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**IDEAL PROCUREMENT SYSTEM FOR NEW
ZEALAND PRIVATE SECTOR CONSTRUCTION
CLIENTS**

Research Thesis
MPhil (Construction)

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IDEAL PROCUREMENT SYSTEM FOR NEW ZEALAND PRIVATE SECTOR CONSTRUCTION CLIENTS

A research thesis presented in fulfillment of the requirements for the
degree of

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ABSTRACT

Making the right choice of a procurement system at the onset ensures successful project delivery, a satisfied client, a successful service provider, and a reputable construction industry. Research has shown that client's requirements have not been properly addressed due largely to wrong choice of procurement systems.

This research aims to identify the priority needs of clients and the appropriate procurement system that can ensure the delivery of satisfactory outcomes. Investigations were limited to the views expressed by private sector construction clients, consultants and contractors, registered with their respective umbrella organizations in New Zealand. The descriptive survey method was used, which involved pilot interviews and structured questionnaire surveys. Content analysis, multi-attribute analysis and rank correlation tests were used in the analysis of the data.

Results showed that clients' would prefer a procurement system that can ensure the delivery of the project within time, budget and quality/specification targets. Other priority needs include fixed price tender, competitive/ lowest price tenders, separate service provider for the design and management of the construction, life cycle cost, risk preference and to accommodate variation orders without incurring financial penalties. Construction management type of procurement system offering responsibilities for monitoring and coordinating the construction process is the ideal procurement route that could best meet the needs of the New Zealand construction clients. However, the sequential traditional procurement system is the most commonly used; clients are not prepared to adopt any other system that could better meet their procurement needs. The most influential reason for this is the perceived risk evasiveness of clients in the adoption of other systems which are not tried and tested. The use of partnering clause in the prevailing sequential traditional system is recommended to ensure win-win outcomes for all stakeholders and to motivate service providers to deliver more satisfactory outcomes to their clients.

Keywords *Construction clients, construction industry, clients' needs, construction management, procurement system*

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The guidance received from my supervisor is hereby acknowledged. Human Ethics requirements have been complied with in accordance with Massey University research requirements.

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CHAPTER 1: INTRODUCTION

1.1 Background

Procurement system provides an avenue for bringing together various service providers in a construction project, and for identifying and fulfilling the priority needs of the client for procuring the building or facility (Mbachu and Nkado, 2006). Furthermore, Kwakye (1994) is of the view that the successful execution of construction work depends on the procurement approach adopted. This is because, "the key to procurement is to identify the priorities in the objectives of the client and to plan a path, a procurement route, that will be the most appropriate to realize the objectives" (Turner, 1990, p20).

Construction clients in New Zealand and elsewhere prefer traditional procurement systems to other forms, even in conditions where the use of the traditional systems are inappropriate. For instance, Henriod (2007) argues that the traditional procurement system is largely used in New Zealand due to its appeal as a means of achieving lowest price for the construction of the project. Henriod identifies the inherent disadvantages of this system to include not taking account of qualifications and financial strength in the award of the tender, neglecting aspects such as constructability and new or different technologies, as well as engendering adversarial relations amongst the project team.

Furthermore, Body (2004) finds that the traditional procurement system is dominant in the New Zealand construction industry, adding that, "the procurement practice in the construction sector in New Zealand tended to be based primarily on competitive pricing models that focus the process on:

- Economic objectives (e.g. returns on investment)
- Cost over value
- Short-term rather than long-term outcomes (e.g. the construction of a building, road etc to meet an immediate need or opportunity)
- Construction rather than whole-of-life costs
- Risk and liability transfer to suppliers/providers" (p.5)

This means that the needs of the New Zealand construction clients are not adequately addressed by the prevailing procurement system.

The literature is replete with discussions on the novel procurement systems that could better meet the needs of construction clients than the prevailing traditional method. For instance, Henriod (2007) recommends the use of New Engineering Contract (NEC) form of contracting as a means of mitigating the inadequacies of the traditional procurement system; arguing that NEC has the following advantages:

- It allows contractor's adoption of their experience, techniques and availability of specialized equipments and personnel from the inception stage.
- Collaboration during construction avoids confrontation or time and cost overruns.

Furthermore, Kwakye (1994) advocates the use of integrated management contracts as a means of integrating the contractor's expertise in both design and construction phases with a view to solving the problem of buildability/ constructability associated with the traditional procurement system. In addition, Rowlinson and McDermott (1999) opine that design and build and its variants provide close integration of design and construction team and demonstrate increased level of synergy.

Masurier et al (2006) argue that partnering and alliancing hold numerous benefits especially in responding to disaster. Partnering and alliancing are largely based on the guiding ethics of the project participants, collaborative relationship and trust between parties and provide the fast and efficient contractual framework for rebuilding following a disaster event (Broome, 2002).

In spite of the above and other procurement systems proffered in the literature as avenues for addressing clients' needs in the procurement process, client dissatisfaction is still the order of the day, with incessant complaints of cost overruns, poor quality, time overruns and consultants' and contractors' attitudes to service (Chan, 2007; Mbachu and Nkado, 2006). The fact remains that clients are reluctant to adopt the novel procurement systems proffered in the literature. It is argued that the ideal procurement system that could be adopted by clients, and that could provide solutions to the procurement system related problems in the construction industry is one that balances the priority needs of the client with the practical issues clients are grappling with in their decision making and selection processes. Therefore, there is the need to research the key variables underlying the ideal procurement system that would best meet the client requirements, and wider issues influencing choice of procurement system in the New Zealand construction industry.

1.2 Statement of the research problem

Wrong choice of procurement system at the onset could significantly constrain the efforts of the project team to achieve the set project objectives and satisfy the client. Many attempts have been made to develop various models to assist in the decision making and selection of appropriate procurement system. Unfortunately, none of those models has been widely adopted in practice (Chan, 2007). One possible reason for this could be the lack of a universally applicable set of criteria to determine the appropriateness of a procurement system (Ireland, 1985) – i.e. the challenge of having a universally acceptable criteria for establishing the procurement system that balances the ideal with the practical realities in the selection process. Perhaps, this might have contributed to clients' insistence in the use of the traditional procurement system, even in conditions where the use of this system is inappropriate. The consequences of this development include client dissatisfaction, cost and time overruns, adversarial relations, poor quality, and added risks, all of which constrain the viability and development of the construction industry.

It is believed that the selection of an ideal procurement system should consider the local cultures and allow modifications in order to achieve project success. The overarching aim of this study was to identify the criteria that encompass the ideal and practical needs of the New Zealand private sector construction clients for their projects, and which subsequently would become the valuable ingredients in establishing an ideal procurement system.

1.3 Objectives

Specifically, the objectives of the research are as follows:

1. To identify the priority criteria that encompass the procurement needs of the New Zealand private sector construction clients, and the criteria for assessing the extent of fulfillment of these needs
2. To establish the ideal procurement arrangement option (PAO) that best meet the needs of the clients.
3. To identify the most popular PAO used and reasons for this.
4. To explore the prospects and challenges facing the ideal PAO, if this differs from the prevalent PAO.

1.4 Propositions

The following propositions provided directions for the research design, data gathering and data analysis with a view to meeting the research objectives.

1. Consensus of opinions exists between the client's and service providers' groupings on the levels of importance of the procurement needs of clients in the New Zealand construction industry.
2. Construction Management is the ideal procurement system that best meet the needs of New Zealand clients
3. Traditional system is the most popular procurement system in New Zealand construction industry
4. The most serious constraint to the adoption of the most appropriate procurement system is that project financiers often insist on the use of only the popular systems that have been tried and tested.

1.5 Scope and limitations

The study was limited to the views expressed by private sector clients, building professionals and contractors registered under the following organizations:

- New Zealand Institute of Building (NZIOB)
- Property Council of New Zealand (PCNZ)
- New Zealand Institute of Quantity Surveyor (NZIQS)
- New Zealand Institute of Architects (NZIA)
- Institute of Professional Engineers (IPENZ)
- Master Builders' Federation of New Zealand (RMBF).

Since members of these associations are at the forefront of project conception, planning, implementation and controls, their views were considered most authoritative and useful in this study. The study focused on private sector construction clients. Government or public sector clients were not included, as their criteria for choice of procurement routes usually include non-financial matters such as cost-benefit outcomes, political, social, and cultural issues. Also the study focuses only on building projects (as opposed to other type of projects in construction industry).

1.6 Anticipated study outcomes

The results of this investigation could be of importance to:

- Consultants in assessing the priority needs of their clients and providing advice on the ideal procurement system to meet those needs.
- Clients in understanding the nature and impact of other variables in the articulation of their needs during brief and in the choice of an appropriate procurement system.
- The construction industry in understanding the priority needs of clients and the suitability of the various procurement approaches to meeting these needs.

1.7 Structure of the thesis

The thesis report comprises six chapters: Chapter One is the introduction, which highlights the background, statement of the research problem, objectives, propositions, scope and limitations, and the anticipated study outcomes.

Extensive reviews of literature related to the research topic are presented in Chapter 2. This chapter also presents an overview of previous studies in the area of procurement system; it defines construction procurement system in context, and the classification of procurement systems and their areas of applications. The chapter also highlights the advantages and disadvantages of the procurement systems, contractual relationships and the suitability of each system to certain conditions.. Overall, the reviews provided insight into research strategies and methodologies that were considered appropriate to the research problem and objectives.

Chapter 3 discusses the methodology employed in the study. The key elements of the methodology are the overall research strategy adopted, the procedure used to select random samples from the sampling frames, the data-gathering instruments used, and the methods employed in data analyses. The chapter also highlights compliance with the Massey University's Code of Research Ethics, including approval by the Massey University Human Ethics Committee for the undertaking of the research.

Data obtained from the questionnaire administration are presented, analyzed and discussed in Chapter 4. The data were first subjected to preliminary analyses to produce the parameters used in testing the research propositions. The results of the analyses were discussed in relation to the research objectives and congruence with or divergence from related literature.

In Chapter 5, tests of the research propositions and development of the research model are reported as well as the statistical techniques employed for the test. The chapter also includes discussions of the outcomes of the tests of propositions in relation to the research objectives.

Finally in Chapter 6, conclusions from the research findings are presented as well as the recommendation for future research.

The report ends with appendices comprising documents used in planning and conducting pilot interview and questionnaire surveys, summary of key research findings and supporting charts and tables, and the Massey University Human Ethics Committee (MUHEC) Low Risk Notification approval given prior to the undertaking of the research.

CHAPTER 2: LITERATURE REVIEW

2.1 Overview

This chapter presents a review of previous studies in the area of procurement system. Its main purpose is to explore answers to the research objectives as proffered in the literature, to put the study in the context of previous studies, to explore information that will guide the research design, search for and analysis of data, and the baseline for comparing the research findings with related previous studies. Specifically, the chapter presents definition of construction procurement system in context, and the classification of procurement systems and their areas of applications, advantages and disadvantages, contractual relationships and their suitability to certain conditions. Overall, the reviews provided insights into research strategies and methodologies that were considered appropriate to the research problem and objectives.

2.2 Procurement

Mbachu (2003) defines procurement as the process of acquiring a building or infrastructure project to fulfill some identified needs and requirements of clients, involving the employment or engagement and coordination of the services of consultants, contractors and suppliers. Contractually, the way in which the service providers are brought together to provide the infrastructure gives rise to different procurement arrangement options (Turner, 1990). A more holistic perspective on procurement is provided by the New Zealand Construction Industry Council (NZCIC, 2006), which sees procurement as not only the process by which clients and users achieve their construction aims but covering the process from initial concept planning and design, to development, construction, maintenance and on going monitoring of performance. Therefore, the choice of the appropriate procurement system is vitally important in ensuring the success of any construction project as the use of inappropriate procurement system is believed to result in project failure (Chang and Ive, 2007; Mbachu and Nkado, 2006; Kwakye, 1994). Procurement is crucial as it determines the overall framework for construction, embracing the structure of responsibilities, risks and authorities for construction practitioners (Zuo et al, 2006).

Procurement in construction industry differs markedly from the procurement of goods and services in the production and consumer services sector where an immediate choice can generally be made in term of cost and quality; while the procurement of building is complex and involves the interaction of the client, design team, contractors, suppliers and various statutory/public interest bodies in the process from inception to completion (The Scottish Executive, 2005).

From a strategic perspective, procurement can be seen as a strategy designed to satisfy the client's development needs (Moore, 2002). This aligns with the Latham Report (1994) that, "Clients are at the core of the process and their needs must be met by the industry". Unfortunately, in recent years, there has been much inquiry on the construction industry's ability to deliver projects that meet the client's requirements. The literature is rife with reports that not all of client's requirements have been addressed by the industry. According to Gregus (2007), procurement was just one of the areas that required urgent and significant improvement to minimize risks and uncertainty in the industry. The author notes that there is nothing amiss with the actual systems, only on how they are selected inappropriately and implemented wrongly. Indeed, the selection of suitable procurement system has gained reputation of being one of the most crucial processes in the construction industry and the success of the project may depend on the right contractual vehicle being chosen (Richards, 2005).

2.1.1 Classification of procurement system

Alhazmi and Mc Caffer (2000) observe that a number of different procurement systems has increased over the last few decade. However, no standard definition and classification of procurement approaches has become generally acceptable (Hibberd, 1991). This is because there are no formal structures or agreement on the terms and the underpinning criteria. According to Rowlinson and Mc Dermott (1999) in all of the attempts by previous researchers to distinguish between procurement systems, it is forgotten that they are actually more similar than different.

Love et al (1998) and Alhazmi and Mc Caffer (2000) note that the commonly used procurement system can be categorized as separated and cooperative, integrated and management oriented procurement system. From a development phase and coordination perspective, Peck et al (2005) classify procurement system into:

- Traditional design-bid-build
- Construction management at risk
- Multiple-prime contracting
- Design and build
- Agency construction management services

Hibberd (1991) finds that UK practitioners identified with the following eight procurement path despite the fact that some of them share a significant number of characteristics:

- Conventional or traditional
- Management contracting
- Design and build
- Two-stage conventional
- Construction management
- British Property Federation System
- Prime cost
- Develop and construct

In New Zealand, procurement systems have been well established and developed following the examples from generally recognized Western models (Zuo et al, 2006). Wilkinson and Scofield (2003) note that the procurement systems available and frequently used in New Zealand are:

- Traditional
- Design and build
- Project management
- Management contracting.

The authors further classify other procurement systems such as novation, partnering and alliancing, which currently are not in common use in New Zealand.

In this study, the procurement systems are classified into the following as gleaned from the literature:

- Traditional
- Design and build
- Total package

- Management oriented
- Collaborative

Traditional

The traditional system has long been widely adopted by clients to deliver their projects. This approach to procuring projects involves discrete design development, tender, contract award and construction delivery phases. The process begins with a client approaching the principal design consultant. This is generally the architect for building projects or a design engineer for engineering projects. The design is developed to as close to completion as possible before tenders are invited. Tenders are invited in one of two bases: Open tendering, which allows anyone to tender for the project; closed or pre-qualified tendering, which restricts those invited who have met pre-tender qualification criteria such as financial soundness and relevant project experience (Walker and Hampson, 2003).

Frank (1996) observes that in the traditional system, the contractor is selected on some basis of competition, normally with a Bill of Quantities being produced to be priced. By the mid-nineteenth century, the Quantity Surveyor had been established as the independent compiler of the bill and also giving expert advice on matters such as building cost and accounts.

In terms of contractual arrangement, the client has contract with the design professionals for design and administration of the project, with the design professionals being responsible for full design of the project. Separately, the client has contract with the contractor for the construction of the project. The contractor only has responsibility for construction and not for design. Figure 1 exhibits the contractual relationship structure of the traditional procurement system.

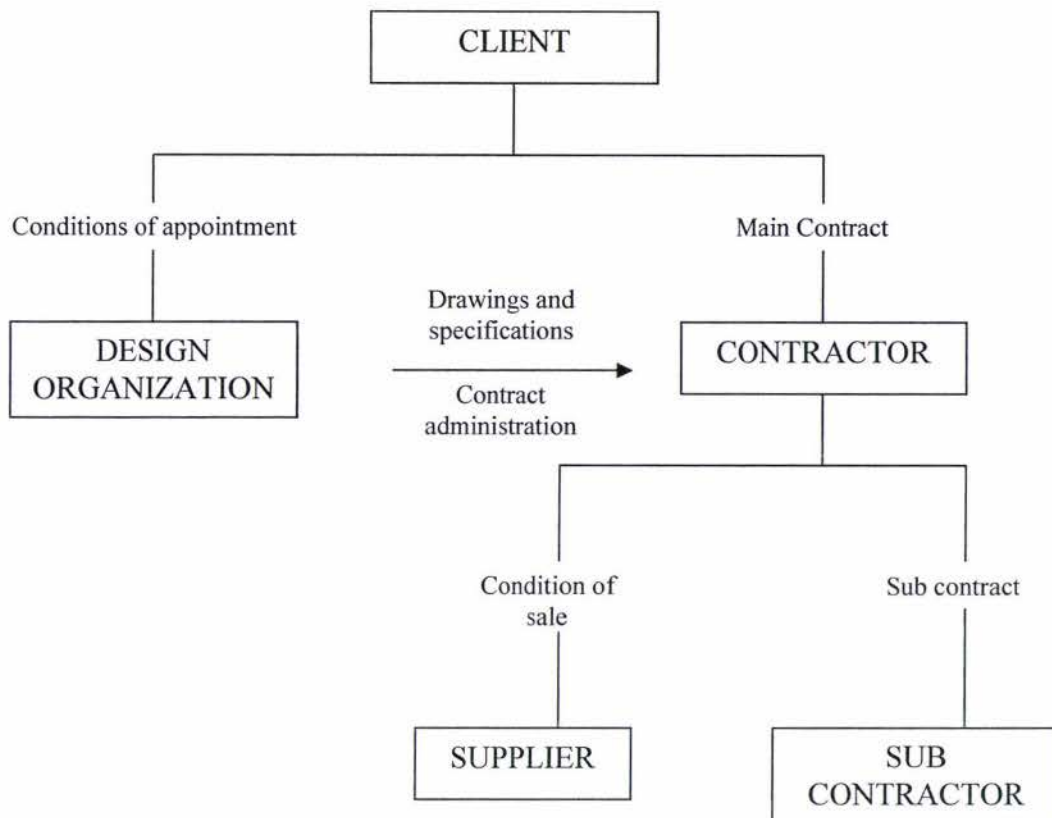


Figure 1: Traditional procurement system (Source: Ashford, 1989)

Richard (2005) argues that the popularity of the traditional procurement system is due to a range of benefits: most clients and contractors have wide experience of it; the system offers some price certainty if the design has been fully scoped out prior to construction; and it gives the client greater control of design as by default, the client controls the design team. This would facilitate high level of quality in design and construction.

