHAPTER 5 RESEARCH METHODS

5.1 INTRODUCTION

As explained in Section 2.5.1, there is an important difference between methodology and methods. Methodology pertains to principles and procedures of orderly thought, whereas, research methods concerns techniques used to collect and analyse data. Section 2.5.1 outlined the methodology adopted in this thesis – namely, realism. Consistent with this methodology, the hypothetical-deductive process is also adopted in this thesis and which begins with theories and hypotheses (that were critiqued and developed in Chapter 3 and Chapter 4), in order to guide the subsequent collection and analysis of data. This chapter now sets out and justifies the research methods, or techniques used to collect and analyse the data. First, the use of multiple methods and sources of data collection are justified. Next, the design and development of the questionnaire is described, including the manner by which this core research instrument is adapted for use in both the case studies and in the survey. Finally, an account is given of the research attributes of the case studies and the survey (that are consistent with the hypothetical-deductive process), as well as the administration of these methods. This account also includes a summary of the data collected and an outline of the methods and approach used to analyse the data in the next chapter.

5.2 MULTIPLE METHODS AND SOURCES OF DATA COLLECTION

As shown in Figure 5.1, multiple methods and sources of data collection were used. Multiple methods of data collection harness the relative strengths of different methods to provide a more enlightened perspective on the phenomena being studied (Easterby-Smith, Thorpe and Lowe 1991; Gable 1994). The multiple methods in this thesis comprise a case study approach and a postal survey. In both methods, the core research instrument was a questionnaire that was designed and developed before undertaking either research method. Moreover, and within the case study methods, sources of data beyond that generated by the questionnaire were collected.

The main reason a researcher uses a case study method is to deploy its principal strength in revealing contemporary phenomena within its real life context (Yin 1994). That is, the researcher considers that the context is relevant to the phenomena being studied. In Section 4.4.1 a classification of the conditions under which the TCE and RBT variables are expected to be dominant is based, in part, on the type of industry and competitive conditions surrounding the activity and the firm, or its SCP context. In the SCP, the "conduct" of the firm (including, tacit collusion, market power, cost leadership, product differentiation and price taking) and "performance" of the firm (including its profitability) represent sensitive information about the firm. These SCP components may not always be best revealed by a postal survey, as postal surveys generate data in more of an arms-length fashion and from the respondents in isolation from other respondents. Hence, a case study method seemed appropriate. Case studies may include interviews that infuse more trust in the relationship between the researcher and respondent and more readily facilitate the generation of this sensitive information. Additionally, multiple sources of information converging in a triangulated fashion would lend greater confidence to the results. Finally, the case study method (that incorporates analytical generalisation) allows the researcher the opportunity to select a range of cases expected to differ on theoretical grounds and which generate a full range of outcomes on the variables. Thus, the case study approach ensures a full range of sizes of centres and firms are included. This is important, as random sampling used in the postal survey is likely to result in the under representation of larger centres and larger firms – given a lesser incidence of these types of respondents. Therefore, the case study approach increases the likelihood that all of the conditions

classified, by reference to the SCP surrounding the firm, can be accessed and revealed through a full range of sizes of centres and firms. That said, the main weakness of the case study method is the extent to which the full incidence of the phenomena can be described and the findings statistically generalised.

In contrast, a postal survey method, whilst weak on the SCP context, can provide a larger number of data points and across a wide geographical area and is, therefore, strong in terms of describing the incidence of the phenomena and, with random sampling, affords statistical generalisability. Combining the relative strengths of the case study method and a postal survey method will reinforce the extent to which the totality of the data speaks to the hypotheses and, therefore, adds confidence to the conclusions.

Step 1: Questionnaire Development and Design

Six case study versions of the questionnaire were developed to address five activities and nine exchange relationships in the air conditioning maintenance supply chain – using the following approach:

- Unstructured and exploratory interviews (four in Brisbane);
- Semi-structured interviews (three in Brisbane); and
- Structured interviews - interstate (24 in total - across Brisbane, Sydney, Melbourne, Adelaide and Perth).

Two survey versions of the questionnaire were then developed, to address one of the five case study activities and two of the nine case study exchange relationships and involved:

- Structured interviews (two in Brisbane)

↓

Step 2: Case Studies

Six case studies of retail centres in Brisbane were selected and designed to address the five activities and the nine exchange relationships in the air conditioning supply chain - using data collected from the following sources:

- Practice data and secondary data pertaining to the context of each case study;
- The six case study versions of the questionnaire from Step 1 (total 18 responses);
- Interviews (total 18 interviews); and
- Documents.

↓

Step 3: Postal Survey

A nationwide postal survey was developed and designed to address one of the case study activities and two of the case study exchange relationships in the air conditioning maintenance supply chain – using the two survey versions of the questionnaire from Step 1:

- Centre Managers that predominantly *externalise* the implementation of air conditioning maintenance (109 usable responses); and
- Air conditioning contractors that predominantly *internalise* the implementation of air conditioning maintenance (96 usable responses).

Figure 5.1: Overview of multiple methods and sources of data collection

5.3 QUESTIONNAIRE DEVELOPMENT AND DESIGN

5.3.1 Reliability and validity

The principal aim in the development and design of the questionnaire, and indeed all of the research methods, is to ensure the data generated is both reliable and valid. One of the ways that reliability can be estimated is to use the internal consistency approach. Here, two or more indicators, *or items (question and response format)* can be used as measures of the same phenomenon. If these items are reliable, then they should generate a similar score. Although items may be reliable they may not necessarily be measuring the phenomenon as intended – there being no relationship between reliability and the phenomenon. In contrast, validity concerns the direct relationship between the item and the phenomenon. However, validity is not absolute - an item may be valid in one context but not another. In brief, an item can be reliable but not valid, but cannot be valid but not reliable (SPSS 1998).

Validity is troublesome to assess. In survey research a number of different approaches have been developed to assess validity (SPSS 1998):

- *Content Validity*: This is the extent to which an item, or range of items, reflects a specific domain of content, body of knowledge or specific set of tasks;
- *Face Validity*: This is the extent to which an item measures what it claims to measure, based on a close reading of the item;
- *Criterion Validity*: This involves using item(s) to validate some outcome external to the item(s). The size of the correlation between the two events is a measure of the level of validity of the item(s); and
- *Construct Validity*: This is the most sophisticated form of validity and assesses the extent to which an item(s) relate to other item(s) – given a theoretically specified set of hypotheses relating to the phenomenon being measured. Here, the hypotheses specify the relationships (or patterns) between the items.

In summary, all of the above approaches to ensuring and assessing reliability and validity are incorporated in the development and design of the questionnaire in this thesis and, therefore, are incorporated in the case studies and in the survey. More specifically, criterion validity is assured by the inclusion of the two dependent variables (the make-or-buy decision and the nature of the exchange relationship decision). Furthermore, construct validity is incorporated by virtue of hypothesised patterns of TCE and RBT variables - on the issue of the make-or-buy decision (as shown in Table 4.2) and in terms of rival hypotheses (under a given set of economic conditions) arising from TCE versus RDT - on the matter of the nature of the exchange relationship decision. The following description of the development and design of the questionnaire highlights the particular way in which reliability, content validity and face validity are established.

5.3.2 Development of questionnaire

5.3.2.1   Unstructured and exploratory interviews

5.3.2.1.1 Summary and objectives of interviews

A summary of the interviews in this initial stage of the development of the questionnaire is shown in Table 5.1.

Based on secondary data, and as described in Section 1.1.6, there are three principal market sectors supplying air conditioning maintenance to retail centres in Australia, comprising CMs, MSCs and CCs. These three sectors create two potential vertical boundaries in this supply chain. However, and as noted in Section 1.1.6, the extent of internalisation, or vertical integration, within specialist firms operating in each of these three sectors - beyond anecdotal evidence, is not known. Again, the nature of exchange relationships within and between these firms - beyond anecdotal evidence, is not known.

Table 5.1: Unstructured and exploratory interviews

Number	Date	Location	Approximate Duration	Nature of respondent's position and firm
1	3/10/2000	Brisbane	40 minutes	Operations Manager (located 100% in MRC); CM firm
2	3/10/2000	Brisbane	50 minutes	Operations Manager (located 100% in RC); CM firm
3	3/10/2000	Brisbane	40 minutes	Operations Manager (located 50% in NC); CM firm
4	5/10/2000	Brisbane	1 hour	Manager; MSC (more than $30million turnover)
Total Approx Duration			3 hours and 10 minutes	

Note:

- *For the classification of retail centres, including MRC, RC and NC, see Section 1.1.3*
- *See Section 1.1.6 for details concerning scope of activities performed by CM firms*
- *For further details on the scope of activities undertaken by MSCs – see Section 1.1.6*

Therefore, the objectives of the unstructured and exploratory interviews were to gain a clearer understanding of:

1. The nature of the governance structure within the air conditioning maintenance supply chain, including which activities are normally internalised and which activities are normally externalised by firms in each of the three sectors, as well as the nature of internal and external exchanges; and

2. The fundamental context of governance decision making – in terms of the extent of the influence of economising / efficiency and the maximisation of profits.

5.3.2.1.2 The nature of governance

Each of the three Operations Managers advised that they were full-time employees of the CM and that the activity of operations management is normally internalised in other CMs. These Operations Managers also mentioned that the activity of planned maintenance (see Table 1.2 for definition of this type of maintenance) is normally externalised to MSCs. In retail centres, this planned maintenance comprises largely preventive and routine corrective maintenance, and

emergency corrective maintenance – that is usually termed "breakdown" maintenance by Operations Managers in retail centres. In total, this range of maintenance activity is usually described as *"preventive maintenance"* by Operations Managers in retail centres. With regard to very basic corrective and breakdown maintenance, however, the Operations Managers all said that larger centres usually had some level of internal capability to deal with this type of maintenance. Indeed, Operations Manager Number 1 (located in a MRC), manages four internal technical maintenance personnel of which two had the skills and knowledge to perform very simple breakdown maintenance on air conditioning plant and equipment. Operations Manager 2 (resident in an RC) manages two internal technical maintenance personnel – both with the skills and knowledge to perform very simple breakdown maintenance. Finally, Operations Manager 3 (located in a NC) externalises all air conditioning maintenance.

The manager in the MSC advised that he was a full-time employee of the MSC and that, to his knowledge, all similar managers in other MSCs were also full-time. This manager also mentioned that his firm internalises the implementation of all air conditioning maintenance, including generic DDC maintenance - with the exception of highly specific/proprietary DDC and, water testing and treatment. It was thought by this manager that highly specific/proprietary DDC is undertaken entirely internally by CCs. This manager then said that whilst he felt his firm was fairly typical in its approach – in terms of the type of activities that are mostly internalised or externalised, some appreciable variation in the extent of internalisation and externalisation of air conditioning maintenance amongst other MSCs might well be expected.

With regard to the nature of exchange relationships, all interviewees indicated that they were satisfied with internal and external relationships. Importantly, however, the MSC advised the longest duration of any exchanges – that being amongst his air conditioning technicians. The majority of these personnel having been with this MSC since completing their apprenticeship with this MSC. In contrast, the shortest duration of exchange relationship was that between the CMs and MSCs. Across the three Operations Managers interviewed this ranged from 1 to 3 years. The exchange with maintenance personnel employed internally by the two CMs managing the larger retail centres ranged from a few years to more than ten years. The manager in the first

interview intuitively offered the time aspect of the exchange as a proxy to describe the nature of the exchange relationship and this was then used in subsequent interviews. It will be seen later in this chapter that the time aspect is, indeed, one of the important indicators of the nature of the exchange relationship.

5.3.2.1.3 The fundamental context of decision making

As summarised in Section 3.3.3, TCE and RBT can be considered as an extension of neoclassical economics – with an emphasis on economising and efficiency, as well as the maximisation of profits. Moreover, the SCP model that is used to classify the conditions under which the TCE and RBT variables can be expected to dominant also draws on the key neoclassical price mechanism of supply and demand. In contrast, RDT adopts a less strong form of rationality - that is closer to the market-power approach of the old industrial economics.

All the Operations Managers mentioned the constant pressure they are under to not exceed their operations budget, which they perceived as barely sufficient, as well as the expectation that this budget should be maintained or even reduced in the next budget period. These managers are also confident that the vast majority of all other Operations Managers would experience similar pressures. Furthermore, the MSC noted his firm's objective to maximise profits is the key factor influencing all decision making within his firm. These observations are more consistent with the stronger version of rationality assumed in TCE and RBT, rather than the weaker form of rationality assumed in RDT.

5.3.2.1.4 Outcomes

The principal outcomes from the unstructured and exploratory interviews comprised the determination of the nature and extent of the activities and exchange relationships to be case studied and surveyed, as well as an early indication of the likely relative strength of the theories employed in this thesis to explain governance problems.

Table 5.2 summarises the five activities and nine exchange relationships selected for the case studies. These activities comprise all the bundles of tasks making-up the air conditioning maintenance supply chain to retail centres. In terms of water treatment, all three Operations Managers advised that this activity is normally always externalised directly to a specialist contractor and not subcontracted through the MSC. Indeed, the MSC manager noted that his firm rarely performed water treatment and testing and when required to do so, this activity would be externalised. On this basis, water treatment is outside the supply chain in this thesis and is not, therefore, selected for study.

With regard to the survey, and to facilitate descriptive and inferential statistical analysis, it is desirable to select an activity that ensures that both the dependent variable and independent variables vary, as well as an activity that would generate a sufficient number of responses. On this basis, and mindful this time of both the secondary data described in Section 1.1.6 and the unstructured and exploratory interviews, the following appeared *unsuitable* for a survey:

- Operations Management: This activity is advised as being extensively internalised by CMs and, therefore, extensively externalised by Centre Owners. However, this downstream vertical boundary between Centre Owners and CMs is outside the limits of the supply chain selected and, therefore, outside the scope of this thesis;

Table 5.2: Five activities and nine exchange relationships to be case studied

Type of Firm / Sector	Activity	Exchange relationship
CM	**1.** Operations Management (internalised) **2.** General Maintenance (internalised where applicable) **3.** Preventive Maintenance (externalised where applicable and including DDC)	**1.** Internal relationship between CM and Operations Manager **2.** Internal relationship between CM and general maintenance personnel **3.** External relationship between CM and MSC
MSC	**3.** Preventive Maintenance (internalised or externalised) **4.** Generic DDC Maintenance (internalised) **5.** Highly Specific/Proprietary DDC Maintenance (externalised)	**4.** Internal relationship between MSC and preventive maintenance personnel **5.** Internal relationship between MSC and generic DDC maintenance personnel **6.** External relationship between MSC and CC **7.** External relationship between MSC and MSC subcontractor
CC	**3.** Preventive Maintenance (internalised) **5.** Highly Specific/Proprietary DDC Maintenance (internalised)	**8.** Internal relationship between CC and preventive maintenance personnel **9.** Internal relationship between CC and highly specific/proprietary DDC maintenance personnel

- General Maintenance: This activity is advised as being largely internalised by CMs but only in the large to medium-sized centres. Table 1.1 shows that SpRCs, MRCs and RCs account for only 113 centres out of 1,337 centres nationwide and, therefore, this would offer only a small pool of potential respondents;

- Generic DDC Maintenance: This activity is advised as being largely internalised by MSCs but again only a small pool of potential respondents would be generated as DDC systems (generic or otherwise) only become cost effective in larger facilities (Martin and Oughton, 1989); and

- Highly specific/proprietary DDC Maintenance: This activity is advised as being entirely internalised by CCs. These highly sophisticated systems become even more difficult to justify and tend to be in very large facilities, hence, this would create an even smaller pool of potential respondents than generic DDC systems. Indeed, there are only nine CCs that account for the entire DDC market sector.

This leaves the activity of preventive maintenance (excluding generic DDC maintenance) that seemed to be a *suitable* activity to survey. This activity is largely externalised by CMs, and at least some proportion of this activity is internalised by MSCs. Therefore, an internal and external exchange relationship is also realised in relation to this one activity. Furthermore, practically the same questions (with slight contextual differences only) pertaining to this activity's dependent and independent variables can be developed and issued to CMs and MSCs to ensure that both the dependent and independent variables are able to vary. As a small proportion of the CMs undertake some basic preventive maintenance internally, it is necessary to specify in the questionnaire sent to the CMs, that the questions relate to externalised preventive maintenance only. Also, since there is expected to be variation in the extent of internalised preventive maintenance within MSCs, it is necessary to specify in the questionnaire sent to the MSCs that the questions concern internalised preventive maintenance only. As noted in Table 1.3 and Table 1.4, there is a sufficient pool of CMs (459) and MSCs undertaking at least some level of commercial and industrial work (449) to facilitate both descriptive and inferential statistical analysis.

Finally, an early indication of the likely relative strength of these theories in explaining governance problems is given by these unstructured and exploratory interviews - in so far as, all the managers were very clear on the importance of economising / efficiency and maximisation of profits. Should this observation be widespread, then this should promote the explanatory power of TCE and RBT over RDT, as TCE and RBT assume a stronger form of rationality.

5.3.2.2   Semi-structured interviews

5.3.2.2.1 Summary and objectives

A summary of the interviews in the second stage of the development of the questionnaire is shown in Table 5.3.

Table 5.3: Semi-structured interviews

Number	Date	Location	Approximate duration	Nature of respondent's position and firm
1	26/4/2002	Brisbane	40 minutes	Centre Manager (located 100% in MRC); CM firm
2	26/4/2002	Brisbane	1 hour and 10 minutes	Operations Manager (located 100% in MRC); CM firm
3	26/4/2002	Brisbane	1 hour	Service Manager; MSC firm (more than $30million turnover)
Total Approx Duration			2 hours and 50 minutes	

Having selected the activities and exchange relationships to be case studied and surveyed, the approach to establishing the first type of validity, that is content validity, can now be addressed.

As explained previously, content validity is the extent to which an indictor, or range of indicator(s) reflects a specific domain of content. It is evident from Chapter 3 that TCE has, by far, undergone the most testing and development and this is partly reflected in the identification of six types, or *elements*, of asset specificity (as detailed in Section 3.2.3.1). These elements more clearly specify the domain of the content of this variable dimension. Additionally, in Chapter 4, an alternative and new approach is developed to operationalising the TCE asset specificity variable (Ongoing Asset Specificity) - on the issue of the nature of the exchange relationship and when internalisation has been selected and the resource is the object of the transaction. Based on Chapter 3 and Chapter 4, Table 5.4 summarises the TCE variables in terms of the further elements that need to be considered when determining the domain of the content of this theory.

Therefore, the objective of the semi-structured interviews was to determine, from the perspective of the decision maker's position in the supply chain, which of the TCE variable elements are most prominent and relevant. That is, the dimensions and elements of TCE that reflect the greatest non-redeployable investment by the buyer/decision maker's firm and which are, therefore, the dimensions and element(s) of TCE that are most likely to capture potential hold-up by the supplier. In doing so, the domain of the content of this theory would be established.

Table 5.4: Determining TCE's domain of content

TCE	Variable (dimension)	Variable (element)
Independent Variable 1 (pertaining to the activity as the object of the transaction: make-or-buy and external exchange)	Asset Specificity	• Site Specificity • Physical Asset Specificity • Human Asset Specificity • Dedicated Asset Specificity • Trademark Specificity • Temporal Specificity
Independent Variable 1 (pertaining to the resource as the object of the transaction: internal exchange - with human resource)	Asset Specificity	• Human Asset Specificity • Ongoing Asset Specificity
Independent Variable 2 (pertaining to the activity as the object of the transaction: make-or-buy and external exchange)	Uncertainty	• Exogenous (unpredictability only - provided technological change not disincentive to internalisation)
Independent Variable 2 (pertaining to the resource as the object of the transaction: internal exchange - with human resource)	Uncertainty	• Exogenous (unpredictability - provided technological change not disincentive to internalisation) • Endogenous (meterability)
Independent Variable 3 (pertaining to the activity as the object of the transaction: make-or-buy and external exchange)	Frequency	• Size/scale and level of recurrence
Independent Variable 3 (pertaining to the resource as the object of the transaction: internal exchange - with human resource)	Frequency	• Size/scale and level of recurrence – any differences measured across internal human resources employed on same activity but under different terms and conditions

5.3.2.2.2 Outcomes

Table 5.5 summarises the position of the Centre Manager in terms of the TCE variable elements that are most prominent and relevant to the two governance problems faced by this manager and in respect of operations management.

Table 5.5: Centre Manager on operations management

Centre Manager on:	Internalise / Externalise	Make-or-buy decision (activity as object of transaction)	Nature of the exchange (resource as object of transaction)
Operations management	Internalised	Asset Specificity • Human Asset Specificity Uncertainty • Exogenous: Unpredictability only – as technological change unlikely to deter internalisation Frequency • Scale and level of recurrence	Asset Specificity • <u>Human Asset Specificity</u> and • Ongoing Asset Specificity Uncertainty • Exogenous: Unpredictability only – as technological change unlikely to deter internalisation • Endogenous: (meterability) Frequency • Scale and level of recurrence – no differences: one Operations Manager only

The Centre Manager's firm in Table 5.5 internalised the activity of operations management. The tasks associated with this activity are bundled-up and undertaken by a single and full-time Operations Manager, who is 100 per cent resident at the centre.

In terms of making this internalisation decision and when considering working/practice translations of the TCE variables (dimensions and elements), this manager felt that:

• Human Asset Specificity is the only relevant type of asset specificity in terms of the investment made by his firm in allowing for a new incoming Operations Manager's time – at a lower level of performance, to become familiar with a new centre; and

• The core technology associated with operations management had not changed much during his career and unlikely to change significantly over the next few years. The only exception was risk assessment associated with health and safety issues – but this manager's firm now employed specialists to deal with this emerging activity. This response indicates that the traditional approach of using unpredictability can be used as the basis of an indicator(s) of Exogenous Uncertainty.

With regard to the nature of the internal exchange decision and considering working definitions of the TCE variables (dimensions and elements), this manager considered that:

- Both Human Asset Specificity and Ongoing Asset Specificity applied – with Human Asset Specificity being by far the most dominant. That is, this manager estimated it would take at a few months for a competent Operations Manager to become familiar with a new centre of any size and up to six months or so to become familiar with this Manager's centre and other centres of a similar size. Moreover, the manager's firm provided some ongoing training to its Operations Managers – comprising annual seminars with other Operations Managers in the firm. In terms of Ongoing Asset Specificity, although the manager felt that Operations Managers are not like "hens' teeth", he felt that sometimes it's not easy to appoint the right type of person with both technical skills and business acumen;
- Exogenous Uncertainty also applies to the exchange relationship decision. In contrast, Endogenous Uncertainty was a not a concern, given that only one Operations Manager is appointed as responsible for the entire operations budget and so the assessment of the Operations Manager's performance was straightforward; and
- Assessment of the Frequency of the requirement of the Operations Manager's contribution was again straightforward, as only one Operations Manager is appointed.

Table 5.6 summarises the position of the Operations Manager in terms of which of the TCE variable elements are most prominent and relevant to the two governance problems faced by this manager in respect of general maintenance and preventive maintenance.

Table 5.6: Operations Manager on general maintenance and preventive maintenance

Operations Manager on:	Internalise / Externalise	Make-or-buy	Nature of the exchange
General Maintenance	Internalised	(activity as object of transaction) Asset Specificity • Human Asset Specificity Uncertainty • Exogenous: Unpredictability only – as technological change unlikely to deter internalisation Frequency • Scale and level of recurrence	(resource as object of transaction) Asset Specificity • <u>Human Asset Specificity</u> and • Ongoing Asset Specificity Uncertainty • Exogenous: Unpredictability – as technological change unlikely to deter internalisation • Endogenous: (meterability) Frequency • Scale and level of recurrence – no differences: all maintenance staff on same terms and conditions
Preventive Maintenance	Externalised	(activity as object of transaction) Asset Specificity • Human Asset Specificity Uncertainty • Exogenous: Unpredictability only – as technological change unlikely to deter internalisation Frequency • Scale and level of recurrence	(activity as object of transaction) Asset Specificity • Human Asset Specificity Uncertainty • Exogenous: Unpredictability only – as technological change unlikely to deter internalisation Frequency • Scale and level of recurrence

The Operations Manager's firm in Table 5.6 internalised the activity of general maintenance with a total of six maintenance personnel – two of which are capable of undertaking basic mechanical maintenance, including air conditioning maintenance. This firm externalised preventive maintenance, with at least one technician from the external firm at the centre for four days in each week.

In terms of making this internalisation and externalisation decision and considering working/practice translations of the TCE variables (dimensions and elements), this manager felt that:

- Human Asset Specificity is the only relevant type of asset specificity across both the internalisation and externalisation decision. With regard to the internalisation decision, this human asset specificity is represented by the investment made by the firm in allowing a new incoming technician's time – at a lower level of performance, to become familiar with a new centre. Again, and with the activity as the object of the transaction, Human Asset Specificity is the most relevant type of asset specificity in terms of the externalisation of preventive maintenance and represented by the investment the firm would need to make (if it internalised the activity) in allowing a new incoming technician's time – at a lower level of performance, to become familiar with a new centre. This learning curve type of investment is the only relevant kind of Human Asset Specificity for this firm, as competent basic and preventive maintenance technicians are available to be employed without having to provide further/ongoing training; and
- The core technology associated with basic and preventive maintenance had not changed appreciably and unlikely to change significantly over the next few years. This response indicates that the traditional approach of using unpredictability can be used as the basis of an indicator(s) of Exogenous Uncertainty.

With regard to the nature of the exchange relationship decision, the situation in respect of externalised preventive maintenance is the same as the make-or-buy decision - as the object of the transaction is again the activity. However, there are some differences between the make-or-buy decision and the nature of the exchange relationship decision with regard to internalised general maintenance, since the object of transaction is now the resource.

Thus, on the issue of the nature of the exchange relationship with regard to internalised general maintenance, and considering working definitions of the TCE variables (dimensions and elements), this manager believed that:

- Both Human Asset Specificity and Ongoing Asset Specificity applied – with Human Asset Specificity being much more dominant. That is, this manager estimated it would take at least a few months for a competent technician to become familiar with a new centre of any size and six months or more to become familiar with this manager's centre and other centres of a similar size. Moreover, the manager's firm provided some small amount of ongoing training to its technicians. In terms of Ongoing Asset Specificity, although the manager felt that general handyperson technicians are more readily available then specialist air conditioning technicians, he felt that sometimes it's not straightforward to appoint the right type of person with communication skills to suit retail centre maintenance;

- Exogenous Uncertainty mentioned also applies to the exchange relationship decision. Endogenous Uncertainty was also of some concern, given that basic maintenance technicians would often work together on tasks and unsupervised, and this manager was not able to directly monitor their performance. Instead, performance would often be inferred from the cessation of requests/complaints from tenants; and

- Assessment of the Frequency of the requirement for the basic maintenance technicians was straightforward, as all of these personnel were appointed on the same terms and conditions.

Table 5.7 summarises the position of the Service Manager in terms of which of the TCE variable elements are most prominent and relevant to the two governance problems faced by this manager in respect of preventive maintenance and generic DDC maintenance.

Table 5.7: Service Manager on preventive maintenance and generic DDC maintenance

Service Manager on:	Internalise / Externalise	Make-or-buy (activity as object of transaction)	Nature of the exchange (resource as object of transaction)
Preventive Maintenance	Predominantly Internalised (small percentage externalised)	Asset Specificity • Human Asset Specificity Uncertainty • Exogenous: Unpredictability only – as technological change unlikely to deter internalisation Frequency • Scale and level of recurrence	Asset Specificity • Human Asset Specificity and • Ongoing Asset Specificity Uncertainty • Exogenous: Unpredictability – as technological change unlikely to deter internalisation • Endogenous: (meterability) Frequency • Scale and level of recurrence – no differences: all maintenance staff on same terms and conditions
Generic DDC maintenance	Internalised	Asset Specificity • Temporal Specificity Uncertainty • Exogenous: Unpredictability only – as technological change unlikely to deter internalisation Frequency • Scale and level of recurrence	Asset Specificity • Human Asset Specificity and • Ongoing Asset Specificity Uncertainty • Exogenous: Unpredictability – as technological change unlikely to deter internalisation • Endogenous: (meterability) Frequency • Scale and level of recurrence – no differences: all maintenance staff on same terms and conditions

The Service Manager's firm in Table 5.7 predominantly internalised the activities of preventive maintenance and generic DDC maintenance with a total of over 20 maintenance personnel. The vast majority of these personnel being fridge mechanics/preventive maintenance personnel, with only a few electricians/DDC personnel.

In terms of making these internalisation decisions and considering working/practice translations of the TCE variables (dimensions and elements), this manager felt that:

- Human Asset Specificity is the only relevant type of asset specificity in terms of preventive maintenance. This is reflected by the investment made by the firm in allowing a new incoming technician's time – at a lower level of performance, to become familiar with new clients and their facilities. Typically, however, this manager indicated that this was not a major investment as competent technicians should become familiar with facilities' air conditioning systems within a few visits (at a few hours per visit). This firm would also subcontract a small proportion of its preventive maintenance, if necessary. In doing so, this manager was confident that the subcontractors would not hold-up the firm, as the prospect of future work would check any opportunistic behaviour. This stands in contrast to concerns about subcontracting DDC maintenance. Usually, the firms capable of DDC maintenance also carry a reasonable preventive maintenance capability and would be very interested, given the opportunity, to take-over the manager's firm's preventive maintenance contract. Thus, the prospects of a DDC subcontractor holding-up the manager's firm was real, and particularly given the intimate relationship between the effectiveness of the air conditioning system and the controlling DDC system. Hence, Temporal Specificity was thought to be the most relevant form of asset specificity with regard to generic DDC maintenance; and

- The core technology associated with preventive maintenance had not changed appreciably and unlikely to change significantly over next few years. With regard to generic DDC maintenance, although the core technology had changed appreciably, and is likely to continue to change, the suppliers of this generic DDC technology are not in the market of maintenance. [1] Hence, all firms attempting to develop knowledge of this technology sufficient to maintain these generic systems, are neither advantaged nor disadvantaged by a change in technology. Both these responses indicate that the traditional approach of using unpredictability can be used as the basis of an indicator(s) of Exogenous Uncertainty.

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[1] The manager gave the following as examples of CCs that design and manufacture only generic DDC systems in Australia including, *Innotech Control Systems* and *Invensys Appliances Controls*.

With regard to the nature of the exchange relationship decision, the situation in respect of internalised preventive maintenance is the same as internalised generic DDC maintenance, and considering working definitions of the TCE variables (dimensions and elements), this manager believed that:

- Both Human Asset Specificity and Ongoing Asset Specificity applied – with Ongoing Asset Specificity being much more dominant. Here, Human Asset Specificity is reflected by the investment made by the firm in allowing a new incoming technician's time – at a lower level of performance, to become familiar with a new client and their facilities. As mentioned previously, however, this manager indicated that this was not a major investment, as competent technicians should become familiar with facilities' air conditioning systems within a few visits (at a few hours per visit). In contrast, Ongoing Asset Specificity is a major issue for this manager – there being severe shortage of suitably qualified and competent fridge mechanics, and an even greater shortage of electricians capable of maintaining DDC systems. In most firms, Ongoing Asset Specificity would also be even more prominent when the technician received training that is funded by the firm;

- Exogenous Uncertainty also applies to the exchange relationship decision. Endogenous Uncertainty was again of some concern, given that the maintenance technician would work unsupervised and that the effect of the quality of their work can be disguised by the age and condition of the plant and equipment. That is, poor work may go undetected for a while with newer plant and equipment, whilst good quality work may still not prevent breakdown with older plant and equipment; and

- Assessment of the Frequency of the requirements for the technicians was straightforward as all of these personnel were appointed on the same terms and conditions. The difference in pay would result from bonuses paid but the conditions leading to the payment of bonuses were the same for all technicians.

With regard to the small percentage of externalised preventive maintenance, the only difference noted by the manager in Table 5.7 concerned asset specificity and uncertainty and in terms of nature of exchange relationship. Here, only Human Asset Specificity and Exogenous Uncertainty applied as the subcontractor took responsibility for resourcing the activity.

This Service Manager also offered a view in terms of which of the TCE variable elements are likely to be most prominent and relevant to the two governance problems faced by his counterpart working in a CC firm, and in respect of internalised preventive maintenance and specific/highly proprietary DDC maintenance. His view was that the situation would be very similar to that described for his internalised preventive maintenance and generic DDC maintenance personnel. With regard to Exogenous Uncertainty, although the technology is changing rapidly and likely to continue to change, the fact that the CC firm is the proprietor of this technology and controls the design and development of this technology, means that this does not deter the internalisation of the maintenance of these DDC systems.

Finally, Table 5.8 summarises the position of the Service Manager in terms of which of the TCE variable elements are most prominent and relevant to the two governance problems faced by this manager in respect of externalised specific/highly proprietary DDC maintenance.

Table 5.8: Service Manager on specific/highly proprietary DDC maintenance

Service Manager on:	Internalise / Externalise	Make-or-buy (activity as object of transaction)	Nature of the exchange (activity as object of transaction)
Specific/highly proprietary DDC Maintenance	Externalised	Asset Specificity • <u>Temporal Specificity</u> • Human Asset Specificity Uncertainty • Exogenous: Unpredictability and complexity – as technological change likely to deter internalisation Frequency • Scale and level of recurrence	Asset Specificity • <u>Temporal Specificity</u> • Human Asset Specificity Uncertainty • Exogenous: Unpredictability and complexity – as technological change likely to deter internalisation Frequency • Scale and level of recurrence

The Service Manager's firm in Table 5.8 externalised the activity of specific/highly proprietary DDC maintenance. In terms of making this externalisation decision and considering working/practice translations of the TCE variables (dimensions and elements), this manager felt that:

- Temporal Specificity and Human Asset Specificity are by far the most relevant type of asset specificity in terms of specific/highly proprietary DDC maintenance. Similar to the concerns expressed by this manager in relation to generic DDC maintenance, the firms capable of specific/proprietary DDC maintenance carry an even stronger preventive maintenance capability and would be extremely interested in, given the opportunity, a take-over of the firm's preventive maintenance contract. Thus, the prospects of a specific/highly proprietary DDC subcontractor holding-up the firm were very real and particularly given the intimate relationship between the effectiveness of the air conditioning system and the controlling DDC system, along with the fact that the specialist/highly proprietary DDC maintenance firms have a monopoly supply on at least some aspect of the maintenance of their DDC system. Human Asset Specificity would be relevant if this firm chose to internalise this activity, since this firm would need to invest heavily in staff knowledge/training to understand all the hardware and software requirements of the specific/proprietary DDC system. The firm would then

become vulnerable to hold-up by the specific/proprietary DDC firm – should this firm choose to develop and change the technology without imparting knowledge of any such change. In practice, the specific/highly proprietary CCs adopt this restrictive position from the outset, and so Temporal Specificity is the major concern for this firm; and

- The core technology associated with specific/highly proprietary DDC systems had changed very appreciably and is likely to continue to change significantly over the next few years. Given that this response suggests that the external environment could act as a disincentive for internalisation, both the traditional approach of using unpredictability and the non-traditional approach of using complexity associated with technically change should be used. In the event that the unpredictable indicator(s) are high in conjunction with externalisation (a prediction that runs counter to TCE), then a conclusion can be drawn along the lines of the relative strength of alternative theories, such as possibly Real Options Theory (as explained in Section 3.2.5.3).

With regard to the nature of the exchange relationship decision, the situation in respect of externalised specific/highly proprietary DDC maintenance is the same as the make-or-buy decision - as the object of the transaction is again the activity.

5.3.2.3   Structured interviews – interstate

5.3.2.3.1 Summary and objectives

A summary of the structured interviews – conducted interstate, in the third stage of the development of the questionnaire are shown in Table 5.9.

Having established content validity with respect to TCE, the objective of the interstate structured interviews was to address the second approach to validity, namely face validity. More specifically, the objective was to establish appropriate items to represent each chosen TCE element, as well as appropriate items to represent all the other variables. With regard to the two dependent variables pertaining to the two governance problems and the independent variables pertaining to RBT and RDT, it is possible to proceed directly to issues concerning face validly. As previously mentioned, RBT and RDT have undergone much less testing and development - as

compared with TCE, and the variable dimensions in RBT and RDT have not yet been developed and refined beyond their dimensions into further elements. Together, content validity and face validity amount to operationalising variables. In simple terms, operationalising variables is the act of defining variables – as indicator(s), in such a way that they can be observed and measured (Runeson and Skitmore 1999).

This section deals with face validity only, whilst the next section addresses matters concerning reliability and which are particularly important to the survey, including the assessment of the internal consistency of items and techniques to improve response rates.

Table 5.9: Structured interviews - interstate

Number	Date	Location	Approximate duration	Nature of respondent's position and firm
1	30/1/2003	Sydney	50 minutes	Operations Manager (located 100% in SpRC); CM firm
2	30/1/2003	Sydney	1 hour	Service Manager; MSC firm (more than $30million turnover)
3	30/1/2003	Sydney	50 minutes	Service Manager; MSC firm (more than $15million turnover)
5	31/1/2003	Sydney	30 minutes	Director (responsible for centres in region and located in Head Office); CM firm
5	31/1/2003	Sydney	40 minutes	Operations Manager (located 100% in SpRC); CM firm
6	31/1/2003	Sydney	40 minutes	Operations Manager (located 100% in SpRC); CM firm
7	31/1/2003	Sydney	40 minutes	Operations Manager (located 100% in SpRC); CM firm
8	3/2/2003	Melbourne	1 hour 15 minutes	Operations Manager (located 100% in MRC); CM firm
9	3/2/2003	Melbourne	55 minutes	Service Manager; MSC firm (more than $30million turnover)
10	4/2/2003	Melbourne	35 minutes	Regional Property Manager (responsible for centres in region and located in state's Head Office); Centre Owner
11	4/2/2003	Adelaide	50 minutes	Managing Agent (responsible for centres in region and located in state's Head Office); CM firm
12	4/2/2003	Adelaide	45 minutes	Managing Agent (responsible for centres in region and located in state's Head Office); CM firm
13	5/2/2003	Adelaide	35 minutes	Managing Agent (responsible for centres in region and located in state's Head Office); CM firm
14	5/2/2003	Adelaide	45 minutes	Operations Manager (located 100% in MRC); RC firm
15	5/2/2003	Adelaide	35 minutes	Service Manager; MSC firm (more than $5million turnover)
16	5/2/2003	Adelaide	50 minutes	Service Manager; MSC firm (more than $5million turnover)
17	5/2/2003	Perth	1 hour 10 minutes	Service Manager; MSC firm (more than $10million turnover)
18	5/2/2003	Perth	1 hour 10 minutes	Service Manager; MSC firm (more than $10million turnover)
19	6/2/2003	Perth	35 minutes	Managing Agent (responsible for centres in region and located in state's Head Office); CM firm
20	6/2/2003	Perth	30 minutes	Service Manager; MSC firm (more than $5million turnover)
21	7/2/2003	Perth	35 minutes	Operations Manager (located 100% in MRC); RC firm
22	7/2/2003	Perth	40 minutes	Operations Manager (located 100% in MRC); SbR firm
23	7/2/2003	Perth	40 minutes	Service Manager; MSC firm (more than $30million turnover)
24	7/2/2003	Perth	50 minutes	Service Manager; MSC firm (more than $15million turnover)
Total Approx Duration			18 hours and 25 minutes	

In order to address face validity, well established (published doctoral equivalent) empirical work was identified as the principal basis for each item pertaining to each dimension and in each theory. Additional items were then developed in order to corroborate the principal items.

Having identified principal items from well established empirical work and additional corroborative items, the interstate structured interviews were used to help contextualised all the items, in terms of different versions of the case study questionnaire to suit the various decision makers and their approach to the five activities and nine relationships (that were summarised in Table 5.2). Appendix 1 gives an example of the initial draft of one of the versions of the case study questionnaire (Centre Managers on operations management). Whilst, Appendix 2 to Appendix 7 inclusive, provides a copy of each of the six final versions of the case study questionnaire – summarised in Table 5.10. Appendix 8 summarises the principal items and the corroborative items in the final versions of the case study questionnaire. This appendix also details the source of the well established empirical work upon which the principal items were developed.

Table 5.10: Case study versions of questionnaire

Version of Case Study Questionnaire	Decision Maker	Activity	Exchange Relationship
1 (see Appendix 2)	Centre Manager (internal to CM)	1. Operations Management (internalised)	1. Internal relationship between Centre Manager and Operations Manager
2 (see Appendix 3) Larger centres with some internalised general maintenance	Operations Manager (internal to CM)	2. General Maintenance (internalised) 3. Preventive Maintenance (externalised where applicable including DDC)	2. Internal relationship between CM firm and general maintenance personnel 3. External relationship between CM firm and MSC
3 (see Appendix 4) Smaller centres without any internalised general maintenance	Operations Manager (internal CM)	3. Preventive Maintenance (externalised where applicable including DDC)	3. External relationship between CM firm and MSC
4 (see Appendix 5) Larger MSCs maintaining larger facilities including generic DDC systems	Service Manager (internal to MSC)	3. Preventive Maintenance (internalised) 4. Generic DDC Maintenance (internalised) 5. Highly Specific/Proprietary DDC Maintenance (externalised)	4. Internal relationship between MSC and preventative maintenance personnel 5. Internal relationship between MSC and generic DDC maintenance personnel 6. External relationship between MSC and CC
5 (see Appendix 6) Larger MSCs maintaining larger facilities including specific DDC systems	Service Manager (internal to MSC)	3. Preventive Maintenance (internalised) 5. Highly Specific/Proprietary DDC Maintenance (internalised)	8. Internal relationship between CC and preventative maintenance personnel 9. Internal relationship between CC and highly specific/proprietary DDC maintenance personnel
6 (see Appendix 7) Smaller MSCs maintaining smaller facilities without DDC systems	Service Manager (internal to MSC)	3. Preventative Maintenance (externalised)	7. External relationship between MSC and MSC subcontractor

A number of changes were made to the structure and format of the initial draft of the case study questionnaire (as illustrated by contrasting the initial draft of Version 1 in Appendix 1 with the final draft of Version 1 in Appendix 2). First, a number of questions and sections in the initial draft of Version 1 (Appendix 1) were *deleted*, comprising:

- The profile of the centres managed by CM. The interstate interviewees felt that this information may not be "to-hand" and may reduce response rates;
- Question 4 concerning short term and longer-term approach to profits. The interviewees considered that managers downstream in their firm would be better placed to answer this question;

- Question 5 regarding the autonomous nature of decision making. Although this was deleted in the case study version it was reintroduced in the surveys. As the case study questionnaires were administered partly face-to-face, there was the opportunity to ensure that this questionnaire was being answered by the most appropriate manager. In the survey that was administered by post, the reintroduction of this question was designed to help ensure that the questionnaire reached the right person;

- Question 30 asked for a completely descriptive answer concerning the reason for either internalising or externalising the activity. In each interstate interview, the interviewee would normally include "cost" and / or "control" as a one word answer. This did not seem to help explain the make-or-buy decision, as the issue is more *why did it cost less to adopt the approach taken* and *in what way did the firm benefit from more control*. The issues are purview of the theories in this study and so Question 30 was considered to be redundant;

- Section C (Questions 39 to 41). These questions were based on institutional isomorphism related to the old institutional economics. However, it was subsequently decided to delimit the scope of the thesis to the deployment of TCE, RBT and RDT in the spirit of the New Institutional Economics;

- Section D (Questions 46-50). These questions concern the structure of the firm's industry. Again, the interviewees considered that downstream managers were better placed to answer these questions and so it was decided that a "Five Forces" analysis of secondary data (Porter, 1980) would a more effective way of describing the "Structure" component of SCP; and

- Deletion of Section D (Question 51). This question aimed to capture the firm's business strategy. Once again, the interviewees felt that managers downstream in their firm were in a better position to answer these questions and it was decided to delimit the thesis such that business strategy is beyond the scope of the study.

A number of questions were *added* – appearing only in the eventual final versions of the case study questionnaire. In the main, the questions concerned the development in theory subsequent to the interstate interviews and comprise:

- Clarifying the nature of the exchange relationship and decision in terms of the level of pay/price and the use of negative measures (Questions 19 and 20 in the final Version 1);

- Matters relating to Ongoing Asset Specificity (Questions 33 and 34 in the final Version 1);

- Items concerning TCE's Exogenous Uncertainty (Questions 39 and 40 in the final Version 1);

- Items on TCE's Frequency (Questions 10 and 11 in the final Version 1);

- Items relating to RDT (Questions 46, 48, 50, 53 and 52 in the final Version 1);

- Items that pertain to the "Conduct" and "Performance" components of the SCP. In contrast to the "Structure" component, it was subsequently felt, that secondary data would be an insufficient basis upon which to describe these components; and

- Items that describe the static/dynamic attributes of the nature of the exchange relationship (Questions 21, 22, 23 and 24 in the final draft of Version 1 of the case study questionnaire);

In terms of the remaining questions that appear in both the initial draft and in the final versions of the case study questionnaire, Appendix 8 cross references the initial draft with the final Version 1 of the case study questionnaire to illustrate how these questions were developed as a result of the interstate interviews. This time, the main changes concerned style and the complexity of the questions. That is, the questions in the final Version 1 of the case study questionnaire were simplified by using the terms like, "How much…" and "What is/are…" instead of "To what extent…", along with a reduction in the length of a number of the questions.

In terms of the MSC versions of the case study questionnaire (Versions 4, 5 and 6), and after trial and error, it was decided that the most effective approach was to maintain the use of the term "typical" as part of the initial contact and information given to each respondent. Having received the respondent's completed case study questionnaire in advance of the case study interview, adjustments were then made during the interview – where necessary, to the respondent's initial answers to reflect the case study / retail centre. A small number of minor adjustments were usually required. This indicates that the case studies were close to the respondents' typical contract and that a tendency towards homogeneity exists amongst air conditioning and DDC technical staff, as well as air conditioning and DDC subcontractors employed across these firms' contracts.

5.3.2.4   Structured interviews – Brisbane

5.3.2.4.1 Summary and objectives

A summary of the structured interviews – conducted in Brisbane (towards the conclusion of the case studies), and which represents the fourth and final stage of the development of the questionnaire for the purpose of a postal survey, are shown in Table 5.11.

Table 5.11: Structured interviews - Brisbane

Number	Date	Location	Approximate duration	Nature of respondent's position and firm
1	10/3/2005	Brisbane	1 hour	Service Manager; MSC firm (more than $10million turnover)
2	11/10/2005	Brisbane	50 minutes	Centre Manager/Operations Manager (located 100% across two SbRC)
Total Approx Duration			1 hours and 50 minutes	

Having considered content validity and face validity with respect to all the items representing the dependent variables and all the independent variables - designed to capture each of the dimensions in each of the theories, the objective of the Brisbane structured interviews was to convert the two closest versions of the case study questionnaire (Version 3 and Version 4), into two versions suitable for the postal survey.

The eventual two versions of the postal survey are given in Appendix 9 (MSC Version based on Version 4 of the case study questionnaire) and Appendix 10 (CM Version based on Version 3 of the case study questionnaire). In order to highlight the differences between the two versions of the survey questionnaire and the two closest versions of the case study questionnaire, Appendix 11 notes the location of the same item in each of these versions. In converting the case study versions of the questionnaire to the survey versions, particular attention was given to matters concerning reliability and the response rate.

In terms of reliability, two further steps were taken:

1. Additional items were included and designed to capture the independent variables and, in doing so, further corroborate the principal items. As mentioned in Section 5.3.1, the approach used in this thesis to address reliability is internal consistency. In this approach, the focus is on the application of at least two items and the evaluation of their consistency. At this point, it can be noted that with the exception of the make-or-buy dependent variable and RDT's variables, all other dependent and independent variables are represented by at least two items – facilitating an evaluation of their internal consistency. In terms of the variables that are represented by one item;

   a. The make-or-buy dependent variable: This is a common approach in other well established empirical studies (as noted in Appendix 8); and

   b. The RDT's variables: There are four dimensions and each dimension requires an item to reflect the buyer and an item to reflect the buyer's perception of supplier's dependence. Thus, a minimum of eight items are required and if two items per dimension were included this would have resulted in a total of 16 items. It was decided that this would cause the questionnaire to be too long and negatively affect the response rate. It was decided to select the eight items, mindful that the case studies would incorporate multiple source of evidence (beyond the eight items) and this would be sufficient to corroborate the survey findings.

2. A number of control variables were included in the two versions of the survey. More specifically, variables concerning the size, age and geographic location of the respondent's firm are very popular control variables and not least in construction research (for example, Kale and Arditi 2001). Beyond the internal consistency, or homogeneity, of the items representing their target variable and discussed in this section, the control variables are designed to ensure that the respondents are sufficiently homogeneous in terms of their responses to the individual items.

With regard to the design of the two versions of the survey questionnaire and to improve the response rate (and in contrast to the two closest versions of the case study questionnaires), a

number of changes were made based on Dillman's (1978) total design method for postal surveys and feedback from the two Brisbane structured interviews:

- A number of the items incorporated a shorter question component;

- The items with a 7-point response format were simplified using an "Agree / Disagree" approach. It is accepted that this approach may be argued as a less accurate approach to recording the respondent's views - in so far as, an opposite response scale is only implied. That is, although the statement is moderately worded in terms of being either slightly positive or negative about the question, this approach falls short of an explicit statement of the opposite terms – as found in the semantic differential scale. Although a semantic differential approach was used in the case study versions of the questions, this format would again have unduly extended the length of the two versions of the survey questionnaire and, therefore, would have undermined the response rate;

- Related to the "Agree / Disagree" approach, the statement was either moderately positively or negatively worded on the basis of whether positive or negative terms were more meaningful to the respondent. This resulted in some items being positively worded in the MSC version of the survey and negatively worded in the CM version and visa versa. In order to ensure consistency in the analysis, these responses are required to be reversed scored;

- A "Don't Know" option was included despite the possibility of increasing the amount of missing data and increasing the complexity of the questionnaire. This option is important in terms of avoiding the situation in which a respondent erroneously selects the mid-point 4. This mid-point is designed for the situation in which the respondent is genuinely indifferent about the statement. This situation differs from the "Don't Know" scenario, and so selecting the mid-point 4 when a "Don't Know" response is more appropriate would reduce the accuracy of the results;

- More straightforward questions were moved to the front of the two versions of the survey, including questions concerning the attributes of the respondent, firm and retail centre. In doing so, and in the interests of anonymity, the request for the respondent's name was deleted; and

- A portrait layout was resumed for the two versions of the survey questionnaire.

5.4 CASE STUDY DESIGN

5.4.1 Case study rationale

As mentioned in Section 5.2, case studies are promoted under conditions in which the researcher has little control over events and when the focus is on contemporary phenomena within some real-life context. In these conditions, and particularly when seeking to address a research aim that is more *explanatory*, the case study method offers the facility to generate more trust with respondents that may yield more detailed information. Finally, the case study's unique strength is its ability to use a range of evidence (Yin 1994, 8).

The conditions that promote the case study method are evident in this study, including the economic sensitivity surrounding the variables. Using a range of evidence that is focused on a case also promotes greater accuracy of responses to questions administered in the case study questionnaire and in a less structured format in the case study interview. That is, the respondent can devote his/her energy to the answer being given – to a constant case and without the need to temporarily suspend and attach a "typical" object as the basis of the answer. In contrast, the postal survey requires the respondent to think of a typical employee (MSC version) or a typical air conditioning contractor (CM version). The reliability and validity of any observed convergence in the data is then reinforced by virtue of the common focus on the "case" as opposed to a likely range of "typical" research objects. Furthermore, the research aim and objectives are largely explanatory, in terms of seeking to understand the determinants of the two governance decisions via testing-out the explanatory power of the three theories in this thesis.

Finally, case studies are required to ensure that Hypothesis 4 and Hypothesis 7 are tested – given the limitations of the sizes of centre and sizes of firm that can be accessed in a postal survey.

5.4.2 Nature and purpose of case study data

The case study method should not be confused with interpretivism (sometimes referred to as qualitative research) and can be based on entirely quantitative evidence (Yin 1994, 14). In the end, it is not the extent and mix of raw quantitative and qualitative evidence that distinguishes a

research philosophy but rather the ontological position adopted by the researcher that informs the manner by which the evidence is analysed and the purpose served by the data. Hence, Runeson and Skitmore (1999, 27) comment that it is incorrect to refer to interpretivism as qualitative science.

The nature of the raw evidence generated by the cases in this study is both quantitative and qualitative, and the ontological perspective adopted in this thesis is realism as explained in Section 2.5.2. Hence, all the data is analysed in a quantitative, or quasi-quantitative fashion. For example, quotes are used from interviews that can be directly connected with one of the hypotheses, along with minimal interpretation of text in conjunction with guidelines to enhance the consistency of this interpretation.

5.4.3 Components of case study design

Yin (1994, 20) develops five components of case study design, comprising the study's:

1. Question(s);
2. Proposition(s);
3. Unit(s) of analysis;
4. Logic – in linking data to the proposition(s); and
5. Criteria for judging the findings.

The design of each of the case studies in this thesis is based on these five components and described in the following sections.

5.4.3.1   Questions

The study's question is synonymous with the study's research aim (Section 1.2). The research objectives in Section 2.3 are designed to address the research aim.

5.4.3.2   Propositions

In order to avoid possible confusion between the terms proposition and hypothesis, Perry (1994) suggests that a proposition is restricted to prose, whilst a hypothesis is written in a statistical form with a null hypothesis and an alternative hypothesis. Notwithstanding this possible distinction, the proposition/hypothesis represents a position statement about the research question and may be based on some intuitive guess or theory. Either way, the proposition/hypothesis provides an important bridge between the research question and the research method (Robson 1993, 28). Yin (1994, 21) recognises this, and notes that for explanatory studies the proposition should be based on theory and direct what it is that should be studied. More specifically, the proposition provides guidance on where to look for relevant evidence. Yin (1994) may well use the term proposition in preference to hypothesis on the basis that he promotes analytical generalisation (to be explained later in this section) and not statistical generalisation.

For the purposes of this thesis, the term hypothesis will continued to be used in both the case studies and the survey, although the development null and alternative hypotheses will be restricted to the statistical analysis of the survey data. The hypotheses developed in this thesis are summarised in Section 2.4.1.

5.4.3.3   Units of analysis

In TCE and RBT the unit of analysis is the transaction. More specifically, when applying TCE and RBT to the issue of the make-or-buy decision, the transaction equates to the activity. Whereas, when applying TCE to the issue of the nature of the exchange relationship decision, the resource is used as the object of the transaction in respect of internal exchange but the activity is again used as the object of the transaction with regard to external exchange. Finally, when applying RDT on the issue of the nature of the exchange relationship decision, the net dependency between the exchange parties, and surrounding the transaction, is used as the unit of analysis.

These units of analysis can be studied as a group of cases, and which form one larger case (Yin 1994, 24). This larger case is the chain that supplies air conditioning maintenance to a retail centre, comprising CMs, MSCs and CCs. In terms of this supply chain, it is the retail centre that brings together, or groups, the contiguous smaller cases represented by the different units of analysis. In doing so, the focal retail centre (in particular its size) can be expected to affect the measurement of the variables pertaining to each unit of analysis. On this basis, and from this point, "the case" is taken to be the retail centre.

In terms of time boundaries, although there is approximately a three year period over which the data from each of the case study retail centres were collected, the principal data (interview and questionnaire data) was collected from each case study / retail centre in one period of no more than a few weeks. As such, these studies are cross sectional, as they do not seek to account for the effect of time in the measurement of the variables – in the sense of a longitudinal study.

5.4.3.4 Logic – in linking data to the propositions

In order to link the data to the propositions, Yin (1994, 25) promotes the idea of "pattern-matching" and the simple "eyeballing" of data. Here, expected patterns can be established based on theory and theoretical propositions, and compared with observed patterns in order to determine the degree of fit. On the basis that statistical analysis is inappropriate for case study data (that lack random sampling and comprise insufficient data points), Yin (1994, 26) considers that provided expected patterns are sufficiently different, then this obviates the question concerning how close does a match have to be, so as to be considered a match. That is, given contrasting expected patterns, the observed pattern may be seen as more clearly matching one of the expected patterns and, therefore, providing empirical support for the theory behind the more closely matched pattern.

This approach to analysing data in case studies, emphasises the role of theory in the design of the case study – whether the ensuing case study's purpose is to develop or test theory, and this further distinguishes case studies from methods associated with interpretivism, such as

ethnography. In summary, a thorough knowledge of theory in case study design is important for the following main reasons:

1. Selecting case studies that are expected to produce different patterns. That is, case studies are selected on theoretical grounds – in so far as, a particular case study including its context or conditions are considered as suiting the relative strengths of one theory that provides one of the expected patterns. Yin (1994, 30) refers to this as "analytic generalisation" and distinguishes this from statistical generalisation;
2. In the operationalisation or measurement of the units of analysis; and
3. Establishing rival expected patterns of variables.

5.4.3.5   Criteria for judging the findings

Yin (1994, 32-33) identifies the following four tests concerning the quality of case studies – along with tactics to address these tests:

1. External validity;
2. Construct validity;
3. Internal validity; and
4. Reliability.

The reliability criterion refers mainly to issues associated with inconsistency arising from the data collection by multiple researchers. As this was not the situation in this thesis, the following sections focus on the first three criteria. In doing so, these criteria are linked to the more standard notion of validity associated with survey design (content validity, face validity, criterion validity and construct validity) and which were described previously as part of the development of the questionnaire.

5.4.3.5.1 External validity

The test termed *"external validity"* seeks to establish the domain to which a study's findings can be generalised. Here, Yin (1994) employs the tactic of *analytical generalisation*, in contrast to *statistical generalisation* associated with survey design. Analytical generalisation is based on a replication logic and comprises two components namely, theoretical replication and literal replication. This tactic is analogous to that used in multiple experiments – with each case considered akin to a single experiment. Therefore, each case is selected so that it either predicts similar results (a literal replication) or contrasting results but for predictable reasons (a theoretical replication). Yin (1994, 46) goes on to note that "the ability to conduct six to ten case studies, arranged effectively within a multiple-case, is analogous to the ability to conduct six to ten experiments on related topics…. If all the cases turn out as predicted, these six to ten cases, in the aggregate, would have provided compelling support for the initial set of propositions".

As mentioned, case study selection in pursuance of analytical generalisation requires that the proceeding theoretical framework states the conditions under which a particular phenomenon is likely to be found (a literal replication) as well as the conditions when it is not likely to be found (a theoretical replication).

The integrative framework of vertical integration developed in Section 4.4 and shown in Table 4.2 classifies the SCP conditions in which the make-or-buy phenomenon, or internalisation and externalisation, can be expected. Furthermore, this framework classifies the conditions in which internalisation and externalisation turns on production cost and benefits, in contrast to transaction costs. *Prima facie,* contrasting sizes of retail centre seemed important in terms of ensuring the inclusion of very large centres that would provide the opportunity for firms to specialize in the five activities chosen to be case studied. That is, the relative rarity of large centres (only 54 SpRCs / MRCs, plus a likely small number of these centres in NT, out of a total of 1,337 retail centres nationwide) creates the possibility of relatively rare service attributes in terms of CM, MSC and CC firms associated with these large centres. For example, DDC systems only become cost effective in larger facilities (Martin and Oughton, 1989). Indeed, the number of firms in a market sector, and the availability of skills of knowledge, is a key and contrasting attribute in

TCE (expressed more as a hard core attribute pertaining to its neoclassical connection to perfect markets – Section 3.2.4.2) and RBT (expressed as a variable in the protective belt – Section 3.3.2.1) that are combined in the integrative framework of vertical integration.

In pursuance of theoretical replication, therefore, a large centre was selected for study along with a contrasting small centre. A medium sized centre was also selected for study, on the basis that the unstructured and exploratory interviews indicated that RCs were the turning point towards a retail centre incorporating an internalised general maintenance capability. As such, and in order to facilitate the further development and application of the findings of this thesis, the PCA's categories of retail centre (Section 1.1.3) were employed and a SpRC or MRC (Case Study 1) was used to represent a large centre, an RC (Case Study 2) was selected to represent a medium-sized centre and a SbRC or a NC (Case Study 3) was used to represent a small centre. In terms of addressing literal replication, a further large centre (Case Study 1A), medium-sized centre (Case Study 2A) and small centre was selected (Case Study 3A). Case studies 1, 2 and 3 are summarised in Table 5.12 and case studies 1A, 2A and 3A are summarised in Table 5.13.

Moreover, part of the selection of the cases in Tables 5.12 and 5.13 involved targeting different CM and MSC firms and individuals. This was largely achieved across the six case studies, with a total of:

- Five different CM firms;
- Five different MSC/CC firms;
- Six different Centre Managers;
- Six different Operations Managers;
- Different General Maintenance staff in each centre; and
- Five different Service Managers.

One of the CM firms managed two of the retail centres (Case Study 2 and Case Study 2A) and one of the MSC firms maintained two of retail centres (Case Study 1A and Case Study 3A). However, this did not violate the replication logic behind the case study selection, as information

concerning operations management, general maintenance and routine preventive maintenance in Case Study 2 and Case Study 2A were provided by different Centre Managers and different Operations Managers. Moreover, and where appropriate, different answers were given by the MSC in Case Study 1A and Case Study 3A, reflecting differences between these two case studies.

To address theoretical replication with regard to the nature of the exchange relationship phenomenon, that comprises a continuum from discrete to relational exchange, selecting Case Studies 1 to 3 on the basis of contrasting size also applies - in order to test TCE by ensuring varying levels of different types of asset specificity. More specifically, selecting centres of contrasting sizes is important in order to display the effect of varying levels of Human Asset Specificity pertaining to the facilities on the exchange relationship continuum. Additionally, selecting contrasting sizes of centres should increase the likelihood of different internalisation and externalisation practices amongst the firms and which would also increase the likelihood of observing the effect of Ongoing Asset Specificity on the exchange relationship continuum. On the testing of TCE, Case Studies 1A to 3A also provide a literal replication.

This approach is also used to test the power of TCE relative to RDT. Given the fundamental difference concerning the rationality attribute in the hard core of TCE and RDT, TCE is expected to be more powerful in markets in which firms display a tendency to maximise profits in the short term. If the early indications of strong maximising tendency across all market sectors in the air conditioning maintenance supply chain to retail centres, (revealed in the exploratory and unstructured interviews), apply in the case studies, then TCE is expected to out-perform RDT in all cases.

Table 5.12: Summary of Case Studies 1, 2 and 3 (Source: Partly from PCA 2004b and Section 1.1.3 in terms of the PCA classification of retail centres)

Retail Centre	Case Study 1	Case Study 2	Case Study 3
Size and Type	Around 70,000m2 GLAR MRC	Around 45,000m2 GLAR RC	Around 15,000m2 GLAR SbRC
Major Tenants and Specialties	Around 55% of GLAR Around 45% of GLAR	Around 65% of GLAR Around 35% of GLAR	Around 40% of GLAR Around 60% of GLAR
Years old	Around 35 years	Around 35 years	Around 5 years
Number(s) of Refurbishments	4	3	None
Mechanical Services	Fully Air Conditioned	Fully Air Conditioned	Fully Air Conditioned (in enclosed mail)
Owner	Property Fund	Private Investor	Property Trust
CM Attributes relating to CM: • Centres managed by CM in Queensland	External to owner • CC x 2, MRC x 1, RC x 2, SbRC x 3, NC x 1 = Total 9 centres	Internal to owner • RC x 5, SbRC x 12, NC x 1 = Total 18 centres	Internal to owner • SbRC x 1 = Total 1 centre
Centre Manager Attributes relating to CM: • Years at CM • Years in position • Number of firms worked for	• 3 • 19 • No answer obtained	• 14 • 15 • No answer obtained	• 5 • 25 • No answer obtained
Operations Management Attributes relating to Operations Manager: • Operations Manager's background • DDC normally in MSC contract or in separate contract	Internal to CM (1 x Full-Time Operations Manager) • Mainly technical background • DDC normally in MSC contract	Internal to CM (1 x Full-Time Operations Manager) • Technical and managerial background • DDC normally in MSC contract	Internal to CM (1 x Full-Time Operations Manager – including Centre Manager duties) • Mainly managerial background • DDC normally in MSC contract
General Maintenance	Internal to CM (2 x Full-Time Personnel)	Internal to owner/CM 1 x Full-Time Personnel	External to owner/CM Part of MSC Contract
Preventive Maintenance Attributes relating to MSC: • Years in existence • % Commercial and Industrial • Turnover (Air Conditioning / Generic DDC / Specific DDC)	MSC External to CM • 6 years old • 97% Commercial and Industrial • Between $10-30million / $1million / less than $500,000	MSC external to owner/CM • 32 years old • 95% Commercial and Industrial • Between $10-30million / no answer / $1million	MSC external to owner/CM • 16 years old • 100% Commercial and Industrial • Less than $1million / no answer / no answer
DDC maintenance in case study	Internal to MSC Generic DDC system	Internal to MSC Specific/highly proprietary system	No DDC system

Table 5.13: Summary of Case Studies 1A, 2A and 3A (Source: Partly from PCA 2004b Section 1.1.3 in terms of the PCA classification of retail centres)

Retail Centre	Case Study 1A	Case Study 2A	Case Study 3A
Size and Type	Around 100,000m2 GLAR SpRC	Around 35,000m2 GLAR RC	Around 15,000m2 GLAR SbRC
Major Tenants and Specialties	Around 70% of GLAR Around 30% of GLAR	Around 55% of GLAR Around 45% of GLAR	Around 80% of GLAR Around 20% of GLAR
Years old	Around 25 years	Around 35 years	Around 30 years
Number(s) of Refurbishments	4	5	None
Mechanical Services	Fully Air Conditioned	Fully Air Conditioned	Fully Air Conditioned
Owner	Property Trust	Private Investor	Superannuation Fund
CM Attributes relating to CM • Centres managed by CM in Queensland	Internal to owner • SpRC x 1, MR x 2, R x 2 = Total 5 centres	Internal to owner • As Case Study 2	Eternal to owner • CC x 5, RC x 1, SbRC x 5, NC x 7, BGC x 2, TC x 3 = 23 centres
Centre Manager Attributes relating to CM: • Years at CM • Years in position • Number of firms worked for	• 3 • 7 • 3	• No answer obtained • No answer obtained • No answer obtained	• 8 • 18 • 6
Operations Management Attributes relating to Operations Manager: • Operations Manager's background • DDC in MSC contract or separate contract	Internal to CM (1 x Full-Time Operations Manager) • Mainly technical background • DDC normally in MSC contract	Internal to CM (1 x Full-Time Operations Manager) • No answer • DDC normally in MSC contract	Internal to CM (1 x Full-Time Operations Manager including Centre manager duties) • Mainly technical background • DDC normally in MSC contract
General Maintenance	Internal to owner/CM 4 x Full-Time Personnel	Internal to owner/CM 2 x Full-Time Personnel	External to CM Part of MSC Contract
Preventive Maintenance Attributes relating to MSC: • Years in existence • % Commercial and Industrial • Turnover (Air Conditioning / Generic DDC / Specific DDC)	MSC External to CM • 25 years old • 80% Commercial and Industrial • Between $10-30million / less than $1million / less than $1million	MSC external to owner/CM • 26 years old • 80% Commercial and Industrial • Between $10-30million / no answer / $1million	MSC external to owner • As Case Study 1A
DDC maintenance in case study	External to MSC Specific/highly proprietary system	Internal to MSC Specific/highly proprietary system	No DDC system

On the question concerning the number of cases deemed necessary or sufficient, Yin (1994, 50) considers that just as the level of significance in statistical analysis is discretionary, so to is the number of literal replications. Yin considers that this judgment is to be based on the extent to which the conditions forming the basis of the theoretical replication may vary. From the exploratory and unstructured interviews it was expected that the competitive conditions within a

market sector (either CMs, MSCs or CCs) are homogeneous, as illustrated by the view expressed by the interviewees, that all firms in the air conditioning maintenance supply chain to retail centres show a strong tendency to promote profit maximisation in the short term. Moreover, the theories embody clear rival positions on their phenomena (under given conditions), with the expectation of clearly contracting results. Indeed, the analysis of the case study data, that largely preceded the survey, confirmed this expectation. Hence, the initial consideration that a three case study theoretical replication and a literal replication in each case would be sufficient was supported. The sufficiency of the total of six case studies was further reinforced by the prospect of survey results that may generate converging and corroborating evidence. Indeed, it transpired that the survey results did provide converging and corroborating evidence and so no further case studies were conducted after having completed the survey.

5.4.3.5.2 Construct validity

This test concerns establishing correct operational measures for the concepts being studied. It is, therefore, similar to the more conventional notion of content validity and face validity and which formed the focus in Section 5.3.2.2 and Section 5.3.2.3 in terms of questionnaire development and design. Again, the role of extant theory is critical in guiding the domain of each measure and in the provision of established approaches to constructing questions, as well as the specification of the response format for a question.

This time, Yin (1994) suggests two tactics to increase construct validity namely, the use of multiple sources of evidence (including creating a case study database and maintaining a chain of evidence) and providing the opportunity for respondents to review and comment on the interpretation of data collected. Both these tactics are incorporated in this thesis, and since the questionnaire developed and designed in Section 5.3 is used in the case studies, construct validity (or the more convectional content validity and face validity) has already been considered in this source of data.

Beyond the structured questionnaire developed in Section 5.3, the multiple sources of evidence comprise interviews and documentary information. Of all sources of data, Yin (1994, 84)

considers the interview to be one of the most important sources of case study information. In the case studies in this thesis, the interviews are closest to Yin's "focused interviews", in which the respondents are interviewed for up to around an hour and in a conversational manner but initial answers and subsequent elaboration are based on set questions (the structured questionnaire). In order to maximise the opportunity for respondents to elaborate on the structured questions, the completed structured questionnaire was collected in advance of the interview. With the exception of the Centre Manager in Case Study 1A, all the interviews were conducted face-to-face. In the one exception, a telephone interview was conducted.

During the course of conducting the interviews, a change may have been made to one or more of the initial questions in the structured questionnaire and which was that then administered to the next respondent. In this situation, a corresponding change was then made to the answers given by respondents to the superseded version of the question – if it was felt that the changed question may appreciably affect the answer. Also, as mentioned in Section 5.3.2.3, a small number of minor changes were made in respect of the answers given by MSC respondents, in order that these answers reflected the actual retail centre representing the case study – in contrast to the "typical" situation. The initial answers and any / all changes made to these initial answers – were confirmed on the respondent's final version of the case study questionnaire, along with a summary of the respondent's comments elaborating their answers, as a record of the interview. All respondents were then sent the record of their interview (either by courier or by registered post – both generating written evidence of the receipt by the respondent of the interview record). Respondents were asked to check the accuracy of this record and to make further comment if they wished. Two respondents did make further comment and their interview record was adjusted accordingly. By this process, all the respondents' answers relate to the same questions, shown in the final versions of the case study questionnaire summarised in Table 5.10, and all the respondents' answers relate to their respective retail centre / case study. The process of allowing respondents the opportunity to review and comment on data collected promotes the reliability of the data and, in particular, the consistency of data in the case studies in this thesis.

In contrast to the focused interviews, Yin (1994, 81) considers the role of documentary evidence to be corroborative – augmenting evidence from other sources. If the documentary evidence is contradictory rather than corroborative, then this would prompt further consideration of the validity of other sources of evidence. Documents were collected during the interviews directly from respondents, as well as outside of the interviews. A major strength of the case study method is the opportunity to use multiple sources of evidence in order to develop converging lines of inquiry, or *triangulation*. That is, multiple sources of evidence provide multiple measures of the same phenomenon and help address construct validity.

Creating a case study data base, or evidentiary base, that is separate from the analysis of the case study data and corresponding conclusions, is important to allow interested parties the opportunity to understand the depth and breadth of case study data. This also promotes the reliability of the findings and subsequent theory development and testing. The database for the case studies in presented in Appendix 12.

The case study database also promotes the maintenance of a chain of evidence - in so far as, the circumstances surrounding the collection of the data are given (in particular, the date and location). This shows that, with the exception of Case Study 2A, the Operations Managers were interviewed before the MSC firms. Here, the Operations Managers were able to advise the MSC firm in their centre and the MSC was subsequently contacted for inclusion in this thesis. Whilst in Case Study 2A, the MSC was approached first and asked to select a retail centre as the reference point for the interview. This time, the Centre Manager in the retail centre serviced by the MSC in Case Study 2A was subsequently approached for inclusion in this study. Furthermore, the analysis of the case study data in the next chapter is able to be cross referenced to Appendix 12. Again, this increases the reliability of the data and the findings.

5.4.3.5.3 Internal validity

This final test relates to explanatory or causal studies only, and is not for descriptive or exploratory studies (Yin 1994, 33). In this way, this test is similar to the more conventional notion of criterion validity that was discussed in Section 5.3.1. Here, Yin's (1994, 103-106)

preferred approach is to follow the theoretical propositions that led to the case study and adopt *pattern-matching* as a way of analysing the data. More specifically, this approach compares one or more empirical patterns of data with theoretically predicted and rival patterns. If the empirical pattern(s) match one of the rival theoretical patterns, then the internal validity of the case study is strengthened. In the case studies in this thesis, the rival patterns concern the independent variables and in this sense, internal validity is akin to the more conventional construct validity discussed in Section 5.3.1.

With regard to complexity of the patterns, comparing empirical patterns with the predicted rival patterns of the independent variables pertaining to TCE and RDT (summarised in Figure 4.5) and on the issue of the nature of the exchange decision, is more straightforward that the comparison of the TCE and RBT independent variables comprising the integrative framework of vertical integration (presented in Table 4.2). That is, Table 4.2 gives seven levels / different predicted patterns. Yin (1994, 109) goes on to comment that the simpler the pattern, the more dramatic the different patterns will have to be to facilitate comparisons of their differences. This situation applies in this thesis, in which Table 4.2 shows distinct but more graduated differences in the patterns across the seven levels, than the differences in the patterns of the TCE and RDT independent variables on the nature of the exchange. Yin (1994, 110) then considers the question concerning the precision required (in the fit) between an empirical pattern and a theoretical predicted pattern in order to establish internal validity. In the absence of quantitative data and statistical inference, Yin (1994, 110) cautions against the use of subtle patterns and advocates the pursuit of outcomes that are likely to yield gross matches and mismatches and in which simple "eyeballing" of the data is sufficient to draw conclusions. Even in this situation, however, Yin (1994, 110) concedes the involvement of some level of interpretation of the data.

This section proceeds to develop a strategy and guidelines for the analysis of the case study data in pursuance of establishing summary patterns of the independent variables pertaining to the rival theories that can be compared with the theoretically predicted patterns. The purpose of this strategy and guidelines is to minimise the possible negative effect of the interpretation of the data, in terms of providing a consistent approach to categorising and classifying the data. In

doing so, this section also sets out the way the case study data will be presented in the next chapter.

In terms of presenting the results, each case study is taken as a "whole" story (Yin 1994, 49-50). Such that, the results of each case study are presented in turn. This approach also facilitates reference to each case study in the conclusions, in terms of the extent to which each case study supports or contradicts each of the hypotheses. In the conclusions, an assessment is made of the results across the case studies and also in terms of the extent to these multiple case study results support or contradict each of the hypotheses.

The strategy developed for analysing the case study data comprises reliance on the principal items – common to all six versions of the case study questionnaire (summarised in Appendix 8) in order to establish summaries of empirical patterns that can be compared with theoretically predicted patterns. Here, inconsistency in the interpretation of data is minimal on the basis that the data is completely quantitative, the analysis concerns the arithmetic mean only and guidelines are developed in Appendix 13 to categorise the data.