On the other hand, the contractor assumes responsibility and financial risk for the building works whilst the client takes responsibility and risk for design team performance. Therefore, if the contractor's works are delayed by the failure of the design team to meet their obligations, the contractor may seek recompense from the client for additional cost and/or time to complete the project. In turn, the client could seek to recover these costs from the design team members responsible, if negligence could be proved (Kelly et al, 2002). It can be relatively low-risk procurement option for the client.

Split responsibility between construction and design is viewed as the main disadvantages of this system. This can lead to disputes about whether defects are really design defects (for

which the client or client agent is responsible) or defects in materials or workmanships (for which the contractors is responsible) (Richard,2005). Lam et al (2003) argues that the adversarial relationship among project team members engendered by the traditional system lowers the chance of the project success. On the other hand, Richard (2005) is certain that in practice, the final design in most traditional systems is often not fully developed before construction start, and this can create problems and price uncertainty. This also would become unsuitable for the client who has budgetary constraints.

The absence of a contractor's input into the project design may limit the effectiveness and constructability of the design. Important design decisions affecting both the types of materials specified and the means of construction may be made without full consideration of the contractor's choice of approach or preference (Peck et al, 2005). Francis and Sidwell (1996) opine that the contractor has much to offer in terms of advice on how best to meet design specification in a cost and time effective manner because the contractor is closest to the workforce with intimate knowledge of the production process. Thus this has serious consequences in terms of both cost and relationship risk (Walker and Hampson, 2003).

The other shortcoming in this system is that the overall programme may be longer as there is no parallel working (Kelly et al, 2002). The process is time-consuming since all design work must be completed prior to solicitation of the construction contract (Peck et al, 2005).

Design and Build

Wide dissatisfaction with traditional approaches to procurement (especially in terms of cost and time) together with acrimonious conflicts between the various parties involved have fuelled the rapid expansion in use of design and build and its variants (Rowlinson and McDermot, 1999). According to Walker and Hampson (2003) a design and build procurement approach provides for an organization to be contracted by a client to manage the design and construction processes with a single point of contract.

Latham (1994) notes that this procurement system tends to be used most where a "standard" construction is required. Standard processes and components will be involved, with the client transferring most of the risk to the contractor. The contractor will be responsible for delivering the whole package.

Due to many attempts to improve the efficiency of the design and build approach, several variants have emerged in practice such as novation, turnkey and package deal. The organizational and contractual relationships vary slightly amongst its variants.

Design-and-build

According to Peck et al (2005), design-and-build procurement system has grown in popularity, and is seen by some in the industry as the perfect solution in addressing the limitations of other methods. Under this system, a single contractor assumes the risk and responsibility for designing and building the project, in return for a fixed-price lump sum (Kelly et al, 2002). Walker and Hampson (2003) note that there may have been preliminary sketch plans developed to indicate a generalized design solution or the design brief may be left fairly open for the design and build contractor to offer proposals.

Depending on the size and complexity of the project, tenderers may be required to submit only an outline of the project, showing how they would complete the project, with sketch designs, or they may be required to undertake fuller design and costing preparations. Based on this initial information, the client makes a decision to proceed with one contractor who then creates detailed drawings and specifications and constructs the project. The client at this stage may employ professional help such as an architect, engineer, quantity surveyor or project manager to assist with the decision making and to check the design information (Wilkinson and Scofield, 2003).

In terms of contractual relationship, the client has one main contract with the design-and-build company for the design and construction of the project. The client may have smaller contracts with professionals for advice and scope design in the early stage of the project. The contractual relationship structure of design and build is shown in Figure 2. The single point of contract between the client and the contractor means that the client has the advantage of dealing with one single organization, which would be responsible for all aspects of the project (Gregus, 2007). For instance, in the event of dispute, the responsibility can be unambiguously attributed to a single source – the contractor (Rampling Associates, 2007).

According to Walker and Hampson (2003), the relationship experience for project teams moves toward treating design and construction supervision entities as being contributing partners in an enterprise to deliver a project solution that combines the skill of both design

and construction group. Dulaimi and Dalzell (1994) opine that design-and-build system improves project team integration. On the other hand, inherent buildability can be achieved as design-and-build contractors being primarily builders, make constructability inputs that can be of significant value in developing cost effective and practical design solutions (Walker and Hampson, 2003).

Since the construction team is working together from the outset, design-and-build procurement system offers the opportunity to save time and money (Peck et al, 2005). Kelly et al (2002) note that this system is a fast-track strategy where the construction can start before all the detailed design is completed, but at the contractor's risk. Additionally, price certainty can be obtained before construction starts, provided the client's requirements are adequately specified and changes are not introduced during the implementation process.

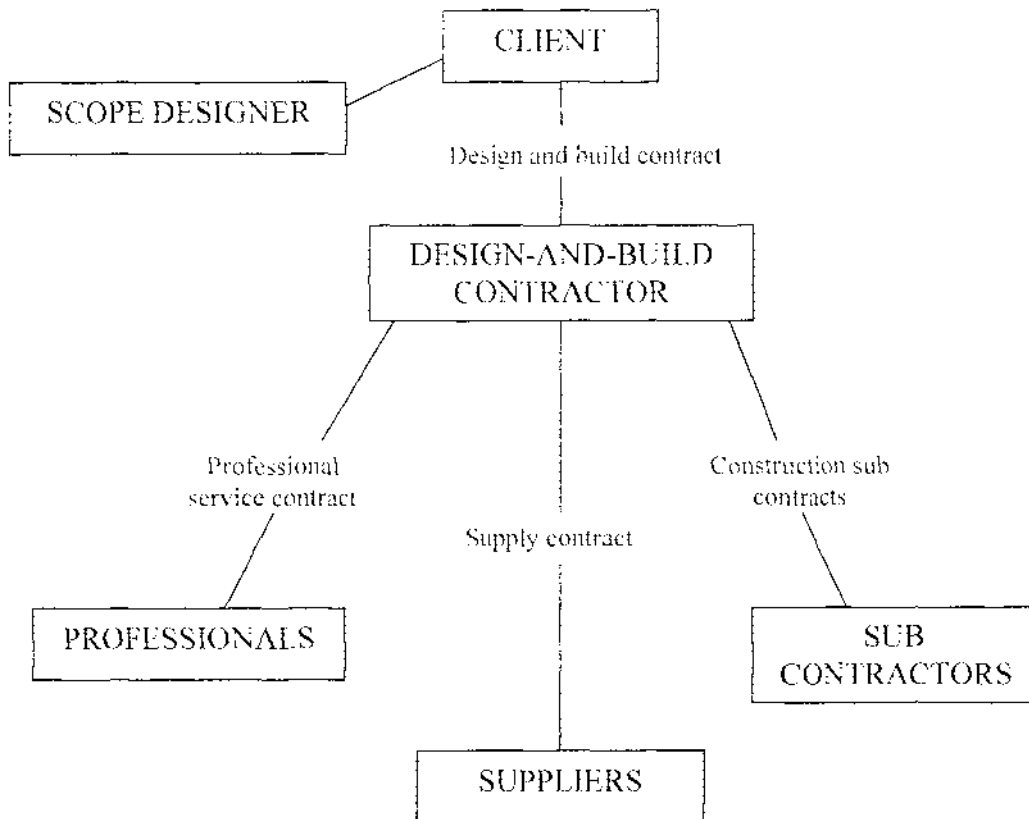


Figure 2: Design-and-build system (Source: Wilkinson and Scofield, 2003)

By transferring risks to the contractor, the client loses some control over the project (Kelly et al, 2002). Rampling Associates (2007) note that, as the designers are employed directly by the design-and-build contractor, the client's interest may not always be given first priority. Consequently, any client requirement, which is not directly specified in the tender document, will constitute a change or variation to the contract. Changes are usually more expensive to introduce after the contract has been let, compared with other types of procurement system (Kelly et al, 2002). In addition, specification is a risky area for inexperienced clients: over specification can cut out useful specialist experience; under specification can be exploited. Accordingly, it is difficult for the owner to verify that it is receiving the best value for money, without a great deal of confidence in the design-and-build contractor. Similarly, Richards (2005) argues that experience suggests that in an effort to bring projects in on budget, design-and-build contractors can often compromise on design and this can be a problem to clients.

Rampling Associates (2007) note that many clients that are disposed to short tender period under traditional procurement system, fail to give design-and-build tenderers adequate time to prepare their design or undertake crucial activities of estimating, subcontract enquiries etc. This can lead to tenders being inflated to cover unforeseen costs. Since each tenderer's bid is based on a different design, programme and cost, tenders can be difficult to compare (Rampling associates, 2007; Kelly et al, 2002).

Novation

According to Ng et al (2006), novation system is very similar to the design-and-build system, except that the design team is selected by the client and subsequently 'novated' to the contractor. 'Novation' is a legal agreement that occurs when a client transfers the contractual obligation with the design team to a contractor (Howden and Billiard, 1992). Walker and Hampson (2003) note that in this system, the contractor is responsible for design development, working details and construction with the assignment of the design team from the client. Initially, the client commissions a design team to undertake a partially complete design instead of each design and build company separately developing a design to a proposal stage. Upon successful negotiation of the construction contract, the design team and its design is passed to the successful bidder (Walker and Hampson, 2003).

Ng et al (2006) observe that the contractual relationship between client and design team is transferred once a contractor is appointed for the project. The client novates to the contractor the design team's right and responsibility for the project in its entirety until project completion (i.e. the post-novation phase). The new contract between client and contractor replaces the original contract between client and design team entirely. The contractor is therefore contractually responsible to client for both design and construction once novation has taken place. The contractual relationship structure of novation system is shown in Figure 3.

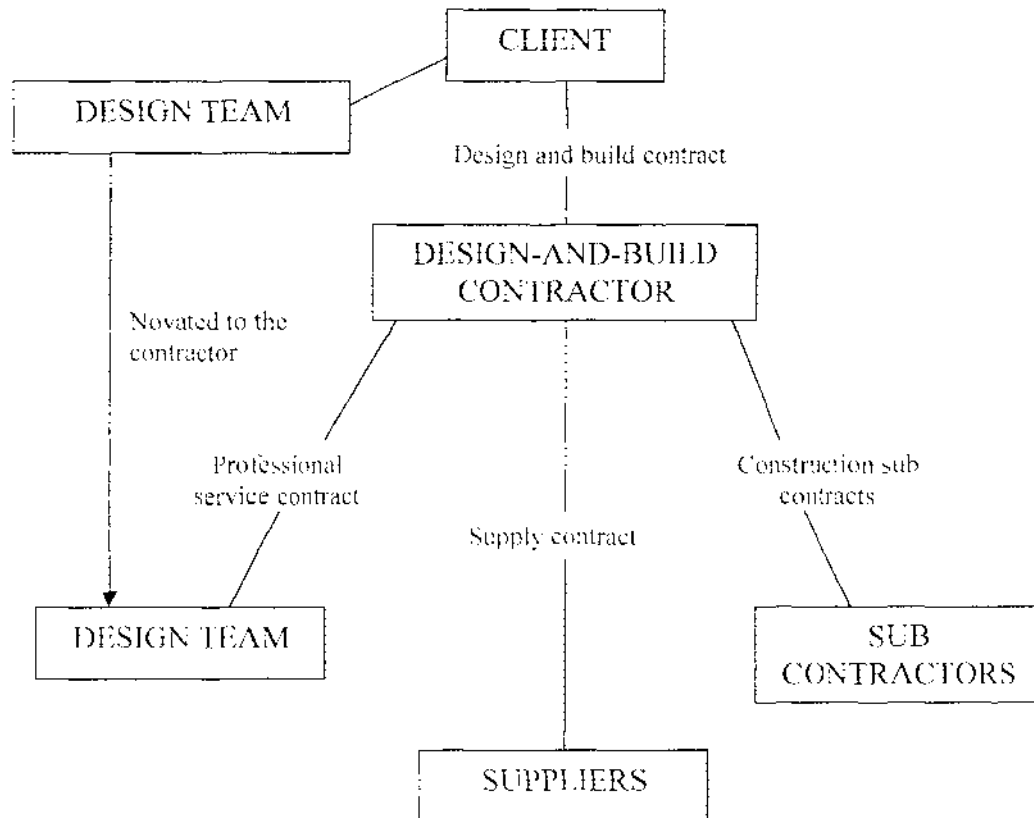


Figure 3: Novation system contractual relationships (Adapted from Ng et al (2006))

Walker and Hampson (2003) note that novation procurement system is very attractive for the client as the client's risk can be reduced when the contractor takes over design development after novation while accepting pre-novation design assumptions. This system ensures a greater consistency in design as the design team originally appointed oversees the entire phases of the project development. Ng et al (2006) argue that there may likely be fewer conflicts between the client and the contractor because the contractor no longer needs to seek claims through variations. Additionally, novation allows fast tracking and

fixed price. However the client forgoes some flexibility of making design changes without incurring potential cost penalties (Walker and Hampson, 2003).

In contrast with the design-and-build system, Chan (1998) argued that client has a greater degree of control over design and quality in novation contract since the contractor is appointed after the initial design is developed. Ng et al (2006) observe that since the preliminary design should have evolved during the bidding phase, the bids obtained will not be based on completely different designs. This makes bid analysis much more objective than is usually possible with the traditional design-and-build system.

Walker and Hampson (2003) are of the view that novation type of procurement system has had numerous successes. For instance, the Adelaide Entertainment Centre was the example of Australian project that successfully used a novated design approach (Chan and Tam, 1994). The followings are the comments arising from the practice of novation system (Chan, 1996):

- For a limited marketplace with insufficient companies who do not have a proven record of both designing and constructing – perceived risk of taking over a design deters many would-be tenderers.
- By accepting a novated design companies accept errors and omissions and other potential problems including a design that may potentially prove unworkable
- The architect will no longer supervise quality control or exercise sanction once novation occurs. This is difficult for many designers, as their reputation is closely associated with their work, which may be modified in a way that could upset them
- Once novation occurs, the contractor pays the design team. This may pose a financial risk to the design team if they believe that the contractor is not financially reliable.

In addition, Ng et al (2006) note that novation procurement system may be disliked by most contractors, with 96% of contractor respondents in a recent UK study indicating they would prefer not to use the system.

Turnkey / Package Deal

Turnkey procurement system provides for a contractor supplying design and builds services to also finance the project. The contractor is generally paid upon completion of commissioning and testing. Literally, the client pays for the project and gets the key to gain

access to the project (Walker and Hampson, 2003). Speculative development, especially for private housing is a prime example of turnkey project. The authors further note that this procurement system shares some similarities with the package deal system except that the contractor does not undertake to operate the constructed facility. These system approaches suit many clients who wish, for tax or other financial purposes, to only make a payment upon delivery of an accepted product.

Total package/ Build-operate systems

Walker and Hampson (2003) hint that in this procurement system, a client's project needs are met by an entity that contracts to design, build, operate, own for some period of time and transfer the facility back to the owner. There are variants of total package such as BOO (Build-Operate-Own), BOT (Build-Operate-Transfer) and BOOT (Build-Operate-Own-Transfer). Wikipedia (2007a) hints that during the time the project proponent operates the facility, it is allowed to charge facility users appropriate tolls, fees, rentals, and charges stated in their contract to enable the project proponent to recover its investment and operating and maintenance expenses in the project. However, this system is more common for government infrastructure projects than building because the concession allows for tolls or other payments to be made by end-users to cover the cost of both procuring the facility and its operation (Walker and Hampson, 2003).

Walker and Smith (1995) argue that the total package requires the contracted parties to accept the conventional wisdom that risk should be assumed by the party within whose control the risk most lies. A major function of this system is therefore to recognize and provide a mechanism for the assignment and management of those risks.

The advantage of this arrangement is that it extends the ideas of constructability further to embrace lifecycle cost effectiveness. If the entity proposing the design solution is responsible for maintaining and operating the facility then they will have the incentive to reduce long-term costs and thus develop a highly cost effective product over the product lifecycle (Smith, 1999). In addition, the entity undertakes financing, design and construction as well as operation and so the client is taking no direct cost risk other than the possibility that the facility does not meet its needs or that the concession arrangement is unsatisfactory (Smith et al., 1994).

As a cautionary note, experience with BOO/BOT/BOOT scheme reveals some failures. Generally these have been based on failures of trust and/or communication. One of the most prominent failures has been in the Bangkok Second Stage Expressway (Walker and Hampson, 2003).

Management oriented

A management oriented procurement system will generally be chosen where the client requires a hands-on involvement. This allows for a high degree of innovation throughout the project. This system also known as the “fast track” method due to their overlapping of design and construction, leading to shorter overall project duration (Gregus, 2007).

The variants of management oriented system are management contracting, construction management, and design and manage or project management.

Management Contracting

With this contract strategy, a management contractor is engaged by the client to manage the building process and is paid a fee. The management contractor is responsible for all the construction works and has direct contractual links with all the works contractors. The works are subdivided into trades and let as a series of work packages. The client employs the design team and therefore, bears the risk of the design team delaying construction for reasons other than negligence (Kelly et al, 2002).

Kelly et al (2002) note that this system is a ‘fast-track strategy where all design work will not be complete before the first works contractors start work, although the design necessary for those packages must be complete. As design is completed, subsequent packages of work are tendered and let. With the agreement of the client, the management contractor selects works contractors by competitive tender to undertake sections of the construction works. The client reimburses the cost of these work packages to the management contractor who, in turn, pays the works contractors. The management contractor coordinates the release of information from the design team to the works contractors.

Kelly et al (2002) identify the main advantages of this system:

- Time-saving potential for overall project time
- Buildability potential
- Breaks down traditional adversarial barriers
- Parallel working is inherent
- Changes can be accommodated provided packages affected have not been let and there is little or no impact on those already let
- Works packages are let competitively

However, Hashim (1997) argues that the quality of workmanship may suffer because the actual construction works are carried out by works or package contractors who are employed, coordinated and administered by the management contractor, and in which the criterion of high quality in workmanship is not a priority by management contracting client.

The contractual relationship of this type of procurement system is shown in Figure 4

Construction Management

Walker and McDermott (1999) describe the attributes of the construction management system, where the client does not allocate risk and responsibility to a single main contractor; instead, the client employs the design team, and a construction manager is engaged as a fee-earning professional to programme and coordinate the design and construction activities and to improve the buildability of the design. Construction work is carried out by trade contractors through direct contracts with the client for distinct trade or work packages (Kelly et al, 2002). Gregus (2007) notes that this system is slightly different from management contracting system where there will be a construction manager intermediary between the client and works contractors.

Walker and Hampson (2003) are of the view that under construction management system, the contractor acts as 'consultant' builder providing significant advice on the practicality of the design and expected construction method to be employed. In adopting the construction management system, the client will be closely involved in each stage of design and construction and needs to maintain a strong presence through a project management team that is technically and commercially astute (Kelly et al, 2002). Therefore, this system is not suitable for inexperienced client in the construction industry.

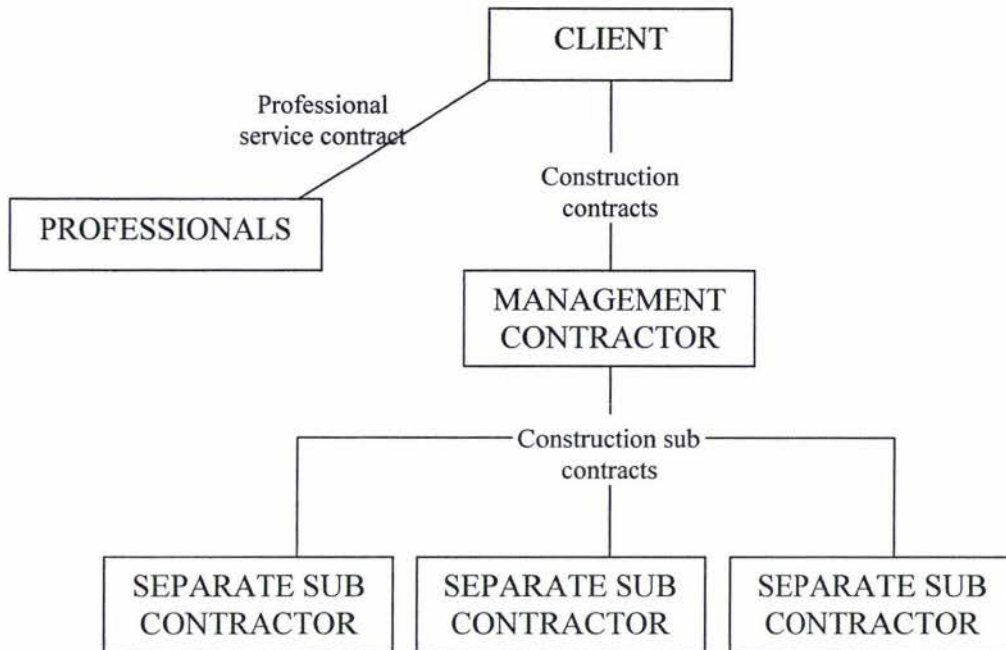


Figure 4: Management contracting system
 (Source: Wilkinson and Scofield, 2003)

As other innovative procurement systems, this system also allows the overlap of design and construction and therefore can speed up the project. However, Kelly et al (2002), argues that although the time for completion can be reduced, price certainty is not achieved until the design and construction have advanced to the extent that all the construction work packages have been let.

In this type of procurement, client has multiple contracts with designers, construction manager and contractors. The contractual relationship structure of construction management system is shown in Figure 5.

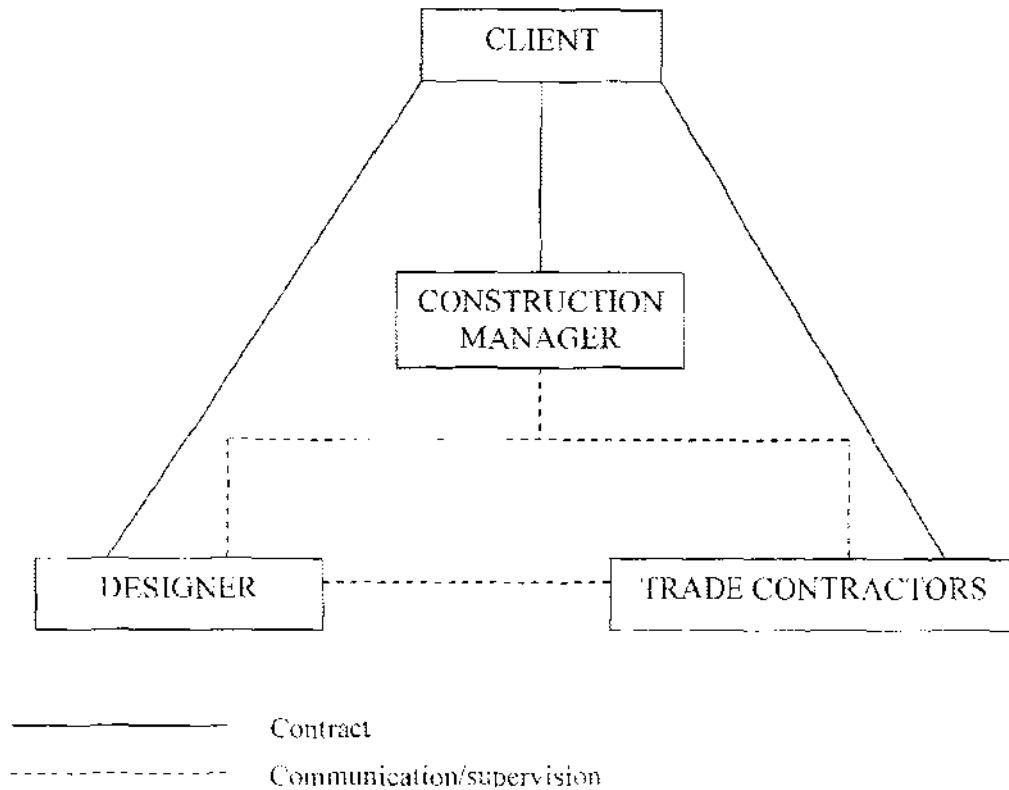


Figure 5: Construction management system (Adapted from Kelly et al, 2002)

Design and manage

Under this type of procurement system, the client appoints a single firm to design and deliver the project but specialist contractors are appointed to undertake the construction work by negotiation or in competition (Mbanjwa, 2003). There are two variants of this system: contractor project management and consultant project management.

1. Contractor project management

According to Kelly et al (2002), this strategy is similar to management contracting. The project design-and-manage firm takes a contractual risk to deliver the project to an agreed price and time targets and delivers the project by employing the works contractors as its subcontractors to design and/or construct (Mbanjwa, 2003). The contractual relationship structure of this strategy is shown in Figure 6.

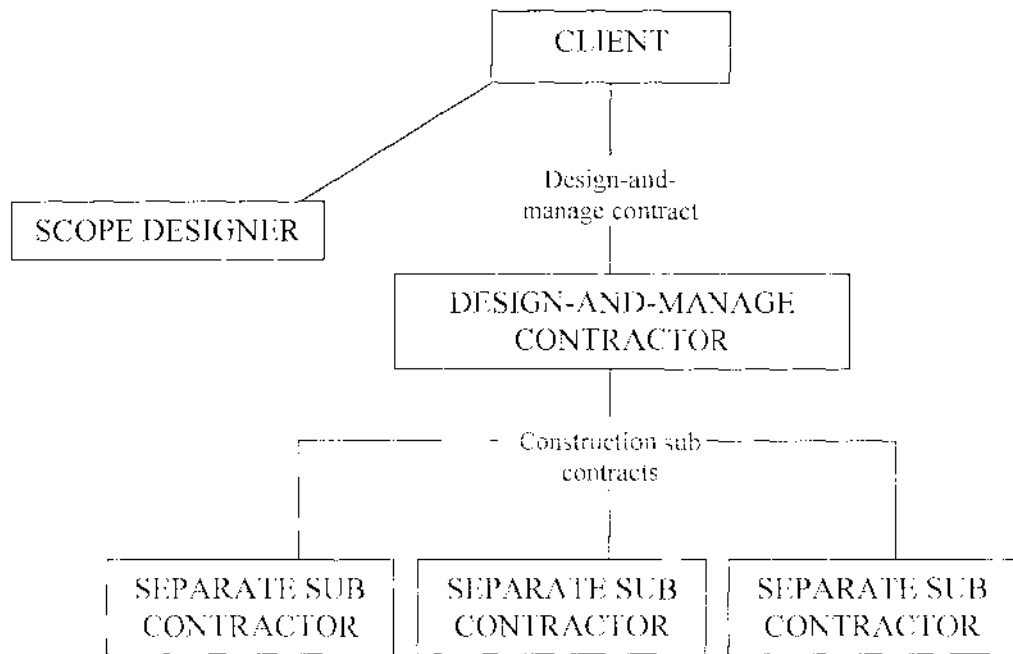


Figure 6: Design-and-manage contractor project management contractual relationship structure (Adapted from Kelly et al, 2002).

2. Consultant project management

Under this variant, the design-and-manage firm may act as the client's agent only and other contractors enter into direct contracts with the client, who takes the time slippage and price risks (Mbanjwa, 2003). The contractual relationship structure of this strategy is shown in Figure 7.

Kelly et al (2002) list the main advantages of this system as follows:

- Early completion is possible because of overlapping activities
- It can be applied to a complex building
- The design-and-manage firm assumes risk and responsibility for the integration of the design with construction

However, the disadvantages of the system include the following:

- Price certainty is not achieved until the last work package has been let.
- The client loses direct control over the design quality.

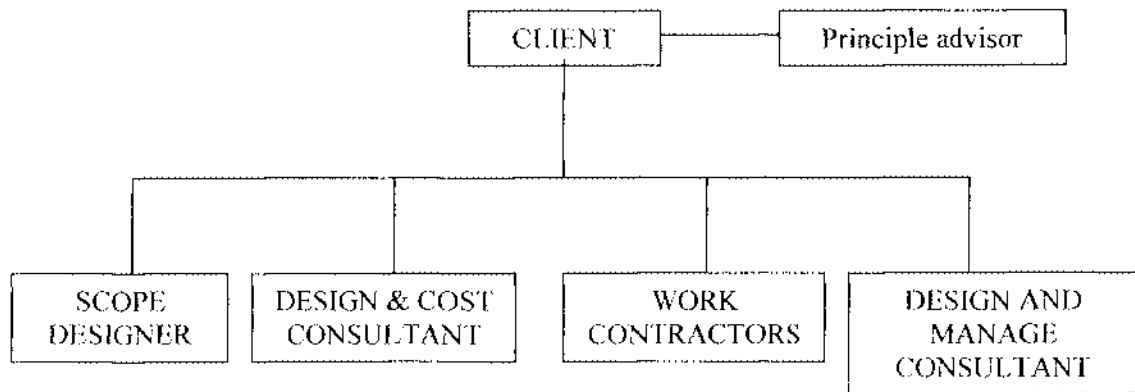


Figure 7: Design-and-manage consultant project management contractual relationship structure (Adapted from Mbanjwa (2003))

Collaborative approach

The collaborative or the relationship based procurement systems rely upon high level of trust and commitment of individuals working as coherent teams to achieve common objectives (Walker and Hampson, 2003). Indeed, there is an assumption (Latham, 1994) that greater collaboration between clients and contractors would be beneficial. Nowadays, collaborative method is seen as a very comprehensive procurement system that offers numerous benefits for project participants as well as encourages the industry to stay competitive globally.

Three popular forms of collaborative approaches are partnering, private-public partnership (PPP) and alliancing.

Partnering

A desire to avoid the problems caused by conflicts between different participants in the construction process has been an important driver behind the emergence of partnering system in 1990s (Barlow et al, 1997). The Construction Industry Institute (CII, 1991) defines partnering as, "a long term commitment between two or more organizations for the purpose of achieving specific business objectives by maximizing the effectiveness of each participant's resources" (p2). This requires changing traditional relationship to a shared culture without regard to organizational boundaries. The relationship is based on trust,

dedication to common goals, and an understanding of each partner's expectations and values. Expected benefits include improved efficiency and cost effectiveness, increased opportunity for innovation, and the continuous improvement of quality products and services.

Walker and Hampson (2003) argue that there is no partnering contract as such; rather an agreed partnering Charter forms the basis of a working agreement that is intended to shape a non-adversarial culture and to promote win-win working relationship between partners.

Nowadays, partnering has become an established concept for procuring buildings with wide acceptance in the USA, Australia and the UK (Rowlinson and McDermott, 1999). This is one type of innovative procurement options established with the purpose to overcome the shortcoming in the traditional procurement system. Essentially, the most concern for client in partnering system is to reduce the cost of construction and improve its efficiency (Barlow et al, 1997). Other drivers include:

- The need to carryout projects with specific requirements which could not be fulfilled using traditional procurement methods.
- A desire to rationalize their supplier base
- The need to ensure that contractors and suppliers adequately represented the client to their public customers or other internal clients

Partnering offers numerous benefits to the clients and all participants of the project. Barlow et al (1997) reveal the mutual benefits of partnering to all participants as follows:

- Improved project quality
- More effective use of personnel
- Reduced claims and litigation
- Better working environment
- Improvement in cost, scheduling and profitability
- Responsiveness to changing business conditions

Similarly, in a study of US Army Corps of Engineers construction projects, Walker and Hampson (2003) highlight other intangible benefits of partnering to include:

- Reduced administrative paperwork
- More enjoyable project work environment

- Reduced communication barriers
- Less adversarial relationships

Despite the potential advantages derived from the partnering system, it entails risks and problems in its implementation. Commitment by all parties is a key challenge, with problems such as uneven level of commitment, continuity of commitment, lack of commitment and upfront commitment (Rowlinson and McDermott, 1999). Cultural issues involved in changing the way a company works, as part of the partnering requirement, can also be problematic. Since the adversarial ways run deep and hard to change, the partnering philosophy is very hard to introduce in practice and it could easily be taken over by the traditional philosophy. In addition, Barlow et al (1997) note that there is a grumble from the contractors and suppliers that partnering is an expensive approach to procurement because of higher management overheads, with an uncertain pay-off.

Public-private partnership

One popular variant of partnering is Public-Private Partnership. Ascari Partners (2005) note that Public-Private Partnerships exist in a wide variety of forms and applications and are the standard way of delivering many public sector outputs especially for infrastructure projects in New Zealand.

Public-private partnership or sometimes referred to as PPP is a system in which a government service or private business venture is funded and operated through a partnership of government and one or more private sector companies (Wikipedia, 2007b). Broadly speaking, a public-private partnership can encompass any relationship between the public and private sectors, which produces an asset or delivers a service (Ascari Partners, 2005).

Katz (2005) distinguishes between PPP and conventional private sector procurement by the aid of the contractual relationship structure shown in Figure 8. The author notes that, in PPP system, the job of producing detailed designs, finding the finance, organizing the construction and on-going management of the facility are carried out by the private sector. If coordination and financing are carried out by a public sector agency but all other elements are carried out by the private sector, then the arrangement can be called "conventional private sector procurement" as illustrates in Figure 8.