The templates for the presentation of the results in respect of the make-or-buy decision and the nature of the exchange decision in each of the case studies is tabular and shown in Table 5.14 and Table 5.15.

Table 5.14: Template for the presentation of results to each activity in each case study relating to the make-or-buy decision

Decision Maker on Activity & Version (V) of Case Study Questionnaire	TCE Asset Specificity	TCE Uncertainty	TCE Frequency	RBT Value	RBT Rarity	RBT Costly to Imitate	Mode of Governance & Level
Decision maker on activity							
Empirical pattern (Principal Items in Appendices 8 and 13)	HAS or TAS Items 1,2 Appendix 13	Exogenous Items 1,2,3,4,5, Mean Appendix 13	Item 1 Appendix 13	Items 1,2,Mean Appendix 13	Items 1,2,Mean Appendix 13	Items 1,2,Mean Appendix 13	
Empirical summary of pattern and mode	Empirical summary symbol Appendix 13	Empirical summary symbol Appendix 13	Empirical summary symbol Appendix 13	Empirical summary symbol Appendix 13	Empirical summary symbol Appendix 13	Empirical summary symbol Appendix 13	Empirical mode: Item 1 Appendix 13
Conventional predicted pattern	Figure 3.1	Figure 3.1	Figure 3.1	Figure 3.2	Figure 3.2	Figure 3.2	
Closest match between empirical summary and integrated predicted pattern and assigned level and mode	Predicted summary symbol (Table 4.2)	Predicted summary symbol (Table 4.2)	Predicted summary symbol (Table 4.2)	Predicted summary symbol (Table 4.2)	Predicted summary symbol (Table 4.2)	Predicted summary symbol (Table 4.2)	Classified level and predicted mode (Table 4.2)

Table 5.15: Template for the presentation of results to each case study relating to the nature of the exchange decision

Decision Maker on Exchange / Case Study Version (V) of qnr	TCE Asset Specific	TCE Uncertain	TCE Freq'	RDT Critical (Buyer, Supplier)	RDT Mag' of Exchange (Buyer, Supplier)	RDT Lack of Discret' (Buyer, Supplier)	RDT Few Altern' (Buyer Supp'	RDT Mean	Nature of Exchange
Decision maker on relationship									
Empirical pattern and exchange	HAS or TAS Items 1,2 App' 13 OAS Items 1,2 App' 13	Exogen' Items 1,2,3,4,5 Mean Appendix 13 Endogen' Items 1,2 Mean Appendix 13	Item 1 App' 13	Items 1,1a App' 13	Items 1,1a Appendix 13	Items 1,1a Appendix 13	Items 1,1a App' 13	Mean Buyer (4 x Item 1) Mean Supplier (4 x Item 1a) App' 13	Solidarity Items 1, 2 Appendix 13 Role Integ' Items 1,2 Appendix 13 Mutuality Items 1,2 Appendix 13 Mean Empirical exchange summary Appendix 13
Empirical pattern summary	Empirical summary symbol Appendix 13	Empirical summary symbol Appendix 13	Empirical summary symbol Appendix 13					Empirical Summary Symbol Appendix 13	
Predicted pattern summary (based on empirical exchange summary)	Predicted summary symbol (Figure 4.5)	Predicted summary symbol (Figure 4.5)	Predicted summary symbol (Figure 4.5)	Predicted summary symbol (Figures 4.5)	Predicted summary symbol (Figures 4.5)	Predicted summary symbol (Figures 4.5)	Predict sum' symbol (Figure 4.5)	Predicted summary symbol (Figure 4.5)	

Having established summary patterns of empirical data, the remaining quantitative and qualitative data is juxtaposed with these patterns to consider the extent to which this remaining data either corroborates or contradicts the empirical summary patterns. This approach to the remaining data involves the following steps:

1. Comparing and contrasting the results relating to the clarifying and corroborating items in the six versions of the case study questionnaire with the results concerning the principal items. These are also summarised in Appendix 8 - but not all of these are included in all six versions of the case study questionnaire;

2. A review of the case study interviews and documents to identify any quotations that can be directly connected with an independent variable and/or a dependent variable and/or an entire theoretical perspective, in terms of either corroborating or contradicting any part or all of any of the summary empirical patterns. This approach is popular amongst construction researchers conducting case studies for example, Bresnen (1991; 2000).

Following the completion of Table 5.14 and Table 5.15 for each case study, an assessment is made of the extent to which there is a match between the empirical patterns and the theoretically predicted patterns.

An SCP analysis is then undertaken in respect of internalised activity – if this activity is the firm's principal source of competitive advantage, in order to corroborate the assigned levels pertaining to the make decision. This analysis is specified as part of the refutability procedure in the integrative framework of vertical integration. More specifically, the predicted patterns comprising combinations TCE and RBT variables are classified into different levels according to different stereotypical market structures - as depicted particular SCP attributes. In order to analyse the "Structure" of the market sectors a "five forces" (Porter, 1985) analysis is undertaken using secondary data. A "five forces" analysis is a well established tool for systematically applying neoclassical determinants of supply to explain the extent of price competition in a market (Besanko, Dranove and Shanley 2000, 360). This approach has also been used by researchers in construction to explain market sectors in new construction/installation supply chains (for example, de Valence 2003). With regard to the "Conduct and Performance" components of the SCP analysis, data is drawn from the items pertaining to these components in the case study questionnaire.

Finally, an assessment is made of the extent to which the market sectors in each case studies reflect a tendency towards either static or dynamic market conditions to corroborate patterns of independent variables relating to the both make-or-buy decision and the nature the exchange relationship decision. Here, static conditions are expected to be associated with at least a reasonably successful application of TCE and RBT. As explained in Chapter 3, these theories are

based on a stronger form of rationality that is more applicable in static markets that promote firms maximising profits in the short term. The assessment of the tendency towards static or dynamic market conditions is based on the static/dynamic items in the case study questionnaire.

5.4.4 Summary

Case studies are promoted under conditions in which the researcher has little control over events and when the focus is on contemporary phenomenon within a real-life context. Moreover, case studies allow the opportunity to more effectively explore sensitive issues and a unique strength of case studies concerns the application of multiple sources of evidence that focus on a specific case – as opposed to some typical case. With regard to the Research Objectives 3 and 4, an explanatory study of the governance phenomena in this thesis is able to take advantage of the strengths of a case study approach. Furthermore, the application of analytic generalisation means that the results of the case studies may be generalised at least to other retail centres in Brisbane.

5.5 SURVEY DESIGN

5.5.1 Survey rationale

Although the results of the case studies may be generalised at least to other retail centres in Brisbane, the extent to which the results are generalisable beyond Brisbane may be questioned on the basis of whether the economic conditions in other locations (represented by the SCP surrounding each of the market sectors in the air conditioning maintenance supply chain to retail centres) are similar to that found in Brisbane. Therefore, a survey approach holds the potential to complement the case studies in this thesis, in terms of adding confidence in the generalisability of the findings beyond Brisbane. This is related to Research Objectives 1 and 2, which concern the establishment of a nationwide incidence and description of the research phenomena in conjunction with random sampling. Indeed, case studies should not generally be used to assess the incidence of phenomena (Yin 1994, 48). In contrast, a postal survey is an effective approach to capturing data across substantial geographical distances, as is the situation in this thesis with the vast majority of retail centres residing in metropolitan locations in Australia. Moreover, where the results of pattern matching fall short of gross matches and / or gross mismatches, then the results of a survey offer a further source of evidence upon which to draw conclusions.

5.5.2 Nature and purpose of survey data

In contrast to the case study data, the data from the survey is quantitative only and analysed from the perspective of statistical generalisation – as opposed to analytical generalisation in the case studies. More specifically, the analysis of the survey data employs descriptive and inferential statistics. Descriptive statistics are used to analyse the properties of a data set, or a sample. However, a major goal in the analysis of this quantitative data is to make statistical inferences, that includes using the mean and the sample proportion to estimate the corresponding parameters in the respective population. Here, the purpose is to draw conclusions about the population, not about the sample (Levine, Krehbal and Berenson 2003, 230). Conventionally, the term *statistical significance* relates to results imparted by inferential statistics and may not be related to the size or importance of the effect (shown by descriptive statistics). That is, a result is statistically significant on the grounds of being unlikely to be attributable to chance factors alone. Therefore, it is possible to find that a result may be statistically significant but trivial, on the bases of the interpretation of the corresponding descriptive statistics. In practice, however, statistical significance is affected by factors that include the sample size and the underlying strength of the relationship being analysed and is deeply entrenched in many fields including economics and management (Robson 2003, 352). As such, the analyses of the survey data in this thesis will place importance on any statistically significant results found. The level of statistical significance can range between 0 to 100 percent. A 95 percent confidence level is the accepted level for most business research, and commonly expressed by the significance level $p \leq .05$ (Sekaran 1992, 246). That is, 95 times out of 100, the estimate will reflect the true population characteristic.

5.5.3 Components of survey design

The following components of the survey design are now explained – in particular, highlighting the manner by which the integrity of statistical significance is maintained:

1. Population and sampling;
2. Administration and response; and
3. Analysis procedures.

5.5.3.1   Population and sampling

As first explained in Section 5.3.2.1.4, the activity of preventive maintenance seemed suitable for the purposes of a survey in terms of facilitating *both* descriptive and inferential statistical analysis. That is, the unstructured and exploratory interviews indicated that preventive maintenance is normally externalised by CMs (creating external relationships) and some proportion of this activity is usually internalised by MSCs (leading to internal relationships). Thus, the two dependent variables in this thesis are able to be analysed as part of the data generated by a survey of the same preventive maintenance activity. Moreover, the aggregate of the data from CMs and MSCs, concerning this same activity, allows the possibility of the independent variables (from the three respective theories) and the dependent variables to co-vary. This is preferable, on the basis that statistically significant relationships are more readily revealed when variables are allowed to co-vary. Additionally, Table 1.3 and Table 1.4 indicates that the populations of CMs and MSCs are sufficiently large - from which a reasonable size of sample can be drawn. In summary, the activity of preventive maintenance seemed to offer the characteristics necessary to show statistically significant relationships – should any such relationships exist.

Table 1.3 and Table 1.4 represent the starting point to establishing the population, or the total number of units to be surveyed. Respectively, these tables show 459 CMs and 449 MSCs. With regard to the CMs, however, one or more of the centres being managed may not be air conditioned or the air conditioning may not be part of the CM's responsibilities. This applied more often with smaller neighbourhood centres, in which air conditioning is found in the rented space only - with no air conditioning to common spaces. Here, the tenants took full responsibility for the management of air conditioning. In accordance with the scope of this thesis, any CM that is not managing at least one air conditioned centre was excluded from the survey. Where a CM managed more than one air conditioned centre within a particular state, simple random sampling was used to select a representative centre. Finally, the PCA directories relating to the states of WA and SA contained contact details collected in 2003. A simple random sample was taken of these states and then each firm in this sample was contacted once over a period of two consecutive days to check the accuracy of the contact details.

In terms of the MSCs, each of these firms undertake at least some level of commercial and industrial work – in accordance with the scope of this thesis. The ACMA directory provided full contact details, including the name of the Service Manager and the postal address of each of the firms listed. Therefore, each firm in this directory was included in the survey. However, the Yellow Pages®.com.au gave only partial contact details – comprising the name of the firm and a phone number. Over one period of three consecutive days, each of the firms in the Yellow Pages®.com.au were contacted once. In doing so, some of the firms were not able to be reached – either, there was no one available at the time to answer the call and so the phone rang-out or the call was answered by a recorded message / voicemail message. Those firms that were able to be successfully contacted in the period were included in the survey. In summary, the resultant sample of CMs and MSCs equates to a probability sample required for statistical theory and the validity of any statistically significant results.

5.5.3.2   Administration and response

The approach used to administrate the postal survey to both MSCs and CMs was based on Salant and Dillman (1994) and summarised by the following steps:

1. A pre-notification letter was sent to the respondents shortly before the mailed questionnaire, notifying the respondents about the survey, why it is being done, and thanking them in advance for their participation;
2. An initial package of survey information was mailed to all respondents;
3. A reminder package of survey information was mailed to non-respondents ; and
4. A final call package of survey information was mailed to the remaining non-respondents.

In steps 2, 3 and 4 the package of survey of information comprised a:

- Cover letter;
- Questionnaire;
- Participant information sheet (that ensured informed consent was obtained and is explained further in Section 5.6); and a
- Reply-paid envelope.

A summary of the administration of steps 1 to 4 above to both MSCs and CMs is given in Table 5.16. This table also includes details concerning the response to the survey. A total of 211 responses were received representing a 36 percent response rate. However, a total of six of these responses were not used giving a usable response rate of 35 percent.

Table 5.16: Survey administration and response

Recipients	Pre-notification letter	Initial survey package	Reminder survey package	Final call survey package	Response	Useable Response
285 x MSCs	24/10/2005	26/10/2005	18/11/2005	20/02/2006	100 (35%)	96 (34%)
305 x CMs	11/11/2005	14/11/2005	25/11/2005	20/02/2006	111 (36%)	109 (36%)
Total 590 Firms					211 (36%)	205 (35%)

The reasons for not using six of the responses are as follows:

- One MSC respondent considered their firm not capable of maintaining a retail centre (MSC version of questionnaire: Question 8 – see Appendix 9);
- One MSC respondent did not internalise any of the activity (MSC version of questionnaire: Question 17 – see Appendix 9);
- Two MSC respondents had only answered the first 16 questions and so had not answered any of the questions concerning the dependent variables nor any of the questions relating to

independent variables - principal items (MSC version of questionnaire: Questions 1-16 – see Appendix 9); and

- Two CM respondents did not currently externalise the activity (CM version of questionnaire: Question 8 – see Appendix 10).

The most serious bias introduced by non-respondents exists when there is a direct connection between the purposes of a survey and the likelihood of response (SPSS® 1998, 7). For example, when a postal survey is conducted to measure the proportion of people who engage in some behaviour – if those who engage in the behaviour are more likely to respond, then the extent of the behaviour will be overestimated. This does not apply to either the MSCs or CMs. In all of the useable responses, all of the MSCs internalised some percentage of preventive maintenance and all of the CMs externalised some percentage of this activity. Indeed, the interviewees in the exploratory and unstructured interviews considered this behaviour to be typical amongst all MSCs and CMs nationwide including, therefore, the non-respondents in the postal survey in this thesis. Moreover, steps were taken to avoid response bias. First, no questions were included that could be regarded as sensitive from a personal perspective and second, the use of strong and suggestive adjectives was avoided (Cooper and Emory 1995). Finally, Moser and Kalton (cited in Akintoye, McIntosh and Fitzgerald 2000, 162) hold that the results of a postal survey are biased if the response rate is lower than 30 percent.

In summary, the factors that are likely to have contributed to obtaining a response rate greater than 30 percent, include:

- Contacting a named manager in both the MSCs and CMs with appealing cover letters;
- Using pre-notification and reminders;
- The simplicity, clarity and reasonable length of the questionnaire (determined though its development and design);
- Unbiased questions; and
- Use of a reply-paid envelope.

5.5.3.3 Analysis procedures

5.5.3.3.1 Data entry, coding and checking

The data was entered into SPSS® 14.0 – initially as two separate files. File 1 contained the data from the MSC version of the questionnaire (see Appendix 9) and File 2 comprised data from the CM version of the questionnaire (see Appendix 10).

In order to facilitate data entry, guidelines and codes for each version of the questionnaire were developed. As part of developing these guidelines and codes, additional questions were able to be included (to be answered as a direct function of two or more answers given by the respondent to other questions). The guidelines and codes for data entry - along with the additional questions (and their guidelines and codes) are given in Appendix 14 and Appendix 15. The code "999" was used to represent missing data and any respondents who circled "Don't Know".

Having entered the data using the above guidelines and codes, a number of the entries were reversed-scored in order to ensure consistency in the subsequent analysis of the data. As explained in Section 5.3.2.4.1, and indicated in Appendix 9 and Appendix 10, the construction of the "Agree / Disagree" statements in the MSC and CM versions of the questionnaire were designed to ensure the statement was meaningful to each type of respondent. However, this created the need for reverse scoring in order to compare like-with-like in the analysis. In terms of the MSC questionnaire, answers to the following questions were reversed: q45 to q48 inclusive; q50; q53 to q59 inclusive; q62: and q64 to q67 inclusive. With regard to the CM version of the questionnaire, the answers to the following questions were reversed: q22 to 31 inclusive; q36 to 51 inclusive; q55 to 56 inclusive; and q58 to 59 inclusive.

Finally, and after having entered the data using the above guidelines and codes, the entire entry of the data was checked.

5.5.3.3.2 *Analysing interval-level / continuous data*

The extent to which a 7-point response format (used as one of the response formats in each of the two versions of the questionnaire) represents interval data, or continuous data, is open to discussion. The importance of this discussion relates to the applicability of general linear model techniques, such as analysis of variance and regression. On the one hand, it can be argued that data collected on Likert scales – that label each point in the scale, are not truly interval / continuous. That is, the distance between each point is not necessarily the same. On the other hand, and in order to help counter this argument, only the end points on 5 to 9-point scales may be labelled. This is the case with the two versions of the questionnaire in this thesis, which label only the end points of 7-point scales in a semantic differential fashion. Moreover, it is established practice for researchers in the fields of economics and management to use 5 to 9-point scales and proceed to analyse the data using general linear model techniques (Shelanski and Klein 1995 and Hoskisson et al. 1999). There are a number of reasons that justify this practice, including adopting a data analytic approach that sees Likert-type scales as sufficiently close to interval scales to make assumptions reasonable – in so far as, strong or weak or non-existent relationships will not be distorted no matter what technique is used (SPSS® 1998, 12).

5.5.3.3.3 *Reliability*

As mentioned in Section 5.3.2.4, a number of background or control variables were included in the two versions of the survey, including size, age and geographic location of the respondent's firm. These are very popular control variables in business research and in construction research (for example, Kale and Arditi 2001). The control variables (listed in Appendix 11) are designed to ensure that the respondents are sufficiently homogeneous in terms of their responses to the individual items. As the two separate SPSS® files containing the MSC data (File 1) and the CM data (File 2) are later combined into one larger file (File 3) to facilitate the hypotheses testing described in the next section, it is not technically correct to undertake hypotheses testing whilst at the same time controlling for certain background variables within File 3 (for example, using the block facility within SPSS® linear regression analysis). Therefore, the activity of applying controlling variables took the form of identifying, within File 1 and File 2, statistically significant

relationships between the control variables and all the other dependent and independent variables, again, listed in Appendix 11.

It can been seen from Appendix 11, that there are both continuous and categorical variables across both the control variables and the other variables, and in both File 1 and File 2. The following parametric and non-parametric techniques (each with different assumptions about the underlying distribution of data) were used to analyse the following combinations of different types of data:

- Pearson correlation coefficient (parametric) and Spearman correlation coefficient (non-parametric) in respect of a continuous control variable and a continuous dependent or independent variable;
- T-test for two categories and Analysis of Variance (ANOVA) for three or more categories (both parametric techniques) and Mann-Whitney *U* test for two categories and Kruskal-Wallis *H* test for three or more categories (both non-parametric techniques) of categorical control variable and a continuous dependent or independent variable; and
- Spearman correlation coefficient in relation to a categorical control variable and a categorical dependent or independent variable.

With regard to a continuous control variable and a categorical dependent or independent variable, the control variable was converted to a categorical variable (based on theory) and the relationship analysed using the Spearman correlation coefficient.

If a relationship between a control variable and any of the dependent and independent variables was found to be statistically significant - using both parametric and non-parametric techniques, then this relationship was deemed insufficiently homogeneous. If this relationship involved answers to a question that would comprise either wholly, or in part, one of the principal items (listed in Appendix 11), then this question / answer received further investigation - in terms of the effect on the level of significance caused by omitting certain respondents and / or varying the level of the control variable. However, if the significant relationship involved answers to a

question pertaining to any of the clarifying or corroborating items (again, listed in Appendix 11), then the answers to this question would not be carried forward to help test the hypotheses.

Having made adjustments concerning significance, to ensure a sufficient level of homogeneity in both the MSC data set and the CM data set (to be used to test the hypotheses), the responses to all the questions that make-up the principal items were then copied into File 3. In File 3, approximately the top half of rows comprised data from the MSC questionnaire (each of these top rows representing one MSC respondent) and approximately the bottom half of rows contained data from the CM questionnaire (each of these bottom rows representing one CM respondent), such that, each column represented one of the principal items in Appendix 11. For example, the column concerning Item 1 Solidarity was made-up of approximately the top half of responses from each of the MSCs to Question 26 in the MSC version of the questionnaire, followed by approximately the bottom half of responses from each of the CMs to Question 22 in the CM version of the questionnaire (as noted in the first page of Appendix 11).

The next step concerned the reliability of the data at the level of the individual items. As mentioned in Section 5.3.1, the approach to addressing reliability in the survey is to use the internal consistency approach, or inter-item reliability. Here, two or more items (question and response) are used as a measure of a variable. If these two or more items pertaining to the same variable are reliable, then they should generate a similar score. All of the variables have two or more items, with the exception of the make-or-buy dependent variable and the RDT independent variables (as explained in Section 5.3.2.4.1). Of the variables that have two or more items, those that are common to both the MSC and CM versions of the questionnaire are termed principal items and listed in Appendix 11. These principal items are tested for their inter-item reliability and used as the main source of data to test the hypotheses.

More specifically, the approach is to test related items, or *item scales*, for correlation. Consistent with the approach to the analysis of the effect of the control variables on all dependent and independent variables, Pearson correlation coefficient and Spearman correlation coefficient are used for 2-Item scales. If a statistically significant relationship was found, and on the basis that it

is preferable to use as much of the data as possible, then the mean of the two items was computed and used to represent the variable. With regard to 3-Item or more scales, Cronbach's alpha coefficient is used. Here, an alpha ≥ 0.7 was used as the cut-off in terms of a reliable scale (Nunnally, 1978) and in determining the construction of a mean score of the three or more items in the scale - to represent the variable. If an item scale was not statistically significant or had an alpha <0.7, then the items in the scale would receive further investigation. That is, consideration would be given to the possibility ambiguity or confusion amongst the respondents when answering one or more of the questions that make-up an item in the scale. If, upon reflection, the existence of some ambiguity or confusion was thought to be possible, then only one item would be justified as being used to represent the variable. If, on the other hand, any ambiguity or confusion could not be identified, then each item in the scale would be deployed as rival items when testing the hypotheses.

5.5.3.3.4 Hypotheses testing

The techniques used to test three of the four hypotheses concerning the make-or-buy decision (Hypotheses 1, 2 and 3) comprised, an analysis of arithmetic means (including a confidence interval estimate) and logistic regression analysis, as summarised in Table 5.17. Whilst, the techniques used to test the three hypotheses concerning the nature of the exchange relationship decision (Hypotheses 5, 6 and 7) comprised, an analysis of arithmetic means (including a confidence interval estimate), linear regression analysis and Pearson correlation coefficient and Spearman correlation coefficient, as summarised in Table 5.18. These tables also include a rationale for using the selected statistical technique and, where applicable, the statistical form of the hypothesis that is expressed in terms of a null and an alternative hypothesis. A null hypothesis is always one of status quo or no difference and represented by the symbol H_0. If the null hypothesis is considered false, then something else must be true. In anticipation of this, an alternative hypothesis is specified. The alternative hypothesis - given by the symbol H_1, is the opposite of the null hypothesis (Levine, Krehbiel and Berenson 2003).

It is not possible to expect to test Hypothesis 4 – whose null hypothesis effectively states that it is either transaction costs or production costs that are the substantive determinants of the make-or-buy decision in a supply chain, as the survey considers only one activity, and in one sector, of the air conditioning maintenance supply chain. That is, the physical implementation of air conditioning maintenance. It is theorised that the survey approach will only promote one of the theories and, therefore, only either transaction costs or production costs. Hence, part of the rationale of the case study design is to ensure that all the sectors in the air conditioning supply chain are able to be observed, thus providing a greater expectation that Hypothesis 4 can be reliably tested.

Table 5.17: Statistical techniques used to test the hypothesis concerning the make-or-buy decision

Hypothesis	Statistical technique, rationale and statistical form
Hypothesis Number 1 (Section 2.4.1)	*Analysis of arithmetic means and a confidence interval estimate; and* *Binomial (or binary) logistic regression*: As the dependent variable is categorical and takes on one of only two values (internalise or externalise, coded "1" or "0" respectively), the use of simple or multiple linear regression for this type of dependent variable would often lead to predicted values that are less than zero or greater than one – values that cannot occur. In addition to showing the relative importance of the TCE independent variables – in terms of the relative size of their regression coefficient (ß), logistic regression provides a *p* value for each independent variable to show the strength of each variable's statistical significance. The statistical form of the hypothesis is given as: • H_0: β_1 (Human Asset Specificity) = β_2 (Exogenous Uncertainty) = β_3 (Frequency) = 0 [No relationship between the dependent variable (internalise / externalise) and the independent variables] • H_1: At least one $\beta \neq 0$ [Relationship between the dependent variable (internalise / externalise) and at least one of the independent variables]
Hypothesis Number 2 (Section 2.4.1)	*Analysis of arithmetic means and a confidence interval estimate; and* *Binomial (or binary) logistic regression*: For the same reasons as in Hypothesis 1. The statistical form of this hypothesis is given as: • H_0: β_1 (Value) = β_2 (Rarity) = β_3 (Costly to Imitate) = 0 [No relationship between the dependent variable (internalise / externalise) and the independent variables] • H_1: At least one $\beta \neq 0$ [Relationship between the dependent variable (internalise / externalise) and at least one of the independent variables]
Hypothesis Number 3 (Section 2.4.1)	*Analysis of arithmetic means and a confidence interval estimate:* Although the regression coefficient in logistic regression will indicate the relative importance of the independent variables, these coefficients are not sufficiently precise (due to the manner by which the technique treats variance) to show the patterns of variables predicted in Table 4.2. In contrast, a simple analysis of the arithmetic means of each of the independent variables will provide empirical patterns that can be more accurately compared with the predicted patterns in Table 4.2. Moreover, a 95% confidence interval estimate is computed using the sample mean (X), the standard deviation (S) – which is sufficient to estimate the population standard deviation (σ) given the sample size, and the sample size (n) as follows: • $X \pm (1.96)(S / \sqrt{n})$ This is interpreted thus: If samples of the same size *n* are taken and their sample means are computed, 95% of the intervals include the true population mean somewhere within the interval around their sample means and only 5% of them do not (Levine, Krehbel and Berenson 2003, 243-245).
Hypothesis Number 4 (Section 2.4.1)	Not applicable (tested using case study data)

Table 5.18: Statistical techniques used to test the hypothesis concerning the nature of exchange relationship decision

Hypothesis	Statistical technique, rationale and statistical form
Hypothesis Number 5 (Section 2.4.1)	*Analysis of arithmetic means and a confidence interval estimate; and* *Multiple linear regression*: As each of the three dimensions of this dependent variable are continuous, multiple linear regression is appropriate. In addition to showing the relative importance of the TCE independent variables – in terms of the relative size of their regression coefficient (ß), multiple linear regression provides a *p* value for each independent variable to show the strength of each variable's statistical significance. Two versions of the TCE model (applied to each of the three dimensions of the dependent variable) will be analysed using multiple linear regression. The first model represents the conventional approach in TCE that seeks to capture the potential for the strong form of hold-up by measuring TCE's variables using the activity as the focus of the transaction in both internal and external relationships. The second model represents the alternative approach developed in this thesis that seeks to capture both the strong and weak forms of hold-up by measuring TCE's variables using the activity as the focus of the transaction in terms of the external relationship between the CM and MSC, but also using the resource as the focus of the transaction with respect to the internal relationship between the MSC and its technical air conditioning staff. In the two versions of the TCE model, the statistical form of the hypothesis is given as: Conventional TCE model: • H_0: β_1 (Human Asset Specificity) = β_2 (Exogenous Uncertainty) = β_3 (Frequency) = 0 [No linear relationship between the dependent variable (exchange: Solidarity, Role Integrity and Mutuality) and the independent variables] • H_1: At least one $\beta \neq 0$ [Linear relationship between the dependent variable (exchange: Solidarity, Role Integrity and Mutuality) and at least one of the independent variables] Alternative TCE model: • H_0: β_1 (Human Asset Specificity or Ongoing Asset Specificity) = β_2 (Exogenous or Endogenous Uncertainty) = β_3 (Frequency) = 0 [No linear relationship between the dependent variable (exchange: Solidarity, Role Integrity and Mutuality) and the independent variables] • H_1: At least one $\beta \neq 0$ [Linear relationship between the dependent variable (exchange: Solidarity, Role Integrity and Mutuality) and at least one of the independent variables]
Hypothesis Number 6 (Section 2.4.1)	*Analysis of arithmetic means and a confidence interval estimate; and* *Pearson correlation coefficient and Spearman correlation coefficient:* A single continuous independent variable is created and analysed for correlation with each of the three continuous dependent variables. As RDT theory concerns the net difference between scores representing the buyer and supplier, one continuous independent variable for each respondent is created by comparing the mean scores representing the buyer and supplier, and then performing a transformation of the results of this comparison. That is, the mean of the four items representing the buyer (Criticality Item 1, Magnitude of exchange Item 1, Lack of Discretion Item 1 and Few Alternatives Item 1) is compared with the mean of the four items representing the buyer (Criticality Item 1a, Magnitude of exchange Item 1a, Lack of Discretion Item 1a and Few Alternatives Item 1a) – as shown in Appendix 11, and then proceeded by the following transformation: • If no difference and both buyer and supplier scores are at 5, 6 or 7, then the transformed score is the same score • If no difference and both buyer and supplier scores are at 1, 2, 3 or 4, then the transformed is scored 4 • If there is a difference of 1, 2 or 3 points, then the transformed score is 4 • If there is a difference of 4, 5 or 6 points, then the transformed score is 3, 2 and 1 respectively For each relationship, the statistical form of the of the hypothesis is given as: • H_0: $\rho = 0$ (No significant correlation in the relationship) • H_1: $\rho \neq 0$ (Significant correlation in the relationship)
Hypothesis Number 7 (Section 2.4.1)	*Analysis of arithmetic means and a confidence interval estimate;*

Finally, and in a similar fashion to the case studies, an analysis of means and a confidence interval estimate will be performed on all SCP and Static/Dynamic items also listed in Appendix 11.

5.6 ETHICAL CONSIDERATIONS

Details of the research in this thesis were provided to QUT's Human Research Ethics Committee. This committee advised that the research is exempt from ethical clearance but in accordance with university policy subjects must always be recruited on a volunteer basis and that informed consent needs to be ensured. To address these requirements a consent form was approved by QUT's Human Research Ethics Committee that ensures that informed consent is obtained on the basis that the participant:

- Acknowledges that the nature of the research and their involvement in the project has been explained;
- Understands that confidentiality will be maintained and no identifying information will be released;
- Understands that they may withdraw from the study at any time, without comment or penalty; and
- Understands that their participation is voluntary.

Where it was practically possible, written consent was obtained from participants. Such that, a total of 51 signed and dated consent forms were collected as part of the administration of the various interviews - performed in relation to the questionnaire development and the case studies. With regard to the survey, the consent form was adapted into a participant information sheet and stapled to the cover letter – forming part of the survey package sent to each respondent (as described in Section 5.5.3.2). In the participant information sheet it is noted that the return of the completed questionnaire is accepted as the respondent's consent to participate in the research. A copy of the consent form and the participant information sheet are given in Appendix 16.

5.7 SUMMARY

This chapter set out and justified the research methods used to collect data and the techniques to be used to analyse the data. First, the use of multiple methods and sources of data collection was justified.

1. The design and development of the questionnaire was then described, including the manner by which this core research instrument is adapted for use in both the case studies and surveys. As criterion validity is assured by the inclusion of the two dependent variables and construct validity is incorporated by virtue of hypothesised patterns of TCE and RBT variables and in terms of rival hypotheses arising from TCE versus RDT, the development and design of the questionnaire focused on addressing the way in which reliability, content validity and face validity are established. An account was then given of the components of the case study design and the postal survey

Finally, ethical considerations were mentioned that formed part of the administration of the 51 interviews, collection of documentary information, as well as the collection of 18 completed case study questionnaires and 205 useable survey questionnaires.

CHAPTER 6 ANALYSIS OF CASE STUDY DATA

6.1 INTRODUCTION

The techniques to be used to analyse the case study data were described in the previous chapter. In doing so, Section 5.4.3.5.3 also outlined the presentation and structure of this chapter. This chapter's objective is to facilitate an assessment of the extent to which the case study data either supports or contradicts the hypotheses. The analysis of the survey data follows in the next chapter. The final Chapter 8 will summarise the extent to which the total data supports or contradicts the hypotheses, including a review of the convergence of the case study and survey data. Chapter 8 will also consider the implications of the results in terms of theoretical development, research methods and practice.

6.2 APPROACH AND FORMAT OF CASE STUDY DATA

The preferred approach to presenting an analysis of case study data is to treat each case study as a "whole story" and present the analysis of each case study in turn (Yin 1994, 49-50). The analysis and presentation of each case study adopts the *same format* and in the following order: Case Study 1; Case Study 1A; Case Study 2; Case Study 2A; Case Study 3; and Case Study 3A.

Each case study analysis includes both the make-or-buy decision and the nature of the exchange relationship decision and relies on the technique of pattern matching - in conjunction with the

strategy and guidelines established in Section 5.4.3.5.3. In summary, simple "eyeballing" of the data is used to assess the match between empirical patterns of data and the theoretical patterns of data. To facilitate this matching approach, first, empirical patterns are established using the principal items and which are interpreted in accordance with the guidelines in Appendix 13. Next, the corresponding theoretical patterns are identified. In terms of the make-or-buy decision, the conventional theoretical pattern is taken from Figure 3.1 and Figure 3.2. Also, in respect of the make-or-buy decision the pattern predicted by the integrative framework of vertical integration is obtained from Table 4.2. With respect to the nature of the exchange relationship, Figure 4.5 is used to provide the predicted patterns.

The validity of the empirical patterns is then checked by a review of the corroborating and clarifying items (listed in Appendix 8), as well as by a review of the other information generated from the interviews and documents pertaining to each case study. The case study database (Appendix 12) provides details of all the case study information including respondents and the dates the information was collected. Finally, the closeness of the match between the empirical patterns and the predicted patterns is considered in order to determine the extent to which data supports or contradicts the hypotheses.

The penultimate section in this chapter concerns an SCP analysis of the selected market sector(s) in the air conditioning supply chain to Brisbane retail centres. This uses data from the case studies and secondary data, in order to classify the market sectors as part of the refutability procedure associated with the integrative framework of vertical integration (Section 4.4.2.1). The final section in this chapter comprises an assessment of the extent to which the market sectors across the case studies in Brisbane reflect a tendency towards either static or dynamic market conditions. This assessment will either corroborate or contradict the match between the empirical patterns and the theoretically predicted patterns concerning both governance decisions, as well as the SCP analysis.

6.3 CASE STUDY 1

6.3.1 Hypotheses concerning the make-or-buy decision

6.3.1.1 Empirical and predicted patterns

Table 6.1 summarises the empirical patterns for the make-or-buy decisions in Case Study 1. These empirical patterns are based on interpreting the principal items in accordance with the guidelines in Appendix 13 and presented using the results template matrix concerning the make-or-buy decision (explained and illustrated by Table 5.14). Each of the empirical patterns of TCE variables and RBT variables in Table 6.1 are matched with the conventional predicted patterns shown in Figure 3.1 and Figure 3.2 and with the best-fit predicted pattern from the integrative framework of vertical integration presented in Table 4.2. The conventional predicted patterns are derived from having observed the mode of governance (either internalisation or externalisation). With regard to the integrative framework predicted patterns, and having selected the best-fit predicted pattern, the classification level is assigned along with the predicted mode of governance. This amounts to part of *Steps 2 and 3* in the refutability procedure associated with Table 4.2 (Section 4.4.2.1).

The validity of the empirical patterns in Table 6.1 is checked by reviewing the corroborating items listed in Appendix 8 and which are summarised in Table 6.2. The two items pertaining to the Frequency (TCE) variable are applicable to the four internalised activities (operations management; general maintenance; preventive maintenance and generic DDC maintenance). All respondents noted that internal human resources are working 40 hours per week and either very busy or extremely busy. These results support the Appendix 13 guidelines that interpreted the employment of one Full- Time Equivalent (FTE) staff at a high (+) frequency level. That is, the results show that there is sufficient demand to provide a continuous flow of work for each FTE staff. There are no results to report in terms of the one RBT corroborating item.

The validity of the empirical patterns in Table 6.1 is further checked by a review of the other information generated from the interviews and documents pertaining to the case study that are summarised in Table 6.3. With regard to the Centre Manager on operations management, a significant proportion (40 percent) of the GLAR of this very large retail centre is made-up with speciality shops. Self-contained retail outlets create internal divisions in floor space and complicate the air conditioning and other services to the common space. Such a complex internal layout is consistent with the results that indicate a very high (six to nine month) period of time to reach full performance in terms of operations management and which represents the Human Asset Specificity (TCE) variable. The Centre Manager's comment concerning the scarcity of firms able to match his firm's level of service and reputation corresponds with this manager's high (+) to very high (++) scores on the items pertaining to the Rarity (RBT) variable.

In terms of the Operations Manager on general maintenance, again, the complex internal layout is consistent with the results that indicate a high (three to six month) period of time to reach full performance in terms of general maintenance staff – representing the Human Asset Specificity (TCE) variable. The Operations Manager's comment relating to savings by using internal staff, show the importance of tangible and readily observable production costs, and is consistent with a high (+) score given on the Value (RBT) variable.

With regard to the Service Manager on preventive maintenance, the very (++)/extremely high (+++) scores on the Value (RBT) variable expressed by the Service Manager is consistent with this manager's comment that service and maintenance is their core business. Furthermore, the view that this firm is a "major player" supports the high (+) to very high (++) scores on the Rarity (RBT) variable.

Finally, in terms of the Service Manager on generic DDC maintenance, this manager explains that his firm is concerned about the possibility of a DDC subcontractor taking commercial advantage in the situation where this subcontractor is allowed direct access to the client. This could involve the DDC subcontractor convincing the client to engage their firm directly and on improved terms and conditions (to the detriment of the Service Manager's firm). Moreover, this

situation is heightened when the DDC subcontractor also has the capability of maintaining the facility's general air conditioning. Here, the Service Manager's concern is that his firm could be completely replaced by the DDC subcontractor. The Service Manager is also concerned that the DDC subcontractor may hold-up the Service Manager's firm by simply performing poorly. This would then negatively influence the client's/CM's perception of the Service Manager's firm, given the close relationship between the DDC system and the general air conditioning system. This makes the Service Manager's firm vulnerable and would lead to the possibility of the Service Manager's firm having to make concessions to the DDC subcontractor in order to ensure their satisfactory performance. Hence, and where possible, the Service Manager will undertake as much of this work in-house to minimise this potential hold-up. In other contracts in which the Service Manager's firm has no choice but to subcontract DDC maintenance, the Service Manager's firm closely monitors the performance of the DDC subcontractor and takes all steps possible to ensure that communication concerning the DDC system is through the Service Manager's firm and not directly between the DDC subcontractor and the client. This situation is consistent with the very high (++)/extremely high (+++) scores on the Temporal Asset Specificity (TCE) variable expressed by the Service Manager and which arises out of the intimate relationship between the performance of the air conditioning system and the management and maintenance of the DDC system. With regard to the Uncertainty (TCE) variable, the Service Manager explains that his firm is not able to control developments in technology associated with the hardware and software used in the DDC. This is not an issue when generic DDC is internalised but would be issue if this activity were externalised. Here, potential hold-up may ensue as the externalised DDC subcontractor would control the implementation of any technological developments by the generic DDC design/manufacturing firm. This supports the very high (++) scores on the Uncertainty (TCE) variable expressed in relation to generic DDC maintenance activity.

Table 6.1: Case Study 1: Make-or-buy empirical and predicted patterns

Decision Maker on Activity & Version (V) of Case Study Questionnaire	TCE Asset Specific	TCE Uncertain (Exogenous)	TCE Frequent	RBT Value	RBT Rarity	RBT Costly to Imitate	Mode of Governance & Level (L)
CM'er on OM'mt-V1 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 6-9 mths,5 +/++ +/+++ **0/+++**	1,2,2,2,3 M= 2 **0** +/+++ **0/+**	1 FTE + +/+++ +/+++	7,6 M=6.5 ++/+++ +/+++ ++	7,4 M=5.5 +/++ 0/+++ +/++	4,5 M=4.5 **0/+** 0/+++ **0**	Internalised L2 and Internal
OM'er on GM'ce-V2 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 3-6 mths,5 + +/+++ **0/+++**	1,2,3,1,1 M=1.6 **0** +/+++ **0**	2 FTE + +/+++ +/+++	5,5 M=5 + +/+++ +	1,3 M=2 **0** 0/+++ **0**	1,2 M=1.5 **0** 0/+++ **0**	Internalised L3 and Internal
OM'er on PM'ce-V2 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 16 days,3 **0** **0/+** **0**	1,2,3,1,3 M=2 **0** **0/+** **0**	0.7 FTE **0** **0** **0**	3,3 M=3 **-** **-/---** **-**	2,3 M=2.5 **0** 0/+++ **0**	1,2 M=1.5 **0** 0/+++ **0**	Externalised L5 and External
SM'er on PM'ce-V4 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 3 days,3 **0** +/+++ **0/+++**	2,2,2,1,3 M=2 **0** +/+++ **0/+**	20 FTE +++ +/+++ +/+++	6,7 M=6.5 ++/+++ +/+++ ++	6,6 M=6 ++ 0/+++ +/++	2,2 M=2 **0** 0/+++ **0**	Internalised L2 and Internal
SM'er on Generic DDCM'ce-V4 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	TAS: 7,5 M=6.5 ++/+++ +/+++ +/+++	5,6,6,5,6 M=5.6 ++ +/+++ +/+++	1 to 5 FTE + +/+++ +/+++	4,4 M=4 **0** +/+++ **0**	4,4 M=4 **0** 0/+++ **0**	2,4 M=3 **0** 0/+++ **0**	Internalised L4a and Internal

Key:
M = *Mean*
Mths, HAS, TAS = *Months, Human Asset Specificity, Temporal Asset Specificity*
FTE = *Full-Time Equivalent*
CM'er = *Centre Manager (internal to CM)*
OM'mt = *Operations Management*
OM'er = *Operations Manager (internal to CM)*
GM'ce = *General Maintenance*
PM'ce = *Preventive Maintenance*
SM'er = *Service Manager (internal to MSC)*
DDCM'ce = *Direct Digital Controls Maintenance*

Table 6.2: Case Study 1: Make-or-buy corroborating items

Decision Maker on Activity & Version (V) of Case Study Questionnaire	TCE: Frequency Item 1 (V1,2,4,5): Hours per week worked by internal human resource (Hours) Item 2 (V1,2,4,5): How busy internal resource (7-point)	RBT: Rarity Item 1 (V2,3,4,6): Minimum experience required by external firm (Years)
CM'er on OM'mt - V1	Item 1: 40; Item 2: 7	Item 1: Not applicable
OM'er on GM'ce - V2	Item 1: 40; Item 2: 6	Item 1: Not applicable
OM'er on PM'ce - V2	Item 1: Not applicable; Item 2: Not applicable	Item 1: Not answered
SM'er on PM'ce - V4	Item 1: 40 ; Item 2: 7	Item 1: Not applicable
SM'er on Generic DDCM'ce - V4	Item 1: 40 ; Item 2: 7	Item 1: Not applicable

Key:

CM'er	*= Centre Manager (internal to CM)*
OM'mt	*= Operations Management*
OM'er	*= Operations Manager (internal to CM)*
GM'ce	*= General Maintenance*
PM'ce	*= Preventative Maintenance*
SM'er	*= Service Manager (internal to MSC)*
DDCM'ce	*= Direct Digital Controls Maintenance*

Table 6.3: Case Study 1: Make-or-buy information from interviews and documents

Decision Maker on Activity	Variable
Centre Manager on operations management	• TCE/HAS: Total area of specialties in centre - approximately $30,000m^2$ on 3 levels and approximately 40% of GLAR (Source: PCA, 2005) • RBT/Rarity: *"Very few firms able to match the level of service / reputation across portfolio of centres managed"* (Source: Interview with Centre Manager)
Operations Management on general maintenance	• TCE/HAS: Total area of specialties in centre - approximately 30,000m2 on 3 levels and approximately 40% of GLAR (Source: PCA, 2005) • RBT/Value: *"Even small savings by using internal staff important given pressures on budget"* (Source: Interview with Operations Manager)
Operations Management on preventive maintenance	• No further information provided
Service Manager on preventive maintenance	• RBT/Value: *"Service and maintenance is our business – it's what we do!* (Source: MSC's homepage/website) • RBT/Rarity: *"Firm is one of the major players in Brisbane"* (Source: Interview with Service Manager)
Service Manager on generic DDC maintenance	• TCE/TAS: *"Aim to ensure that one of firm's staff in attendance when a DDC subcontractor visits site and to ensure that any issue with DDC is communicated to client through firm"* (Source: Interview with Service Manager) • TCE/Uncertainty: *"Uncertainty in generic DDC arising out of faults and developments in hardware and software that is designed by external firm"* (Source: Interview with Service Manager)

6.3.1.2   Pattern matching and hypotheses testing

Having established empirical patterns and corresponding predicted patterns (in Table 6.1), as well as having checked the validity of the empirical patterns (using information from Table 6.2 and Table 6.3) the match or mismatch between the empirical patterns and the predicted patterns in Table 6.1 is now considered - in order to determine the extent to which data in this case study supports or contradicts the following hypotheses (detailed in Section 2.4.1):

- *Hypothesis Number 1* (concerning the conventional approach to TCE): Two of the empirical patterns match the conventional TCE predicted patterns (externalised preventive maintenance and internalised generic DDC maintenance), whilst the other three empirical patterns do not match the conventional TCE predicted patterns (internalised operations management, internalised general maintenance and internalised preventive maintenance). The discrepancy between the empirical score on the Uncertainty variable with the score for the Uncertainty variable conventionally predicted by TCE, appears in each three empirical patterns not matching the conventional TCE predictions. Therefore, these results mainly contradict Hypothesis Number 1;

- *Hypothesis Number 2* (concerning the conventional approach to RBT): Four of the empirical patterns match the conventional RBT predicted patterns (internalised operations management, internalised general maintenance, externalised preventative maintenance and internalised preventive maintenance), whereas, one of the empirical patterns does not match the RBT predicted patterns (internalised generic DDC maintenance). The difference between the empirical score on the Value variable with the score for the Value variable conventionally predicted by RBT, is the basis of this one mismatch. Therefore, these results mainly support Hypothesis Number 2;

- *Hypothesis Number 3* (concerning the TCE and RBT integrative framework): All of the empirical patterns match and are within the range of the patterns predicted by the integrative framework of vertical integration. Moreover, all the predicted modes of governance match the empirical modes of governance. Therefore, these results support the Hypothesis Number 3; and

- *Hypothesis Number 4* (concerning the make decision in a supply chain): In the supply chain in this case study, both transaction costs (specifically, TCE) and production costs are important determinants of the make decision. The importance of transaction costs is evidenced by the presence of a Level 4a activity (generic DDC maintenance) and the importance of production costs is demonstrated by the identification of Level 2 activities (operations management and preventive maintenance), a Level 3 activity (general maintenance) and a Level 5 activity (preventive maintenance). Therefore, these results contradict Hypothesis Number 4.

6.3.2 Hypotheses concerning the nature of the exchange relationship decision

6.3.2.1   Empirical and predicted patterns

Table 6.4 summarises the empirical patterns for the nature of the exchange relationship decisions in Case Study 1. Again, these empirical patterns are based on interpreting the principal items in accordance with the guidelines in Appendix 13 and presented using the results template matrix concerning the nature of the exchange relationship decision (explained and illustrated by Table 5.15). Each of the empirical patterns of TCE variables and RDT variables in Table 6.4 are matched with the theoretical predicted patterns shown in Figure 4.5. Where a relational exchange relationship is observed, then the corresponding predicted pattern can be identified readily from Figure 4.5. However, where a discrete exchange relationship is observed, it is necessary to refer to the clarifying items in Table 6.5 in order to establish whether this exchange is an efficient exchange (competitive prices and absence of credible threats) or an inefficient exchange (uncompetitive prices and credible threats). Where only credible threats exist, then this is still taken as an inefficient exchange as other factors may be causing high prices (including a lack of supply). Having established whether a discrete exchange is efficient or inefficient, the corresponding predicted pattern can then be identified from Figure 4.5.

With regard to establishing whether the one external exchange (Operations Manager on MSC) is efficient or inefficient, the clarifying items in Table 6.5 indicate that this exchange is efficient, on the basis that low prices prevail and there is an absence of credible threats. Moreover, the

clarifying items substantially confirm the expectation that all of the four internal exchanges are efficient, on the basis that there is an absence of credible threats in all of these exchanges and three of these internal exchanges display a moderate to a low level of pay.

The validity of the empirical patterns in Table 6.4 is checked by reviewing the corroborating items listed in Appendix 8 and summarised in Table 6.5. The first two corroborating items concerning the nature of the exchange supports the varying levels of relational exchange across the four internal exchanges. That is, the CM has not provided any training to its external appointed Operations Manager nor General Maintenance technical staff and provides only minimal ongoing training to its General Maintenance technical staff, such that these exchanges are less relational than those between the MSC and its technical staff – having typically provided four years of training to at least ten percent of its staff, along with a five to ten days per annum ongoing training commitment to its technical staff. The third corroborating item is only applicable to the external relationship between the CM and MSC. The tendency to renew the contract is consistent with an efficient exchange. In so far as, the prospect of future work acts as a check against hold-up and obviates the need for costly credible threats. The final corroborating item is only applicable to the external relationship between the CM and MSC. Here, the CM does not invest in any training of the external firm and this is consistent with a discrete relationship.

The two corroborating items concerning the Ongoing Asset Specificity (TCE) variable support the varying levels of relational exchange across the four internal exchanges. That is, the CM requires 1 to 1.5 years experience when considering a new Operations Manager or General Maintenance staff, in contrast to four years experience required by the MSC in respect of new technical staff. This difference in this required experience is consistent with the higher score on the Ongoing Asset Specificity (TCE) variable given by the MSC that indicates a shortage of potential recruits. Moreover, the reliance of the MSC firm on external recruitment (as opposed to internal training) may well have contributed to the shortage of technical recruits and exacerbates the effect of this shortage on internal relationships. Finally, the results for corroborating item relating to the Few Alternatives (RDT) variable shows that the buyer is mainly willing to consider more than one source and this is consistent with the low scores – representing the buyer,

on this variable in Table 6.4. Here, the validity of the empirical patterns in Table 6.4 is further checked by a review of the other information generated from the interviews and documents pertaining to the case study that is summarised in Table 6.6. With regard to the Centre Manager on the Operations Manager, the comment concerning the firm's ability to develop Operations Managers into full competence is consistent with the low scores from this buyer on the Few Alternatives (RDT) variable in Table 6.4. Also with regard to this relationship, the view expressed that the firm is successful in retaining staff is consistent with the existence of a relational exchange with the Operations Manager shown in Table 6.4.

With regard to the exchange between the MSC and its air conditioning staff, the comment that indicates that the activity is less objectively measured than when assessing technical performance supports a higher score on the Endogenous Uncertainty (TCE) variable than the Exogenous Uncertainty (TCE) variable. In terms of the exchange between the MSC and both its air conditioning and DDC technical staff, the standard letter of appointment is consistent with the extremely high scores given in respect of the Mutuality (Exchange Relationship) variable item. That is, the standard appointment letter is not prescriptive on performance requirements and contains only key performance indicators. The comment concerning the "skills shortage" confirms the very high scores given for the Ongoing Asset Specificity (TCE) variable that seeks to capture skills acquisition including the scarcity of human resources. Finally, the comment that indicates that the MSC would be proactive in finding solutions to a staff problem is consistent with the low scores representing the buyer on the Criticality (RDT) variable.

Table 6.4: Case Study 1: Exchange relationship empirical and predicted patterns

Decision Maker on Exchange / Case Study Version (V) of qnr	TCE Asset Specific	TCE Uncertain	TCE Freq'	RDT Crit' (B,S)	RDT Mag' of Exchange (B,S)	RDT Lack of Discret' (B,S)	RDT Few Alt' (B,S)	RDT Mean	Nature of Exchange
CM'er on OM'er – V1 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 6-9 mths,5 OAS: 4,4 +/++ +	X: 1,2,2,2,3 M=2 N: 3,2 M=2.5 **0** **0/+++**	1 FTE **+** **+/+++**	1, 4	1, 7	2, 6	2, 3	M (B)=1.5 M (S)=5 **B<S Low** **B=S High**	6,5,5,7,2,5 M=5 Internal Relational
OM'er on GM t-staff – V2 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 3-6 mths,5 OAS:3,3 + +	X: 1,2,3,1,1 M=1.6 N: 1,1 M=1 **0** **0/+++**	2 FTE **+** **+/+++**	1,4	1,7	1,3	2,2	M (B)=1.3 M (S)=4 **B<S Low** **B=S High**	7,3,5,5,5,7 M=5 Internal Relational
OM'er on MSC – V2 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 16 days,3 OAS:NA **0** **0**	X: 1,2,3,1,3 M=2 N: NA **0** **0/+++**	0.7 FTE **0** **0/+**	1,4	5,3	1,3	2,1	M (B)=2.3 M (S)=2.8 **B=S Low** **B=S Low**	5,4,3,3,3,1 M=3.2 External Discrete - Efficient
SM'er on ACM t-staff – V4 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 3 days,3 OAS: 6,6 M=6 ++ ++	X: 2,2,2,1,3 M=2 N: 5,6 M=5.5 +/++ **0/+++**	20 FTE **+++** **+/+++**	2,4	1,7	3,3	2,3	M (B)=4 M (S)=4.3 **B=S Low** **B=S V High**	7,7,7,6,4,7 M=6.3 Internal Very Relational
SM'er on DDC t-staff – V4 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 2 days,3 OAS: 6,6 M=6 ++ ++	X: 5,6,6,5,6 M=5.6 N: 5,6 M=5.5 +/++ **0/+++**	1 to 5 FTE **+** **+/+++**	2,4	1,7	3,3	2,3	M (B)=4 M (S)=4.3 **B=S Low** **B=S V High**	6,7,7,6,4,7 M=6.2 Internal Very Relational

Key: As Table 6.1, plus:
M   *= Mean*
HAS, OAS   *= Human Asset Specificity, Ongoing Asset Specificity*
X, N   *= Exogenous Uncertainty, Endogenous Uncertainty*
B, S   *= Buyer, Supplier*
V High   *= Very High*
GM t-staff   *= General Maintenance technical staff*
MSC   *= Mechanical Services Contractor*
ACM t-staff   *= Air Conditioning Maintenance technical staff*
DDC t-staff   *= Direct digital Controls technical staff*

Table 6.5: Case Study 1: Exchange relationship clarifying and corroborating items

Decision Maker on Exchange & Case Study Version (V) of Questionnaire	TCE: Asset Specificity (OAS)	RDT: Few Alternatives	Nature of the Exchange
	Corroborating Item 1 (V1,2,4,5): Minimum experience required by resource (Years) Item 2 (All Vs): In-house trained versus externally recruited	*Corroborating* Item 1: Number of alternatives considered out of five possible other sources	*Clarifying* Item 1 (All Vs): level of pay/price (7-point) Item 2 (All Vs): Use of negatives measures (credible threats) (Yes/No) *Corroborating* Item 1 (V1,2,4,5): Training to reach full competence (Years) Item 2 (V1,2,4,5): Ongoing training once fully competent (Days per annum) Item 3 (V2,3): Renewal of fixed term contract (Yes/No) Item 4 (V2,3,4,6): Investment in training external firm (Yes/No)
CM'er on OM'er – V1	Item 1: 1.5 Item 2: Externally recruited	Item 1: 3	*Clarifying* Item 1: 5 Item 2: No *Corroborating* Item 1: None – external appointee Item 2: Not answered Item 3: Not applicable (ongoing) Item 4: Not applicable
OM'er on GM t-staff – V2	Item 1: 1 Item 2: Externally recruited	Item 1: 2	*Clarifying* Item 1: 3 Item 2: No *Corroborating* Item 1: None – external appointees Item 2: "Minimal" Item 3: Not applicable (ongoing) Item 4: Not applicable
OM'er on MSC – V2	Item 1: Not answered Item 2: Not applicable	Item 1: 1	*Clarifying* Item 1: 3 Item 2: No *Corroborating* Item 1: Not applicable Item 2: Not applicable Item 3: Yes Item 4: No
SM'er on ACM t-staff – V4	Item 1: 4 plus Item 2: 10% in-house trained and 90% externally recruited	Item 1: 3	*Clarifying* Item 1: 3 Item 2: No *Corroborating* Item 1: 4 Item 2: 5 Item 3: Not applicable (ongoing) Item 4: Not applicable
SM'er on DDC t-staff – V4	Item 1: 4 plus Item 2: 10% in-house trained and 90% externally recruited	Item 1: 3	*Clarifying* Item 1: 4 Item 2: No *Corroborating* Item 1: 4 Item 2: 10 Item 3: Not applicable (ongoing) Item 4: Not applicable

Key: As Table 6.4

Table 6.6: Case Study 1: Exchange relationship information from interviews and documents

Decision Maker on Exchange	Variable
Centre Manager on Operations Manager	• TCE/OAS: *"Firm has ability to develop and mould Operations managers into full competence"* (Source: Interview with Centre Manager) • RDT/Criticality: As an elaboration on the moderate score concerning tolerance displayed by Operations Manager seeking to improve unsatisfactory pay/working conditions: *"Reflects firm's success in keeping staff"* (Source: Interview with Centre Manager)
Operations Manager on General Maintenance technical staff	• No further information provided
Operations Manager on MSC	• No further information provided
Service Manager on Air Conditioning technical staff	• Exchange Relationship/Mutuality: Standard appointment letter from MSC to service technician expresses responsibilities in key terms only (Source: Document from MSC):*"Carry out routine maintenance to the mechanical service equipment at various sites; Carry out fault finding of HVAC systems; Perform after hours callout duties on a rotating roster system; Complete the planned maintenance task sheets and all associated paperwork neatly, correctly and on time; Carry out works as directed by the Service; Work safely and unsupervised; Conduct oneself in a professional manner at all times; Be aware of work place health and safety issues; and Assist with training of apprentices during your day-to-day schedule"* • Exchange Relationship/Mutuality: Standard appointment letter from MSC to service technician expresses performance measures in broad terms only (Source: Document from MSC): *"Completion and correctness of paperwork / reports; Completion of maintenance / repairs on time and within the allocated hours; Client satisfaction; Ability to work unsupervised; Rate of call back / warranty repairs; and Attitude to customers and staff"* • TCE/OAS: "Skills shortage and difficulty in finding right staff" (Source: Interview with Service Manager) • TCE/Endogenous Uncertainty: *"Service is more than technical including customer relations"* (Source: Interview with Service Manager) • RDT/Criticality: *"Most of staff settled and would try to find solution to their problem"* (Source: Interview with Service Manager)
Service Manager on DDC technical staff	• Exchange Relationship/Mutuality: Standard appointment letter from MSC to service technician expresses responsibilities in key terms only (Source: Document from MSC): See Service Manager on Air Conditioning technical staff • Exchange Relationship/Mutuality: Standard appointment letter from MSC to service technician expresses performance measures in broad terms only (Source: Document from MSC): See Service Manager on Air Conditioning technical staff • TCE/OAS: "Skills shortage and difficulty in finding right staff" (Source: Interview with Service Manager) • TCE/Endogenous Uncertainty: *"Service is more than technical including customer relations"* (Source: Interview with Service Manager) • RDT/Criticality: *"Most of staff settled and would try to find solution to their problem"* (Source: Interview with Service Manager)

6.3.2.2   Pattern matching and hypotheses testing

Having established empirical patterns and corresponding predicted patterns (in Table 6.4), as well as having checked the validity of the empirical patterns (using information from Table 6.5 and 6.6) the match or mismatch between the empirical patterns and the predicted patterns in Table 6.4

is now considered - in order to determine the extent to which data from this case study supports or contradicts the following hypotheses (detailed in Section 2.4.1):

- *Hypothesis Number 5* (concerning TCE): All of the empirical patterns match and are within the range of the TCE predicted patterns and, therefore, these results support this hypothesis;

- *Hypothesis Number 6* (concerning RDT): The one external exchange does match the RDT predicted pattern, whilst the other four internal exchanges do not match the RDT predicted patterns. Generally, the low buyer and supplier scores indicating a low level of mutual dependency - when high scores representing a high level of mutual dependency are predicted in relational exchanges, is a common discrepancy in each of the four mismatches. Therefore, these results mainly contradict this hypothesis; and

- *Hypothesis Number 7* (concerning a supply chain): In this case study there is one external relationship – between the CM and MSC that is a discrete and efficient exchange. This exchange is inconsistent with the upstream very relational exchanges with technical staff in the MSC. Therefore, these results contradict this hypothesis.

6.4 CASE STUDY 1A

6.4.1 Hypotheses concerning the make-or-buy decision

6.4.1.1 Empirical and predicted patterns

Table 6.7 summarises the empirical patterns for the make-or-buy decisions in Case Study 1A. As explained in Section 6.2, the same approach and format is used to present the data in all the case studies.

The validity of the empirical patterns in Table 6.7 is checked by reviewing the corroborating items listed in Appendix 8 and which are summarised in Table 6.8. The two items pertaining to the Frequency (TCE) variable are applicable to the three internalised activities (operations management; general maintenance; and preventive maintenance). All respondents noted that internal human resources are working between 37.5 and 40 hours per week and either very busy or extremely busy. These results support the Appendix 13 guidelines that interpreted the

employment of one FTE staff at a high (+) frequency level. That is, the results show that there is sufficient demand to provide a continuous flow of work to each FTE staff. There are no results to report in terms of the one RBT corroborating item.

The validity of the empirical patterns in Table 6.7 is further checked by a review of the other information generated from the interviews and documents pertaining to the case study that is summarised in Table 6.9. With regard to the Centre Manager on operations management, a significant proportion (30 percent) of the GLAR of this very large retail centre is made-up with speciality shops. As previously mentioned, self-contained retail outlets create internal divisions in floor space and complicate the air conditioning and other services to the common space. Such a complex internal layout is consistent with the results that indicate a high (six month) period of time to reach full performance in terms of operations management and which represent the Human Asset Specificity (TCE) variable. The CM's homepage/website notes that asset management (which would include operations management) is part of this highly integrated firm and this is consistent with the very high (++) scores given on the Value (RBT) variable.

In terms of the Operations Manager on general maintenance, again, the complex internal layout is consistent with the results that indicate a high (six month) period of time to reach full performance in terms of general maintenance staff - representing the Human Asset Specificity (TCE) variable. The Operations Manager's comments relating to the "eyes and ears" role of General Maintenance staff, along with their level of response and passion corresponds with a high (+) score given on the Value (RBT) variable. With regard to preventive maintenance, the Operation Manager explains the negative scores on the Value (RBT) variable in terms of having to provide the same level of cover all year, including training and recruitment costs.

With regard to the Service Manager on preventive maintenance, the heavy-all year round workload that is mentioned is consistent with the extremely high (+++) score on the Frequency (TCE) variable. Moreover, this firm's proprietary knowledge of chillers and its large size supports the very high (++) scores on the Rarity (RBT) variable.

Finally, with respect to the Service Manager on specific DDC maintenance, the lack of choice in subcontracting this work is due to the monopoly position enjoyed by the DDC firm (by virtue of the DDC firm's system already installed in the retail centre) and the inability of MSC to conduct this activity in-house. This supports the capability explanation provided by RBT. This manager also notes the critical interface between the DDC system and air conditioning system and this is consistent with the extremely (+++) scores given for the Temporal Asset Specificity (TCE) variable. In noting that very few firms own and maintain their own highly specific DDC system, this manager supports his scores on the Rarity (RBT) variable.

Table 6.7: Case Study 1A: Make-or-buy empirical and predicted patterns

Decision Maker on Activity & Version (V) of Case Study Questionnaire	TCE Asset Specific	TCE Uncertain (Exogenous)	TCE Frequent	RBT Value	RBT Rarity	RBT Costly to Imitate	Mode of Governance & Level (L)
CM'er on OM'mt-V1							
- Empirical pattern	HAS:	1,2,3,2,2	1 FTE	7,5	5,6	6,3	Internalised
- Empirical summary	6 mths,2	M=2		M=	M=	M=4.5	
of pattern and mode:	**0/+**	**0**	**+**	**++**	**+/++**	**0/+**	
- Conventional							
predicted pattern:	**+/+++**	**+/+++**	**+/+++**	**+/+++**	**0/+++**	**0/+++**	
- Integrated predicted							
pattern & assigned							
level & mode:	**0/+++**	**0/+**	**+/+++**	**++**	**+/++**	**0**	L2 and Internal
OM'er on GM'ce-V2							
- Empirical pattern	HAS:	2,2,2,2,2	4 FTE	5,5	1,1	1,4	Internalised
- Empirical summary	6 mths,6	M=2		M=5	M=1	M=2.5	
of pattern and mode:	**+/++**	**0**	**+**	**+**	**0**	**0**	
- Conventional							
predicted pattern:	**+/+++**	**+/+++**	**+/+++**	**+/+++**	**0/+++**	**0/+++**	
- Integrated predicted							
pattern & assigned							
level & mode:	**0/+++**	**0**	**+/+++**	**+**	**0**	**0**	L3 and Internal
OM'er on PM'ce-V2							
- Empirical pattern	HAS:	2,2,2,2,4	1 FTE	3,2	4,6	5,4	Externalised
- Empirical summary	3 mths,5	M=2.4		M=2.5	M=5	M=4.5	
of pattern and mode:	**+**	**0**	**+**	**- / - -**	**+**	**0/+**	
- Conventional							
predicted pattern:	**0/+**	**0/+**	**0**	**- / - - -**	**0/+++**	**0/+++**	
- Integrated predicted							
pattern & assigned							
level & mode:	**0/+++**	**0/+++**	**0/+**	**- -**	**+/++**	**0**	L6 and External
SM'er on PM'ce-V4							
- Empirical pattern	HAS:	3,3,4,3,3	40 FTE	6,6	6,6	4,3	Internalised
- Empirical summary	1.5 mths, 5	M=3.2		M=6	M=6	M=3.5	
of pattern and mode:	**+**	**0**	**+++**	**++**	**++**	**0**	
- Conventional							
predicted pattern:	**+/+++**	**+/+++**	**+/+++**	**+/+++**	**0/+++**	**0/+++**	
- Integrated predicted							
pattern & assigned							
level & mode:	**0/+++**	**0/+**	**+/+++**	**++**	**+/++**	**0**	L2 and Internal
SM'er on Specific DDCM'ce-V4							Externalised
- Empirical pattern	TAS: 7,7	6,6,7,6,7	.03 FTE	1,2	7,7	7,5	
- Empirical summary	M=7	M=6.4		M=1.5	M=7	M=6	
of pattern and mode:	**+++**	**++**	**0**	**- - / - - -**	**+++**	**++**	
- Conventional							
predicted pattern:	**0/+**	**0/+**	**0**	**- / - - -**	**0/+++**	**0/+++**	
- Integrated predicted							
pattern & assigned							
level & mode:	**0/+++**	**0/+++**	**0/+**	**- - -**	**+/+++**	**+/+++**	L7 and External

Key:
M   = *Mean*
Mths, HAS, TAS = *Months, Human Asset Specificity, Temporal Asset Specificity*
FTE   = *Full-Time Equivalent*
CM'er   = *Centre Manager (internal to CM)*
OM'mt   = *Operations Management*
OM'er   = *Operations Manager (internal to CM)*
GM'ce   = *General Maintenance*
PM'ce   = *Preventative Maintenance*
SM'er   = *Service Manager (internal to MSC)*
DDCM'ce   = *Direct Digital Controls Maintenance*

Table 6.8: Case Study 1A: Make-or-buy corroborating items

Decision Maker on Activity & Version (V) of Case Study Questionnaire	TCE: Frequency Item 1 (V1,2,4,5): Hours per week worked by internal human resource (Hours) Item 2 (V1,2,4,5): How busy internal resource (7-point)	RBT: Rarity Item 1 (V2,3,4,6): Minimum experience required by external firm (Years)
CM'er on OM'mt - V1	Item 1: 37.5; Item 2: 6	Item 1: Not applicable
OM'er on GM'ce - V2	Item 1: 38; Item 2: 7	Item 1: Not applicable
OM'er on PM'ce - V2	Item 1: Not applicable; Item 2: Not applicable	Item 1: Not answered
SM'er on PM'ce - V4	Item 1: 40 ; Item 2: 7	Item 1: Not applicable
SM'er on Specific DDCM'ce - V4	Item 1: Not applicable; Item 2: Not applicable	Item 1: No answered

Key: As per Table 6.7

Table 6.9: Case Study 1A: Make-or-buy information from interviews and documents

Decision Maker on Activity	Variable
Centre Manager on operations management	• TCE/HAS: Total area of specialties in centre - approximately 30,000m^2 on 3 levels and approximately 30% of GLAR (Source: PCA, 2005) • RBT/Value: *"The group (CM) is an internally managed, vertically integrated retail group, undertaking ownership, development, design, construction and asset management, property management and leasing..."* (Source: CM's homepage/website)
Operations Manager on general maintenance	• TCE/HAS: Total area of specialties in centre - approximately 30,000m^2 on 3 levels and approximately 30% of GLAR (Source: PCA, 2005) • RBT/Value: *"These (General Maintenance) staff are Operations Manager's eyes and ears"* (Source: Interview with Operations Manager) • RBT/Value: *"Response is important and passion"* (Source: Interview with Operations Manager)
Operations Manager on preventive maintenance	• RBT/Value: *"If had to provide same level of cover all year, including training/recruitment etc"* (Source: Interview with OM'er)
Service Manager on preventive maintenance	• TCE/Frequency*: "Have a heavy workload all year round"* (Source: Interview with Service Manager) • RBT/Rarity: *"Reflects proprietary knowledge of chillers etc"* (Source: Interview with Service Manager) • RBT/Rarity: *"Not many firms as large as MSC"* (Source: Interview with Service Manager)
Service Manager on specific DDC maintenance	• Make-or-buy decision: *"Where ever possible generic systems in-house – with no choice but to subcontract inaccessible work associated with highly proprietary systems"* and *"Practically impossible to switch to in-house due to highly proprietary software"* (Source: Interview with Service Manager) • TCE/TAS: *"Critical interface between DDC and air conditioning system"* (Source: Interview with Service Manager) • RBT/Rarity: *"Very few firms that own and maintain their own highly specific DDC system"* (Source: Interview with Service Manager)

6.4.1.2   Pattern matching and hypotheses testing

Having established empirical patterns and corresponding predicted patterns (in Table 6.7), as well as having checked the validity of the empirical patterns (using information from Table 6.8 and Table 6.9) the match or mismatch between the empirical patterns and the predicted patterns in Table 6.7 is now considered - in order to determine the extent to which data in this case study supports or contradicts the following hypotheses (detailed in Section 2.4.1):

- *Hypothesis Number 1* (concerning the conventional approach to TCE): One of the empirical patterns matches the conventional TCE predicted pattern (specific DDC maintenance). A discrepancy between the empirical score on the Uncertainty variable with the score for the Uncertainty variable conventionally predicted by TCE appears in the three internalised activities. In the other externalised activity – concerning preventive maintenance, a difference between the empirical score on the Frequency variable with the score for this variable conventionally predicted by TCE is apparent. Therefore, these results mainly contradict Hypothesis Number 1;

- *Hypothesis Number 2* (concerning the conventional approach to RBT): All of the empirical patterns match the conventional RBT predicted patterns. Therefore, these results support Hypothesis Number 2;

- *Hypothesis Number 3* (concerning the TCE and RBT integrative framework): Three of the empirical patterns, general maintenance, preventative maintenance (internalised) and specific DDC maintenance match and are within the range of the patterns predicted by the integrative framework of vertical integration. In the other two activities, operations management and preventative maintenance (externalised), the empirical patterns match the patterns predicted by the integrative framework of vertical integration with the empirical Costly to Imitate (RBT) variable at the boundary of that predicted. Moreover, all the predicted modes of governance match the empirical modes of governance. Therefore, these results support the Hypothesis Number 3; and

- *Hypothesis Number 4* (concerning the make decision in a supply chain): In the supply chain to this case study, transaction costs do not feature as a dominant determinant of the make decision in any of the internalised activities. Therefore, production costs are the important

determinants of the make decision in this supply chain - demonstrated by the identification of two Level 2 activities (operations management and preventative maintenance) and a Level 3 activity (general maintenance). Therefore, these results support Hypothesis Number 4.

6.4.2 Hypotheses concerning the nature of the exchange relationship decision

6.4.2.1   Empirical and predicted patterns

Table 6.10 summarises the empirical patterns for the nature of the exchange relationship decisions in Case Study 1A.

With regard to establishing whether the one entirely discrete external exchange is efficient or inefficient, the clarifying items in Table 6.11 indicate that this exchange is inefficient on the basis that extremely high prices prevail and MSC will refer problems concerning the DDC subcontractor directly to the client –as a credible threat. Moreover, the clarifying items substantially confirm the expectation that all of the three other internal exchanges are efficient, on the basis that there is an absence of credible threats in all of these exchanges.

The validity of the empirical patterns in Table 6.10 is checked by reviewing the corroborating items listed in Appendix 8 and which are summarised in Table 6.11. The first two corroborating items concerning the nature of the exchange supports the varying level of relational exchange across the three internal exchanges. That is, although the CM has provided training to its Operations Manager, the MSC has provided twice the length of training (four years) to allow a proportion of its technical staff to reach full competence. The third corroborating item is only applicable to the external relationship between the CM and MSC. The tendency to renew the contract is consistent with an efficient exchange. In so far as, the prospect of future work acts as a check against hold-up and obviates the need for costly credible threats. The final corroborating item is only applicable to the external relationship between the CM and MSC. Here, the CM does extend some minimal investment in training to the external firm – in terms of induction and ongoing orientation to policy and procedure. This is consistent with a relationship which lies between relational and discrete exchange.

The two corroborating items concerning the Ongoing Asset Specificity (TCE) variable, support the varying level of relational exchange across the three internal exchanges. That is, the CM requires two years experience when considering a new Operations Manager, in contrast to four (plus) years experience required by the MSC in respect of new technical staff. Moreover, the overall reliance of the MSC firm on external recruitment (as opposed to internal training) may well have contributed to the shortage of technical recruits and exacerbates the effect of this shortage on internal relationships. Finally, the results for corroborating items relating to the Few Alternatives (RDT) variable, shows the buyer is mainly willing to consider more than one source and this is consistent with the low scores – representing the buyer, on the Few Alternatives (RDT) variable in Table 6.10. This item is not applicable to the Service Manager on the DDC subcontractor, as the DDC subcontractor enjoys a monopoly position over rights to maintain its own system already installed in the centre.

The validity of the empirical patterns in Table 6.10 is further checked by a review of the other information generated from the interviews and documents pertaining to the case study that is summarised in Table 6.12. With regard to the Operations Manager on General Maintenance technical staff, the comment concerning the desire not to lose these staff is consistent with the high scores on the Solidarity (Nature of Exchange) variable.