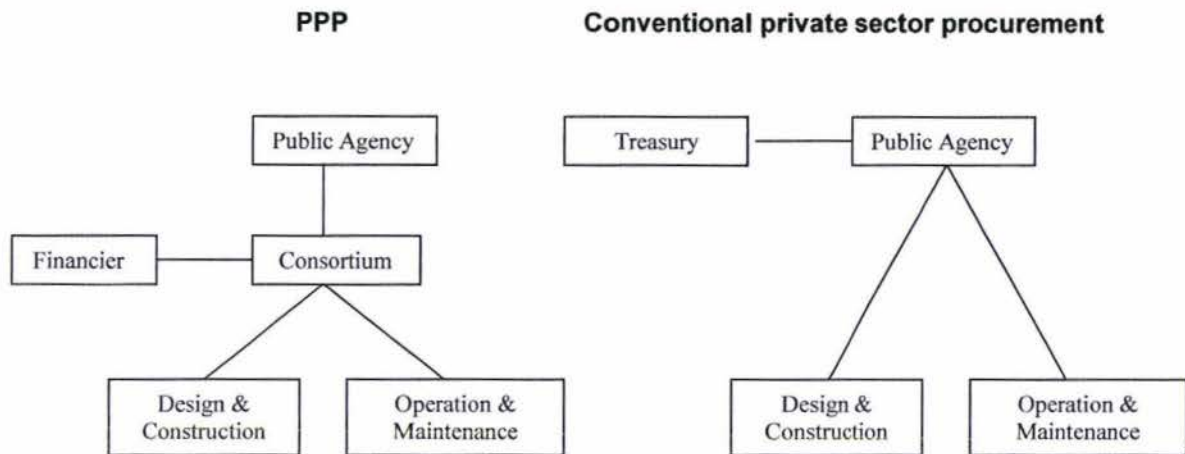


Figure 8: The differences in the structures of PPP and Conventional private sector procurement (Adapted from Ascari Partners, 2005)

Ascari Partners (2005) argue that there are a large number of international examples of public-private partnerships in the infrastructure sector, which involve transferring responsibility for undertaking not just design, construction and maintenance, but also financing and operational responsibility to the private sector, for a defined period of time such as BOOT (Build, Own, Operate, Transfer), BOT (Build, Operate, Transfer), DBFM (Design, Build, Fund, Manage), and DBFO (Design, Build, Finance, Operate). These models of public-private partnerships are characterized by a high degree of sharing of investment, risk, responsibility and reward between public and private partners. Essentially, they allow for greater opportunity for the public sector to transfer specific project risks to the private sector than would be the case under a simple design and construct model. In addition, in some types of PPP, the government uses tax revenue to provide capital for investment, with operations run jointly with the private sector or under contract.

In another variant - the Private Finance Initiative (PFI) - capital investment is made by the private sector on the strength of a contract with government to provide agreed services (Wikipedia, 2007b). Compared with traditional procurement system, this system offers potential to fill the prevalent shortcomings of the traditional system by providing:

- better whole-of-life project evaluation,
- stronger incentives to innovate and minimize whole-of-life costs,
- access to additional capital without affecting the gross debt target (Katz, 2006).

However, PPP contracts are typically much more complicated than conventional procurement contracts where it involves a very large tendering and contracting costs as well as the costs of contract renegotiation. Ascari Partners (2005) are of the opinion that high transaction costs arising from complex processes and the need for highly skilled resources to develop, manage and monitor projects are a common factor across large PPP, at least during initial projects. Other disadvantages of this system are:

- the difficulties of ensuring good performance, especially with respect to "soft" performance dimensions,
- the difficulty for the government not to intervene if the provider threatens to go bankrupt.
- Potential trade-off between financial and social objectives.

Alliancing

As previously described, the philosophy of partnering introduces the 'joint' commitment rather than 'share' commitment between the participants of the project. Indeed, in partnering system, Walker and Hampson (2003) argue that:

"One team may 'sink or swim' without necessarily affecting the business position of teams. One team may make profits from a project while other partnered firms/teams may actually make a financial lost" (p.53)

Essentially, the alliancing philosophy introduces that if one team in the alliance under-performs then all the other alliance partners are at risk of losing their rewards (profits and incentives) and could even share losses according to the agreed project pain-sharing / gain-sharing model (Kennedy and Budiawan, 2003). In addition, Rowlinson and Cheung (2005) note that *No Dispute* clause in the alliance agreement embedded the fundamental philosophy of alliancing where decision making should be focused on the project outcome and "best for project" practice.

Walker and Hampson (2003) note several vital components that differentiate alliancing from partnering as follows:

- Level of trust and commitment
- Degree to which the relationship is planned and nurtured rather than forced or required as a condition of contract

- Way in which the relationship is initiated, fostered and maintained as part of an integrated procurement process
- the degree to which transparency/open-book philosophy is maintained
- the way in which risk and reward is treated.

Collaboration between alliance partners is vital for a successful alliance project. Rowlinson and Cheung (2005) note that during collaboration, alliance partners are able to share resources including professional expertise. In addition, through the open and transparency of communication, foreseeable risks are exposed and parties have a better understanding of each other's needs.

Alliancing offers potential advantages for the industry, including (Lendrum, 1998):

- Continuous improvement based on trust, cooperation and commitment
- Higher profitability
- Greater employment opportunities
- Positive impact on the economy, society and the environment
- Positive cultural change for both organizations at all levels based on trust, cooperation and commitment.
- Adding value based on an open learning environment; allowing for high skills and fast adaptation to change
- As a benchmark against world best practice.

Although alliancing has been successfully used on civil and process engineering project as well as general building project, this type of procurement is mainly suitable for large or mega projects. It offers a medium to meet client's needs, but it must be borne in mind is that there are very few mega projects in the construction industry compared to the small and medium size projects and therefore, not all the shortcomings in small and medium size projects can be addressed by this type of procurement.

2.3 Clients and procurement needs

2.3.1 Classification of construction clients

The client in the construction industry can be defined as the initiator and the sponsor of a construction project. It denotes the person or organization that initiates the building process and appoints the building participants. The client is the main player in the construction industry and provides the most important inputs that affect how the construction industry performs. Newcombe (1994) points out that the most obvious thing that the industry expects from the client is the decision to build. Essentially, the client sets the objectives and requirements and then the construction industry turns those objectives into reality.

Clients can be categorized in many ways. Wilkinson and Scofield (2003) attempt to classify clients in the construction industry based on the following parameters:

- Expenditure: whether high, medium or low
- The types of project they are initiating such as residential, commercial, industrial or civil
- The level of skills and expertise in the construction industry
- The size and experience of the client's organization.

Rowlinson and McDermott (1999) note that commercially, the client may exist in one of three broad areas:

- Outside the construction industry
- Within the construction industry: for instance government or local authority departments with their own professional staff
- Partially outside the construction industry such as property developers with associated construction companies.

From a different perspective, Newcombe (1994) classifies clients into two groups:

- public authorities, which are accountable to society for the projects undertaken and so have an obligation to provide some form of service;
- private organization with their main obligation being to maximize stakeholder's benefits.

Generally, inexperienced clients do procure buildings on one-off basis and need to purchase construction expertise from outside the organization (Masterman, 1992; Newcombe, 1994). Rowlinson and McDermott (1999) provide further insights into the nature of construction clients and their recent transformations:

- An occasional builder to a regular builder
- Naïve of construction process to being highly sophisticated
- A distinct person or body to a much more unfocused and temporary multiorganisation
- Outside the construction to within it" (p.31)

Mbanjwa (2003) notes that experienced clients now challenge all aspects of the building industry's performance in search for better value, faster construction and higher profit. However, the key issue to be borne in mind is that the client is the financier and the initiator of a construction project and provides the most important perspective on how the construction industry performs. Understanding of the category of a particular client provides insights into the level of experience and the peculiar needs of the client and informs the consultants on the reliability or authenticity of the brief given by the client. For instance, briefs given by the inexperienced and one-off procurer-clients should be received with caution, while those of experienced and regular procurers are expected to be reliable and subject to little or no variations over the project development phase. However, regardless of the category and level of experience of the client in the construction industry, it is vital to understand their objectives and requirements in order to deliver to their expectation.

Figure 9 shows the broad categories of clients and the category delineated for the study – i.e. private sector commercial property clients. This client grouping was delineated for the study because they are frequent procurers who are well experienced and who have in-depth knowledge of the construction industry and their exact requirements, and so are well informed to give authoritative feedback on the issues being investigated (Mbachu and Nkado, 2006).

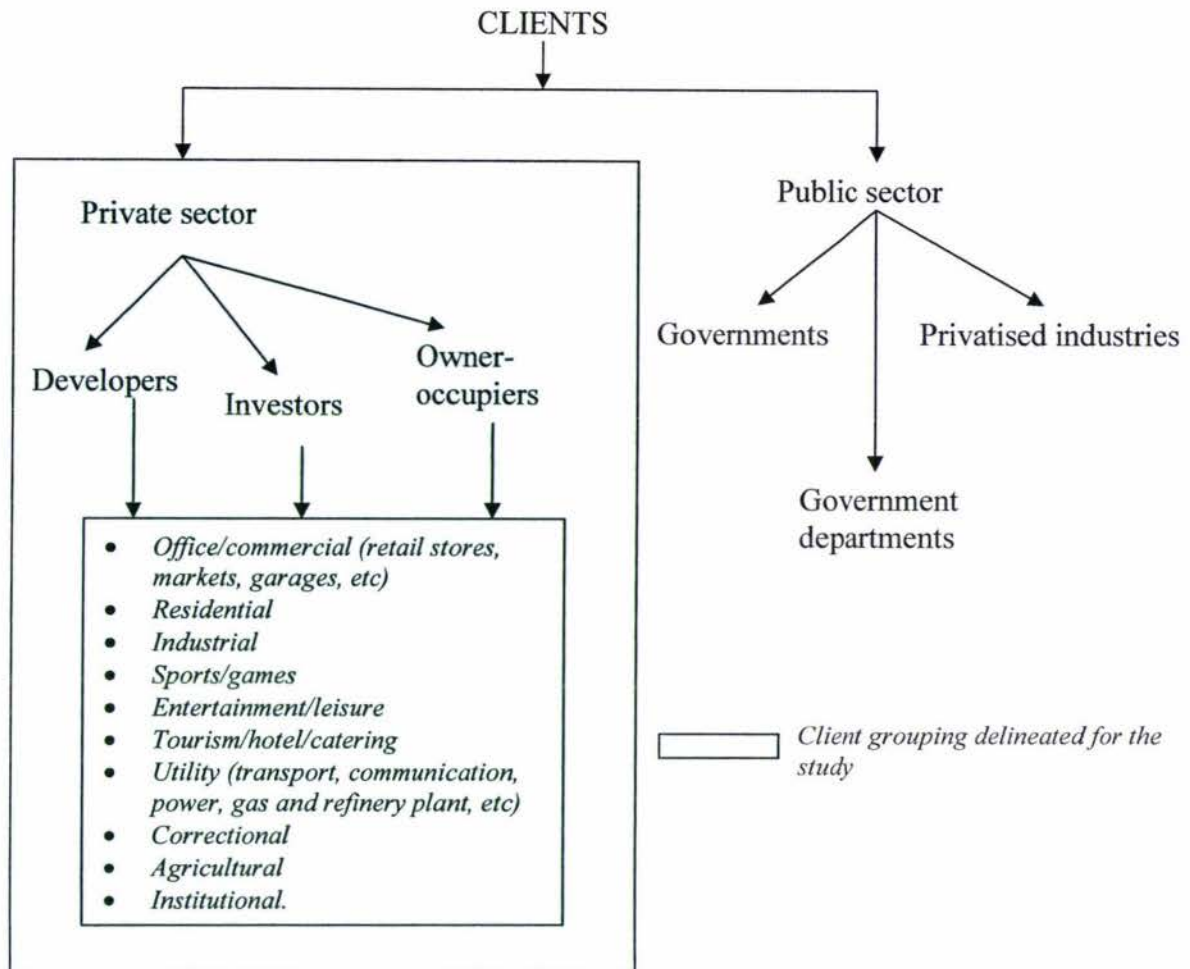


Figure 9: Broad categories of clients and the category delineated for the study

2.3.2 Procurement needs

Basically, procuring a construction project within the designated time, cost and quality is the prime objective of clients (Mbachu and Nkado, 2006; Raftery, 1999; Luder, 1986). Latham (1995) identify that client's needs and expectations in relation to construction projects will include the following:

- Value for money
- Pleasing to look at
- Free from defects on completion
- Fit for purpose
- Supported by worthwhile guarantees

- Reasonable running cost
- Satisfactory durability,

Mbanjwa (2003) adds cost and quality as part of client's needs in the procurement process. However, due to construction projects differing in nature, size and complexity, clients may attach different levels of importance to each of the three key client needs. For instance, Mbanjwa (2003) notes as follows:

"Cost, for example, may need to be traded off on a project that requires very high standards of quality. Time, on such a project, may also be traded of in order to ensure that the high quality levels expected from the project are indeed achieved." (p. 10).

Kelly et al (2002) prioritize likely client's objectives by client type since these objectives will obviously vary from client to client. Table 1 shows the examples of prioritized criteria by client types.

Table 1: Priority needs of clients in the procurement process
Source (Kelly et al, 2002)

	Owner-occupier (%)	Developer (%)	Investor (%)
Performance (Functionality/quality)	45	20	50
Time (Certainty or speed)	25	50	30
Cost (Certainty or price)	30	30	20
Total	100	100	100

Cost

According to Newcomb (1994) cited in Rowlinson and McDermott (1999), one of the most important things that a client expects from the construction is unbiased advice and accurate information. Therefore, the client has an obvious need to determine a realistic budget before design to evaluate project feasibility, to secure financing, and as a tool to choose from among alternative design or site locations. The certainty of project cost including capital, running and maintenance cost is very crucial for the client in making decision and evaluating the worthiness of the project. Once the budget is determined, the client requires that the project to be completed at or near the established figure without excessive overrun.

In theory, the adoption of the traditional approach based on full drawings and bills of quantities should give clients a firm and fixed construction price (Rowlinson and McDermott, 1999). Unfortunately in practice, there are very few projects that actually completed within the tendered price due to full drawings and bills of quantities often are not available when the project goes to tender. The authors further note that this has lead to:

- “a lack of flexibility
- a price to pay in terms of claims-conscious behavior
- the fallacy of cost certainty
- a release of control by the client organization?” (p.49)

This means that the traditional system failed to address this one of the most important criteria of the clients needs in procuring a construction project.

As a lesson from the past experiences, many researchers note in their research that the client pressurizes to obtain “best value” or “value for money” in a construction project. What does “best value” or “value for money” mean? Could it be equated with achieving a reduction in cost? Or purchasing a service or good in the cheapest price could be considered as “best value” or “value for money? At the simplest level, the concept of value for money is “you pay \$1 and you will get a good or service that worth \$1 value”. Atkin and Brooks (2005) opine that whereas cost is easier to measure, value for money is concerned with quality of a service and the economy, efficiency and effectiveness with which it is delivered. Undoubtedly, Rowlinson and McDermott (1999) are certain that most clients will look to see increased profitability and productivity from the outcome of the procurement process. This is because once decision to build a building or infrastructure is made, it

requires large sums of money to be expended and “locked up” in perpetuity or for a considerable period of time.

Quality

According to Wilkinson and Scofield (2003), quality means producing a product or service that is of a high standard and is fit for purpose. In short, meaning that it does what is supposed to do. In the construction industry context, the expected quality and specification of a project are set up in the outset of the project itself. Essentially, the functionality, durability and easily maintainable facility with no latent defect are the aspects of quality expected by the clients in procuring any construction project regardless whether the project is for commercial and business purposes or for individual self occupied. Once his entire requirement is briefed at the early stage of the project, the client requires that the expected quality of product could be delivered.

Schedule

According to Griffith et al (2000), the late completion of whatever purpose of the built product, will result the contractor’s loss of income, which is often reflected in the amount of contractual liquidated and ascertain damages. Similarly, clients have vested interest in the handover and commissioning of a project in a realistic time frame. This is because the date of completion of a new facility can be crucial, either in terms of generating revenue from the facility, or in terms of providing needed functional space by a particular deadline (Peck et al, 2005).

In the construction industry context, time is very crucial as it is related directly to the cost factor. The longer the construction period, the higher the cost of construction will be. Speed in construction is one of the most important client’s requirements in procuring a construction project in order to meet forecasted business profit and objectives which is set up at the outset of the project. Therefore, clients require that the project could be completed within the estimated realistic time frame.

Risk

Risk constitutes another major factor of the client procurement needs. Due to the misalignment of objectives between client and contractor, the management and distribution of risk should be done in contemplated way. Gilbreath (1992) advocates the important of risk management in construction procurement:

"Special difficulties abound in construction. By its very nature, this business is fraught with risk. People and companies are brought together, often for the first time, working in unique combinations, under different agendas, and some with incomplete information and opposing objectives – and all under pressure of time, money and technology. Risk is the underlying presence and how you confront risk – recognize it, provide for it, and counter it when you can – is the major factor in whether or not you will be successful" p.vii

Basically, the client's risk in a construction project can be transferred to another through a medium of contract. The traditional procurement approach introduces that the risk to be shared equally between client and contractor. This is one of the preference factors of client to traditional method than others even in fact, they aware that this method causes many of woes of the industry. Similarly (but conversely), the management oriented procurement approaches of Management Contracting and Construction Management will retain most of the risk on the client. Meanwhile in the Design and Build option, all risks are transferred to the contractor, which consequently will lose the client's control upon the projects (Kelly et al, 2002). However, according to Masurier et al (2006), the introduction of new procurement method that based on collaborative relationship for example Alliancing, provides risk and profit sharing between parties in a construction contract. This method introduces the "win – win situation" where the parties share of the "pain" or "gain" depending on how the project outcomes compare with the pre-agreed targets which have been jointly committed to.

All the procurement system properties have their own pros and cons over the risk management aspect. A conscientious decision regarding allocation of these risks among project participant should be made so that all areas of exposure are properly understood. The key to borne in mind is that, risk is a major factor that determines the success and the smoothness of a construction project and should be taken into consideration during the procurement system selection process.

Variation

Variations in the scope of the project very often result in increased cost, and usually more expensive to introduce after the contract has been let. A variation order is usually not a well-liked situation for the client, unfortunately in practice, the issuance of variation cannot be avoided in a construction project although the client's requirement has been properly briefed at the outset of the project. Some variation cannot be avoided due to outside the control of the project team for instance changes in interest rate, inflation, legislation etc. (Rowlinson and McDermott, 1999). Though traditional procurement approach offers that the variations to scope can introduced tolerantly, but the key issue should be borne in mind is that the variation is a "cancer" in construction industry. It is not only overrun the project cost but also reflect the uncompetitive ness of professionals of the project. Therefore, the introduction of variation should be controlled and implemented in a much contemplated way.

Many attempts have been made by the construction practitioners and researchers to study on the pitfalls in the construction industry caused by the variations. But in practice, the construction industry is full of uncertainty and unpredictability that influence by many internal (between the construction industries) and external (outside the construction industry for instance political stability, global market impact, natural disasters and etc.) factors (Kelly et al, 2002). As a cautionary note to this fact, clients require a procurement arrangement that the variation could be introduced in reasonably easy to arrange and value with the incurrence of reasonable financial penalties.

Client's involvement

Client is the sponsor and the financier of a construction project. Since a considerable amount of money to be invested in a project, clients require that their idea or involvement to be considered through out the project period. Unfortunately, their involvement or interruption to the project is limited to some extent by the building and construction contract. Due to the development of the procurement system over the pass few decades, the level of client's involvement in a construction project also has changed. Essentially, the level of client's involvement is directly related to the risk bearing of the project. This is because the greater the client's involvement in the project the greater the risk to be borne by the clients. Nevertheless, the excessive client's involvement might bring harm to the project. This is

evident where in literature indicate that the excessive client's involvement has become one of the factors that lead to the project failure (Mbanjwa, 2003)

2.3.3 Other needs

Clients have other needs, which cannot be easily addressed by the choice of an appropriate procurement arrangement option. The following sections identify these needs.

Construction safety and health

Construction safety and health is greatly concerned by the New Zealand construction industry. It is evident by the inclusion of quality health and safety systems as a qualification for the licensing of Building Practitioners under the Building Act as a mean of achieving the goal of the Construction Industry Council (CIC) Health and Safety strategy which aims for zero fatality record within five years (RMBF, 2006). The responsibility is clear and specifically placed upon clients, designers and contractors to be proactive in the planning, co-ordination and management of safety and health. This is a positive initiative, which deserves the support of the entire industry since safety is everyone's business. Undoubtedly therefore, this safety and health factor should be taken into consideration in the clients' decision to procure their project.

Sustainable construction

Sustainable construction is one of the most important upcoming concerns for the construction industry. According to BRANZ (2004), sustainable construction is the application of sustainable development to the construction process by the construction industry. As far as we are concern, the construction industry is typically characterized as a major consumer of energy and resources, and producer of a significant amount of waste. Rowlinson and McDermott (1999) note that, the consequences of waste generation are often borne by the community rather than those who have generated it. Therefore, the efficiency use of energy and resources that last for generations is viewed as a very important factor to be adopted in a construction project.

Commenting on the analysis of the 265 submissions received on the New Zealand Government's discussion document "Building for the 21st Century – Review of the Building

Code”, the Building Issues Minister Clayton Cosgrove said that the feedback shows the public shares the government concerns over factors such as climate changes and the need for sustainable development (RMBF, 2007). This is evident that the New Zealanders are very concern regarding to the environment sustainability and push that the construction process to be done in ways that are socially and ecologically responsible.

The UK strategy for more sustainable construction, Building a Better Quality of Life, suggests key themes for action by the construction industry. “They are:

- design for minimum waste
- lean construction & minimise waste
- minimise energy in construction & use
- do not pollute
- preserve & enhance biodiversity
- conserve water resources
- respect people & local environment
- monitor & report, (ie use benchmarks) “(SCT, 2004)

However, the sustainable development or sustainable construction not only pressurizes on the environmental aspect, where it should cover the aspect of social and economic sustainability as well. This is because there is a growing awareness of the impact upon society's long-term future of the process of developing the built environment. For instance Walker and Walker (1999) argue “if we cannot create a sustainable product or industry, then our industry sectors are doomed to die” (p.132). Kelly et al (2002) note the aims of sustainable development outlined by the UK government are as follow:

- Social progress which recognizes the needs of everyone
- Effective protection of the environment
- Prudent use of natural resources
- Maintenance of high and stable levels of economic growth.

In New Zealand, in order to meet the Kyoto Protocol obligation as well as the awakening of public conscience, the sustainable construction becomes one of the factors to be considered by clients in procuring a construction project.

From a different perspective, Mbachu (2003) categorizes clients' needs into stated and non-stated but expected needs as follows:

Typical stated needs of clients

These may also vary from one client to the other. Generally, typical stated needs of clients may be understood from the procurement assessment criteria listed by the National Economic Development Office (NEDO) (1985) report. These include:

- Time (programme) certainty
- Controllable variation
- Complexity
- Quality
- Price certainty
- Competition
- Division of responsibility
- Risk avoidance.

Typical 'non-stated but expected' needs

These may include the following:

- Empathy: Clients expect their views to be respected. It is advisable for the service provider to put himself or herself in the shoes of the client and see things from the client's perspectives, rather than insisting on the objective reality (Salisbury, 1990)
- Unbiased advice
- Reliable and accurate information/reports
- Honesty and integrity
- Cordial relations
- Value for money
- Timeliness and comprehensiveness of service
- Assurance of quality of service (performance capabilities).

2.4 Selection of an ideal procurement system

The study on the selection of appropriate procurement system to ensure the success of a construction project has gained much attention from practitioners in the industry recently (Chang and Ive, 2002). Many attempts have been carried out to develop various models to assist in decision of the selection procurement system process. The followings are the examples of previous study that have been made for this purpose:

- Alhazmi and McCaffer (2000)
- Cheung et al (2001)
- Chang and Ive (2002)
- Ng et al (2002)
- Luu et al (2005)

Unfortunately, according to Chan (2007), none of those models has been widely adopted in practice. The most significant possible reason is the lack of a universally applicable set of criteria to determine the appropriateness of a procurement system (Ireland, 1985)

In the process of procurement system selection, Rowlinson (1999) suggests the client's guides to assist in procurement system selection that produced by NEDO (1983). This guide lists nine separate criteria by which the client is expected to set priorities for its construction project. The criteria are as follows:

- Time: is early project completion required?
- Certainty of time: is project completion on time important?
- Certainty of cost: is a firm price needed before any commitment to construction is given?
- Price competition: is the selection of the construction team by price competition important?
- Flexibility: are variations necessary after work has begun on-site?
- Complexity: does the building need to be highly specialised, technologically advance, or highly serviced?
- Quality: is highly quality of the project, in terms of material and workmanship and design concept, important?
- Responsibility:
 1. Is single-point responsibility to you, after the briefing stage, desired?

2. Is direct professional responsibility to you from the designers and cost consultants desired?

- Risk: is the transfer of the risk of cost and time slippage from you important?

However, the author notes that in certain circumstances, it may be impossible at the outset clearly to define the key issues of procurement criteria. Thus, in such a situation it must be borne in mind that the selection process can only be a satisfying process rather than providing a definite answer to the procurement system question.

2.5 The most popular procurement system

There is a consensus of opinions by all researchers and building practitioners around the world that the traditional procurement system is the most popular and widely adopted by this industry to procure a construction project (For example Latham (1994); Taylor et al (1999), Richards (2005)). The popularity of the traditional procurement system is due to a range of benefits but the most prominent reasons are; most clients and contractors have wide experience of it; the system offers some price certainty if the design has been fully scoped out prior to construction; and it gives the client greater control of design as by default, the client controls the design team.

2.5.1 Reasons underlying client's preference for the traditional method

The reasons underlying client's preference to the popular method entail the followings:

Risk evasiveness

Insufficient knowledge of new innovated procurement system makes clients and other building practitioners averse to adopt and prefer to stick to the traditional system which has been adopted for a long time. Most of them refuse to change and claim that having no time to learn the new procurement approach. In addition, all parties very understand in depth the advantages and disadvantages of the traditional system (Richards, 2005) and prepared themselves to face the risks and responsibilities.

The adoption of new approach to the company or organization is viewed as a “try and error” test. Most clients refuse to take risk by trying a new system without proven outcomes. It is common for clients to ask once they are asked to try a new thing which is uncommon to them, “What benefit will this system give me?” and “What are the potential problems?” This is because clients does not like to take risk to adopt new approach due to a reasonable amount of money has been invested in a project and therefore they only seek for a system that promises the increased profitability and productivity outcomes.

Emmitt (1997) outlined in his study the difficulty of convincing a client on the new procurement approach where the author mentioned that there was a learning curve to be encountered by the client when he was integrated into the decision making process. Nevertheless, the author opines that the client’s learning curve will only delay the benefit of innovation rather than completely choke it.

Familiarity with traditional

Taylor et al (1999) note that the descriptive traditional system has been the standard system for more than a century in the UK and in those countries that have adopted the system imposed by UK and similar power.

Since the traditional procurement system has been widely adopted in the industry to procure a construction project, this system is viewed as standard procedures by clients especially in public sector. For instance, Latham (1994) states that after the client is satisfied with the brief and the feasibility of the project, a typical client’s instinctive reaction is to get into “ring up an architect or engineer syndrome”. This scenario is seen as for a typical client, traditional system is the automatic allocation of a specific construction procurement system for a project. On the other hand, insufficient knowledge of other innovative procurement system also lead to the preference of most clients to the traditional system where all the building participants have better knowledge and indirectly would enhance their effectiveness on their job. Since most clients and contractors as well as building professionals would have experience of it, this system remains popular and be one of the factors that obstruct the adoption of the innovation procurement systems.

Desire for lowest tender/ competitive processes

Clients, especially in private sector are very desired and tempted for the lowest tender through the competitive pricing processes. Undeniably, cost factor is the paramount important to be considered by clients at the outset of the project to evaluate the feasibility of the project and to secure financing (Peck et al, 2005). In addition, client's *business-as-usual* attitude require that the capital cost to be as lowest as possible but desire to gain profit from the capital invested as much as it can be.

Lowest cost is defined as meaning the lowest dollar value without consideration of the non-financial attributes (NZCIC, 2006). Walker and Hampson (2003) note that open or pre-qualified tender competition using the traditional approach almost always results in acceptance of the cheapest fixed price for the specific work. Therefore, the apparent attraction of the traditional method as delivering the market or cheapest price, at least initially, is widely attributed to its continued popularity (Latham, 1994). Furthermore, the win-lose philosophy of this system promotes the success coming from the expense of others tempting the preferences of clients as well as others contract participants into the traditional system.

Prefer the division of the design and construction responsibilities

In most literature, the innovation of new procurement system attempts to overcome the problem of adversarial relationship between building participants brought by the traditional system. However, this aspiration is not always achieved. This is because the adversarial and split responsibility culture runs deep and very hard to change. The division of design and construction responsibilities become one of the reasons of client's preference to the traditional system. Clients prefer the former stage that is design stage to be handled by professionals and the latter that is construction stage to be handled by the contractors. The clarity of responsibility of each project participants will reflect the risk that to be borne by. This philosophy is crucial for instance, in case of dispute; it would be easy to point out who should be responsible. This is because there is a clear-cut that the client and professionals are responsible for the design matters while the contractor will take responsibilities on the dispute arose due to the construction matters.

2.7 Summary of literature review

The reviewed literature has provided insights into the prevalent and current practices and thinking in the field of construction procurement. In addition, related works of researchers in the past have been studied with a view to visualizing gaps in the literature where the current study intends to contribute to filling.

In relation to research objectives, the reviews have provided part answers as proffered by researchers in the past.

The first objective of the study is to identify the criteria that encompass the procurement needs of the New Zealand construction clients. Outcomes from the literature review show that client needs in procuring a construction project include:

- Cost: The certainty of total cost of the contract including capital cost and whole life cycle cost.
- Schedule: The certainty of estimated time frame and also the speed of design and construction time.
- Quality: The functionality, durability and easily maintainable facility with no latent defect as well as with aesthetic appearance as expected by the client.
- Risk: The degree of risk to be borne by may vary from client to other clients dependent on how much their involvement on the construction process.
- Variation: Clients require a procurement arrangement that the variation could be introduced in reasonably easy to arrange and value.
- Client's involvements: The level of client's involvement is directly related to the risk bearing of the project.

Other needs

- Sustainable construction: Procurement system that gives attention to social progress; effective protection of the environment; prudent use of natural resources and maintenance of high and stable levels of economic growth.
- Safety and health: Practices that ensure sufficient time is provided to plan, design and incorporate health and safety elements throughout the life of the project.

The second objective is to establish the ideal procurement system for the New Zealand private sector construction clients. The findings from literature show that many attempts have been carried out to develop various models to assist in decision of the selection procurement system process. Unfortunately, none of those models has been widely adopted in practice. Many researchers concluded that, and the selection process should consider the clients' preferences as well as the local cultures to allow modification and adjustment in order to achieve project success.

The third objective of the study is to identify the most popular procurement system used and the reasons for its use. The most popular procurement system cited by all researchers in literature is traditional system. The followings are some of the reason revealed in literature underlying clients' preference to this popular method

- Risk evasiveness of client to try new procurement system
- Familiarity of clients and project participants with traditional procurement system
- Prefer the division of the design and construction responsibility
- Desire for lowest tender

Gaps in literature

As indicated above, the reviews of related literature have provided part answers to the research objectives as proffered by researchers in the past. However, the New Zealand private clients' requirements are unique and might be different from the need preferences of clients in other countries. In addition, although there are various models proffered in the literature for selecting an appropriate procurement system, none of those models has been widely adopted in practice. The researcher believes that the ideal procurement system selection process should consider the unique needs preferences of the local clients, the practical realities on ground, and the local industry culture, and be flexible enough to allow modification and adjustments in order to be acceptable and practically operable. . This study aims to contribute to finding the ideal procurement system that will meet the unique needs of the New Zealand clients, and that will be attuned to the realities on ground, and so lend readily to acceptance and practical adoption

CHAPTER 3: METHOD

3.1 Overview

This chapter presents the research design and methods adopted in the thesis. It provides a brief explanation of the steps of the research process, and how they are employed in relation to each of the thesis objectives. The chapter also highlights compliance with the Massey University's Code of Research Ethics, including approval by the Massey University Human Ethics Committee for the undertaking of the research.

3.2 Research design

The descriptive survey method was used for the study, as the data needed were opinions of respondents, which were gathered using the technique of observation via pilot interviews and questionnaire surveys. Prior to the sending of questionnaire, pilot interviews were conducted with a convenience sample of construction clients, professionals and contractors in New Zealand.

Constructs generated at the pilot interviews and others sourced from the literature were used in designing the questionnaires. The questionnaires were subsequently pre-tested and finally distributed to the sampling frames of the target populations: i.e. registered members shown in the membership directories of the New Zealand Institute of Building (NZIOB), the Property Council of New Zealand (PCNZ), the New Zealand Institute of Quantity Surveyor (NZIQS), the New Zealand Institute of Architect (NZIA), the Institution of Professional Engineers New Zealand (IPENZ) and the Registered Master Builders Federation (RMBF). The questionnaires were self-administered; participation was voluntary. Questionnaire forms were distributed by hand, and some through fax and email. Completed questionnaires distributed by post were returned using enclosed stamped and self-addressed envelopes; others were received by fax or as attachments to emails.

3.2.1 Questionnaire design

A questionnaire was chosen instead of other survey method as it allowed structured questions to be posed to respondents. The questionnaire comprised of two sections i.e. Section 1 and Section 2. Both sections had to be completed by respondents. In Section 1 all of the questions had to be answered by all respondents regardless whether they were clients, consultants or contractors. However in Section 2, the specific questions of demographic background of each group were developed.

Section 1 was divided into 4 parts, namely:

- Clients preferences in procuring a construction project
- Respondents' level of usage of various available procurement systems in their previous and current projects.
- Client willingness to adopt a novel system other than normally used system
- Reasons for not adopting a different procurement system

In the first part question, clients' needs or preferences were listed and questions were asked based on four categories; cost, time, quality and general needs. However, a series of detailed questions were developed in the questionnaire in order to encompass their preferences based on the four categories. In this part also, respondents were asked to rate the perceived level of importance of every criterion in procuring their projects. In second part, several number of established procurement systems available in local and international construction industry were listed. Respondents were asked to rate the perceived frequency of adoption of the listed procurement system in their past and current project. Three levels of frequency were used for this question; "Frequently" (3), "Occasionally" (2) and "Rarely" (1). In the third part of the Section 1, respondents were asked to indicate their willingness to adopt novel or different procurement system other than what they were used to. The fourth part focused on a series of reasons of clients' unwillingness to adopt new or different systems. The identified reasons were sourced from literature and pilot interviews. Respondents were asked to rate their levels of agreement by ticking "Agree" (3), "Somewhat agree" (2) and "Disagree" (1).

In Section 2, the following demographic background information was asked:

- Respondents' length of experience of building procurement
- Respondents' status in their respective organizations

- Categories of client groupings for the respondents' organizations
- Purpose groups of buildings/ facilities mainly procured by respondents' organizations
- Professional affiliations of consultant respondents
- Professional associations of consultant respondents
- Construction businesses of contractor respondents
- Trade associations of contractor respondents

Appendix B2 presents a sample of the questionnaire.

3.3 Research strategy

Figure 10 presents the flowchart of the process used in carrying out the research project from conception to completion. Eleven steps were involved, which ranged from the identification of the research problem at the onset, through the review of the relevant literature, research design, proposal, ethical approval, pilot interviews, questionnaire administration, data analysis, report compilation, and submission of the draft report, to the correction and submission of the final report and submission of summary of the research findings to interested respondents.