With regard to the exchange between the MSC and its air conditioning staff, the comment which indicates that expectations ("goal posts") can change is consistent with the high scores on the Role Integrity (Nature of the Exchange) variable. The comment concerning staff developing customer relations is consistent with higher Endogenous Uncertainty (TCE) scores – reflecting the less objective nature of the performance of the staff in this regard. Finally, the comment in relation to the DDC subcontractor has been explained previously, in terms of the nature of this credible threat.

Table 6.10: Case Study 1A: Exchange relationship empirical and predicted patterns

Decision Maker on Exchange / Case Study Version (V) of qnr	TCE Asset Specific	TCE Uncertain	TCE Freq'	RDT Crit' (B,S)	RDT Mag' of Exchange (B,S)	RDT Lack of Discret' (B,S)	RDT Few Alt' (B,S)	RDT Mean	Nature of Exchange
CM'er on OM'er – V1 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 6 mths,2 OAS: 6,6 ++ +	X: 1,2,3,2,2 M=2 N: 4,1 M=2.5 0 0/+++	1 FTE + +/+++	2,1	3,7	6,6	5,2	M (B)=4 M (S)=4 B=S Low B=S High	6,7,5,2,2,6 M=4.7 Internal Relational
OM'er on GM t-staff – V2 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 6 mths,6 OAS: 5,5 +/++ ++	X: 2,2,2,2,2 M=2 N:2,2 M=2 0 0/+++	4 FTE + +/+++	3,7	1,7	3,3	1,1	M (B)=2 M (S)=4.5 B<S Low B=S V High	7,5,6,5,6,7 M=6 Internal Very Relational
OM'er on MSC – V2 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 3 mths,5 OAS:NA + 0/+	X: 2,2,2,2,4 M=2.4 N: NA 0 0/+++	1 FTE + 0/+	3,4	5,4	3,3	2,2	M (B)=3.3 M (S)=3.3 B=S Low B=S Low	6,3,5,3,3,3, M=3.8 External Relational/ Discrete - Efficient
SM'er on ACM t-staff – V4 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 1.5 mths,5 OAS: 6,5 M=5.5 +/++ ++	X: 3,3,4,3,3 M=3.2 N: 3,5 M= 4 0 0/+++	40FTE +++ +/+++	1,4	1,7	1,1	3,1	M (B)=1.5 M (S)=3.3 B<S Low B=S V High	7,7,6,6,2,7 M=5.8 Internal Very Relational
SM'er on DDC Subcontract – V4 - Empirical pattern - Empirical summary - Predicted pattern	TAS: 7,7 M=7 OAS: NA ++ ++	X: 6,6,7,6,7 M=6.4 N: NA +/++ +/+++	.03FTE 0 0	1,1	3,3	4,4	7,1	M (B)=3.8 M (S)=2.3 B>S Low B<S V High/ B>S V High	4,4,1,1,2,1 M=2.2 External Very Discrete - Inefficient

Key: As Table 6.1, plus:
M = Mean
HAS, TAS, OAS = Human Asset Specificity, Temporal Asset Specificity, Ongoing Asset Specificity
X, N = Exogenous Uncertainty, Endogenous Uncertainty
B, S = Buyer, Supplier
V High = Very High
GM t-staff = General Maintenance technical staff
MSC = Mechanical Services Contractor
ACM t-staff = Air Conditioning Maintenance technical staff
DDC t-staff = Direct digital Controls technical staff

Table 6.11: Case Study 1A: Exchange relationship clarifying and corroborating items

Decision Maker on Exchange & Case Study Version (V) of Questionnaire	TCE: Asset Specificity (OAS)	RDT: Few Alternatives	Nature of the Exchange
	Corroborating Item 1 (V1,2,4,5): Minimum experience required by resource (Years) Item 2 (All Vs): In-house trained versus externally recruited	*Corroborating* Item 1: Number of alternatives considered out of five possible other sources	*Clarifying* Item 1 (All Vs): level of pay/price (7-point) Item 2 (All Vs): Use of negatives measures (credible threats) (Yes/No) *Corroborating* Item 1 (V1,2,4,5): Training to reach full competence (Years) Item 2 (V1,2,4,5): Ongoing training once fully competent (Days per annum) Item 3 (V2,3): Renewal of fixed term contract (Yes/No) Item 4 (V2,3,6): Investment in training external firm (Yes/No)
CM'er on OM'er – V1	Item 1: 2 Item 2: In-house trained	Item 1: 4	*Clarifying* Item 1: 6 Item 2: No *Corroborating* Item 1: 2 Item 2: 20 Item 3: Not applicable (ongoing) Item 4: Not applicable
OM'er on GM t-staff – V2	Item 1: Not answered Item 2: Not answered	Item 1: Not answered	*Clarifying* Item 1: Not answered Item 2: No *Corroborating* Item 1: Not answered Item 2: Not answered Item 3: Not applicable (ongoing) Item 4: Not applicable
OM'er on MSC – V2	Item 1: Not answered Item 2: Not applicable	Item 1: Not answered	*Clarifying* Item 1: 4 Item 2: No *Corroborating* Item 1: Not applicable Item 2: Not applicable Item 3: Yes Item 4: Yes (Induction etc)
SM'er on ACM t-staff – V4	Item 1: 4 plus Item 2: 10% in-house trained and 90% externally recruited	Item 1: 3	*Clarifying* Item 1: 5 Item 2: No *Corroborating* Item 1: 4 Item 2: 10 Item 3: Not applicable (ongoing) Item 4: Not applicable
SM'er on DDC Subcontractor – V4	Item 1: Not answered Item 2: Not applicable	Item 1: Not applicable	*Clarifying* Item 1: 7 Item 2: Yes *Corroborating* Item 1: Not applicable Item 2: Not applicable Item 3: Not applicable (dependent on main contract being renewed) Item 4: Not applicable

Key: As per Table 6.10

Table 6.12: Case Study 1A: Exchange relationship information from interviews and documents

Decision Maker on Exchange	Variable
Centre Manager on Operations Manager	• No further information provided
Operations Manager on General Maintenance technical staff	• Exchange Relationship/Solidarity: *"Would try to take these staff to alternative centre"* (Source: Interview with Operations Manager)
Operations Manager on MSC	• No further information provided
Service Manager on Air Conditioning technical staff	• Exchange Relationship/Role Integrity: *"Goal posts can sometimes change"* (Source: Interview with Operations Manager) • TCE/OAS: *"Expectation that own staff go beyond technical issues into customer relations / sales etc"* Source: Interview with Service Manager)
Service Manager on DDC Subcontractor	• Exchange Relationship/Role Integrity: *"Expectations normally remain clear for DDC subcontractor in terms of their specification"* (Source: Interview with Operations Manager) • Exchange Relationship/Clarifying whether discrete exchange is efficient or inefficient: *"Will consider seeking assistance from client if problem with DDC subcontractor"* Source: Interview with Operations Manager)

6.4.2.2   Pattern matching and hypotheses testing

Having established empirical patterns and corresponding predicted patterns (in Table 6.10), as well as having checked the validity of the empirical patterns (using information from Table 6.11 and 6.12) the match or mismatch between the empirical patterns and the predicted patterns in Table 6.10 is now considered - in order to determine the extent to which data in this case study supports or contradicts the following hypotheses (detailed in Section 2.4.1):

- *Hypothesis Number 5* (concerning TCE): All of the empirical patterns match and are within the range of the TCE predicted patterns and, therefore, these results support this hypothesis;

- *Hypothesis Number 6* (concerning RDT): One of the external exchanges (between Operations Manager on MSC) matches the RDT predicted pattern, whilst the other three internal exchanges and one external exchange do not match the RDT predicted patterns. Generally, the low buyer and supplier scores indicating a low level of mutual dependency - when high scores representing a high level of mutual dependency are predicted in relational exchanges, is a common discrepancy in each of these four mismatches. Therefore, these results mainly contradict this hypothesis; and

- *Hypothesis Number 7* (concerning a supply chain): In this case study, there is one external relationship. This is the CM and MSC exchange that lies between a relational and a discrete

(efficient) exchange. This is not entirely inconsistent with the very relational exchange with technical staff within the MSC that is upstream of the CM. In contrast, this is inconsistent with the very discrete (inefficient) upstream relationship between the MSC and the DDC subcontractor. Therefore, these results contradict this hypothesis.

6.5 CASE STUDY 2

6.5.1 Hypotheses concerning the make-or-buy decision

6.5.1.1 Empirical and predicted patterns

Table 6.13 summarises the empirical patterns for the make-or-buy decisions in Case Study 2.

The validity of the empirical patterns in Table 6.13 is checked by reviewing the corroborating items listed in Appendix 8 and which are summarised in Table 6.14. The two items pertaining to TCE's frequency are applicable to the four internalised activities. All respondents noted that internal human resources are working between at least 40 hours per week and are all extremely busy. These results support the Appendix 13 guidelines that interpreted the employment of one FTE staff at a high frequency level. That is, the results show that there is sufficient demand to provide a continuous flow of work for each FTE staff. There are no results to report in terms of the one RBT corroborating item.

The validity of the empirical patterns in Table 6.13 is further checked by a review of the other information generated from the interviews and documents pertaining to the case study that is summarised in Table 6.15. With regard to the Centre Manager on operations management, a significant proportion (35 percent) of the GLAR of this medium sized retail centre is made-up with speciality shops. Again, as previously mentioned, self-contained retail outlets create internal divisions in floor space and complicate the air conditioning and other services to the common space. Such a complex internal layout is consistent with the results that indicate a high (three month) period of time to reach full performance in terms of operations management and which is represented by the Human Asset Specificity (TCE) variable. This period is also consistent with (less than) the two periods previously presented in the larger centres (Case Study 1 and Case

Study 1A). The CM's homepage/website notes that operations management is one of this firm's strengths and this is consistent with the moderate to high scores given on the Value (RBT) variable.

In terms of the Operations Manager on general maintenance, again, the complex internal layout is consistent with the results concerning the Human Asset Specificity (TCE) variable, although the 18 month period given is inconsistent with the periods given for the larger centres (Case Study 1 and Case Study 1A). In these larger centres, three to six months is given as the period of time to reach full performance in terms of general maintenance staff. With regard to both general maintenance and preventive maintenance, the Operation Manager advises the "cost effectiveness of his firm's procurement approach and, in doing so, confirms the importance production costs and the capability / competence approach in RBT. On preventive maintenance, the Operations Manager indicates that it is straightforward to identify tenderers for this work and this is consistent with the very low scores on the Rarity (RBT) variable.

Also with regard to preventive maintenance, and this time from the Service Manager's viewpoint, this manager's comment indicates his firm's capacity suits larger facilities and is consistent with the very high scores on the Rarity (RBT) variable. Finally, with regard to the Service Manager on specific DDC maintenance, the critical interface between air conditioning system performance and the DDC system, along with the substantial learning-by-doing involved with this firm's own specific DDC system accounts for the very high scores on the Temporal Asset Specificity (TCE) variable. However, the relatively low Exogenous Uncertainty (TCE) involved with this work (as the design development is controlled by this firm) and the core technology of the technical staff remains "fairly stable", undermines TCE as an explanation for the internalisation of this activity. In contrast, this manager emphasises the high rate of return from the internalisation of DDC maintenance and this is consistent with the RBT explanation and very high scores across all three of the RBT variables.

Table 6.13: Case Study 2: Make-or-buy empirical and predicted patterns

Decision Maker on Activity & Version (V) of Case Study Questionnaire	TCE Asset Specific	TCE Uncertain (Exogenous)	TCE Frequent	RBT Value	RBT Rarity	RBT Costly to Imitate	Mode of Governance & Level (L)
CM'er on OM'mt-V1 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 3 mths,5 + +/+++ 0/+++	1,2,2,2,3 M=2 **0** +/+++ **0**	1 FTE + +/+++ +/+++	5,4 M=4.5 **0/+** +/+++ +	5,3 M=4 **0** 0/+++ **0**	3,3 M=3 **0** 0/+++ **0**	Internalised L3 and Internal
OM'er on GM'ce-V2 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 18 mths,6 ++/+++ +/+++ 0/+++	1,2,3,2,1 M=1.8 **0** +/+++ **0**	1 FTE + +/+++ +/+++	5,5 M=5 + +/+++ +	1,2 M=1.5 **0** 0/+++ **0**	2,1 M=1.5 **0** 0/+++ **0**	Internalised L3 and Internal
OM'er on PM'ce-V2 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 3 days,3 **0** 0/+ **0**	1,2,2,2,3 M=2 **0** 0/+ **0**	0.03FTE **0** 0 **0**	3,3 M=3 **-** - / - - - **-**	1,2 M=1.5 **0** 0/+++ **0**	2,1 M=1.5 **0** 0/+++ **0**	Externalised L5 and External
SM'er on PM'ce-V5 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 1 day,2 + +/+++ 0/+++	1,2,2,1,3 M=1.8 **0** +/+++ **0/+**	30 FTE +++ +/+++ +/+++	6,6 M=6 ++ +/+++ ++	6,6 M=6 ++ 0/+++ +/++	3,3 M=3 **0** 0/+++ **0**	Internalised L2 and Internal
SM'er on Specific DDCM'ce-V5 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	TAS: 7,6 M=6.5 ++/+++ +/+++ +/+++	2,3,3,1,5 M=2.8 **0** +/+++ **0/+++**	15 FTE +++ +/+++ +/+++	6,6 M=6 ++ +/+++ +++	6,7 M=6.5 ++/+++ 0/+++ +/+++	7,6 M=6.5 ++/+++ 0/+++ +/+++	Internalised L1 and Internal

Key:
M = *Mean*
Mths, HAS, TAS = *Months, Human Asset Specificity, Temporal Asset Specificity*
FTE = *Full-Time Equivalent*
CM'er = *Centre Manager (internal to CM)*
OM'mt = *Operations Management*
OM'er = *Operations Manager (internal to CM)*
GM'ce = *General Maintenance*
PM'ce = *Preventative Maintenance*
SM'er = *Service Manager (internal to MSC)*
DDCM'ce = *Direct Digital Controls Maintenance*

Table 6.14: Case Study 2: Make-or-buy corroborating items

Decision Maker on Activity & Version (V) of Case Study Questionnaire	TCE: Frequency Item 1 (V1,2,4,5): Hours per week worked by internal human resource (Hours) Item 2 (V1,2,4,5): How busy internal resource (7-point)	RBT: Rarity Item 1 (V2,3,4,6): Minimum experience required by external firm (Years)
CM'er on OM'mt - V1	Item 1: 40 plus; Item 2: 7	Item 1: Not applicable
OM'er on GM'ce - V2	Item 1: 40; Item 2: 7	Item 1: Not applicable
OM'er on PM'ce - V2	Item 1: Not applicable; Item 2: Not applicable	Item 1: Not answered
SM'er on PM'ce – V5	Item 1: 40; Item 2: 7	Item 1: Not applicable
SM'er on Specific DDCM'ce – V5	Item 1: 40; Item 2: 7	Item 1: Not applicable

Key: As per Table 6.13

Table 6.15: Case Study 2: Make-or-buy information from interviews and documents

Decision Maker on Activity	Variable
Centre Manager on operations management	• TCE/HAS: Total area of specialties in centre - approximately $15,000m^2$ on 1 level and approximately 35% of GLAR (Source: PCA, 2005) • RBT/Value: *"Our strengths in terms of knowledge base and capacity include: Asset management and development; Operations and risk management; Leasing; Marketing; Information technology; and Financial management"*. (Source: CM's homepage/website)
Operations Management on general maintenance	• TCE/HAS: Total area of specialties in centre - approximately $15,000m^2$ on 1 level and approximately 35% of GLAR (Source: PCA, 2005) • RBT/Value: *"More cost effective to have at least one general maintenance staff and outsource air conditioning maintenance"* (Source: Interview with Operations Manager)
Operations Management on preventive maintenance	• RBT/Value: *"More cost effective to have at least one general maintenance staff and outsource air conditioning maintenance"*. (Source: Interview with Operations Manager) • RBV/Rarity: *"Not a problem to construct list of tenderers for Air conditioning work"* (Source: Interview with Operations Manager)
Service Manager on preventive maintenance	• RBT/ Rarity: *"Target the big end of town, there being not many large air conditioning firms like (this MSC) and very few specialist DDC firms like (this MSC/CC)"* (Source: Interview with Service Manager)
Service Manager on specific DDC maintenance	• TCE/TAS: *"Critical interface between DDC and AC"* and *"Based on substantial learning by doing involved in new software / products"* (Source: Interview with Service Manager) • TCE/Uncertainty: "*Core is electrical and so fairly stable*" (Source: Interview with Service Manager) • RBT/Value: *"Although DDC work is not as profitable (in terms of total dollars) as general air conditioning work, it has a higher percentage return / profit margin and given the strong relationship between DC work and general air conditioning work (i.e. each can generate new work for the other), then best to approximately score them equally"* (Source: Interview with Service Manager) • RBT/Costly to Imitate: *"Difference in learning by doing between air conditioning staff and DDC staff"* (Source: Interview with Service Manager)

6.5.1.2   Pattern matching and hypotheses testing

Having established empirical patterns and corresponding predicted patterns (in Table 6.13), as well as having checked the validity of the empirical patterns (using information from Table 6.14 and Table 6.15) the match or mismatch between the empirical patterns and the predicted patterns in Table 6.13 is now considered - in order to determine the extent to which data in this case study supports or contradicts the following hypotheses (detailed in Section 2.4.1):

- *Hypothesis Number 1* (concerning the conventional approach TCE): The one externalised empirical pattern matches the conventional TCE predicted pattern. However, none of the four internalised empirical patterns match the conventional TCE predicted patterns. A discrepancy between the empirical score on the Uncertainty variable with the score for this variable conventionally predicted by TCE is common across the four internalised activities. Therefore, these results mainly contradict Hypothesis Number 1;

- *Hypothesis Number 2* (concerning the conventional approach RBT): All the empirical patterns match the conventional RBT predicted patterns. Therefore, these results support Hypothesis Number 2;

- *Hypothesis Number 3* (concerning the TCE and RBT integrative framework): Three of the empirical patterns, general maintenance, preventative maintenance (externalised) and preventative maintenance (internalised) match and are within the range of the patterns predicted by the integrative framework of vertical integration. In the other two activities operations management and specific DDC maintenance, the empirical patterns match the patterns predicted by the integrative framework of vertical integration with the empirical Value (RBT) variable at the boundaries of that predicted. Moreover, all the predicted modes of governance match the empirical modes of governance. Therefore, these results support the Hypothesis Number 3; and

- *Hypothesis Number 4* (concerning the make decision in a supply chain): In the supply chain to this case study, transaction costs do not feature as the dominant determinants of the make decision in any of the internalised activities. Therefore, production costs are the important determinants of the make decision in this supply chain - demonstrated by the identification of one Level 1 activity and one Level 2 activity (specific DDC maintenance and preventive

maintenance), as well as two Level 3 activities (operations management and general maintenance). Therefore, these results support Hypothesis Number 4.

6.5.2 Hypotheses concerning the nature of the exchange relationship decision

6.5.2.1   Empirical and predicted patterns

Table 6.16 summarises the empirical patterns for the nature of the exchange relationship decisions in Case Study 2.

With regard to establishing whether the one discrete external exchange is efficient or inefficient, the clarifying items in Table 6.17 indicate that this exchange is efficient on the basis that moderate prices prevail and there is an absence of credible threats. Moreover, the clarifying items substantially confirm the expectation that all of the four other internal exchanges are efficient, on the basis that there is an absence of credible threats in all of these exchanges.

The validity of the empirical patterns in Table 6.16 is checked by reviewing the corroborating items listed in Appendix 8 and which are also summarised in Table 6.17. There are only results for the first two corroborating items concerning the internal exchange with technical staff in the MSC. The high level of training is consistent with a very relational exchange with these staff. The third corroborating item is only applicable to the external exchange between the CM and MSC. The tendency to renew the contract is consistent with an efficient exchange. In so far as, the prospect of future work acts as a check against hold-up and obviates the need for costly credible threats. The final corroborating item is again only applicable to the external exchange between the CM and MSC. Here, the CM does not provide any training of the external firm and this is consistent with a discrete exchange.

The two corroborating items concerning the Ongoing Asset Specificity (TCE) variable, support the varying levels of relational exchange across the four internal exchanges. That is, the CM requires one to two years experience when considering a new Operations Manager or General maintenance staff, in contrast to six years experience required by the MSC in respect of new

technical staff. Moreover, the overall reliance of the MSC firm on external recruitment (as opposed to internal training) may well have contributed to the shortage of technical recruits and exacerbates the effect of this shortage on internal relationships. Finally, the results for corroborating items relating to the Few Alternatives (RDT) variable, shows the buyer is mainly willing to consider more than one source and this is consistent with the corresponding low scores – representing the buyer, on the Few Alternatives (RDT) variable in Table 6.16.

The validity of the empirical patterns in Table 6.16 is further checked by a review of the other information generated from the interviews and documents pertaining to the case study that is summarised in Table 6.18. With regard to the Centre Manager on the Operations Manager, the information concerning the desire not to lose these staff is consistent with the high scores on the Solidarity (Nature of the Exchange) variable.

In terms of the Operations Manager on General Maintenance staff, the comment that indicates the task of creating and maintaining relationships is consistent with the very high scores on the Role Integrity (Nature of the Exchange) variable. Furthermore, this manager's comment that air conditioning is the second ranked contract, is consistent with a very high score on the Magnitude of Exchange (RDT) variable. With respect to the exchange between the MSC and its air conditioning staff and DDC staff, the comment concerning the "increasing importance of customer relations" explains the higher scores given for the Endogenous Uncertainty (TCE) variable than those scores provided on the Exogenous Uncertainty (TCE) variable. Finally, the comments in relation to the "on-the-job learning" required as part of maintaining this firm's own specific DDC system explains the extremely high Ongoing Asset Specificity (TCE) variable score and the very high Few Alternatives (RDT) variable score.

Table 6.16: Case Study 2: Exchange relationship empirical and predicted patterns

Decision Maker on Exchange / Case Study Version (V) of qnr	TCE Asset Specific	TCE Uncertain	TCE Freq'	RDT Crit' (B,S)	RDT Mag' of Exchange (B,S)	RDT Lack of Discret' (B,S)	RDT Few Alt' (B,S)	RDT Mean	Nature of Exchange
CM'er on OM'er – V1 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 3 mths,5 OAS: 4,4 + +	X: 1,2,2,2,3 M=2 N: 3,3 M=3 **0** **0/+++**	1 FTE + +/+++	1,4	1,7	2,3	2,2	M (B)=1.5 M (S)=4 **B<S Low** **B=S High**	7,4,7,4,2,6 M=5 Internal Relational
OM'er on GM t-staff – V2 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 18 mths,6 OAS: 3,3 ++/+++ ++	X: 1,2,3,2,1 M=1.8 N:3,5 M=4 **0** **0/+++**	1 FTE + +/+++	1,4	2,7	1,5	2,3	M (B)=1.5 M (S)=4.8 **B<S Low** **B=S V High**	7,6,7,7,2,7 M=6 Internal Very Relational
OM'er on MSC – V2 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 3 days,3 OAS:NA **0** **0**	X: 1,2,2,2,3 M=2 N: NA **0** **0/+++**	0.03 FTE **0** 0/+	1,4	6,3	1,3	2,1	M (B)=2.5 M (S)=2.8 **B<S Low** **B=S Low**	6,5,4,1,1,1 M=3 External Discrete - Efficient
SM'er on ACM t-staff – V5 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 1 day,2 OAS: 6,7 M=6.5 ++/+++ ++/+++	X: 1,2,2,1,3 M=1.8 N:4,5 M=4.5 **0/+** **0/+++**	30FTE +++ +/+++	2,4	1,7	2,2	3,1	M (B)=4 M (S)=3.5 **B>S Low** **B=S V/E High**	7,6,7,7,5,6 M=6.5 Internal Very/ Extremely Relational
SM'er on DDC t-staff – V5 - Empirical pattern - Empirical summary - Predicted pattern	TAS: 7,6 M=6.5 OAS: 7,7 M=7 +++ ++/+++	X: 2,3,3,1,5 M=2.8 N: 4,5 M=4.5 **0/+** **0/+++**	15FTE +++ +/+++	2,4	1,7	2,2	6,1	M (B)=2.8 M (S)=3.5 **B>S Low** **B=S V/E High**	7,6,7,7,5,6 M=6.5 Internal Very/ Extremely Relational

Key: As Table 6.1, plus:
M   = Mean
HAS, TAS, OAS = Human Asset Specificity, Temporal Asset Specificity, Ongoing Asset Specificity
X, N   = Exogenous Uncertainty, Endogenous Uncertainty
B, S   = Buyer, Supplier
V High, V/E High = Very High, Very/Extremely High
GM t-staff   = General Maintenance technical staff
MSC   = Mechanical Services Contractor
ACM t-staff   = Air Conditioning Maintenance technical staff
DDC t-staff   = Direct digital Controls technical staff

Table 6.17: Case Study 2: Exchange relationship clarifying and corroborating items

Decision Maker on Exchange & Case Study Version (V) of Questionnaire	TCE: Asset Specificity (OAS)	RDT: Few Alternatives	Nature of the Exchange
	Corroborating Item 1 (V1,2,4,5): Minimum experience required by resource (Years) Item 2 (All Vs): In-house trained versus externally recruited	*Corroborating* Item 1: Number of alternatives considered out of five possible other sources	*Clarifying* Item 1 (All Vs): level of pay/price (7-point) Item 2 (All Vs): Use of negatives measures (credible threats) (Yes/No) *Corroborating* Item 1 (V1,2,4,5): Training to reach full competence (Years) Item 2 (V1,2,4,5): Ongoing training once fully competent (Days per annum) Item 3 (V2,3): Renewal of fixed term contract (Yes/No) Item 4 (V2,3,6): Investment in training external firm (Yes/No)
CM'er on OM'er – V1	Item 1: 1 to 2 Item 2: Externally recruited	Item 1: 3	*Clarifying* Item 1: 4 Item 2: No *Corroborating* Item 1: Not answered Item 2: Not answered Item 3: Not applicable (ongoing) Item 4: Not applicable
OM'er on GM t-staff – V2	Item 1: 2 plus Item 2: Externally recruited	Item 1: 3	*Clarifying* Item 1: 4 Item 2: No *Corroborating* Item 1: Not applicable Item 2: Not answered Item 3: Not applicable (ongoing) Item 4: Not applicable
OM'er on MSC – V2	Item 1: Not answered Item 2: No applicable	Item 1: 3	*Clarifying* Item 1: 4 Item 2: No *Corroborating* Item 1: Not applicable Item 2: Not applicable Item 3: Yes Item 4: No
SM'er on ACM t-staff – V5	Item 1: 6 Item 2: In-house trained (20%) and externally recruited (80%)	Item 1: 3	*Clarifying* Item 1: 5 Item 2: No *Corroborating* Item 1: 4 Item 2: 2 Item 3: Not applicable (ongoing) Item 4: Not applicable
SM'er on DDC t-staff – V5	Item 1: 6 Item 2: In-house trained (20%) and externally recruited (80%)	Item 1: 1	*Clarifying* Item 1: 5 Item 2: No *Corroborating* Item 1: 6 Item 2: 15 Item 3: Not applicable (ongoing) Item 4: Not applicable

Key: As Table 6.16

Table 6.18: Case Study 2: Exchange relationship information from interviews and documents

Decision Maker on Exchange	Variable
Centre Manager on Operations Manager	• Exchange Relationship/Mutuality: *"CM desire to retain staff and their knowledge of CM"* (Source: Interview with Centre Manager) • Exchange Relationship/Mutuality: *"With the ability to attract and retain the most committed staff..."* (Source: CM's homepage/website)
Operations Manager on General Maintenance technical staff	• Exchange Relationship/Role Integrity: *"Includes relationships with tenants/contractors etc...doing more than only attending to technical issues"* (Source: Interview with Operations Manager)
Operations Manager on MSC	• RDT/Magnitude of Exchange: *"AC contract is second only to cleaning"* (Source: Interview with Operations Manager)
Service Manager on Air Conditioning technical staff	• TCE/Endogenous Uncertainty: *"Reflects increasing importance of customer relations"* (Source: Interview with Service Manager)
Service Manager on DDC technical staff	• TCE/OAS: *"Reflects the higher level of learning by doing on the job"* (Source: Interview with Service Manager) • TCE/Endogenous Uncertainty: *"Reflects increasing importance of customer relations"* (Source: Interview with Service Manager) • RDT/Few Alternatives: *"Difficulty in subcontracting DDC work given 2 year on the job component"* (Source: Interview with Service Manager)

6.5.2.2 Pattern matching and hypotheses testing

Having established empirical patterns and corresponding predicted patterns (in Table 6.16), as well as having checked the validity of the empirical patterns (using information from Table 6.17 and 6.18) the match or mismatch between the empirical patterns and the predicted patterns in Table 6.16 is now considered - in order to determine the extent to which data in this case study supports or contradicts the following hypotheses (detailed in Section 2.4.1):

• *Hypothesis Number 5* (concerning TCE); All of the empirical patterns match and are within the range of the TCE predicted patterns and, therefore, these results support this hypothesis;

• *Hypothesis Number 6* (concerning RDT); The one external exchange is on the boundary of the RDT predicted pattern, whilst the other four internal exchanges do not match the RDT predicted patterns. Generally, the empirical low buyer and supplier scores (indicating a low level of mutual dependency) and when high scores representing a high level of mutual dependency are predicted in relational exchanges, is a common discrepancy in each of these four mismatches. Therefore, these results mainly contradict this hypothesis; and

- *Hypothesis Number 7* (concerning a supply chain): In this case study, there is one external relationship – between the CM and MSC that is a discrete (efficient) exchange. This is inconsistent with the very / extremely relational exchanges with technical staff within the MSC that is upstream of the CM. Therefore, these results contradict this hypothesis.

6.6 CASE STUDY 2A

6.6.1 Hypotheses concerning the make-or-buy decision

6.6.1.1 Empirical and predicted patterns

Table 6.19 summarises the empirical patterns for the make-or-buy decisions in Case Study 2A.

The validity of the empirical patterns in Table 6.19 is checked by reviewing the corroborating items listed in Appendix 8 and which are summarised in Table 6.20. The two items pertaining to the Frequency (TCE) variable are applicable to the four internalised activities. All respondents noted that internal human resources are working between 36 to 45 hours per week and are all at least very busy. These results support the Appendix 13 guidelines that interpreted the employment of one FTE staff at a high frequency level. That is, the results show that there is sufficient demand to provide a continuous flow of work for each FTE staff. There are no results to report in terms of the one RBT corroborating item.

The validity of the empirical patterns in Table 6.19 is further checked by a review of the other information generated from the interviews and documents pertaining to the case study that is summarised in Table 6.21. With regard to the Centre Manager on operations management, a significant proportion (35 percent) of the GLAR of this medium sized retail centre is made-up with speciality shops. As previously mentioned, self-contained retail outlets create internal divisions in floor space and complicate the air conditioning and other services to the common space. Such a complex internal layout is consistent with the results that indicate a high (three month) period of time to reach full performance in terms of operations management and which is represented by the Human Asset Specificity (TCE) variable. This period is also consistent with, and less than, the two previously presented larger centres (Case Study 1 and Case Study 1A). The

CM is the same CM in Case Study 2 and this CM's homepage/website notes that operations management is one of this firm's strengths and this is consistent with the high scores given on the Value (RBT) variable. The comment by the Centre Manager concerning the widely defined role explains the low scores on the Uncertainty (TCE) and Costly to Imitate (RBT) variables.

In terms of the Operations Manager on general maintenance, again, the complex internal layout is consistent with the results that indicate a high (three month) period of time to reach full performance – represented by Human Asset Specificity (TCE) variable. This period is also consistent with, and less than, the three to six month period given in the larger case studies (Case Study 1 and Case Study 1A).

On preventive maintenance, the MSC's homepage/website and the Service Manager's comment concerning profits, indicates that this service activity is a core activity and consistent with the very high scores on the Value (RBT) variable. Furthermore, the homepage/website and Service Manager's comments indicate that this firm's size is a key factor in generating its profits and accounts for the very high scores on the Rarity (RBT) variable. Finally, and with regard to the Service Manager on specific DDC maintenance, this manager's comment concerning profits equally applies to DDC maintenance and indicates that this is also core activity and consistent with the very high scores on the Value (RBT) variable. Moreover, the Service Manager's comments indicate that this firm's specialised DDC knowledge is a key factor in creating its profits, and accounts for the extremely high scores on the Rarity (RBT) variable.

Table 6.19: Case Study 2A: Make-or-buy empirical and predicted patterns

Decision Maker on Activity & Version (V) of Case Study Questionnaire	TCE Asset Specific	TCE Uncertain (Exogenous)	TCE Frequent	RBT Value	RBT Rarity	RBT Costly to Imitate	Mode of Governance & Level (L)
CM'er on OM'mt-V1 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 3 mths,4 + +/+++ **0/+++**	2,2,2,2,2 M=2 **0** +/+++ **0**	1 FTE + +/+++ +/+++	5,5 M=5 + +/+++ +	1,3 M=2 **0** **0/+++** **0**	3,3 M=3 **0** **0/+++** **0**	Internalised L3 and Internal
OM'er on GM'ce-V2 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 3 mths, 5 + +/+++ **0/+++**	3,2,3,1,1 M=2 **0** +/+++ **0**	2 FTE + +/+++ +/+++	5,5 M=5 + +/+++ +	4,5 M=4.5 **0** **0/+++** **0**	3,5 M=4 **0** **0/+++** **0**	Internalised L3 and Internal
OM'er on PM'ce-V2 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 7 days, 2 **0** **0/+** **0**	3,2,3,1,3 M=2.4 **0** **0/+** **0**	0.35 FTE **0** **0** **0**	3,3 M=3 - - / - - - -	4,4 M=4 **0** **0/+++** **0**	3,5 M=4 **0** **0/+++** **0**	Externalised L5 and External
SM'er on PM'ce-V5 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 1 day,2 **0** +/+++ **0/+++**	1,2,3,1,4 M=2.2 **0** +/+++ **0/+**	30 FTE +++ +/+++ +/+++	6,6 M=6 ++ +/+++ ++	5,6 M=5.5 +/++ **0/+++** +/++	3,4 M=3.5 **0** **0/+++** **0**	Internalised L2 and Internal
SM'er on Specific DDCM'ce-V5 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	TAS: 7,7 M=7 +++ +/+++ +/+++	1,2,3,1,4 M=2.2 **0** +/+++ **0/+++**	5 FTE +++ +/+++ +/+++	6,6 M=6 ++ +/+++ +++	7,7 M=7 +++ **0/+++** +/+++	7,6 M=6.5 ++/+++ **0/+++** +/+++	Internalised L1 and Internal

Key:
M = Mean
Mths, Has, TAS = Months, Human Asset Specificity, Temporal Asset Specificity
FTE = Full-Time Equivalent
CM'er = Centre Manager (internal to CM)
OM'mt = Operations Management
OM'er = Operations Manager (internal to CM)
GM'ce = General Maintenance
PM'ce = Preventative Maintenance
SM'er = Service Manager (internal to MSC)
DDCM'ce = Direct Digital Controls Maintenance

Table 6.20: Case Study 2A: Make-or-buy corroborating items

Decision Maker on Activity & Version (V) of Case Study Questionnaire	TCE: Frequency Item 1 (V1,2,4,5): Hours per week worked by internal human resource (Hours) Item 2 (V1,2,4,5): How busy internal resource (7-point)	RBT: Rarity Item 1 (V2,3,4,6): Minimum experience required by external firm (Years)
CM'er on OM'mt - V1	Item 1: 40 plus; Item 2: 7	Item 1: Not applicable
OM'er on GM'ce - V2	Item 1: 36; Item 2: 6	Item 1: Not applicable
OM'er on PM'ce - V2	Item 1: Not applicable; Item 2: Not applicable	Item 1: Not answered
SM'er on PM'ce – V5	Item 1: 45; Item 2: 6	Item 1: Not applicable
SM'er on Specific DDCM'ce – V5	Item 1: 45; Item 2: 6	Item 1: Not applicable

Key: As per Table 6.19

Table 6.21: Case Study 2A: Make-or-buy information from interviews and documents

Decision Maker on Activity	Variable
Centre Manager on operations management	• TCE/HAS: Total area of specialties in centre - approximately 10,000m^2 on 3 level and approximately 35% of GLAR (Source: PCA, 2005) • RBT/Value: *"Our strengths in terms of knowledge base and capacity include: Asset management and development; Operations and risk management; Leasing; Marketing; Information technology; and Financial management"* (Source: CM's homepage/website – same as Case Study 2) • TCE/Uncertainty and RBT/Costly to Imitate: *"Various codes help widely define the role"* (Source: Interview with Centre Manager)
Operations Manager on general maintenance	• TCE/HAS: Total area of specialties in centre - approximately 10,000m^2 on 3 levels and approximately 35% of GLAR (Source: PCA, 2005)
Operations Manager on preventive maintenance	• No further information
Service Manager on preventive maintenance	• RBT/ Value: *"(MSC) service is not only about providing you with spare parts for your HVAC system – It is an attitude. It is a work ethic shared everyone within (MSC) to make our service second to none. Procuring efficient and reliable machines is only the first step. Planned service programs are the next step to help protect your investment, provide operating efficiency, prolong equipment and system life, and of course, assist in compliance with government and environmental regulations. It all adds up to peace of mind. (MSC) provide expertise in the provision of professional quality services focused on comfort, health and safety, efficiency, dependability and reliably."* (Source: MSC homepage/website) • RBT/Value: *"The execution of actual air conditioning and DDC by highly skilled staff is central to generating profits"* (Source: Interview with Service Manager) • RBT/Rarity: *"We have operations in all capital cities and number of regional areas in Australia. (MSC) currently consists of approximately 520 employees. This places (CM) in the top five air conditioning and mechanical service organisations in Australia. With our acquisition of (Another MSC), the combined resources and knowledge of both companies make us one of the largest and most technically competent Air Conditioning and mechanical Services organisations In Australia. This can only enhance our capability to offer our customers Comprehensive Solutions."* (Source: MSC homepage/website) • RBT/Rarity: *"Emphasis is on size and capability to manage large and high number of buildings"* and *"Not many large air conditioning service firms same size as (CM)"* (Source: Interview with Service Manager)
Service Manager on specific DDC maintenance	• RBT/Value: *"The execution of actual air conditioning and DDC by highly skilled staff is central to generating profits"* (Source: Interview with Service Manager) • RBT/Rarity: *"Emphasis on specialist knowledge required to service own highly proprietary system"* and *"Very few firms with own specific DDC system"* (Source: Interview with Service Manager)

6.6.1.2   Pattern matching and hypotheses testing

Having established empirical patterns and corresponding predicted patterns (in Table 6.19), as well as having checked the validity of the empirical patterns (using information from Table 6.20 and Table 6.21) the match or mismatch between the empirical patterns and the predicted patterns in Table 6.19 is now considered - in order to determine the extent to which data in this case study supports or contradicts the following hypotheses (detailed in Section 2.4.1):

- *Hypothesis Number 1* (concerning the conventional approach TCE): The one externalised empirical pattern matches the conventional TCE predicted pattern. However, none of the four internalised empirical patterns match the conventional TCE predicted patterns. A discrepancy between the empirical score on the Uncertainty variable with the score for this variable conventionally predicted by TCE is common across the four internalised activities. Therefore, these results mainly contradict Hypothesis Number 1;

- *Hypothesis Number 2* (concerning the conventional approach RBT): All the empirical patterns match the conventional RBT predicted patterns. Therefore, these results support Hypothesis Number 2;

- *Hypothesis Number 3* (concerning the TCE and RBT integrative framework): Four of the empirical patterns, operations management, general maintenance, preventive maintenance (externalised) and preventive maintenance (internalised), match and are within the range of the patterns predicted by the integrative framework of vertical integration. In the remaining activity - specific DDC maintenance, the empirical pattern matches the pattern predicted by the integrative framework of vertical integration with the empirical Value (RBT) variable at the boundary of that predicted. Moreover, all the predicted modes of governance match the empirical modes of governance. Therefore, these results support the Hypothesis Number 3; and

- *Hypothesis Number 4* (concerning the make decision in a supply chain): In the supply chain to this case study, transaction costs do not feature as the dominant determinant of the make decision in any of the internalised activities. Therefore, production costs are the important determinants of the make decision in this supply chain - demonstrated by the identification of one Level 1 activity (specific DDC maintenance) and one Level 2 activity (preventive

maintenance), as well as two Level 3 activities (operations management and general maintenance). Therefore, these results support Hypothesis Number 4.

6.6.2 Hypotheses concerning the nature of the exchange relationship decision

6.6.2.1 Empirical and predicted patterns

Table 6.22 summarises the empirical patterns for the nature of the exchange relationship decisions in Case Study 2A.

With regard to establishing whether the one entirely discrete external exchange is efficient or inefficient, the clarifying items in Table 6.23 indicate that this exchange is efficient on the basis that moderate prices prevail and there is an absence of credible threats. Moreover, the clarifying items substantially confirm the expectation that all of the four other internal exchanges are not inefficient, on the basis that there is an absence of credible threats in all of these exchanges.

The validity of the empirical patterns in Table 6.22 is checked by reviewing the corroborating items listed in Appendix 8 and which are also summarised in Table 6.23. There are only results for the first two corroborating items concerning the internal exchange with general maintenance staff in the CM and with technical staff in the MSC. The high level of training is consistent with a very relational exchange with these staff. The third corroborating item is only applicable to the external exchange between the CM and MSC. The tendency to renew the contract is consistent with an efficient exchange. In so far as, the prospect of future work acts as a check against hold-up and obviates the need for costly credible threats. The final corroborating item is again only applicable to the external exchange between the CM and MSC. Here, the CM does not provide any training of the external firm and this is consistent with a discrete exchange.

The first corroborating item concerning the Ongoing Asset Specificity (TCE) variable, supports the very high level of relational exchange across the two internal exchanges in the MSC. However, the Ongoing Asset Specificity (TCE) variable is at a low level in the two relational exchanges in the CM and this corresponds with the lower scores on the first corroborating items

relating to the Ongoing Asset Specificity (TCE) variable. Finally, the results for corroborating items relating to the Few Alternatives (RDT) variable shows the buyer is mainly willing to consider more than one source and this is consistent with the corresponding low scores – representing the buyer, on the Few Alternatives (RDT) variable in Table 6.22. The result for Operations Manager on MSC in terms of this corroborating does not undermine the low score for the Few Alternatives (RDT) variable in Table 6.22 – on the basis that there is not sufficient work to enable consideration of the alternatives beyond outsourcing, and there is considered to be at least a reasonable supply of air conditioning contractors.

The validity of the empirical patterns in Table 6.22 is further checked by a review of the other information generated from the interviews and documents pertaining to the case study that is summarised in Table 6.24. With regard to the Centre Manager on the Operations Manager, the information concerning the desire not to lose these staff is consistent with the high Solidarity (Nature of the Exchange) variable scores.

In terms of the Operations Manager on General Maintenance staff, the comment that indicates the CM is able to develop and train its own General Maintenance staff is consistent with the low scores on the Ongoing Asset Specificity (TCE) variable. Furthermore, this manager's comment that concerns supervisory and customer relations role of General Maintenance staff accounts for the higher scores on the Endogenous Uncertainty (TCE) variable versus the Exogenous Uncertainty (TCE) variable scores. The Operations Manager also indicates that General Maintenance staff help him perform his role and this is consistent with the high scores on the Solidarity (Nature of the Exchange) variable.

Finally, with respect to the exchange between the MSC and its air conditioning staff and DDC staff, the comment indicating the greater emphasis on "customer/sales" explains the higher scores given for Endogenous Uncertainty (TCE) variable than those scores for Exogenous Uncertainty (TCE) variable.

Table 6.22: Case Study 2A: Exchange relationship empirical and predicted patterns

Decision Maker on Exchange / Case Study Version (V) of qnr	TCE Asset Specific	TCE Uncertain	TCE Freq'	RDT Crit' (B,S)	RDT Mag' of Exchange (B,S)	RDT Lack of Discret' (B,S)	RDT Few Alt' (B,S)	RDT Mean	Nature of Exchange
CM'er on OM'er – V1 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 3 mths,4 OAS: 4,4 + +	X: 2,2,2,2,2 M=2 N: 3,3 M=3 **0** **0/+++**	1 FTE + +/+++	2,3	2,7	2,3	2,2	M (B)=2 M (S)=3.75 **B<S Low** **B=S High**	7,7,3,5,4,6 M=5.3 Internal Relational
OM'er on GM t-staff – V2 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 3 mths,5 OAS: 4,4 + ++	X: 3,2,3,1,1 M=2 N:4,6 M=5 + **0/+++**	2 FTE + +/+++	2,3	3,7	1,4	4,2	M (B)=2.5 M (S)=4 **B<S Low** **B=S V High**	7,7,7,5,6,5 M=6.2 Internal Very Relational
OM'er on MSC – V2 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 7 days,2 OAS:NA **0** **0**	X: 3,2,3,1,3 M=2.4 N: NA **0** **0/+++**	0.35 FTE **0** **0/+**	2,3	4,4	1,3	3,2	M (B)=2.5 M (S)=3 **B<S Low** **B=S Low**	5,3,3,3,2,2 M=3 External Discrete - Efficient
SM'er on ACM t-staff – V5 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 1 day,2 OAS: 6,6 M=6 ++ ++	X: 1,2,3,1,4 M=2.2 N:2,7 M=4.5 **0/+** **0/+++**	30FTE +++ +/+++	2,6	1,6	2,3	3,1	M (B)=2 M (S)=4 **B<S Low** **B=S V High**	7,6,7,6,2,7 M=5.8 Internal Very Relational
SM'er on DDC t-staff – V5 - Empirical pattern - Empirical summary - Predicted pattern	TAS: 7,7 M=7 OAS: 6,6 M=6 ++ ++	X: 1,2,3,1,4 M=2.2 N:3,7 M=5 + **0/+++**	5 FTE + +/+++	2,6	1,6	2,3	7,1	M (B)=3 M (S)=4 **B<S Low** **B=S V High**	7,6,7,6,2,7 M=5.8 Internal Very Relational

Key: As Table 6.1, plus:
M = Mean
HAS, TAS, OAS = Human Asset Specificity, Temporal Asset Specificity, Ongoing Asset Specificity
X, N = Exogenous Uncertainty, Endogenous Uncertainty
B, S = Buyer, Supplier
V High, V/E High = Very High, Very/Extremely High
GM t-staff = General Maintenance technical staff
MSC = Mechanical Services Contractor
ACM t-staff = Air Conditioning Maintenance technical staff
DDC t-staff = Direct digital Controls technical staff

Table 6.23: Case Study 2A: Exchange relationship clarifying and corroborating items

Decision Maker on Exchange & Case Study Version (V) of Questionnaire	TCE: Asset Specificity (OAS)	RDT: Few Alternatives	Nature of the Exchange
	Corroborating Item 1 (V1,2,4,5): Minimum experience required by resource (Years) Item 2 (All Vs): In-house trained versus externally recruited	*Corroborating* Item 1: Number of alternatives considered out of five possible other sources	*Clarifying* Item 1 (All Vs): level of pay/price (7-point) Item 2 (All Vs): Use of negatives measures (credible threats) (Yes/No) *Corroborating* Item 1 (V1,2,4,5): Training to reach full competence (Years) Item 2 (V1,2,4,5): Ongoing training once fully competent (Days per annum) Item 3 (V2,3): Renewal of fixed term contract (Yes/No) Item 4 (V2,3,6): Investment in training external firm (Yes/No)
CM'er on OM'er – V1	Item 1: 3 Item 2: Externally recruited	Item 1: Not answered	*Clarifying* Item 1: 4 Item 2: No *Corroborating* Item 1: Not answered Item 2: Not answered Item 3: Not applicable (ongoing) Item 4: Not applicable
OM'er on GM t-staff – V2	Item 1: 1 Item 2: In-house trained	Item 1: 3	*Clarifying* Item 1: 4 Item 2: No *Corroborating* Item 1: 1 Item 2: 5 Item 3: Not applicable (ongoing) Item 4: Not applicable
OM'er on MSC – V2	Item 1: 4 Item 2: No applicable	Item 1: 1	*Clarifying* Item 1: 4 Item 2: No *Corroborating* Item 1: Not applicable Item 2: Not applicable Item 3: Yes Item 4: No
SM'er on ACM t-staff – V5	Item 1: 3 to 5 Item 2: Not answered	Item 1: 3	*Clarifying* Item 1: 5 Item 2: No *Corroborating* Item 1: 4 Item 2: 10 Item 3: Not applicable (ongoing) Item 4: Not applicable
SM'er on DDC t-staff – V5	Item 1: 3 to 5 Item 2: Not answered	Item 1: 3	*Clarifying* Item 1: 5 Item 2: No *Corroborating* Item 1: 5 Item 2: 15 Item 3: Not applicable (ongoing) Item 4: Not applicable

Key: As per Table 6.22

Table 6.24: Case Study 2A: Exchange relationship information from interviews and documents

Decision Maker on Exchange	Variable
Centre Manager on Operations Manager	• Exchange Relationship/Mutuality: *"With the ability to attract and retain the most committed staff…"* (Source: CM's homepage/website – same as Case Study 2)
Operations Manager on General Maintenance technical staff	• TCE/OAS: *"Firm (CM) has ability to develop staff from trade assistant to required competence"* (Source: Interview with Operations Manager) • TCE/Endogenous Uncertainty: *"Part of the job is check others which makes their job less easy to check"* and *"Role includes customer relations"* (Source: Interview with Operations Manager) • Exchange Relationship/Solidarity: *"General maintenance staff act as eyes and ears and stand-in during my (Operations Manager) absence"* (Source: Interview with Operations Manager)
Operations Manager on MSC	• No further information
Service Manager on Air Conditioning technical staff	• TCE/Endogenous Uncertainty: *"Big change these days is technical issues taken more as given and much more emphasis on customer/sales"* (Source: Interview with Service Manager)
Service Manager on DDC technical staff	• TCE/Endogenous Uncertainty: *"Big change these days is technical issues taken more as given and much more emphasis on customer/sales"* (Source: Interview with Service Manager)

6.6.2.2 Pattern matching and hypotheses testing

Having established empirical patterns and corresponding predicted patterns (in Table 6.22), as well as having checked the validity of the empirical patterns (using information from Table 6.23 and Table 6.24) the match or mismatch between the empirical patterns and the predicted patterns in Table 6.22 is now considered - in order to determine the extent to which data in this case study supports or contradicts the following hypotheses (detailed in Section 2.4.1):

- *Hypothesis Number 5* (concerning TCE); All of the empirical patterns match and are within the range of the TCE predicted patterns and, therefore, these results support this hypothesis;

- *Hypothesis Number 6* (concerning RDT); The one external exchange is on the boundary of the RDT predicted pattern, whilst the other four internal exchanges do not match the RDT predicted patterns. Generally, the empirical low buyer and supplier scores indicating a low level of mutual dependency - when high scores representing a high level of mutual dependency are predicted in relational exchanges, is a common discrepancy in each of these four mismatches. Therefore, these results mainly contradict this hypothesis; and

- *Hypothesis Number 7* (concerning a supply chain); In this case study, there is one external relationship – between the CM and MSC that is a discrete (efficient) exchange. This is inconsistent with the very relational exchanges with technical staff within the MSC that is upstream of the CM. Therefore, these results contradict this hypothesis.

6.7 CASE STUDY 3

6.7.1 Hypotheses concerning the make-or-buy decision

6.7.1.1 Empirical and predicted patterns

Table 6.25 summarises the empirical patterns for the make-or-buy decisions in Case Study 3.

The validity of the empirical patterns in Table 6.25 is checked by reviewing the corroborating items listed in Appendix 8 and which are summarised in Table 6.26. The two items pertaining to the Frequency (TCE) variable are applicable to the one internalised activity. The Centre Manager noted that Operations Manager is working 40 hours per week and is extremely busy. These results support the Appendix 13 guidelines that interpreted the employment of one FTE staff at a high frequency level. That is, the results show that there is sufficient demand to provide a continuous flow of work for each FTE staff. With regard to the item concerning minimum experience, the Operations Manager noted that three years experience is required by external MSCs. This period of time can be seen as a fairly short period of time and is consistent with the low Rarity (RBT) variable scores in respect of preventive maintenance.

The validity of the empirical patterns in Table 6.25 is further checked by a review of the other information generated from the interviews and documents pertaining to the case study that is summarised in Table 6.27. With regard to the Centre Manager on operations management, a significant proportion (60 percent) of the GLAR of this small retail centre is made-up with speciality shops. As previously mentioned, self-contained retail outlets create internal divisions in floor space and complicate the air conditioning and other services to the common space. Such a complex internal layout – albeit in small centre is consistent with the results that indicate a moderate (two month) period of time to reach full performance in terms of operations

management. This period is also consistent with, and less than, the four previously presented larger centres (Case Study 1, 1A, 2 and 2A).

On preventive maintenance, the Service Manager's comment that the *management* of this activity is the primary and central role in this firm shows that the *implementation* of air conditioning is *not* a core activity, and this is consistent with the negative score on the Value (RBT) variable.

Table 6.25: Case Study 3: Make-or-buy empirical and predicted patterns

Decision Maker on Activity & Version (V) of Case Study Questionnaire	TCE Asset Specific	TCE Uncertain (Exogenous)	TCE Frequent	RBT Value	RBT Rarity	RBT Costly to Imitate	Mode of Governance & Level (L)
CM'er on OM'mt-V1 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 2 mths, 5 **0/+** +/+++ **0/+++**	1,1,2,2,2 M=1.6 **0** +/+++ **0**	1 FTE **+** +/+++ **+/+++**	5,5 M=5 **+** +/+++ **+**	5,2 M=3.5 **0** 0/+++ **0**	4,2 M=3 **0** 0/+++ **0**	Internalised L3 and Internal
OM'er on PM'ce-V3 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 4 days, 3 **0** 0/+ **0**	1,2,2,1,3 M=1.8 **0** 0/+ **0**	0.1 FTE **0** 0 **0**	3,3 M=3 **-** - / - - - **-**	3,4 M=3.5 **0** 0/+++ **0**	3,4 M=3.5 **0** 0/+++ **0**	Externalised L5 and External
SM'er on PM'ce-V6 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 0.5 day,1 **0** 0/+ **0**	1,1,2,1,2 M=1.4 **0** 0/+ **0**	0.1 FTE **0** 0 **0**	2,4 M=3 **-** - /- - - **-**	3,3 M=3 **0** 0/+++ **0**	2,3 M=2.5 **0** 0/+++ **0**	Externalised L5 and External

Key:
M   = Mean
Mths, HAS   = Months, Human Asset Specificity
FTE   = Full-Time Equivalent
CM'er   = Centre Manager (internal to CM)
OM'mt   = Operations Management
OM'er   = Operations Manager (internal to CM)
GM'ce   = General Maintenance
PM'ce   = Preventative Maintenance
SM'er   = Service Manager (internal to MSC)
DDCM'ce   = Direct Digital Controls Maintenance

Table 6.26: Case Study 3: Make-or-buy corroborating items

Decision Maker on Activity & Version (V) of Case Study Questionnaire	TCE: Frequency Item 1 (V1,2,4,5): Hours per week worked by internal human resource (Hours) Item 2 (V1,2,4,5): How busy internal resource (7-point)	RBT: Rarity Item 1 (V2,3,4,6): Minimum experience required by external firm (Years)
CM'er on OM'mt - V1	Item 1: 40; Item 2: 7	Item 1: Not applicable
OM'er on PM'ce – V3	Item 1: Not applicable; Item 2: Not applicable	Item 1: 3 plus
SM'er on PM'ce – V6	Item 1: Not applicable; Item 2: Not applicable	Item 1: Not answered

Key: As per Table 6.25

Table 6.27: Case Study 3: Make-or-buy information from interviews and documents

Decision Maker on Activity	Variable
Centre Manager on operations management	• TCE/HAS: Total area of specialties in centre - approximately 9,000m^2 on 1 level and approximately 60% of GLAR (Source: PCA, 2005) • RBT/Rarity: *"More than sufficient supply but service standards may vary""* (Source: Source: Interview with Centre Manager)
Operations Management on preventive maintenance	• No further information
Service Manager on preventive maintenance	• RBT/Value*: "The primary and central role is the management of this (preventative maintenance) activity"* (Source: Source: Interview with Service Manager)

6.7.1.2 Pattern matching and hypotheses testing

Having established empirical patterns and corresponding predicted patterns (in Table 6.25), as well as having checked the validity of the empirical patterns (using information from Table 6.26 and Table 6.27) the match or mismatch between the empirical patterns and the predicted patterns in Table 6.25 is now considered - in order to determine the extent to which data in this case study supports or contradicts the following hypotheses (detailed in Section 2.4.1):

- *Hypothesis Number 1* (concerning the conventional approach TCE): The two externalised empirical patterns match the conventional TCE predicted patterns. However, the one internalised empirical pattern does not match the conventional TCE predicted pattern. A discrepancy between the empirical score on the Uncertainty variable with the score for this variable conventionally predicted by TCE is the reason for the mismatch in the internalised activity. Therefore, these results mainly support Hypothesis Number 1;

- *Hypothesis Number 2* (concerning the conventional approach RBT): All the empirical patterns match the conventional RBT predicted patterns. Therefore, these results support Hypothesis Number 2;

- *Hypothesis Number 3* (concerning the TCE and RBT integrative framework): All of the empirical patterns match and are within the range of the patterns predicted by the integrative framework of vertical integration. Moreover, all the predicted modes of governance match the empirical modes of governance. Therefore, these results support the Hypothesis Number 3; and

- *Hypothesis Number 4* (concerning the make decision in a supply chain): In the supply chain to the retail centre in this case study, transaction costs do not feature as the dominant determinant of the make decision in the one internalised activity. Therefore, production costs are the important determinants of the make decision in this supply chain - demonstrated by the identification of one Level 3 activity. Therefore, these results support Hypothesis Number 4.

6.7.2 Hypotheses concerning the nature of the exchange relationship decision

6.7.2.1 Empirical and predicted patterns

Table 6.28 summarises the empirical patterns for the nature of the exchange relationship decisions in Case Study 3.

With regard to establishing whether the two discrete external exchanges are efficient or inefficient, the clarifying items in Table 6.29 indicate that these exchanges are efficient on the basis that there is an absence of credible threats in both exchanges and moderate prices in one of the exchanges (between the CM and MSC). Moreover, the clarifying items substantially confirm the expectation that the one internal exchange is efficient, on the basis that there is an absence of credible threats in this exchange.

The validity of the empirical patterns in Table 6.28 is checked by reviewing the corroborating items listed in Appendix 8 and which are also summarised in Table 6.29. There are only two results available concerning the exchange dependent variable. That is, the external exchange between the CM and MSC. The tendency to renew the contract is consistent with an efficient exchange. In so far as, the prospect of future work acts as a check against hold-up and obviates the need for costly credible threats. The final corroborating item is again only applicable to the external exchange between the CM and MSC. Here, the CM does not provide any training to the external firm and this is consistent with a discrete exchange.

The first corroborating item concerning the Ongoing Asset Specificity (TCE) variable, supports the relational exchange between the CM and the Operations Manager, in so far as one to two years experience makes it moderately difficult to find new Operations Managers. Finally, the results for the corroborating item relating to the Few Alternatives (RDT) variable, shows that all of the buyers are willing to consider more than one source and this is consistent with the corresponding low scores – representing the buyer, on the Few Alternatives (RDT) variable in Table 6.28.

The validity of the empirical patterns in Table 6.28 is further checked by a review of the other information generated from the interviews and documents pertaining to the case study that is summarised in Table 6.30. With regard to the Centre Manager on the Operations Manager, the comment concerning the CMs ability to develop Operations Managers is consistent with no more than moderate scores on the Ongoing Asset Specificity (TCE) variable.

Table 6.28: Case Study 3: Exchange relationship empirical and predicted patterns

Decision Maker on Exchange / Case Study Version (V) of qnr	TCE Asset Specific	TCE Uncertain	TCE Freq'	RDT Crit' (B,S)	RDT Mag' of Exchange (B,S)	RDT Lack of Discret' (B,S)	RDT Few Alt' (B,S)	RDT Mean	Nature of Exchange
CM'er on OM'er – V1 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 2 mths,5 OAS: 5,3 **0/+** **+**	X: 1,1,2,2,2 M=1.6 N:2,2 M=2 **0** **0/+++**	1 FTE **+** **+/+++**	2,4	2,7	1,3	2,3	M (B)=1.8 M (S)=4.3 **B<S Low** **B=S High**	6,4,5,7,3,7 M=5.3 Internal Relational
OM'er on MSC – V3 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 4 days,3 OAS:NA **0** **0**	X: 1,2,2,1,3 M=1.8 N: NA **0** **0/+++**	0.1FTE **0** **0/+**	1,4	3,3	2,5	2,4	M (B)=2 M (S)=4 **B<S Low** **B=S Low**	6,5,4,4,1,1 M=3.5 External Neutral Discrete – Efficient
SM'er on ACM Subcontract – V6 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 0.5 day,1 OAS: NA **0** **0**	X: 1,1,2,1,2 M=1.4 N: NA **0** **0/+++**	0.1FTE **0** **0/+**	1,3	6,5	1,3	4,3	M (B)=3 M (S)=3.5 **B<S Low** **B=S Low**	5,7,1,1,3,1 M=3 External Discrete – Efficient

Key: As Table 6.1, plus:
M	*= Mean*
HAS	*= Human Asset Specificity*
X	*= Exogenous Uncertainty*
N	*= Endogenous Uncertainty*
B, S	*= Buyer, Supplier*
V High, V/E High	*= Very High, Very/Extremely High*
GM t-staff	*= General Maintenance technical staff*
MSC	*= Mechanical Services Contractor*
ACM t-staff	*= Air Conditioning Maintenance technical staff*
DDC t-staff	*= Direct digital Controls technical staff*

Table 6.29: Case Study 3: Exchange relationship clarifying and corroborating items

Decision Maker on Exchange & Case Study Version (V) of Questionnaire	TCE: Asset Specificity (OAS)	RDT: Few Alternatives	Nature of the Exchange
	Corroborating Item 1 (V1,2,4,5): Minimum experience required by resource (Years) Item 2 (V1,2,4,5): In-house trained versus externally recruited	*Corroborating* Item 1: Number of alternatives considered out of five possible other sources	*Clarifying* Item 1 (All Vs): level of pay/price (7-point) Item 2 (All Vs): Use of negatives measures (credible threats) (Yes/No) *Corroborating* Item 1 (V1,2,4,5): Training to reach full competence (Years) Item 2 (V1,2,4,5): Ongoing training once fully competent (Days per annum) Item 3 (V2,3): Renewal of fixed term contract (Yes/No) Item 4 (V2,3,6): Investment in training external firm (Yes/No)
CM'er on OM'er – V1	Item 1: 1 to 2 Item 2: Externally recruited	Item 1: 3	*Clarifying* Item 1: 5 Item 2: No *Corroborating* Item 1: Not answered Item 2: Not answered Item 3: Not applicable (ongoing) Item 4: Not applicable
OM'er on MSC – V3	Item 1: Not applicable Item 2: Not applicable	Item 1: 2	*Clarifying* Item 1: 4 Item 2: No *Corroborating* Item 1: Not applicable Item 2: Not applicable Item 3: Yes Item 4: No
SM'er on ACM Subcontractor – V6	Item 1: Not applicable Item 2: Not applicable	Item 1: 2	*Clarifying* Item 1: 5 Item 2: No *Corroborating* Item 1: Not applicable Item 2: Not applicable Item 3: Not applicable Item 4: Not answered

Key: As per Table 6.28

Table 6.30: Case Study 3: Exchange relationship information from interviews and documents

Decision Maker on Exchange	Variable
Centre Manager on Operations Manager	• TCE/OAS: *"Firm can develop person from related background"* (Source: Interview with Centre Manager) • RDT/Criticality: *"Most staff settled and would try to seek solution"* (Source: Interview with Centre Manager)
Operations Manager on MSC	• No further information
Service Manager on Air Conditioning Subcontractor	• No further information

6.7.2.2   Pattern matching and hypotheses testing

Having established empirical patterns and corresponding predicted patterns (in Table 6.28), as well as having checked the validity of the empirical patterns (using information from Table 6.29 and Table 6.30) the match or mismatch between the empirical patterns and the predicted patterns in Table 6.28 is now considered - in order to determine the extent to which data in this case study supports or contradicts the following hypotheses (detailed in Section 2.4.1):

- *Hypothesis Number 5* (concerning TCE); All of the empirical patterns match and are within the range of the TCE predicted patterns and, therefore, these results support this hypothesis;

- *Hypothesis Number 6* (concerning RDT); The external exchange between the MSC and the preventive maintenance subcontractor is on the boundary of the RDT predicted pattern, whilst the other external exchange and the internal exchange do not match the RDT predicted patterns. In the external exchange mismatch, there is a net difference between the buyer and supplier greater than one – when a balance is predicted. Whilst, in terms of the internal exchange mismatch, the low buyer and supplier empirical scores (indicating a low level of mutual dependency) are recorded when high scores representing a high level of mutual dependency are predicted in relational exchanges. Therefore, these results mainly contradict this hypothesis; and

- *Hypothesis Number 7* (concerning a chain); In this case study, there is an external relationship – between the CM and MSC that is a discrete (efficient) exchange. This is consistent with the discrete (efficient) exchange between the MSC and its subcontractor that is upstream of the CM. Therefore, these results support this hypothesis.

6.8 CASE STUDY 3A

6.8.1 Hypotheses concerning the make-or-buy decision

6.8.1.1 Empirical and predicted patterns

Table 6.31 summarises the empirical patterns for the make-or-buy decisions in Case Study 3A.

The validity of the empirical patterns in Table 6.31 is checked by reviewing the corroborating items listed in Appendix 8 and which are summarised in Table 6.32. The two items pertaining to the Frequency (TCE) variable are applicable to the two internalised activities. The Centre Manager and Service Manager noted that their staff are working 45 hours per week and 40 hours per week respectively and are at least busy. These results support the Appendix 13 guidelines that interpreted the employment of one FTE staff at a high frequency level. That is, the results show that there is sufficient demand to provide a continuous flow of work for each FTE staff. There are no results to report in terms of the one RBT corroborating item.

The validity of the empirical patterns in Table 6.31 is further checked by a review of the other information generated from the interviews and documents pertaining to the case study that is summarised in Table 6.33. With regard to the Centre Manager on operations management, a significant proportion (20 percent) of the GLAR of this small retail centre is made-up with speciality shops. As mentioned, self-contained retail outlets create internal divisions in floor space and complicate the air conditioning and other services to the common space. Such a complex internal layout – albeit in small centre, is consistent with the results that indicate a moderately high (three month) period of time to reach full performance in terms of operations management. This period is also consistent with, and less than, the four previously presented larger centres (Case Study 1, 1A, 2 and 2A). Also, the information from CM' homepage/website indicates that operations management is an important activity in this firm – in order to ensure clients have an "accurate picture of operating expenses". This is consistent with the high scores on the Value (RBT) variable.

The information from CM's homepage/website is also relevant to the Operations Manager on preventive maintenance. Here, the CM seeks to "minimise operating costs". These costs would pertain to production costs and this is consistent with the negative scores on the Value (RBT) variable – indicating that if this activity were internalised then this would increase net costs.

In terms of the Service Manager on preventive maintenance, the heavy-all year round workload that is mentioned is consistent with the extremely high score on the Frequency (TCE) variable. Moreover, this firm's proprietary knowledge of chillers and its large size supports the very high scores on the Rarity (RBT) variable.

The MSC in this case study is the same MSC as in Case Study 1A. Differences in the scores relating to TCE's variables are consistent with the difference in the size of the centre in this case study (around 15,000m^2 GLAR) and the size of Case Study 1A (around 100,000m^2 GLAR).

Table 6.31: Case Study 3A: Make-or-buy empirical and predicted patterns

Decision Maker on Activity & Version (V) of Case Study Questionnaire	TCE Asset Specific	TCE Uncertain (Exogenous)	TCE Frequent	RBT Value	RBT Rarity	RBT Costly to Imitate	Mode of Governance & Level (L)
CM'er on OM'mt-V1 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 3 mths,4 + +/+++ 0/+++	2,2,2,3,3 M=2.4 **0** +/+++ **0**	1 FTE + +/+++ +/+++	5,5 M=5 + +/+++ +	4,3 M=3.5 **0** 0/+++ **0**	3,3 M=3 **0** 0/+++ **0**	Internalised L3 and Internal
OM'er on PM'ce-V3 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 0.5 days,1 **0** 0/+ **0**	1,1,2,1,2 M=1.4 **0** 0/+ **0**	0.03FTE **0** 0 **0**	3,3 M=3 - - / - - - -	2,4 M=3 **0** 0/+++ **0**	2,2 M=2 **0** 0/+++ **0**	Externalised L5 and External
SM'er on PM'ce-V4 - Empirical pattern - Empirical summary of pattern and mode: - Conventional predicted pattern: - Integrated predicted pattern & assigned level & mode:	HAS: 2 days,3 **0** +/+++ 0/+++	1,2,3,2,3 M=2.2 **0** +/+++ **0/+**	40 FTE +++ +/+++ +/+++	6,6 M=6 ++ +/+++ ++	6,6 M=6 ++ 0/+++ +/++	4,3 M=3.5 **0** 0/+++ **0**	Internalised L2 and Internal

Key:
M   = Mean
Mths   = Months
HAS   = Human Asset Specificity
FTE   = Full-Time Equivalent
CM'er   = Centre Manager (internal to CM)
OM'mt   = Operations Management
OM'er   = Operations Manager (internal to CM)
GM'ce   = General Maintenance
PM'ce   = Preventative Maintenance
SM'er   = Service Manager (internal to MSC)
DDCM'ce   = Direct Digital Controls Maintenance

Table 6.32: Case Study 3A: Make-or-buy corroborating items

Decision Maker on Activity & Version (V) of Case Study Questionnaire	TCE: Frequency Item 1 (V1,2,4,5): Hours per week worked by internal human resource (Hours) Item 2 (V1,2,4,5): How busy internal resource (7-point)	RBT: Rarity Item 1 (V2,3,4,6): Minimum experience required by external firm (Years)
CM'er on OM'mt - V1	Item 1: 45; Item 2: 5	Item 1: Not applicable
OM'er on PM'ce – V3	Item 1: Not applicable; Item 2: Not applicable	Item 1: Not answered
SM'er on PM'ce – V4	Item 1: 40; Item 2: 7	Item 1: Not applicable

Key: As per Table 6.31

Table 6.33: Case Study 3A: Make-or-buy information from interviews and documents

Decision Maker on Activity	Variable
Centre Manager on operations management	• TCE/HAS: Total area of specialties in centre - approximately 2,500m^2 on 1 level and approximately 20% of GLAR (Source: PCA, 2005) • RBT/Value: *"(CMs') Management services team provides integrated, value-added property management services to maximise investors' return on investment, both in terms of current cash flow and capital appreciation. (CM's) experts develop a tailored solution for our clients' asset, whether they are a CBD premium tower or a regional retail centre. Our reporting platform ensures that our clients have a clear and accurate picture of operating expenses, rental income, accruals, capital works underway and occupancy profile"* (Source: CM's homepage/website)
Operations Manager on preventive maintenance	• RBT/Value: *"We unlock value from our clients' portfolios through the development of enhanced revenue streams and by minimising operating costs"* (Source: CM's homepage/website)
Service Manager on preventive maintenance (Same as Case Study 1A)	• TCE/Frequency*: "Have a heavy workload all year round"* (Source: Interview with Service Manager) • RBT/Rarity: *"Reflects proprietary knowledge of chillers etc"* (Source: Interview with Service Manager) • RBT/Rarity: *"Not many firms as large as MSC"* (Source: Interview with Service Manager)

6.8.1.2   Pattern matching and hypotheses testing

Having established empirical patterns and corresponding predicted patterns (in Table 6.31), as well as having checked the validity of the empirical patterns (using information from Table 6.32 and Table 6.33) the match or mismatch between the empirical patterns and the predicted patterns in Table 6.31 is now considered - in order to determine the extent to which data in this case study supports or contradicts the following hypotheses (listed in detail in Section 2.4.1):

• *Hypothesis Number 1* (concerning the conventional approach TCE): The externalised empirical pattern matches the conventional TCE predicted pattern. However, neither of two internalised empirical patterns matches the conventional TCE predicted pattern. A discrepancy between the empirical score on the Uncertainty variable with the score for this variable conventionally predicted by TCE is common across the two internalised activities. Additionally, a discrepancy between the empirical score on the Human Asset Specificity (TCE) variable with the score for this variable conventionally predicted by TCE exists - in

relation to the internalisation of preventive maintenance within the MSC. Therefore, these results mainly contradict Hypothesis Number 1;

- *Hypothesis Number 2* (concerning the conventional approach RBT): All the empirical patterns match the conventional RBT predicted patterns. Therefore, these results support for Hypothesis Number 2;

- *Hypothesis Number 3* (concerning the TCE and RBT integrative framework): All of the empirical patterns match and are within the range of the patterns predicted by the integrative framework of vertical integration. Moreover, all the predicted modes of governance match the empirical modes of governance. Therefore, these results support the Hypothesis Number 3; and

- *Hypothesis Number 4* (concerning the make decision in a supply chain): In the supply chain to this case study, transaction costs do not feature as the dominant determinant of the make decision in any of the internalised activities. Therefore, production costs are the important determinants of the make decision in this supply chain - demonstrated by the identification of one Level 3 activity (operations management) and one Level 2 activity (preventive maintenance). Therefore, these results support Hypothesis Number 4.

6.8.2 Hypotheses concerning the nature of the exchange relationship decision

6.8.2.1 Empirical and predicted patterns

Table 6.34 summarises the empirical patterns for the nature of the exchange relationship decisions in Case Study 3A.

With regard to establishing whether the one discrete external exchange is efficient or inefficient, the clarifying items in Table 6.35 indicate that this exchange is efficient on the basis that low prices prevail and there is an absence of credible threats. Moreover, the clarifying items confirm the expectation that the two other internal exchanges are efficient, on the basis that there is an absence of credible threats in these exchanges.

The validity of the empirical patterns in Table 6.34 is checked by reviewing the corroborating items listed in Appendix 8 and which are also summarised in Table 6.35. There are only results for the first two corroborating items concerning the internal exchange with the Operations Manager in the CM and with technical staff in the MSC. The high level of training is consistent with at least a relational exchange with these staff. The third corroborating item is only applicable to the external exchange between the CM and MSC. The tendency to renew the contract is consistent with an efficient exchange. In so far as, the prospect of future work acts as a check against hold-up and obviates the need for costly credible threats. The final corroborating item is again only applicable to the external exchange between the CM and MSC. Here, the CM does not provide any training of the external firm and this is consistent with a discrete exchange.

The first corroborating item concerning the Ongoing Asset Specificity (TCE) variable, supports the high level of relational exchange in the two internal exchanges. The second corroborating item relating to Ongoing Asset Specificity (TCE) variable, supports the high scores on this variable – in so far as, there is at least a 50 percent reliance on external recruitment in both internal exchanges. Finally, the results for corroborating item relating to the Few Alternatives (RDT) variable, shows the buyer is willing to consider more than one source and this is consistent with the corresponding low scores – representing the buyer, on the Few Alternatives (RDT) variable in Table 6.34.

The validity of the empirical patterns in Table 6.34 is further checked by a review of the other information generated from the interviews and documents pertaining to the case study that is summarised in Table 6.36. With regard to the exchange between the MSC and its air conditioning staff, the comment that indicates that expectations ("goal posts") can change is consistent with the high scores on the Role Integrity (Nature of the Exchange) variable. The comment concerning staff developing customer relations is consistent with higher scores on the Endogenous Uncertainty (TCE) variable than the Exogenous Uncertainty (TCE) variable – reflecting the less objective nature of the performance of the staff in this regard.

Table 6.34: Case Study 3A: Exchange relationship empirical and predicted patterns

Decision Maker on Exchange / Case Study Version (V) of qnr	TCE Asset Specific	TCE Uncertain	TCE Freq'	RDT Crit' (B,S)	RDT Mag' of Exchange (B,S)	RDT Lack of Discret' (B,S)	RDT Few Alt' (B,S)	RDT Mean	Nature of Exchange
CM'er on OM'er – V1 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 3 mths,4 OAS: 4,5 + +	X: 2,2,2,3,3 M=2.4 N: 3,3 M=3 **0** **0/+++**	1 FTE + +/+++	5,4	3,1	2,4	5,2	M (B)=3.8 M (S)=2.8 **B>S Low** **B=S High**	7,6,4,4,2,7 M=5 Internal Relational
OM'er on MSC – V3 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 0.5 days,1 OAS:NA **0** **0**	X: 1,1,2,1,2 M=1.4 N: NA **0** **0/+++**	0.03 FTE **0** **0/+**	2,4	6,3	4,4	3,5	M (B)=3.8 M (S)=4 **B<S Low** **B=S Low**	5,2,2,2,1,1 M=2.2 External Discrete - Efficient
SM'er on ACM t-staff – V4 - Empirical pattern - Empirical summary - Predicted pattern	HAS: 2 days,3 OAS: 6,6 M=6 **++** **++**	X: 1,2,3,2,3 M=2.2 N:2,7 M=4.5 **0/+** **0/+++**	40FTE **+++** **+/+++**	1,4	1,7	1,1	3,1	M (B)=1.5 M (S)=3.3 **B<S Low** **B=S V High**	7,7,6,6,2,7 M=5.8 Internal Very Relational

Key: As Table 6.1, plus:
M = Mean
HAS = Human Asset Specificity
X = Exogenous Uncertainty
N = Endogenous Uncertainty
B, S = Buyer, Supplier
V High, V/E High = Very High, Very/Extremely High
GM t-staff = General Maintenance technical staff
MSC = Mechanical Services Contractor
ACM t-staff = Air Conditioning Maintenance technical staff
DDC t-staff = Direct digital Controls technical staff

Table 6.35: Case Study 3A: Exchange relationship clarifying and corroborating items

Decision Maker on Exchange & Case Study Version (V) of Questionnaire	TCE: Asset Specificity (OAS)	RDT: Few Alternatives	Nature of the Exchange
	Corroborating Item 1 (V1,2,4,5): Minimum experience required by resource (Years) Item 2 (V1,2,4,5): In-house trained versus externally recruited	*Corroborating* Item 1: Number of alternatives considered out of five possible other sources	*Clarifying* Item 1 (All Vs): level of pay/price (7-point) Item 2 (All Vs): Use of negatives measures (credible threats) (Yes/No) *Corroborating* Item 1 (V1,2,4,5): Training to reach full competence (Years) Item 2 (V1,2,4,5): Ongoing training once fully competent (Days per annum) Item 3 (V2,3): Renewal of fixed term contract (Yes/No) Item 4 (V2,3,6): Investment in training external firm (Yes/No)
CM'er on OM'er – V1	Item 1: 3 Item 2: In-house (50%) and Externally recruited (50%)	Item 1: 5	*Clarifying* Item 1: 4 Item 2: No *Corroborating* Item 1: 5 Item 2: 10 Item 3: Not applicable (ongoing) Item 4: Not applicable
OM'er on MSC – V3	Item 1: Not applicable Item 2: Not applicable	Item 1: 3	*Clarifying* Item 1: 4 Item 2: No *Corroborating* Item 1: Not applicable Item 2: Not applicable Item 3: Yes Item 4: No
SM'er on ACM t-staff – V4	Item 1: 4 plus Item 2: In-house (10%) trained and externally recruited (90%)	Item 1: 3	*Clarifying* Item 1: 5 Item 2: No *Corroborating* Item 1: 4 Item 2: 10 Item 3: Not applicable (ongoing) Item 4: Not applicable

Key: As per Table 6.34

Table 6.36: Case Study 3A: Exchange relationship information from interviews and documents

Decision Maker on Exchange	Variable
Centre Manager on Operations Manager	• No further information
Operations Manager on MSC	• No further information
Service Manager on Air Conditioning technical staff	• Exchange Relationship/Role Integrity: *"Goal posts can sometimes change"* (Source: Interview with Operations Manager) • TCE/OAS: *"Expectation that own staff go beyond technical issues into customer relations / sales etc"* Source: Interview with Service Manager)

6.8.2.2   Pattern matching and hypotheses testing

Having established empirical patterns and corresponding predicted patterns (in Table 6.34), as well as having checked the validity of the empirical patterns (using information from Table 6.35 and Table 6.36) the match or mismatch between the empirical patterns and the predicted patterns in Table 6.34 is now considered - in order to determine the extent to which data in this case study supports or contradicts the following hypotheses (detailed in Section 2.4.1):

- *Hypothesis Number 5* (concerning TCE): All of the empirical patterns match and are within the range of the TCE predicted patterns and, therefore, these results support this hypothesis;

- *Hypothesis Number 6* (concerning RDT): The one external exchange is on the boundary of the RDT predicted pattern, whilst the two other internal exchanges do not match the RDT predicted patterns. In these two mismatches, low buyer and supplier empirical scores (indicating a low level of mutual dependency) are recorded when high scores representing a high level of mutual dependency are predicted in relational exchanges. Therefore, these results mainly contradict this hypothesis; and

- *Hypothesis Number 7* (concerning a supply chain): In this case study, there is one external relationship – between the CM and MSC that is a discrete (efficient) exchange. This is inconsistent with the very relational exchange with technical staff within the MSC that is upstream of the CM. Therefore, these results contradict this hypothesis.

6.9 SCP ANALYSIS OF SELECTED MARKET SECTOR(S) ACROSS CASE STUDIES

6.9.1   Identification of relevant activity(ies)

Step 4 of the refutability procedure associated with the integrated framework of vertical integration (shown in Table 4.2 and explained in Section 4.4.2.1), specifies that: *in the case that an activity is the firm's principal source of competitive advantage, seek to corroborate the predicted mode of governance by assigning an SCP to the focal firm that corresponds to the level of this activity*.

The firm's principal source of competitive advantage, or the manner by which the firm adds value, is generated from some internalised activity. From a competence perspective, this is *raison d'être* of the firm. Table 6.37 summaries the internalised activities in each of the firms across all of the case studies.

Table 6.37: Internalised activities in case studies

Case Study	Firm & Internalised Activity(ies) (Level)
1	CM • Operations management (Level 2) • General maintenance (Level 3) MSC • Preventive maintenance (Level 2) • Generic DDC maintenance (Level 4a)
1A	CM • Operations management (Level 2) • General maintenance (Level 3) MSC • Preventive maintenance (Level 2)
2	CM • Operations management (Level 3) • General maintenance (Level 3) MSC • Preventive maintenance (Level 2) • Specific DDC maintenance (Level 1)
2A	CM (Same firm as Case Study 2) • Operations management (Level 3) • General maintenance (Level 3) MSC • Preventive maintenance (Level 2) • Specific DDC maintenance (Level 1)
3	CM • Operations management (Level 3)
3A	CM • Operations management (Level 3) MSC (Same firm as Case Study 1A) • Preventive maintenance (Level 2)

Of the internalised activities in Table 6.37, operations management and general maintenance are two of a number of other important activities provided by the CMs and which also includes overall centre management and leasing/marketing of the retail space. Moreover, the contribution

of the internalisation of operations management and general maintenance is stated in a number of the case studies in terms of reducing costs and not raising revenues for the firm (for example, Case Study 1 – Table 6.3, Case Study 2 – Table 6.15 and Case Study 3A – Table 6.33). On this basis, it is suspected that other activities beyond operations management and general maintenance may well be more likely candidates as principal sources of competitive advantage within CM firms. However, to show this, all these important activities within CMs would need to be studied and which is beyond the scope of this thesis.

With regard to DDC maintenance within the MSC firms noted in Table 6.37, the generic form of this maintenance performed by the MSC firm in Case Study 1 is said (by the Service Manager) to be undertaken to avoid the possibility of hold-up and this is supported by the very low scores on the Value (RBT) variable shown in Table 6.1. Also, preventive maintenance staff are four times the number of DDCS maintenance staff in this firm. Therefore, it is considered that generic DDCS maintenance is not the principal source of competitive advantage in this firm.

In contrast, there seems to be sufficient evidence to show that preventive maintenance is the principal source of competitive advantage in the MSCs internalising this activity in the case studies. Indeed, the MSCs in Case Study 1 and Case Study 2A indicate that this activity is their firm's *raison d'être* and all the MSCs that internalise this activity record high scores on the Value (RBT) variable – along with the highest proportion of their staff dedicated to the physical implementation of this activity (Tables 6.1, 6.7, 6.13, 6.19 and 6.31). The MSC in Case Study 3 is the only MSC in the case studies that externalises this activity and, in doing so, this firm indicates that its principal source of competitive advantage is not the physical implementation of the activity but rather the activity of managing the physical implementation of preventive maintenance.

In relation to the specific form of DDCS maintenance in the MSC firms in Case Study 2 and Case Study 2A, although both these firms have substantially more preventive maintenance staff than DDC maintenance staff (Table 6.13 and Table 6.19), both these firms note that their specific DDC maintenance activity is very profitable - in terms of the rate of return. More significantly,

both the MSCs in these case studies note the strong relationship between preventive maintenance and their specific DDC maintenance in terms of procuring new work. That is, specific DDC maintenance can generate new preventive maintenance work and visa versa. On this basis, there seems to be merit in conducting an SCP analysis for both preventive maintenance and specific DDC maintenance.

Accordingly, an SCP analysis will only be performed on preventive maintenance and specific DDC maintenance, with particular reference to all the MSCs - except the MSC in Case Study 3 (that does not internalise either activity).

6.9.2 SCP analysis pertaining to preventive maintenance and specific DDCS maintenance

6.9.2.1 From industry to sector analysis

The Structure-Conduct-Performance (SCP) model was briefly introduced in Section 4.4.1. In summary, it was explained that SCP is a general theoretical model, from industrial organisation economics, that can be used to inform the analysis of environmental threats and opportunities. The factors that can be used to measure the three components in the SCP model are summarised in Table 6.38. Having assessed these factors, the SCP can be used to classify an industry in terms of its market structure Along with duopoly (a special case of monopoly comprising two firms), the market structures in Table 6.38 represent a range of price competition, from reacting to intense price competition (perfect competition) to the power to set prices (monopoly). On the basis that the market structure represents stereotypical points in a continuum of pricing possibilities, the match between the SCP attributes and the industry's market structure is far from exact. Rather, the application of the SCP model merely allows some important characteristics from an industry to be revealed and, in overall terms, suggests that an industry may have a *tendency* towards a particular market structure.

Table 6.38: SCP pertaining to different types of industry (Source: Based on Barney 2002, 77)

Structure	Conduct	Performance	Market Structure
• One firm • Costly entry	• Use of market power to set prices	• Above normal	Monopoly
• Small number of competing firms • Homogenous or heterogeneous products • Costly entry and exit	• Collusion	• Above normal	Oligopoly
• Large number of competing firms • Heterogeneous products • Low cost entry and exit	• Cost leadership • Product differentiation	• Above normal	Monopolistic competition
• Large number of competing firms • Homogenous products • Low cost entry and exit	• Price taking	• Normal	Perfect competition

However, and as explained in Section 1.1.5, it is questionable whether activities like construction (including maintenance and repair) can be considered a single entity or industry – on the basis that different sectors of construction/maintenance use fundamentally distinct resource and skill bases. Indeed, the CIB W55 and W65 (Carassus, 2004) have adopted the focus on sectors, as opposed to one industry, as an approach to analysing the operation and function of construction activity (including maintenance and repair). Furthermore, within a sector of activity, it is possible to identify sub-sectors of firms that specialise in parts of maintenance activity.

For example, using the SCP model, de Valence (2003) classifies two main sectors (main contractors and subcontractors) and their sub-sectors in Australian construction activity (erection/new installation activity) in terms of the stereotypical market structures, as shown in Table 6.39. Here, de Valence notes that "one of the interesting aspects of this analysis is that on any given construction project, there will be a range of market structures in existence, with various different forms of competitive behaviour overlapping these" (2003, 823). He goes on to

conclude that the form the market structure takes in the building and construction industry depends on the sector being analysed.

Table 6.39: Market sectors/sub-sectors and structures in new construction (Source: Based on de Valence 2003, 824)

Market Structure	Main Contractors	Subcontractors
Monopoly	None	None
Oligopoly	Large main contractors	Lifts, building automation
Monopolistic competition	Some medium-sized contractors	Mechanical Services (HVAC)
Perfect competition	Many small and medium-sized contractors	Labour-based subcontracting

By taking a similar approach to de Valence (2003), Table 6.40 is developed to show the market structures for the sectors and sub-sectors supplying preventive maintenance and specific DDC maintenance services to air conditioning systems in Australian retail centres (Bridge 2008). The justification to Table 6.40, which uses SCP analysis in order to assign the markets structures to the sectors and sub sectors, follows this table. The "Structure" component of the SCP analysis relies on secondary data that provides details of the number of competing firms and gives an indication of the homogeneity / heterogeneity of the product and the cost of entry and exit. Whereas, the "Conduct" and "Performance" components of the SCP analysis draws from the case study data.

Table 6.40: Market sectors/sub-sectors and structures in preventive maintenance and specific DDCS maintenance to air conditioning systems (Source: Air Conditioning and Mechanical Contractors' Association, 2004 and Yellow Pages.com.au, 2004)[1]

Market Structure	Preventive Maintenance: Main MSCs	Specific DDCS maintenance: Either as a subcontractor supplying maintenance to own specific system or as part of main MSC contract supplying both preventive maintenance and maintenance to own specific system
Monopoly	None	None
Oligopoly	None	Large MSCs with own specific DDCS maintenance capability *Nationally - 5 firms* • All C&I *Brisbane/SEQ – 5 firms* • All C&I
Monopolistic competition	Large MSCs *Nationally - 16 firms (including the 5 Large MSCs with own specific DDCS maintenance capability)* • All C&I only *Brisbane/SEQ – 9 firms (including the 5 Large MSCs with own specific DDC maintenance capability)* • All C&I	
Perfect competition	Small and Medium-sized MSCs *Nationally - 735 firms* • C&I only – 354 firms • C&I and Hm – 79 firms • Hm only – 302 firms *Brisbane/SEQ - 129* • C&I only – 56 firms • C&I and Hm – 23 firms • Hm only – 50 firms	

Key:
• *SEQ = South East Queensland*
• *C&I = Commercial and Industrial*
• *Hm = Home / residential*

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[1] In terms of the ACMA directory, firms operating in more than state were counted once and those firms that occur in the ACMA directory and Yellow Pages are again only counted once. With regard to the Yellow Pages, firms listed under "Air Conditioning" - "Commercial & Industrial" were searched under "Service", "Maintenance", "Repairs" and "Warranty". Also firms listed under "Installation and Service" were searched under "Commercial and Industrial". Firms appearing in more than one list were counted once. A similar search was applied to firms listed under "Air Conditioning" – "Home", with the exception that under "Installation and Service" firms were searched using "Home Residential Domestic". Firms were counted once in terms of whether they provided either commercial/industrial services only, or commercial/industrial and home services only, or home services only.

6.9.2.2 "Structure"

In order to establish a sector, it is necessary to identity a pool of firms whose production and pricing decisions affect each other. Besanko et al. (2000) summaries an approach to identifying competitors based on the extent to which competitors' good/services are *substitutes*. The factors that affect a goods/services substitutability comprise its *performance characteristics*, its *occasions for use* and its *geographical market*.

Applying the "Structure" component only and employing the secondary data used in Table 6.40, it is clear that the 449 firms providing mechanical services maintenance (including at least some part of a Commercial/Industrial facility and excluding the 302 firms that service residential property only and which are outside the scope of this thesis) are not all competing against one another. More specifically, three sectors – each with different stereotypical market structures, can be identified.

One of these sectors concerns DDCSs . There are nine firms that cover practically the entire sector in Australia and that are capable of at least the manufacture and installation of their own proprietary DDCS . These firms are able to provide a level of maintenance / support to their DDCS throughout all states and territories in Australia and so the geographical constraints does not disperse the competition in this market sector. However, and in addition to the already small number of firms in this sector, the performance characteristics and occasions for use of this product operate to subdivide this sector and significantly further reduce the extent of competition in terms of the maintenance of highly specific DDCSs. First, in terms of performance characteristics, these DDCSs mainly differ in the extent to which the system can be accessed (in particular software) by firms other than the firm that designed the system. Such that, the five firms noted under the specific DDCS maintenance column in Table 6.39 are the only firms that can fully maintain their firm's own specific DDCS (illustrated by the MSCs in Case Study 2 and Case Study 2A). In contrast, all of the MSCs undertaking Commercial and Industrial work could readily develop the capability to maintain generic DDCSs designed and installed by the other four DDCS firms (as is the situation in Case Study 1). Second, and in relation to occasions for use, the specific and generic DDCSs differ in respect to the extent to which they are appropriate

to buildings of alternative sizes and varying levels of complexity. Here, the specific systems tend to be deployed in larger facilities and the generic systems in smaller facilities.

From this analysis of the numbers of competitors in this sector, it is evident that this market is highly concentrated and heterogeneous. Moreover, there is substantial investment in research and development involved by all the firms in this sector, including the time involved in their technicians' learning-by-doing and updating their skills to suit new software and hardware developments. This creates significant barriers to new firms wanting to enter this sector.

Accordingly, this sector is assigned to an oligopoly market structure and which is consistent with de Valence (2003) classification of new Building Automation installation/construction in Table 6.39. If this assignment is accurate, then the MSCs in Case Study 2 and Case Study 2A are expected to demonstrate market power (pertaining to the "Conduct" component) and earn above normal economic profit (relating to the "Performance" component).

The sector relating to preventive maintenance comprises 16 large MSC firms that only maintain commercial and industrial facilities and each of these firms operate in more than one state in Australia (as a separate subsidiary or licensed firm with a unique Australian Business Number for taxation purposes and consistent with an autonomous profit centre) and 433 small to medium-sized firms. The larger firms are able to differentiate their service, in so far as, they have enough technical staff to provide a non-interrupted and sufficiently responsive operation to larger facilities. These firms can also generate economies of scale (and choose to pass on some or all of these economies to CMs) by offering their service across a number of facilities. Moreover, where the facility has a specific DDCS , then one of the five large MSCs that owns this system may well have a competitive advantage in terms of performing the preventive maintenance. However, this may not always apply, as the decision maker may prefer to separate the DDCS from the preventive maintenance work (as illustrated in Case Study 1A).

In contrast to the large MSCs, the small to medium-sized MSCs maintain smaller facilities and are located within one state only. Here, the size of the firm appears to be an important factor in

determining the performance characteristics of MSCs. Once a retail centre reaches an important threshold point that makes it more appropriate to use chillers and chilled water, then this generally promotes the larger MSCs in terms of their capabilities in meeting the scope/range or scale of tasks involved. Beyond this, differences in the maintenance of retail centres occur mainly due to the size, complexity and age of the facility, as well as its maintenance policy. Notwithstanding this, these differences have little affect on the scope/range of tasks required on common alternative air conditioning systems, but rather have a greater affect on the extent/scale (or time) that each tasks takes. This reinforces the position that this sector is differentiated mainly based on the size of firms, in terms of the extent to which they can meet the extent/scale of work in different type/sizes of retail centre. The geographical scope of operations also seems important in terms of dispersing competition amongst the MSCs in this market sector. The fact that MSCs face a cost in transporting their resources to an immobile retail centre, means that the small-to-medium sized MSCs compete on a local/regional basis only. Overall, the substitutability of the product provided by MSCs seems to create two broad levels of service on a local basis.

Given that the nature/scope of preventive maintenance requirements to alternative retail centres appears to be relatively narrow, then there is greater homogeneity of the product in the MSC market sector in smaller facilities. Furthermore, barriers to entry for small-to-medium sized MSCs seem relatively modest. However, there may well be some significant investment involved in recruiting, training and retaining the scale of technical staff required by the larger MSCs, in order that these firms can maintain larger and more complex facilities.

As such, the 16 large MSCs in this sector are assigned to a monopolistic market structure and which is again consistent with de Valence (2003) classification of new HVAC installation/construction in Table 6.39. Whereas, the 433 small-medium sized MSCs are assigned to Perfect Competition. Furthermore, given the influence of geographical scope of operations on competition, and using Brisbane/SEQ as an example, there would be nine large MSCs (assigned to a monopolistic market structure) and 79 small to medium-sized MSC (assigned to perfect competition) in this locality. If these assignments are accurate, then the MSCs in Case Study 1 and Case Study 1A/3A are expected to demonstrate less market power (pertaining to the

"Conduct component") than the MSCs in Case Study 2 and 2A, although the MSCs in Case Study 1 and Case Study 1A/3A are still expected to earn above normal economic profit (relating to the "Performance" component).

6.9.2.3   "Conduct" and "Performance"

In this section, data from the case studies is used to support or contradict the market structure assignments in Table 6.40. This data is summarised in Table 6.41 and Table 6.42 and relates to the SCP items listed in Appendix 8.

Table 6.41:"Conduct" items

SCP: "Conduct" Items: Appendix 8	CS1 OM'er on MSC (V2)	CS1 SM'er on MSC (V4)	CS1A OM'er on MSC (V2)	CS1A SM'er on MSC (V4)	CS2 OM'er on MSC (V2)	CS2 SM'er on MSC (V5)	CS2A OM'er on MSC (V2)	CS2A SM'er on MSC (V5)	CS3A OM'er on MSC (V3)	CS3A SM'er on MSC (V4) (As CS1A)
Item 1 (Number)	4	NA	5	NA	3	NA	3 to 4	NA	3	NA
Item 2 (Prev'/Comp'/ Other)	Prev'	Prev' (100%)	Prev'	Prev' (70%) Comp' (30%)	Prev'	Prev' (90%) Comp' (10%)	Prev'	Prev' (83%) Comp' (17%)	Prev'	Prev' (70%) Comp' (30%)
Item 3 (Years)	1 to 3	5	3	1	3	2	3	1	2	1
Item 4 (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Item 5 (Open/List/ Neg')	NA	Open (30%) List (60%) Neg' (10%)	NA	Open (40%) List (30%) Neg' (30%)	NA	Open (30%) List (40%) Neg' (30%)	NA	Open (0%) List (50%) Neg' (50%)	NA	Open (40%) List (30%) Neg' (30%)
Item 6 (Client/ MSC/ Standard/ Other)	NA	Clients ("mostly")	NA	Na	NA	MSC ("mostly")	NA	Clients (15%) MSC (85%	NA	na
Item 7 (Yes/No)	NA	Yes	NA	Yes	NA	Yes	NA	Yes	NA	Yes
Item 8 (Number)	NA	80 (Clients) 600 (Contracts)	NA	700 (Clients) 400 (Contracts)	NA	na (Clients) 167 (Contracts)	NA	400 (Clients) 560 (Contracts)	NA	700 (Clients) 400 (Contracts)
Item 9 (Yes/No)	NA	Yes	NA	Na	NA	na	NA	No	NA	na
Item 10 (%)	NA	50% plus	NA	"majority"	NA	"majority"	NA	80%	NA	"majority"

Key:
- *CS (Number)*   = *Case Study Number*
- *Om'er*   = *Operations Manager*
- *SM'er*   = *Service Manager*
- *V(Number)*   = *Version of case study questionnaire+*
- *Prev'*   = *Preventive*
- *NA*   = *Not Applicable*
- *Neg'*   = *Negotiation*
- *Comp'*   = *Comprehensive*
- *na*   = *Not answered*

Table 6.42: "Performance" item

SCP: "Performance" Item: Appendix 8	CS1 SM'er on MSC (V4)	CS1A SM'er on MSC (V4)	CS2 SM'er on MSC (V5	CS2A SM'er on MSC (V5)	CS3A SM'er on MSC (V4) (As CS1A)
Item 1	Above average	Above average	Above average	Above average	Above average

Key: As per Table 6.41

The results for the "Conduct" items in Table 6.41 show that the four MSCs are fairly comparable on most of the items except two of the key "Conduct" items concerning the manner by which these firms are procured (Item 5) and the author of the terms and conditions of the contact (Item 6). As expected, the MSCs in Case Study 2 and Case Study 2A display greater market power then the MSCs in Case Study 1 and Case Studies 1A/3A, in so far as these firms obtain more work by negotiation and write most of their contracts. Again, as expected, all four MSCs earn above average profits as shown in Table 6.42.

6.9.2.4   Summary

The assignment of the MSCs in Case Study 2 and Case Study 2A to an oligopoly market structure and the MSCs in Case Study 1 and Case Study 1A/3A to a monopolistic market structure is supported by the SCP analysis in this section. Furthermore, these assignments corroborate the identification of Level 1 and Level 2 activities in the MSCs in Case Study 2 and Case Study 2A and the identification of Level 2 only activities in the MSCs in Case Study 1 and Case Study 1A/3A.

The SCP analysis of sectors and sub-sectors in this section also supports de Valence's (2003) expectation that on a given project, there may well be a range of market structures in existence. That is, Case Study 1A is evidence of a supply chain (that can be considered as the equivalent to a new construction project) that involves firms operating in different market structures. Here, the main MSC is assigned to a monopolistic market structure whilst its DDCS subcontractor is assigned to an oligopoly market structure.

6.10   STATIC / DYNAMIC ANALYSIS OF CASE STUDIES

The static / dynamic analysis of the case studies is based on items outlined in Appendix 8 and shown in Table 6.43 and Table 6.44. These items are designed to capture the extent to which decision making displays a static or stable orientation. A tendency towards a static, or stable, decision making environment promotes maximising behaviour and which, in turn, promotes the relative strengths of TCE and RBT that incorporate stronger forms of rationality than in RDT.

Table 6.43 shows that the make-or-buy decisions in the case studies have a lengthy history, with the mean time that these decisions have been in existence at approximately eight years. Moreover, having implemented this decision for this period there are no plans to change the decision across all decision makers and in all activities (with the one exception of the Operations Manager in Case Study 1A). Even with this exception, however, the manager notes that the extant approach will substantially prevail.

Table 6.44 shows that in terms of internal human resources in the case studies, there is again a lengthy period over which the relationship has developed, with the mean time that the typical human resource has maintained their employment with the firm for at least approximately five years. Furthermore, relationships in the case studies tend to be steady (with a mean score of 2.64), along with consistent approach to treating all resources and contractors the same across the firms (with a mean score of 2.65). Finally, there is an expectation for relationships to become closer (with a mean of 2.31) and which is consistent with a well established approach and unchanged outlook to the make-or-buy decision.

In summary, the make-or-buy decisions and decisions concerning the nature of the exchange relationship in the case studies display a static/stable orientation. Therefore, this is expected to promote the relative strengths of TCE and RBT.

Table 6.43: Case Study Static/dynamic items pertaining to the make-or-buy decision

Decision maker on activity Version of Case Study Questionnaire	Item 1: Time approach to sourcing existed (Years)	Item 2: Plans to change approach to sourcing (Yes/No)
Case Study 1 Centre Manager on OM'mt-Version 1	3	No
Case Study 1 Operations Manager on GM'ce-Version 2	5	No
Case Study 1 Operations Manager on PM'ce-Version 2	5	No
Case Study 1 Service Manager on PM'ce-Version 4	4.5	No
Case Study 1 Service Manager on DDC'ce-Version 4	4.5	No
Case Study 1A Centre Manager on OM'mt-Version 1	3	No
Case Study 1A Operations Manager on GM'ce-Version 2	10	No
Case Study 1A Operations Manager on PM'ce-Version 2	10	Yes (from 100% outsource to 70% outsource)
Case Study 1A Service Manager on PM'ce-Version 4	20	No
Case Study 1A Service Manager on DDC'ce-Version 4	20	No
Case Study 2 Centre Manager on OM'mt-Version 1	1	No
Case Study 2 Operations Manager on GM'ce-Version 2	7	No
Case Study 2 Operations Manager on PM'ce-Version 2	7	No
Case Study 2 Service Manager on PM'ce-Version 5	10	No
Case Study 2 Service Manager on DDC'ce-Version 5	10	No
Case Study 2A Centre Manager on OM'mt-Version 1	"At least a few years"	No
Case Study 2A Operations Manager on GM'ce-Version 4	5	No
Case Study 2A Operations Manager on PM'ce-Version 4	5	No
Case Study 2A Service Manager on PM'ce-Version 5	10	No
Case Study 2A Service Manager on DDC'ce-Version 5	10	No
Case Study 3 Centre Manager on OM'mt-Version 1	4	No
Case Study 3 Operations Manager on PM'ce-Version 3	4	No
Case Study 3 Service Manager on PM'ce-Version 6	15	No
Case Study 3A Centre Manager on OM'mt-Version 1	10	No
Case Study 3A Operations Manager on PM'ce-Version 3	3	No
Case Study 3A Service Manager on PM'ce-Version 4	20	No

Key:
OM'mt   *= Operations Management*
GM'ce   *= General Maintenance*
PM'ce   *= Preventative Maintenance*
DDCM'ce   *= Direct Digital Controls Maintenance*

Table 6.44: Case Study Static/dynamic items pertaining to the exchange decision

Case Study Decision maker on exchange Version of case study Questionnaire	Item 1: Steadiness of Relationship (7-point: 1=Steady)	Item 2: Relationship likely To become closer (7-point: 1=Likely)	Item 3: All human resources / contractors treated the same (7-point: 1=Same)	Item 4: Time typical human resource been with firm (Years)
Case Study 1 CM'er on Om'er V1	2	2	2	2
Case Study 1 Om'er on GMt-staff V2	3	3	2	"Few years"
Case Study 1 Om'er on MSC V2	3	3	2	Not applicable
Case Study 1 SM'er on ACMt-staff V4	2	3 (reversed score)	2	"More than 5 years"
Case Study 1 SM'er on DDCt-staff V4	2	3 (reversed score)	4	"More than 5 years"
Case Study 1A CM'er on Om'er V1	1	1	3	4
Case Study 1A Om'er on GMt-staff V2	Not answered	Not answered	Not answered	Not answered
Case Study 1A Om'er on MSC V2	4	2	Not answered	Not applicable
Case Study 1A SM'er on ACMt-staff V4	2	2 (reversed score)	2	"At least 5 to 10 years"
Case Study 1A SM'er on DDC SC V4	4	4	4	Not applicable
Case Study 2 CM'er on Om'er V1	2	2	2	Not answered
Case Study 2 Om'er on GMt-staff V2	1	1	1	Not answered
Case Study 2 Om'er on MSC V2	4	3	2	Not applicable
Case Study 2 SM'er on ACMt-staff V5	2	3 (reversed score)	3	"A long time 5 to 10 years"
Case Study 2 SM'er on DDCt-staff V5	2	3 (reversed score)	3	"A long time 5 to 10 years"
Case Study 2A CM'er on Om'er V1	3	3	Not answered	Not answered
Case Study 2A Om'er on GMt-staff V2	2	2	2	2
Case Study 2A Om'er on MSC V2	4	2	5	Not applicable
Case Study 2A SM'er on ACMt-staff V5	4	2 (reversed score)	4	"Most between 5 to 10 years"
Case Study 2A SM'er on DDCt-staff V5	4	2 (reversed score)	4	"Most between 5 to 10 years"
Case Study 3 CM'er on Om'er V1	3	3	3	5
Case Study 3 Om'er on MSC V3	2	2	2	Not applicable
Case Study 3 SM'er on Subcontract V6	2	2 (reversed score)	3	Not applicable
Case Study 3 CM'er on Om'er V1	2	2	2	8
Case Study 3 Om'er on MSC V3	4	3	2	Not applicable
Case Study 3 SM'er on ACMt-staff V4	2	2 (reversed score)	2	"At least 5 to 10 years"

Key:
CM'er = Centre Manager (internal to CM)   *GM t-staff = General Maintenance technical staff*
OM'er = Operations Manager (internal to CM)   *ACM t-staff = Air Conditioning Maintenance tech' staff*
SM'er = Service Manager (internal to MSC)   *DDC t-staff = Direct Digital Controls technical staff*
DDC SC = Direct Digital Controls Subcontractor

6.11   SUMMARY

This chapter presented the data from the case studies using a "whole story" approach. That is, each case study is addressed individually including a summary statement commenting on the extent to which the data in the case study either supports or contradicts the hypotheses.

CHAPTER 7 ANALYSIS OF SURVEY DATA

7.1 INTRODUCTION

In contrast to the analysis of the case study data, which treated each case study as a "whole story" when testing the hypotheses, the analysis of the survey data involves the aggregation of the data from the MSCs and CMs in order to address the make-or-buy hypotheses and the nature of the exchange relationship hypotheses. However, and in common with case study data analysis, the survey data analysis incorporates an analysis of the same "Conduct" and "Performance" items and the same analysis of static/dynamic items.

Before proceeding to aggregate the MSC and CM survey data and test the hypotheses, the reliability of the survey data is analysed. First, respondent reliability is assessed. That is, the extent to which the respondents within each of the MSC and CM data sets are homogeneous in terms of their responses to individual items. This is then followed by an evaluation of the extent to which the item scales are correlated, or inter-item reliability.

7.2 RELIABILITY OF DATA

7.2.1 Respondent reliability

7.2.1.1 Control variables

As mentioned in Section 5.3.2.4 and Section 5.5.3.3.3, a number of control variables were included in the two versions of the survey, and which are designed to facilitate an assessment of the extent to which the respondents within each of the MSC and CM data sets are homogeneous in terms of their responses to individual items.

It can be seen from Appendix 11, that there are both continuous and categorical variables across both the control variables and the other dependent and independent variables. Table 7.1 and Table 7.2 summarise the control variables and the other variables (with reference to Appendix 14 and Appendix 15), along with the parametric and non-parametric techniques used to analyse the relationship between the control variables and other variables.

Table 7.1: Control variables in MSC version of questionnaire (Appendix 14) and statistical techniques

Type of control variable	Type of dependent/independent variable	Statistical technique
Continuous question • 6b Years in existence • 7a Type of work (% Shops) • 7b Type of work (% Other Commercial & Industrial) • 7c Type of work (% Residential) • 7d Type of work (% Other)	Continuous question • 9a 9b 9c 9d 10a 10b 10c 10d 11a 11d1 11d2 11d312a 12b 13b1 13b2 14 17a 17b 18 20g 21 23 24 26 27 28 29 30 31 32 33 34 35 36 37c 38a 39a 39b 40a 40b 41a 41b 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67	• Pearson correlation coefficient – two tailed (Parametric) • Spearman correlation coefficient – two tailed (Non-parametric)
Continuous question • 6b Years in existence – converted to 6a (1=2001 and 2=2002 or after) • 7 Type of work – converted to 7e (1=>50% shops/C&I and 2=>50% residential)	Categorical question • 11b 11c 13a 16 19 25a 25b 25c 38b 42e	Not technically correct to analyse continuous control variable and categorical other variable, therefore, continuous control variable is converted to a categorical variable (based on theory) and the relationship analysed using: • Spearman correlation coefficient – two tailed (Non-parametric)
Categorical question • 1a Geographical area (9 categories) • 8 Capable of servicing at least small retail centre (1=Yes and 2=No) – as less than 2 in second category this control variable not used • 15 Turnover (7 categories)	Continuous question • 9a 9b 9c 9d 10a 10b 10c 10d 11a 11d1 11d2 11d3 12a 12b 13b1 13b2 14 17a 17b 18 20g 21 23 24 26 27 28 29 30 31 32 33 34 35 36 37c 38a 39a 39b 40a 40b 41a 41b 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67	As the two control variables used comprise three or more categories: • Analysis of Variance – ANOVA (Parametric) • Kruskal-Wallis *H* test (Non-parametric)
Categorical question • 1a Geographical area (9 categories) • 8 Capable of servicing at least small retail centre (1=Yes and 2=No) – as less than 2 in second category this control variable not used • 15 Turnover (7 categories)	Categorical question • 11b 11c 13a 16 19 25a 25b 25c 38b 42e	• Spearman correlation coefficient – two tailed (Non-parametric)

Table 7.2: Control variables in CM version of questionnaire (Appendix 15) and statistical techniques

Type of control variable	Type of dependent/independent variable	Statistical technique
Continuous question • 1d Size of centre (m^2)	Continuous question • 8a 8b 9 14b 17a 19a 22 23 24 25 26 27 28 29 30 31 32a 33a 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59	• Pearson correlation coefficient – two tailed (Parametric) • Spearman correlation coefficient – two tailed (Non-parametric)
Continuous • 1d Size of centre (m^2) – converted to 1c (1=>50,000m^2 and 2=30 to 50,000m^2 and 3=<30,000m^2)	Categorical • 10a 13e 15 16 17b 17c 17d 18d 20a 20b 20c 21 33b 34 35e	Not technically correct to analyse continuous control variable and categorical other variable, therefore, continuous control variable is converted to a categorical variable (based on theory) and the relationship analysed using: • Spearman correlation coefficient – two tailed (Non-parametric)
Categorical question • 1a Geographical area (8 categories)	Continuous question • 8a 8b 9 14b 17a 19a 22 23 24 25 26 27 28 29 30 31 32a 33a 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59	As the control variables comprises three or more categories: • Analysis of Variance – ANOVA (Parametric) • Kruskal-Wallis *H* test (Non-parametric)
Categorical • 1a Geographical area (8 categories)	Categorical • 10a 13e 15 16 17b 17c 17d 18d 20a 20b 20c 21 33b 34 35e	• Spearman correlation coefficient – two tailed (Non-parametric)

7.2.1.2 Analysis of control variables in MSC data

Table 7.3 and Table 7.4 show the results of the analysis of the control variables with the other variables in the MSC version of the questionnaire in terms of highlighting (with an "X") those relationships that are statistically significant ($p \leq .05$) under *both* the parametric and non-parametric techniques. Table 7.3 comprises the principal variables (listed in Appendix 11) that are common to both the MSC and CM versions of the questionnaire and are the main source of testing the hypotheses. A number of the cells are not applicable and blocked-out in this table

under the question 6a and question 7e control variables (categorical variable) columns, as a different and extant continuous version of these control variables has been analysed with the other continuous variables. Whilst Table 7.4 shows the clarifying and corroborative items (also listed in Appendix 11). Again, a number of cells are not applicable and blocked-out in the question 6b, 7a to 7d control variables (continuous variable) columns, as their relationship with categorical variables is not technically able to be analysed and, hence, a categorical version of the these control variables was created (question 6a and question 7e).

Table 7.3: Results of the analysis of the control variables with the principal variables in the MSC version of the questionnaire

Principal Variables	Control Variable 1a	Control Variable 6a	Control Variable 6b	Control Variable 7a	Control Variable 7b	Control Variable 7c	Control Variable 7d	Control Variable 7e	Control Variable 15
17a									
17b									
20g						X			X
26									
27									X
28						X			
29									
30									
31						X			X
34									
37c									
43									
44						X			
45									
46									
47									
48									
50									
51									
52									
53						X			
54									
55									
56						X			
58									
59									
60									
61									
62							X		
63					X	X			
64									
65									
66									
67					X	X			

Table 7.4: Results of the analysis of the control variables with the clarifying and corroborative variables in the MSC version of the questionnaire

Clarifying/ Corroborative Variables	Control Variable 1a	Control Variable 6a	Control Variable 6b	Control Variable 7a	Control Variable 7b	Control Variable 7c	Control Variable 7d	Control Variable 7e	Control Variable 15
~~9a~~	X	▓		X		X			
~~9b~~		▓				X		▓	X
~~9c~~		▓		X				▓	X
9d		▓						▓	
~~10a~~		▓		X				▓	
~~10b~~		▓		X				▓	
10c		▓						▓	
10d		▓						▓	
11a		▓						▓	
11b			▓	▓	▓	▓	▓		
11c			▓	▓	▓	▓	▓		
~~11d1~~		▓			X			▓	X
11d2		▓						▓	
11d3		▓						▓	
~~12a~~		X						▓	X
~~12b~~		▓						▓	X
13a			▓	▓	▓	▓	▓		
~~13b1~~		▓				X		▓	
~~13b2~~		▓						▓	X
14		▓						▓	
16			▓	▓	▓	▓	▓		
~~18~~		X				X		▓	X
19a			▓	▓	▓	▓	▓		
~~21~~		X						▓	
23		▓						▓	
~~24~~		X						▓	X
25a			▓	▓	▓	▓	▓		
25b			▓	▓	▓	▓	▓		
25c			▓	▓	▓	▓	▓		
32		▓						▓	
33		▓						▓	
35		▓						▓	
36		▓						▓	
38a		▓						▓	
38b			▓	▓	▓	▓	▓		
39a		▓						▓	
39b		▓						▓	
~~40a~~		▓			X	X		▓	
~~40b~~		▓			X			▓	
~~41a~~		▓		X				▓	
41b		▓						▓	
42e			▓	▓	▓	▓	▓		
49									
57		▓						▓	

A number of the relationships in Table 7.3 and Table 7.4 are marked with an "X" indicating that they are statistically significant under both parametric and non-parametric analysis. As explained in Section 5.5.3.3.3, these statistically significant relationships are deemed insufficiently homogenous. With regard to Table 7.4, the 16 clarifying and corroborating variables that have a statistically significant relationship with the control variables are crossed-out and not carried forward as part of the data used to test the hypotheses. In terms of Table 7.3, there are ten emboldened variables that have a statistically significant relationship with at least one of the control variables and which are detailed in Table 7.5.

All of the ten principal variables in Table 7.5 are required to test the hypotheses. Therefore, these ten principal variables received further investigation in terms of the effect of omitting certain respondents and varying the level of the control variable – on the basis of matters related to scope.

Table 7.5: Principal variables in MSC version of questionnaire with statistically significant relationship with control variables

Control variable	Principal Variable
q7b *What types of building does your firm service & maintain? Please insert approximate percentages: Other Commercial and Industrial:_____%*	Positive relationship with: • q63 *Each of my firm's typical technical staff works exclusively for my firm.* Negative relationship with: • q67 *I think it is reasonably straightforward for one of my firm's typical air conditioning technical staff to leave my firm and work for a different firm in the same or related job.*
q7c *What types of building does your firm service & maintain? Please insert approximate percentages: Residential:_____%*	Positive relationship with: • q53 *My firm is able to reasonably predict the <u>range</u> of air conditioning service and maintenance tasks, in one of my firm's typical buildings.* • q56 *My firm is able to reasonably <u>describe/specify</u> the performance requirements for its air conditioning technical staff in terms of one of my firm's typical buildings.* • q67 *I think it is reasonably straightforward for one of my firm's typical air conditioning technical staff to leave my firm and work for a different firm in the same or related job.* Negative relationship with: • q28 *My firm's relationship with this typical member of staff is reasonably complex, as it may involve this staff member developing relationships with others, e.g. clients, operations managers, other contractors etc.* • q31 *The terms and conditions of the initial employment contract with this typical member of staff are ongoing with general performance requirements described.* • Q44 *The percentage of air conditioning work performed in-house (using direct employees) that I inserted in <u>Question 17</u> is central to my firm's core business.* • Q63 *Each of my firm's typical technical staff works exclusively for my firm.*
q7d *What types of building does your firm service & maintain? Please insert approximate percentages: Other:_____%*	Positive relationship with: • Q20g *How many service & maintenance in-house staff (employees) are there in your firm? Please insert approximate numbers: Total Technical:_____* Negative relationship with: • Q61 *I would expect a typical air conditioning technical member of staff to take some sort of immediate action to correct what they may feel is unsatisfactory pay/working conditions.*
q15 *What was the approximate <u>total</u> annual turnover of all your firm's service & maintenance works last year? Please tick one box:* *Up to $500,000* ☐ *$500,000 to $1million* ☐ *$1 to 2.5million* ☐ *$2.5 to 5million* ☐ *$5 to 10million* ☐ *$10 to 15million* ☐ *Over $15million* ☐	Relationship with: • Q20g *How many service & maintenance in-house staff (employees) are there in your firm? Please insert approximate numbers: Total Technical:_____* • Q27 *This typical staff member has the expectation that they would continue to be used on alternative jobs should the particular jobs they mostly currently work on come to an end.* • Q31 *The terms and conditions of the initial employment contract with this typical member of staff are ongoing with general performance requirements described.*

The SCP analysis of the market concerning preventive maintenance (summarised in Table 6.40) indicated that the vast majority of MSCs operate in market conditions pertaining to perfect competition. Despite this, the case studies showed that preventive maintenance can be assigned as a Level 2 activity in each of the four MSCs that internalised this activity in the case studies. Consistent with this, each of these firms were assessed as operating under at least monopolistic

market conditions. The clearest delineation of these four large MSCs in the case studies concern turnover. Each of these firms' turnover was greater than $10 million.

As one of the control variables concerns turnover (question 15) and as this control variable was revealing three significant relationships, it seemed appropriate to delete MSCs in the survey with a turnover over $10million (that is, four respondents – leaving 92 MSC respondents) and, in doing so, refine the survey in terms of a focus on the vast majority of small to medium-sized MSCs. The results of deleting the four large MSC respondents to the survey is shown in Table 7.6 – in terms of the remaining statistically significant relationships.

Table 7.6: Results of the analysis of the control variables with the principal variables in the MSC version of the questionnaire – after deleting four large MSCs

Principal Variables	Control Variable 1a	Control Variable 6a	Control Variable 6b	Control Variable 7a	Control Variable 7b	Control Variable 7c	Control Variable 7d	Control Variable 7e	Control Variable 15
20g			X			X			X
28						X			
31						X			
53						X			
56					X	X			
63					X	X			
67						X			

Table 7.6 shows that there was still one statistically significant relationship in connection with the question 15 control variable that concerned turnover. This indicates that MSCs operating under monopolistic conditions may have a turnover below $10million. Rather than deleting further respondents and unnecessarily removing data, question 20g was divided into those respondents with a turnover less than $5million (question 20gH1 – 81 respondents) and those respondents with a turnover greater than $5million (question 20gH2 – 11 respondents). Question 20gH1 was then re-tested with respect to all the control variables and this now showed no relationships that were statistically significant across both the parametric and non-parametric techniques (including the relationship between question 20gH1 and the control variable question 6b) and, therefore, respondents to question 20gH1 are now deemed sufficiently homogenous. This outcome suggests that the lower limit, in terms of turnover, for larger MSC operating in monopolistic conditions lies somewhere between $5 million to $10 million.

This left the statistically significant relationships that concerned the extent of commercial and industrial work (question 7b control variable) versus the extent of residential work (question 7c control variable). The thesis is delimited in terms of excluding MSCs that undertake 100% residential work. Related to this delimitation, question 28 and question 67 were divided into those respondents with less than 90% residential work (question 28H1 and question 67H1 respectively - 89 respondents) and those respondents with 90% to 95% residential work (question 28H2 and question 67H2 respectively – 3 respondents). Question 28H1 and question 67H1 were then re-tested with respect to all the control variables and this now showed no relationships that were statistically significant across both the parametric and non-parametric techniques and, therefore, respondents to question 28H1 and question 67H1 are now deemed sufficiently homogenous.

In a similar way, question 53 and question 63 were divided into those respondents with less than 70% residential work (question 53H1a and question 63H1a respectively - 84 respondents) and those respondents with greater than 70% residential work (question 53H2a and question 63H2a respectively – 8 respondents). Question 53H1a and question 63H1a were then re-tested with respect to all the control variables and this now showed no relationships that were statistically significant across both the parametric and non-parametric techniques and, therefore, respondents to question 53H1 and question 63H1 are now deemed sufficiently homogenous.

Again, in a similar way, question 56 was divided into those respondents with less than 50% residential work (question 56H1b - 78 respondents) and those respondents with greater than 50% residential work (question 56H2b – 14 respondents). Question 56H1b and was then re-tested with respect to all the control variables and this now showed no relationships that were statistically significant across both the parametric and non-parametric techniques and, therefore, respondents to question 56H1b was now deemed sufficiently homogenous.

Once again, following the above approach, question 31 was divided into those respondents with less than 10% residential work (question 31H1c - 50 respondents) and those respondents with greater than 10% residential work (question 31H2c – 42 respondents). Question 31H1c was then re-tested with respect to all the control variables and this now showed no relationships that were

statistically significant across both the parametric and non-parametric techniques and, therefore, respondents to question 31H1c was now deemed sufficiently homogenous.

7.2.1.3   Analysis of control variables in CM data

Table 7.7 and Table 7.8 show the results of the analysis of the control variables with the other variables in the CM version of the questionnaire, again, in terms of highlighting (with an "X") those relationships that are statistically significant ($p \leq .05$) under *both* the parametric and non-parametric techniques. Table 7.7 comprises the principal variables (listed in Appendix 11) that are common to both the MSC and CM versions of the questionnaire and are the main source of testing the hypotheses. A number of the cells are not applicable and blocked-out in this table under the question 1c control variable (categorical variable) column, as a different and extant continuous version of these control variables has been analysed with the other continuous variables. Whereas, Table 7.8 shows the clarifying and corroborative items (also listed in Appendix 11). Again, a number of cells are not applicable and blocked-out in the question 1d control variable (continuous variable) column, as the relationship with categorical variables is not technically able to be analysed and, hence a categorical version of these control variables was created (question 1c).

Table 7.7: Results of the analysis of the control variables with the principal variables in the CM version of the questionnaire

Principal Variables	Control Variable 1a	Control Variable 1c	Control Variable 1d
8a			
8b			
19b			X
22			
23			
24			
25			
26			X
27			X
30			
32b			X
36			
37			
38			X
39			X
40			X
41			
43			
44			
45			
46	**X**		X
47			
48			X
50			
51			
52			
53			
54			
55	**X**		
56			
57			
58			
59			

Table 7.8: Results of the analysis of the control variables with the clarifying and corroborative variables in the CM version of the questionnaire

Clarifying/Corroborative Variables	Control Variable 1a	Control Variable 1c	Control Variable 1d
9		▓	
10a			▓
14b		▓	
13e			▓
16			▓
~~17a~~		▓	X
17b			▓
17c			▓
17d			▓
18d			▓
20a			▓
20b			▓
20c			▓
21			▓
28		▓	
29		▓	
31		▓	
33a		▓	
33b			▓
34			▓
35e			▓
42		▓	
49		▓	

A number of the relationships in Table 7.7 and Table 7.8 are marked with an "X" , indicating that they are statistically significant under both parametric and non-parametric analysis and deemed insufficiently homogenous. With regard to Table 7.8, the one clarifying and corroborating variable (question 17a) that has a statistically significant relationship with the control variables is crossed-out and not carried forward as part of the data used to test the hypotheses. In terms of Table 7.7, there are ten emboldened variables that have a statistically significant relationship with at least one of the control variables and which are detailed in Table 7.9.

All of the ten principal variables in Table 7.7 are required to test the hypotheses. Therefore, these ten principal variables received further investigation in terms of the effect of omitting certain respondents and varying the level of the control variable, again, on the basis of matters related to scope.

Table 7.9: Principal variables in CM version of questionnaire with statistically significant relationship with control variables

Control variable	Principal Variable
q1a *Geographical area (state)*	Relationship with: • q46 *My firm (including using any consultants) is able to reasonably estimate the <u>time/duration</u> required to complete most of the air conditioning maintenance tasks that may arise in my centre.* • q55 *I suspect that a typical air conditioning maintenance contractor in my centre earns a small proportion of their total revenue from servicing the centre(s) my firm manages.*
q1d *Size of centre (m²)*	Positive relationship with: • q19b *Total FTE staff* • q32b *Total FTE days* • q26 *My firm monitors the performance of this typical air conditioning maintenance contractor in reasonable detail and on a fairly frequent basis.* • q27 *The terms and conditions of the contract with this typical air conditioning maintenance contractor are in detail, with performance requirements specified.* • q46 *My firm (including using any consultants) is able to reasonably estimate the <u>time/duration</u> required to complete most of the air conditioning maintenance tasks that may arise in my centre.* • 48 *My firm (including using any consultants) is able to reasonably <u>describe/specify</u> the performance requirements for an air conditioning maintenance contractor in my centre.* Negative relationship with: • q38 *I think the technology, knowledge, practices etc required by an air conditioning maintenance contractor to service my centre are possessed by most of the commercial & industrial air conditioning service & maintenance contractors in the locality of my centre.* • q39 *In the locality of my centre, there is a reasonable supply of air conditioning maintenance contractors that are capable of servicing & maintaining my centre.* • q40 *I imagine that it is straightforward for rival air conditioning maintenance contractors in the locality of my centre to develop and match the technology (hardware, software), knowledge, skills, policies, procedures and practices etc required to service my centre.*

Case study 1A showed that preventive maintenance was a Level 6 activity relative to the CM firm that externalised this activity in the very large centre (greater than 85,000m² / SpR centre). Moreover, this activity is performed by a large MSC that internalised this activity as a Level 2 activity. The SCP analysis of the market concerning preventive maintenance (summarised in Table 6.40) indicated that Level 2 activities are, indeed, the purview of large MSCs operating in at least monopolistic market conditions. On this basis, and given that question 1d control variable accounted for most of the statistically significant relationships, eight of the CM respondents that answered in respect of very large (SpR) centres were omitted - leaving 101 CM respondents. In doing so, this effectively aligned the CM respondents (now reflecting a greater proportion of smaller to medium-sized centres but still with some large centres) with the MSC data set. That is, having omitted the large MSC respondents the remaining small-medium sized MSCs are firms that are more likely to service the small to medium-sized retail centres - that

represents the vast majority of the different types of retail centres across Australia. The results of omitting the eight very large CM respondents to the survey is shown in Table 7.10 – in terms of the remaining statistically significant relationships.

Table 7.10: Results of the analysis of the control variables with the principal variables in the CM version of the questionnaire – after omitting eight very large CMs

Principal Variables	Control Variable 1a	Control Variable 1c	Control Variable 1d
26			X
27			X
38			X
39			X
40			X
48	X		X

Table 7.10 shows that there are still statistically significant relationships in connection with question 1d control variable that concerned the size of the retail centre. This indicates that there remains scope to more closely align the size of the centres with the smaller-to medium sized MSCs. Again, rather than omitting further whole respondents and unnecessarily discarding data, questions 26, 40 and 41 were divided into those respondents reporting on a centre less than 50,000m^2 (questions 26H1, 40H1 and 48H1 respectively – 94 respondents) and those respondents reporting on a centre greater than 50,000m^2 (questions 26H2, 40H2 and 48H2 respectively – 7 respondents). Questions 26H1, 40H1 and 48H1 were then re-tested with respect to all the control variables and this now showed no relationships that were statistically significant across both the parametric and non-parametric techniques (including the relationship between question 48H1 and control variable question 1a that had previously been statistically significant) and, therefore, respondents to these questions were now deemed sufficiently homogenous.

In a similar way, question 27 was divided into those respondents reporting on a centre less than 40,000m^2 (questions 27H1a – 86 respondents) and those respondents reporting on a centre greater than 40,000m^2 (question 27H2a respectively – 15 respondents). Question 27H1a was then re-tested with respect to all the control variables and this now showed no relationships that were statistically significant across both the parametric and non-parametric techniques and, therefore, respondents to these questions were now deemed sufficiently homogenous.

Once again, following the above approach, questions 38 and 39 were divided into those respondents reporting on a centre less than 30,000m^2 (questions 38H1b and 39H1b respectively – 65 respondents) and those respondents reporting on a centre greater than 30,000m^2 (questions 38H2b and 39H2b respectively – 36 respondents). Questions 38H1b and 39H1b were then re-tested with respect to all the control variables and this now showed no relationships that were statistically significant across both the parametric and non-parametric techniques and, therefore, respondents to these questions were now deemed sufficiently homogenous.

7.2.1.4   Summary and implications of the adjustments for the control variables

With regard to the MSC respondents, this data set excludes respondents to all questions from firms that have an annual turnover greater than $10 million. Moreover, question 20g (now 20gH1) is further restricted to MSCs with a turnover of less than $5million and questions 28 (now 28H1), 31 (now 31H1c), 53 (now 53H1a), 56 (now 56H1b), 63 (now 63H1a) and 67 (now 67H1) are further restricted to MSCs undertaking specified levels of residential works – as follows:

- Questions 28H1 and 67H1: less than 90% residential;
- Questions 53H1a and 63H1a: Less than 70% residential;
- Question 56H1b: Less than 50% residential; and
- Question 31H1c: Less than 10% residential.

In terms of CM respondents, this data set excludes responses to all questions from CMs reporting on centres greater than 85,000m^2 (SpR centres) and questions 26 (now 26H1), 27 (now 27H1a), 38 (now 38H1b), 39 (now 39H1b), 40 (now 40H1) and 48 (now 48H1) are further restricted with respect to the size of the centre as follows:

- Questions 26H1, 40H1 and 48H1: Less than 50,000m^2;
- Question 27H1a: less than 40,000m^2; and
- Questions 38H1b and 39H1b: less than 30,000m^2.

On the basis of taking the greatest level of restrictions, the implication of the adjustments for the controls are that the results of testing the hypotheses using the survey data can be generalised to:

- All MSCs with a turnover up to $5million and undertaking up to 10% residential work; and
- All retail centres up to 30,000m^2.

Referring to Table 6.40, this level of generalisation means that the results of the survey represent all of the 354 small to medium-sized MSCs firms that undertake commercial and industrial work only, as well as a likely small proportion of the 79 small to medium-sized MSCs firms that undertake commercial and industrial work and residential work. This amounts to at least 354 firms out of a national total of 449 firms, or 79 percent coverage, of the MSC firms undertaking at least some commercial and industrial work in Australia. Moreover, the results of the survey also represent at least 1,085 centres (SbRC, NC, BGC, TC, M) with respect to the national total of 1,337 retail centres in Australia. Using the area classification of each of the different types of centre (Section 1.1.3), this equates to 12,655,000m^2 GLAR out of the national total of 19,125,000m^2 GLAR, or 66 percent coverage.

Having made adjustments concerning statistical significance to ensure a sufficient level of homogeneity in both the MSC data set (File 1) and the CM data set (File 2), the responses to all the questions that make-up the principal items were then copied into File 3. In File 3, approximately the top half of rows comprised data from the MSC questionnaire (each of these top rows representing one MSC respondent) and approximately the bottom half of rows contained data from the CM questionnaire (each of these bottom rows representing one CM respondent). Such that, each column represented one of the principal items in Appendix 11. For example, the column concerning Item 1 Solidarity was made-up of approximately the top half of responses from each of the MSCs to Question 26 in the MSC version of the questionnaire, followed by approximately the bottom half of responses from each of the CMs to Question 22 in the CM version of the questionnaire (as noted on the first page of Appendix 11). The next step concerned the reliability of the data at the level of the individual items.

7.2.2 Inter-item reliability

As explained in Section 5.5.3.3.3, part of the approach to addressing reliability in this thesis is to use the internal consistency approach, or inter-item reliability. Here, two or more items (question and response format) are used as a measure of a variable. If these two or more items pertaining to the same variable are reliable, then they should generate a similar score. All of the principal items (common to both the MSC and CM versions of the survey questionnaire) comprise a two or more item scale, with the exception of the make-or-buy dependent variable and the RDT independent variables (as explained in Section 5.3.2.4.1). The principal item scales are tested for their inter-item reliability and used as the main source of data to test the hypotheses.

More specifically, the approach is to test the item scales for correlation. Consistent with the approach used to analyse the effect of the control variables on all other dependent and independent variables, Pearson correlation coefficient and Spearman correlation coefficient are used for 2-Item scales. If a statistically significant relationship was found, and on the basis that it is preferable to use as much of the data as possible, then the mean of the two items was computed and used to represent the item-scale. With regard to 3 or more-Item scales, Cronbach's alpha coefficient is used. Here, an alpha ≥ 0.7 was used as the cut-off in terms of a reliable scale (Nunnally 1978) and in terms of determining when to compute a mean score - of the three or more items in the scale, to represent the item-scale.

Tables 7.11, 7.12 and 7.13 show the results of this approach to testing the item scales for correlation and, where applicable, the mean of the item scales is also shown. In summary, and with the exception of Human Asset Specificity, all the item scales had either an alpha $\geq .7$ or were significantly correlated and, therefore, a mean of the items in each scale was computed. With regard to the Human Asset Specificity, the lack of correlation between Item 1 and Item 2 is created by the discrepancy between the number of days reported by the MSCs versus the CMs. This discrepancy is thought to be caused by a misinterpretation on behalf of the CMs, who may well have included in the days reported the time for the entire business relationship to reach full performance. As such, only Asset2 is carried forward into the regression equations as part of the hypotheses testing in the next section. That said, and in absolute terms, the mean score of

approximately 16 days reported by the CMs to reach full-performance is still not a substantial amount of time and investment (relative to the operating budget) and so Item 1 is still carried forward but used only in the analysis of means as part of the hypotheses testing.

Table 7.11: Testing principal items scales (dependent variables) for correlation (Appendix 11) in File 3 (combined MSC and CM data)

Principal item scale (File 3)	Correlation Test	Mean (and confidence interval estimate)
Make-or-buy Item 1 (internalise/externalise) MSC (from File 1) q17 = Internalise (1) CM (from File 1) q8 = Externalise (0)	Not applicable, only 1 item	Not applicable, each MSC respondents entered as "1" and each CM respondent entered as "0"
Solidarity (Exchange relationship) Item 1 (Solid1) MSC (from File1) q26 CM (from File2) q22 Item 2 (Solid 2) MSC (from File1) q27 CM (from File2) q23 Item 3 (Solid 3) MSC (from File1) q34 CM (from File2) q30	Alpha (3 items): .512 Pearson 2 items (1, 2): .280** 2 items (2, 3): .222** 2 items (1, 3): .274** Spearman 2 items (1, 2): .330** 2 items (2, 3): .272** 2 items (1, 3): .307** **. *Correlation is significant at the 0.01 level (2-tailed)*	As Alpha <.7, select mean of Item 1 and 2 = SolidM Means within SolidM for each data set: MSC (File 3): 5.69 (5.52, 5.86) CM (File 3): 3.77 (3.54, 4.00)
Role Integrity (Exchange relationship) Item 1 (Role1) MSC (from File1) q28H1 CM (from File2) q24 Item 2 (Role2) MSC (from File1) q29 CM (from File2) q25	Pearson .611** Spearman .624** **. *Correlation is significant at the 0.01 level (2-tailed)*	As relationship is significant, mean of Item 1 and Item 2 selected = RoleM Means within RoleM for each data set: MSC (File 3): 4.64 (4.43, 4.85) CM (File 3): 1.99 (1.80, 2.18)
Mutuality (Exchange relationship) Item 1 (Mutual1) MSC (from File1) q30 CM (from File2) q26H1 Item 2 (Mutual2) MSC (from File1) q31H1c CM (from File2) q27H1a	Pearson .599** Spearman .591** **. *Correlation is significant at the 0.01 level (2-tailed)*	As relationship is significant, mean of Item 1 and Item 2 selected = MutualM Means within MutualM for each data set: MSC (File 3): 4.84 (4.60, 4.72) CM (File 3): 2.48 (2.25, 2.71)

Table 7.12: Testing principal items scales (TCE variables) for correlation (Appendix 11) in File 3 (combined MSC and CM data)

Principal item scale (File 3) and Mean (and confidence interval estimate)	Correlation Test	Mean (and confidence interval estimate)
Human Asset Specificity Item 1 (Asset1 - days) MSC (from File1) q37c: Mean: 3.06 (2.34, 3.77) CM (from File2) q32b: Mean: 16.28 (10.69, 21.87) Item 2 (Asset2 – 7-point) MSC (from File1) q50: Mean: 3.26 (3, 3.52) CM (from File2) q43: Mean: 3.04 (2.78, 3.30)	Pearson .074[.356] Spearman .082[.308]	Relationship is not significant. This is caused by the discrepancy between the number of days reported by the MSCs versus the CMs. As such, Asset 2 is carried forward into the regression equations as part of the hypotheses testing in the next section. That said, approximately 16 days to reach full-performance is still not a substantial amount of time and investment and so Item 1 is still carried forward but only used in the analysis of means as part of the hypotheses testing.
Ongoing Asset Specificity *(applies to internalisation only)* Item 1 (Asset3) MSC (from File1) q51 CM (Item 2/Asset 2 from File2) q43 Item 2 (Asset4) MSC (from File1) q52 CM (Item 2/Asset 2 from File2) q43	Pearson .944** Spearman .925** **. *Correlation is significant at the 0.01 level (2-tailed)*	As relationship is significant, mean of Item 1 and Item 2 selected = AssetM3-4 Means within AssetM3-4 for each data set: MSC (File 3): 6.35 (6.17, 6.53) CM (File 3): 3.04 (2.78, 3.30)
Exogenous Uncertainty Item 1 (UncertX1) MSC (from File1) q53H1a CM (from File2) q45 Item 2 (UncertX2) MSC (from File1) q54 CM (from File2) q46 Item 3 (UncertX3) MSC (from File1) q55 CM (from File2) q47 Item 4 (UncertX4) MSC (from File1) q56H1b CM (from File2) q48H1 Item 5 (UncertT) MSC (from File1) q57 CM (from File2) q49	Alpha (5 items): .799	As Alpha is $\geq$.7 mean of items 1 to 5 selected = UncertMXT Means within UncertMXT for each data set: MSC (File 3): 2.41 (2.25, 2.57) CM (File 3): 2.56 (2.38, 2.74)
Endogenous Uncertainty *(applies to internalisation only)* Item 1 (Uncert NX1) MSC (from File1) q58 CM (UncertMXT from File3) Item 2 (Uncert NX2) MSC (from File1) q59 CM (UncertMXT from File3)	Pearson .581** Spearman .656** **. *Correlation is significant at the 0.01 level (2-tailed)*	As relationship is significant, mean of Item 1 and Item 2 selected = UncertMNX Means within UncertMNX for each data set: MSC (File 3): 2.62 (2.44, 2.80) CM (File 3): 2.56 (2.38, 2.74)
Frequency Item 1 (Freq1) MSC (from File1) q20Hg1: Mean: 8.86 (7.17, 10.55) CM (from File2) q19b: Mean: 0.22 (0.16, 0.28)	Not applicable, only 1 item	See first column

Table 7.13: Testing principal items scales (RBT variables) for correlation (Appendix 11) in File 3 (combined MSC and CM data)

Principal item scale (File 3) and Mean (and confidence interval estimate)	Correlation Test	Mean (and confidence interval estimate)
Value Item 1 (Value1) MSC (from File1) q43 CM (from File2) q36 Item 2 (Value2) MSC (from File1) q44 CM (from File2) q37	Pearson .647** Spearman .635** **. *Correlation is significant at the 0.01 level (2-tailed)*	As relationship is significant, mean of Item 1 and Item 2 selected = ValueM Means within ValueM for each data set: MSC (File 3): 5.35 (5.14, 5.56) CM (File 3): 2.86 (2.58, 3.14)
Rarity Item 1 (Rare1) MSC (from File1) q45 CM (from File2) q38H1b Item 2 (Rare2) MSC (from File1) q46 CM (from File2) q39H1b	Pearson .462** Spearman .450** **. *Correlation is significant at the 0.01 level (2-tailed)*	As relationship is significant, mean of Item 1 and Item 2 selected = RareM Means within RareM for each data set: MSC (File 3): 3.34 (3.06, 3.62) CM (File 3): 3.09 (2.78, 3.40)
Costly to Imitate Item 1 (Cost1) MSC (from File1) q47 CM (from File2) q40H1 Item 2 (Cost2) MSC (from File1) q48 CM (from File2) q41	Pearson .277** Spearman .342** **. *Correlation is significant at the 0.01 level (2-tailed)*	As relationship is significant, mean of Item 1 and Item 2 selected = CostM Means within CostM for each data set: MSC (File 3): 3.09 (2.86, 3.32) CM (File 3): 3.05 (2.82, 3.28)

7.3 HYPOTHESES TESTING

7.3.1 Hypotheses concerning the make-or-buy decision

7.3.1.1 Empirical and predicted patterns

Table 7.14 summarises the empirical patterns for the make-or-buy decisions mainly by using the means and confidence interval estimates from Table 7.12 and Table 7.13. These empirical patterns are based on interpreting the principal items in the same way as the case study empirical patterns (Appendix 13) and presented using a similar results template matrix concerning the make-or-buy decision as used in the case studies. Each of the empirical patterns of TCE variables and RBT variables in Table 7.14 are matched with the conventional predicted patterns shown in Figure 3.1 and Figure 3.2 and with the best-fit predicted pattern from the integrative framework of vertical integration presented in Table 4.2. The conventional patterns are derived from having observed the mode of governance (either internalisation or externalisation). However, with regard to the predicted patterns in the integrative framework of vertical integration and having selected

the best-fit predicted pattern, the classification level is assigned - along with the predicted mode of governance. This amounts to part of *Steps 2 and 3* in the refutability procedure associated with Table 4.2 (Section 4.4.2.1).

The validity of the empirical patterns in Table 7.14 is checked by reviewing the corroborating items listed in Appendix 11 and which are summarised in Table 7.15. The mean (6.13) of the item pertaining to the Frequency (TCE) variable indicates that the respondents' internal human resources are at least very busy. These results support the Appendix 13 guidelines that interpreted the employment of one FTE staff at a high (+) frequency level. That is, the results show that there is sufficient demand to provide a continuous flow of work for each FTE staff. The mean (8.35) of the item concerning the Rarity (RBT) variable is consistent with a low mean score on this variable. Firms are generally expected to take up to five years to fully establish themselves and so a further three year requirement does not seem prohibitive. Indeed, in response to question 6a in the MSC version of the questionnaire, all respondents (except one) had been in existence for over five years.

Beyond the 95 percent confidence interval estimate associated with the means in Table 7.14 and Table 7.15, regression analysis is used in the next section to generate a *p* value for the independent variables. Additionally, regression analysis will show the relative importance of the independent variables in terms of their standardised regression coefficients.

Table 7.14: Survey: Make-or-buy empirical and predicted patterns

Decision Maker on Activity & Survey Version (V) of Questionnaire	TCE Asset Specific (HAS)	TCE Uncertainty (Exogenous)	TCE Frequent	RBT Value	RBT Rarity	RBT Costly to Imitate	Mode of Governance & Level (L)
CM'er / OM'er on PM'ce-V2							
Empirical pattern: - **Mean**	Asset1 **16.28**	Uncert-MXT **2.56**	Freq1 **0.22**	ValueM **2.86**	RareM **3.09**	CostM **3.05**	
- 95% confidence interval estimate	10.69, 21.87	2.38, 2.74	0.16, 0.28	2.58, 3.14	2.78, 3.40	2.82, 3.28	
Empirical pattern: - **Mean**	Asset2 **3.04**						
- 95% confidence interval estimate	2.78, 3.30						
Empirical summary of pattern and mode:	**0**	**0**	**0**	**-**	**0**	**0**	Externalised (100%)
Conventional predicted pattern:	**0/+**	**0/+**	**0**	**- / - - -**	**0/+++**	**0/+++**	
Integrated predicted pattern & assigned level & mode:	**0**	**0**	**0**	**-**	**0**	**0**	L5 and External
SM'er on PM'ce-V1							
Empirical pattern: - **Mean**	Asset1 **3.06**	Uncert-MXT **2.41**	Freq1 **8.86**	ValueM **5.35**	RareM **3.34**	CostM **3.09**	
- 95% confidence interval estimate	2.34, 3.77	2.25, 2.57	7.17, 10.55	5.14, 5.56	3.06, 3.62	2.86, 3.32	
Empirical pattern: - **Mean**	Asset2 **3.26**						
- 95% confidence interval estimate	3.00, 3.52						
Empirical summary of pattern and mode:	**0**	**0**	**+**	**+**	**0**	**0**	Internalised (100%)
Conventional predicted pattern:	**+/+++**	**+/+++**	**+/+++**	**+/+++**	**0/+++**	**0/+++**	
Integrated predicted pattern & assigned level & mode:	**0/+++**	**0**	**+/+++**	**+**	**0**	**0**	L3, Internal

Key:
HAS   = Human Asset Specificity
CM'er   = Centre Manager (internal to CM)
OM'er   = Operations Manager (internal to CM)
PM'ce   = Preventative Maintenance
SM'er   = Service Manager (internal to MSC)

Table 7.15: Survey: Make-or-buy corroborating items

Decision Maker on Activity & Version (V) of Survey Questionnaire	TCE: Frequency Item 1 (V1): How busy internal resource (7-point)	RBT: Rarity Item 1 (V2): Minimum experience required by external firm (Years)
Cm'er / OM'er on PM'ce - V2	Not applicable	Mean: 8.35 95% confidence interval estimate: 6.42, 10.28
SM'er on PM'ce – V1	Mean: 6.13 95% confidence interval estimate: 5.94, 6.32	Not applicable

7.3.1.2   Logistic regression and testing for outliers

Binomial (or binary) logistic regression is used as the dependent variable is categorical - taking on one of only two values (internalise or externalise – coded "1" or "0" respectively). The use of multiple linear regression for this type of dependent variable would often lead to predicted values that are less than zero or greater than one – values that cannot occur. In addition to showing the relative importance of the independent variables – in terms of the relative size of their standardised regression coefficient (ß), logistic regression provides a *p* value for each independent variable to show the strength of each variable's statistical significance.

The statistical form of the hypothesis for TCE first given in Table 5.17 and updated for Table 7.14 is as follows:

- H_0: β_1 (Human Asset Specificity: Asset2) = β_2 (Exogenous Uncertainty: UncertMXT) = β_3 (Frequency: Freq1) = 0 [No relationship between the dependent variable (internalise / externalise) and the independent variables]; and

- H_1: At least one $\beta \neq 0$ [Relationship between the dependent variable (internalise / externalise) and at least one of the independent variables].

Similarly, the statistical form of the hypothesis for RBT first given in Table 5.17 and updated for Table 7.14 is as follows:

- H_0: β_1 (Value: ValueM) = β_2 (Rarity: RareM) = β_3 (Costly to Imitate: CostM) = 0 [No relationship between the dependent variable (internalise / externalise) and the independent variables]; and
- H_1: At least one $\beta \neq 0$ [Relationship between the dependent variable (internalise / externalise) and at least one of the independent variables].

Table 7.16 shows that in both TCE and RBT, the null hypothesis (H_0) can be rejected and the alternative (H_1) hypothesis accepted – on the basis that there is at least a statistically significant relationship between one of the independent variables and the dependent variable. Furthermore, Table 7.17 shows that the item ValueM accounts for the statistically significant relationship in the RBT model and which is consistent with the integrative framework of vertical integration that predicted this, in terms of a change from a negative symbol with respect to of externalisation to a positive symbol in relation to internalisation as shown in Table 7.14. However, Table 7.17 does not show which of the TCE items is responsible for the statistically significant relationship in the TCE model. Here, there is nothing untoward about the data, rather the differences across internalisation and externalisation with respect to Freq1 (with an internalisation mean of 0.22 and an externalisation mean of 8.86) creates an unstable estimation of parameter estimates – as evidence by the excessively large standard error.