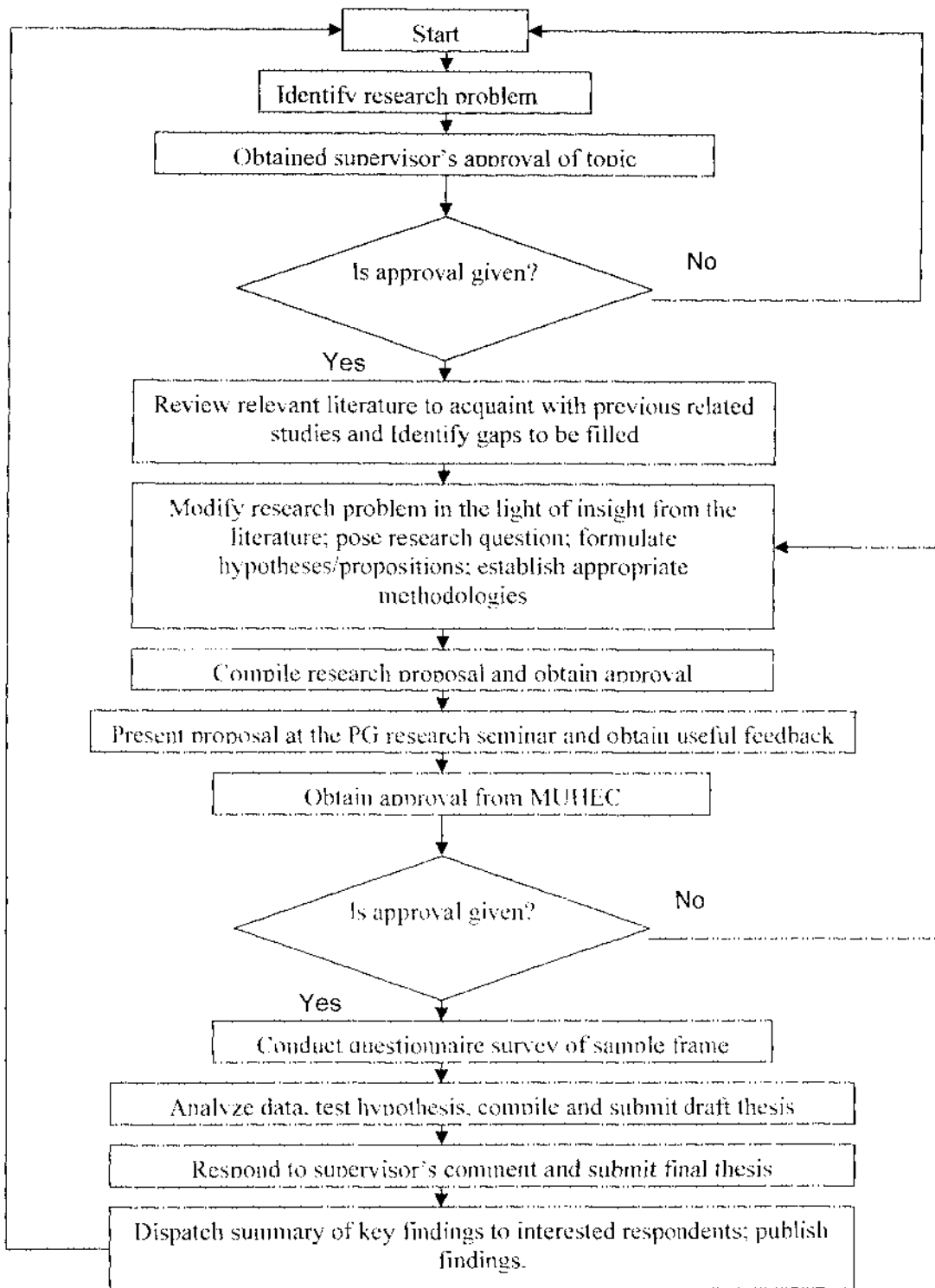


Figure 10: Flowchart of the process used in carrying out the research project from conception to completion

3.4 Target Population & Sampling Frame

The target populations of respondents for the study were construction professionals, clients and contractors in New Zealand. The sampling frames were registered members of the following association as indicated in their current membership list:

- Registered members of the New Zealand Institute of Building (NZIOB)
- Registered members of Property Council of New Zealand (PCNZ)
- Registered members of New Zealand Institute of Quantity Surveyor (NZIQS)
- New Zealand Institute of Architects (NZIA)
- The Institution of Professional Engineers New Zealand (IPENZ)
- Registered member of Registered Master Builders Federation (RMBF)

3.5 Data Gathering

The method of data gathering involved 2 stages:

First stage

Qualitative data gathering: During this stage, the constructs or recurring themes for questionnaire design were obtained through pilot interviews conducted with convenience samples of respondents drawn from the sampling frames.

Second stage

Quantitative data gathering: At this stage, the opinions of representative samples of the sampling frames were obtained via questionnaire surveys, involving ratings of the attributes of the identified constructs.

3.6 Data Analysis

Content analysis and multi-attribute methods were used in analyzing the data obtained from the questionnaire survey. The multi-attribute analytical technique was used to analyze the ratings of the respondents with a view to establishing a representative or mean rating point for each group of respondents. The analysis drew from the Multi-attribute Utility approach of Chang and Ive (2002), and involves the computations of the Influence Index (II) and the frequency of occurrence of each constraint within a subset of factors. In each computation, the total number of respondents (TR) rating each constraint was used to calculate the percentages of the number of respondents associating a particular rating point to each constraint as shown in Equation 1

$$II_j = \sum_{k=1}^5 (R_{pjk} \times \%R_{jk}) \quad (1)$$

(Where II_j = Influence Index for attribute j ; R_{pjk} = Rating point k (ranging from 1-5); $R_{jk}\%$ = Percentage response to rating point k , for attribute j). The Frequency Index (FI) was computed in the same manner.

Choosing the ideal procurement system

A modified version of Turner (1990) matrix chart for choosing the procurement arrangement option that best meets the needs of client is adopted. The chart shows a list of client procurement assessment criteria incorporating additional needs established at the pilot interview stage. Also the list of procurement arrangement options (PAOs) was increased to include additional types identified during the interviews. On the chart, an 'X' is marked in a matrix cell where a given PAO meets the preferences of the client in relation to the preference eliciting optional answers. By summing the 'Xs' under each PAO column, the ideal procurement system is found as that with the highest sum of 'Xs'. In other words, this indicates the PAO that best addresses the needs of clients in the procurement process. Table 2 shows the chart used for this purpose.

Table 2: Chart for the assessment of client's procurement needs, and choice of appropriate procurement route (Adapted from: Turner, 1990)

(*Trad = Traditional; D & bld = Design and build; Mgt = Management; D & man = Design and manage; Seq = Sequential; Accel = Accelerated; Comp = Competitive; D & C = Develop and construct; MC = Management contracting; CM = Construction management; Ctr PM = Contractor project manager; Csl PM = Consultant project manager)

Procurement a	Preference-eliciting question	Possible answer	*Procurement arrangement options (PAO)								
			Trad Seq	D & bld Accel	Mgt Direct	D & man Comp D & C		MC	CM	Ctr PM	Csl PM
Timing	How important is on-time completion to the success of your project?	Crucial		X	X			X	X	X	X
		Important		X	X	X	X	X	X	X	X
		Not as important as others	X								
Controllable variation	Do you foresee the need to alter the project in any way once it has	Yes	X	X				X	X	X	X
		Definitely not			X	X	X				
Complexity	Does your building (as distinct from what goes in it) need to be technically advanced or highly	Yes	X	X				X	X	X	X
		Moderately so		X	X	X	X	X	X	X	
		No, just simple			X	X					
Quality level	What level of quality do you seek in the design and workmanship?	Basic competence			X	X					
		Good but not special	X	X	X	X	X	X	X	X	X
		Prestige	X	X				X	X		
Price certainty	Do you need to have a firm price for the project construction before	Yes	X		X	X	X	X		X	
		A target plus or minus will do		X					X		X
Competition	Do you need to choose your project team by price competition?	Certainly for all const work	X			X	X	X	X	X	X
		Const & mgmt team	X			X	X	X			
		No		X	X						
Division of responsibility	Can you manage separate consultancies and contractors, or do	Can manage separate firms	X	X				X	X		
		Only one firm for everything			X	X	X			X	X
Professional responsibility	Do you want direct professional responsibility to you from the	Not important			X	X	X			X	
		Yes	X	X				X	X		X
Risk preference	Do you want to pay someone to take the risk of cost and time slippage from you?	No, prefer to retain risk							X		X
		Prepared to share agreed risk	X	X				X			
		Yes			X	X	X			X	
Totals:			X	X	X	X	X	X	X	X	X

Rank correlation analyses

For the purpose of improving reliability and validity of the research findings, the opinions of contractors, building professionals and clients were compared with a view to establishing "multiple sources of evidence" (Tan, 2002, p.63) or measuring internal consistency through the "equivalent-form method" (Zikmund, 1997, p.341). The comparison involves matching the sets of ranks analyzed from the responses of contractors, building professionals and clients on attributes of dimensions being rated.

Both Cooper and Emory (1995) and Zikmund (1997) recommend the use of Spearman rank-order correlation as the appropriate statistical technique in situations involving the ordinal level of measurement and two related sample cases. Naoum (2003) also support the use of Spearman correlation test where "the problem is to measure the amount and significance of a correlation between people's rank on a number of issues" (p.124). The Spearman rank-order correlation coefficient rho (ρ) is computed (Zikmund, 1997, p.649) using Equation 2.

$$\rho = 1 - \frac{6 \sum_{i=1}^n di^2}{n^3 - n} \quad (2)$$

Where d_i is the difference between the ranks given to the i^{th} attribute by each group; n is the number of attributes being raked.

T-Score

The Spearman rank-order correlation coefficient ρ , computed in Equation 2 assumes a normal distribution where the data points are thirty or more. For a small sample size, with data points less than thirty, Zikmund (1997) recommends converting the ρ to Student-T test statistic for a more accurate result.

The Student-T test statistic is computed using Equation 3 below:

$$\text{T-score} = \rho \sqrt{\frac{n-2}{1-\rho^2}} \quad (3)$$

Where:

n = number of objects ranked

t = Student t test statistic computed as a transformation of the Spearman's rank correlation coefficient correlating both sets of paired ranks of the criteria importance scores computed from clients, consultants and contractors' ratings.

t_c = Critical value of Student t test statistic for a given degree of freedom, df (i.e. n-2) corresponding to n number of pairs of ranked objects at 0.05 level of significance. (See Appendix E)

Test of significance

To associate some level of confidence in the outcome of the proposition testing, the propositions were formulated as hypothesis and tested with the appropriate test statistic (Zikmund, 1997; Tan, 2002).

In the test of significance of the computed value of Spearman rank correlation coefficient, the null hypothesis (H₀) assumes that significant correlation exist between the two sets of ranks of n attributes computed from the ratings of contractors, building professionals, and clients. In statistical terms, this implies that the computed rho (ρ) is less than or equal to the critical rho (ρ_α). In the study, an alternative hypothesis (H_A) is chosen for two tailed test, which assumes that a significant correlation exists. At 5 percent level of significance, both H₀ and H_A could be stated as statistical hypotheses as follows:

$$H_0 \quad \rho \leq \rho_{\alpha} \text{ (i.e. significant correlation exists)} \quad (4)$$

$$H_A \quad \rho \geq \rho_{\alpha} \text{ (i.e. no significant correlation exists)} \quad (5)$$

3.7 Research Model / Conceptual Framework

The conceptual framework that provides insights into the expected outcome and use of the research findings is shown in Figure 11. The process starts by identifying the clients' procurement needs and by using multi-attribute analytical technique; all of those needs are prioritized. The process continues by identifying the procurement arrangement options (PAOs) and then matching them with clients priority needs. The PAO that matches most of the clients need is considered the ideal procurement system.

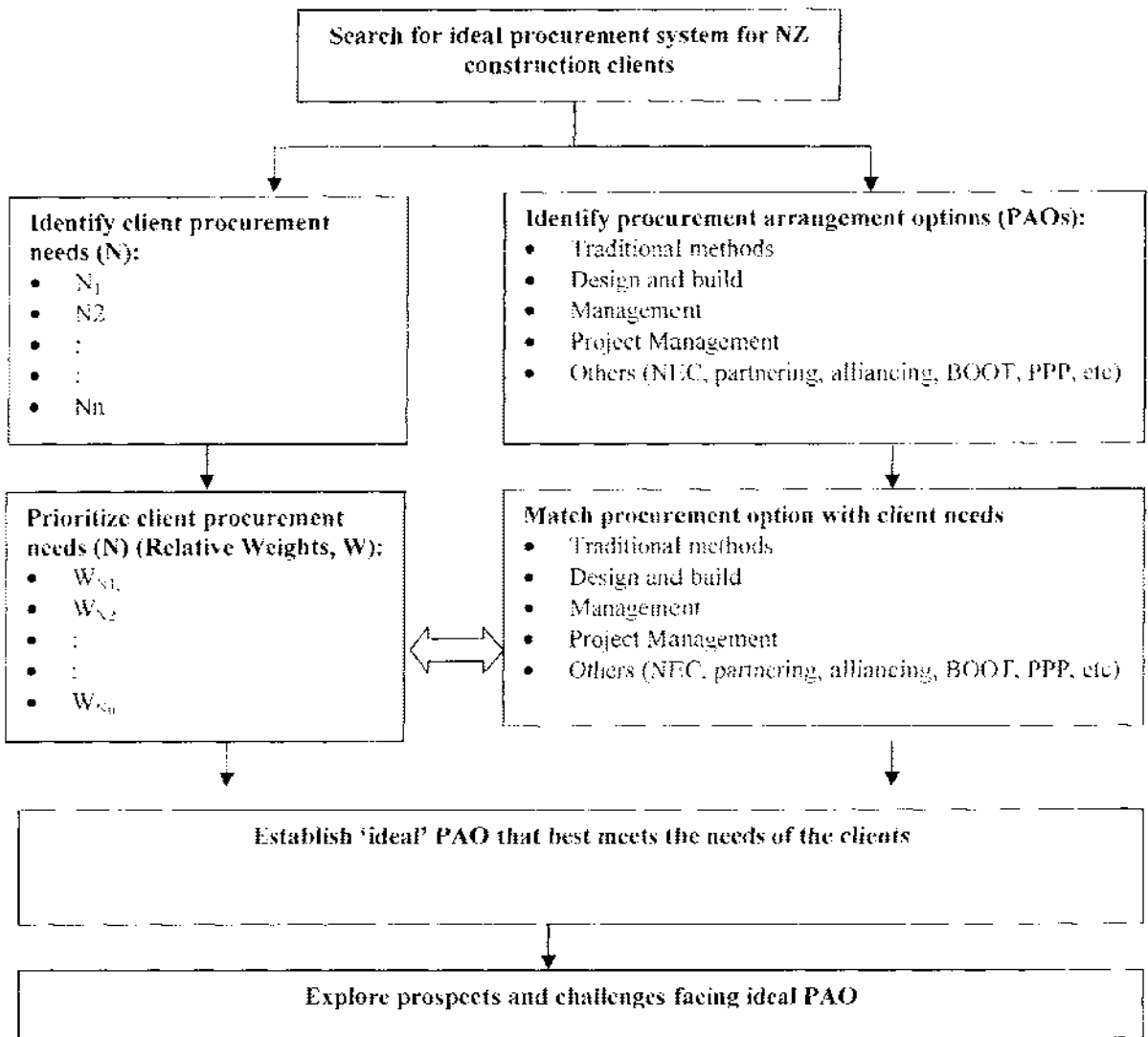


Figure 11: Research model / conceptual framework

3.8 Compliance with research ethics

3.8.1 Clearance for research undertaking

As part of Massey University's Policy on research involving human participants, application for permission to undertake the questionnaire survey was made to the Massey University's Human Ethics Committee (MUHEC) prior to obtaining the research data. The application was approved (see Appendix D) on the basis of the following principles; details are provided in the MUHEC Code of Ethical Conduct (Massey University, 2006):

1. Respect for persons
2. Minimization of risk of harm
 - Risk of Harm to Participants
 - Risk of Harm to Researchers
 - Risk of Harm to Groups/Communities/Institutions
 - Risk of Harm to Massey University
3. Informed and voluntary consent
4. Respect of privacy and confidentiality
5. Avoidance of unnecessary deception
6. Avoidance of conflict of interest
7. Social and cultural sensitivity
8. Justice

CHAPTER 4: DATA PRESENTATION, ANALYSIS AND DISCUSSIONS

4.1 Overview

In this chapter, data obtained from questionnaire administration are presented and analyzed. The chapter subsections include survey responses, respondents' demographic background, and findings in relation to the research objectives

4.2.1 Survey responses

A total of 150 questionnaires were distributed. However, only 60 questionnaires were returned by the cut-off date, resulting in a 40% response rate. Out of total respondents, 33% were clients, 53% were consultants and 13% were from contractors. The views were therefore predominantly those of consultants. This bodes well for the quality of the research findings, as the inputs were mainly from those who are responsible for giving procurement advice in the construction industry.

4.2.2 Demographic background

Since the respondents of the survey comprised three (3) groupings, the demographic backgrounds of respondents were analyzed separately for clients, consultants and contractors.

a) Client respondents

Table 3: Client's categories

Client	Frequency	Percentage
Property developer	8	40%
Owner-occupier	4	20%
Property investor	8	40%
Total	20	100%

The above Table 3 shows that the categories of clients' sub-grouping of respondents' organizations encompass property developer (40%), property investor (40%) and owner-

occupier (20%). The findings of the study and the conclusions reached were therefore biased towards the views expressed by property developer and property investor.