Table 7.16: Make-or-buy – logistic regression omnibus tests of model (TCE and RBT) coefficients

	Chi-square	**Df**	**Sig.**
TCE Step 1			
• Step	207.704	3	.000
• Block	207.704	3	.000
• Model	207.704	3	.000
RBT Step 1			
• Step	88.099	3	.000
• Block	88.099	3	.000
• Model	88.099	3	.000

Table 7.17: Make-or-buy decision – logistic regression variables (TCE and RBT) in the equation

	B	**S.E.**	**Wald**	**Df**	**Sig.**	**Exp(B)**
TCE Step 1[a]						
• Asset2	13.277	216.377	.004	1	.951	583757.26
• UncertMXT	29.315	443.034	.004	1	.947	5.4E+012
• Freq1	136.358	1393.722	.010	1	.922	1.7E+059
• Constant	-267.175	2798.211	.009	1	.924	.000
RBT Step 1[b]						
• ValueM	1.223	.186	43.253	1	.000	3.397
• RareM	.132	.208	.400	1	.527	1.141
• CostM	-.201	.252	.640	1	.424	.818
• Constant	-4.591	1.000	21.094	1	.000	.010

a. Variable(s) entered on step 1: Asset2, UncertMXT, Freq1
b. Variable(s) entered on step 1: ValueM, RareM, CostM

A T-test was performed in order to reveal which of the TCE variables are statistically significant as shown in Table 7.18. This table shows that Freq1 is the statistically significant variable and, again, this is consistent with the integrative framework of vertical integration that predicts this item changing from a negative symbol in terms of externalisation to a positive symbol in relation to internalisation as shown in Table 7.14.

Table 7.18: Make-or-buy decision – t-test logistic (TCE variables)

	Levine's test for Equality of Variances	Levine's test for Equality of Variances	t-test for Equality of Means	t-test for Equality of Means	t-test for Equality of Means	**t-test for Equality of Means**
	F	Sig.	t	df	Sig. (2 tailed)	**Mean Difference**
Asset2 • Equal variances assumed	.255	.614	1.132	185	.259	.218
• Equal variances not assumed			1.135	184.668	.258	.218
UncertMXT • Equal variances assumed	1.557	.214	-1.166	191	.245	-.146
• Equal variances not assumed			-1.173	190.720	.242	-.146
Freq1 • Equal variances assumed	45.373	.000	9.607	154	.000	8.642
• Equal variances not assumed			9.985	80.222	.000	8.642

Finally, although logistic regression does not assume linearity of the relationship between the independent variables and the dependent variable, does not require normally distributed variables and does not assume homoscedasticity, it can be affected by outliers – more than three standard deviations from 0 (Mendenhall and Sincich 2003, 397). As logistic regression was not able to effectively cope with Freq1 in the TCE model, only the RBT model was investigated in terms of outliers. Here, five outliers (or cases) were found. These were then removed and the analysis re-run. As can be seen from Table 7.19, there no substantive change in the results, with ValueM remaining as the only significant variable.

Table 7.19: Make-or-buy – logistic regression variables (TCE) in the equation excluding outliers

	B	**S.E.**	**Wald**	**Df**	**Sig.**	**Exp(B)**
RBT						
Step 1						
• ValueM	1.945	.316	37.797	1	.000	6.990
• RareM	.224	.270	.689	1	.407	1.252
• CostM	-.350	.343	1.041	1	.308	.704
• Constant	-7.258	1.453	24.962	1	.000	.001

7.3.1.3   Survey "Conduct" and "Performance" items

In this section, data from the survey is used to support or contradict the market structure assignments in Table 6.40. More specifically, this data comprises those items listed in Appendix 11 and which are deemed sufficiently homogenous (that is, *not* crossed-out in Table 7.4 and Table 7.8) as shown in Table 7.20 and Table 7.21. Table 7.20 and Table 7.21 indicate that the MSCs in the survey are closer to perfect competition than the MSCs in the case studies – that were considered closer to monopolistic competition and oligopoly. In particular, the MSCs in the survey are procured by CMs with a greater level of competition (91 percent – Item 5) and a lesser level of negotiation (9 percent – Item 5) than those MSCs in the case studies (at least 30 percent negotiation) and the survey MSCs write their own terms and conditions to a much lesser extent (17 percent – Item 6) than the case study MSCs (mostly by the MSCs). Furthermore, 82 percent of the survey MSCs are performing at an average or below average level of profit. In contrast, the four large MSCs in the case studies are all performing at above average level.

Table 7.20: Survey "Conduct" items

SCP: "Conduct" Items Appendix 11	Service Manager on MSC (with confidence interval estimate where applicable)	Centre/Operations Manger on MSC (with confidence interval estimate where applicable)
Item 1	Not applicable	3.74 (3.47, 401)
Item 2	Not sufficiently homogenous	Preventative (68%) Comprehensive (28%) Other (4%)
Item 3	2.19 (1.94, 2.44)	Not sufficiently homogenous
Item 4	Yes (67%) No (18%)	Yes (92%) No (8%)
Item 5	Not sufficiently homogenous	Open (27%) List (64%) Negotiation (9%)
Item 6	Not sufficiently homogenous	Owner (26%) CM firm (36%) MSC (17%) Standard Form (7%) Other (15%)
Item 7	Yes (81%) No (19%)	Yes (95%) No (5%)
Item 8	Not sufficiently homogenous	Not applicable
Item 9	Yes (52%) No (48%)	Not applicable
Item 10	82.49 (65.11, 99.87)	Not applicable

Table 7.21: Survey "Performance" item

SCP: "Conduct" Items Appendix 11	Service Manager on MSC (with confidence interval estimate where applicable)
Item 1	Above average (18%) Average (71%) Below (11%)

7.3.1.4   Static / dynamic analysis of survey items pertaining to make-or-buy decision

The static / dynamic analysis of the survey data concerning the make-or-buy decision is based on the items outlined in Appendix 11 and which, again, are deemed sufficiently homogenous (that is, *not* crossed-out in Table 7.4 and Table 7.8) as shown in Table 7.22. These items are designed to capture the extent to which decision making displays a static or stable orientation. A tendency towards static or stable decision making promotes the maximising behaviour and which, in turn, promotes the relative strength of TCE an RBT that incorporate a stronger form of rationality than in RDT.

Table 7.22: Survey static/dynamic items pertaining to the make-or-buy decision

Decision maker on activity Version of Survey Questionnaire	Item 1: Time approach to sourcing existed - Years (with confidence interval estimate)	Item 2: Plans to change approach to sourcing (Yes/No)
Service Manager on PM'ce -Version 1	Not sufficiently homogenous	Yes (32%) No (68%)
Centre/Operations Manager on PM'ce- Version 2	12.24 (10.94, 13.54)	Yes (8%) No (92%)

Key: As per Table 7.14

Table 7.22 shows that the make-or-buy decisions in the survey have a lengthy history, with the mean time that these decisions have been in existence at approximately 12 years. Moreover, having implemented this decision for this period, the substantial majority of the decision makers have no plans to change the decision. In summary, the make-or-buy decisions in the survey display a clear static/stable orientation. Therefore, this is expected to promote the relative strength of TCE and / or RBT – contingent on the SCP surrounding the activity.

7.3.1.5   RBT's refutability

In support of Barney's response to the RBT's refutability critique (explained in Section 3.3.5.3), Table 7.3 and Table 7.4 showed that there was a statistically significant relationship between the MSC size (using the control variable concerning turnover -question 15) and the following questions:

- *q20. How many service & maintenance in-house staff (employees) are there in your firm?;*
- *q21. For how long have you had at least around 75% of your current number of technical staff? Please insert approximate years;*
- *q24. Hong long has one of your typical technicians been with your firm? Please insert years.*

This is consistent with the source of competitive advantage displayed by the large four MSCs in the case studies who are able to achieve Level 2 and Level 1 activities – associated with monopolistic and oligopoly market structures respectively. Indeed, there is an appreciable difference in the mean score to each of these questions between the small to medium sized MSCs (turnover less than $5 million) and the larger MSCs (turnover greater than $5million) as shown in Table 7.23. In particular, this supports the refutability of the Rare and Costly to Imitate variables (pertaining to sustainable competitive advantage and temporary competitive advantage) in RBT.

Table 7.23: Survey items that support the refutability of RBT

MSC Version of Survey Questionnaire	Small to medium-sized MSCs turnover less than $5 million - mean (and confidence interval estimate)	Large MSCs turnover less than $5 million - mean (and confidence interval estimate)
q20g	8.86 (7.17, 10.55)	28.29 (17.80)
q21	5.22 (4.57, 5.87)	8.92 (5.45, 12.39)
q24	4.96 (4.38, 5.54)	6.14 (4.13, 8.15)

7.3.1.6　Summary

Having established empirical patterns and corresponding predicted patterns (in Table 7.14), as well as having checked the validity of the empirical patterns (using information from Table 7.15) the match or mismatch between the empirical patterns and the predicted patterns in Table 7.14 is now considered, along with the results from the logistic regression analysis and the SCP analysis and analysis of static/dynamic items - in order to determine the extent to which data in the survey supports or contradicts the following hypotheses (detailed in Section 2.4.1):

- *Hypothesis Number 1* (concerning the conventional approach to TCE): The externalised empirical pattern matches the conventional TCE predicted pattern, whilst the internalised empirical pattern does not match the conventional TCE predicted pattern. In the internalised pattern, there is a discrepancy between the empirical score on the Asset Specificity and Uncertainty variables with the score for these variables conventionally predicted by TCE. Furthermore, the survey results reveal that only the Frequency variable is statistically significant, when all three variables are conventionally predicted to be statistically significant. On balance, therefore, these results contradict Hypothesis Number 1;

- *Hypothesis Number 2* (concerning the conventional approach to RBT): Both the internalisation and externalisation empirical patterns match the conventional RBT predicted patterns. Moreover, the survey results show at least the Value variable to be statistically significant - as conventionally predicted. Therefore, these results support Hypothesis Number 2;

- *Hypothesis Number 3* (concerning the TCE and RBT integrative framework): Both of the empirical patterns match and are within the range of the patterns predicted by the integrative framework of vertical integration. Moreover, the predicted modes of governance match the empirical modes of governance. The survey results show both the Frequency (TCE) variable and the Value (RBT) variable are statistically significant - as predicted by the integrative framework of vertical integration. Moreover, the analysis of the "Conduct" and "Performance" items indicates that the MSCs in the survey are operating under conditions closest to perfect competition and this is consistent with the identification of a Level 3

internalised activity and Level 5 externalised activity. The static/dynamic items display a tendency towards a static/stable orientation and this is consistent with the promotion of both TCE and RBT – contingent on the SCP surrounding the activity. Finally, the responses to three of the questions in the MSC questionnaire support the refutability of RBT – as anticipated by Barney. Therefore, these results support Hypothesis Number 3; and

- *Hypothesis Number 4* (concerning the make decision in a supply chain): As only part of the supply chain is studied in the survey, this hypothesis is not able to be addressed by the survey data.

7.3.2 Hypotheses concerning the nature of the exchange relationship decision

7.3.2.1 Empirical and predicted patterns

Data from Table 7.11 and Table 7.12 (concerning the exchange dependent variables and TCE variables) is combined with data relating to RDT variables (that has undergone the transformation procedure described in Table 5.18) in order to summarize the empirical patterns for the nature of the exchange relationship decisions in Table 7.24 and Table 7.25. Once again, these empirical patterns are based on interpreting the principal items in the same way as the case study empirical patterns (Appendix 13) and presented adopting a similar results template matrix concerning the nature of the exchange relationship decision as used in the case studies. Each of the empirical patterns of TCE variables and RDT variables in Table 7.24 and Table 7.25 are matched with the theoretical predicted patterns shown in Figure 4.5. Where a relational exchange relationship is observed, then the corresponding predicted pattern can be identified readily from Figure 4.5. However, where a discrete exchange relationship is observed, it is necessary to refer to the clarifying items in Table 7.26, in order to establish whether this exchange is an efficient exchange (competitive prices and absence of credible threats) or an inefficient exchange (uncompetitive prices and credible threats). If credible threats are only observed, then the exchange considered inefficient as other factors may be causing high prices. Having established whether a discrete exchange is efficient or inefficient, the corresponding predicted pattern can now be identified from Figure 4.5.

With regard to the establishing whether the external exchange in Table 7.24 is efficient or inefficient, the clarifying items in Table 7.26 indicate that this exchange is efficient on the basis that low prices prevail (3.15 mean) and there is an absence of credible threats (only four percent answering "Yes" to using negative incentives). Moreover, the clarifying items substantially confirm the expectation that the internal exchange is efficient on the basis that there is an absence of credible threats in this exchange (only 15 percent answered "Yes" to using negative incentives) and with the absence of credible threats taking priority over the level of pay.

The validity of the empirical patterns in Table 7.24 and Table 7.25 is checked by reviewing the corroborating items listed in Appendix 11 and which are summarised in Table 7.26. The first two corroborating items (applicable only to the MSCs) concerning the nature of the exchange, supports the existence of a relational to very relational exchange with technical air conditioning staff in the MSCs, in so far as, the MSCs are demonstrating a credible commitment to their staff in the form of training. The next three corroborating items apply only to the relationship between the CMs and the MSCs and are consistent with a tendency toward an efficient discrete exchange. That is, a discrete exchange seems consistent with the majority of the MSCs holding direct contractual relations with the CM as opposed to the owner. Here, the CMs would themselves be contracted under fixed term arrangement. Also, the tendency to renew the contract is consistent with an efficient exchange. In so far as, the prospect of future work acts as a check against hold-up and obviates the need for costly credible threats. Finally, the tendency for the CMs not to invest in any training of the MSCs is, again, consistent with a discrete relationship.

The two corroborating items concerning the Ongoing Asset Specificity (TCE) variable and which are only applicable to the relationship between the CM and its technical air conditioning staff, are consistent with the very high score for this variable (Asset3-4) in Table 7.25. That is, almost a six year experience requirement and an important reliance (mean of 42.48%) on externally recruited staff reinforces the skills acquisition and scarcity associated with these resources. Finally, the results for the corroborating item relating to the Few Alternatives (RDT) variable show that each of the two types of buyers are willing to consider more than one source of supply and this is

consistent with the low scores – representing the buyer, on this variable in Table 7.24 and Table 7.25.

Table 7.24: Survey – CM and MSC external exchange relationship empirical and predicted patterns

Decision Maker on Exchange Survey Version (V) of qnr	TCE Asset Specif'	TCE Uncert'	TCE Freq'	RDT Crit'	RDT Mag' of Exchange	RDT Lack of Discret'	RDT Few Alt'	RDT Overall	Nature of Exchange
CM'er / OM'er on MSC – V2									
Empirical pattern: **-Mean** -(95% CIE)	Asset1 **16.28** (10.69, 21.87)	Uncert MXT **2.56** (2.38, 2.74)	Freq1 **0.22** (0.16, 0.28)	Buyer (Item 1) **5.48** (5.21, 5.75)	Buyer (Item 1) **5.48** (5.21, 5.75)	Buyer (Item 1) **5.48** (5.21, 5.75)	Buyer (Item 1) **5.48** (5.21, 5.75)	Buyer **3.93** (3.82, 4.04)	SolidM **3.77** (3.54, 4.00)
Empirical pattern: **-Mean** -(95% CIE)	Asset2 **3.04** (2.78, 3.30)	Uncert MNX (=UncertMXT) (=UncertMXT)		Supplier (Item 1a) **5.52** (5.26, 5.78)	Supplier (Item 1a) **5.52** (5.26, 5.78)	Supplier (Item 1a) **5.52** (5.26, 5.78)	Supplier (Item 1a) **5.52** (5.26, 5.78)	Supplier **3.84** (3.71, 3.97)	RoleM **1.99** (1.80, 2.18)
Empirical pattern: **-Mean** -95% CIE	Asset 3-4 (=Asset 2)								MutualM **2.48** (2.25, 2.71)
Transform-ation: **-Mean** -95% CIE								**4.02** (3.99, 4.05)	
Empirical summary:	**0**	**0**	**0**					**B=S Low**	**External Neutral to Very Discrete-Efficient**
Predicted pattern: -Neutral	**0/+**	**0/+++**	**0/+**					**B=S High / Low)**	
-Very Disc'	**0**	**0/+++**	**0**					**B=S Very Low**	

Key:
CM'er   = Centre Manager (internal to CM)
OM'er   = Operations Manager (internal to CM)
MSC   = Mechanical Services Contractor
CIE   = Confidence Interval Estimate

Table 7.25: Survey – MSC and technical staff internal exchange relationship empirical and predicted patterns

Decision Maker on Exchange Survey Version (V) of qnr	TCE Asset Specif'	TCE Uncert'	TCE Freq'	RDT Crit'	RDT Mag' of Exchange	RDT Lack of Discret'	RDT Few Alt'	RDT Overall	Nature of Exchange
SM'er on ACMt-staff – V1									
Empirical pattern: **-Mean** -(95% CIE)	Asset1 **3.06** (2.34, 3.77)	Uncert MXT **2.41** (2.25, 2.57)	Freq1 **8.86** (7.17, 10.55)	Buyer (Item 1) **5.82** (5.60, 6.04)	Buyer (Item 1) **3.69** (3.35, 4.03)	Buyer (Item 1) **2.45** (2.22, 2.68)	Buyer (Item 1) **3.45** (3.2, 3.88)	Buyer **3.87** (3.71, 4.03)	SolidM **5.69** (5.52, 5.86)
Empirical pattern: **-Mean** -(95% CIE)	Asset2 **3.26** (3, 3.52)	Uncert MNX **2.62** (2.44, 2.80)		Supplier (Item 1a) **5.69** (5.48, 5.90)	Supplier (Item1a) **6.32** (6.10, 6.54)	Supplier (Item 1a) **3.48** (3.15, 3.81)	Supplier (Item 1a) **1.93** (1.71, 2.15)	Supplier **4.34** (4.22, 4.46)	RoleM **4.64** (4.43, 4.85)
Empirical pattern: **-Mean** -95% CIE	Asset 3-4 **6.35** (6.17, 6.53)								MutualM **4.84** (4.60, 4.72)
Transform-ation: **-Mean** -95% CIE								**4.03** (3.92, 4.14)	
Empirical summary:	+ + (using Asset 3-4)	**0**	+					**B=S Low**	**Internal Relational To Very Relational**
Predicted pattern: - Relational	+	**0/+++**	+/+++					**B=S High**	
- Very Rel'	++	**0/+++**	+/+++					**B=S Very High**	

Key:
SM'er = *Service Manager (internal to MSC)*
ACM t-staff = *Air Conditioning Maintenance technical staff*
CIE = *Confidence Interval Estimate*

Table 7.26: Survey: Exchange relationship clarifying and corroborating items

Decision Maker on Exchange & Case Study Version (V) of Questionnaire	TCE: Asset Specificity (OAS) *Corroborating* Item 1 (V1): Minimum experience required by resource (Years) Item 2 (All Vs): In-house trained versus externally recruited	RDT: Few Alternatives *Corroborating* Item 1: Number of alternatives considered out of five possible other sources	Nature of the Exchange *Clarifying* Item 1 (All Vs): level of pay/price (7-point) Item 2 (All Vs): Use of negatives measures (credible threats) (Yes/No) *Corroborating* Item 1 (V1): Training to reach full competence (Years) Item 2 (V1): Ongoing training once fully competent (Days per annum) Item 3 (V2): Direct contract with Owner/CM Item 4 (V2): Renewal of fixed term contract (Yes/No) Item 5 (V2): Investment in training external firm (Yes/No)
CM'er/OM'er on MSC – V2	Item 1: Not applicable Item 2: Not applicable	Item 1: Mean: 3.09 and CIE: 2.86, 3.32	*Clarifying* Item 1: Mean: 3.15 and CIE: 2.86, 3.44 Item 2: Yes (4%) / No (96%) *Corroborating* Item 1: Not applicable Item 2: Not applicable Item 3: Owner (37%) / CM (63%) Item 3: Yes (86%) / No (14%) Item 4: Yes (9%) / No (91%)
SM'er on ACM t-staff – V1	Item 1: Mean: 5.91 and CIE: 5.66, 6.43 Item 2: In-house trained: Mean: 56.80% and CIE: 50.76, 62.84 Externally recruited: Mean: 42.86% and CIE: 36.7, 49.02	Item 1: Mean: 3.88 and CIE: 3.78, 3.98	*Clarifying* Item 1: Mean: 5.91 and CIE: 5.66, 6.16 Item 2: Yes (15%) / No (85%) *Corroborating* Item 1: Mean: 4.24 and CIE: 4.08, 4.4 Item 2: Mean: 11.45 and CIE: 8.22, 14.68 Item 3: Not applicable Item 4: Not applicable Item 5: Not applicable

Key:
CM'er   *= Centre Manger*
Om'er   *= Operations Manager*
SM'er   *= Service Manager (internal to MSC)*
ACM t-staff   *= Air Conditioning Maintenance technical staff*
CIE   *= 95% confidence interval estimate*

7.3.2.2   Multiple linear regression and testing for assumptions – in respect of TCE

This time, as all three dimensions of the dependent variable are continuous, multiple linear regression is appropriate in relation to TCE with its three independent variables. In addition to showing the relative importance of the TCE independent variables – in terms of the relative size of their regression coefficient (ß), multiple linear regression provides a *p* value for each independent variable to show the strength of each variable's statistical significance. Two versions of the TCE model (applied to each of the three dimensions of the dependent variable) are analysed using multiple linear regression. The first model represents the conventional approach in TCE that seeks to capture the potential for the strong form of hold-up by measuring TCE's

variables using the activity as the focus of the transaction in both internal and external relationships. The second model represents the alternative approach developed in this thesis that seeks to capture both the strong and weak forms of hold-up by measuring TCE's variables using the activity as the focus of the transaction in terms of the external relationship between the CM and MSC, but also using the resource as the focus of the transaction with respect to the internal relationship between the MSC and its technical air conditioning staff.

The statistical form of the hypothesis for the conventional model first given in Table 5.18 and updated for Table 7.24 and Table 7.25 is as follows:

- H_0: β_1 (Human Asset Specificity: Asset2) = β_2 (Exogenous Uncertainty: UncertMXT) = β_3 (Frequency: Freq1) = 0 [No linear relationship between the dependent variable (exchange relationship: SolidM, RoleM, MutualM) and the independent variables]; and
- H_1: At least one $\beta \neq 0$ [Linear relationship between the dependent variable (exchange relationship: SolidM, RoleM, MutualM) and at least one of the independent variables].

Similarly, the statistical form of the hypothesis for the alternative model first given in Table 5.18 and updated for Table 7.24 and Table 7.25 is as follows:

- H_0: β_1 (Human Asset Specificity and Ongoing Asset Specificity: Asset3-4) = β_2 (Exogenous and Endogenous Uncertainty: UncertMNX) = β_3 (Frequency: Freq1) = 0 [No linear relationship between the dependent variable (exchange relationship: SolidM, RoleM, MutualM) and the independent variables]; and
- H_1: At least one $\beta \neq 0$ [Linear relationship between the dependent variable (exchange relationship: SolidM, RoleM, MutualM) and at least one of the independent variables].

Tables 7.27, 7.28 and 7.29 show that in both the conventional and alternative TCE models, the null hypothesis (H_0) can be rejected and the alternative H_1 can be accepted – on the basis that there is at least a statistically significant relationship between one of the independent variables and each of three dimensions on the dependent variable. Furthermore, these three tables show the

substantial improvement in the predictive power of TCE using the alternative approach. That is, the alternative approach to measuring Asset Specificity that uses Ongoing Asset Specificity (if this is more prominent than Human Asset Specificity) in internal exchange and uses Human Asset Specificity in external exchange (represented by Asset 3-4) is now statistically significant. This is in contrast to the conventional approach of using Human Asset Specificity only in both internal and external exchange and which was not statistically significant. Moreover, the alternative approach (represented by Asset3-4) assumes the greatest value (standardised coefficient) of the three variables. The results are consistent with Table 7.24 and 7.25 that shows the alternative approach to measuring Asset Specificity creates an empirical pattern that matches the predicted pattern.

Table 7.27: Exchange relationship (Solid) – multiple linear regression coefficients (conventional and alternative TCE models)

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	T	Sig.
TCE (Conventional)					
• (Constant)	4.247	.369		11.494	.000
• Asset2	-.042	.084	-.038	-.494	.622
• uncertMXT	.045	.126	.028	.359	.720
• Freq1	.099	.015	.499	6.772	.000
TCE (Alternative)					
• (Constant)	3.060	.336		9.113	.000
• Asset3-4	.300	.053	.430	5.690	.000
• uncertMNX	-.016	.103	-.010	-.151	.881
• Freq1	.056	.015	.280	3.726	.000

Table 7.28: Exchange relationship (RoleM) – multiple linear regression coefficients (conventional and alternative TCE models)

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	T	Sig.
TCE (Conventional)					
• (Constant)	2.526	.420		6.009	.000
• Asset2	.004	.096	.003	.044	.965
• uncertMXT	.114	.144	.061	.792	.430
• Freq1	.107	.017	.478	6.409	.000
TCE (Alternative)					
• (Constant)	.747	.340		2.198	.029
• Asset3-4	.471	.053	.599	8.836	.000
• uncertMNX	.068	.105	.038	.653	.515
• Freq1	.040	.015	.177	2.634	.009

Table 7.29: Exchange relationship (MutualM) – multiple linear regression coefficients (conventional and alternative TCE models)

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	T	Sig.
TCE (Conventional)					
• (Constant)	3.166	.454		6.980	.000
• Asset2	.039	.102	.030	.385	.701
• uncertMXT	-.063	.153	-.032	-.412	.681
• Freq1	.109	.018	.467	6.196	.000
TCE (Alternative)					
• (Constant)	1.434	.379		3.787	.000
• Asset3-4	.471	.058	.570	8.071	.000
• uncertMNX	-.092	.115	-.049	-.801	.425
• Freq1	.045	.016	.192	2.738	.007

Tests for assumptions concerning the random error (ε) were performed. The assumptions comprise:

1. The ε is normally distributed with a mean of 0;
2. The variance (σ^2) is constant; and
3. Errors are probabilistically independent, such that all pairs of error terms are uncorrelated.

In order to test these assumptions, the following approach was taken in each of the regression analyses. That is, across both conventional and alternative TCE models and in respect of each of the three dimensions of dependent variable:

1. A residual analysis using plots to test Assumptions 1 to 3;
2. Normal probability plot (P-P plot) of regression standardised residuals to specifically test Assumption 1; and
3. Analysis of the effect of outliers (more than three standard deviations from 0, Mendenhall and Sincich 2003, 397) again, to specifically test Assumption 1.

In all of the regression analyses, a review of the residual plots revealed neither any trends nor dramatic changes in variability and a linear trend exists with the points clustered around a straight line in the normal P-P plots.

However, outliers were found in a number of the regression analyses – as shown in Table 7.30.

Table 7.30: Exchange relationship: Std. Residual

	Minimum	**Maximum**
TCE (Conventional)		
• SolidM	-3.074	1.864
• RoleM	-3.032	2.602
• MutualM	-3.587	2.161
TCE (Alternative)		
• SolidM	No outliers	No outliers
• RoleM	-2.391	3.565
• MutualM	No outliers	No outliers

The initial regression analysis displaying outliers was re-run without the outliers. As can be seen from Table 7.31, 7.32 and 7.33, there were no substantive changes in the results. That is, there was no change in statistical significance of the variables.

Table 7.31: Exchange relationship (SolidM) – multiple linear regression coefficients (conventional TCE model) without outliers

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
TCE (Conventional)					
• (Constant)	4.125	.352		11.707	.000
• Asset2	-.073	.081	-.066	-.905	.367
• uncertMXT	.069	.120	.042	.570	.570
• Freq1	.142	.017	.574	8.144	.000

Table 7.32: Exchange relationship (RoleM) – multiple linear regression coefficients (conventional and alternative TCE models) without outliers

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
TCE (Conventional)					
• (Constant)	2.389	.402		5.950	.000
• Asset2	-.031	.092	-.025	-.335	.738
• uncertMXT	.140	.137	.075	1.020	.309
• Freq1	.155	.020	.556	7.792	.000
TCE (Alternative)					
• (Constant)	.552	.316		1.747	.083
• Asset3-4	.495	.050	.639	9.947	.000
• uncertMNX	.080	.097	.046	.820	.414
• Freq1	.039	.014	.178	2.785	.006

Table 7.33: Exchange relationship (MutualM) – multiple linear regression coefficients (conventional TCE model) without outliers

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
TCE (Conventional)					
• (Constant)	2.993	.423		7.082	.000
• Asset2	-.005	.095	-.004	-.049	.961
• uncertMXT	-.031	.142	-.016	-.221	.825
• Freq1	.169	.020	.579	8.260	.000

In summary, the results from these tests indicate that the assumptions concerning ε are satisfied and, therefore, that inferences derived from the results of the regression analyses are robust.

7.3.2.3 Pearson correlation coefficient and Spearman correlation coefficient in respect of RDT

Having transformed the data pertaining to the RDT variables using the approach described in Table 5.18, the resultant single continuous independent variable (BuySuppTS) is now analysed for correlation with each of the three continuous dimensions of the dependent variable, using Pearson correlation coefficient and Spearman correlation coefficient. For each relationship, the statistical form of the hypothesis is given as:

- H_0: $\rho = 0$ (No significant correlation in the relationship); and
- H_1: $\rho \neq 0$ (Significant correlation in the relationship).

Table 7.34 shows that the alternative H_1 can be rejected and the null hypothesis (H_0) can be accepted – on the basis that there are no statistically significant relationships between the independent variable and each of three dimensions on the dependent variable.

Table 7.34: Exchange relationship correlations using a transformed RDT variable

BuySuppTS	SolidM	RoleM	MutualM
Pearson Correlation	.077	.040	-.016
Sig. (2 tailed)	.290	.570	.830
Spearman's rho Correlation Coefficient	.065	.020	-.012
Sig. (2 tailed)	.368	.783	.868

7.3.2.4 Static / dynamic analysis of survey items pertaining to exchange relationship decision

The static / dynamic analysis of the survey respondents is based on items outlined in Appendix 11 and shown in Table 7.35. As with the case studies, these items are designed to capture the extent to which decision making displays a static or stable orientation. A tendency towards static or stable decision making promotes maximising behaviour and which, in turn, promotes the relative strengths of TCE that incorporates a stronger form of rationality than in RDT.

Table 7.35 shows that relationships amongst the survey respondents tend to be steady (with a mean of 5.79 between MSCs and technical staff and a mean of 4.27 between CMs and MSCs). Finally, there is an approximately moderate to reasonable expectation for these relationships to become closer (with a mean of 5.47 between MSCs and technical staff and a mean of 3.47 between CMs and MSCs). These results are consistent with a well established approach and unchanged outlook to the make-or-buy decision.

In summary, the decision concerning the nature of the exchange relationship displays a static/stable orientation. Therefore, this is expected to promote the relative strength of TCE.

Table 7.35: Static/dynamic survey items pertaining to the exchange relationship decision

Decision maker on activity Version of Survey Questionnaire	Item 1: Steadiness of relationship (7-point: 7=Steady)	Item 2: Relationship likely to become closer (7-point: 7=Likely)
Centre Manager / Operations Manager on preventive maintenance-Version 2	Mean: 4.27 Confidence Interval Estimate: 3.94, 4.60	Mean: 3.74 Confidence Interval Estimate: 3.57, 3.91
Service Manager on preventive maintenance - Version 1	Mean: 5.79 Confidence Interval Estimate: 5.59, 5.99	Mean: 5.47 Confidence Interval Estimate: 5.23, 5.71

7.3.2.5   Summary

Having established empirical patterns and corresponding predicted patterns (in Table 7.24 and Table 7.25), as well as having checked the validity of the empirical patterns (using information from Table 7.26), the match or mismatch between the empirical patterns and the predicted patterns in Table 7.24 and Table 7.25 is now considered - in order to determine the extent to which the survey data supports or contradicts the following hypotheses (detailed in Section 2.4.1):

- *Hypothesis Number 5* (concerning TCE); The empirical patterns of both the internal exchange and external exchange match the TCE predicted patterns. Furthermore, the survey results show that Asset Specificity and Frequency variables are statistically significant. This is consistent with the greater predictive power of TCE expected to be shown under conditions that tend toward stable / static conditions - also shown by survey items. These results support this hypothesis;

- *Hypothesis Number 6* (concerning RDT); The external exchange does match the RDT predicted pattern, whilst the internal exchange does not match the RDT predicted pattern. In the internal exchange, the discrepancy is created by low buyer and supplier empirical scores that indicate a low level of mutual dependency, when high scores representing a high level of mutual dependency are predicted in a relational exchange. Moreover, the survey results show that the variable representing RDT is not statistically significantly. This is consistent with the lesser predictive power of RDT expected under conditions that tend toward stable / static

conditions - also shown by survey items. On balance, therefore, these results contradict this hypothesis; and

- *Hypothesis Number 7* (concerning a supply chain): In the survey there is one external relationship – between the CM and MSC that is tending towards discrete and efficient exchange. This exchange is inconsistent with the upstream relational exchange with technical staff in the MSCs. Therefore, these results contradict this hypothesis.

7.4 SUMMARY

This chapter presented the survey data using an aggregated approach, including a summary statement commenting on the extent to which this data supported or contradicted the hypotheses.

CHAPTER 8 CONCLUSIONS

8.1 INTRODUCTION

The next section will draws conclusions on the basis of the extent to which the entire results from the case studies and from the survey support or contradict the make-or-buy hypotheses and the nature of the exchange relationship hypotheses (summarised in Section 2.4.1). This chapter also considers the implications of the conclusions in terms of theoretical development, research methods, practice and future research.

8.2 HYPOTHESIS TESTING USING BOTH CASE STUDY DATA AND SURVEY DATA

8.2.1 The make-or-buy decision

8.2.1.1 Hypothesis Number 1

This hypothesis concerns the testing of TCE as follows: the greater the potential for hold-up associated with an activity, the greater the internalisation of the activity with a relational exchange, and the lesser the potential for hold-up associated with an activity, the greater the externalisation of the activity with a lesser relational exchange than that associated with internalisation.

In all activities and in all case studies, as well as in the survey, the empirical patterns for externalised activities match the conventional pattern predicted by TCE - with the exception of one activity in Case Study 1A. In contrast, in all activities and in all case studies, along with the

survey, the empirical patterns for internalised activities *did not match* the conventional patterns predicted by TCE - with the exception of one activity in Case Study 1. The discrepancy creating the mismatch amongst the internalised activities, and which is apparent in both the case studies and survey, concern the results on the Uncertainty variable. Consistent with the externalised matches and internalised mismatches, the survey results reveal that only one of the TCE variables (Frequency) is statistically significant - when all three of the TCE variables are expected to be statistically significant. In summary, this set of results contradicts this hypothesis.

8.2.1.2   Hypothesis Number 2

This hypothesis concerns the testing of RBT as follows: the greater the potential for an activity to create a competitive advantage, the greater the internalisation of the activity and the greater the potential for an activity to create a competitive disadvantage the greater the externalisation of the activity.

In all activities and in all case studies, as well as in the survey, the empirical patterns for internalised activity and externalised activity match the conventional patterns predicted by RBT - with the exception of one activity in Case Study 1. Consistent with the internalised and externalised matches, the survey results show that the Value variable is statistically significant – as predicted by RBT. RBT holds that this variable is necessary in either competitive parity or in a temporary competitive advantage or in a sustained competitive advantage. Additionally, the survey supported Barney's response to the RBT refutability critique. That is, there were statistically significant relationships concerning the MSCs size (in terms of turnover, number of staff and longevity of the retention of a rare portfolio of staff) and this was consistent with the market structures identified in both the case studies and the survey. On the basis of the one activity in Case Study 1, however, this set of results does not entirely support this hypothesis.

8.2.1.3   Hypothesis Number 3

This hypothesis concerns the testing of TCE and RBT as part of the integrative framework of vertical integration. This framework is represented by classified patterns of variables as shown in Table 4.2 and the corresponding refutability procedure described in Section 4.4.2.1.

In all activities and in all case studies, along with the survey, there is a gross match between empirical patterns for internalised activities and externalised activities and the patterns predicted by integrative framework of vertical integration. Additionally, in all the activities and in all the case studies, as well as in the survey, the predicted modes of governance match the empirical modes of governance. Moreover, the survey results show the Frequency (TCE) variable and the Value (RBT) variable to be statistically significant as predicted by the integrative framework of vertical integration (across a Level 3 internalised activity and a Level 5 externalised activity). The refutability procedure also requires, where appropriate, an SCP analysis. This analysis was able to be conducted in respect to preventive maintenance and specific DDCS maintenance (Section 6.9) and based on the case study data. This analysis indicated that the market structures surrounding the case study MSCs are consistent with the assigned internalised levels derived from the integrative framework of vertical integration. A partial SCP analysis of the survey data also indicated that the market structure surrounding the survey MSCs is consistent with the assigned internalised level identified from the integrative framework of vertical integration. Finally, in all the case studies and in the survey, the items designed to capture static / dynamic nature of decision making, indicated that the two governance decisions in this thesis are undertaken under conditions that tend towards a static and stable environment. These results are consistent with the gross match between the empirical patterns and the patterns predicted in the integrative framework of vertical integration - on the basis that more static and stable conditions are expected to promote the stronger form of rationality assumed in TCE and RBT. In summary, this set of results supports this hypothesis.

8.2.1.4   Hypothesis Number 4

This hypothesis concerns a particular supply chain, in terms of the relative importance of transaction costs and production costs as follows: either transaction costs or production costs are the important determinants of the make decision in a supply chain.

In all the activities and in all case studies, production costs are more important determinants of the make decision in the supply chain represented in the case studies - with the exception of one activity in Case Study 1. The survey data is not able to be used to test this hypothesis, as only part of the supply chain is examined in the survey. In the presence of the one exception in Case Study 1, however, this set of results does not entirely support this hypothesis.

8.2.1.5   Conclusions concerning sub-research question 1: The make-or-buy decision

The results of the testing of TCE, show that this theory substantially fails to predict the make-or-buy decision in the supply chain in this thesis. That is, TCE has mainly predicted externalised activities but has mainly failed to account for internalisation. The power to substantially account for externalisation only, is no significant claim on TCE's part – given that this theory predicts that low levels of asset specificity allow the market to aggregate demand and generate scale economies. In other words, TCE adopts a production costs or competence-based approach in its explanation and prediction of externalisation. Rather, the much greater test is whether this theory predicts internalisation arising out of hold-up. TCE achieves this only relation to one activity in one of the case studies. The failure to predict internalisation is caused by the low level of exogenous uncertainty surrounding the various activities in the supply chain studied. That is, market contracting is efficacious because of the lack of threat of negative opportunistic behaviour arising out of contractual disturbances created by exogenous change. In one sense, this outcome actually helps to reinforce the integrity of TCE. After all, TCE's normative advise is to consider vertical integration as the last resort (Williamson, 1991, 83) and, more recently, Williamson's (1999) "constructive critiques" of TCE seems to have brought TCE's limited explanatory and predicative expectation, with respect to vertical integration, in line with its narrow and restrictive normative position. Nevertheless, the fact that TCE can account for internalisation, no matter

how limited, shows that TCE can be an important determinant of the make-or-buy decision under conditions that pertain to firm-market homogeneity.

Correspondingly, RBT is shown to be substantially more powerful than TCE in predicting the make-or-buy decisions in the supply chains studied. That is, it predicts all but one of the internalised activities across all of the cases studies and in the survey, together with predicting all of the externalised activities in all of the case studies and in the survey. Moreover, RBT has as its focus differential production costs. This could be seen as more closely reflecting externalisation than TCE in the case studies and the survey. That is, the more narrow/precise range of the expected scores on the RBT variables, than those shown for the TCE variables in Table 4.2, indicates that RBT is more accurate on externalisation than TCE. It remains, however, that RBT failed to outperform TCE *in all activities*. This promotes the need for theoretical pluralism in order to provide a comprehensive coverage of the make-or-buy decision. Indeed, the integrative framework of vertical integration, that combines the relative strengths of TCE and RBT showed a gross match between its predicted patterns and all the empirical patterns in all activities across all the cases studies and the survey. This outcome is consistent with the economic conditions surrounding the supply chains studied, in terms of promoting the maximising assumptions within TCE and RBT.

In summary, and in response to sub-research question 1, the results to the above four hypotheses show that when taking a whole-of-supply chain approach and contingent on the economic conditions surrounding the activity, both transaction costs *and* production costs can be key determinants of the make-or-buy decision concerning air conditioning maintenance in Australian retail centres.

8.2.2 The nature of the exchange relationship decision

8.2.2.1 Hypothesis Number 5

This hypothesis concerns the testing of TCE, including the treatment of the nature of the exchange decision as a genuinely separate and subsequent decision with respect to internalisation. In doing so, a new type of asset specificity (Ongoing Asset Specificity) was developed in this thesis, in order to more accurately reflect a weaker form of hold-up associated with internalised human resources. This hypothesis was constructed as follows: with regard to an internalised activity, and when the resource is taken as the object of the transaction, the greater the potential for the non-conventional weaker form of hold-up associated with the exchange, the greater the relational exchange and the lesser the potential for the non-conventional weaker form of hold-up associated with the exchange, the greater a discrete exchange. In terms of an externalised activity, and when the activity is taken as the object of the transaction, the greater the potential for the conventional strong form of hold-up, the more likely a relational exchange will ensue (in the presence of a moderate level of frequency) and the more likely an inefficient discrete exchange will ensue (in the presence of a low level of frequency), and the lesser the potential for the conventional strong form of hold-up, the more likely an efficient discrete exchange will ensue.

In all of the internal relationships and external relationships, and in all of the case studies, as well as in the survey, there is a gross match between the empirical patterns and the patterns predicted by TCE (incorporating Ongoing Asset Specificity). Moreover, the survey results show that the Asset Specificity and Frequency variables are statistically significant. This is consistent with the treatment of the nature of the exchange decision as a genuinely separate and subsequent decision in terms of internalisation, in so far as, only the presence of asset specificity and frequency are necessary to create the possibility of the weaker form of hold-up that may lead to a relational internal exchange. In summary, this set of results supports this hypothesis.

8.2.2.2   Hypothesis Number 6

This hypothesis concerns the testing of RDT as follows: the greater the degree of bilateral dependence (two-way interdependence and balanced both ways) associated with the exchange, the greater the relational exchange (and based on credible commitments as positive balancing measures). The greater the degree of unilateral dependence (one-way interdependence and unbalanced) associated with the exchange, the greater the discrete exchange (with uncompetitive prices or credible threats as negative balancing measures, in addition to the tacit threat of using some other exchange partner or use of simple termination clauses). The greater the degree of independence (two-way and balanced) associated with the exchange, the greater the discrete exchange (competitive prices and an absence of credible threats with reliance on the tacit threat of using some other exchange partner or simple termination clauses only).

In all the external relationships and in all the case studies, as well as in the survey, the empirical patterns broadly match the RDT predicted patterns - with the exception of two external relationships (Case Study 1A and Case Study 3). In contrast, in all the internal relationships and in all the case studies, along with the survey, the empirical patterns do not match the RDT predicted patterns. Generally, in the internal relationships, a discrepancy is created by the low buyer and supplier empirical scores that indicate a low level of mutual dependency - when high scores representing a high level of mutual dependency are predicted. Consistent with the externalised matches and internalised mismatches, the survey results show that the variable representing RDT (constructed using a transformation procedure) is not statistically significant. In summary, this set of results contradicts this hypothesis.

8.2.2.3   Hypothesis Number 7

This hypothesis concerned a particular supply chain in terms of upstream internal and external relationships being determined by downstream external relationships. A downstream external relationship was observed in all six of the case studies and, in five of these case studies (Case Study 1, 1A, 2, 2A, 3A), a distinctly different exchange was observed upstream. A downstream

external relationship was also observed in the survey and, again, a distinctly different exchange was observed upstream. In summary, this set of results contradicts this hypothesis.

8.2.2.4　Conclusions concerning sub-research question 2: The nature of the exchange relationship decision

The results of the testing of TCE show that this theory predicts the nature of the internal and external exchanges in the supply chains in this thesis. However, this is based on the introduction and deployment of Ongoing Asset Specificity variable that pertains to internalised human resources and which is designed to more accurately capture a weaker form of hold-up by these resources. Here, and with respect to internal exchanges, asset specificity is sufficient to generate a relational exchange in the presence of a high level of frequency and notwithstanding the level of uncertainty. In contrast, the results of the testing of RDT shows that this theory substantially fails to predict the nature of the exchange relationships in the supply chains in this thesis.

Again, these results are consistent with the expectation that TCE should outperform RDT under more stable / static conditions that promote TCE's stronger form of rationality. Therefore, it expected that less stable conditions arising perhaps from few buyers and few suppliers, rapidly changing technology, extensive third party influence and more than one / complex transactions between parties to the exchange, may well promote the predictive power of RDT. Hence, Williamson is not ruling out the possibility of a combined efficiency (read TCE) and power-based (read theories like RDT) hypothesis. This pluralistic stance would require a broader view of the complementarity of these theories. That is, due to the nature of assumptions concerning rationality, TCE and RBT might be developed within the same SRP but TCE and RDT would require the coexistence of complementary SRPs.

8.2.3 Conclusions concerning the main research question: Governance of air conditioning maintenance in Australian retail centres

In total, this research has shown that transaction costs and production costs can both be key determinants of the governance of air conditioning maintenance in the chain that supplies this activity to Australian retail centres. Moreover, and in this chain, upstream exchange relationships are not determined by downstream external exchange relationships.

With regard to the extent to which these findings can be generalised across Australian retail centres, the scope the study was delimited to the vertical boundaries and exchange relationships (both internal and external) that lie between the CM - and this firm's decision concerning the activity of operations management and the MSC - and this firm's decision concerning the activity of DDC maintenance. Thus, the downstream vertical boundary and exchange between the owner of the centre and the CM is excluded from the findings, as well as the upstream vertical boundaries and exchanges considered by dedicated CC firms. Additionally, only MSCs that undertake some level of commercial and industrial work (and that are at least capable of servicing a small retail centre) and CMs that manage retail centres which are at least partially air conditioned are included.

The findings fully apply to the delimited scope of this study in terms of Brisbane and SEQ - on the basis of analytical generalisation (comprising theoretical replication and literal replication) afforded by the cases studies. That is, three recognised size categories of retail centre were selected and in each category an alternative "A" version was selected. The results showed that the "A" version of each case study substantially replicated the results of the primary case study version and that there were appreciable differences in the level of the variables across the different sizes of centre.

However, the findings apply to a further restricted scope, in terms of locations outside Brisbane and SEQ – on the basis of statistical generalisation provided by the survey. That is, the analysis of the control variables required the focus on MSCs with a turnover up to $5million and undertaking no more than 10 percent residential work, as well as retail centres up to 30,000m^2

GLAR. This focus was necessary to ensure that both the MSC and CM data sets were sufficiently homogenous prior to the aggregation of these two data sets. Despite these restrictions beyond the study's initial delimitations, the results of the survey still represent all of the 354 small to medium-sized MSCs firms that undertake commercial and industrial work only, as well as a likely small proportion of the 79 small to medium-sized MSCs firms that undertake commercial and industrial work and residential work. This amounts to at least 354 firms out of a national total of 449 firms, or 79 percent coverage of the MSC firms undertaking at least some commercial and industrial work in Australia. Moreover, the results of the survey also represent at least 1,085 centres (comprising four types of centre: SbRC; NC; BGC; TC; and M) with respect to the national total of 1,337 retail centres in Australia. Using the area classification of each of the different types of centre (Section 1.1.3), this equates to 12,655,000m^2 GLAR out of the national total of 19,125,000m^2 GLAR, or 66 percent coverage.

8.3 CONTRIBUTIONS

8.3.1 Theoretical development

8.3.1.1 Changes to the scope and certainty TCE and RBT applied to the make-or-buy decision

The nature of the contribution of research can be measured by changes to scope and certainty. Changes to scope are determined by claims made after the completion of the research and certainty is determined by justification (validity and reliability) of the claims made (Runeson and Skitmore 1999, 31-32). The manner by which this research addressed matters concerning validity and reliability is explained in Chapter 5, and so the focus in the rest of this section concerns changes to research scope.

As explained in Chapter 3 and summarised in Table 4.1, both TCE and RBT are expected to be successfully applied to the make-or-buy decision under conditions in which firms adopt an efficiency orientation and maximising behaviour. However, TCE is expected to be restricted in its application to conditions in which there exists information symmetry, or firm-market homogeneity. In contrast, RBT is expected to be applied successfully across both firm-market homogeneity *and* under conditions in which there is information asymmetry, or firm-market

heterogeneity. The research in this thesis concerning the make-or-buy decision, revolved around the activity of establishing under which conditions a theory applies and is probably the most common activity among scientists and, in particular, social scientists (Runeson and Skitmore 1999, 67).

The results from Case Study 1 (summarised in Table 6.1) extend the scope of the applicability of TCE on the issue of the make-or-buy decision to MSC firms in Brisbane/SEQ. That is, one of the activities in Case Study 1 (generic DDC maintenance) was successfully explained and predicted by TCE. Also, as this is the first testing of TCE in general facilities and building maintenance, this theory's scope is now extended into this field.

However, the results concerning a range of activities in all the case studies and in the survey, extend the scope of the applicability of RBT on the issue of the make-or-buy decision to a much greater extent than that achieved for TCE. That is, RBT's scope is now extended to CM firms and MSC firms of all sizes in Brisbane/SEQ and to CM firms managing retail centres up to 30,000m2 GLAR and MSC firms with a turnover up to $5million across Australia. That is, 66 percent coverage of retail centres in Australia and 79 percent coverage of MSCs in Australia. Moreover, as this is the first testing of RBT in any sector of construction activity, this theory's scope is also extended into this field.

More generally, the application of TCE and RBT in the supply chains in this thesis have provided a successful first test of the integrative framework of vertical integration developed in this thesis (detailed in Chapter 4 and summarised in Table 4.2). The integrative framework of vertical integration is based on the idea that the relationship between the focal firm and alternative upstream and downstream firms can be conceptualised in terms of a *capability and competence spectrum*. This spectrum is based on Williamson's (1985) "efficient boundaries problem" and Barney's (2002) capabilities approach to vertical integration, as well as the SCP model and developed into a seven-level classification comprising patterns of TCE and RBT variables.

The outcome of the integrative framework of vertical integration also serves to change the more fundamental scope of TCE and RBT on the make-or-buy decision. That is, this framework has revealed and operationalised the interface between TCE and RBT across internalisation (between Level 3 and Level 4) and externalisation (Level 4 and Level 5). In particular, the framework has shown that although RBT does perform successfully under conditions of firm-market homogeneity, it is restricted to Level 3 and Level 5. RBT does not explain and predict Level 4 – *which also reflects* firm-market homogeneity. Although, this restricts the general scope of application TCE to Level 4 activities and, correspondingly, removes these activities from the scope of application of RBT, the respective territory of TCE and RBT has been clarified and this increases the likelihood that these theories will be more successfully applied and developed in the future. As mentioned, this outcome actually helps to reinforce the integrity of TCE, as TCE's normative advice is to consider vertical integration as the last resort (Williamson, 1991, 83). These adjustments to the scope of the application of TCE and RBT on the make-or-buy decision represented by the integrative framework of vertical integration, are justified on the basis of the supply chains studied in the case studies and in the survey in this thesis. Further testing of the integrative framework in other sectors and industries is now warranted.

The integrative framework of vertical integration has also achieved a clarification of the scope of the different types of competitive advantage within RBT (Sustainable Competitive Advantage, Temporary Competitive Advantage and Competitive Parity) that can explain and predict internalisation (Levels 1, 2 and 3) and externalisation (Levels 5, 6 and 7).

Furthermore, in its operationalisation of competitive parity at Level 3, the integrative framework of vertical integration has taken a step towards operationalising Coase's Nobel prize winning thesis. That is, Level 3 represents the junction between RBT and Coase's thesis and both the case studies (incorporating analytical generalisation) and the survey (including statistical generalisation and statistically significant results) support the combination of the Value variable and the Frequency variable. This does not change the logic of RBT and is not a synthesis of TCE and RBT. Rather, Level 3 concerns the establishment of firms through superior organisational competence and the results provide empirical justification of the connection between RBT and

Coase's thesis. Moreover, the Frequency value used in TCE, is derived from a production cost logic – which is the domain of RBT. Adding the Frequency variable to RBT provides this theory with the means to more accurately predict internalisation at Level 3 and further deflect any tautology charge in relation to its Value variable.

As a final point on the integrative framework of vertical integration, the testing of this framework involved an SCP analysis. For the first time, this thesis provides empirical support for the de Valence hypothesis (detailed in Section 6.9.2.1) that concerns the existence of different market structures in a given project.

8.3.1.2   Changes to the scope and certainty TCE and RDT applied to the nature of the exchange relationship decision

Again, as explained in Chapter 3 and summarised in Table 4.1, TCE is expected to be successfully applied to the nature of the exchange relationship decision under conditions in which firms adopt an efficiency orientation and maximising behaviour. In contrast, RDT is expected to be successful under conditions in which firms adopt an effectiveness orientation and a longer term approach to profits.

The results from the cases studies and survey confirm these expectations and, in doing so, extend the scope of the applicability of TCE and reduce the scope of RDT on the issue of the nature of the exchange relationship to CM firms and MSC firms of all sizes in Brisbane/SEQ and to CM firms managing retail centres up to 30,000m2 GLAR (66 percent coverage of retail centres in Australia) and MSC firms with a turnover up to $5million (79 percent coverage of MSCs in Australia). Furthermore, as this is the first testing of TCE on the issue of the internal exchange relationships in any sector of construction activity and the first testing TCE on the issue of external exchange relationships within the context of general facilities and building maintenance, TCE's scope is now extended into these fields.

More generally, the application of TCE in the supply chains in this thesis have given a successful first test of the development of TCE's contractual schema in this thesis (detailed in Chapter 4).

The development in TCE's contractual schema was encouraged by Williamson's "constructive critiques" that collectively concede the possibility that internalisation may occur for reasons other than hold-up. This leads to the expectation that a range of exchange relationships may be expected within the firm and which is beyond the conventional and restrictive TCE expectation of only a relational exchange. Here, an implied heuristic embedded in TCE's contractual schema concerning the requirement that TCE should account simultaneously for the make-or-buy decision and the nature of the exchange relationship decision in terms of internalisation is relaxed. By relaxing this requirement and treating these two decisions as genuinely separate and sequential decisions with regard to internalisation, this thesis is able to develop the notion of the weaker form of hold-up arising from opportunistic behaviour by internal human resources and from this, develop and successfully test a new type of asset specificity pertaining to these resources (Ongoing Asset Specificity). In doing so, the predictive potential of TCE on the issue of the nature of the exchange relationship was enhanced. As part of enhancing the predictive power of TCE, Williamson's claims that skills acquisition is a necessary but not sufficient condition for asset specificity and that behavioural uncertainties would not pose contractual problems if transactions were known to be free from exogenous disturbances, were both refuted. In order to capture the weaker form of hold-up, the object of the transaction becomes the resource (not the activity) and in terms of human resources, the transaction is represented by the employment contract. Employers, via the employment contract, purchase the ability to adapt and can become insulated from exogenous disturbances. Related to this, skills acquisition and scarcity (reflected by Ongoing Asset Specificity) has been shown to be a sufficient condition for asset specificity. The development of TCE's hypotheses concerning the nature of exchange also involved developing closer relations between TCE and the T-C-R trinity (explained in Section 4.5.2).

Whilst, TCE's domain pertaining to conditions of firm-market homogeneity is found to reduce the scope of the application of this theory on the make-or-buy decision, the development in TCE's contractual schema avoids these conditions restricting the scope of TCE's application to the nature of the exchange relationship decision. That is, the new type of asset specificity developed in this thesis, is able to capture hold-up generated by circumstances both endogenous

and exogenous to the firm. More specifically, a general shortage of key resources may impact on all firms in terms of their staff relations and render all firms homogeneous in this respect. Thus, on the nature of the exchange, TCE may have a substantial level of coverage across all firms in any sector that competes for tradable resources. These adjustments to the scope of the application of TCE on the nature of the exchange relationship decision are justified on the basis of the supply chains studied in the case studies and in the survey in this thesis. Further testing of TCE, incorporating Ongoing Asset Specificity, in other sectors and industries is now justified.

8.3.1.3   Promotion of Theoretical pluralism

The integrative framework of vertical integration and the development in TCE's contractual schema, along with the deployment of multiple theories and a whole-of-supply chain approach – has yielded mutually supportive results across the two governance questions and, therefore, support for the doctrine of theoretical pluralism. More specifically, the outcome of this research is to support the view that TCE and RBT can be developed as complementary theories within the same SRP. Furthermore, and subject to further testing of RDT under conditions in which firms adopt an effectiveness orientation and a longer term approach to profits, TCE and RDT may be developed as theories representing separate but complementary SRPs.

8.3.2 Development in methods

As part of testing the above theories, this thesis also represents the operationalisation of the variables in TCE, RBT and RDT and the nature exchange relationship variable for the first time in building maintenance activity. Furthermore, this thesis incorporates a more comprehensive approach to the operationalisation of uncertainty, than that undertaken so far in any sector of construction activity. This was called for by González, Arruñada and Fernández (1999) and the five-item uncertainty scale that is developed in this thesis achieved a Cronbach's alpha of .799. Finally, this thesis also represents the operationalisation of the new type of Ongoing Asset Specificity for the first time, in any sector of activity.

8.4 IMPLICATIONS FOR THEORY AND METHODS

The important implications for theory resulting from the above contributions revolve around the two key developments in this thesis. First, the success of integrating TCE and RBT highlights the importance of researchers either taking a whole-of-supply chain approach in theoretical development and testing of either of the governance decisions in this thesis or, if focusing on one sector of activity, ensuring the inclusion of the measurement of the conditions surrounding the focal activity or exchange relationship, before drawing conclusions concerning the predictive power of TCE and / or RBT and / or RDT. Second, researchers are able to measure asset specificity in terms of the level of resource, using conventional types of asset specificity *and* Ongoing Asset Specificity, in order to allow TCE to fulfil its predictive potential on the issue of exchange relationships.

In order to achieve the contributions in this thesis, it was necessary to investigate both the make-or-buy decision *and* the nature of the exchange relationship decision. For example, in demonstrating the relative weakness of TCE on the make-or-buy decision and the relative strength of this theory in terms of the nature of the exchange relationship decision, the results to these two decisions become mutually supportive. Related to this, a whole-of-supply chain approach was necessary in order to ensure Hypotheses 1, 2, 3, 5 and 6 were all able to be tested and to specifically allow the testing of Hypothesis 4 and Hypothesis 7. The use of a case study method and a survey method also enhanced the reliability and validity of the conclusions, on the basis of their convergent results.

8.5 IMPLICATIONS FOR PRACTICE

8.5.1 The make-or-buy decision

As mentioned in Section 2.4.3.2, Eccles (1981b, 354) reported the difficulties faced by construction firms concerning whether or not to subcontract basic trades, and that about a third of the firms interviewed had previously subcontracted these trades but had changed to in-house provision and vice-versa. The results of this thesis in respect of the internalisation of generic DDC maintenance in Case Study 1 (that incorporated Temporal Asset Specificity as part of a

Level 4 activity) suggest that the most difficult make-or-buy decisions for main contractors may well, indeed, concern those trades in close physical and intellectual proximity to the main contractor's key activity of planning and coordinating site activity. The results also suggest that in these circumstances and when facing a Level 4 activity, main contractors would benefit from focusing on the possibility of hold-up and not production cost improvements.

In contrast, the results concerning general maintenance activity (that is shown as a Level 3 activity) indicate that Operations Managers overseeing this activity (or any manager facing a Level 3 activity) should focus on the more general influence of transaction costs – as opposed to the more specific threat of hold-up. Here, for example, Operations Managers could usefully take steps to document and demonstrate the increased quantity of work that could be achieved, in a given period, through internalisation and effective management. Additionally, these managers might document the cost of their time involved in searching, negotiating and enforcing a contract for this activity when externalised.

More generally, the integrative framework of vertical integration provides a technique that managers could use to map an activity, in terms of showing a current internalised activity's contribution to the firm or, perhaps, when assessing the costs and benefits of possibly internalising an activity that is currently externalised.

8.5.2 The nature of exchange relationships

Returning to the debate concerning a call for universal changes towards attitudes relating to trust, in conjunction with an extensive shift towards relational contracting between firms (Section 2.4.3.3), the results show that even in the circumstances in which clients have an ongoing requirement for an activity (that is, the CMs procuring preventive maintenance from MSCs) a discrete exchange can be economical. Moreover, the results indicate that this discrete exchange can deliver at least a satisfactory performance. This can be inferred from the static nature of the decision making concerning these exchange relationships as shown in Table 6.44 and Table 7.35, as well as a tendency to renew an existing contract for example, Table 6.11 and Table 7.26 (86 percent of CMs in the survey usually renew the existing contract with the existing MSC).

Although there may well be scope to substantially benefit from a far greater incidence of relational contracting between firms in Australia, the results of this thesis suggest that a gross shift (as called for by some government reports) to relational contracting and across all construction and maintenance sectors is not economically justifiable and not necessary from a performance perspective.

In terms of the firm's upstream external relationships and internal relationships, and picking-up from Section 2.4.3.4, the evidence from this thesis is that these relationships should not necessarily be determined by the firm's downstream external relationships. For example, main contractors might not allow their exchanges with their subcontractors and staff to be determined by exchanges with their clients. More specifically, this thesis indicates that main contractors can prosper from developing relational exchanges with their staff despite engaging in discrete and arms length exchanges with their clients. This may encourage main contractors to help move mainstream construction away from any "command and control" image. This time, and in respect of exchange relationships, the findings of this thesis provide support for government reports calling for main contractors to develop closer relations with their staff, core subcontractors and suppliers.

8.6 LIMITATIONS AND IMPLICATIONS FOR FUTURE RESEARCH

The most obvious immediate avenue for future research arising from this thesis is to relax one or more of the delimitations noted in Section 1.4 in order to increase the scope of the findings. For example, a focus on MSCs performing predominantly residential work might be undertaken.

Beyond these delimitations, further limitations emerged in the research as a result of the effects and implications of the control variables and which also suggest further research. For example, a survey that targets the larger retail centres (greater than $30,000m^2$ GLAR) and the larger MSCs (greater than $5million turnover), in order to lift the level of generalisation of the results nationwide to the same level as Brisbane/SEQ.

More generally, further testing the integrative framework of vertical integration in other sectors and, in terms of exchange relationships, further testing of the application of TCE - incorporating Ongoing Asset Specificity, again, in other sectors is justified.

In terms of theoretical pluralism, the testing of TCE and RDT under different conditions than those presented in the supply chain in this thesis, and which better suit RDT's weaker form of rationality, would seem to be an important area of future research.

APPENDIX 1 – EXAMPLE OF INITIAL VERSION OF CASE STUDY QUESTIONNAIRE

Procuring Operations Management for the Future

Section A: Procuring Operations Management

In this section we would like to ask you about your firm's procurement decision in relation to Operations Management.

1) According to the latest Property Council of Australia Shopping Centre Directory (2002), to follow is the approximate number of the centres in your state that your firm manages (please feel free to change any of these figures if they are currently significantly incorrect). Please insert, in each category of centre the approximate number of centres in which your firm insources Operations Management (e.g, uses employees) versus the approximate number that your firm outsources Operations Management (e.g., uses an external Facilities/Operations firm).

			Insources Opertions Man	Outsources Operations Man
City Centre	(GLAR[1] 1,000m^2 or more)	____No	____No	____No
Super Regional	(GLAR 85,000m^2 or more)	____No	____No	____No
Major Regional	(GLAR 50-85,000m^2)	____No	____No	____No
Regional	(GLAR 30-50,000m^2)	____No	____No	____No
Sub-Regional	(GLAR 10-30,000m^2)	____No	____No	____No
Neighbourhood	(GLAR 10,000m^2 or less)	____No	____No	____No
Showroom/Homemaker	(GLAR 5,000m^2 or more)	____No	____No	____No
Themed		____No	____No	____No
Market	(GLAR 5,000m^2 or more)	____No	____No	____No
Overall Total Centres		____**No**	____**No**	____**No**

Please indicate your response to the following questions in relation to your firm's current balance of insourcing and outsourcing Operations Management. These questions concern the stability of your current Operations Management procurement strategy.

2) Roughly how long has your firm had the above approach to insourcing / outsourcing Operations Management? Please insert approximate number of years: ____

3) Does your firm have any plans to change this approach to insourcing / outsourcing Operations Management in the next five years? Please tick the appropriate box and insert approximate percentage to indicate the approximate direction of the likely change:

No change likely ☐   Increase in insourcing likely ☐ ____%   Decrease in insourcing likely ☐____%

4) What is the inclination of your firm's philosophy towards the procurement of Operations Management? Please tick the appropriate box:

	In last 5 years	Currently	In next 5 years
Tendency to pursue profit maximisation in short term by minimisation of cost of service	☐	☐	☐
Tendency to pursue profit maximisation in longer term through investments in the performance of the service	☐	☐	☐

5) To what extent is the department in your firm, that is associated with the Operations Management procurement decision, free to make this decision autonomously? Please circle an appropriate point on the following scale:

Makes recommendation only 1 2 3 4 5 6 7 Entirely responsible for decision

6) If your firm uses an external Facilities / Operations Management firm then does your firm own any shares in the external firm that your firm uses most? Please circle: Yes / No

7) If you answered "Yes" to Question 6, is your firm among the major share holders in this external Facilities / Operations Management firm? Please circle: Yes / No

8) What would you describe as your firm's "Core Business". Please insert:_____

---

[1] GLAR = Gross Lettable Area Retail

Please answer Question 9 only if your firm insources 100% of its Operations Management. Whereas, please answer both Question 9 and 10 if your firm insources and outsources Operations Management. Whereas, please answer Question 10 only if your firm outsources 100% of its Operations Management.

9) *If your firm insources part or all of its Operations Management:* In comparison to other activities undertaken by your firm, to what extent does Operations Management have the potential to increase profits (increase revenue and / or reduce net costs). Please circle an appropriate point on the following scale:

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

10) *If your firm outsources part or all of its Operations Management imagine that this were switched to insourcing:* In this scenario to what extent would insourcing Operations Management in these additional centres, in comparison to other activites undertaken by your firm, have the potential to increase profits (increase revenue and / or reduce net costs). Please circle an appropriate point on the following scale:

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Please indicate your response to the following questions in relation to your firm's dominant approach to the procurement of Operations Management (i.e., either insourcing or outsourcing indicated by that approach most used in your portfolio of centres that you inserted above). These questions concern possible reasons for your procurement strategy. In all questions that ask for a response on a seven-point scale please avoid using the neutral point 4 – unless you consider this point to most accurately reflect your view.

11) Knowledge about the particular way my firm requires its Operation Managers to perform is possessed by few organisations. Please circle an appropriate point on the following scale:

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

12) The particular knowledge about my firm's centres concerning their specific maintenance requirements is possessed by few organisations. Please circle an appropriate point on the following scale:

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

13) It is difficult to find an alternative Operations Manager / firm that is capable, in due course, of matching the performance of one of my firm's typical Operations Managers/firm. Please circle an appropriate point on the following scale:

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

14) The entire knowledge and skills associated with my firm's Operations Management service is tacit (i.e., difficult to document and teach, and is complex being difficult for any one individual or outsider to understand). Please circle an appropriate point on the following scale:

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

15) My firm's policies and procedures are written to include Operations Management tasks and the monitoring of the performance of Operations Management. Please circle an appropriate point on the following scale:

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

16) My firm seeks quality assurance and continuous improvement in Operations Management. Please circle an appropriate point on the following scale:

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

17) To what extent is Operations Management peripheral or central to your firm's core business? Please circle an appropriate point on the following scale:

Peripheral 1 2 3 4 5 6 7 Central

18) To what extent is the specific knowledge of running your firm's centres (beyond the normal level of competence of Operations Management) of value to an individual Operations Manager if s/he should transfer their employment to a Shopping Centre Management owner (outside your portfolio of centres) or a rival Shopping Centre Management firm?: Please circle an appropriate point on the following scale:

Little value 1 2 3 4 5 6 7 Extremely valuable

19) To what extent are the underlying skills, knowledge and / or technology supporting Operations Management constantly changing or remains the same? Please circle an appropriate point on the following scale:

Constantly changing 1 2 3 4 5 6 7 Remains the same

20) To what extent does the level of changes in your tenants requirements for space and / or configuration of space impact on the nature and scope of Operations Management? Please circle an appropriate point on the following scale:

Substantial impact 1 2 3 4 5 6 7 Little impact

21) To what extent is it difficult or easy for your firm to define the tasks and performance requirements for Operations Management? Please circle an appropriate point on the following scale:

Difficult to define 1 2 3 4 5 6 7 Easy to define

22) To what extent is it difficult or easy for your firm to assess and / or inspect a task undertaken by your Operations Management before a problem occurs that needs to be solved by your firm's involvement? Please circle an appropriate point on the following scale:

Difficult to assess 1 2 3 4 5 6 7 Easy to assess

23) To what extent is running costs an unfair or fair reflection of the performance of Operations Management? Please circle an appropriate point on the following scale:

Unfair reflection 1 2 3 4 5 6 7 Fair reflection

24) What is the approximate level of cost of Operations Management across all of your firm's centres in comparison to the total cost of running all of these centres? Please circle an appropriate point on the following scale:

High in comparison 1 2 3 4 5 6 7 Low in comparison

25) In comparison to other activities in your firm, to what extent would a poor performance (at about the level of performance that is barely acceptable and that would prompt you consider replacing the current Operations Management at the next convenient opportunity) across all your firm's centres adversely impact or have little impact on the profits of your firm? Please circle an appropriate point on the following scale:

Substantial adverse impact on profits 1 2 3 4 5 6 7 Little impact on profits

26) To what extent are you unable or able to influence the policies and procedures of rival Shopping Centre Management firms in terms of Operations Management? Please circle an appropriate point on the following scale:

Unable to influence 1 2 3 4 5 6 7 Able to influence

27) To what extent is it difficult or easy to gain immediate access to alternative Operations Management individuals / firms that are capable of providing a service comparable to your existing Operations Management? Please circle an appropriate point on the following scale:

Difficult to gain access 1 2 3 4 5 6 7 Easy to gain access

28) What is the approximate amount of time it takes a newly installed and already competent Operation Management individual / firm to become familiar with a centre in order to reach their expected level of performance? Please insert months against three size categories of centre:

1-10,000 GLAR___months   10-50,000 GLAR___months   50-85,000 GLAR____months

29) If for some reason the Operation Manager, in a typical centre of your firm, walked out on strike then to what extent could this centre continue to operate without his/her contribution? Please tick the appropriate box to indicate operability:

Immediately inoperable ☐   Minutes ☐   Hours ☐   Days ☐   Weeks ☐

30) What are the top three reasons and percentage weighting concerning your firm's decision to adopt its dominant approach to the procurement of Operations Management? Please state briefly in your own words and insert percentage:

Most important reason: _____/_____%

Second most important reason: _____/_____%

Third most important reason: _____/_____%

Section B: Relationships surrounding Operations Management

In this part of Section B we would like to ask you about your firm's relationships with Operations Managers. Please indicate to what extent you disagree or agree with the following statements.

31) My firm treats Operations Managers more favourably than external suppliers of goods or services. Please circle an appropriate point on the following scale:

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

32) There is a specific expectation of continued employment / use of a particular Operations Manager should my firm discontinue the management of their centre. Please circle an appropriate point on the following scale:

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

33) The relationship with my firms Operations Managemers is extremely complicated comprising many diverse expectations about each other's behaviour. Please circle an appropriate point on the following scale:

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

34) My firm's relationship with its Operations Managers is part of complex network of relationships involving other firms. Please circle an appropriate point on the following scale:

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

35) Terms explicitly agreed by my firm and each Operations Management are specified precisely from the outset (e.g., annual budgets for running costs are stated specifically as opposed to using "performance requirements" or "fair market costs"). Please circle an appropriate point on the following scale:

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

36) My firm assures itself that its Operations Managers act as expected by precisely and regularly monitoring the performance at each centre. Please circle an appropriate point on the following scale:

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

In this part of Section B we are interested in Operations Managers' relationships with other parties other than your firm.

37) During the course of their duties, to what extent does an Operations Manager develop relationships with individuals or firms, other than your firm, that may influence its relationship with your firm? Please circle an appropriate point on the following scale:

Develops other relationships 1 2 3 4 5 6 7 Does not develop other relationships

38) If an Operations Manager is likely develop relationships with individuals or firms, other than your firm, that may influence its relationship with your firm please give example(s):

_____

_____

_____

Section C: External and internal factors influencing decision making

In this part of Section C we explore external factors that may influence any decision made by your firm.

39) Along with other rival providers of owners of Shopping Centre Management, to what extent is your firm dependent or not dependent on a single (or several similar) source for vital resources (e.g., Centre Managers, Operations Managers and Marketing Managers)? Please circle an appropriate point on the following scale:

Dependent on single/several similar sources 1 2 3 4 5 6 7 Not dependent on single/several similar sources

40) To what extent are the skills and technology constantly changing **and / or** goals unclear (e.g., maximise profit) of your firm's core business? Please circle an appropriate point on the following scale:

Constantly changing skills/technology and/or unclear goals 1 2 3 4 5 6 7 Stable skills/technology and/or clear goals

41) To what extent are there specific qualifications that are generally required to achieve senior management status in firms like your firm **and / or** are there professional bodies that are able to influence firms like your firm. Please circle an appropriate point on the following scale:

Specific qualifications needed and/or influential professional bodies 1 2 3 4 5 6 7 No specific qualifications needed and/or lack of influential professional bodies

On the other hand, in this part of Section C we investigate internal factors that may influence the Operations Management procurement decision.

42) How many organisational levels are there between the most senior person in the department in your firm associated with the Operations Management procurement decision and your firm's CEO? (e.g., if this person reports directly to the CEO then the answer is 0). Please insert number of levels: ____

43) Compared with other departments in your firm, how difficult or easy is it for the department associated with the Operations Management procurement decision to obtain resources (e.g., capital and personnel)? Please circle an appropriate point on the following scale:

Difficult 1 2 3 4 5 6 7 Easy

44) Compared with other departments in your firm, to what extent is work of senior management - in the department associated with the Operations Management procurement decision - monitored closely and in an ongoing fashion? Please circle an appropriate point on the following scale:

Closely and ongoing 1 2 3 4 5 6 7 Loosely and intermittently

45) Compared other departments in your firm, to what extent is senior management - in the department associated with the Operations Management procurement decision - encouraged to bond with your firm (e.g., compensation linked to performance, firm culture that encourages lengthy employment)? Please circle an appropriate point on the following scale:

Not encouraged to bond 1 2 3 4 5 6 7 Encouraged to bond

Section D: Structure of retail investment industry and business strategy

In this part of Section D we are interested in your views about the structure of the retail investment industry.

46) To what extent does your firm face intense or weak competition (e.g., promotional strategies among rival providers of Shopping Centre Management, service strategies to Owners / Tenants)? Please circle an appropriate point on the following scale:

Intense competition 1 2 3 4 5 6 7 Weak competition

47) To what extent does a new firm, without any centres, face barriers to establish a similar portfolio of centres as your firm? Please circle an appropriate point on the following scale:

Difficult to establish 1 2 3 4 5 6 7 Easy to establish

48) To what extent do you consider alternative Shopping Centre Management models (e.g., Owner's Centre Manager, Marketing Manager with an external Facilities Management firm) a threat as a substitute for your firm's services? Please circle an appropriate point on the following scale:

Potential substitute 1 2 3 4 5 6 7 No substitute

49) To what extent does your firm have bargaining power over suppliers to your firm's shopping centres (e.g., maintenance firms)? Please circle an appropriate point on the following scale:

Strong bargaining power over suppliers 1 2 3 4 5 6 7 Weak bargaining power over suppliers

50) To what extent do your firm's three biggest clients have bargaining power over your firm? Please circle an appropriate point on the following scale:

Strong bargaining power over your firm 1 2 3 4 5 6 7 Weak bargaining power over your firm

Whereas, in this part of Section D we would like to consider the business strategy of your firm.

51) What is the approximate percentage of your firm's centres serviced with cost focus (i.e., where the focus is to achieve low rents and / or low outgoing costs for tenants relative to other providers of Shopping Centre Management whilst still achieving a shopping experience comparable with the industry standard) versus as a result of a differentiation focus (i.e., in which the focus is to create a centre perceived by tenants and shoppers as unique through superior shopping features, your firm's brand image, and Shopping Centre Management service)? Please insert percentage:

Cost focus____%   Differentiation focus____%   = 100%

Section E: General information about you and your views

In this section you are asked to provide basic details about your position and invited to make further comments.

52) Please provide the following information:

Name (please print):   _____

Position held: _____

Number of years position held: _____

Date questionnaire completed: _____

53) If you would like to make any further comments, then these are welcomed. Please comment in the space below, or perhaps send a separate message (contact details are given at the end of this questionnaire).

Thank you very much indeed for your valuable time and effort spent completing this questionnaire.

If you require any additional information, contact details are as follows:

E-mail: a.bridge@qut.edu.au   Phone: (07) 3864 2935   Fax: (07) 3864 1170

Case Number:_____

APPENDIX 2 – VERSION 1 OF CASE STUDY QUESTIONNAIRE

Section A: General information about you and your views

Q1: Please print:
   Name:_____/Position:_____/Years at current firm:_____
   Name(s) of shopping centre(s) that you are currently responsible for:_____
   Years in position (all firms worked for):_____/Number of firms worked for:_____ / Date questionnaire completed:_____

Q2: If after completing this questionnaire, you would like to make any further comments about any aspect of this survey then these are welcomed. Please attach a sheet to the questionnaire with your comments, or alternatively send a separate message to me (please see cover page for my contact details).

Q3: If you would like to receive a copy of the summary of the findings (that includes the number of responses and verification of the amount that I have contributed to the Salvation Army), please tick box: ☐

Section B: You and your firm's approach to sourcing operations management

Q4: How do you source operations management? Please insert approximate percentages:
   In your centre(s):   In-house (direct employees)____% / Outsource (external firms)____% = 100%
   Across your firm's centres: In-house (direct employees)____% / Outsource (external firms)____% = 100%

Q5: How long has this approach to the sourcing of operations management existed? Please insert approximate number of years:
   In your centre(s):   _____years
   Across your firm's centres: _____years

Q6: If there are any plans to change this approach to sourcing operations management in next few years, then what is the likely new approach? Please insert approximate percentages: In your centre(s):   In-house (direct employees)____% / Outsource (external firms)____% = 100%
                Across your firm's centres: In-house (direct employees)____% / Outsource (external firms)____% = 100%

Q7: If your firm outsources any of its operations management, then typically what is the contract duration? Please insert:_____years

Q8: Typically, what minimum size of centre (see footnote[1]) would have a full-time resident Operations Manager? Please insert:_____

Q9: If your firm uses a multi-skilled manager to oversee one or more than one shopping centre(s), then typically how many and what types of centre would s/he manage and very roughly what percentage of their total time would be taken-up with operations management? Please insert:
   Number of centres_____ / Type(s) of centres _____ / _____% of total time on operations management

Q10: How many hours per week does a typical Operations Manager (or other manager that incorporates operations management) generally work?
Please insert approximate hours per week_____

---

[1] Super Regional (85,000 GLAR), Major Regional (50-85,000 GLAR), Regional (30-50,000 GLAR), Sub Regional (10-30,000 GLAR), Neighbourhood (less than 10,000 GLAR)

Section B continued

Q11: How busy is one of your firm's typical Operations Managers (or other manager that incorporates operations management)? Please circle on scale:

Generally extremely quiet   **1 2** 3 4 5 6 7   Generally extremely busy

Q12: In your firm, are Operations Managers mainly from a technical background or general management background? Please circle: technical / managerial

Section C: The relationship between with the Operations Manager(s) in your centre(s) and you/your firm

Q13: How much does this relationship involve a cooperative effort? Please circle on scale:

Extremely arms length   **1 2** 3 4 5 6 7   Extremely cooperative

Q14: How much expectation would your Operations Manager(s) have that they will be used on an alternative centre managed by your firm should your firm's management of their current centre(s) end? Please circle on scale:

Extremely low expectation   **1 2** 3 4 5 6 7   Extremely high expectation

Q15: How complex is this <u>relationship</u>? Please circle on scale:

<u>Extremely straightforward</u> (only really one relationship with you and your firm / treating each other the same most of the time)   **1 2** 3 4 5 6 7   <u>Extremely complex</u> (many relationships with others in addition to you/your firm, including all participant groups in centre e.g. shoppers, retailers, owner, contractors etc and need to treat different groups differently most of the time)

Q16: How complex are your <u>expectations</u> of your Operations Manager(s)? Please circle on scale:

<u>Extremely clear</u> (mostly the same, and limited range expectations from you/your firm)   **1 2** 3 4 5 6 7   <u>Not always clear</u> (often changing and wide ranging expectations from others in addition to you/your firm)

Q17: How detailed is the monitoring of the performance of your Operations Manager(s)? Please circle on scale:

<u>Extremely detailed</u> (every aspect of performance closely monitored, on a regular and frequent basis)   **1 2** 3 4 5 6 7   <u>Extremely imprecise</u> (important parts of performance monitored using key indicators only, on an irregular and infrequent basis)

Q18: How detailed are the terms and conditions of the contract with your Operations Manager(s)? Please circle on scale:

<u>Contract is fixed term</u> (with all performance requirements precisely specified and continuously updated in respect of assigned and named shopping centre(s))   **1 2** 3 4 5 6 7   <u>Contract is ongoing</u> (with very general performance requirements only - developed and agreed with Operations Manager during course of their contract)

Q19: How do you feel about the pay your firm would need to offer to attract a new and competent Operations Manager to your centre(s) – mindful of the contribution of Operations Manager(s) to your firm's core business? Please circle on scale: Extremely low **1 2** 3 4 5 6 7   Extremely High

Q20: Does your firm use any incentives (positive and/or negative measures - beyond the prospect of ongoing employment/termination of employment) to improve the performance of your Operations Manager(s)? Please circle: Yes / No. If so, then very briefly what are these measures? Please insert measures:

Positive measures:_____/Negative measures:_____

Section C continued

Q21: How steady has your relationship been with your Operations Manager(s) over the last few years? Please circle on scale:

Extremely steady **1 2** 3 4 5 6 7 Extremely variable

Q22: How much do you think that your relationship with your Operations Manager(s) is likely to become closer over the next few years? Please circle on scale:

Extremely likely **1 2** 3 4 5 6 7 Extremely unlikely

Q23: How much do you and your firm aim to treat all your Operations Manager(s) the same? Please circle on scale:

All treated in an extremely similar way **1 2** 3 4 5 6 7 All treated in an extremely different way

Q24: How long has a typical Operations Manager been with your firm? Please insert very approximate years_____

Section D: The role of operations management in your centre(s)/your firm

Q25: What is the potential for operations management to directly and/or indirectly increase your firm's profits (decrease costs and/or increase revenues) in your centre(s) when performed mainly in-house in comparison to all in-house and all outsourced activities your firm performs in the management of your centre(s)?
Please circle on scale: Greatly decrease profits **1 2** 3 4 5 6 7 Greatly increase profits

Q26: How central is operations management to your firm's core business applied to your centre(s) compared with all in-house and all outsourced activities your firm performs in the management of your centre(s)? Please circle on scale:

Extremely peripheral **1 2** 3 4 5 6 7 Extremely central

Q27: How different is any of the following: the technology (hardware and software), knowledge, skills, policies, procedures and/or practices as provided by the Operations Managers in your centre(s) compared with Operations Management in all other firms (of all sizes) in your area of operation? Please circle on scale:

Extremely similar **1 2** 3 4 5 6 7 Extremely different

Q28: How much do you think that there is a shortage of firms in your area of operation that would offer operations management (either solely or as part of their services) to a similar portfolio of number and type of centre(s) as that managed by your firm? Please circle on scale:

Extremely plentiful supply **1 2** 3 4 5 6 7 Extreme shortage

Q29: How costly do you imagine it would be for any of your main rivals in your area of operation to develop and match any differences in operations management you may have had in mind in Q26? Please circle on scale: Extremely easy **1 2** 3 4 5 6 7 Extremely costly/difficult

Q30: How difficult do you think it would be to have a manual written that would effectively communicate the total of the technology, knowledge, skills, policies, practices and procedures of the Operations Managers in your centre(s)? Please circle on scale:

Extremely easy **1 2** 3 4 5 6 7 Extremely difficult

Section D continued

Q31: How long should it take a competent Operations Manager (who has been with your firm for a good while) to become familiar with a typical new centre in order to reach your expected level of operations management performance? Please insert months:
       Super & Major Regional (>50,000 GLAR)_____mths / Regional (30-50,000 GLAR)_____mths / Sub Regional & Neighbourhood (<30,000 GLAR)_____mths

Q32: How much does the operations management service (technology – hardware and software, policies, procedures and practices) and the Operations Manager(s) (knowledge and skills) need to be customised and developed to suit a new owner and/or a new centre? Please circle on scale:
       Super Regional & Major Regional (>50,000 GLAR)   Minimal adaptations   **1** **2** 3 **4** **5** **6** **7**   Substantial adaptations
       Regional (30-50,000 GLAR)   Minimal adaptations   **1** **2** 3 **4** **5** **6** **7**   Substantial adaptations
       Sub Regional & Neighbourhood (<30,000 GLAR)   Minimal adaptations   **1** **2** 3 **4** **5** **6** **7**   Substantial adaptations

Q33: Assuming you had due cause, how difficult and costly would it be (including your time and effort) to replace a typical Operations Manager?
Please circle on scale: Extremely easy **1** **2** 3 **4** **5** **6** **7**   Extremely difficult and costly

Q34: How much is there a shortage of available Operations Managers (that could <u>at least be developed</u> into the role) in your area of operation? Please circle on scale:
                             Plentiful supply **1** **2** 3 **4** **5** **6** **7**   Extreme shortage

Q35: What is the minimum experience in or connected with Operations Management (beyond a related trade or profession) you generally require when seeking <u>to recruit</u> a new fully competent Operations Manager? Please insert approximate number of years? Minimum experience:_____years

Q36: If your firm gives any training to develop an Operations Managers from less than full competence to full-competence, then what is the total time commitment and how much of this training could be reused in one of your rival firms? Also, across your firm what percentage of Operations Managers that would receive this training and what percentage are recruited as fully competent? Please insert approximate time and percentages:
       In your centre(s):
       Total period beyond related trade/profession (on the job training and tertiary/professional qualifications):_____(years)_____(% reusable)
       In-house trained (to reach full competence from related trade/profession):_____%   Externally recruited (fully competent):_____%   = 100%

       Across your firm:
       Total period beyond related trade/profession (on the job training and tertiary/professional qualifications):_____(years)_____(% reusable)
       In-house trained (to reach full competence from related trade/profession):_____%   Externally recruited (fully competent):_____%   = 100%

Q37: In terms of a fully competent Operations Manager (who has been with your firm for a good while), what is your firm's training commitment and how much of this could be reused in one of your rival firms? Please insert approximate days and percentages: Ongoing training:_____(days per annum) ___% reusable

Q38: How confident would you be (in relation to your centre(s)) that you/your firm could reasonably predict the <u>range</u> of operations management tasks? Please circle on scale:
       Range of operation management tasks: Extremely confident **1** **2** 3 **4** **5** **6** **7**   Extremely unsure

Section D continued

Q39: In terms of the range of operations management tasks in the previous Q38, how confident would you be that you/your firm could reasonably estimate the duration/time required to complete these tasks (this does not include the being able to predict when any particular task will occur)?

        Duration/time of operations management tasks: Extremely confident **1 2** 3 4 5 6 **7** Extremely unsure

Q40: Again, in relation to the range of operations management tasks in the question Q38, how confident would you be that you/your firm could reasonably predict the approximate frequency of each of these tasks, as well as the approximate proportion of the total operations management workload each task would consume (this does not include the being able to predict when any particular task will occur)? Please circle on scale:

        Frequency and proportion of operation management tasks: Extremely confident **1 2** 3 4 5 6 **7** Extremely unsure

Q41: How confident would you be that you could clearly describe/specify the performance standards/requirements concerning operations management? Please circle on scale: Extremely confident **1 2** 3 4 5 6 **7** Extremely unsure

Q42: How much is the core knowledge and skills (excluding multi-skilling) of operations management likely to change in the next three years? Please circle on scale:

        Extremely low level of change **1 2** 3 4 5 6 **7** Extremely high level of change

Q43: How easy is it for you, or for you to arrange for someone, to directly check the performance of your Operations Manager(s) before a problem occurs that needs your input? Please circle on scale: Extremely easy **1 2** 3 4 5 6 **7** Extremely difficult

Q44: How much are technical objective measures (like budget management, service levels of staff/contractors etc) a fair reflection of the performance of your Operations Manager(s)? Please circle on scale: Extremely fair reflection **1 2** 3 4 5 6 **7** Extremely unfair reflection

Q45: How tolerant are you/your firm in terms of taking some sort of measure to correct unsatisfactory performance by your Operations Manager(s)?
Please circle on scale: Extremely sensitive **1 2** 3 4 5 6 **7** Extremely tolerant
                (immediate action)   (action delayed as long as possible)

Q46: How tolerant do you feel your Operations Manager(s) are in terms of seeking to improve what they might feel is unsatisfactory pay and/or working conditions?
Please circle on scale: Extremely sensitive **1 2** 3 4 5 6 **7** Extremely tolerant
                (immediate action)   (action delayed as long as possible)

Q47: What is the cost of one of your Operations Manager(s) as a proportion of the total cost of your entire firm's staff costs? Please circle on scale:

        Extremely small proportion **1 2** 3 4 5 6 **7** Extremely large proportion

Q48: What is the proportion of income that each of your Operation Managers obtains from working for your firm? Please circle on scale:

        Extremely small proportion **1 2** 3 4 5 6 **7** Extremely large proportion (practically 100%)

Q49: How much are you/your firm able to influence the manner by which your Operations Manager(s) performs their role? Please circle on scale:

        Extremely easy to influence **1 2** 3 4 5 6 **7** Extremely difficult to influence

Section D continued

Q50: How much are your Operations Manager(s) able to influence your firm's policies, procedures and practices concerning operations management?
Please circle on scale: Extremely easy to influence   1 2 3 4 5 6 7 Extremely difficult to influence

Q51: How easy could you adopt <u>any one</u> of any of the alternative approaches to sourcing operations management in your centre(s) (<u>including</u> using existing internal resources or employing a new full time competent in-house Operations Manager or by using temporary hire staff or outsourcing to an external firm etc)? Please circle on scale: Extremely easy 1 2 3 4 5 6 7 Extremely difficult

Q52: If your firm were required to manage two or more additional centres beyond your current operations management capacity and your firm were required to <u>consider all alternatives</u>, then how do you think your firm would you rank the following alternatives? Please insert a number 1 up to 5 against the following (with Number 1 being the most preferred alternative):
     _____: Use/promote/train other internal staff
     _____: Recruit new and fully competent Operations Manager as in-house staff
     _____: Outsource work to external firm:
     _____: Employ temporary hire staff for the remaining duration of your firm's commitment to the management of the centre concerned
     _____: Other: please briefly describe_____

Q53: How easy is it for your Operations Manager(s) to gain employment with a different firm as an Operations Manager or in some related role? Please circle on scale:
                                 Extremely easy 1 2 3 4 5 6 7 Extremely difficult

End of questionnaire - Once again, thank you very much for your time

APPENDIX 3 – VERSION 2 OF CASE STUDY QUESTIONNAIRE

Section A: General information about you and your views

Q1: Please print:

Name:_____/Position:_____/Years at current firm:_____

Name(s) of shopping centre(s) that you are currently responsible for:_____

Years in position (all firms worked for):_____/ Number of firms worked for:_____/ Date questionnaire completed:_____

Q2: If after completing this questionnaire, you would like to make any further comments about any aspect of this survey then these are welcomed. Please attach a sheet to the questionnaire with your comments, or alternatively send a separate message to me (please see cover page for my contact details).

Q3: If you would like to receive a copy of the summary of the findings (that includes the number of responses and verification of the amount that I have contributed to the Salvation Army), please tick box: ☐

Section B: Your approach to sourcing General Maintenance and Air Conditioning/Ventilation maintenance in your centre(s)

Q4: How do you source maintenance? Please insert approximate percentages:

General Maintenance: In your centre(s):   In-house (direct employee(s))_____% / Outsource (contractor(s))_____% = 100%

Air Conditioning/Ventilation: In your centre(s):   In-house (direct employee(s))_____% / Outsource (contractor(s))_____% = 100%

Q5: How long has this approach to sourcing maintenance existed? Please insert approximate number of years:_____

Q6: If there are plans to change this approach to sourcing maintenance in the next few years, then what is the likely new approach? Please insert approximate percentages:

General Maintenance: In your centre(s):   In-house (direct employee(s))_____% / Outsource (contractor(s))_____% = 100%

Air Conditioning/Ventilation: In your centre(s):   In-house (direct employee(s))_____% / Outsource (contractor(s))_____% = 100%

If at least some general maintenance is performed in-house, then:

Q7: How many of these staff are there and approximately how many hours per week do they work? Please insert:

In your centre(s):   Number of in-house general maintenance staff_____/Number of hours per week per typical staff_____

Across your firm's centres: Typical size/type of centre to justify one full-time in-house general maintenance staff_____

Maximum number of in-house general maintenance staff at one centre:_____Size/type of this centre____ _____

Q8: How busy is one of your typical general maintenance staff? Please circle on scale:

Generally extremely quiet   **1 2** 3 4 5 6 7 Generally extremely busy

Q9: How long has one of your typical general maintenance staff members been with your firm? Please insert very approximate years_____

Section B continued

Assuming that Air Conditioning/Ventilation maintenance is mainly outsourced, then

Q10: How often would you expect the contractor (at least one technician) to be at your centre(s)? Please tick <u>one</u> box and insert <u>very approximate typical</u> time:

Continuously	☐	(at least 5 days per week and 8 hours per day)	
Daily (parts of day)	☐	and hours per day _____	
Weekly (parts of week)	☐	and days per week _____	and hours per day_____
Monthly (parts of month)	☐	and days per month _____	and hours per day_____
Quarterly	☐	and days per quarter _____	and hours per day_____
6 Monthly	☐	and days per 6 months _____	and hours per day_____
Annually	☐	and days per year _____	and hours per day_____

Q11: How many technicians from this contractor would typically visit your centre(s)? Please insert number:_____

Q12: In your experience, do Air Conditioning/ Ventilation contractors tend to have their contract renewed? Please circle Yes / No

Q13: What are the following aspects of the Air Conditioning/Ventilation tender/contract? Please insert/circle:

Typical number of firms selected to tender:	_____number
Nature of contract:	Preventative/Comprehensive/Other
Typical duration:	_____years
30 day termination clause (or similar):	Yes / No

Q14: If you manage a shopping centre with direct digital controls (DDC) systems, then would you normally include the maintenance of this system as part of the Air Conditioning/ Ventilation Contractors work? Please circle: Yes / No

Please note: In the following Sections C and D, if you do not have any in-house General Maintenance staff or an Air Conditioning/ Ventilation contractor, then please ignore the part of each question that concerns General Maintenance or Air Conditioning/Ventilation – with the exception of Question 26. Please answer Question 26 under any arrangement you have – whether or not General Maintenance and Air Conditioning/Ventilation is done in-house or externally using a contractor.

Section C: Your relationship with your <u>in-house</u> General Maintenance staff and <u>external</u> Air Conditioning/Ventilation maintenance contractor(s) in your centre(s)

Please consider one of your typical staff members in terms of General Maintenance.

Q15: How much do these relationships involve a cooperative effort? Please circle on scale:

General Maintenance Staff:	Extremely arms length 1 2 3 4 5 6 7 Extremely cooperative
Air Conditioning Contractor:	Extremely arms length 1 2 3 4 5 6 7 Extremely cooperative

Section C continued

Q16: How much expectation would this staff/contractor have that they will be used on an alternative centre managed by your firm should your firm's management of their current centre end and what expectation would the contractor have that your firm would use them on an alternative centre? Please circle on scale:

General Maintenance Staff:	Extremely low expectation 1 2 3 4 5 6 7	Extremely high expectation
Air Conditioning Contractor:	Extremely low expectation 1 2 3 4 5 6 7	Extremely high expectation

Q17: How complex are these relationships? Please circle on scale:

General Maintenance Staff:	Extremely straightforward (only really one relationship with you and your firm/treating each other the same mostly all of the time) 1 2 3 4 5 6 7	Extremely complex (many relationships with others in in addition to you/your firm, e.g. shoppers, retailers, owner, contractors etc and need to treat different groups differently most of time)
Air Conditioning Contractor:	Extremely straightforward (only really one relationship with you and your firm/treating each other the same mostly all of the time) 1 2 3 4 5 6 7	Extremely complex (many relationships with others in in addition to you/your firm, e.g. shoppers, retailers, owner, contractors etc and need to treat different groups differently most of time)

Q18: How complex are your expectations of this staff/contractor? Please circle on scale:

General Maintenance Staff:	Extremely clear (mostly the same and limited range expectations from you/your firm) 1 2 3 4 5 6 7	Not always clear (often changing and wide ranging expectations from others in addition to you/your firm)
Air Conditioning Contractor:	Extremely clear (mostly the same and limited range expectations from you/your firm) 1 2 3 4 5 6 7	Not always clear (often changing and wide ranging expectations from others in addition to you/your firm)

Q19: How detailed is the monitoring of the performance of this staff/contractor? Please circle on scale:

General Maintenance Staff:	Extremely detailed (every aspect of performance closely monitored on a regular and frequent basis) 1 2 3 4 5 6 7	Extremely imprecise (important parts of performance monitored using key indicators only, on an irregular and infrequent basis)
Air Conditioning Contractor:	Extremely detailed (every aspect of performance closely monitored on a regular and frequent basis) 1 2 3 4 5 6 7	Extremely imprecise (important parts of performance monitored using key indicators only, on an irregular and infrequent basis)

Q20: How detailed are the terms and conditions of the contract with this staff/contractor? Please circle on scale:

General Maintenance Staff:	Contract is fixed term (with all performance requirements precisely specified and continuously updated in respect of assigned/named centre(s)) 1 2 3 4 5 6 7	Contract is ongoing (with very general performance requirements only - developed and agreed during the course of their contract)
Air Conditioning Contractor:	Contract is fixed term (with all performance requirements precisely specified and continuously updated in respect of assigned/named centre(s)) 1 2 3 4 5 6 7	Contract is ongoing (with very general performance requirements only - developed and agreed during the course of their contract)

Section C continued

Q21: How do you feel about the pay/price your firm would need to offer to attract a new and competent staff/contractors to your centre(s) – mindful of their contribution to your firm's core business? Please circle on scale:

General Maintenance Staff: Extremely low **1 2** 3 4 5 6 7 Extremely High

Air Conditioning Contractor: Extremely low **1 2** 3 4 5 6 7 Extremely High

Q22: Does your firm use any incentives (positive and/or negative measures) to improve the performance of this staff/contractor (beyond the prospect of ongoing use/termination)? Please circle: Yes/No. If so, then very briefly what are these measures? Please insert measures:

General Maintenance Staff: Positive measures:_____/Negative measures:_____

Air Conditioning Contractor: Positive measures:_____/Negative measures:_____

Q23: How steady have the relationships been over the last few years with this staff/contractor? Please circle on scale:

General Maintenance Staff: Extremely steady   **1 2** 3 4 5 6 7 Extremely variable

Air Conditioning Contractor: Extremely steady   **1 2** 3 4 5 6 7 Extremely variable

Q24: How much do you think that these relationships are likely to become closer over the next few years? Please circle on scale:

General Maintenance Staff: Extremely likely   **1 2** 3 4 5 6 7 Extremely unlikely

Air Conditioning Contractor: Extremely likely   **1 2** 3 4 5 6 7 Extremely unlikely

Q25: How much do you and your firm aim to treat all your general maintenance staff and all contractors the same? Please circle on scale:

General Maintenance Staff: All treated in an extremely similar way **1 2** 3 4 5 6 7 All treated in an extremely different way

All contractors: All treated in an extremely similar way **1 2** 3 4 5 6 7 All treated in an extremely different way

Section D: The role of <u>in-house</u> General Maintenance staff and <u>external</u> Air Conditioning/Ventilation maintenance contractor(s) in your centre(s)

Q26: What is the potential for these activities to <u>directly and/or indirectly</u> increase your firm's <u>profits</u> (decrease costs and/or increase revenues) in your centre(s) when performed <u>mainly in-house</u> (if not currently mainly in-house then assume it is proposed to do this) in comparison to <u>all</u> in-house <u>and</u> outsourced activities your firm performs in terms of your centre(s)? Please circle on scale:

General Maintenance: Greatly decrease profits **1 2** 3 4 5 6 7 Greatly increase profits

Air Conditioning: Greatly decrease profits **1 2** 3 4 5 6 7 Greatly increase profits

Q27: How central are these activities to your centre(s)/your firm's core business compared with <u>all</u> the activities that your firm performs in-house <u>and</u> outsources? Please circle on scale:

General Maintenance Staff: Extremely peripheral **1 2** 3 4 5 6 7 Extremely central

Air Conditioning Contractor: Extremely peripheral **1 2** 3 4 5 6 7 Extremely central

Section D continued

Q28: How different is any of the following: technology (hardware and software), knowledge, skills, policies, procedures and/or practices used/required by this staff/contractor to service your centre? Please circle on scale:

    General Maintenance Staff: Extremely similar   1 2 3 4 5 6 7   Extremely different
    Air Conditioning Contractor: Extremely similar   1 2 3 4 5 6 7   Extremely different

Q29: How much do you think there is a shortage of any type of firm that is capable of providing a similar standard of general maintenance as provided by your firm (though your general maintenance staff) and a shortage of contractors that can provide air conditioning similar to the contractor you engage in your centre(s) and in your area of operation? Please circle on scale:

    General Maintenance: Extremely plentiful supply   1 2 3 4 5 6 7   Extremely shortage
    Air Conditioning: Extremely plentiful supply   1 2 3 4 5 6 7   Extremely shortage

Q30: How costly do you think it would be for any firm that provides general maintenance (as part of their services) to develop and match any differences in your general maintenance staff that you have had in mind in Q28 and for any firm that provides air conditioning maintenance to develop and match any differences in your current air conditioning contractor that you may have had in mind in Q28? Please circle on scale:

    General Maintenance: Extremely easy 1 2 3 4 5 6 7   Extremely costly/ difficult
    Air Conditioning: Extremely easy 1 2 3 4 5 6 7   Extremely costly/ difficult

Q31: How difficult do you think it would it be to write a manual that would effectively communicate the total of the technology, knowledge, skills, policies, practices and procedures of the staff/contractor required in your centre(s)? Please circle on scale:

    General Maintenance Staff: Extremely easy 1 2 3 4 5 6 7   Extremely costly/ difficult
    Air Conditioning Contractor: Extremely easy 1 2 3 4 5 6 7   Extremely costly/ difficult

Q32: How long would it take a recently appointed and competent staff/contractor to become familiar your centre(s) and to reach their expected level of performance? Please insert months:

    General Maintenance Staff:
        Super & Major Regional (>50,000 GLAR)_____mths / Regional (30-50,000 GLAR)_____mths / Sub Regional & Neighbourhood (<30,000 GLAR)_____mths
    Air Conditioning Contractor:
        Super & Major Regional (>50,000 GLAR)_____mths / Regional (30-50,000 GLAR)_____mths / Sub Regional & Neighbourhood (<30,000 GLAR)_____mths

Q33: How much did your current staff/contractor in your centre(s) need to customise their technology (hardware and software), knowledge, skills, policies, procedures and practices to suit your firm and/or owner(s) and/or these centre(s) (if you have a more than one centre – then use your largest centre as the example)? Please circle on scale: General Maintenance Staff: Minimal adaptations   1 2 3 4 5 6 7   Substantial adaptations
    Air Conditioning Contractor: Minimal adaptations   1 2 3 4 5 6 7   Substantial adaptations

Q34: Assuming you have due cause, and given your budget, how difficult and costly would it be to (including your time and effort) to replace a typical member of general maintenance staff and your current contractor? Please circle on scale:

    New full-time and General Maintenance Staff: Extremely easy 1 2 3 4 5 6 7   Extremely difficult
    New Air Conditioning Contractor: Extremely easy 1 2 3 4 5 6 7   Extremely difficult

Section D continued

Q35 How much is there a shortage of available full-time and competent general maintenance staff? Please circle on scale:

Plentiful supply **1** **2** **3 4 5 6 7** Extreme shortage

Q36 What are the minimum technical experience and qualifications you generally require when seeking to recruit new fully competent staff/contractors? Please insert approximate number of years and any particular qualifications:

New full-time General Maintenance Staff: Total experience:_____years / Qualifications:_____

New Air Conditioning Contractor: Total experience:_____years / Qualifications:_____

Q37 If your firm gives any training to develop General Maintenance staff from less than full competence to full-competence, then what was the total time commitment and how much of this training could be reused in one of your rival firms? Also, in your centre(s) what percentage of General Maintenance staff would receive this training and what percentage are recruited as fully competent? Please insert approximate time and percentages:

In your centre(s):   Total period of training (on the job training and tertiary education)_____(years)_____(% reusable)

In-house trained (to reach full competence):   _____%   Externally recruited (fully competent):_____%   = 100%

Q38 In terms of a fully competent General Maintenance staff (who has been with your firm for a good while), what is your firm's ongoing training commitment and how much of this could be reused in one of your rival firms? Please insert approximate days and percentages: Ongoing training:_____(days per annum) ___% reusable

Q39 Does your firm provide any training or invest in any way in your Air Conditioning contractor? Please circle: Yes / No.
If yes, then briefly in what way?:_____

Q40: How confident would you be (in relation to your to your centre) that either you/your firm could reasonably predict the <u>range</u> of general maintenance and air conditioning maintenance tasks? Please circle on scale:

Range of General Maintenance tasks: Extremely confident **1** **2** **3 4 5 6 7** Extremely unsure

Range of Air Conditioning maintenance tasks: Extremely confident **1** **2** **3 4 5 6 7** Extremely unsure

Q41: In terms of the range of general maintenance tasks and air conditioning maintenance tasks in the previous question Q40, how confident would you be that you/your firm could reasonably estimate the <u>duration/time</u> required to complete these tasks (this does <u>not</u> include the being able to predict <u>when</u> any <u>particular task</u> will occur)?

Duration of General Maintenance tasks: Extremely confident **1** **2** **3 4 5 6 7** Extremely unsure

Duration of Air Conditioning maintenance tasks: Extremely confident **1** **2** **3 4 5 6 7** Extremely unsure

Q42: Again, in relation to the range of general maintenance tasks and air conditioning maintenance tasks in question Q40, how confident would you/your firm could reasonably predict an appropriate <u>frequency</u> of routine preventative work, as well as a minimum level of occurrence of *ad hoc* maintenance /breakdown maintenance (this does <u>not</u> include the being able to predict <u>when</u> any particular *ad hoc*/breakdown maintenance task will occur)? Please circle on scale:

General Maintenance (appropriate frequency of
routine preventative and minimum breakdown):   Extremely confident **1 2 3 4 5 6 7** Extremely unsure

Air Conditioning maintenance (appropriate frequency of
routine preventative work and minimum breakdown):   Extremely confident **1 2 3 4 5 6 7** Extremely unsure

Section D continued

Q43: How confident would you be that you could clearly describe/specify the performance standards/requirements concerning your staff/contractor? Please circle on scale:
General Maintenance staff: Extremely confident 1 2 3 4 5 6 7 Extremely unsure
Air Conditioning Contractor: Extremely confident 1 2 3 4 5 6 7 Extremely unsure

Q44: Hoe much is the core knowledge and skills (excluding multi-skilling) of this staff/contractor likely to change in the next three years? Please circle on scale:
General Maintenance staff: Extremely low level of change 1 2 3 4 5 6 7 Extremely high level of change
Air Conditioning Contractor: Extremely low level of change 1 2 3 4 5 6 7 Extremely high level of change

Q45: If you had the resources, then how easy is it for you, or for you to arrange for someone, to directly check the performance of your staff/contractor before a problem occurs that needs your input? Please circle on scale:
General Maintenance Staff: Extremely easy 1 2 3 4 5 6 7 Extremely difficult
Air Conditioning Contractor: Extremely easy 1 2 3 4 5 6 7 Extremely difficult

Q46: How much are technical objective measures (like correct completion of work on time and within scheduled hours etc) a fair reflection of the performance of your staff/contractor? Please circle on scale:
General Maintenance Staff: Extremely fair reflection 1 2 3 4 5 6 7 Extremely unfair reflection
Air Conditioning Contractor: Extremely fair reflection 1 2 3 4 5 6 7 Extremely unfair reflection

Q47: How tolerant are you/your firm in terms of taking some sort of measure to correct unsatisfactory performance by your staff/contractor? Please circle on scale:
General Maintenance Staff: Extremely sensitive (immediate action) 1 2 3 4 5 6 7 Extremely tolerant (action delayed as long as possible)
Air Conditioning Contractor: Extremely sensitive (immediate action) 1 2 3 4 5 6 7 Extremely tolerant (action delayed as long as possible)

Q48: How tolerant do you feel your staff/contractors are in terms of seeking to improve perceived unsatisfactory pay and/or working conditions? Please circle on scale:
General Maintenance Staff: Extremely sensitive (immediate action) 1 2 3 4 5 6 7 Extremely tolerant (action delayed as long as possible)
Air Conditioning Contractor: Extremely sensitive (immediate action) 1 2 3 4 5 6 7 Extremely tolerant (action delayed as long as possible)

Q49: What is the cost of one of your General Maintenance staff and your air conditioning contractor as a proportion of your total operations budget? Please circle on scale:
One General Maintenance Staff: Extremely small proportion 1 2 3 4 5 6 7 Extremely large proportion
Air Conditioning Contractor: Extremely small proportion 1 2 3 4 5 6 7 Extremely large proportion

Q50: What do you estimate to be the proportion of income/revenue that your staff/contractor obtains from working for your firm (across all your firm's centres)? Please circle on scale:
General Maintenance Staff: Extremely small proportion 1 2 3 4 5 6 7 Extremely large proportion (practically 100%)
Air Conditioning Contractor: Extremely small proportion 1 2 3 4 5 6 7 Extremely large proportion (practically 100%)

Q51: How much are you/your firm able to influence the manner by which your staff/contractor performs their role? Please circle on scale:
General Maintenance Staff: Extremely easy to influence 1 2 3 4 5 6 7 Extremely difficult to influence
Air Conditioning Contractor: Extremely easy to influence 1 2 3 4 5 6 7 Extremely difficult to influence

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Section D continued

Q52: How much are your staff/contractor able to influence your firm's policies, procedures and practices concerning general maintenance/air conditioning? Please circle on scale:

General Maintenance Staff: Extremely easy to influence   1 2 3 4 5 6 7   Extremely difficult to influence

Air Conditioning Contractor: Extremely easy to influence   1 2 3 4 5 6 7   Extremely difficult to influence

Q53: How easy could you adopt <u>any one</u> of any of the alternative approaches to sourcing general maintenance and air conditioning maintenance in your centre(s) (<u>including</u> using existing internal resources or employing a new full time competent technicians or by using temporary hire technicians or outsourcing to an alternative external firm etc)? Please circle on scale:

General Maintenance: Extremely easy 1 2 3 4 5 6 7   Extremely difficult

Air Conditioning Maintenance: Extremely easy 1 2 3 4 5 6 7   Extremely difficult

Q54: If your firm were required to manage two or more additional centres beyond your current General Maintenance staff capacity and your firm were required to <u>consider all alternatives</u>, then how do you think your firm would rank the following alternatives? Please insert a number 1 up to 5 against the following (with Number 1 being the most preferred alternative):

    _____: Use/promote/train other internal staff

    _____: Recruit new and fully competent tradesperson(s) as in-house staff

    _____: Outsource work to external contractor:

    _____: Employ temporary hire staff for the remaining duration of your firm's commitment to the management of the additional centre concerned

    _____: Other: please briefly describe_____

Q55: Again, if your firm were required to manage two or more additional centres beyond your current air conditioning contractor's capacity and your firm were required to <u>consider all alternatives</u>, then how do you think your firm would rank the following alternatives? Please insert a number 1 up to 5 against the following (with Number 1 being the most preferred alternative):

    _____: Use/promote/train internal staff

    _____: Recruit new and fully competent tradesperson(s) as in-house staff

    _____: Outsource work to an additional external contractor:

    _____: Employ temporary hire staff for the remaining duration of your firm's commitment to the management of the additional centres concerned

    _____: Other: please briefly describe_____

Q56: How easy do you think it would be for your staff/contractor to gain work with a different firm in the same or related role? Please circle on scale:

General Maintenance Staff: Extremely easy   1 2 3 4 5 6 7   Extremely difficult

Air Conditioning Contractor: Extremely easy   1 2 3 4 5 6 7   Extremely difficult

End of questionnaire - Once again, thank you very much for your time

Case Number:_____

APPENDIX 4 – VERSION 3 OF CASE STUDY QUESTIONNAIRE

Section A: General information about you and your views

Q1: Please print:
Name:_____/Position:_____/Years at current firm:_____
Name(s) of shopping centre(s) that you are currently responsible for:_____
Years in position (all firms worked for):_____/ Number of firms worked for:_____/ Date questionnaire completed:_____

Q2: If after completing this questionnaire, you would like to make any further comments about any aspect of this survey then these are welcomed. Please attach a sheet to the questionnaire with your comments, or alternatively send a separate message to me (please see cover page for my contact details).

Q3: If you would like to receive a copy of the summary of the findings (that includes the number of responses and verification of the amount that I have contributed to the Salvation Army), please tick box: ☐

Section B: Your approach to sourcing Air Conditioning/Ventilation maintenance in your centre(s)

Q4: How do you source Air Conditioning/Ventilation maintenance? Please insert approximate percentages:
        In your centre(s):   In-house (direct employee(s))_____% / Outsource (contractor(s))_____% = 100%

Q5: How long has this approach to sourcing maintenance existed? Please insert approximate number of years:_____

Q6: If there are plans to change this approach to sourcing Air Conditioning/Ventilation maintenance in the next few years, then what is the likely new approach? Please insert approximate percentages: In your centre(s):   In-house (direct employee(s))_____% / Outsource (contractor(s))_____% = 100%

Assuming that Air Conditioning/Ventilation maintenance is mainly outsourced, then:

Q7: How often would you expect the contractor (at least one technician) to be at your centre(s)? Please tick <u>one</u> box and insert <u>very approximate typical</u> time:
        Continuously   ☐   (at least 5 days per week and 8 hours per day)
        Daily (parts of day)   ☐   and hours per day   _____
        Weekly (parts of week)   ☐   and days per week   _____   and hours per day_____
        Monthly (parts of month)   ☐   and days per month   _____   and hours per day_____
        Quarterly   ☐   and days per quarter   _____   and hours per day_____
        6 Monthly   ☐   and days per 6 months _____   and hours per day_____
        Annually   ☐   and days per year   _____   and hours per day_____

Q8: How many technicians from this contractor would typically visit your centre(s)? Please insert number:_____

Q9: In your experience, do Air Conditioning/Ventilation contractors tend to have their contract renewed? Please circle Yes / No

Section B continued

Q10: What are the following aspects of the Air Conditioning/Ventilation tender/contract? Please insert/circle:

    Typical number of firms selected to tender: _____number

    Nature of contract: Preventative/Comprehensive/Other

    Typical duration: _____years

    30 day termination clause (or similar):   Yes / No

Q11: If you manage a shopping centre with direct digital controls (DDC) systems, then would you normally include the maintenance of this system as part of the Air Conditioning/Ventilation Contractors work? Please circle: Yes / No

Section C: Your relationship with your <u>external</u> Air Conditioning/Ventilation maintenance contractor(s) in your centre(s)

Q12: How much does this relationship involve a cooperative effort? Please circle on scale:

        Extremely arms length **1 2** 3 4 5 **6 7** Extremely cooperative

Q13: How much expectation would the contractor have that your firm would use them on an alternative centre? Please circle on scale:

        Extremely low expectation **1 2** 3 4 5 6 7 Extremely high expectation

Q14: How complex is this <u>relationship</u>? Please circle on scale:

    <u>Extremely straightforward</u> (only really one   **1 2** 3 4 5 6 7 <u>Extremely complex</u> (many relationships with others in
    <u>relationship</u> with you and your firm/treating each   in addition to you/your firm, e.g. shoppers, retailers,
    <u>other</u> the same mostly all of the time)   owner, contractors etc and need to treat different groups
        <u>differently</u> most of time)

Q15: How complex are your <u>expectations</u> of this contractor? Please circle on scale:

    <u>Extremely clear</u> (mostly the same and limited range **1** 2 3 4 5 6 7 <u>Not always clear</u> (often changing and wide ranging
    <u>expectations</u> from you/your firm)   expectations from others in addition to you/your firm)

Q16: How detailed is the monitoring of the performance of this contractor? Please circle on scale:

    <u>Extremely detailed</u> (every aspect of performance **1 2** 3 4 5 6 7 <u>Extremely imprecise</u> (important parts of performance
    closely monitored on a regular and frequent basis)   monitored using key indicators only, on an irregular and
        infrequent basis)

Q17: How detailed are the terms and conditions of the contract with this contractor? Please circle on scale:

    <u>Contract is fixed term</u> (with all performance **1 2** 3 4 5 6 7 <u>Contract is ongoing</u> (with very general performance
    <u>requirements</u> precisely specified and continuously   requirements only - developed and agreed during
    <u>updated</u> in respect of assigned/named centre(s))   the course of their contract)

Section C continued

Q18: How do you feel about the price your firm would need to offer to attract a new and competent contractors to your centre(s) – mindful of their contribution to your firm's core business? Please circle on scale: Extremely low **1 2** 3 4 5 6 7 Extremely High

Q19: Does your firm use any incentives (positive and/or negative measures) to improve the performance of this contractor (beyond the prospect of ongoing use/termination)? Please circle: Yes / No. If so, then very briefly what are these measures? Please insert measures:
    Positive measures:_____/Negative measures:_____

Q20: How steady have the relationships been over the last few years with this contractor? Please circle on scale:
                        Extremely steady   **1 2** 3 4 5 6 7 Extremely variable

Q21: How much do you think that this relationship is likely to become closer over the next few years? Please circle on scale:
                        Extremely likely   **1 2** 3 4 5 6 7 Extremely unlikely

Q22: How much do you and your firm aim to treat all your contractors the same? Please circle on scale:
                    All treated in an extremely similar way **1 2** 3 4 5 6 7 All treated in an extremely different way

Section D: The role of external Air Conditioning/Ventilation maintenance contractor(s) in your centre(s)

Q23: What is the potential for this activity to directly and/or indirectly increase your firm's profits (decrease costs and/or increase revenues) in your centre(s) when performed mainly in-house (if not currently mainly in-house then assume it is proposed to do this) in comparison to all in-house and outsourced activities your firm performs in terms of your centre(s)? Please circle on scale: Greatly decrease profits **1 2** 3 4 5 6 7 Greatly increase profits

Q24: How central is this activity to your centre(s)/ your firm's core business compared with all the activities that your firm performs in-house and outsources? Please circle on scale: Extremely peripheral **1 2** 3 4 5 6 7 Extremely central

Q25: How different is any of the following: technology (hardware and software), knowledge, skills, policies, procedures and/or practices used/required by this contractor to service your centre? Please circle on scale: Extremely similar **1 2** 3 4 5 6 7 Extremely different

Q26: How much do you think there is a shortage of contractors that can provide air conditioning similar to the contractor you engage in your centre(s) and in your area of operation? Please circle on scale: Extremely plentiful supply **1 2** 3 4 5 6 7 Extremely shortage

Q27: How costly do you think it would be for any firm that provides air conditioning maintenance to develop and match any differences in your current air conditioning contractor that you may have had in mind in Q25? Please circle on scale:
                        Extremely easy **1 2** 3 4 5 6 7 Extremely costly/ difficult

Q28: How difficult do you think it would it be to write a manual that would effectively communicate the total of the technology, knowledge, skills, policies, practices and procedures of the contractor required in your centre(s)? Please circle on scale:
                        Extremely easy **1 2** 3 4 5 6 7 Extremely costly/ difficult

Section C continued

Q29: How long would it take a recently appointed and competent contractor to become familiar your centre(s) and to reach their expected level of performance? Please insert months: Super & Major Regional (>50,000 GLAR)_____mths / Regional (30-50,000 GLAR)_____mths / Sub Regional & Neighbourhood (<30,000 GLAR)_____mths

Q30: How much did your current contractor in your centre(s) need to customise their technology (hardware and software), knowledge, skills, policies, procedures and practices to suit your firm and/or owner(s) and/or these centre(s) (if you have a more than one centre – then use your largest centre as the example)? Please circle on scale:
Minimal adaptations **1 2** 3 4 5 6 7 Substantial adaptations

Q31: Assuming you have due cause, and given your budget, how difficult and costly would it be to (including your time and effort) to <u>replace</u> your current contractor? Please circle on scale: Extremely easy **1 2** 3 4 5 6 7 Extremely difficult

Q32 <u>What</u> is the minimum technical experience and qualifications you generally require when seeking to recruit new fully competent contractors? Please insert approximate number of years and any particular qualifications: Total experience:_____years / Qualifications:_____

Q33 Does your firm provide any training or invest in any way in your Air Conditioning contractor? Please circle: Yes / No.
If yes, then briefly in what way?:_____

Q34: How confident are you (in relation to your to your centre) that either you or your firm could reasonably predict the <u>range</u> of air conditioning maintenance tasks? Please circle on scale: Range of A C maintenance tasks: Extremely confident **1 2** 3 4 5 6 7 Extremely unsure

Q35: In terms of the range <u>of air</u> conditioning maintenance tasks in the previous question Q34, how confident are you be that either you or your firm could reasonably estimate the <u>duration/time</u> required to complete these tasks (this does <u>not</u> include the being able to predict <u>when</u> any particular task will occur)? Duration of
      Duration of Air Conditioning maintenance tasks: Extremely confident **1 2** 3 4 5 6 7 Extremely unsure

Q36: Again, in relation to the range of air conditioning maintenance tasks in question Q34, how confident would you be that either you or your firm could reasonably predict an appropriate <u>frequency</u> of routine preventative work, as well as a minimum level of occurrence of *ad hoc* maintenance /breakdown maintenance (this does <u>not</u> include the being able to predict <u>when</u> any particular *ad hoc*/ breakdown maintenance task will occur)? Please circle on scale:
      Air Conditioning maintenance (appropriate frequency of
      <u>routine</u> preventative work and minimum breakdown):   Extremely confident **1** 2 3 4 5 6 7 Extremely unsure

Q37: How confident would you be that either you or your firm could clearly describe/specify the performance standards/requirements concerning your contractor? Please circle on scale:
      Air Conditioning Contractor: Extremely confident **1 2** 3 4 5 6 7 Extremely unsure

Q38: How much is the <u>core</u> knowledge and skills (excluding multi-skilling) of this contractor likely to change in the <u>next three years</u>? Please circle on scale:
      Air Conditioning Contractor: Extremely low level of change **1 2** 3 4 5 6 7 Extremely high level of change

Q39: If you had the resources, then how easy is it for you, or for you to arrange for someone, to <u>directly</u> check the performance of your contractor before a problem occurs that needs your input? Please circle on scale: Extremely easy **1 2** 3 4 5 6 7 Extremely difficult

Section D continued

Q40: How much are technical objective measures (like correct completion of work on time and within scheduled hours etc) a fair reflection of the performance of your contractor? Please circle on scale: Extremely fair reflection   **1 2** 3 4 5 6 7   Extremely unfair reflection

Q41: How tolerant are you/ your firm in terms of taking some sort of measure to correct unsatisfactory performance by your contractor? Please circle on scale:
Extremely sensitive (immediate action)   **1 2** 3 4 5 6 7   Extremely tolerant (action delayed as long as possible)

Q42: How tolerant do you feel your contractors is in terms of seeking to improve perceived unsatisfactory pay and/or working conditions? Please circle on scale:
Extremely sensitive (immediate action)   **1 2** 3 4 5 6 7   Extremely tolerant (action delayed as long as possible)

Q43: What is the cost of your air conditioning contractor as a proportion of your total operations budget? Please circle on scale:
Extremely small proportion   **1 2** 3 4 5 6 7   Extremely large proportion

Q44: What do you estimate to be the proportion of revenue that your contractor obtains from working for your firm (across all your firm's centres)? Please circle on scale:
Extremely small proportion   **1 2** 3 4 5 6 7   Extremely large proportion (practically 100%)

Q45: How much are you/ your firm able to influence the manner by which your contractor performs their role? Please circle on scale:
Extremely easy to influence   **1 2** 3 4 5 6 7   Extremely difficult to influence

Q46: How much is your contractor able to influence your firm's policies, procedures and practices concerning air conditioning maintenance? Please circle on scale:
Extremely easy to influence   **1 2** 3 4 5 6 7   Extremely difficult to influence

Q47: How easy could you adopt <u>any one</u> of any of the alternative approaches to sourcing air conditioning maintenance in your centre(s) (<u>including</u> using existing internal resources or employing a new full time competent technicians or by using temporary hire technicians or outsourcing to an external firm etc)? Please circle on scale:
Extremely easy **1 2** 3 4 5 6 7   Extremely difficult

Q48: If you had to replace your existing Air Conditioning Contractor in your centre(s) and were required to <u>consider all alternatives</u>, then how would you rank the following alternatives? Please insert a number 1 up to 5 against the following (with Number 1 being the most preferred alternative):
_____: Use/promote/train internal staff
_____: Recruit new and fully competent tradesperson(s) as in-house staff
_____: Outsource work to an alternative external firm:
_____: Employ temporary hire staff for the remaining duration of your firm's commitment to the management of the centre concerned
_____: Other: please briefly describe_____

Q49: How easy do you think it would be for your contractor to gain work with a different firm in the same or related role? Please circle on scale:
Extremely easy **1 2** 3 4 5 6 7   Extremely difficult

End of questionnaire - Once again, thank you very much for your time

Case Number:_____

APPENDIX 5 – VERSION 4 OF CASE STUDY QUESTIONNAIRE

Section A: General information about you and your views

Q1: Please print:

Name:_____/Position:_____/Years at current firm:_____

Name of service division and firm:_____/Your geographic area of responsibility and operation_____

Years in position (all firms worked for):_____/Number of firms worked for:_____/ Date questionnaire completed:_____

Q2: If after completing this questionnaire, you would like to make any further comments about any aspect of this survey then these are welcomed. Please attach a sheet to the questionnaire with your comments, or alternatively send a separate message to me (please see cover page for my contact details).

Q3: If you would like to receive a copy of the summary of the findings (that includes the number of responses and verification of the amount that I have contributed to the Salvation Army), please tick box: ☐

Section B: General information about your firm <u>in your area of operation</u>

Q4: What year did your firm come into existence in terms of service/maintenance in your area of operation? Please state very approximate year:_____

Q5: What types of building do you service & maintain? Please insert very approximate percentages:

Shopping Centres_____%   Other Commercial & Industrial_____%   Residential_____%   Other_____% = 100%

Q6: If your firm does not currently service & maintain shopping centres, then is it capable of doing so? Please circle: Yes / No

Q7: How would your firm obtain new work? Please insert very approximate percentages:

Shopping centres: Open Competition:_____% Competition with selected list of rivals:_____% Negotiation as only contractor:_____% Other:_____% = 100%

All other work: Open Competition:_____% Competition with selected list of rivals:_____% Negotiation as only contractor:_____% Other:_____% = 100%

Q8: Who writes your contracts (terms and conditions)? Please insert approximate percentages:

Shopping centres: Client:_____%   Your firm:_____%   Standard form:_____%   Other:_____% = 100%

Other contracts: Client:_____%   Your firm:_____%   Standard form:_____%   Other:_____% = 100%

Q9: What are the following aspects of your contracts? Please insert/circle:

Typical duration of your contracts? Please insert for shopping centres:_____years. Please insert for other contracts:_____years

Hourly rates and response times for breakdown work normally specified in your contracts? Please circle: Yes / No

30 day termination clause (or similar) normally included? Please circle: Yes / No

Type of contract: Preventative:_____%/Comprehensive:_____%/Other:_____% = 100%

Section B continued

Q10: How many clients and contracts do your firm service? Please insert approximate numbers: Number of clients_____ / Number of contracts_____

Q11: Is a large percentage of your turnover connected with just a few clients / Please circle: Yes / No. If yes, then what is this approximate percentage turnover and how many clients are responsible for this work? Please insert approximate percentage and number of clients: Turnover_____% Number of clients_____

Q12: Very approximately, and in last two years, what percentage of your contracts have been renewed? Please insert: Shopping centres:_____% Other contracts:_____%

Q13: What is likely to be a very approximate estimate of total annual turnover of all your firm's service/maintenance works? Please tick one box:
This year: Up to $1million ☐ Between $1 to 10million ☐ Between $10 to 30million ☐ Between $30 to 50million ☐ Over $50million ☐
Next year: Up to $1million ☐ Between $1 to 10million ☐ Between $10 to 30million ☐ Between $30 to 50million ☐ Over $50million ☐

Q14: In terms of service and maintenance of DDC systems, what is your approximate turnover of this work? Please insert very approximate turnover per annum:
Generic/Accessible Systems: In-house: $_____(per annum) Subcontract: $_____(per annum) = Total turnover
Specific/Highly proprietary Systems: In-house: $_____(per annum) Subcontract: $_____(per annum) = Total turnover

Q15: Very approximately, how would you estimate your firm's profits (service and maintenance only) compared with firms of all sizes providing service and maintenance of commercial and industrial buildings in your area of operation? Please circle: Above average / About average / Below average

Section C: You and your firm's approach, in your area of operation, to sourcing service & maintenance (Air Conditioning/Ventilation systems and DDC systems) in commercial and industrial buildings

Q16: How do you source service & maintenance? Please insert approximate percentages:
Air Conditioning: In-house (direct employee(s))_____% / Subcontractor(s)_____% = 100%
DDC (generic systems): In-house (direct employee(s))_____% / Subcontractor(s)_____% = 100%
DDC (specific systems): In-house (direct employee(s))_____% / Subcontractor(s)_____% = 100%

Q17: How long have you had this approach to sourcing Air Conditioning and DDC (highly specific-proprietary type)? Please insert approximate number of years:_____

Q18: If there are any plans to change this approach in the next few years, then what is the likely new approach? Please insert approximate percentages:
Air Conditioning: In-house (direct employee(s))_____% / Subcontractor(s)_____% = 100%
DDC (generic systems): In-house (direct employee(s))_____% / Subcontractor(s)_____% = 100%
DDC (specific systems): In-house (direct employee(s))_____% / Subcontractor(s)_____% = 100%

Q19: How many service & maintenance in-house staff (direct employees) are there in your firm? Please insert approximate numbers:
Management_____ Fridge/Mechanical_____ Electrical_____ Other technical_____ Admin_____ Other_____ = Total in-house staff

Section C continued

Assuming you have at least one in-house technical member of staff that services and maintains air conditioning systems and DDC (generic systems), then:

Q20: How many hours per week would a typical technical member of staff work? Please insert average number of hours per week:
Air Conditioning technician/fridge mechanic: _____hours per week
DDC technician/electrician: _____hours per week

Q21: How busy is one of your typical in-house technical staff? Please circle on scale:
Air Conditioning technician/fridge mechanic: Generally extremely quiet **1 2** 3 4 5 6 7 Generally extremely busy
DDC technician/electrician: Generally extremely quiet **1 2** 3 4 5 6 7 Generally extremely busy

Q22: Hong long has one of your typical technicians been with your firm? Please insert years:_____

Assuming you would subcontract at least some part of the service & maintenance of highly specific/proprietary DCC systems, then:

Q23: Who writes this subcontract (terms and conditions)? Please insert approximate percentages:
Your firm_____% / DDC firm_____% / Standard form_____% / Other_____% = 100%

Q24: What are the aspects of this subcontract? Please insert/circle:
Typical duration of your contracts? Please insert for shopping centres:_____years. Please insert for other contracts:_____years
Hourly rates and response times for breakdown work normally specified in your contracts? Please circle: Yes / No
30 day termination clause (or similar) normally included? Please circle: Yes / No
Type of contract: Preventative:_____%/Comprehensive:_____%/Other:_____% = 100%

Q25: How often would you expect this subcontractor to visit one of your typical buildings? Please tick one box:
Continuously ☐ (at least 5 days per week and 8 hours per day)
Daily (parts of day) ☐ and hours per day _____
Weekly (parts of week) ☐ and days per week _____ and hours per day_____
Monthly (parts of month) ☐ and days per month _____ and hours per day_____
Quarterly (parts of quarter) ☐ and days per quarter _____ and hours per day_____

Q26: Typically, how many technicians from this subcontractor would visit your centre(s)? Please insert number:_____

Section D: Your relationship with a <u>typical in-house</u> Air Conditioning and DDC employee/staff member and a <u>typical external</u> DDC (highly specific systems) <u>subcontractor</u>

Q27: How much do these relationships involve a cooperative effort? Please circle on scale:

Air Conditioning Staff:	Extremely arms length 1 2 3 4 5 6 7	Extremely cooperative
DDC Staff (generic systems):	Extremely arms length 1 2 3 4 5 6 7	Extremely cooperative
DDC Subcontractor (highly specific systems):	Extremely arms length 1 2 3 4 5 6 7	Extremely cooperative

Q28: How much expectation would this staff/subcontractor have that your firm would want to use them/agree to have them as a subcontractor on an alternative contract serviced & maintained by your firm should your firm's involvement in the buildings that they currently service end? Please circle on scale:

Air Conditioning Staff:	Extremely low expectation	1 2 3 4 5 6 7 Extremely high expectation
DDC Staff (generic systems):	Extremely low expectation	1 2 3 4 5 6 7 Extremely high expectation
DDC Subcontractor (highly specific systems):	Extremely low expectation	1 2 3 4 5 6 7 Extremely high expectation

Q29: How complex are these <u>relationships</u>? Please circle on scale:

Air Conditioning Staff:	<u>Extremely straightforward</u> (only really one relationship with you and your firm/treating each other the same mostly all of the time)	1 2 3 4 5 6 7	<u>Extremely complex</u> (many relationships with others in in addition to you/your firm e.g. client, facility manager, other contractors etc and need to treat different group differently)
DDC Staff (generic systems):	<u>Extremely straightforward</u> (only really one relationship with you and your firm/treating each other the same mostly all of the time)	1 2 3 4 5 6 7	<u>Extremely complex</u> (many relationships with others in in addition to you/your firm e.g. client, facility manager, other contractors etc and need to treat these groups differently)
DDC Subcontractor (highly specific systems):	<u>Extremely straightforward</u> (only really one relationship with you and your firm/treating each other the same mostly all of the time)	1 2 3 4 5 6 7	<u>Extremely complex</u> (many relationships with others in in addition to you/your firm e.g. client, facility manger, other contractors etc and need to treat these groups differently)

Q30: How complex are your <u>expectations</u> of these staff/subcontractor? Please circle on scale:

Air Conditioning Staff:	<u>Extremely clear</u> (mostly the same and limited range expectations from you/your firm)	1 2 3 4 5 6 7	<u>Not always clear</u> (often changing and wide ranging expectations from others in addition to you/your firm)
DDC Staff (generic systems):	<u>Extremely clear</u> (mostly the same and limited range expectations from you/your firm)	1 2 3 4 5 6 7	<u>Not always clear</u> (often changing and wide ranging expectations from others in addition to you/your firm)
DDC Subcontractor: (highly specific systems):	<u>Extremely clear</u> (mostly the same and limited range expectations from you/your firm)	1 2 3 4 5 6 7	<u>Not always clear</u> (often changing and wide ranging expectations from others in addition to you/your firm)

Section D continued

Q31: How detailed is your monitoring of the performance of these staff/subcontractor? Please circle on scale:

Air Conditioning Staff:	Extremely detailed (every aspect of performance closely monitored on a regular and frequent basis)	**1 2** 3 4 5 6 7	Extremely imprecise (important parts of performance monitored using key indicators only, on an irregular and infrequent basis)
DDC Staff (generic systems):	Extremely detailed (every aspect of performance closely monitored on a regular and frequent basis)	**1 2** 3 4 5 6 7	Extremely imprecise (important parts of performance monitored using key indicators only, on an irregular and infrequent basis)
DDC Subcontractor (highly specific systems):	Extremely detailed (every aspect of performance closely monitored on a regular and frequent basis)	**1 2** 3 4 5 6 7	Extremely imprecise (important parts of performance monitored using key indicators only, on an irregular and infrequent basis)

Q32: How detailed are the terms and conditions of the contract with these staff/subcontractor? Please circle on scale:

Air Conditioning Staff:	Contract is fixed term (with all performance requirements precisely specified and continuously updated in respect of assigned buildings)	**1 2** 3 4 5 6 7	Contract is ongoing (with very general performance requirements only - developed and agreed during the course of their contract)
DDC Staff (generic systems):	Contract is fixed term (with all performance requirements precisely specified and continuously updated in respect of assigned buildings)	**1 2** 3 4 5 6 7	Contract is ongoing (with very general performance requirements only - developed and agreed during the course of their contract)
DDC Subcontractor (highly specific systems):	Contract is fixed term (with all performance requirements precisely specified and continuously updated in respect of assigned buildings)	**1 2** 3 4 5 6 7	Contract is ongoing (with very general performance requirements only - developed and agreed during the course of their contract)

Q33: How do you feel about the pay/price your firm would need to offer to attract a new and competent staff/subcontractor – mindful of their contribution to your firm's core business? Please circle on scale:

Air Conditioning Staff:	Extremely low **1 2** 3 4 5 6 7 Extremely High
DDC Staff (generic systems):	Extremely low **1 2** 3 4 5 6 7 Extremely High
DDC Subcontractor (highly specific systems):	Extremely low **1 2** 3 4 5 6 7 Extremely High

Q34: Does your firm use any incentives (positive and/or negative measures) to improve the performance of these staff/subcontractor (beyond the prospect of ongoing use/termination)? Please circle: Yes/No. If yes, then very briefly what are these measures? Please insert:

Air Conditioning Staff:	Positive measures:_____	/Negative measures:_____
DDC Staff (generic systems):	Positive measures:_____	/Negative measures:_____
DDC Subcontractor (specific systems):	Positive measures:_____	/Negative measures:_____

Q35: How steady have the relationships been over the last few years with these staff/subcontractor? Please circle on scale:

Air Conditioning Staff:	Extremely steady **1 2** 3 4 5 6 7 Extremely variable
DDC Staff (generic systems):	Extremely steady **1 2** 3 4 5 6 7 Extremely variable
DDC Subcontractor (specific systems):	Extremely steady **1 2** 3 4 5 6 7 Extremely variable

Section D continued

Q36: How much do you think that these relationships are likely to become closer in the next few years? Please circle on scale:

Air Conditioning technical Staff: Extremely likely to become more distant   1 2 3 4 5 6 7   Extremely likely to become closer

DDC Staff (generic systems):   Extremely likely to become more distant   1 2 3 4 5 6 7   Extremely likely to become closer

DDC Subcontractor (specific systems):   Extremely likely to become more distant   1 2 3 4 5 6 7   Extremely likely to become closer

Q37: How much do you and your firm aim to treat all your technical staff and all your subcontractors the same? Please circle on scale:

<u>All</u> Technical staff: All treated in an extremely similar way   1 2 3 4 5 6 7   All treated in an extremely different way

<u>All</u> Subcontractors: All treated in an extremely similar way   1 2 3 4 5 6 7   All treated in an extremely different way

Section E: The role of <u>in-house</u> Air Conditioning and DDC service & maintenance staff and <u>external</u> DDC (highly specific-proprietary systems) service & maintenance subcontractors

Q38: *In this question, answer in terms of the percentage of air conditioning and DDC work that is performed in-house and on the basis that you are required to consider attempting to <u>switch in-house</u> your percentage of subcontracted DDC work (as you noted in Q16). <u>Using this approach,</u> what is the potential for this work to <u>directly</u> and/or <u>indirectly</u> increase your firm's <u>profits</u> in comparison to <u>all</u> other activities your firm currently performs in-house (including management activities) <u>and</u> through subcontracts? Please circle on scale:*

Air Conditioning service & maintenance: Greatly decrease profits   1 2 3 4 5 6 7   Greatly increase profits
(In terms of current percentage done in-house)

DDC (generic systems service & maintenance: Greatly decrease profits   1 2 3 4 5 6 7   Greatly increase profits
(In terms of current percentage done in-house)

DDC (highly specific systems):   Greatly decrease profits (practically incapable in-house   1 2 3 4 5 6 7   Greatly increase profits
(In terms of switching current percentage   manufacturer/installer unlikely to release all necessary
Subcontracted to in-house)   information to service in-house)

In the following questions, return to answering on the basis of the role performed by your actual in-house air conditioning and DDC staff and the subcontractors you use for highly specific DDC systems:

Q39: How central are these activities performed by your staff/subcontractors to your firm's core business compared with <u>all</u> other activities your firm performs in-house (including management activities) <u>and</u> through subcontracts? Please circle on scale:

Air Conditioning Staff: Extremely peripheral   1 2 3 4 5 6 7   Extremely central

DDC Staff (generic systems):   Extremely peripheral   1 2 3 4 5 6 7   Extremely central

DDC Subcontractors (specific systems):   Extremely peripheral   1 2 3 4 5 6 7   Extremely central

Section E continued

Q40: How different is any of the following: the capacity (in terms of the number and size of contracts capable of being serviced at one time), technology (hardware and software), knowledge, skills, policies, procedures and practices offered by your firm compared with that offered by all other firms (of all sizes) that provide air conditioning maintenance and DDC (generic systems) maintenance and similarly how different are your DCC subcontractors in your area of operation? Please circle on scale:

Air Conditioning - Your firm versus other firms:	Extremely similar 1 2 3 4 5 6 7	Extremely different
DDC Staff (generic systems) - Your firm versus other firms:	Extremely similar 1 2 3 4 5 6 7	Extremely different
DDC subcontractors (specific systems):	Extremely similar 1 2 3 4 5 6 7	Extremely different

Q41: How much do you think that there is a shortage of firms that are capable of providing a similar standard of service & maintenance to air conditioning systems and DDC (generic systems) as your firm (to a portfolio of contracts / building similar to that serviced by your firm) and how much do you think that there is a shortage of subcontractors that are capable of providing a similar standard that are capable of providing a similar standard of service and maintenance of DDC (highly specific systems) as provided by your subcontractors in your geographical area of operation? Please circle on scale:

Air Conditioning service & maintenance:	Extremely plentiful supply 1 2 3 4 5 6 7	Extremely shortage
DDC (generic systems):	Extremely plentiful supply 1 2 3 4 5 6 7	Extremely shortage
DDC (highly specific systems):	Extremely plentiful supply 1 2 3 4 5 6 7	Extremely shortage

Q42: How costly do you imagine it would be for any of your firm's main rivals to develop and match any differences in you may have had in mind in Q40 and how costly do you guess it might be for a DDC firm to develop and match any differences in a rival DDC (highly specific system) that you had in mind in Q40? Please circle on scale:

Air Conditioning Staff:	Extremely easy 1 2 3 4 5 6 7	Extremely costly/ difficult
DDC Staff (generic systems):	Extremely easy 1 2 3 4 5 6 7	Extremely costly/ difficult
DDC Subcontractor (specific systems):	Extremely easy 1 2 3 4 5 6 7	Extremely costly/ difficult

Q43: How difficult do you think it would be to write a manual that would effectively communicate the total of the technology, knowledge, skills, policies, practices and procedures of your staff/subcontractors? Please circle on scale:

Air Conditioning Staff:	Extremely easy 1 2 3 4 5 6 7	Extremely costly/ difficult
DDC Staff (generic systems):	Extremely easy 1 2 3 4 5 6 7	Extremely costly/ difficult
DDC Subcontractor (specific systems):	Extremely easy 1 2 3 4 5 6 7	Extremely costly/ difficult

Q44: How long would it take a recently appointed and competent staff member/subcontractor to become familiar with the typical buildings / contracts they may service and to reach their expected level of performance? Please insert number of visits and hours per visit:

Air Conditioning Staff:	Number of visits _____	Time per visit_____ (hours)
DDC Staff (generic systems):	Number of visits _____	Time per visit_____ (hours)
DDC Subcontractor (specific systems):	Number of visits _____	Time per visit_____ (hours)

Section E continued

Q45: Typically, how much do your staff/subcontractors need to customise their technology (hardware and software), knowledge and skills to suit a typical new owner and/or a typical new building (excluding issues that relate to gaining access, constraints on working etc)? Please circle on scale:

Air Conditioning Staff:	Minimal adaptations	1 2 3 4 5 6 7	Substantial adaptations
DDC Staff (generic systems):	Minimal adaptations	1 2 3 4 5 6 7	Substantial adaptations
DDC Subcontractor (specific systems):	Minimal adaptations	1 2 3 4 5 6 7	Substantial adaptations

Q46: In one of your typical buildings (that has a DDC system) how sensitive could the client's perception/impression be of your firm's performance based on the performance of the service and maintenance of a DDC system?

Generic systems	Extremely insensitive	1 2 3 4 5 6 7	Extremely sensitive
Specific systems	Extremely insensitive	1 2 3 4 5 6 7	Extremely sensitive

Q47: Assuming you had no choice but to subcontract some of your air conditioning and DDC (generic systems) work, then how difficult and costly would it be (including your time and effort) to replace these subcontractors, along with having a current DDC subcontractor (whose own highly specific/proprietary DDC system is installed in the building) replaced?

New Air Conditioning Subcontractor:	Extremely easy 1 2 3 4 5 6 7	Extremely difficult/practically impossible
New DDC Subcontractor (generic systems):	Extremely easy 1 2 3 4 5 6 7	Extremely difficult/practically impossible
New DDC Subcontractor (highly specific system):	Extremely easy 1 2 3 4 5 6 7	Extremely difficult/practically impossible

Q48: Assuming you have due cause, how difficult and costly would it be (including your time and effort) to replace a typical in-house technical staff? Please circle on scale:

New full-time and competent Air Conditioning Staff:	Extremely easy 1 2 3 4 5 6 7	Extremely difficult
New full-time and competent DDC Staff:	Extremely easy 1 2 3 4 5 6 7	Extremely difficult

Q49: How much is there a shortage of available full-time and competent Air Conditioning and DDC technicians? Please circle on scale:

Air Conditioning Staff:	Plentiful supply 1 2 3 4 5 6 7 Extreme shortage
DDC Staff:	Plentiful supply 1 2 3 4 5 6 7 Extreme shortage

Q50: What are the minimum requirements (experience and qualifications) you generally require when seeking to recruit staff/appoint a subcontractor? Please insert:

New full-time and competent Air Conditioning Staff:	Total experience:_____years / Qualifications:_____
New full-time and competent DDC Staff:	Total experience:_____years / Qualifications:_____
New DDC Subcontractor (highly specific systems):	Minimum requirements:_____

Section E continued

Q51: If your firm trains apprentice technical air conditioning and DDC staff, then what is the total period of years over which training happens (including TAFE or the like) and how much of this training could be reused in one of your rival firms? Also, what <u>percentage of your technical staff were</u> trained in this way and what percentage recruited as fully competent? Please insert approximate years and percentages:

    Air Conditioning Staff: Total Period to train apprentice (to reach full competence):_____(years)   _____(% reusable)

                     In-house trained: _____%   Externally recruited (fully competent):_____%   = 100%

    DDC Staff: Total Period to train apprentice (to reach full competence):_____(years)   _____(% reusable)

                     In-house trained: _____%   Externally recruited (fully competent):_____%   = 100%

Q52: In terms of a typical fully competent technical staff (who has been with your firm for a good while), what is your firm's ongoing training commitment and how much of this could be reused in a rival firm? Please insert approximate days and percentages:

    Air Conditioning Staff: Ongoing training:____(days per annum)__% reusable

    DDC Staff: Ongoing training:____(days per annum)__% reusable

Q53: If your firm provides any training, or invests in any way, in any of your DDC subcontractors, then how many subcontractors receive this investment and what is the nature of this investment? Please insert and very briefly describe: ___% / _____

Q54: How confident would you be (in relation to one of your typical buildings) that you or your firm could reasonably predict the <u>range</u> of maintenance tasks involved? Please circle on scale:

    Range of Air Conditioning tasks: Extremely confident **1 2** 3 4 5 6 7 Extremely unsure

    Range of DDC (generic systems) tasks: Extremely confident **1 2** 3 4 5 6 7 Extremely unsure

    Range of DDC (specific systems) tasks: Extremely confident **1 2** 3 4 5 6 7 Extremely unsure

Q55: In terms of the range of tasks in the previous question Q54, how confident would you be that you or your firm could reasonably estimate the <u>duration/time</u> required to complete these maintenance tasks (this does <u>not</u> include the being able to predict <u>when</u> any particular task will occur)?