Table 4: Purpose group of building procured

Purpose group of buildings/facilities procured	Frequency	Percentage
Commercial/retail/office	18	50%
Industrial	3	8%
School/institutional	-	-
Residential	14	39%
Others	1	3%
Total	36	100%

Table 4 shows that the respondents were largely involved with five distinctive purpose groups of building/facilities: Commercial/retail/office (50%), Residential (39%), Industrial (8%), School/Institutional (0%) and others (3%), which comprised airport. None of the respondents were involved with the procurement of School/Institutional. Overall, this result indicates that the findings and conclusions reached are predominantly in relation to procurement of Commercial/retail/office and residential, and may not be applicable to building or facilities such as Industrial and School/Institutional. It should be noted that school/institutional buildings are mainly procured by public agency such as government; these types of buildings are not included in the scope of this study.

b) Consultant respondents

Table 5: Professional affiliations of consultant respondents

Consultant	Frequency	Percentage
Architect	7	21%
Quantity surveying	14	42%
Project management	6	18%
Engineering	-	-
Construction management	5	15%
Other	1	3%
Total	33	100%

Based on Table 5 above, majority of the consultant respondents comprised Quantity surveyors (i.e. 42% of total respondents). It is followed by Architect (21%), Project manager (18%), Construction manager (15%) and others which comprised Recruitment agency (3%). There was no representation from the engineering sector.

The above demographic profile bodes well for the quality of the research inputs as the majority of the respondents – i.e. Quantity surveyors, Architects, Project managers and Construction managers - are at the forefront of the project procurement advice, planning, implementation and control, and so should be in positions to give more authoritative feedback on issues concerning procurement based on their experiences of past projects they were involved in.

At the professional affiliation level, Table 6 shows the professional associations of consultant respondents. Majority of respondents were registered with NZIQS (44%) and followed by NZIOB (25%), NZIA (19%), Others (8%) comprised Project Management Institute (PMI), Architectural Designers New Zealand (ADNZ) and Chartered Institution of Building (CIOB) and IPENZ (3%). The views were therefore mainly those of the quantity surveyors, who play significant role in providing procurement advice.

Table 6: Professional association of consultant respondents

Professional associations of consultant	Frequency	Percentage
New Zealand Institute of Building (NZIOB)	9	25%
New Zealand Institute of Architects (NZIA)	7	19%
New Zealand Institute of Quantity Surveyors (NZIQS)	16	44%
Institution of Professional Engineers New Zealand (IPENZ)	1	3%
Other	3	8%
Total	36	100%

c) Contractor respondents

The sub-groupings of the contractor respondents are presented in Table 7.

Table 7: Construction businesses of contractor respondents

Construction business type	Frequency	Percentage
General contractor, building/civil	8	100%
Subcontractor, building/civil	-	-
Labour-only	-	-
Specialist	-	-
Material/equipment supplier	-	-
Other	-	-
Total	8	100%

Table 7 shows that 100% of contractor respondents was general contractors in the building and civil engineering works. The absence of the views of subcontractors and suppliers

could undermine the generalization of the research findings to broader scope of construction industry business areas.

Table 8 below indicates the trade associations of the contractor respondents. 67% of respondents were registered with Registered Master Builders Federation and the rest 33% were registered with Certified Builders Association of New Zealand. The views were therefore mainly those of the Registered Master Builders Federation, which is consistent with the dominant main contractor views above, being the umbrella organization of main contractors in New Zealand.

Table 8: Trade associations of contractor respondents

Trade association of contractor respondents	Frequency	Percentage
NZ Building Subcontractors Federation	-	-
Certified Builders Association of NZ	4	33%
NZ Contractors Federation	-	-
Building Industry Federation	-	-
Registered Master Builders Federation	8	67%
Other	-	-
Total	12	100%

4.2.3 Length of experience of the all respondents

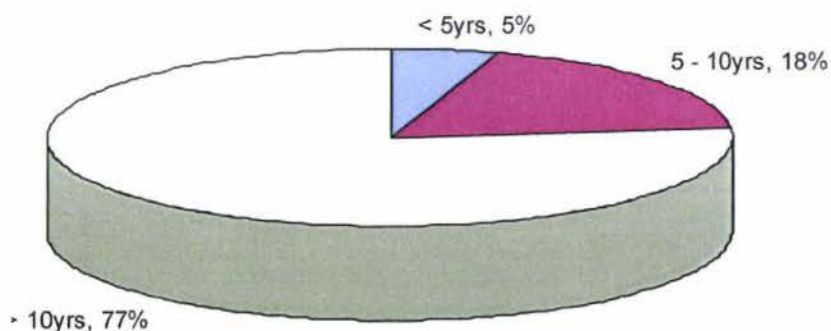


Figure 12: Length of experience of the all respondents

Figure 12 shows that majority of all respondents (i.e. 77%) have more than 10 years of working experience in procuring construction projects. This profile means that the

respondents' extensive experience contributes to the quality of the responses received, and to the reliability and validity of the conclusions to be drawn from the research findings.

4.2.4 Respondents' status in their respective organizations

Figure 13 shows the respondents' status in their respective organizations. Overall, most of the usable responses (about 73%) were from respondents that occupied middle level positions in their respective organizations, mainly managers. High level status such as CEO and director constitutes 25% of total respondents followed by low level (2%). This profile means that the responses were largely from middle and high ranking individuals who make strategic decisions in their respective organizations. Their responses should therefore be reliable and valid. This adds to the quality of the research findings and conclusions.

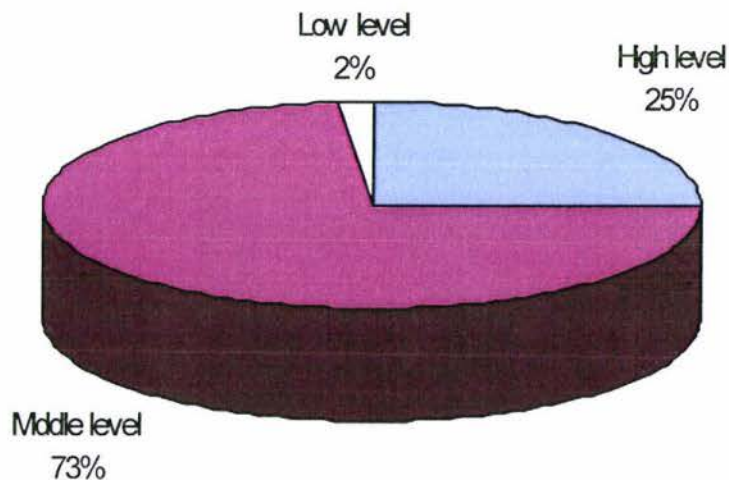


Figure 13: Respondents' status in their respective organizations

4.3 Priority needs of clients in the procurement process

The first objective of the study was to identify and prioritize clients' needs in procuring a construction project and the criteria for assessing the extent of fulfillment of these needs. The outcome of the pilot interviews revealed thirteen criteria underpinning clients' procurement needs, and which form the basis for assessing the suitability of a given procurement system in meeting each need.. At the questionnaire survey stage,

respondents were asked to rate the level of importance of each criterion based on their experiences in the construction industry. In Table 9 the ratings of the client respondents on the level of importance of each procurement assessment criterion were analyzed. With the mean rating (MR) value of 3.00, zero cost overrun, lowest price tender, high quality, risk preference, on-time completion and flexibility to variation orders were perceived to be the most significant set of criteria influencing clients' decisions to procure a construction project and the choice of a particular procurement system to use. Other priority needs include time, quality and issues related to risks. This result confirms that in the New Zealand construction industry, as in other countries, cost, time, quality and risk are the most influential factors of concern to clients in initiating a construction project. The finding accords with similar observations by Luder (1986), Raftery (1999) and Nkado (1991).

Analysis of the ratings by service providers, comprising consultants and contractors in Table 10 shows similar results with those of clients above. Results showed that zero cost overrun was perceived by consultants and contractors to be the most important criterion sought by clients in the procurement process. This is followed by on-time completion, project control, project complexity and quality. Based on the results, it can be concluded that there was a consensus between client and service provider respondents on the priority needs of clients in the procurement process. This shows a high level of understanding of clients' needs by service providers in the New Zealand construction industry. This finding accords with Peck et al (2005) that the client expects the project to be completed at or near the established figure without excessive overrun.

Table 9: Prioritization of clients' procurement needs (Clients' responses)

Procurement Assessment Criteria	Level of Importance						IR	MR	Ranks	Result
	3		2		1					
	No	%	No	%	No	%				
Cost ¹	20	100%	0	0%	0	0%	20	3.00	1	I
Lowest price ²	20	100%	0	0%	0	0%	20	3.00	1	I
Quality ³	20	100%	0	0%	0	0%	20	3.00	1	I
Risk preference ⁴	20	100%	0	0%	0	0%	20	3.00	1	I
Time ⁵	20	100%	0	0%	0	0%	20	3.00	1	I
Variation ⁶	20	100%	0	0%	0	0%	20	3.00	1	I
Project control ⁷	14	70%	6	30%	0	0%	20	2.70	7	I
Price certainty ⁸	6	30%	14	70%	0	0%	20	2.30	8	S.I
Life cycle costs ⁹	0	0%	20	100%	0	0%	20	2.00	9	S.I
Limited disruptions ¹⁰	0	0%	20	100%	0	0%	20	2.00	9	S.I
Project management responsibility ¹¹	0	0%	20	100%	0	0%	20	2.00	9	S.I
Non-financial issues ¹²	0	0%	17	85%	3	15%	20	1.85	12	S.I
Complexity ¹³	0	0%	11	55%	9	45%	20	1.55	13	N.I

Importance Ratings: 3 (I) - Important; 2 (S.I) - Somewhat important; 1 (N.I) - Not Important

Overall Importance Ratings: N.I (1.67 < MR); S.I (1.66 < MR < 2.33); I (MR > 2.33)

1: Zero cost overrun

2: Need to have competitive tenders for the job

3: Compliance with the specifications: high quality job

4: Need to pay someone to take the risk of cost and time slippage

5: On-time completion

6: Flexibility to alter the project requirement at any stage

7: Need to be in control, or actively involved during the implementation of the project

8: Need to have a reliable price estimate for the completion of the project at the onset

9: Need for reasonable running costs at the operation phase

10: Need to minimise disruptions to ongoing business activities during the construction phase

11: Need to delegate project management responsibility to others

12: Need to consider socio-cultural, political and non-financial issues as important parameters that inform decisions in the procurement process

13: Need for technically advanced construction or highly serviced building

Table 10: Prioritization of clients' procurement needs (Service providers' responses)

Procurement Assessment Criteria	Level of Importance						TR	MR	Ranks	Result
	I 3		S.I 2		N.I 1					
	No	%	No	%	No	%				
Cost ¹	33	83%	7	18%	0	0%	40	2.83	1	I
Time ³	25	63%	15	38%	0	0%	40	2.63	2	I
Project control ²	23	58%	17	43%	0	0%	40	2.58	3	I
Complexity ⁴	20	50%	18	45%	2	5%	40	2.45	4	I
Quality ⁵	17	43%	23	58%	0	0%	40	2.43	5	I
Price certainty ⁶	13	33%	27	68%	0	0%	40	2.33	6	S.I
Lowest price ⁷	5	13%	35	88%	0	0%	40	2.13	7	S.I
Variation ⁸	4	10%	36	90%	0	0%	40	2.10	8	S.I
Life cycle costs ⁹	0	0%	40	100%	0	0%	40	2.00	9	S.I
Limited disruptions ¹⁰	0	0%	40	100%	0	0%	40	2.00	9	S.I
Risk preference ¹¹	0	0%	40	100%	0	0%	40	2.00	9	S.I
Project management responsibility ¹²	0	0%	35	88%	5	13%	40	1.88	12	S.I
Non-financial issues ¹³	0	0%	5	13%	35	88%	40	1.13	13	N.I

Importance Ratings : 3 (I) = Important; 2 (S.I) = Somewhat important; 1 (N.I) = Not Important
Overall Importance Ratings : N.I (1.67 < MR); S.I (1.66 < MR < 2.33); I (MR > 2.33)

1 : Zero cost overrun

2 : Need to be in control, or actively involved during the implementation of the project

3 : On-time completion

4 : Need for technically advanced construction or highly serviced building

5 : Compliance with the specifications; high quality job

6 : Need to have a reliable price estimate for the completion of the project at the onset

7 : Need to have competitive tenders for the job

8 : Flexibility to alter the project requirement at any stage

9 : Need for reasonable running costs at the operation phase

10 : Need to minimise disruptions to ongoing business activities during the construction phase

11 : Need to pay someone to take the risk of cost and time slippage

12 : Need to delegate project management responsibility to others

13 : Need to consider socio-cultural, political and non-financial issues as important parameters that inform decisions in the procurement process

4.4 Ideal procurement system

The second objective of the study was to establish the ideal procurement arrangement option (PAO) that best meets the needs of the clients. The prevailing procurement arrangement options in use were identified from a review of related literature and during the pilot interviews. Results revealed seven broad categories of procurement systems: traditional, design and build, management, design and manage, total package, collaboration, and engineering systems (see Table 11). In line with the process flowchart of Figure 11 in the Method section, the procurement systems were matched with the identified priority needs of clients in Table 9 and Table 10 with a view to ascertaining the procurement system(s) that would be best suited to meeting these needs. The selection was made using the modified version of Turner (1990) matrix chart (see Table 2) as explained in the Data Analysis section. Results of the analysis of the ratings of clients and service providers in Table 11 and Table 12 showed that construction management was the most ideal procurement system that meets most of the procurement needs of clients. This system was perceived to offer the client more control over the project, expedites the construction process through encouraging overlapping of design and construction phases, reduces adversarial relationship, and ensures better control on variations. However, the system is incapable of offering price certainty and places more risks on the client due to lack of established standards benchmarking quality of workmanship and outputs. Morledge (2006) notes that the procurement system places most risks on the client's shoulders, including the design and construction risks. Overall, the system is incapable of addressing with the New Zealand private sector clients' needs preference of paying someone to take the risk of cost and time slippage from them. It should be noted that the New Zealand private sector clients cannot desire to have control over the project and at the same time desire to shift the risks to the contractor. They should choose between both conflicting preferences.

Table 11: Ideal procurement system score by clients

Seq = sequential; Accel = Accelerated; Comp = Competitive; D&C = Design & manage; MC = Management contracting; CM = Construction management; Cr PM = Contractor prjk management; CsPM = Consultant prjk management; BOOT = Build-operate-own-transfer; Trky = Turnkey; Ptnrg = Partnering; S.Allnc=Strategic alliancing; FIDIC =International federation of constructing engineers;NEC=New engineering contract

Procurement assessment criteria (PAC)	Possible answer	No	%	*Procurement arrangement options (PAO)															
				Traditional		Design & build			Mgt		D&M		Total Package		Collaborative		Engineering		
				Seq	Accel	Direct	Comp	D & C	MC	CM	Cr PM	CsPM	BOOT	Trky	Ptnrg	S.Allnc	FIDIC	NEC	
TIMING ¹	Important	14	70		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
CONTROLLABLE VARIATION ²	Definitely not	11	55			X	X	X						X					
COMPLEXITY ³	No, just simple	11	55			X	X							X					
QUALITY ⁴	Good but not special	15	75	X	X	X	X	X	X	X	X	X	X		X	X	X	X	
PRICE CERTAINTY ⁵	Yes	17	85	X		X	X	X	X		X			X					
COMPETITION ⁶	Yes	13	65	X			X	X	X	X	X	X	X	X					
DIVISION OF RESPONSIBILITY ⁷	Separately	20	100	X	X				X	X					X	X	X	X	
PROFESSIONAL RESPONSIBILITY ⁸	Yes	18	90	X	X				X	X		X					X		
RISK PREFERENCE ⁹	Share agreed risk	10	50	X	X				X						X	X	X	X	
OPERATIONAL COSTS ¹⁰	Yes	12	60	X						X		X	X		X	X		X	
SOCIAL ASPECTS ¹¹	No	14	70	X		X	X	X	X	X	X			X					
ON GOING BUSINESS DISRUPTIONS ¹²	Yes	20	100							X	X	X		X	X	X	X	X	
CONTROL OVER PROJECT ¹³	Yes	15	75		X					X	X	X			X	X	X	X	
Total				8	6	6	7	6	8	9	7	7	4	7	7	7	7	7	

1. How important is on-time completion to the success of your project?
2. Do you foresee the need to alter the project in any way once it has begun on site?
3. Does your building (as distinct from what goes in it) need to be technically advanced or highly serviced?
4. What level of quality do you seek in the design and workmanship?
5. Do you need to have a firm price for the project construction before you can commit it to proceed?
6. Do you need to choose your project team by price competition?
7. Can you manage separate consultancies and contractors, or do you want just one firm to be responsible after the briefing stage?
8. Do you want direct professional responsibility to you from the designers and cost consultants?
9. Do you want to pay someone to take the risk of cost and time slippage from you?
10. Do you have a need for reasonable running costs for your building in the operation phase?
11. Are cost-benefit, socio-cultural and political issues important parameters that inform your decisions in the procurement process? (ROI: Return on investment)
12. Do you have a need to minimise disruptions to ongoing business activities during the construction phase?
13. Do you have a desire to be in control, or actively involved during the implementation of the project?