    Duration of Air Conditioning tasks: Extremely confident **1 2** 3 4 5 6 7 Extremely unsure

    Duration of DDC (generic systems) tasks: Extremely confident **1 2** 3 4 5 6 7 Extremely unsure

    Duration of DDC (specific systems) tasks: Extremely confident **1 2** 3 4 5 6 7 Extremely unsure

Q56: Again, in relation to the range of tasks in question Q54, how confident would you be that you or your firm could reasonably predict an appropriate <u>frequency</u> of routine preventative work, as well as a minimum level of occurrence of *ad hoc* maintenance / breakdown maintenance (this does <u>not</u> include the being able to predict <u>when</u> any particular *ad hoc*/breakdown maintenance task will occur)? Please circle on scale:

    Air Conditioning maintenance (appropriate frequency of

    routine preventative and minimum breakdown):   Extremely confident **1 2 3 4 5 6 7** Extremely unsure

    DDC (generic systems) maintenance (appropriate frequency

    of routine preventative work and minimum breakdown):   Extremely confident **1 2 3 4 5 6 7** Extremely unsure

    DDC (specific systems) maintenance (appropriate frequency

    of routine preventative work and minimum breakdown):   Extremely confident **1 2 3 4 5 6 7** Extremely unsure

Section E continued

Q57: How confident would you be that you could clearly describe/specify the performance requirements concerning your staff/subcontractor? Please circle on scale:

Air Conditioning Staff:	Extremely confident 1 2 3 4 5 6 7	Extremely unsure
DDC Staff (generic systems):	Extremely confident 1 2 3 4 5 6 7	Extremely unsure
DDC Subcontractor (specific systems):	Extremely confident 1 2 3 4 5 6 7	Extremely unsure

Q58: How much are the core knowledge and skills (excluding multi-skilling) of the staff/subcontractors likely to change, over the next three years? Please circle on scale:

Air Conditioning Staff:	Extremely low level of change 1 2 3 4 5 6 7	Extreme high level of change
DDC Staff (generic systems):	Extremely low level of change 1 2 3 4 5 6 7	Extreme high level of change
DDC Subcontractor (specific systems):	Extremely low level of change 1 2 3 4 5 6 7	Extreme high level of change

Q59: How easy is it for someone, to directly check the performance of your staff/subcontractor before a problem occurs that needs your input? Please circle on scale:

Air Conditioning Staff:	Extremely easy 1 2 3 4 5 6 7	Extremely difficult
DDC Staff (generic systems):	Extremely easy 1 2 3 4 5 6 7	Extremely difficult
DDC Subcontractor (specific systems):	Extremely easy 1 2 3 4 5 6 7	Extremely difficult

Q60: How much are technical objective measures (like correct completion of work on time and within scheduled hours etc) a fair reflection of performance? Please circle on scale:

Air Conditioning Staff:	Extremely fair reflection 1 2 3 4 5 6 7	Extremely unfair reflection
DDC Staff (generic systems):	Extremely fair reflection 1 2 3 4 5 6 7	Extremely unfair reflection
DDC Subcontractor (specific systems):	Extremely fair reflection 1 2 3 4 5 6 7	Extremely unfair reflection

Q61: How tolerant are you in terms of taking some sort of measure to correct unsatisfactory performance by your staff/subcontractor? Please circle on scale:

Air Conditioning Staff:	Extremely sensitive (immediate action) 1 2 3 4 5 6 7	Extremely tolerant (action delayed as long as possible)
DDC Staff (generic systems):	Extremely sensitive (immediate action) 1 2 3 4 5 6 7	Extremely tolerant (action delayed as long as possible)
DDC Subcontractor (specific systems):	Extremely sensitive (immediate action) 1 2 3 4 5 6 7	Extremely tolerant (action delayed as long as possible)

Q62: How tolerant do you think your staff/subcontractors are in terms of seeking to improve perceived unsatisfactory pay and/or working conditions? Please circle on scale:

Air Conditioning Staff:	Extremely sensitive (immediate action) 1 2 3 4 5 6 7	Extremely tolerant (action delayed as long as possible)
DDC Staff (generic systems):	Extremely sensitive (immediate action) 1 2 3 4 5 6 7	Extremely tolerant (action delayed as long as possible)
DDC Subcontractor (specific systems):	Extremely sensitive (immediate action) 1 2 3 4 5 6 7	Extremely tolerant (action delayed as long as possible)

Q63: What is the cost of one of your typical technical staff as a proportion of the total cost of all your staff and what is the cost of one of your typical DDC subcontractors as a proportion of the total cost of all your subcontractors across all of your subcontracts? Please circle on scale:

One Air Conditioning Staff:	Extremely small proportion 1 2 3 4 5 6 7	Extremely large proportion
One DDC Staff (generic systems):	Extremely small proportion 1 2 3 4 5 6 7	Extremely large proportion
One DDC Subcontractor (specific systems):	Extremely small proportion 1 2 3 4 5 6 7	Extremely large proportion

Section E continued

Q64: What do you think is the proportion of income/revenue that a typical staff/DDC subcontractor obtains from working for your firm? Please circle on scale:

Air Conditioning Staff:	Extremely small proportion	**1 2** 3 4 5 6 7 Extremely large proportion (practically 100%)
DDC Staff (generic systems):	Extremely small proportion	**1 2** 3 4 5 6 7 Extremely large proportion (practically 100%)
DDC Subcontractor (specific systems):	Extremely small proportion	**1 2** 3 4 5 6 7 Extremely large proportion (practically 100%)

Q65: How much are you able to influence the manner by which your staff/subcontractor performs their role? Please circle on scale:

Air Conditioning Staff:	Extremely easy to influence	**1 2** 3 4 5 6 7 Extremely difficult to influence
DDC Staff (generic systems):	Extremely easy to influence	**1 2** 3 4 5 6 7 Extremely difficult to influence
DDC Subcontractor (specific systems):	Extremely easy to influence	**1 2** 3 4 5 6 7 Extremely difficult to influence

Q66: How much are your staff/subcontractors able to influence your firm's policies, procedures and practices? Please circle on scale:

Air Conditioning Staff:	Extremely easy to influence	**1 2** 3 4 5 6 7 Extremely difficult to influence
DDC Staff (generic systems):	Extremely easy to influence	**1 2** 3 4 5 6 7 Extremely difficult to influence
DDC Subcontractor (specific systems):	Extremely easy to influence	**1 2** 3 4 5 6 7 Extremely difficult to influence

Q67: How easy could you adopt <u>any one</u> of any of the alternative approaches to sourcing air conditioning maintenance and DDC maintenance in one of your typical buildings (<u>including</u> using existing internal resources or employing a new full time competent technicians or by using temporary hire technicians or subcontracting to an alternative external firm etc)? Please circle on scale:

Air Conditioning Maintenance:	Extremely easy **1 2** 3 4 5 6 7 Extremely difficult
DDC (generic systems) Maintenance:	Extremely easy **1 2** 3 4 5 6 7 Extremely difficult
DDC (specific systems) Maintenance:	Extremely easy **1 2** 3 4 5 6 7 Extremely difficult

Q68: If you had to replace one of your existing air conditioning or DDC maintenance staff and were required to <u>consider all alternatives</u>, then how would you rank the following alternatives? Please insert a number 1 up to 5 against the following (with Number 1 being the most preferred alternative):

_____: Use/promote/train other internal staff

_____: Recruit new and fully competent tradesperson(s) as in-house staff

_____: Subcontract this work to external firm:

_____: Employ temporary hire staff

_____: Other: please briefly describe_____

Q69: How easy is it for your staff/subcontractors to gain work with a different firm in the same or related role? Please circle on scale:

Air Conditioning Staff:	Extremely easy **1 2** 3 4 5 6 7 Extremely difficult
DDC Staff (generic systems):	Extremely easy **1 2** 3 4 5 6 7 Extremely difficult
DDC Staff (specific systems):	Extremely easy **1 2** 3 4 5 6 7 Extremely difficult

End of questionnaire - Once again, thank you very much for your time

Case Number:_____

APPENDIX 6 – VERSION 5 OF CASE STUDY QUESTIONNAIRE

Section A: General information about you and your views

Q1: Please print:
 Name:_____/Position:_____/Years at current firm:_____
 Name of service division and firm:_____/Your geographic area of responsibility and operation_____
 Years in position (all firms worked for):_____/Number of firms worked for:_____/ Date questionnaire completed:_____

Q2: If after completing this questionnaire, you would like to make any further comments about any aspect of this survey then these are welcomed. Please attach a sheet to the questionnaire with your comments, or alternatively send a separate message to me (please see cover page for my contact details).

Q3: If you would like to receive a copy of the summary of the findings (that includes the number of responses and verification of the amount that I have contributed to the Salvation Army), please tick box: ☐

Section B: General information about your firm <u>in your area of operation</u>

Q4: What year did your firm come into existence in terms of service/maintenance in your area of operation? Please state very approximate year:_____

Q5: What types of building do you service & maintain? Please insert very approximate percentages:
 Shopping Centres_____%   Other Commercial & Industrial_____%   Residential_____%   Other_____% = 100%

Q6: If your firm does not currently service & maintain shopping centres, then is it capable of doing so? Please circle: Yes / No

Q7: How would your firm obtain new work? Please insert very approximate percentages:
 Air Conditioning (with or without own DDC system)
  Shopping centres: Open Competition:_____% Competition – selected list of rivals:_____% Negotiation as only contractor:_____% Other:_____% = 100%
  All other work: Open Competition:_____% Competition – selected list of rivals:_____% Negotiation as only contractor:_____% Other:_____% = 100%
 Own DDC system only (highly specific/proprietary systems)
  Shopping centres: Open Competition:_____% Competition – selected list of rivals:_____% Negotiation as only contractor:_____% Other:_____% = 100%
  All other work: Open Competition:_____% Competition – selected list of rivals:_____% Negotiation as only contractor:_____% Other:_____% = 100%

Q8: Who writes your contracts (terms and conditions)? Please insert approximate percentages:
 Air Conditioning (with or without own DDC system)
  Shopping centres: Client:_____%   Your firm:_____%   Standard form:_____%   Other:_____% = 100%
  Other contracts: Client:_____%   Your firm:_____%   Standard form:_____%   Other:_____% = 100%
 Own DDC system only (highly specific/proprietary systems)
  Shopping centres: Client:_____%   Your firm:_____%   Standard form:_____%   Other:_____% = 100%
  Other contracts: Client:_____%   Your firm:_____%   Standard form:_____%   Other:_____% = 100%

Section B continued

Q9: What are the following aspects of your contracts? Please insert/circle:
    Air Conditioning (with or without own DDC system)
        Typical duration of your contracts? Please insert for shopping centres:_____years. Please insert for other contracts:_____years
        Hourly rates and response times for breakdown work normally specified in your contracts? Please circle: Yes / No
        30 day termination clause (or similar) normally included? Please circle: Yes / No
        Type of contract: Preventative:_____%/Comprehensive:_____%/Other:_____% = 100%
    Own DDC system only (highly specific/proprietary systems)
        Typical duration of your contracts? Please insert for shopping centres:_____years. Please insert for other contracts:_____years
        Hourly rates and response times for breakdown work normally specified in your contracts? Please circle: Yes / No
        30 day termination clause (or similar) normally included? Please circle: Yes / No
        Type of contract: Preventative:_____%/Comprehensive:_____%/Other:_____% = 100%

Q10: How many clients and contracts do your firm service? Please insert approximate numbers:
    Air Conditioning (with or without own DDC system):   Number of clients_____ / Number of contracts_____
    Own DDC system only (highly specific/proprietary systems)   Number of clients_____ / Number of contracts_____

Q11: Is a large percentage of your turnover connected with just a few clients / Please circle: Yes / No. If yes, then what is this approximate percentage turnover and how many clients are responsible for this work? Please insert approximate percentage and number of clients: Turnover_____%   Number of clients_____

Q12: Very approximately, and in last two years, what percentage of your contracts have been renewed? Please insert:
    Air Conditioning (with or without own DDC system):   Shopping centres:_____% Other contracts:_____%
    Own DDC system only (highly specific/proprietary systems):   Shopping centres:_____% Other contracts:_____%

Q13: What is likely to be a very approximate estimate of total annual turnover of all your firm's service/maintenance works? Please tick one box:
    This year: Up to $1million ☐   Between $1 to 10million ☐   Between $10 to 30million ☐   Between $30 to 50million ☐   Over $50million ☐
    Next year: Up to $1million ☐   Between $1 to 10million ☐   Between $10 to 30million ☐   Between $30 to 50million ☐   Over $50million ☐

Q14: In terms of service and maintenance of own DDC system only (highly specific/proprietary systems), what is your approximate turnover of this work? Please insert very approximate turnover per annum: In-house: $_____(per annum)   Subcontract: $_____(per annum) = Total turnover

Section B continued

Q15: Very approximately, how would you estimate your firm's profits (service and maintenance only) compared with firms of <u>all sizes</u> providing service and maintenance of <u>commercial and industrial buildings</u> in your area of operation? Please circle: Above average / <u>About</u> average / Below average

Section C: You and your firm's approach, <u>in your area of operation</u>, to sourcing service & maintenance (Air Conditioning/Ventilation systems and DDC systems) in <u>commercial and industrial buildings</u>

Q16: How do you source service & maintenance? Please insert approximate percentages:
  Air Conditioning: In-house (direct employee(s))_____% / Subcontractor(s)_____% = 100%
  Own DDC (specific systems): In-house (direct employee(s))_____% / Subcontractor(s)_____% = 100%

Q17: How long have you had this approach to sourcing Air Conditioning and DDC (highly specific-proprietary type)? Please insert approximate number of years:_____

Q18: If there are any plans to change this approach in the next few years, then what is the likely new approach? Please insert approximate percentages:
  Air Conditioning: In-house (direct employee(s))_____% / Subcontractor(s)_____% = 100%
  Own DDC (specific systems): In-house (direct employee(s))_____% / Subcontractor(s)_____% = 100%

Q19: How many service & maintenance in-house staff (direct employees) are there in your firm? Please insert approximate numbers:
  Management_____ Fridge/Mechanical_____ Electrical_____ Other technical_____ Admin_____ Other_____ = Total in-house staff

Assuming you have at least one in-house technical member of staff that services and maintains air conditioning systems and own DDC (specific systems), then

Q20: How many hours per week would a typical technical member of staff work? Please insert average number of hours per week:
  Air Conditioning technician/fridge mechanic: _____hours per week
  DDC technician/electrician: _____hours per week

Q21: How busy is one of your typical in-house technical staff? Please circle on scale:
  Air Conditioning technician/fridge mechanic: Generally extremely quiet 1 2 3 4 5 6 7 Generally extremely busy
  DDC technician/electrician: Generally extremely quiet 1 2 3 4 5 6 7 Generally extremely busy

Q22: Hong long has one of your typical technicians been with your firm? Please insert years:_____

Section D: Your relationship with a <u>typical in-house</u> Air Conditioning and DDC employee/staff member

Q23: How much do these relationships involve a cooperative effort? Please circle on scale:

Air Conditioning Staff: Extremely arms length   **1 2** 3 4 5 6 7   Extremely cooperative

DDC Staff (own specific systems):   Extremely arms length   **1 2** 3 4 5 6 7   Extremely cooperative

Q24: How much expectation would this staff have that your firm would want to use them on an alternative contract serviced & maintained by your firm should your firm's involvement in the buildings that they currently service end? Please circle on scale:

Air Conditioning Staff: Extremely low expectation   **1 2** 3 4 5 6 7   Extremely high expectation

DDC Staff (own specific systems):   Extremely low expectation   **1 2** 3 4 5 6 7   Extremely high expectation

Q25: How complex are these <u>relationships</u>? Please circle on scale:

Air Conditioning Staff: <u>Extremely straightforward</u> (only really one relationship with you and your firm/treating each other the same mostly all of the time)   **1 2** 3 4 5 6 7   <u>Extremely complex</u> (many relationships with others in in addition to you/ your firm e.g. client, facility manager, other contractors etc and need to treat different group differently)

DDC Staff (<u>own</u> specific systems):   <u>Extremely straightforward</u> (only really one relationship with you and your firm/treating each other the same mostly all of the time)   **1 2** 3 4 5 6 7   <u>Extremely complex</u> (many relationships with others in in addition to you/ your firm e.g. client, facility manger, other contractors etc and need to treat these groups differently)

Q26: How complex are your <u>expectations</u> of these staff? Please circle on scale:

Air Conditioning Staff: <u>Extremely clear</u> (mostly the same and limited range expectations from you/ your firm)   **1 2** 3 4 5 6 7   <u>Not always clear</u> (often changing and wide ranging expectations from others in addition to you/ your firm)

DDC Staff (own specific systems):   <u>Extremely clear</u> (mostly the same and limited range expectations from you/ your firm)   1 **2** 3 4 5 6 7   <u>Not always clear</u> (often changing and wide ranging expectations from others in addition to you/ your firm)

Q27: How detailed is your monitoring of the performance of these staff? Please circle on scale:

Air Conditioning Staff: <u>Extremely detailed</u> (every aspect of performance closely monitored on a regular and frequent basis)   **1 2** 3 4 5 6 7   <u>Extremely imprecise</u> (important parts of performance monitored using key indicators only, on an irregular and infrequent basis)

DDC Staff (own specific systems):   <u>Extremely detailed</u> (every aspect of performance closely monitored on a regular and frequent basis)   **1 2** 3 4 5 6 7   <u>Extremely imprecise</u> (important parts of performance monitored using key indicators only, on an irregular and infrequent basis)

Q28: How detailed are the terms and conditions of the contract with these staff? Please circle on scale:

Air Conditioning Staff: <u>Contract is fixed term</u> (with all performance requirements precisely specified and continuously updated in respect of assigned buildings)   **1 2** 3 4 5 6 7   <u>Contract is ongoing</u> (with very general performance requirements only - developed and agreed during the course of their contract)

DDC Staff (own specific systems):   <u>Contract is fixed term</u> (with all performance requirements precisely specified and continuously updated in respect of assigned buildings)   **1 2** 3 4 5 6 7   <u>Contract is ongoing</u> (with very general performance requirements only - developed and agreed during the course of their contract)

Section D continued

Q29: How do you feel about the pay your firm would need to offer to attract a new and competent staff – mindful of their contribution to your firm's core business? Please circle on scale: Air Conditioning Staff: Extremely low **1 2** 3 4 5 **6 7** Extremely High
                        DDC Staff (own specific systems):   Extremely low **1 2** 3 4 5 **6 7** Extremely High

Q30: Does your firm use any incentives (positive and/or negative measures) to improve the performance of these staff (beyond the prospect of ongoing use/termination)? Please circle: Yes/No. If yes, then very briefly what are these measures? Please insert:
            Air Conditioning Staff: Positive measures:_____/Negative measures:_____
            DDC Staff (own specific systems):   Positive measures:_____/Negative measures:_____

Q31: How steady have the relationships been over the last few years with these staff? Please circle on scale:
            Air Conditioning Staff: Extremely steady   **1 2** 3 4 5 **6 7** Extremely variable
            DDC Staff (own specific systems):   Extremely steady   **1 2** 3 4 5 **6 7** Extremely variable

Q32: How much do you think that these relationships are likely to become closer in the next few years? Please circle on scale:
            Air Conditioning technical Staff: Extremely likely to become more distant **1 2** 3 4 5 **6 7** Extremely likely to become closer
            DDC Staff (own specific systems):   Extremely likely to become more distant **1 2** 3 4 5 **6 7** Extremely likely to become closer

Q33: How much do you and your firm aim to treat all your technical staff the same? Please circle on scale:
            <u>All</u> Technical staff: All treated in an extremely similar way **1 2** 3 4 5 **6 7** All treated in an extremely different way

Section E: The role of <u>in-house</u> Air Conditioning and DDC service & maintenance staff

Q34: What is the potential for this work to <u>directly and/or indirectly</u> increase your firm's <u>profits</u> in comparison to <u>all</u> other activities your firm currently performs in-house (including management activities) <u>and</u> through subcontracts? Please circle on scale:
            Air Conditioning service & maintenance: Greatly decrease profits **1 2** 3 4 5 **6 7** Greatly increase profits
            (In terms of current percentage done in-house)
            Own DDC (specific systems) service & maintenance: Greatly decrease profits **1 2** 3 4 5 **6 7** Greatly increase profits
            (In terms of current percentage done in-house)

Q35: How central are these activities performed by your staff to your firm's core business compared with <u>all</u> other activities your firm performs in-house (including management activities) <u>and</u> through subcontracts? Please circle on scale:
            Air Conditioning Staff: Extremely peripheral   **1 2** 3 4 5 **6 7** Extremely central
            DDC Staff (own specific systems):   Extremely peripheral   **1 2** 3 4 5 **6 7** Extremely central

Section E continued

Q36: How different is any of the following: the capacity (in terms of the number and size of contracts capable of being serviced at one time), knowledge, skills, policies, procedures and practices offered by your firm's staff compared with that offered by <u>all other firms (of all sizes)</u> that provide air conditioning maintenance and DDC (specific systems) maintenance <u>in your geographical area of operation</u>? Please circle on scale:

    Air Conditioning - Your firm compared with other firms: Extremely similar   **1** 2 3 4 5 6 7 Extremely different
    DDC Staff (own specific systems) - Your firm compared
    with other firms: Extremely similar   **1** 2 3 4 5 6 7 Extremely different

Q37: How much do you think that there is a shortage of firms that are capable of providing a similar standard of service & maintenance to air conditioning systems and DDC (specific systems) as your firm (to a portfolio of contracts / building similar to that serviced by your firm) <u>in your geographical area of operation</u>? Please circle on scale: Air Conditioning service & maintenance: Extremely plentiful supply **1** 2 3 4 5 6 7 Extremely shortage
                   DDC (own specific systems):   Extremely plentiful supply **1** 2 3 4 5 6 7 Extremely shortage

Q38: How costly do you imagine it would be for any of your firm's <u>main rivals</u> to develop and match any differences in you may have had in mind in Q36? Please circle on scale: Air Conditioning Staff: Extremely easy **1** 2 3 4 5 6 7 Extremely costly/ difficult
                   DDC Staff (own specific systems):   Extremely easy **1** 2 3 4 5 6 7 Extremely costly/ difficult

Q39: How difficult do you think it would be to write a manual that would effectively communicate the total knowledge, skills, policies, practices and procedures of your staff? Please circle on scale:

    Air Conditioning Staff: Extremely easy **1** 2 3 4 5 6 7 Extremely costly/ difficult
    DDC Staff (own specific systems):   Extremely easy **1** 2 3 4 5 6 7 Extremely costly/ difficult

Q40: How long would it take a recently appointed and competent staff member to become familiar with the typical buildings / contracts they may service and to reach their expected level of performance? Please insert number of visits <u>and</u> hours per visit:

    Air Conditioning Staff: Number of visits_____   Time per visit_____(hours)
    DDC Staff (own specific systems):   Number of visits_____   Time per visit_____(hours)

Q41: Typically, how much do your staff need to customise their technical knowledge and skills to suit a typical new owner and/or a typical new building (<u>excluding</u> issues that relate to gaining access, constraints on working etc)? Please circle on scale:

    Air Conditioning Staff: Minimal adaptations   **1** 2 3 4 5 6 7 Substantial adaptations
    DDC Staff (own specific systems):   Minimal adaptations   **1** 2 3 4 5 6 7 Substantial adaptations

Q42: In one of your typical buildings (that has your own DDC system) how sensitive could the client's perception / impression of your firm's performance based on the performance of the service and maintenance of your DDC system? Extremely <u>insensitive</u> **1** 2 3 4 5 6 7 Extremely sensitive

Section E continued

Q43: Assuming you had <u>no choice</u> but to subcontract some of your air conditioning <u>and</u> DDC (specific systems) work, then how difficult and costly would it be (including your time and effort) to replace these subcontractors?

    New Air Conditioning Subcontractor: Extremely easy **1 2** 3 4 5 6 7 Extremely difficult

    New DDC Subcontractor (own specific systems):   Extremely easy **1 2** 3 4 5 6 7 Extremely difficult

Q44: Assuming you have due cause, how difficult and costly would it be (including your time and effort) to replace a typical in-house technical staff? Please circle on scale: New full-time and competent Air Conditioning Staff: Extremely easy **1 2** 3 4 5 6 7 Extremely difficult

    New full-time and competent DDC Staff: Extremely easy **1 2** 3 4 5 6 7 Extremely difficult

Q45: How much is there a shortage of available full-time and competent Air Conditioning and DDC technicians? Please circle on scale:

    Air Conditioning Staff: Plentiful supply **1** 2 3 4 5 6 7 Extreme shortage

    DDC Staff: Plentiful supply **1** 2 3 4 5 6 7 Extreme shortage

Q46: What are the minimum requirements (experience and qualifications) you generally require when seeking to recruit staff? Please insert:

    New full-time and competent Air Conditioning Staff: Total experience:_____years / Qualifications:_____

    New full-time and competent DDC Staff: Total experience:_____years / Qualifications:_____

Q47: If your firm trains apprentice technical air conditioning and DDC staff, then what is the total period of years over which training happens (including TAFE or the like) and how much of this training could be reused in one of your rival firms? Also, what percentage of your technical staff were trained in this way and what percentage recruited as fully competent? Please insert approximate years and percentages:

    Air Conditioning Staff: Total Period to train apprentice (to reach full competence):_____(years)   _____(% reusable)

                  In-house trained: _____% Externally recruited (fully competent):_____%   = 100%

    DDC Staff: Total Period to train apprentice (to reach full competence):_____(years)   _____(% reusable)

                  In-house trained: _____% Externally recruited (fully competent):_____%   = 100%

Q48: In terms of a typical fully competent technical staff (who has been with your firm for a good while), what is your firm's ongoing training commitment and how much of this could be reused in a rival firm? Please insert approximate days and percentages:

    Air Conditioning Staff: Ongoing training:_____(days per annum)__% reusable

    DDC Staff: Ongoing training:_____(days per annum)__% reusable

Q49: How confident would you be (in relation to a typical building) that you could reasonably predict the <u>range</u> of maintenance tasks involved? Please circle on scale:

    Range of Air Conditioning tasks: Extremely confident **1 2** 3 4 5 6 7 Extremely unsure

    Range of DDC (own specific systems) tasks: Extremely confident **1 2** 3 4 5 6 7 Extremely unsure

Section E continued

Q50: In terms of the range of tasks in the previous question Q49, how confident would you be that you could reasonably estimate the <u>duration/time</u> required to complete these maintenance tasks (this does <u>not</u> include the being able to predict <u>when</u> any particular task will occur)?

      Duration of Air Conditioning tasks: Extremely confident **1 2** 3 4 **5** 6 7 Extremely unsure

      Duration of DDC (own specific systems) tasks: Extremely confident **1 2** 3 4 **5** 6 7 Extremely unsure

Q51: Again, in relation to the range of tasks in question Q49, how confident would you be that you could reasonably predict an appropriate <u>frequency</u> of routine preventative work, as well as a minimum level of occurrence of *ad hoc* maintenance /breakdown maintenance (this does <u>not</u> include the being able to predict <u>when</u> any particular *ad hoc*/breakdown maintenance task will occur)? Please circle on scale:

      Air Conditioning maintenance (appropriate frequency of
<u>routine</u> preventative and minimum breakdown):   Extremely confident **1 2 3 4 5 6 7** Extremely unsure

      DDC (own specific systems) maintenance (appropriate
<u>frequency</u> of routine preventative work and minimum
<u>breakdown</u>):   Extremely confident **1 2 3 4 5 6 7** Extremely unsure

Q52: How confident would you be that you could clearly describe/specify the performance requirements concerning your staff? Please circle on scale:

      Air Conditioning Staff: Extremely confident **1 2 3 4 5 6 7** Extremely unsure

      DDC Staff (own specific systems):   Extremely confident **1 2** 3 4 5 6 7 Extremely unsure

Q53: How much have the core knowledge and skills (<u>excluding</u> multi-skilling) of the staff changed/likely to change, over the <u>next three years</u>? Please circle on scale:

      Air Conditioning Staff: Extremely low level of change **1 2** 3 4 5 6 7 Extreme high level of change

      DDC Staff (own specific systems):   Extremely low level of change **1 2** 3 4 5 6 7 Extreme high level of change

Q54: How easy is it for someone, to <u>directly</u> check the performance of your staff before a problem occurs that needs your input? Please circle on scale:

      Air Conditioning Staff: Extremely easy **1 2** 3 4 5 6 7 Extremely difficult

      DDC Staff (own specific systems):   Extremely easy **1 2** 3 4 5 6 7 Extremely difficult

Q55: How much are technical objective measures (like correct completion of work on time and within scheduled hours etc) a fair reflection of performance? Please circle on scale: Air Conditioning Staff: Extremely fair reflection **1 2** 3 4 5 6 7 Extremely unfair reflection

      DDC Staff (own specific systems):   Extremely fair reflection **1 2** 3 4 5 6 7 Extremely unfair reflection

Q56: How tolerant are you in terms of taking some sort of measure to correct unsatisfactory performance by your staff? Please circle on scale:

      Air Conditioning Staff: Extremely sensitive (immediate action)**1 2 3 4 5 6 7** Extremely tolerant (action delayed as long as possible)

      DDC Staff (own specific systems):   Extremely sensitive (immediate action)**1 2 3 4 5 6 7** Extremely tolerant (action delayed as long as possible)

Q57: How tolerant do you think your staff are in terms of seeking to improve perceived unsatisfactory pay and/or working conditions? Please circle on scale:

      Air Conditioning Staff: Extremely sensitive (immediate action)**1 2 3 4 5 6 7** Extremely tolerant (action delayed as long as possible)

      DDC Staff (own specific systems):   Extremely sensitive (immediate action)**1 2 3 4 5 6 7** Extremely tolerant (action delayed as long as possible)

Section E continued

Q58: What is the cost of <u>one</u> of your typical technical staff as a proportion of the <u>total</u> cost of all your staff? Please circle on scale:

    <u>One</u> Air Conditioning Staff: Extremely small proportion   **1 2** 3 4 5 6 7 Extremely large proportion

    <u>One</u> DDC Staff (own specific systems):   Extremely small proportion   **1 2** 3 4 5 6 7 Extremely large proportion

Q59: What is the proportion of income that a typical staff obtains from working for your firm? Please circle on scale:

    Air Conditioning Staff: Extremely small proportion   **1 2** 3 4 5 6 7 Extremely large proportion (practically 100%)

    DDC Staff (own specific systems):   Extremely small proportion   1 2 3 4 5 6 7 Extremely large proportion (practically 100%)

Q60: How much are you able to influence the manner by which your staff performs their role? Please circle on scale:

    Air Conditioning Staff: Extremely easy to influence   **1 2** 3 4 5 6 7 Extremely difficult to influence

    DDC Staff (own specific systems):   Extremely easy to influence   **1 2** 3 4 5 6 7 Extremely difficult to influence

Q61: How much are your staff able to influence your firm's policies, procedures and practices? Please circle on scale:

    Air Conditioning Staff: Extremely easy to influence   **1 2** 3 4 5 6 7 Extremely difficult to influence

    DDC Staff (own specific systems):   Extremely easy to influence   **1 2** 3 4 5 6 7 Extremely difficult to influence

Q62: How easy could you adopt <u>any one</u> of any of the alternative approaches to sourcing air conditioning maintenance and DDC maintenance in one of your typical buildings (<u>including</u> using other existing internal resources or employing a new full time competent technicians or by using temporary hire technicians or subcontracting to an alternative external firm etc)? Please circle on scale:

    Air Conditioning Maintenance: Extremely easy **1 2** 3 4 5 6 7 Extremely difficult

    DDC (own specific systems) Maintenance: Extremely easy **1 2** 3 4 5 6 7 Extremely difficult

Q63: If you had to replace one of your existing air conditioning or DDC maintenance staff and were required to <u>consider all alternatives</u>, then how would you rank the following alternatives? Please insert a number 1 up to 5 against the following (with Number 1 being the most preferred alternative):

    _____: Use/promote/train other internal staff

    _____: Recruit new and fully competent tradesperson(s) as in-house staff

    _____: Subcontract this work to external firm:

    _____: Employ temporary hire staff

    _____: Other: please briefly describe_____

Q64: How easy is it for your staff to gain work with a different firm in the same or related role? Please circle on scale:

    Air Conditioning Staff: Extremely easy **1 2** 3 4 5 6 7 Extremely difficult

    DDC Staff: Extremely easy **1 2** 3 4 5 6 7 Extremely difficult

End of questionnaire - once again, thank you very much for your time

Case Number:_____

APPENDIX 7 – VERSION 6 OF CASE STUDY QUESTIONNAIRE

Section A: General information about you and your views

Q1: Please print:
    Name:_____/Position:_____/Years at current firm:_____
    Name of service division and firm:_____/Your geographic area of responsibility and operation_____
    Years in position (all firms worked for):_____/Number of firms worked for:_____/ Date questionnaire completed:_____

Q2: If after completing this questionnaire, you would like to make any further comments about any aspect of this survey then these are welcomed. Please attach a sheet to the questionnaire with your comments, or alternatively send a separate message to me (please see cover page for my contact details).

Q3: If you would like to receive a copy of the summary of the findings (that includes the number of responses and verification of the amount that I have contributed to the Salvation Army), please tick box: ☐

Section B: General information about your firm <u>in your area of operation</u>

Q4: What year did your firm come into existence in terms of service/maintenance in your area of operation? Please state very approximate year:_____

Q5: What types of building do you service & maintain? Please insert very approximate percentages:
    Shopping Centres_____%   Other Commercial & Industrial_____%   Residential_____%   Other_____% = 100%

Q6: If your firm does not currently service & maintain shopping centres, then is it capable of doing so? Please circle: Yes / No

Q7: How would your firm obtain new work? Please insert very approximate percentages:
    Shopping centres: Open Competition:_____% Competition with selected list of rivals:_____% Negotiation as only contractor:_____% Other:_____% = 100%
    All other work: Open Competition:_____% Competition with selected list of rivals:_____% Negotiation as only contractor:_____% Other:_____% = 100%

Q8: Who writes your contracts (terms and conditions)? Please insert approximate percentages:
    Shopping centres: Client:_____%   Your firm:_____%   Standard form:_____%   Other:_____% = 100%
    Other contracts: Client:_____%   Your firm:_____%   Standard form:_____%   Other:_____% = 100%

Q9: What are the following aspects of your contracts? Please insert/circle:
    <u>Typical duration of your contracts?</u> Please insert for shopping centres:_____years. Please insert for other contracts:_____years
    <u>Hourly rates and response times for breakdown work normally specified in your contracts?</u> Please circle: Yes / No
    30 day termination clause (or similar) normally included? Please circle: Yes / No
    Type of contract: Preventative:_____%/Comprehensive:_____%/Other:_____%

Section B continued

Q10: How many clients and contracts do your firm service? Please insert approximate numbers: Number of clients_____ / Number of contracts_____

Q11: Is a large percentage of your turnover connected with just a few clients / Please circle: Yes / No. If yes, then what is this approximate percentage turnover and how many clients are responsible for this work? Please insert approximate percentage and number of clients: Turnover_____% Number of clients_____

Q12: Very approximately, and in last <u>two years</u>, what percentage of your contracts have been renewed? Please insert: Shopping centres:_____% Other contracts:_____%

Q13: What is likely to be a very approximate estimate of <u>total</u> annual turnover of <u>all your</u> firm's service / maintenance works? Please tick one box:
This year: Up to $1million ☐ Between $1 to 10million ☐ Between $10 to 30million ☐ Between $30 to 50million ☐ Over $50million ☐
Next year: Up to $1million ☐ Between $1 to 10million ☐ Between $10 to 30million ☐ Between $30 to 50million ☐ Over $50million ☐

Q14: Very approximately, how would you estimate your firm's profits (service and maintenance only) compared with firms of <u>all sizes</u> providing service and maintenance of <u>commercial and industrial buildings</u> in your area of operation? Please circle: Above average / <u>A</u>bout average / Below average

Section C: You and your firm's approach, <u>in your area of operation</u>, to sourcing service & maintenance (Air Conditioning/Ventilation systems) in <u>commercial and industrial buildings</u>

Q15: How do you source Air Conditioning service & maintenance? Please insert approximate percentages:
In-house (direct employee(s))_____% / Subcontractor(s)_____% = 100%

Q16: How long have you had this approach to sourcing Air Conditioning? Please insert approximate number of years:_____

Q17: If there are any plans to change this approach in the next few years, then what is the likely new approach? Please insert approximate percentages:
In-house (direct employee(s))_____% / Subcontractor(s)_____% = 100%

Q18: How many service & maintenance in-house staff (direct employees) are there in your firm? Please insert approximate numbers:
Management_____ Fridge/Mechanical_____ Electrical_____ Other technical_____ Admin_____ Other_____ = Total in-house staff

Assuming you would subcontract at least some part of the service & maintenance of air conditioning systems, then:

Q19: Who writes this subcontract (terms and conditions)? Please insert approximate percentages:
Your firm_____% / subcontractor_____% / Standard form_____% / Other_____% = 100%

Section C continued

Q20: What are the aspects of this subcontract? Please insert/circle:

Typical duration of your contracts? Please insert for shopping centres:_____years. Please insert for other contracts:_____years
Hourly rates and response times for breakdown work normally specified in your contracts? Please circle: Yes / No
30 day termination clause (or similar) normally included? Please circle: Yes / No
Type of contract: Preventative:_____%/Comprehensive:_____%/Other:_____%

Q21: How often would you expect this subcontractor to visit one of your typical buildings? Please tick one box:

Continuously	☐	(at least 5 days per week and 8 hours per day)
Daily (parts of day)	☐	and hours per day _____
Weekly (parts of week)	☐	and days per week _____ and hours per day_____
Monthly (parts of month)	☐	and days per month _____ and hours per day_____

Q22: Typically, how many technicians from this subcontractor would visit your centre(s)? Please insert number:_____

Section D: Your relationship with one of your typical external Air Conditioning subcontractors

Q23: How much does this relationship involve a cooperative effort? Please circle on scale:

Extremely arms length **1 2** 3 4 5 6 7 Extremely cooperative

Q24: How much expectation would this subcontractor have that your firm would want to use them/agree to have them as a subcontractor on an alternative contract serviced & maintained by your firm should your firm's involvement in the buildings that they currently service end? Please circle on scale:

Extremely low expectation **1 2** 3 4 5 6 7 Extremely high expectation

Q25: How complex is this relationship? Please circle on scale:

Extremely straightforward (only really one **1 2** 3 4 5 6 7 Extremely complex (many relationships with others in
relationship with you and your firm/treating each   in addition to you/your firm e.g. client, facility manager, other
other the same mostly all of the time)   contractors etc and need to treat different group differently)

Q26: How complex are your expectations of this subcontractor? Please circle on scale:

Extremely clear (mostly the same and limited range **1 2** 3 4 5 6 7 Not always clear (often changing and wide ranging
expectations from you/your firm)   expectations from others in addition to you/your firm)

Q27: How detailed is your monitoring of the performance of this subcontractor? Please circle on scale:

Extremely detailed (every aspect of performance **1 2** 3 4 5 6 7 Extremely imprecise (important parts of performance monitored
closely monitored on a regular and frequent basis)   using key indicators only, on an irregular and infrequent basis)

Section D continued

Q28: How detailed are the terms and conditions of the contract with this subcontractor? Please circle on scale:

<u>Contract is fixed term</u> (with all performance **1** 2 3 4 5 6 7 <u>Contract is ongoing</u> (with very general performance
<u>requirements</u> precisely specified and continuously requirements only – developed and agreed during
<u>updated</u> in respect of assigned buildings) the course of their contract)

Q29: How do you feel about the price your firm would need to offer to attract a new and competent Air Conditioning subcontractor – mindful of their contribution to your firm's core business? Please circle on scale: Extremely low **1** 2 3 4 5 6 7 Extremely High

Q30: Does your firm use any incentives (positive and/or negative measures) to improve the performance of this subcontractor (beyond the prospect of ongoing use/termination)? Please circle: Yes/No. If yes, then very briefly what are these measures? Please insert:
Positive measures:_____/Negative measures:_____

Q31: How steady have the relationship been with this subcontractor over the last few years? Please circle on scale:
Extremely steady **1** 2 3 4 5 6 7 Extremely variable

Q32: How much do you think that this relationship is likely to become closer in the next few years? Please circle on scale:
Extremely likely to become more distant **1** 2 3 4 5 6 7 Extremely likely to become closer

Q33: How much do you/your firm aim to treat <u>all</u> your subcontractors the same? Please circle on scale:
All treated in an extremely similar way **1** 2 3 4 5 6 7 All treated in an extremely different way

Section E: The role of <u>external</u> Air Conditioning subcontractors

Q34: *In this question only, please answer on the basis that you are required to consider attempting to <u>switch in-house</u> the percentage of subcontracted DDC work that you noted in Q15. <u>Using this approach,</u>* what is the potential for this work to <u>directly and/or indirectly</u> increase your firm's <u>profits</u> in comparison to <u>all</u> other activities your firm currently performs in-house (including management activities) <u>and</u> through subcontracts? Please circle on scale:
Greatly decrease profits **1** 2 3 4 5 6 7 Greatly increase profits

<u>In the following questions, return to answering on the basis of the role performed by your external Air Conditioning subcontractors.</u>

Q35: How central are the activities performed by your air conditioning subcontractors to your firm's core business compared with <u>all</u> other activities your firm performs in-house (including management activities) <u>and</u> through subcontracts? Please circle on scale:
Extremely peripheral **1** 2 3 4 5 6 7 Extremely central

Section E continued

Q36: How different is any of the following: the capacity (in terms of the number and size of contracts capable of being serviced at one time), technology (hardware and software), knowledge, skills, policies, procedures and practices offered by your typical air conditioning subcontractor compared with that offered by all other subcontractors (of all sizes) that provide air conditioning maintenance in your area of operation? Please circle on scale:
<div align="center">Extremely similar   1 2 3 4 5 6 7   Extremely different</div>

Q37: How much do you think that there is a shortage of subcontractors that are capable of providing a similar standard of service & maintenance to air conditioning systems as your air conditioning subcontractors in your geographical area of operation? Please circle on scale:
<div align="center">Extremely plentiful supply   1 2 3 4 5 6 7   Extremely shortage</div>

Q38: How costly do you imagine it would be for any of your typical air conditioning subcontractors' main rivals to develop and match any differences you may have had in mind in Q36? Please circle on scale:
<div align="center">Extremely easy   1 2 3 4 5 6 7   Extremely costly/ difficult</div>

Q39: How difficult do you think it would be to write a manual that would effectively communicate the total of the technology, knowledge, skills, policies, practices and procedures of your typical air conditioning subcontractor? Please circle on scale:
<div align="center">Extremely easy   1 2 3 4 5 6 7   Extremely costly/ difficult</div>

Q40: How long would it take a recently appointed and competent air conditioning subcontractor to become familiar with the typical buildings/contracts they may service and to reach their expected level of performance? Please insert number of visits and hours per visit: Number of visits_____ Time per visit_____(hours)

Q41: Typically, how much do your typical air conditioning subcontractor need to customise their technology (hardware and software), knowledge and skills to suit a typical new owner and/or a typical new building (excluding issues that relate to gaining access, constraints on working etc)? Please circle on scale:
<div align="center">Minimal adaptations   1 2 3 4 5 6 7   Substantial adaptations</div>

Q42: How difficult and costly would it be (including your time and effort) to replace one of your typical air conditioning subcontractors? Please circle on scale:
<div align="center">Extremely easy   1 2 3 4 5 6 7   Extremely difficult/practically impossible</div>

Q43: What are the minimum requirements (experience and qualifications) you generally require when seeking to appoint an air conditioning subcontractor? Please insert:
Minimum requirements:_____

Q44: If your firm provides any training, or invests in any way, in any of your air conditioning subcontractors, then how many subcontractors receive this investment and what is the nature of this investment? Please insert and very briefly describe: ___% / _____

Q45: How confident would you be (in relation to your to your typical buildings) that you could reasonably predict the range of air conditioning maintenance tasks involved? Please circle on scale:
<div align="center">Extremely confident   1 2 3 4 5 6 7   Extremely unsure</div>

Section E continued

Q46: In terms of the range of tasks in the previous question Q45, how confident would you be that either you could reasonably estimate the <u>duration/time</u> required to complete these maintenance tasks (this does <u>not</u> include the being able to predict <u>when</u> any <u>particular task</u> will occur)?

Extremely confident   <u>1</u> <u>2</u> 3 4 5 6 7   Extremely unsure

Q47: Again, in relation to the range of tasks in question Q45, how confident would you be that either you could reasonably predict an appropriate <u>frequency</u> of routine preventative work, as well as a minimum level of occurrence of *ad hoc* maintenance /breakdown maintenance (this does <u>not</u> include the being able to predict <u>when</u> any particular *ad hoc*/breakdown maintenance task will occur)? Please circle on scale:

Extremely confident <u>1</u> <u>2</u> 3 4 5 6 7   Extremely unsure

Q48: How confident would you be that you could clearly describe/specify the performance requirements concerning your typical air conditioning subcontractor? Please circle on scale:

Extremely confident <u>1</u> <u>2</u> 3 4 5 6 7   Extremely unsure

Q49: How much have the core knowledge and skills (<u>excluding</u> multi-skilling) of your typical air conditioning subcontractor likely to change over the <u>next three years</u>? Please circle on scale:

Extremely low level of change <u>1</u> <u>2</u> 3 4 5 6 7   Extreme high level of change

Q50: How easy is it for someone, to <u>directly</u> check the performance of your typical air conditioning subcontractor before a problem occurs that needs your input? Please circle on scale:

Extremely easy <u>1</u> <u>2</u> 3 4 5 6 7   Extremely difficult

Q51: How much are technical objective measures (like correct completion of work on time and within scheduled hours etc) a fair reflection of the performance of your typical air conditioning subcontractors? Please circle on scale: Extremely fair reflection <u>1</u> <u>2</u> 3 4 5 6 7   Extremely unfair reflection

Q52: How tolerant are you in terms of taking some sort of measure to correct unsatisfactory performance by your typical air conditioning subcontractor? Please circle on scale: Extremely sensitive (immediate action) <u>1</u> <u>2</u> 3 4 5 6 7   Extremely tolerant (action delayed as long as possible)

Q53: How tolerant do you think your typical air conditioning subcontractor is in terms of seeking to improve perceived unsatisfactory pay and/or working conditions? Please circle on scale: Extremely sensitive (immediate action) <u>1</u> <u>2</u> 3 4 5 6 7   Extremely tolerant (action delayed as long as possible)

Q54: What is the cost of <u>one</u> of your typical air conditioning subcontractors as a proportion of the <u>total</u> cost of all your subcontractors across all of your subcontracts? Please circle on scale: Extremely small proportion   <u>1</u> <u>2</u> 3 4 5 6 7   Extremely large proportion

Q55: What do you think is the proportion of revenue that a typical air conditioning subcontractor obtains from working for your firm? Please circle on scale:

Extremely small proportion   <u>1</u> <u>2</u> 3 4 5 6 7   Extremely large proportion (practically 100%)

Q56: How much are you able to influence the manner by which your typical air conditioning subcontractor performs their role? Please circle on scale:

Extremely easy to influence   <u>1</u> <u>2</u> 3 4 5 6 7   Extremely difficult to influence

Section E continued

Q57: How much is your typical air conditioning subcontractor able to influence your firm's policies, procedures and practices? Please circle on scale:

Extremely easy to influence **1 2** 3 4 5 **6 7** Extremely difficult to influence

Q58: How easy could you adopt <u>any one</u> of any of the alternative approaches to sourcing air conditioning maintenance in one of your typical buildings (<u>including</u> using existing internal resources or employing a new full time competent technicians or by using temporary hire technicians or subcontracting to an alternative external firm etc)? Please circle on scale:

Extremely easy **1 2** 3 4 5 **6 7** Extremely difficult

Q59: If you had to replace one of your typical air conditioning subcontractors in one of your buildings and were required to <u>consider all alternatives</u>, then how would you rank the following alternatives? Please insert a number 1 up to 5 against the following (with Number 1 being the most preferred alternative):

     _____: Use/promote/train internal staff
     _____: Recruit new and fully competent tradesperson(s) as in-house staff
     _____: Subcontract this work to an alternative external firm:
     _____: Employ temporary hire staff for the remaining duration of your firm's commitment to the management of the centre concerned
     _____: Other: please briefly describe_____

Q60: How easy is it for your typical air conditioning subcontractor to gain work with a different firm in the same or related role? Please circle on scale:

Extremely easy **1 2** 3 4 5 **6 7** Extremely difficult

End of questionnaire - Once again, thank you very much for your time

Case Number:_____

APPENDIX 8 – Summary of items in final versions of case study questionnaire

Dependent variables – principal items

Summary of item: question (and response format)

Source of principal items and other comments

Make-or-buy decision
Item 1: Internalised (%) and externalised (%)
- Version 1: Question 4 (Initial Draft: Question 1)
- Version 2: Question 4
- Version 3: Question 4
- Version 4: Question 16
- Version 5: Question 16
- Version 6: Question 15

Although this item requires a percentage response (ratio scale – as per Monteverde and Teece 1982 and Poppo and Zenger 1998), it is reduced to a nominal/dichotomous scale in so far as all the answers to all the independent variables are specified as relating to either an internalised or externalised activity.

Nature of the exchange relationship decision

Solidarity
Item 1: Level of cooperation (7-point)
- Version 1: Question 13 (Initial Draft: Question 31)
- Version 2: Question 15
- Version 3: Question 12
- Version 4: Question 27
- Version 5: Question 23
- Version 6: Question 23

Item 2: Expectation of continuation (7-point)
- Version 1: Question 14 (Initial Draft: Question 32)
- Version 2: Question 16
- Version 3: Question 13
- Version 4: Question 28
- Version 5: Question 24
- Version 6: Question 24

Each item in each of the three dimensions of this dependent variable is based on Kaufmann and Stern (1988). Kaufmann and Stern's approach is preferred – as this approach considers the nature of the exchange to be a continuum from discrete exchange to relational exchange. This approach is closer to the TCR trinity developed in Section 4.5.2, than rival approaches that are categorical – for example, Macneil (1974) and Pilling, Crosby and Jackson (1994).

A 7-point semantic differential response format is used for each 2-item scale – with the 7/high end labelled in terms of a high incidence of the item and 1/low end of the scale labelled in opposite terms - a low incidence of the item.

Role Integrity
Item 1: Complexity of all relations (7-point)
- Version 1: Question 15 (Initial Draft: Question 33, 37, 38)
- Version 2: Question 17
- Version 3: Question 14
- Version 4: Question 29
- Version 5: Question 25
- Version 6: Question 25

Item 2: Complexity of expectations (7-point)
- Version 1: Question 16 (Initial Draft: Question 34)
- Version 2: Question 18
- Version 3: Question 15
- Version 4: Question 30
- Version 5: Question 26
- Version 6: Question 26

Mutuality
Item 1: Lack of monitoring of performance (7-point)
- Version 1: Question 17 (Initial Draft: Question 36)
- Version 2: Question 19
- Version 3: Question 16
- Version 4: Question 31
- Version 5: Question 27
- Version 6: Question 27

Item 2: Level of imprecise terms and conditions of contract (7-point)
- Version 1: Question 18 (Initial Draft: Question 35)
- Version 2: Question 20
- Version 3: Question 17
- Version 4: Question 32
- Version 5: Question 28
- Version 6: Question 28

Dependent variables – clarifying and corroborative items

Summary of item (and response format) **Comments**

Nature of the exchange relationship decision

Clarifying
Item 1: Level of pay/price (7-point)
- Version 1: Question 19 (Initial Draft: Not included)
- Version 2: Question 21
- Version 3: Question 18
- Version 4: Question 33
- Version 5: Question 29
- Version 6: Question 29

Item 2: Use of negative measures (credible threats) (Yes/No)
- Version 1: Question 20 (Initial Draft: Not included)
- Version 2: Question 22
- Version 3: Question 19
- Version 4: Question 34
- Version 5: Question 30
- Version 6: Question 30

Having used Kaufmann and Stern's approach to describing the exchange relationship, and having identified a discrete relationship, then the two clarifying items show whether this discrete exchange is an efficient or inefficient exchange. Efficient exchanges are characterised by the absence of high pay/prices and credible threats.

The incidence/higher incidence of the corroborating items are expected in conjunction with any relational exchange relationship.

Corroborating
Item 1: Training to reach full competence (Years)
- Version 1: Question 36 (Initial Draft: Not included)
- Version 2: Question 37
- Version 4: Question 51
- Version 5: Question 47

Item 2: Ongoing training once full competence reached (Days per annum)
- Version 1: Question 37 (Initial Draft: Not included)
- Version 2: Question 38
- Version 4: Question 52
- Version 5: Question 48

Item 3: Renewal of contract (Yes/No)
- Version 2: Question 12
- Version 3: Question 9

Item 4: Investment in training to external firm (Yes/No)
- Version 2: Question 39
- Version 3: Question 33
- Version 4: Question 53
- Version 6: Question 44

TCE (Asset Specificity and Frequency) – principal items

Summary of item: question (and response format)

Source of principal items and other comments

Human Asset Specificity
Item 1: Time for new competent internal human resource/external firm to reach full performance (months/days)
- Version 1: Question 31 (Initial Draft: Question 28)
- Version 2: Question 32
- Version 3: Question 29
- Version 4: Question 44
- Version 5: Question 40
- Version 6: Question 40

Item 2: Level of customisation required (7-point)
- Version 1: Question 32 (Initial Draft: Question 18)
- Version 2: Question 33
- Version 3: Question 30
- Version 4: Question 45
- Version 5: Question 41
- Version 6: Question 41

Temporal Asset Specificity
Item 1: Difficult/costly to replace extant external firm (7-point)
- Version 2: Question 34
- Version 3: Question 31
- Version 4: Question 47
- Version 5: Question 43
- Version 6: Question 42

Item 2: Sensitivity of air conditioning firm's performance based on DDC performance (7-point)
- Version 4: Question 46
- Version 5: Question 42

Ongoing Asset Specificity
Item 1: Difficult/costly to replace typical internal human resource (7-point)
- Version 1: Question 33 (Initial Draft: Not included)
- Version 2: Question 34
- Version 4: Question 48
- Version 5: Question 44

Item 2: Shortage of typical internal human resources (7-point)
- Version 1: Question 34 (Initial Draft: Not included)
- Version 2: Question 35
- Version 4: Question 49
- Version 5: Question 45

Frequency
Item 1: Full-time equivalent staff (FTE - Number)
- Version 1: Question 8 / 9 (Initial Draft: Not included)
- Version 2: Question 7 / 10
- Version 3: Question 7
- Version 4: Question 19 (Mechanical and Electrical staff) / 25
- Version 5: Question 19 (Mechanical and Electrical staff)
- Version 6: Question 21

The 2-item Human Asset Specificity scale is based on John and Weitz (1988).

The 2-item Temporal Asset Specificity scale is based on Jensen and Rothwell (1998) and Love and Stephen (1999).

The 1-item Frequency scale is based on John and Weitz (1988). This item reflects both the size and the recurrent nature of the transaction as envisaged by Williamson (1985). In terms of the contractor/external firm in Versions 2, 3 and 6, the FTE staff is established by calculating the total hours per year the contractor/external firm visits the centre and dividing by 1840 hours per year per FTE.

Where a 7-point semantic differential response format is used the 7/high end labelled in terms of a high incidence of the item and 1/low end of the scale labelled in opposite terms - a low incidence of the item.

TCE (Uncertainty) – principal items

Summary Outline of item: question (and response format)

Source of principal items and other comments

Exogenous Uncertainty
Item 1: Difficult to predict range of tasks (7-point)
- Version 1: Question 38 (Initial Draft: Question 20 and 21)
- Version 2: Question 40
- Version 3: Question 34
- Version 4: Question 54
- Version 5: Question 49
- Version 6: Question 45

The 5-item Exogenous Uncertainty scale is based on Walker and Weber (1989) and the 2-item Endogenous scale is based on Anderson and Schmittlein (1984).

Item 2: Difficult to predict time to complete each task (7-point)
- Version 1: Question 39 (Initial Draft: Not included)
- Version 2: Question 41
- Version 3: Question 35
- Version 4: Question 55
- Version 5: Question 50
- Version 6: Question 46

Item 5 in the exogenous scale is also used to confirm that the level of technological change does not deter internalisation and therefore that measures of unpredictability are appropriate.

Item 3: Difficult to predict frequency of each task (7-point)
- Version 1: Question 40 (Initial Draft: Not included)
- Version 2: Question 42
- Version 3: Question 36
- Version 4: Question 56
- Version 5: Question 51
- Version 6: Question 47

Where a 7-point semantic differential response format is used the 7/high end labelled in terms of a high incidence of the item and 1/low end of the scale labelled in opposite terms - a low incidence of the item.

Item 4: Difficult to specify performance requirements (7-point)
- Version 1: Question 41 (Initial Draft: Question 21)
- Version 2: Question 43
- Version 3: Question 37
- Version 4: Question 57
- Version 5: Question 52
- Version 6: Question 48

Item 5: Likelihood of changes in core knowledge and skills (7-point)
- Version 1: Question 42 (Initial Draft: Question 19)
- Version 2: Question 44
- Version 3: Question 38
- Version 4: Question 58
- Version 5: Question 53
- Version 6: Question 49

Endogenous Uncertainty
Item 1: Difficult to monitor performance (7-point)
- Version 1: Question 43 (Initial Draft: Question 22)
- Version 2: Question 45
- Version 3: Question 39
- Version 4: Question 59
- Version 5: Question 54
- Version 6: Question 50

Item 2: Unfairness of objective measures of performance (7-point)
- Version 1: Question 44 (Initial Draft: Question 23)
- Version 2: Question 46
- Version 3: Question 40
- Version 4: Question 60
- Version 5: Question 55
- Version 6: Question 51

TCE (Asset Specificity and Frequency – corroborative items)

Summary of item: question (and response format)   **Comments**

Ongoing Asset Specificity: Corroborating items

Item 1: Minimum experience (Years)

- Version 1: Question 35 (Initial Draft: Not included)
- Version 2: Question 36
- Version 4: Question 50
- Version 5: Question 46

A higher incidence of the Ongoing Asset Specificity corroborating items are expected in conjunction with higher values of the other two Ongoing Asset Specific items in Table 5.13.

Item 2: In-house versus external recruitment (percentages)

- Version 1: Question 36
- Version 2: ?
- Version 3: ?
- Version 4: Question 51
- Version 5: ?
- Version 6: ?

Frequency: Corroborating items

Item 1: Hours per week worked by internal human resource (Hours)

- Version 1: Question 10 (Initial Draft: Not included)
- Version 2: Question 7
- Version 4: Question 20
- Version 5: Question 20

The higher incidence of the frequency corroborating items are expected in conjunction with higher values of full-time equivalent staff value. However, these items are not as revealing as the principal item as they only capture the recurrent nature of the transaction and not the size of the transaction – that is, the number of FTE staff beyond one FTE staff.

Item 2: How busy internal human resource (7-point)

- Version 1: Question 11 (Initial Draft: Not included)
- Version 2: Question 8
- Version 4: Question 21
- Version 5: Question 21

Where a 7-point semantic differential response format is used the 7/high end labelled in terms of a high incidence of the item and 1/low end of the scale labelled in opposite terms - a low incidence of the item.

RBT – principal items

Summary of item: question (and response format)

Value

Item 1: Potential to increase profits when insourced (7-point)
- Version 1: Question 25   (Initial Draft: Question 9/10)
- Version 2: Question 26
- Version 3: Question 23
- Version 4: Question 38
- Version 5: Question 34
- Version 6: Question 35

Item 2: Central to core business (7-point)
- Version 1: Question 26 (Initial Draft: Question 17)
- Version 2: Question 27
- Version 3: Question 24
- Version 4: Question 39
- Version 5: Question 35
- Version 6: Question 36

Rarity

Item 1: Different technology including knowledge and skills (7-point)
- Version 1: Question 27 (Initial Draft: Question 11/12)
- Version 2: Question 28
- Version 3: Question 25
- Version 4: Question 40
- Version 5: Question 36
- Version 6: Question 37

Item 2: Shortage of firms in locality (7-point)
- Version 1: Question 28 (Initial Draft: Question 13)
- Version 2: Question 29
- Version 3: Question 26
- Version 4: Question 41
- Version 5: Question 37
- Version 6: Question 38

Costly to Imitate

Item 1: Costly for main rivals to match differences (in Rarity Item 1) (7-point)
- Version 1: Question 29 (Initial Draft: Question 13/15)
- Version 2: Question 30
- Version 3: Question 27
- Version 4: Question 42
- Version 5: Question 38
- Version 6: Question 39

Item 2: Difficult to write manual (7-point)
- Version 1: Question 30 (Initial Draft: Question 14/16)
- Version 2: Question 31
- Version 3: Question 28
- Version 4: Question 43
- Version 5: Question 39
- Version 6: Question 40

Source of principal items and other comments

The 2-item Value scale is based on Irwin (1994) and Loh (1993).

The 2-item Rarity scale is based on Irwin (1994) and Steensma (1996).

The 2-item Costly to Imitate scale is based on Hall (1993) and Kogut and Zander (1993).

All items use a 7-point semantic differential response format with the 7/high end labelled in terms of a high incidence of the item and 1/low end of the scale labelled in opposite terms - a low incidence of the item.

RBT corroborative items

Outline of item: question (and response format)	Comments
Rarity Item 1: Minimum experience (Years) • Version 2: Question 36 • Version 3: Question 32 • Version 4: Question 50 • Version 6: Question 43	A higher incidence of the Rarity corroborating items are expected in conjunction with higher values of the other two Rarity items in Table 5.16.

RDT – principal items

Summary of item: question (and response format)
Criticality
Item 1: Lack of tolerance correcting unsatisfactory performance
- Version 1: Question 45 (Initial Draft: Question 25/29)
- Version 2: Question 47
- Version 3: Question 41
- Version 4: Question 61
- Version 5: Question 56
- Version 6: Question 52

Item 1a: Lack of tolerance correcting unsatisfactory pay/working conditions (7-point)
- Version 1: Question 46 (Initial Draft: Not included)
- Version 2: Question 48
- Version 3: Question 42
- Version 4: Question 62
- Version 5: Question 57
- Version 6: Question 53

Magnitude of Exchange
Item 1: Proportion of cost (7-point)
- Version 1: Question 47 (Initial Draft: Question 24)
- Version 2: Question 49
- Version 3: Question 43
- Version 4: Question 63
- Version 5: Question 58
- Version 6: Question 54

Item 1a: Proportion of revenue (7-point)
- Version 1: Question 48 (Initial Draft: Not included)
- Version 2: Question 50
- Version 3: Question 44
- Version 4: Question 64
- Version 5: Question 59
- Version 6: Question 55

Lack of Discretion
Item 1: Lack of influence over actions (7-point)
- Version 1: Question 49 (Initial Draft: Question 26)
- Version 2: Question 51
- Version 3: Question 45
- Version 4: Question 65
- Version 5: Question 60
- Version 6: Question 56

Item 1a: Lack of influence over actions (7-point)
- Version 1: Question 50 (Initial Draft: Not included)
- Version 2: Question 52
- Version 3: Question 46
- Version 4: Question 66
- Version 5: Question 61
- Version 6: Question 57

Few Alternatives
Item 1: Few other sources (7-point)
- Version 1: Question 51 (Initial Draft: Question 27)
- Version 2: Question 53
- Version 3: Question 47
- Version 4: Question 67
- Version 5: Question 62
- Version 6: Question 58

Item 1a: Few other sources (7-point)
- Version 1: Question 53 (Initial Draft: Not included)
- Version 2: Question 56
- Version 3: Question 49
- Version 4: Question 69
- Version 5: Question 64
- Version 6: Question 60

Source of principal items and other comments

The items in each of Pfeffer and Salancik's (1978) four RDT dimensions.

Each dimension is represented by two versions of one item. Item 1 represents the buyer's dependence and Item 1a represents the buyer's perception of the supplier's dependence and so the difference between the buyer and supplier's dependence can be established on each dimension. Each Item 1 and each Item 1a was then designed such that it can be reliably answered by the buyer – based on Provan, Beyer and Kruytbosch (1980) and Saidel (1991). Here, the buyer's perception of the net dependency informs the buyer's behaviour in designing the nature of the exchange relationship. More specifically, the buyer makes a decision concerning the nature of the relationships in terms of the level of solidarity, role integrity and mutuality afforded to the supplier (Bridge 2007).

All items use a 7-point semantic differential response format with the 7/high end labelled in terms of a high incidence of the item and 1/low end of the scale labelled in opposite terms - a low incidence of the item.

RDT – corroborative items

Summary of item: question (and response format)

Few Alternatives

Item 1: Number of alternatives considered (Ranked)

- Version 1: Question 52 (Initial Draft: Not included)
- Version 2: Question 54 / 55
- Version 3: Question 48
- Version 4: Question 68
- Version 5: Question 63
- Version 6: Question 59

Comments

A higher number of ranked alternatives are expected in conjunction with lower values on the Few Alternatives items in Table 5.18.

SCP items

Summary of item: question (and response format)	**Comments**

Conduct

Item 1: External firms selected to tender (Number)
- Version 2: Question 13
- Version 3: Question 10

Item 2: Nature of contract (Preventative/Comprehensive/Other)
- Version 2: Question 13
- Version 3: Question 10
- Version 4: Question 9
- Version 5: Question 9
- Version 6: Question 9 / 20

Item 3: Duration of contract (Years)
- Version 2: Question 13
- Version 3: Question 10
- Version 4: Question 9
- Version 5: Question 9
- Version 6: Question 9 20

Item 4: 30 day termination clause (Yes/No)
- Version 2: Question 13
- Version 3: Question 10
- Version 4: Question 9 /
- Version 5: Question 9
- Version 6: Question 9 / 20

Item 5: How obtain new work (Open/List/Negotiated/Other)
- Version 4: Question 7
- Version 5: Question 7
- Version 6: Question 7

Item 6: Who writes contracts (Client/Firm/Standard Form/Other)
- Version 4: Question 8
- Version 5: Question 8
- Version 6: Question 8 / 19

Item 7: Hourly rates specified (Yes/No)
- Version 4: Question 9
- Version 5: Question 9
- Version 6: Question 9 / 20

Item 8: Clients and contracts (Number)
- Version 4: Question 10
- Version 5: Question 10
- Version 6: Question 10

Item 9: Large percentage of work with few clients (Yes/No)
- Version 4: Question 11
- Version 5: Question 11
- Version 6: Question 11

Item 10: Contracts renewed (Percentage)
- Version 4: Question 12
- Version 5: Question 12
- Version 6: Question 12

Performance

Item 1: Profitability (Above average/average/below average)
- Version 4: Question 15
- Version 5: Question 15
- Version 6: Question 14

The "Structure" component of the SCP is addressed via a "Five Forces" analysis (Porter, 1980). The industry attributes highlighted by the five forces are expected to be consistent with the firm's conduct and performance. In sum, the SCP can then be used to depict the type of industry in terms of the level price competition and its stereotypical market structure.

Static/Dynamic items

Summary of item: question (and response format)   **Comments**

Pertaining to the Make-or-Buy Decision

Item 1: Time approach to sourcing existed (Years)

All of the items are designed to indicate the extent to which decision making is occurring under stable conditions. More stable or static conditions promote the stronger forms of rationality in TCE and RBT that are closer to maximising behaviour.

- Version 1: Question 5 (Initial Draft: Question 2)
- Version 2: Question 5
- Version 3: Question 5
- Version 4: Question 17
- Version 5: Question 17
- Version 6: Question 16

Item 2: Plans to change approach to sourcing (Yes/No)

- Version 1: Question 6 (Initial Draft: Question 3)
- Version 2: Question 6
- Version 3: Question 6
- Version 4: Question 18
- Version 5: Question 18
- Version 6: Question 17

Pertaining to the Nature of the Exchange Relationship Decision

Item 1: Steadiness of relationship (7-point)

- Version 1: Question 21 (Initial Draft: Not included)
- Version 2: Question 23
- Version 3: Question 20
- Version 4: Question 35
- Version 5: Question 31
- Version 6: Question 31

Item 2: Relationship likely to become closer (7-point)

- Version 1: Question 22 (Initial Draft: Not included)
- Version 2: Question 24
- Version 3: Question 21
- Version 4: Question 36
- Version 5: Question 32
- Version 6: Question 32

Item 3: All internal human resources / contractors treated the same (7-point)

- Version 1: Question 23 (Initial Draft: Not included)
- Version 2: Question 25
- Version 3: Question 22
- Version 4: Question 37
- Version 5: Question 33
- Version 6: Question 33

Item 4: Time typical internal human resource been with firm (Years)

- Version 1: Question 24 (Initial Draft: Not included)
- Version 2: Question 9
- Version 4: Question 22
- Version 5: Question 22

Other items – case study attributes

Summary of item: question (and response format)

Version 1
Item 1 (Question 12): Operations Manager's background
(Technical/Managerial)

Version 2
Item 1 (Question 14): DDC in Air Conditioning Maintenance
contract (Yes/No)

Version 3
Item 1 (Question 11): DDC in Air Conditioning Maintenance
contract (Yes/No)

Version 4
Item 1 (Question 4): Years in existence (Years)
Item 2 (Question 5): Types of building service and maintain (%
Shops / % Other Commercial & Industrial / % Residential)
Item 3 (Question 6): Capable of servicing & maintaining shop
(Yes/No)
Item 4 (Question 13): Turnover of air conditioning ($)
Item 5 (Question 14): Turnover of DDC ($)

Version 5
Item 1 (Question 4): Years in existences (Years)
Item 2 (Question 5): Types of building service and maintain (%
Shops / % Other Commercial & Industrial / % Residential)
Item 3 (Question 6): Capable of servicing & maintaining shop
(Yes/No)
Item 4 (Question 13): Turnover of air conditioning ($)
Item 5 (Question 14): Turnover of DDC ($)

Version 6
Item 1 (Question 4): Years in existences (Years)
Item 2 (Question 5): Types of building service and maintain (%
Shops / % Other Commercial & Industrial / % Residential)
Item 3 (Question 6): Capable of servicing & maintaining shop
(Yes/No)
Item 4 (Question 13): Turnover of air conditioning ($)

Comments

The survey concerns one activity (preventive air conditioning maintenance) and two exchange relations (internal exchange with technical staff and external relationship between CMs and MSCs). In the survey, the version issued to the MSCs, incorporates the items in Version 4 and 5 as control variables - along with location. Whilst, the version of the survey posted to CMs uses location and centre size as control variables.

APPENDIX 9 – VERSION 1 OF SURVEY QUESTIONNAIRE (MSCs)

QUT

QUEENSLAND UNIVERSITY OF TECHNOLOGY

Nationwide Survey on the Sourcing of the Service and Maintenance of Air Conditioning/Ventilation Systems

For the purposes of this survey, the scope of **service & maintenance** of **air conditioning/ventilation systems** may include: routine preventative and/or breakdown maintenance to chillers, air handling units, water pumps (condensor, chilled, heating) air compressors, plantroom switchboards, package units, cooling towers, smoke and exhaust fans and the like.

Please be assured that the information from this survey will be kept ***strictly confidential***.

If you tick the box at Question 4, I will send you a copy of the **summary of the study findings**.

Thank you very much indeed for your help in completing this questionnaire.

Please **return this survey** in the reply paid envelope provided, or send to:

Adrian Bridge
School of Urban Development
Queensland University of Technology
GPO Box 2434
BRISBANE QLD 4001

Number_____

Section A: General information

1. What is the geographical area covered by your firm? Please insert:_____

2. Does your firm employ you as a full-time member of staff? Please circle: Yes / No

3. During the process of completing this questionnaire, if you would like to make any further comments then these are welcomed. Please insert any further comments in the space provided on the back page.

4. If you would like to receive a copy of the summary of the findings, then please tick the following box: ☐

5. Please enter the date this questionnaire is completed (date/month/year):_____/_____/_____

Section B: General information about your firm's service & maintenance activity in your geographical area of operation

6. When did your firm come into existence in terms of service & maintenance in your firm's geographical area of operation? Please state approximate year:_____

7. What types of building does your firm service & maintain? Please insert approximate percentages:
   Shopping Centres:_____%   Other Commercial & Industrial:_____%   Residential:_____%   Other:_____%

8. If your firm does not currently have any shopping centre clients, then is it capable of servicing a small shopping centre? Please circle: Yes / No

9. How would your firm obtain new work? Please insert approximate percentages:
   Open Competition:_____% Competition (selected list):_____% Negotiation (only contractor):_____% Other:_____%

10. Who writes the terms and conditions of your contracts? Please insert approximate percentages:
    Client:_____% Your firm:_____%   Standard form (e.g. an Australian Standard):_____%   Other:_____%

11. What are the following aspects of your contracts? Please insert/circle:
    Typical duration of your contracts? Please insert:_____years
    Hourly rates and response times for breakdown work normally specified in your contracts? Please circle: Yes / No
    30 day termination clause (or similar) normally included? Please circle: Yes / No
    Type of contract: Preventative:_____% / Comprehensive:_____% / Other:_____%

12. How many clients and contracts does your firm service? Please insert approximate numbers:
    Clients:_____ / Contracts:_____

13. Is a large percentage of your turnover connected with just a few clients? Please circle: Yes / No. If yes, then what is this approximate percentage turnover and how many clients are responsible for this work? Please insert approximate percentage and number of clients: Turnover:_____%   Number of clients:_____

14. In the last two years, what percentage of your contracts have been renewed? Please insert approximate:___%

15. What was the approximate total annual turnover of all your firm's service & maintenance works last year? Please tick one box: Up to $500,000 ☐ $500,000 to $1million ☐ $1 to 2.5million ☐ $2.5 to 5million ☐
         $5 to 10million ☐ $10 to 15million ☐   Over $15million ☐

16. Very approximately, how would you estimate your firm's profits (service & maintenance only) compared with firms of all sizes providing at least some level of service & maintenance to commercial and industrial buildings in your geographic area of operation?
    Please circle: Above average / About average / Below average

Section C: Your firm's approach to the sourcing of service & maintenance of air conditioning/ventilation systems in your geographical area of operations

17. How does your firm source the service & maintenance of air conditioning/ventilation systems? Please insert approximate percentages (e.g. based on value of work):
    In-house (direct employee(s))_____% / Subcontractor(s)_____% = 100%

18. How long has your firm had this approach to the sourcing of the service & maintenance of air conditioning/ventilation systems? Please insert approximate number of years:_____

19. If there are any plans to change this approach in the next few years, then what is the likely new approach? Please insert approximate percentages: In-house (direct employee(s))_____% / Subcontractor(s)_____% = 100%

20. How many service & maintenance in-house staff (employees) are there in your firm? Please insert approximate numbers: Management:_____Fridge/Mechanical:_____Electrical:_____Other Technical:_____Admin:_____Other:_____

21. For how long have you had at least around 75% of your current number of technical staff?
Please insert approximate years:_____

22. In terms of the appointment of new service & maintenance staff and subcontractors, are you mainly responsible for this decision (or at least are your recommendations normally accepted)? Please circle: Yes / No

Assuming you have at least one in-house air conditioning technical service & maintenance member of staff, then:

23. How many hours per week would a typical technical member of staff work? Please insert average number of hours per week: Air conditioning technician/fridge mechanic:_____hours per week

24. Hong long has one of your typical technicians been with your firm? Please insert years:_____

25. Does your firm use any incentives (positive and/or negative measures) to improve the performance of its air conditioning staff (beyond the prospect of ongoing use/termination)? Please circle: Yes/No. If yes, then very briefly what are these measures? Positive:_____/Negative:_____

Section D: Your firm's relationship with a *typical* in-house (employee) air conditioning technical member of staff

This typical air conditioning technical member of staff may be one of your current staff or one of your previous staff at your firm, whichever you feel is more typical.

In this section, please rate each of the statements below by circling the number on the scale (provided in the same row as the statement) that most closely reflects your view about each statement. For example, if you tend to agree with the statement, then you could circle Number 5 as shown:

Very Strongly Disagree ←1   2   3   4   (5)   6   7→ Very Strongly Agree
↑
Neutral / Neither Disagree nor Agree

If you don't know the rating for the statement, then please circle the DK in the same row as the statement.

Statement	Rating	DK
26. My firm's relationship with a typical in-house (employee) air conditioning technical staff member is a cooperative relationship (compared to all other staff and subcontractors).	1 2 3 4 5 6 7	DK
27. This typical staff member has the expectation that they would continue to be used on alternative jobs should the particular jobs they mostly currently work on come to an end.	1 2 3 4 5 6 7	DK
28. My firm's relationship with this typical member of staff is reasonably complex, as it may involve this staff member developing relationships with others, e.g. clients, operations managers, other contractors etc.	1 2 3 4 5 6 7	DK
29. My firm's expectations of this typical member of staff are not always clear, as these expectations can change and this staff member can be influenced by expectations from others e.g. clients, operations managers, other contractors etc.	1 2 3 4 5 6 7	DK

Statement	Rating	DK
30. The performance of this typical member of staff is monitored using mainly key performance indicators (e.g. client feedback and not by actually checking work done) and not always on a regular and frequent basis.	1 2 3 4 5 6 7	DK
31. The terms and conditions of the initial employment contract with this typical member of staff are ongoing with general performance requirements described.	1 2 3 4 5 6 7	DK
32. My firm would need to offer a reasonably high level of pay to attract a new and competent air conditioning technical member of staff.	1 2 3 4 5 6 7	DK
33. My firm's relationship with this typical member of staff has been steady over the last few years.	1 2 3 4 5 6 7	DK
34. My firm and this typical member of staff are generally able to work effectively together without the need to refer to the conditions of employment.	1 2 3 4 5 6 7	DK
35. My firm's relationship with this typical member of staff is likely to become closer in the next few years.	1 2 3 4 5 6 7	DK
36. This typical member of staff is generally busy.	1 2 3 4 5 6 7	DK

Section E: The role of <u>in-house</u> air conditioning <u>technical</u> service&maintenance staff/employees

37. How long would it take a recently appointed and competent air conditioning technical member of staff to reach their expected level of performance in one of your typical buildings/contracts? Please insert:
     Number of visits:_____   Time per visit:_____(hours)

38. What are the minimum requirements you generally look for when recruiting competent air conditioning technical staff? Please insert: Total of apprenticeship and experience:_____years   Qualifications:_____

39. If <u>your</u> firm trains apprentice air conditioning staff, then what is the total period of years over which training happens (including TAFE or the like) and how much of this training could be reused in one of your rival firms? Please insert: Total period to train apprentice (to reach full competence):_____(years)   Training reusable:_____%

40. What percentage of your air conditioning staff were trained in this way and what percentage were recruited as fully competent? Please insert: In-house trained:_____%   Externally recruited (fully competent):_____% = 100%

41. In terms of a typical fully competent air conditioning staff (who has been with your firm for at least a year), what is your firm's ongoing training commitment and how much of this could be reused in a rival firm? Please insert approximate days and percentages: Ongoing training:_____(days per annum)   Reusable:_____%

42. If you had to replace one of your typical air conditioning technical members of staff and were required to <u>consider all alternatives</u>, then how would you rank the following alternatives? Please insert a number 1 up to 4 against the following (with <u>Number 1</u> being the <u>most preferred</u> alternative):
     _____: Use, promote, train other internal staff / _____: Recruit new competent technician as in-house staff
     _____: Subcontract this work to external firm: / _____: Employ temporary hire staff

In the rest of this Section E, please rate each of the statements below by circling the number on the scale (provided in the same row as the statement) that most closely reflects your view about each statement. For example, if you <u>tend to agree</u> with the statement, then you could circle <u>Number 5</u> as shown:

Very Strongly <u>Disagree</u> ←1   2   3   4   (5)   6   7→ Very Strongly <u>Agree</u>
↑
Neutral / Neither Disagree nor Agree

If you don't know the rating for the statement, then please circle the DK in the same row as the statement.

Statement	Rating	DK
43. By undertaking in-house (using direct employees) the percentage of air conditioning work that I inserted in Question 17 (top of page 3) my firm can increase its profits.	1 2 3 4 5 6 7	DK
44. The percentage of air conditioning work performed in-house (using direct employees) that I inserted in Question 17 is central to my firm's core business.	1 2 3 4 5 6 7	DK

Statement	Rating	DK
45. In my firm's geographical area of operations, my firm is reasonably similar to most other typical air conditioning maintenance & service firms, in terms of capacity, knowledge, skills, policies, procedures and practice etc.	1 2 3 4 5 6 7	DK
46. In my firm's geographical area of operations, there is a reasonable supply of firms that are capable of providing a similar level of service & maintenance as my firm, in terms of the type and number of buildings that my firm currently services.	1 2 3 4 5 6 7	DK
47. My firm's closest rivals are able to develop and match my firm's capacity, knowledge, skills, policies, procedures and practice etc.	1 2 3 4 5 6 7	DK
48. My firm can write a manual that reflects the knowledge, skills, policies, practices and procedures of my firm's air conditioning technical staff.	1 2 3 4 5 6 7	DK
49. My firm is satisfied with its management structure and control systems used to organise air conditioning service & maintenance performed in-house (by employees).	1 2 3 4 5 6 7	DK
50. My firm's air conditioning technical staff make minimal technical adaptations to suit a typical new client and typical new building (excluding adaptations that relate to gaining access, constraints on working etc).	1 2 3 4 5 6 7	DK
51. It is difficult and costly (including my time and effort) to replace a typical fully competent in-house air conditioning technical member of staff.	1 2 3 4 5 6 7	DK
52. There is a shortage of available full-time and competent air conditioning technicians.	1 2 3 4 5 6 7	DK
53. My firm is able to reasonably predict the range of air conditioning service and maintenance tasks, in one of my firm's typical buildings.	1 2 3 4 5 6 7	DK
54. My firm is able to reasonably estimate the time/duration required to complete most maintenance tasks that may arise, in one of my firm's typical buildings.	1 2 3 4 5 6 7	DK
55. My firm usually knows the appropriate frequency/level of occurrence of routine preventative work and the likely minimum amount of breakdown maintenance, in one of my firm's typical buildings (this does not include knowing the exact day a particular breakdown maintenance task will arise).	1 2 3 4 5 6 7	DK
56. My firm is able to reasonably describe/specify the performance requirements for its air conditioning technical staff in terms of one of my firm's typical buildings.	1 2 3 4 5 6 7	DK
57. The core skills and knowledge (excluding multi-skilling) of my firm's air conditioning technical staff is unlikely to change significantly over the next three years.	1 2 3 4 5 6 7	DK
58. If necessary, it is reasonably straightforward for someone in my firm to directly check the work of one of my firm's air conditioning technical staff, before a problem arises that requires my involvement.	1 2 3 4 5 6 7	DK
59. Objective technical measures of performance (such as completion of work on time) are a fair reflection of the performance of my firm's air conditioning technical staff.	1 2 3 4 5 6 7	DK
60. My firm tends to take some sort of immediate action to correct unsatisfactory performance by an air conditioning technical member of staff.	1 2 3 4 5 6 7	DK
61. I would expect a typical air conditioning technical member of staff to take some sort of immediate action to correct what they may feel is unsatisfactory pay/working conditions.	1 2 3 4 5 6 7	DK
62. The cost of one of my firm's typical air conditioning technical staff is a small proportion of the total cost of all the service and maintenance staff in my firm.	1 2 3 4 5 6 7	DK
63. Each of my firm's typical technical staff works exclusively for my firm.	1 2 3 4 5 6 7	DK
64. It is straightforward for my firm to influence the manner by which a typical air conditioning technical member of staff undertakes their duties.	1 2 3 4 5 6 7	DK
65. It is straightforward for one of my firm's typical air conditioning technical staff to influence my firm's policies, procedures and practices concerning air conditioning.	1 2 3 4 5 6 7	DK
66. If my firm had due cause, it would be reasonably straightforward for my firm to arrange alternative means to complete the work undertaken by any one of my firm's typical air conditioning technical members of staff (for example, I could use one of the following alternatives: employ a replacement fully competent air conditioning technician or use a temporary hire technician or engage a subcontractor).	1 2 3 4 5 6 7	DK
67. I think it is reasonably straightforward for one of my firm's typical air conditioning technical staff to leave my firm and work for a different firm in the same or related job.	1 2 3 4 5 6 7	DK

Section A: Continued...

3. (Continued) During the process of completing this questionnaire, if you would like to make any further comments then these are welcomed. Please insert any further comments in the space provided below:

End of questionnaire – *once again, thank you very much for your help.*

Please **return this survey** in the reply paid envelope provided, or send to:

Adrian Bridge
School of Urban Development
Queensland University of Technology
GPO Box 2434
BRISBANE QLD 4001

APPENDIX 10 – VERSION 2 OF SURVEY QUESTIONNAIRE (CMs)

QUT

QUEENSLAND UNIVERSITY OF TECHNOLOGY

Nationwide Survey on the Sourcing of the Service & Maintenance of Air Conditioning/Ventilation Systems

For the purposes of this survey, the scope of **service & maintenance** of **air conditioning/ventilation systems in shopping centres** may include: routine preventative and/or breakdown maintenance to chillers, air handling units, water pumps (condensor, chilled, heating) air compressors, plantroom switchboards, package units, cooling towers, smoke and exhaust fans and the like.

Please be assured that the information from this survey will be kept *strictly confidential*.

If you tick the box at Question 6, I will send you a copy of the **summary of the study findings.**

Thank you very much indeed for your help in completing this questionnaire.

Please **return this survey** in the reply paid envelope provided, or send to:

Adrian Bridge
School of Urban Development
Queensland University of Technology
GPO Box 2434
BRISBANE QLD 4001

Number:_____

Section A: General information

1. What is the area of your centre, or your <u>largest</u> centre (in terms retail area) if you manage or oversee operations in more than one centre? Please insert very approximate area (say to the nearest 5,000 sq.m.):
   Gross Lettable Area Retail (GLAR):_____sq.m. & Total Centre Lettable Area:_____sq.m.

2. Are you a full-time member of staff (employee) of the Centre Manager/Managing Agent? Please circle: Yes / No

3. What is the make-up of your time spent on your duties? Please insert approximate percentages:
   Centre Management:_____%   Operations Management:_____%   Other:_____% = 100%

4. What is your background? Please circle: Mainly general management / <u>Mainly</u> technical

5. During the process of completing this questionnaire, if you would like to make any further comments then these are welcomed. Please insert any further comments in the space provided on the back page.

6. If you would like to receive a copy of the summary of the findings, then please tick the following box: ☐

7. Please enter the date you completed this questionnaire (date/month/year):_____/_____/_____

Section B: The approach to the sourcing of service & maintenance of air conditioning/ventilation systems <u>in your centre that you inserted at Question 1</u> (if you manage or oversee operations in more than one centre, then your answers reflect <u>your largest centre</u>)

8. How is the service & maintenance of air conditioning/ventilation systems sourced in your <u>largest</u> centre? Please insert approximate percentages (e.g. based on value of work):
   In-house (employee/s of centre owner <u>or</u> your firm):_____% / Outsourced (Contractor/s):_____% = 100%

9. For how long do you know that this approach has been used to source the service & maintenance of air conditioning/ventilation systems in your centre? Please insert approximate number of years:_____

10. If there are any plans to change this approach in the next few years, then what is the likely new approach? Please insert approximate percentages: In-house (employee/s):_____% / Outsource (Contractor/s):_____% = 100%

11. In terms of the appointment and use of maintenance staff and/or maintenance contractors in your centre, are you mainly responsible for this decision (or at least are your recommendations normally accepted)? Please circle: Yes / No

12. If there are any general maintenance/technical staff (employees of centre owner <u>or</u> your firm) in your centre, then how many are there? Please insert number: Full-time:_____ / Part-time:_____ / Other:_____

Assuming that at least some aspect of the service & maintenance of air conditioning/ventilation systems in your centre is outsourced, then:

13. How would an air conditioning maintenance contractor normally be selected? Please insert approximate percentages:
   Open Competition:____% Competition (selected list):____% Negotiation (with one contractor):____% Other:____%

14. If using a list, then how many air conditioning contractors are usually invited to tender? Please insert number:____

15. Is the air conditioning contractor in direct contract with the owner of the centre or with your firm?
   Please circle: Centre owner / Your firm

16. Who writes the terms and conditions of your air conditioning maintenance contract in your centre? Please tick one box:
   Owner: ☐   Your firm: ☐   Contractor: ☐   Standard form (e.g. an Australian Standard): ☐   Other: ☐

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[1] Method of measurement defined by Property Council of Australia. For example, Australian Property Institute and Property Council of Australia (2000) *Glossary of Property Terms*, Property Council of Australia Ltd Publications Unit, Queensland.

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Section B: Continued...

17. What are the following aspects of the air conditioning/ventilation contract? Please insert/circle/tick box:
   Typical duration of contract? Please insert:_____years
   Hourly rates and response times for breakdown work normally specified? Please circle: Yes / No
   30 day termination clause (or similar) normally included? Please circle: Yes / No
   Type of contract: Preventative: ☐   Comprehensive: ☐   Other: ☐

18. How often would you expect the air conditioning maintenance contractor (at least one technician) to visit your centre? Please tick one box and insert in the same row approximate typical days and hours:

Continuously	☐	(at least 5 days per week and 8 hours per day)		
Daily (parts of day)	☐	hours per day	_____	
Weekly (parts of week)	☐	days per week	_____	hours per day_____
Monthly (parts of month)	☐	days per month	_____	hours per day_____
Quarterly	☐	days per quarter	_____	hours per day_____
6 Monthly	☐	days per 6 months	_____	hours per day_____
Annually	☐	days per year	_____	hours per day_____

19. How many technicians from this contractor would typically visit your centre? Please insert number:_____

20. Does your firm use any incentives (positive and/or negative measures) to improve the performance of this contractor (beyond the prospect of contract renewal/termination)? Please circle: Yes/No. If yes, then very briefly what are these measures? Positive measures:_____/Negative measures:_____

21. Is the air conditioning/ventilation maintenance contract usually renewed? Please circle: Yes / No

Section C: Your firm's relationship with a *typical* air conditioning/ventilation service & maintenance contractor in your centre that you inserted at Question 1 (if you manage or oversee operations in more than one centre, then this is your largest centre)

This typical air conditioning maintenance contractor may be a current contractor or one of the previous contractors at your centre, whichever you feel is more typical.

In this section, please rate each of the statements below by circling the number on the scale (provided in the same row as the statement) that most closely reflects your view about each statement. For example, if you tend to agree with the statement, then you could circle Number 5 as shown:

Very Strongly Disagree ←1   2   3   4   (5)   6   7→ Very Strongly Agree
↑
Neutral / Neither Disagree nor Agree

If you don't know the rating for the statement, then please circle the DK in the same row as the statement.

Statement	Rating	DK
22. My firm's relationship with this typical air conditioning maintenance contractor tends to be more arms length than other relationships my firm has with my firm's in-house staff, clients and external contractors.	1 2 3 4 5 6 7	DK
23. In order to have their contract renewed, this typical air conditioning maintenance contractor would expect to have to tender again and to win this tender (by providing a very competitive/lowest price) following the expiry of their current contract.	1 2 3 4 5 6 7	DK
24. My firm's relationship with this typical air conditioning maintenance contractor is straightforward, as it involves this contractor communicating mainly with me.	1 2 3 4 5 6 7	DK
25. My firm usually ensures that the expectations of this typical air conditioning maintenance contractor are made clear.	1 2 3 4 5 6 7	DK
26. My firm monitors the performance of this typical air conditioning maintenance contractor in reasonable detail and on a fairly frequent basis.	1 2 3 4 5 6 7	DK
27. The terms and conditions of the contract with this typical air conditioning maintenance contractor are in detail, with performance requirements specified.	1 2 3 4 5 6 7	DK

Section C: Continued...

Statement	Rating	DK
28. My firm expects to receive reasonably low prices from competent air conditioning maintenance contractors who might tender for the contract in my centre.	1 2 3 4 5 6 7	DK
29. My firm's relationship with this typical air conditioning maintenance contractor has varied over the last few years of the contract.	1 2 3 4 5 6 7	DK
30. My firm and this typical air conditioning maintenance contractor need to refer fairly frequently to the contract in order to work effectively together.	1 2 3 4 5 6 7	DK
31. My firm's relationship with a typical air conditioning maintenance contractor is unlikely to become closer should their contract be renewed.	1 2 3 4 5 6 7	DK

Section D: The role of a typical air conditioning/ventilation service & maintenance contractor in your centre that you inserted at Question 1 (if you manage or oversee operations in more than one centre, then this is your largest centre)

32. How long would it take a recently appointed and fully competent air conditioning service & maintenance contractor to become familiar with your largest centre and reach their expected level of performance? Please insert the period in months (over which time this air conditioning service & maintenance contractor would perform the frequency of visits you would expect in your largest centre):_____months

33. What are the minimum technical requirements you generally look for when appointing a new and competent air conditioning maintenance contractor? Please insert: Total experience:____years / Qualifications:_____

34. Does your firm provide any training to, or invest in your air conditioning contractor? Please circle: Yes / No.

35. If you had to replace an air conditioning maintenance contractor in your centre and were required to consider all alternatives, then how would you rank the following alternatives? Please insert a number 1 up to 4 against the following (with Number 1 being the most preferred alternative):
    ___: Use, promote, train internal staff   / ___: Recruit new competent tradesperson(s) as in-house staff
    ___: Outsource to an alternative contractor / ___: Employ temporary hire staff

In the rest of this Section D, please rate each of the statements below by circling the number on the scale (provided in the same row as the statement) that most closely reflects your view about each statement. For example, if you tend to agree with the statement, then you could circle Number 5 as shown:

Very Strongly Disagree ←1   2   3   4   (5)   6   7→ Very Strongly Agree
↑
Neutral / Neither Disagree nor Agree

If you don't know the rating for the statement, then please circle the DK in the same row as the statement.

Statement	Rating	DK
36. If my firm were to perform all of the air conditioning service & maintenance in my centre in-house (by using employees and not by using a contractor), then this would tend to increase costs and put more pressure on the operating budget.	1 2 3 4 5 6 7	DK
37. The physical execution of air conditioning service & maintenance is peripheral to my firm's core business of the management of centres.	1 2 3 4 5 6 7	DK
38. I think the technology, knowledge, practices etc required by an air conditioning maintenance contractor to service my centre are possessed by most of the commercial & industrial air conditioning service & maintenance contractors in the locality of my centre.	1 2 3 4 5 6 7	DK
39. In the locality of my centre, there is a reasonable supply of air conditioning maintenance contractors that are capable of servicing & maintaining my centre.	1 2 3 4 5 6 7	DK
40. I imagine that it is straightforward for rival air conditioning maintenance contractors in the locality of my centre to develop and match the technology (hardware, software), knowledge, skills, policies, procedures and practices etc required to service my centre.	1 2 3 4 5 6 7	DK
41. I imagine that a manual could be written that reflects the knowledge, policies and procedures required by an air conditioning maintenance contractor in my centre.	1 2 3 4 5 6 7	DK

Section D: Continued...

Statement	Rating	DK
42. It would be difficult for my firm to develop management structures and control systems to organise the performance in-house of all its air conditioning maintenance – across all of the centres that my firm manages.	1 2 3 4 5 6 7	DK
43. I suspect that a typical air conditioning maintenance contractor's staff would need to make fairly minimal technical adaptations to suit my centre (excluding issues that relate to gaining access, locating plant and equipment, constraints on working etc).	1 2 3 4 5 6 7	DK
44. Assuming my firm had due cause, it is reasonably straightforward to replace an air conditioning maintenance contractor in my centre with a different air conditioning maintenance contractor.	1 2 3 4 5 6 7	DK
45. My firm (including using any consultants) is able to reasonably predict the range of air conditioning service and maintenance tasks in my centre.	1 2 3 4 5 6 7	DK
46. My firm (including using any consultants) is able to reasonably estimate the time/duration required to complete most of the air conditioning maintenance tasks that may arise in my centre.	1 2 3 4 5 6 7	DK
47. My firm (including using any consultants) is able to reasonably assess the appropriate frequency/level of occurrence of routine preventative air conditioning maintenance and the likely minimum amount of air conditioning breakdown maintenance in my centre (that does not include being able to predict the exact day a particular breakdown maintenance task will arise).	1 2 3 4 5 6 7	DK
48. My firm (including using any consultants) is able to reasonably describe/specify the performance requirements for an air conditioning maintenance contractor in my centre.	1 2 3 4 5 6 7	DK
49. I imagine that the core skills and knowledge required by an air conditioning contractor to service my centre is likely to remain fairly constant over the next three years.	1 2 3 4 5 6 7	DK
50. If necessary, my firm (including using any consultants) is able to directly check the work of an air conditioning maintenance contractor in my centre before a problem arises that requires my involvement.	1 2 3 4 5 6 7	DK
51. Objective technical measures of performance (e.g. completion of work on time) are a fair reflection of performance of an air conditioning maintenance contractor in my centre.	1 2 3 4 5 6 7	DK
52. My firm tends to take some sort of immediate action to correct unsatisfactory performance by a typical air conditioning maintenance contractor in my centre.	1 2 3 4 5 6 7	DK
53. I would expect a typical air conditioning contractor in my centre to take some sort of immediate action to correct what they may feel is unsatisfactory pay/working conditions.	1 2 3 4 5 6 7	DK
54. The cost of the air conditioning maintenance contract is a relatively high proportion of the operating budget in my centre (relative to the other maintenance contracts).	1 2 3 4 5 6 7	DK
55. I suspect that a typical air conditioning maintenance contractor in my centre earns a small proportion of their total revenue from servicing the centre(s) my firm manages.	1 2 3 4 5 6 7	DK
56. It is reasonably straightforward for my firm to influence the manner by which a typical air conditioning maintenance contractor undertakes their duties in my centre.	1 2 3 4 5 6 7	DK
57. It is reasonably difficult for a typical air conditioning maintenance contractor in my centre to influence my firm's policies and procedures concerning air conditioning.	1 2 3 4 5 6 7	DK
58. If necessary and justified, it would be reasonably straightforward for me to arrange alternative means to complete the work undertaken by an air conditioning maintenance contractor in my centre (for example, I could select one of the following alternatives: employ a fully competent air conditioning technician or use temporary hire technicians or engage a new air conditioning maintenance contractor).	1 2 3 4 5 6 7	DK
59. I think it is reasonably straightforward for a typical air conditioning maintenance contractor in my centre to obtain work with other clients beyond my firm or the owner of my centre.	1 2 3 4 5 6 7	DK

Section A: Continued...

5. (Continued) During the process of completing this questionnaire, if you would like to make any further comments then these are welcomed. Please insert any further comments in the space provided below:

End of questionnaire – *once again, thank you very much for your help.*

Please **return this survey** in the reply paid envelope provided, or send to:

Adrian Bridge
School of Urban Development
Queensland University of Technology
GPO Box 2434
BRISBANE QLD 4001

APPENDIX 11 – Summary of items in final versions of survey questionnaire

Dependent variables – principal items

Outline of item: question (and response format) in case study version	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 1: To MSCs (closest to Version 4 of case study questionnaire)**	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 2: To CMs (closest to Version 3 of case study questionnaire)**
Make-or-buy decision Item 1: Internalised (%) and externalised (%) • Version 3: Question 4 • Version 4: Question 16	*Make-or-buy decision* Item 1: Internalised (%) and externalised (%) • Continuous variable (but analysed as categorical variable in File 3: "1" = Internalised and "2" = externalised • Question 17	*Make-or-buy decision* Item 1: Internalised (%) and externalised (%) • Continuous variable • Question 8
Nature of the exchange relationship decision	*Nature of the exchange relationship decision*	*Nature of the exchange relationship decision*
Solidarity Item 1: Level of cooperation (7-point) • Version 3: Question 12 • Version 4: Question 27 Item 2: Expectation of continuation (7-point) • Version 3: Question 13 • Version 4: Question 28	*Solidarity* Item 1: Cooperative relationship (7-point) • Continuous variable • Question 26 Item 2: Expectation of continuation (7-point) • Continuous variable • Question 27 Item 3: Lack of reference to contract (7-point) • Continuous variable • Question 27	*Solidarity* Item 1: Arms length relationship (7-point) • Continuous variable • Question 22 (reversed) Item 2: Lack of expectation of continuation (7-point) • Continuous variable • Question 23 (reversed) Item 3: Lack of reference to contract (7-point) • Continuous variable • Question 27
Role Integrity Item 1: Complexity of all relations (7-point) • Version 3: Question 14 • Version 4: Question 29 Item 2: Complexity of expectations (7-point) • Version 3: Question 15 • Version 4: Question 30	*Role Integrity* Item 1: Complex of relationships (7-point) • Continuous variable • Question 28 Item 2: Complex expectations (7-point) • Continuous variable • Question 29	*Role Integrity* Item 1: Straightforward relations (7-point) • Continuous variable • Question 24 (reversed) Item 2: Clear expectations (7-point) • Continuous variable • Question 25 (reversed)
Mutuality Item 1: Lack of monitoring of performance (7-point) • Version 3: Question 16 • Version 4: Question 31 Item 2: Level of imprecise terms and conditions of contract (7-point) • Version 3: Question 17 • Version 4: Question 32	*Mutuality* Item 1: Lack of monitoring of performance (7-point) • Continuous variable • Question 30 Item 2: Imprecise terms and conditions of contract (7-point) • Continuous variable • Question 31	*Mutuality* Item 1:Monitoring of performance (7-point) • Continuous variable • Question 26 (reversed) Item 2: Precise terms and conditions of contract (7-point) • Continuous variable • Question 27 (reversed)

Dependent variables – clarifying and corroborative items

Outline of item: question (and response format) in case study version	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 1: To MSCs (closest to Version 4 of case study questionnaire)**	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 2: To CMs (closest to Version 3 of case study questionnaire)**
Nature of the exchange relationship decision	*Nature of the exchange relationship decision*	*Nature of the exchange relationship decision*

Clarifying
Item 1: Level of pay/price (7-point)
- Version 3: Question 18
- Version 4: Question 33
Item 2: Use of negative measures (credible threats) (Yes/No)
- Version 3: Question 19
- Version 4: Question 34

Corroborating
Item 1: Training to reach full competence (Years)
- Version 4: Question 51

Item 2: Ongoing training once full competence reached (Days per annum)
- Version 4: Question 52

Item 3: Renewal of contract (Yes/No)
- Version 3: Question 9

Item 4: Investment in training to external firm (Yes/No)
- Version 3: Question 33
- Version 4: Question 53

Clarifying
Item 1: High level of pay (7-point)
- Continuous variable
- Question 32
Item 2: Use of negative measures (credible threats) (Yes/No)
- Categorical variable (2 categories)
- Question 25

Corroborating
Item 1: Training to reach full competence (Years)
- Continuous variable
- Question 39
Item 2: Ongoing training once full competence reached (Days per annum)
- Continuous variable
- Question 41

Clarifying
Item 1: Low prices (7-point)
- Continuous variable
- Question 28 (reversed)
Item 2: Use of negative measures (credible threats) (Yes/No)
- Categorical variable (2 categories)
- Question 20

Item 3: MSC in direct contact with owner or centre manager
- Continuous variable
- Question 15
Item 4: Renewal of contract (Yes/No)
- Categorical variable (2 categories)
- Question 21
Item 5: Investment in training to external firm (Yes/No)
- Categorical variable (2 categories)
- Question 34

TCE (Asset Specificity and Frequency) – principal items

Outline of item: question (and response format) in case study version	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 1: To MSCs (closest to Version 4 of case study questionnaire)**	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 2: To CMs (closest to Version 3 of case study questionnaire)**
Human Asset Specificity	*Human Asset Specificity*	*Human Asset Specificity*
Item 1: Time for new competent internal human resource/external firm to reach full performance (months/hours)	Item 1: Time for new competent internal human resource/external firm to reach full performance (visits/hours – to be converted to days)	Item 1: Time for new competent external firm to reach full performance (months – to be converted to days)
• Version 3: Question 29	• Continuous variable	• Continuous variable
• Version 4: Question 44	• Question 37	• Question 32
Item 2: Level of customisation required (7-point)	Item 2: Level of customisation required (7-point)	Item 2: Level of customisation required (7-point)
• Version 3: Question 30	• Continuous variable	• Continuous variable
• Version 4: Question 45	• Question 50	• Question 43
Temporal Asset Specificity		*Temporal Asset Specificity*
Item 1: Difficult/costly to replace extant external firm (7-point)		Item 1: Difficult/costly to replace extant external firm (7-point)
• Version 3: Question 31		• Continuous variable
• Version 4: Question 47		• Question 44
Item 2: Sensitivity of air conditioning firm's performance based on DDC performance (7-point)		
• Version 4: Question 46		
Ongoing Asset Specificity	*Ongoing Asset Specificity*	
Item 1: Difficult/costly to replace typical internal human resource (7-point)	Item 1: Difficult/costly to replace typical internal human resource (7-point)	
• Version 4: Question 48	• Continuous variable	
	• Question 51	
Item 2: Shortage of typical internal human resources (7-point)	Item 2: Shortage of typical internal human resources (7-point)	
• Version 4: Question 49	• Continuous variable	
	• Question 52	
Frequency	*Frequency*	*Frequency*
Item 1: Full-time equivalent staff (FTE - Number)	Item 1: Full-time equivalent staff (FTE - Number)	Item 1: Full-time equivalent staff (FTE - Number)
• Version 3: Question 7	• Continuous variable	• Continuous variable
• Version 4: Question 19 (Mechanical and Electrical staff) / 25	• Question 20	• Questions 19

TCE (Uncertainty) – principal items

Outline of item: question (and response format) in case study version	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 1: To MSCs (closest to Version 4 of case study questionnaire)**	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 2: To CMs (closest to Version 3 of case study questionnaire)**
Exogenous Uncertainty	*Exogenous Uncertainty*	*Exogenous Uncertainty*
Item 1: Difficult to predict range of tasks (7-point)	Item 1: Straightforward to predict range of tasks (7-point)	Item 1: Straightforward to predict range of tasks (7-point)
• Version 3: Question 34	• Continuous variable	• Continuous variable
• Version 4: Question 54	• Question 53 (reversed)	• Question 45 (reversed)
Item 2: Difficult to predict time to complete each task (7-point)	Item 2: Straightforward to predict time to complete each task (7-point)	Item 2: Straightforward to predict time to complete each task (7-point)
• Version 3: Question 35	• Continuous variable	• Continuous variable
• Version 4: Question 55	• Question 54 (reversed)	• Question 46 (reversed)
Item 3: Difficult to predict frequency of each task (7-point)	Item 3: Straightforward to predict frequency of each task (7-point)	Item 3: Straightforward to predict frequency of each task (7-point)
• Version 3: Question 36	• Continuous variable	• Continuous variable
• Version 4: Question 56	• Question 55 (reversed)	• Question 47 (reversed)
Item 4: Difficult to specify performance requirements (7-point)	Item 4: Straightforward to specify performance requirements (7-point)	Item 4: Straightforward to specify performance requirements (7-point)
• Version 3: Question 37	• Continuous variable	• Continuous variable
• Version 4: Question 57	• Question 56 (reversed)	• Question 48 (reversed)
Item 5: Likelihood of changes in core knowledge and skills (7-point)	Item 5: Changes in core knowledge and skills unlikely (7-point)	Item 5: Changes in core knowledge and skills unlikely (7-point)
• Version 3: Question 38	• Continuous variable	• Continuous variable
• Version 4: Question 58	• Question 57 (reversed)	• Question 49 (reversed)
Endogenous Uncertainty	*Endogenous Uncertainty*	*Endogenous Uncertainty*
Item 1: Difficult to monitor performance (7-point)	Item 1: Straightforward to monitor performance (7-point)	• Not applicable
• Version 3: Question 39	• Continuous variable	
• Version 4: Question 59	• Question 58 (reversed)	
Item 2: Unfairness of objective measures of performance (7-point)	Item 2: Fairness of objective measures of performance (7-point)	
• Version 3: Question 40	• Continuous variable	
• Version 4: Question 60	• Question 59 (reversed)	

TCE (Asset Specificity and Frequency) – corroborative items

Outline of item: question (and response format) in case study version	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 1: To MSCs (closest to Version 4 of case study questionnaire)**	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 2: To CMs (closest to Version 3 of case study questionnaire)**
Ongoing Asset Specificity: Corroborating items Item 1: Minimum experience (Years) • Version 4: Question 50	*Ongoing Asset Specificity: Corroborating items* Item 1: Minimum experience (Years) • Continuous variable • Question 38	
Item 2: In-house versus external recruitment • Version 4: Question 51	Item 2: In-house versus external recruitment • Question 40	
Frequency: Corroborating items Item 1: Hours per week worked by internal human resource (Hours) • Version 4: Question 20	*Frequency: Corroborating items* Item 1: Hours per week worked by internal human resource (Hours) • Continuous variable • Question 23	
Item 2: How busy internal human resource (7-point) • Version 4: Question 21	Item 2: Busy internal human resource (7-point) • Continuous variable • Question 36	

RBT – principal items

Outline of item: question (and response format) in case study version

Value
Item 1: Potential to increase profits when insourced (7-point)
- Version 3: Question 23
- Version 4: Question 38
Item 2: Central to core business (7-point)
- Version 3: Question 24
- Version 4: Question 39

Rarity
Item 1: Different technology including knowledge and skills (7-point)
- Version 3: Question 25
- Version 4: Question 40
Item 2: Shortage of firms in locality (7-point)
- Version 3: Question 26
- Version 4: Question 41

Costly to Imitate
Item 1: Costly for main rivals to match differences (in Rarity Item 1) (7-point)
- Version 3: Question 27
- Version 4: Question 42

Item 2: Difficult to write manual (7-point)
- Version 3: Question 28
- Version 4: Question 43

Outline of item: question (and response format and type of variable) in survey questionnaire Version 1: To MSCs (closest to Version 4 of case study questionnaire)

Value
Item 1: Potential to increase profits when insourced (7-point)
- Continuous Variable
- Question 43
Item 2: Central to core business (7-point)
- Continuous Variable
- Question 44

Rarity
Item 1: Similar technology including knowledge and skills (7-point)
- Continuous Variable
- Question 45 (reverse)
Item 2: Reasonable supply of firms in locality (7-point)
- Continuous Variable
- Question 46 (reverse)

Costly to Imitate
Item 1: Straightforward for main rivals to match differences (in Rarity Item 1) (7-point)
- Continuous Variable
- Question 47 (reverse)
Item 2: Straightforward to write manual (7-point)
- Continuous Variable
- Question 48 (reverse)

Outline of item: question (and response format and type of variable) in survey questionnaire Version 2: To CMs (closest to Version 3 of case study questionnaire)

Value
Item 1: Potential to decrease profits when insourced (7-point)
- Continuous Variable
- Question 36 (reverse)
Item 2: Peripheral to core business (7-point)
- Continuous Variable
- Question 37 (reverse)

Rarity
Item 1: Similar technology including knowledge and skills (7-point)
- Continuous Variable
- Question 38 (reverse)
Item 2: Reasonable supply of firms in locality (7-point)
- Continuous Variable
- Question 39 (reverse)

Costly to Imitate
Item 1: Straightforward for main rivals to match differences (in Rarity Item 1) (7-point)
- Continuous Variable
- Question 40 (reverse)
Item 2: Straightforward to write manual (7-point)
- Continuous Variable
- Question 41 (reverse)

RBT corroborative items

Outline of item: question (and response format) in case study version	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 1: To MSCs (closest to Version 4 of case study questionnaire)**	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 2: To CMs (closest to Version 3 of case study questionnaire)**
Rarity	*Rarity*	
Item 1: Minimum experience (Years)	Item 1: Minimum experience (Years)	
• Version 3: Question 32	• Continuous variable	
• Version 4: Question 50	• Question 33	

RDT – principal items

Outline of item: question (and response format) in case study version

Criticality
Item 1: Lack of tolerance correcting unsatisfactory performance
- Version 3: Question 41
- Version 4: Question 61

Item 1a: Lack of tolerance correcting unsatisfactory pay/working conditions (7-point)
- Version 3: Question 42
- Version 4: Question 62

Magnitude of Exchange
Item 1: Proportion of cost (7-point)
- Version 3: Question 43
- Version 4: Question 63

Item 1a: Proportion of revenue (7-point)
- Version 3: Question 44
- Version 4: Question 64

Lack of Discretion
Item 1: Lack of influence over actions (7-point)
- Version 3: Question 45
- Version 4: Question 65

Item 1a: Lack of influence over actions (7-point)
- Version 3: Question 46
- Version 4: Question 66

Few Alternatives
Item 1: Few other sources (7-point)
- Version 3: Question 47
- Version 4: Question 67

Item 1a: Few other sources (7-point)
- Version 3: Question 49
- Version 4: Question 69

Outline of item: question (and response format and type of variable) in survey questionnaire Version 1: To MSCs (closest to Version 4 of case study questionnaire)

Criticality
Item 1: Lack of tolerance correcting unsatisfactory performance (7-point)
- Continuous variable
- Question 60

Item 1a: Lack of tolerance correcting unsatisfactory pay/working conditions (7-point)
- Continuous variable
- Question 61

Magnitude of Exchange
Item 1: Small proportion of cost (7-point)
- Continuous variable
- Question (reverse) 62

Item 1a: Large proportion of revenue (7-point)
- Continuous variable
- Question 63

Lack of Discretion
Item 1: Straightforward to influence actions (7-point)
- Continuous variable
- Question (reverse) 64

Item 1a: Straightforward to influence actions (7-point)
- Continuous variable
- Question (reverse) 65

Few Alternatives
Item 1: Other sources (7-point)
- Continuous variable
- Question (reverse) 66

Item 1a: Other sources (7-point)
- Continuous variable
- Question (reverse) 67

Outline of item: question (and response format and type of variable) in survey questionnaire Version 2: To CMs (closest to Version 3 of case study questionnaire)

Criticality
Item 1: Lack of tolerance correcting unsatisfactory performance (7-point)
- Continuous variable
- Question 52

Item 1a: Lack of tolerance correcting unsatisfactory pay/working conditions (7-point)
- Continuous variable
- Question 53

Magnitude of Exchange
Item 1: Large proportion of cost (7-point)
- Continuous variable
- Question 54

Item 1a: Small proportion of revenue (7-point)
- Continuous variable
- Question (reverse) 55

Lack of Discretion
Item 1: Straightforward to influence actions (7-point)
- Continuous variable
- Question (reverse) 56

Item 1a: Difficult to influence actions (7-point)
- Continuous variable
- Question 57

Few Alternatives
Item 1: Other sources (7-point)
- Continuous variable
- Question (reverse) 58

Item 1a: Other sources (7-point)
- Continuous variable
- Question (reverse) 59

RDT – corroborative items

Outline of item: question (and response format) in case study version	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 1: To MSCs (closest to Version 4 of case study questionnaire)**	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 2: To CMs (closest to Version 3 of case study questionnaire)**
Few Alternatives	*Few Alternatives*	*Few Alternatives*
Item 1: 5 alternatives (Ranked)	Item 1: 4 alternatives (Ranked)	Item 1: 4 alternatives (Ranked)
• Version 3: Question 48	• Categorical variable (4 categories)	• Categorical variable (4 categories)
• Version 4: Question 68	• Question 42	• Question 35

Items in survey questionnaire: SCP items

Outline of item: question (and response format) in case study version	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 1: To MSCs (closest to Version 4 of case study questionnaire)**	**Outline of item: question (and response format and type of variable) in survey questionnaire Version 2: To CMs (closest to Version 3 of case study questionnaire)**

Conduct

Item 1: External firms selected to tender (Number)
- Version 3: Question 10

Item 2: Nature of contract (Preventative/Comprehensive/Other)
- Version 3: Question 10
- Version 4: Question 9 / 24

Item 3: Duration of contract (Years)
- Version 3: Question 10
- Version 4: Question 9 / 24

Item 4: 30 day termination clause (Yes/No)
- Version 3: Question 10
- Version 4: Question 9 / 24

Item 5: How obtain new work (Open/Selected/Negotiated/Other)
- Version 4: Question 7

Item 6: Who writes contracts (Client/Firm/Standard Form/Other)
- Version 4: Question 8 / 23

Item 7: Hourly rates specified (Yes/No)
- Version 4: Question 9 / 24

Item 8: Clients and contracts (Number)
- Version 4: Question 10

Item 9: Large percentage of work with few clients (Yes/No)
- Version 4: Question 11

Item 10: Contracts renewed (Percentage)
- Version 4: Question 12

Performance

Item 1: Profitability (Above average/average/below average)
- Version 4: Question 15

Conduct

Item 2: Nature of contract (Preventative/Comprehensive/Other)
- Continuous variable (percentages)
- Question 11

Item 3: Duration of contract (Years)
- Continuous variable
- Question 11

Item 4: 30 day termination clause (Yes/No)
- Categorical variable (2 categories)
- Question 11

Item 5: How obtain new work (Open/Selected/Negotiated/Other)
- Continuous variable (percentages)
- Question 9

Item 6: Who writes contracts (Client/Firm/Standard Form/Other)
- Continuous variable (percentages)
- Question 10

Item 7: Hourly rates specified (Yes/No)
- Categorical variable (2 categories)
- Question 11

Item 8: Clients and contracts (Number)
- Continuous variable
- Question 12

Item 9: Large percentage of work with few clients (Yes/No)
- Categorical variable (2 categories)
- Question 13

Item 10: Contracts renewed (Percentage)
- Continuous variable
- Question 14

Performance

Item 1: Profitability (Above average/average/below average)
- Categorical variable (3 categories)
- Question 16

Conduct

Item 1: External firms selected to tender (Number)
- Continuous variable
- Question 14

Item 2: Nature of contract (Preventative/Comprehensive/Other)
- Categorical variable (3 categories)
- Question 17

Item 3: Duration of contract (Years)
- Continuous variable
- Question 17

Item 4: 30 day termination clause (Yes/No)
- Categorical variable (2 categories)
- Question 17

Item 5: How obtain new work (Open/Selected/Negotiated/Other)
- Categorical variable (4 categories)
- Question 13

Item 6: Who writes contracts (Client/Firm/Standard Form/Other)
- Categorical variable (4 categories)
- Question 16

Item 7: Hourly rates specified (Yes/No)
- Categorical variable (2 categories)
- Question 17

Static/Dynamic items

Outline of item: question (and response format) in case study version

Pertaining to the Make-or-Buy Decision
Item 1: Time approach to sourcing existed (Years)
- Version 3: Question 5
- Version 4: Question 17

Item 2: Plans to change approach to sourcing (Yes/No)
- Version 3: Question 6
- Version 4: Question 18

Pertaining to the Nature of the Exchange Relationship Decision
Item 1: Steadiness of relationship (7-point)
- Version 3: Question 20
- Version 4: Question 35

Item 2: Relationship unlikely to become closer (7-point)
- Version 3: Question 21
- Version 4: Question 36

Item 3: All internal human resources treated the same (7-point)
- Version 3: Question 22
- Version 4: Question 37

Item 4: Time typical internal human resource been with firm (Years)
- Version 4: Question 22

Outline of item: question (and response format and type of variable) in survey questionnaire Version 1: To MSCs (closest to Version 4 of case study questionnaire)

Pertaining to the Make-or-Buy Decision
Item 1: Time approach to sourcing existed (Years)
- Continuous variable
- Question 18

Item 2: Plans to change approach to sourcing (Yes/No)
- Continuous variable
- Question 19

Pertaining to the Nature of the Exchange Relationship Decision
Item 1: Steady of relationship (7-point)
- Continuous variable
- Question 33

Item 2: Relationship likely to become closer (7-point)
- Continuous variable
- Question 35

Pertaining to the Make-or-Buy Decision – RBT refutability
Item 4: Time typical internal human resource been with firm (Years)
- Continuous variable
- Question 24

Item 5: Time 75% staff with firm (Years)
- Continuous variable
- Question 21

Outline of item: question (and response format and type of variable) in survey questionnaire Version 2: To CMs (closest to Version 3 of case study questionnaire)

Pertaining to the Make-or-Buy Decision
Item 1: Time approach to sourcing existed (Years)
- Continuous variable
- Question 9

Item 2: Plans to change approach to sourcing (Yes/No)
- Continuous variable
- Question 10

Pertaining to the Nature of the Exchange Relationship Decision
Item 1: Varying relationship (7-point)
- Continuous variable
- Question 29 (reverse)

Item 2: Relationship unlikely to become closer (7-point)
- Continuous variable
- Question 31 (reverse)

Control variables

Outline of item: question (and response format and type of variable) in survey questionnaire Version 1: To MSCs (closest to Version 4 of case study questionnaire)

Item 1: Geographical area (state)
- Categorical variable (9 categories)
- Question 1

Item 2: The Year the firm came into existence
- Question 6

Item 3: Type of work (percentage on 4 categories)
- Continuous variable
- Question 7

Item 4: Capable of servicing at least small retail centre (Yes/No)
- Categorical variable (2 categories)
- Question 8

Item 5: Turnover
- Categorical variable (7 categories)
- Question 15

Outline of item: question (and response format and type of variable) in survey questionnaire Version 2: To CMs (closest to Version 3 of case study questionnaire)

Item 1: Geographical area (state)
- Categorical variable (8 categories)
- Determined by response number

Item 2: Size of centre
- Continuous variable
- Question 1

APPENDIX 12 – Case study database

Case Study 1

Interviews (Dates, location, approximate duration and further comments made to interview record)	Versions of structured questionnaire completed (summarised in Table 5.10)	Documentary information collected
Centre Manager (CM) • 18/05/2004 • Brisbane • 50 minutes • Further comments made to interview record Operations Manager (CM) • 18/05/2004 • Brisbane • 40 minutes • No further comments made to interview record Service Manager (MSC) • 05/08/2004 • Brisbane • 1 hour and 20 minutes • No further comments made to interview record	Centre Manager (CM) • Version 1 Operations Manager (CM) • Version 2 Service Manager (MSC) • Version 4	Retail centre • Information collected from centre's website CM • Information collected from CM's website MSC • Information collected from MSC's website • Copy of typical letter of employment to refrigeration mechanic (routine preventative maintenance) • Copy of routine preventative maintenance to DDC system (2monthly, 3 monthly, 6 monthly and 12 monthly)

Case Study 2

Interviews (Dates, location, approximate duration and further comments made to interview record)	Versions of structured questionnaire completed (summarised in Table 5.10)	Documentary information collected
Centre Manager (CM) • 11/05/2004 • Brisbane • 50 minutes • No further comments made to interview record Operations Manager (CM) • 21/05/2004 • Brisbane • 1 hour and 20 minutes • No further comments made to interview record Service Manager (MSC/CC) • 05/08/2004 • Brisbane • 1 hour • No further comments made to interview record	Centre Manager (CM) • Version 1 Operations Manager (CM) • Version 2 Service Manager (MSC) • Version 5	Retail centre • Information collected from centre's website CM • Information collected from CM's website MSC • Information collected from MSC's website • Corporate brochure

Case Study 3

Interviews (Dates, location, approximate duration and further comments made to interview record)	Versions of structured questionnaire completed (summarised in Table 5.10)	Documentary information collected
Centre Manager (CM) • 11/05/2004 • Brisbane • 35 minutes • No further comments made to interview record Operations Manager (CM) • 11/05/2004 • Brisbane • 35 minutes • No further comments made to interview record Service Manager (MSC/CC) • 21/07/2004 • Brisbane • 1 hour and 10 minutes • No further comments made to interview record	Centre Manager (CM) • Version 1 Operations Manager (CM) • Version 3 Service Manager (MSC) • Version 6	Retail centre • Centre's "induction Handbook" CM • Information collected from CM's website

Case Study 1A

Interviews (Dates, location, approximate duration and further comments made to interview record)	Versions of structured questionnaire completed (summarised in Table 5.10)	Documentary information collected
Centre Manager (CM) • 07/06/2006 • Brisbane • 15 minutes • No further comments made Operations Manager (CM) • 06/06/2006 • Brisbane • 50 minutes • No further comments made to interview record Service Manager (MSC) • 01/07/2004 and 01/06/2007 • Brisbane • 1 hour • No further comments made to interview record	Centre Manager (CM) • Version 1 Operations Manager (CM) • Version 2 Service Manager (MSC) • Version 4	Retail centre • Information collected from centre's website CM • Information collected from CM's website MSC • Information collected from MSC's website • Corporate brochure, newsletter (February 2004) and magazine (June 2004)

Case Study 2A

Interviews (Dates, location, approximate duration and further comments made to interview record)	Versions of structured questionnaire completed (summarised in Table 5.10)	Documentary information collected
Centre Manager (CM) • 25/05/2006 • Brisbane • 40 minutes • No further comments made to interview record Operations Manager (CM) • 17/05/2005 • Brisbane • 1hour and 10 minutes • No further comments made to interview record Service Manager (MSC) • 25/02/2005 • Brisbane • 50 minutes • Further comments made to interview record	Centre Manager (CM) • Version 1 Operations Manager (CM) • Version 2 Service Manager (MSC) • Version 5	Retail centre • Information collected from centre's website • Centre's newsletters (May 2005 and May 2006) CM • Information collected from CM's website MSC • Information collected from MSC's website

Case Study 3A

Interviews (Dates, location, approximate duration and further comments made to interview record)	Versions of structured questionnaire completed (summarised in Table 5.10)	Documentary information collected
Centre Manager (CM) • 17/03/2006 • Brisbane • 40 minutes • No further comments made to interview record Operations Manager (CM) • 21/05/2004 • Brisbane • 50 minutes • No further comments made to interview record Service Manager (MSC) • 01/07/2004 and 01/06/2007 • Brisbane • 1 hour • No further comments made to interview record	Centre Manager (CM) • Version 1 Operations Manager (CM) • Version 3 Service Manager (MSC) • Version 4	CM • Information collected from CM's website MSC • Information collected from MSC's website • Corporate brochure, newsletter (February 2004) and magazine (June 2004)

APPENDIX 13 – Guidelines to interpreting principal items in case study questionnaire

Dependent variables

Summary of item: question (and response format)

Make-or-buy decision
Item 1: Internalised (%) and externalised (%)
- Version 1: Question 4 (Initial Draft: Question 1)
- Version 2: Question 4
- Version 3: Question 4
- Version 4: Question 16
- Version 5: Question 16
- Version 6: Question 15

Nature of the exchange relationship decision

Solidarity
Item 1: Level of cooperation (7-point)
- Version 1: Question 13 (Initial Draft: Question 31)
- Version 2: Question 15
- Version 3: Question 12
- Version 4: Question 27
- Version 5: Question 23
- Version 6: Question 23
Item 2: Expectation of continuation (7-point)
- Version 1: Question 14 (Initial Draft: Question 32)
- Version 2: Question 16
- Version 3: Question 13
- Version 4: Question 28
- Version 5: Question 24
- Version 6: Question 24

Role Integrity
Item 1: Complexity of all relations (7-point)
- Version 1: Question 15 (Initial Draft: Question 33, 37, 38)
- Version 2: Question 17
- Version 3: Question 14
- Version 4: Question 29
- Version 5: Question 25
- Version 6: Question 25
Item 2: Complexity of expectations (7-point)
- Version 1: Question 16 (Initial Draft: Question 34)
- Version 2: Question 18
- Version 3: Question 15
- Version 4: Question 30
- Version 5: Question 26
- Version 6: Question 26

Mutuality
Item 1: Lack of monitoring of performance (7-point)
- Version 1: Question 17 (Initial Draft: Question 36)
- Version 2: Question 19
- Version 3: Question 16
- Version 4: Question 31
- Version 5: Question 27
- Version 6: Question 27
Item 2: Level of imprecise terms and conditions of contract
(7-point)
- Version 1: Question 18 (Initial Draft: Question 35)
- Version 2: Question 20
- Version 3: Question 17
- Version 4: Question 32
- Version 5: Question 28
- Version 6: Question 28

Guidelines

Although this item requires a percentage response (ratio scale – as per Monteverde and Teece 1982; Poppo and Zenger 1998), it is reduced to a nominal/dichotomous scale in so far as all the answers to all the independent variables are specified as relating to either a predominantly internalised or predominantly externalised activity.

A 7-point semantic differential response format is used for each 2-item scale – with the 7/high end labelled in terms of a high incidence of the item and 1/low end of the scale labelled in opposite terms - a low incidence of the item.

Mean of the 6 items:

Closest to 7 = Extremely relational exchange relationship
Closest to 6 = Very relational exchange relationship
Closest to 5 = Relational exchange relationship
Closest to 4 = Neutral exchange relationship
Closest to 3 = Discrete exchange relationship
Closest to 2 = Very discrete exchange relationship
Closest to 1 = Extremely discrete exchange relationship

TCE (Asset Specificity and Frequency)

Summary of item: question (and response format)

Human Asset Specificity
Item 1: Time for new competent internal human resource/external firm to reach full performance (months/days)
- Version 1: Question 31 (Initial Draft: Question 28)
- Version 2: Question 32
- Version 3: Question 29
- Version 4: Question 44
- Version 5: Question 40
- Version 6: Question 40

Item 2: Level of customisation required (7-point)
- Version 1: Question 32 (Initial Draft: Question 18)
- Version 2: Question 33
- Version 3: Question 30
- Version 4: Question 45
- Version 5: Question 41
- Version 6: Question 41

Temporal Asset Specificity
Item 1: Difficult/costly to replace extant external firm (7-point)
- Version 2: Question 34
- Version 3: Question 31
- Version 4: Question 47
- Version 5: Question 43
- Version 6: Question 42

Item 2: Sensitivity of air conditioning firm's performance based on DDC performance (7-point)
- Version 4: Question 46
- Version 5: Question 42

Ongoing Asset Specificity
Item 1: Difficult/costly to replace typical internal human resource (7-point)
- Version 1: Question 33 (Initial Draft: Not included)
- Version 2: Question 34
- Version 4: Question 48
- Version 5: Question 44

Item 2: Shortage of typical internal human resources (7-point)
- Version 1: Question 34 (Initial Draft: Not included)
- Version 2: Question 35
- Version 4: Question 49
- Version 5: Question 45

Frequency
Item 1: Full-time equivalent staff (FTE - Number)
- Version 1: Question 8 / 9 (Initial Draft: Not included)
- Version 2: Question 7 / 10
- Version 3: Question 7
- Version 4: Question 19 (Mechanical and Electrical staff) / 25
- Version 5: Question 19 (Mechanical and Electrical staff)
- Version 6: Question 21

Guidelines

Where a 7-point semantic differential response format is used the 7/high end labelled in terms of a high incidence of the item and 1/low end of the scale labelled in opposite terms - a low incidence of the item. Here, individual scores on an item or the mean of a number of items:

7 = Extremely high *or* + + +
6 = Very high *or* + +
5 = High *or* +
0 to 4 = Low *or* 0

With regard to HAS Item 1:

Continuous requirement
More than 12 months = Extremely high *or* + + +
6 months to 12 months = Very high *or* + +
2 months to 6 months = High *or* +
Less than 2 months = Low *or* 0

Less than continuous
Total hours divided by 12 x months reach full performance divided by 8

With regard to Frequency:

Internal
More than 20 FTE staff = Extremely high *or* + + +
10 to 20 FTE staff = Very high *or* + +
1 to 10 FTE staff = High *or* +
Less than 1 FTE staff = Low *or* 0

External
Total hours per year divided by 1840 FTE hours per year

TCE (Uncertainty)

Summary Outline of item: question (and response format)

Exogenous Uncertainty
Item 1: Difficult to predict range of tasks (7-point)
- Version 1: Question 38 (Initial Draft: Question 20 and 21)
- Version 2: Question 40
- Version 3: Question 34
- Version 4: Question 54
- Version 5: Question 49
- Version 6: Question 45

Item 2: Difficult to predict time to complete each task (7-point)
- Version 1: Question 39 (Initial Draft: Not included)
- Version 2: Question 41
- Version 3: Question 35
- Version 4: Question 55
- Version 5: Question 50
- Version 6: Question 46

Item 3: Difficult to predict frequency of each task (7-point)
- Version 1: Question 40 (Initial Draft: Not included)
- Version 2: Question 42
- Version 3: Question 36
- Version 4: Question 56
- Version 5: Question 51
- Version 6: Question 47

Item 4: Difficult to specify performance requirements (7-point)
- Version 1: Question 41 (Initial Draft: Question 21)
- Version 2: Question 43
- Version 3: Question 37
- Version 4: Question 57
- Version 5: Question 52
- Version 6: Question 48

Item 5: Likelihood of changes in core knowledge and skills (7-point)
- Version 1: Question 42 (Initial Draft: Question 19)
- Version 2: Question 44
- Version 3: Question 38
- Version 4: Question 58
- Version 5: Question 53
- Version 6: Question 49

Endogenous Uncertainty
Item 1: Difficult to monitor performance (7-point)
- Version 1: Question 43 (Initial Draft: Question 22)
- Version 2: Question 45
- Version 3: Question 39
- Version 4: Question 59
- Version 5: Question 54
- Version 6: Question 50

Item 2: Unfairness of objective measures of performance (7-point)
- Version 1: Question 44 (Initial Draft: Question 23)
- Version 2: Question 46
- Version 3: Question 40
- Version 4: Question 60
- Version 5: Question 55
- Version 6: Question 51

Guidelines

Where a 7-point semantic differential response format is used the 7/high end labelled in terms of a high incidence of the item and 1/low end of the scale labelled in opposite terms - a low incidence of the item. Here, individual scores on an item or the mean of a number of items:

7 = Extremely high *or* + + +
6 = Very high *or* + +
5 = High *or* +
0 to 4 = Low *or* 0

RBT

Summary of item: question (and response format)
Value
Item 1: Potential to increase profits when insourced (7-point)
- Version 1: Question 25   (Initial Draft: Question 9/10)
- Version 2: Question 26
- Version 3: Question 23
- Version 4: Question 38
- Version 5: Question 34
- Version 6: Question 35

Item 2: Central to core business (7-point)
- Version 1: Question 26 (Initial Draft: Question 17)
- Version 2: Question 27
- Version 3: Question 24
- Version 4: Question 39
- Version 5: Question 35
- Version 6: Question 36

Rarity
Item 1: Different technology including knowledge and skills (7-point)
- Version 1: Question 27 (Initial Draft: Question 11/12)
- Version 2: Question 28
- Version 3: Question 25
- Version 4: Question 40
- Version 5: Question 36
- Version 6: Question 37

Item 2: Shortage of firms in locality (7-point)
- Version 1: Question 28 (Initial Draft: Question 13)
- Version 2: Question 29
- Version 3: Question 26
- Version 4: Question 41
- Version 5: Question 37
- Version 6: Question 38

Costly to Imitate
Item 1: Costly for main rivals to match differences (in Rarity Item 1) (7-point)
- Version 1: Question 29 (Initial Draft: Question 13/15)
- Version 2: Question 30
- Version 3: Question 27
- Version 4: Question 42
- Version 5: Question 38
- Version 6: Question 39

Item 2: Difficult to write manual (7-point)
- Version 1: Question 30 (Initial Draft: Question 14/16)
- Version 2: Question 31
- Version 3: Question 28
- Version 4: Question 43
- Version 5: Question 39
- Version 6: Question 40

Guidelines

Where a 7-point semantic differential response format is used the 7/high end labelled in terms of a high incidence of the item and 1/low end of the scale labelled in opposite terms - a low incidence of the item. Here, individual scores on an item or the mean of a number of items:

7 = Extremely high *or* + + +
6 = Very high *or* + +
5 = High *or* +
0 to 4 = Low *or* 0

RDT

Summary of item: question (and response format)

Criticality

Item 1: Lack of tolerance correcting unsatisfactory performance
- Version 1: Question 45 (Initial Draft: Question 25/29)
- Version 2: Question 47
- Version 3: Question 41
- Version 4: Question 61
- Version 5: Question 56
- Version 6: Question 52

Item 1a: Lack of tolerance correcting unsatisfactory pay/working conditions (7-point)
- Version 1: Question 46 (Initial Draft: Not included)
- Version 2: Question 48
- Version 3: Question 42
- Version 4: Question 62
- Version 5: Question 57
- Version 6: Question 53

Magnitude of Exchange

Item 1: Proportion of cost (7-point)
- Version 1: Question 47 (Initial Draft: Question 24)
- Version 2: Question 49
- Version 3: Question 43
- Version 4: Question 63
- Version 5: Question 58
- Version 6: Question 54

Item 1a: Proportion of revenue (7-point)
- Version 1: Question 48 (Initial Draft: Not included)
- Version 2: Question 50
- Version 3: Question 44
- Version 4: Question 64
- Version 5: Question 59
- Version 6: Question 55

Lack of Discretion

Item 1: Lack of influence over actions (7-point)
- Version 1: Question 49 (Initial Draft: Question 26)
- Version 2: Question 51
- Version 3: Question 45
- Version 4: Question 65
- Version 5: Question 60
- Version 6: Question 56

Item 1a: Lack of influence over actions (7-point)
- Version 1: Question 50 (Initial Draft: Not included)
- Version 2: Question 52
- Version 3: Question 46
- Version 4: Question 66
- Version 5: Question 61
- Version 6: Question 57

Few Alternatives

Item 1: Few other sources (7-point)
- Version 1: Question 51 (Initial Draft: Question 27)
- Version 2: Question 53
- Version 3: Question 47
- Version 4: Question 67
- Version 5: Question 62
- Version 6: Question 58

Item 1a: Few other sources (7-point)
- Version 1: Question 53 (Initial Draft: Not included)
- Version 2: Question 56
- Version 3: Question 49
- Version 4: Question 69
- Version 5: Question 64
- Version 6: Question 60

Guidelines

Net dependency = mean of scores representing buyer's dependency and buyer's perception of supplier's dependency

Where imbalance (B>S or B<S) then "low" = difference of 3.99 or less and "high" = difference of 4 or more

Where balance (B=S) then "low" = same scores of 4.4 or less and "high" = same scores of 4.5 or more

APPENDIX 14 – Guidelines and codes for items in survey questionnaire – MSC version (SPSS® File 1)

Questions and *Additional Questions (in italics)*	**Guidelines and Coding**
• q1a:	Coded 1 to 9
	○ 1= NSW
	○ 2 = ACT
	○ 3 = VIC
	○ 4 = TAS
	○ 5 = QLD
	○ 6 = NT
	○ 7 = WA
	○ 8 = SA
	○ 9 = More than one state
• q1b:	Actual description entered
• q2:	Coded 1 = Yes and 2 = No
• q3:	Coded 1 = Some comment made on back page and 2 = No comment
• q4:	Coded 1 = Ticked and 2 = No tick
• q5:	Date entered
• q6:	Year started entered
• *q6a:*	*Coded 1= 2001 or before and 2 = 2002 or after (calculated from q6)*
• *q6b:*	*Years in existence (calculated from q6)*
• q7a:	Shopping centres % entered or 0 = 0 or blank
• q7b:	Other commercial & industrial % entered or 0 = 0 or blank
• q7c:	Residential % entered or 0 = 0 or blank
• q7d:	Other % entered or 0 = 0 or blank
• *q7e:*	*Code 1 = > 50% (shops/other C&I) and 2 = >50% (residential) – calculated from 7a-d*
• q8:	Coded 1 = Yes and 2 = No
• q9a:	Open competition % entered or 0 = 0 or blank
• q9b:	Competition % entered or 0 = 0 or blank
• q9c:	Negotiation % entered or 0 = 0 or blank
• q9d:	Other % entered or 0 = 0 or blank
• q10a:	Client % entered or 0 = 0 or blank
• q10b:	Your firm % entered or 0 = 0 or blank
• q10c:	Standard form % entered or 0 = 0 or blank
• q10d:	Other % entered or 0 = 0 or blank
• q11a:	Years entered
• q11b:	Coded 1 = Yes and 2 = No
• q11c:	Coded 1 = Yes and 2 = No
• q11d1:	Preventative % entered or 0 = 0 or blank

Questions and
Additional Questions
(in italics)

Guidelines and Coding

- q11d2: Comprehensive % entered or 0 = 0 or blank
- q11d3: Other % entered or 0 = 0 or blank
- q12a: Clients numbers entered
- q12b: Contracts numbers entered
- q13a: Coded 1 = Yes and 2 = No
- q13b1: Turnover % entered
- q13b2: Number of clients entered
- q14a: % entered
- q15: Coded 1 to 7
  - 1=up to $500k
  - 2=$500k-1m
  - 3=$1m-2.5m
  - 4=$2.5-5m
  - 5=$5-10m
  - 6=$10-15m
  - 7=over $15m
- q16: Coded 1 = Above average and 2 = average and 3 = below average
- q17a: In-house % entered
- q17b: Subcontractors % entered
  - Note: In SPSS® File 3 all the MSC responses are coded "1" = internalised and all the CM responses are coded "0" = externalised
- q18: Years entered
- q19a: Coded 1 = Yes and 2 = No
- q19b1: In-house % entered
- q19b2: Subcontractors % entered
- q20a: Management numbers entered
- q20b: Fridge/mechanical numbers entered
- q20c: Electrical numbers entered
- q20d: Other technical numbers entered
- q20e: Admin numbers entered
- q20f: Other numbers entered
- *q20g:* *Total FTE technical staff (calculated from: q20b + c + d)*
- q21: Year entered
- q22: Coded 1 = Yes and 2 = No
- q23: Hours entered
- q24: Years entered
- q25a: Coded 1 = Yes and 2 = No

Questions and *Additional Questions (in italics)*	**Guidelines and Coding**
• q25b:	Coded 1 = Positive measures noted and 2 = Blank
• q25c:	Coded 1 = Negative measures noted and 2 = Blank
• q26-q36 inclusive:	1 to 7 entered
• q37a:	Number entered
• q37b:	Hours entered
• *q37c:*	*FTE days (calculated from: q37a: number of visits x q37b: hours per visit x OM/CM q19: mean number of technical staff that would visit a retail centre: 2 = total hours divided by 8 hours per day)*
• q38a:	Years entered
• q38b:	Coded 1 = Qualification entered and 2 = Blank
• q39a:	Years entered
• q39b:	% entered
• q40a:	In-house % entered
• q40b:	External % entered
• q41a:	Days per annum entered
• q41b:	% entered
• q42a: (Use, promote…)	Coded 1 = Most preferred or 2 = next preferred or 3 = next preferred or 4 = least preferred or 0 = Blank
• q42b: (Recruit…)	Coded 1 = Most preferred or 2 = next preferred or 3 = next preferred or 4 = least preferred or 0 = Blank
• q42c: (Subcontract…)	Coded 1 = Most preferred or 2 = next preferred or 3 = next preferred or 4 = least preferred or 0 = Blank
• q42d: (Employ…)	Coded 1 = Most preferred or 2 = next preferred or 3 = next preferred or 4 = least preferred or 0 = Blank
• *q42e:*	*Number of alternatives that are considered (calculated from q42a-42d)*
• q43-q67 inclusive:	1-7 entered

APPENDIX 15 – Guidelines and codes for items in survey questionnaire – CM version (SPSS® File 2)

Questions and *Additional Questions (in italics)*	Guidelines and Coding
• q1a:	Coded 1 to 8
	o 1=NSW
	o 2=ACT
	o 3=VIC
	o 4=TAS
	o 5= QLD
	o 6=NT
	o 7=WA
	o 8=SA
• q1b1:	m^2 GLAR entered
• q1b2:	m^2 TCLA entered
• q1c:	*TCLA or GLAR coded as 1 = >50,000m^2 and 2 = 30-50,000 m^2 and 3 = <30,000 m^2 calculated from q1b1 and q1b2*
• q1d:	*m^2 – calculated from q1b1 and 1b2: largest area from GLAR and TCLA*
• q2:	Coded 1 = Yes and 2 = No
• q3a:	Centre management % entered
• q3b:	Operations management % entered
• q3c:	Other % entered
• q4:	Coded 1 = mainly general management and 2 = mainly technical
• q5:	Coded 1 = Some comment made on back page and 2 = No comment
• q6:	Coded 1 = Ticked and 2 = No tick
• q7:	Date entered
• q8a:	In-house % entered
• q8b:	Outsourced % entered
• q9:	Years entered
• q10a:	Coded 1 = Yes and 2 = No
• q10b:	In-house % entered
• q10c:	Outsource % entered
	o Note: In SPSS® File 3 all the MSC responses are coded "1" = internalised and all the CM responses are coded "0" = externalised
• q11:	Coded 1 = Yes and 2 = No
• q12a:	Coded 1 = Yes general maintenance staff and 2 = None/blank
• q12b1:	Full-time number entered

Questions and *Additional Questions (in italics)*	**Guidelines and Coding**
• q12b2:	Part-time number entered
• q12b3:	Other number entered
• q13a:	Open competition % entered or 0 = 0 or blank
• q13b:	Competition % entered or 0 = 0 or blank
• q13c:	Negotiation % entered or 0 = 0 or blank
• q13d:	Other % entered or 0 = 0 or blank
• *q13e:*	*Calculated from q13a-d and using highest %* *Coded: 1=open, 2= comp, 3 = Neg, 4 = other*
• q14a:	Coded 1 = Yes and 2 = No
• q14b:	Number entered
• q15a:	Coded 1 = Centre owner and 2 = Your firm
• q16:	Coded 1-6
	o 1 = Owner
	o 2 = Your firm
	o 3 = Contractor
	o 4 = Standard form
	o 5 = Other
	o 6 = More than one of the above ticked
• q17a:	Years entered
• q17b:	Coded 1 = Yes and 2 = No
• q17c:	Coded 1 = Yes and 2 = No
• q17d:	Coded 1 = Preventative and 2 = Comprehensive and 3 = Other
• q18a:	Coded 1-7
	o 1 = Continuously
	o 2 = Daily
	o 3 = Weekly
	o 4 = Monthly
	o 5 = Quarterly
	o 6 = 6 monthly
	o 7 = Annually
• q18b:	Days entered (if 1 or 2 on q18a, then 5 days)
• q18c:	Hours entered (if 1 on q18a, then 8 hours)

Questions and *Additional Questions (in italics)*	**Guidelines and Coding**
• *q18d:*	*Opposite to q18a calculated by reversing q18a answers and coded*
	o *1 = Annually*
	o *2 = 6 monthly*
	o *3 = Quarterly*
	o *4 = Monthly*
	o *5 = Weekly*
	o *6 = Daily*
	o *7 = Continuously*
• q19:	Number entered
• *q19b:*	*Total FTE staff – calculated as follows:*
	o *1 = Continuously=8 x 5 x 46 =<u>total hours</u> divided by 1840 hours FTE year= FTE*
	o *2 = Daily=q18b(hours) x 5 x 46 =<u>total hours</u> divided by 1840 hours FTE year= FTE*
	o *3 = Weekly = q18c(hours) x q18b(days/week) x 46 =<u>total hours</u> divided by 1840 hours FTE year = FTE*
	o *4 = Monthly = q18c(hours) x q18b(days per month) x 12 =<u>total hours</u> divided by 1840hours FTE year = FTE*
	o *5 = Quarterly = q18c(hours) x q18b(days per quarter) x 4 =<u>total hours</u> divided by 1840hours FTE year = FTE*
	o *6 = 6 monthly = q18c(hours) x q18b(days per 6month) x 2 =<u>total hours</u> divided by 1840hours FTE year = FTE*
	o *7 = Annually = q18c (hours) x q18b(days per 12month) x 1 =<u>total hours</u> divided by 1840hours FTE year = FTE*
• q20a:	Coded 1 = Yes and 2 = No
• q20b:	Coded 1 = Positive measures noted and 2 = Blank
• q20c:	Coded 1 = Negative measures noted and 2 = Blank
• q21:	Coded 1 = Yes and 2 = No
• q22 to q31 inclusive:	1-7 entered
• q32:	Months entered
• *q32b:*	*Total FTE days – calculated as follows:*
	o *Total hours (from q19b) divided by 12 months = total hours per month x q32b and divided by 8 hours per day*
• q33a:	Years entered

Questions and *Additional Questions* *(in italics)*	**Guidelines and Coding**
• q33b:	Coded 1 = Qualification entered and 2 = Blank
• q34:	Coded 1 = Yes and 2 = No
• q35a: (Use, promote..)	Coded 1 = Most preferred or 2 = next preferred or 3 = next preferred or 4 = least preferred or 0 = Blank
• q35b: (Recruit..)	Coded 1 = Most preferred or 2 = next preferred or 3 = next preferred or 4 = least preferred or 0 = Blank
• q35c: (Outsource…)	Coded 1 = Most preferred or 2 = next preferred or 3 = next preferred or 4 = least preferred or 0 = Blank
• q35d: (Temp' staff…)	Coded 1 = Most preferred or 2 = next preferred or 3 = next preferred or 4 = least preferred or 0 = Blank
• q35e*:*	*Number of alternatives that are considered – calculated from q35a to q35d*
• q36 to q59 inclusive:	1-7 entered

APPENDIX 16 – Consent form and participant information sheet

CONSENT FORM

Investigator

Name & School: Adrian Bridge: School of Construction Management and Property
Contact details: Phone: 3864 2935 / Fax: 3864 1170

Project title

The Governance of Mechanical Services Maintenance: Theory and Practice

The research study

The objective of the program of research and investigation is to examine the extent to which governance theory and practice are aligned in the mechanical services maintenance supply chain of Australian shopping centres.

Duration of the participant's involvement

The study involves interviews with managers at various points in the mechanical services supply chain. These interviews will take approximately ½ hour to complete. Case studies of shopping centres will also be conducted.

The main study phase will comprise a postal questionnaire which will take approximately 15-20 minutes to complete.

Possible material risks to participants

Participation in this project does not involve any known risk to the participants.

Benefits that may result from the research

The field of study and the results of the research will contribute significantly to existing literature on the governance of supply chains, with particular regard to construction and property support activities.

Confidentiality of the data

Only the research team members will know the identities of the participants. All records and the summaries of the interviews will be kept secure, and only the research team members will have access to them.

No identifying information about the participants will be used in any paper that may result from this research.

Questions or concerns

You are welcome to contact the chief investigator regarding any questions or concerns you may have about this project. Should you have any concerns relating to the ethical conduct of this research please feel free to contact the Secretary of the University Research Ethics Committee on 07 3864 2902.

Feedback to participants

Feedback will be provided to participants in this study through consultation and summary findings.

Consent

By completing this section you indicate that you:

1.   Acknowledge that the nature of this research and your involvement in the project has been explained to you;
2.   Understand that confidentiality will be maintained and no identifying information will be released;
3.   Understand that you may withdraw from this study at any time, without comment or penalty; and
4.   Understand that your participation in the study is voluntary.

Name: ……………………………………………………………..

Signature: ……………………………………………………..   Date: ……………

Participant Information Sheet
(PhD Research Project)

Investigator

Name & School: Adrian Bridge, Lecturer, School of Urban Development

Contact details: Phone: 07 3864 1543 / Fax: 07 3864 1170

Project title

The Governance of Mechanical Services Maintenance: Theory and Practice

The research study

The research project is being undertaken as a PhD by Adrian Bridge.

The objective of the program of research and investigation is to examine the extent to which governance theory and practice are aligned in mechanical services maintenance supply chains.

Duration of the participant's involvement

The main study phase will comprise a postal questionnaire which will take approximately 10 minutes to complete.

Possible material risks to participants

Participation in this project does not involve any known risk to the participants.

Benefits that may result from the research

The field of study and the results of the research will contribute significantly to existing literature on the governance of supply chains, with particular regard to construction and property support activities.

Confidentiality of the data

Only the research team members will know the identities of the participants. All records and the summaries of the interviews will be kept secure, and only the research team members will have access to them. No identifying information about the participants will be used in any paper that may result from this research.

Feedback to participants

Feedback will be provided to participants through consultation and summary findings.

Consent

The return of the completed questionnaire is accepted as an indication of your consent to participate in this project and that you:

1. Acknowledge that the nature of this research and your involvement in the project has been explained to you;
2. Understand that confidentiality will be maintained and no identifying information will be released;
3. Understand that you may withdraw from this study at any time, without comment or penalty; and
4. Understand that your participation in the study is voluntary.

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