Table 12: Ideal procurement system score by service providers

Seq = sequential; Accel =Accelerated; Comp = Competitive; D&C = Design & construct; MC = Management contracting; CM = Construction management; Cr PM = Contractor prjk management; CsPM = Consultant prjk management; BOOT = Build-operate-own-transfer; Trky = Turnkey; Ptnrg =Partnering; S.Allinc=Strategic alliancing; FIDIC =International federation of constructing engineers;NEC=New engineering contract

Procurement assessment criteria (PAC)	Possible answer	No	%	*Procurement arrangement options (PAO)															
				Traditional		Design & build			Mgt		D&M		total Packag		Collaborative		Engineering		
				Seq	Accel	Direct	Comp	D & C	MC	CM	Cr PM	CsPM	BOOT	trky	Ptnrg	S.Allinc	FIDIC	NEC	
TIMING ¹	Important	21	53		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
CONTROLLABLE VARIATION ²	Yes	35	88	X	X				X	X	X	X	X		X	X	X	X	
COMPLEXITY ³	Moderately so	26	65		X	X	X	X	X	X	X			X	X	X			
QUALITY ⁴	Good but not special	20	50	X	X	X	X	X	X	X	X	X	X		X	X	X	X	
PRICE CERTAINTY ⁵	Yes	30	75	X		X	X	X	X		X			X					
COMPETITION ⁶	Yes	18	45	X			X	X	X	X	X	X	X	X					
DIVISION OF RESPONSIBILITY ⁷	Separately	26	65	X	X				X	X					X	X	X	X	
PROFESSIONAL RESPONSIBILITY ⁸	Yes	32	80	X	X				X	X		X					X		
RISK PREFERENCE ⁹	Yes	23	58			X	X	X			X		X	X					
OPERATIONAL COSTS ¹⁰	Yes	23	58	X						X		X	X		X	X		X	
SOCIAL ASPECTS ¹¹	No	28	70	X		X	X	X	X	X	X			X					
ON GOING BUSINESS DISRUPTIONS ¹²	Yes	37	93							X	X	X		X	X	X	X	X	
CONTROL OVER PROJECT ¹³	Yes	33	83		X					X	X	X			X	X	X	X	
Total				8	7	6	7	7	9	11	10	8	6	7	8	8	7	7	

1. How important is on-time completion to the success of your project?
2. Do you foresee the need to alter the project in any way once it has begun on site?
3. Does your building (as distinct from what goes in it) need to be technically advanced or highly serviced?
4. What level of quality do you seek in the design and workmanship?
5. Do you need to have a firm price for the project construction before you can commit it to proceed?
6. Do you need to choose your project team by price competition?
7. Can you manage separate consultancies and contractors, or do you want just one firm to be responsible after the briefing stage?
8. Do you want direct professional responsibility to you from the designers and cost consultants?
9. Do you want to pay someone to take the risk of cost and time slippage from you?
10. Do you have a need for reasonable running costs for your building in the operation phase?
11. Are cost-benefit, socio-cultural and political issues important parameters that inform your decisions in the procurement process?
12. Do you have a need to minimise disruptions to ongoing business activities during the construction phase?
13. Do you have a desire to be in control, or actively involved during the implementation of the project?

The finding that the construction management procurement system is more suited to meeting most of the procurement needs of the New Zealand clients concurs with those of past studies such as Mbanja (2003) on South Africa; Ogunlana and Malmgren (1996) on Thailand, and Lam and Chan (1994) on USA, Europe and Australia.

4.5 Most popular procurement arrangement option (PAO)

The third objective of the study was to identify the most popular PAO used in New Zealand. In questionnaire surveys, respondents were asked to rate the frequency of the utilization of each procurement system based on their experiences in this industry.

Results of the analysis of the clients' and service providers' ratings were presented in Figure 14 and Figure 15, respectively. Result showed that clients perceived that the sequential traditional procurement system was the most popular and widely used by local construction clients with the mean rating (MR) value of 2.60. It is closely followed by design-and-build direct and construction management system with MR value of 2.35 each. The consultants and contractors also identified the traditional sequential system as the most frequently used procurement system in the New Zealand construction industry. This is evident in Figure 15, with the mean rating value of 2.78.

Based on the results shown in Figure 14 and Figure 15, it is evident that there was a consensus of opinion on the popularity of traditional sequential amongst clients and building practitioners in New Zealand. This result accords with the findings of some researchers in the past who also identified the traditional system as the most popular and widely used procurement system by most clients elsewhere. (See Henriod, 2007; Taylor et al., 1999; Zuo et al., 2006; and Richards, 2005).

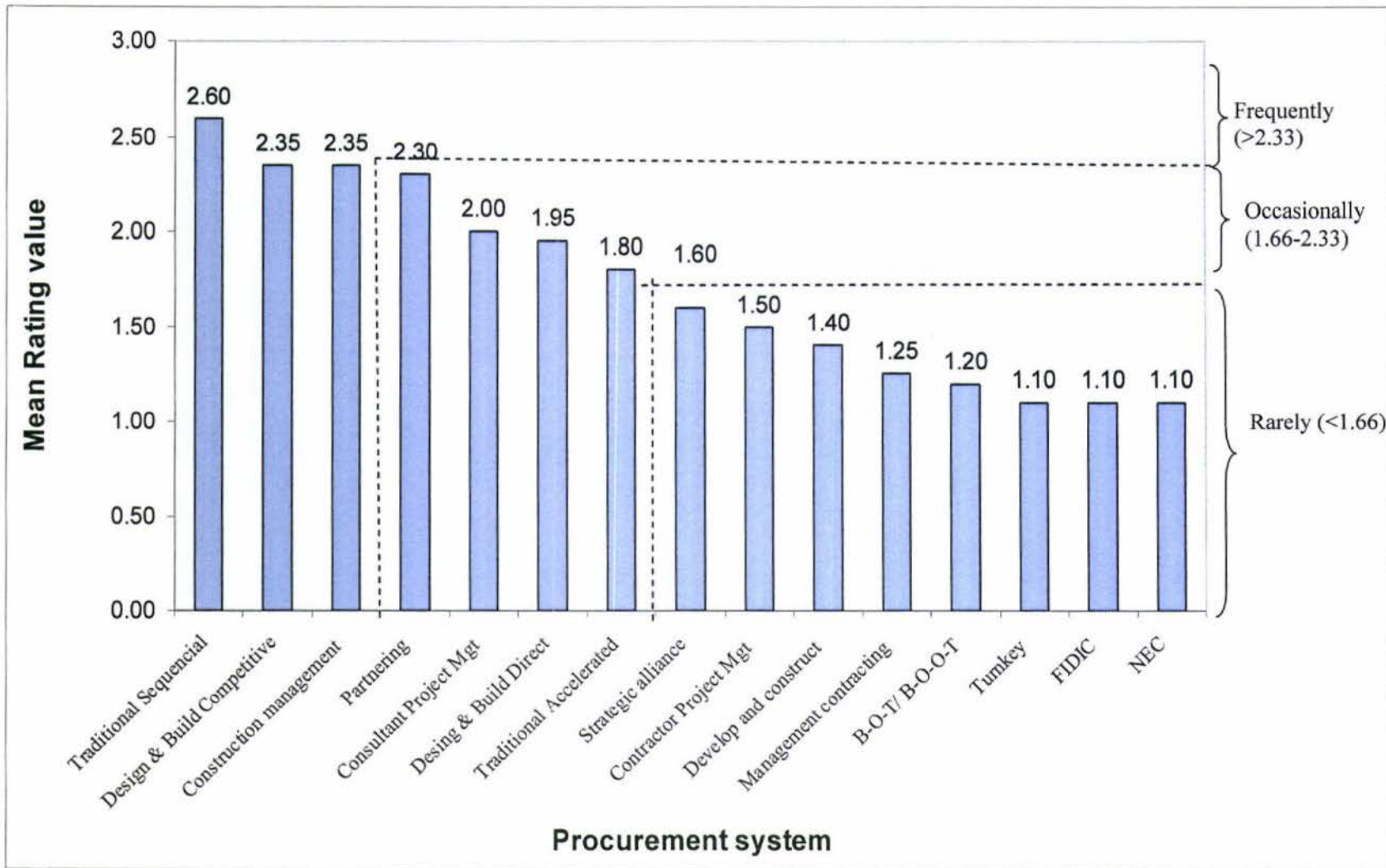


Figure 14: Frequency of use of procurement systems - clients' perspectives

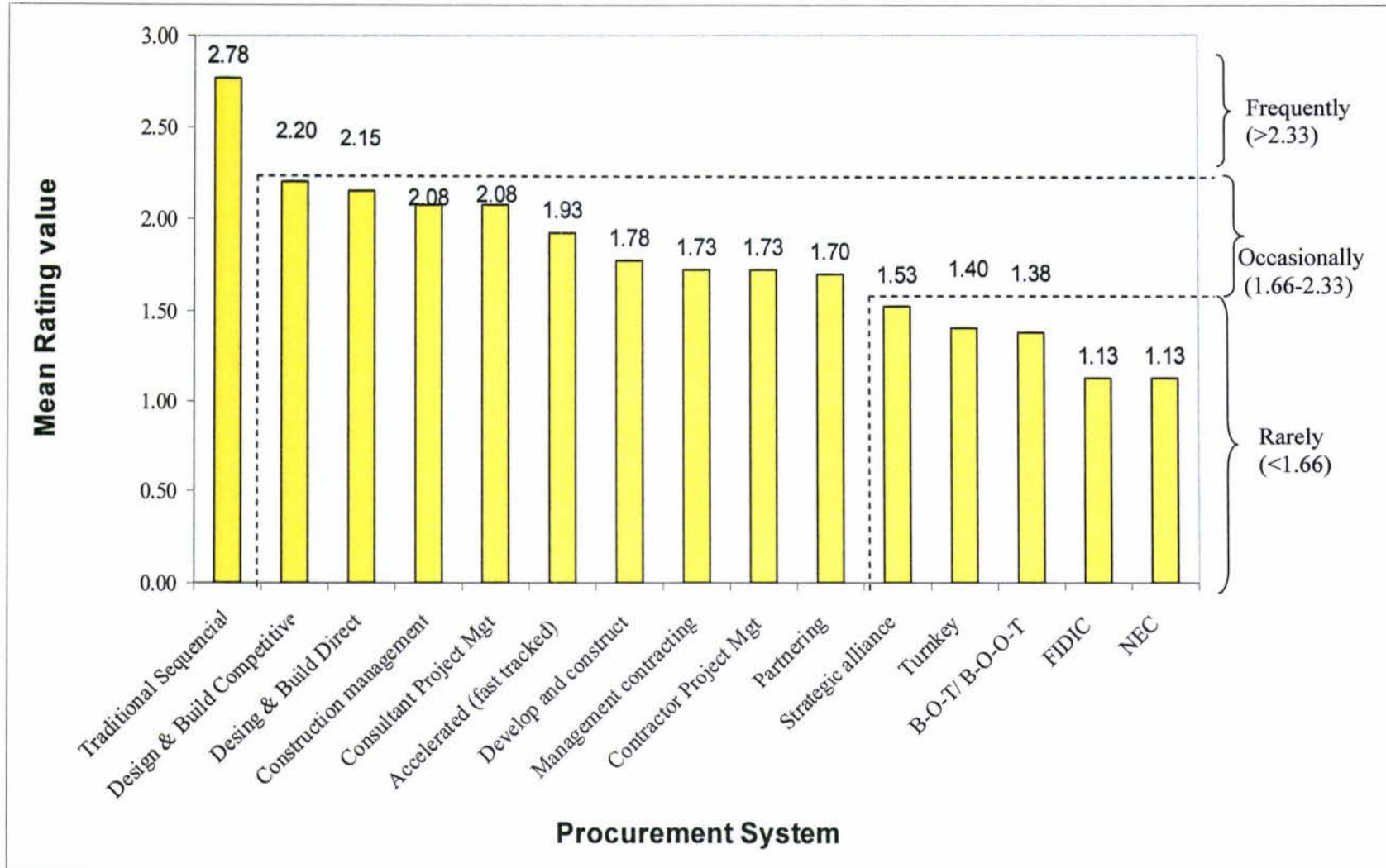


Figure 15: Frequency of use of procurement systems - service providers' perspectives

Clients' willingness to adopt new or different procurement system

Respondents were also asked whether or not they were willing to adopt new or different procurement systems for their projects in future other than the popular or familiar system they were used to. The results of the analysis of the respondents' ratings are presented in Figure 16

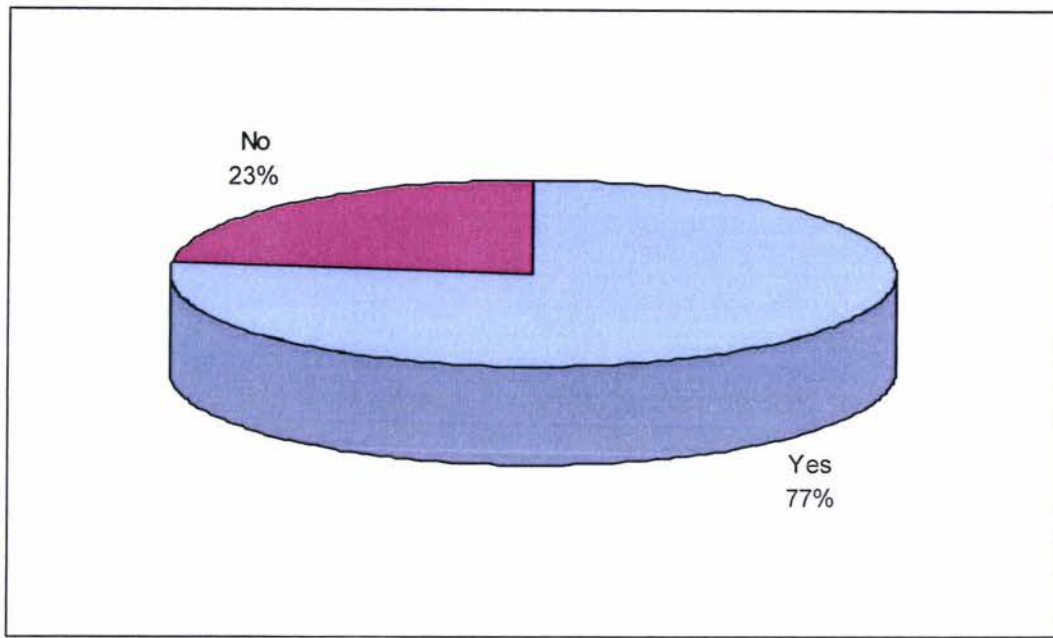


Figure 16: Willingness of clients to adopt new or different systems in future

As shown in Figure 16 above, an overwhelming number of respondents indicated that they would use a different or new procurement system for their projects in future. This indicates that, although traditional sequential procurement system is widely used in the New Zealand construction industry, there is still prospect for other procurement systems provided that the new system can satisfy clients' needs and mitigate shortcomings in their prevalent system. This is a positive outcome for the introduction of the construction management system which was found to be the ideal procurement system in the New Zealand construction industry.

4.6 Prospects and challenges of the ideal PAO

Table 13 presents the results of the analysis of the possible reasons of clients for not willing to adopt a different procurement system which is different from the one they were normally used to. Results showed that both clients and service providers perceived risk as the most influential reason for not willing to adopt a better procurement system than the familiar or popular system. Both groupings of respondents felt that the new systems are often not tried and tested and could introduce additional risks in the procurement process. Another significant reason was that majority of project financiers were only willing to finance projects procured using only the trusted and tested procurement system in order to reduce inherent project risks. This finding accords with Rowlinson's (1999) observation that the source of project finance can have a significant impact on the procurement system chosen, adding that if the client body provides finance then it essentially has a free hand in the choice of procurement, but not the case if finance comes from the third parties.

The next reason was the lack of familiarity with other systems. . This result also accords with the observations of Mbanjwa (2003) that unfamiliarity and insufficient knowledge of other systems were behind clients' refusal to change and insistence to stick to the status quo practice.

Table 13: Reasons for not adopting a different procurement system by clients and service provider respondents

Reasons for not adopting a different procurement system	Clients' responses							Service providers' responses						
	Level of agreement			TR	MR	Ranks	Result	Level of agreement			TR	MR	Ranks	Result
	A	S.A	S					A	S.A	D				
3	2	1	%	%	%	%	%	%	%					
Risks: New systems are often not tried and tested and could introduce additional risks	55	45	0	20	2.55	1	A	38	58	5	40	2.33	1	S.A
They prefer the system that is most widely used in New Zealand	50	40	10	20	2.4	2	A	30	60	10	40	2.20	3	S.A
Lack of familiarity with other terms and conditions or obligations inherent in other systems	25	75	0	20	2.25	3	S.A	23	70	8	40	2.15	4	S.A
Project financiers often insist on the use of the popular systems that have tried and tested.	45	35	20	20	2.25	3	S.A	28	65	8	40	2.20	2	S.A
They feel they don't need new system; their preferred system adequately addresses their needs in the procurement process	10	85	5	20	2.05	5	S.A	13	63	25	40	1.88	5	S.A

Agreement Ratings : 3 (A) = Agree; 2 (S.A) = Somewhat agree; 1 (A) = Disagree

Overall Agreement Ratings : D(1.67 < MR); S.A (1.66 < MR < 2.33); A (MR > 2.33)

It is interesting to note that both clients and service providers were somewhat in agreement that they do not need a new system, since the preferred system - the traditional sequential - adequately addressed their needs in the procurement process. Though the traditional system has been found unsuitable for the needs of most clients in the development process, evidence suggests that this system can be suitable in many respects, especially in developing countries (Turin, 1973). In addition, Frank (1998) comments that the traditional system has operated reasonably satisfactorily in Britain, the Commonwealth and other part of the world, withstanding the test of time.

Furthermore, the traditional system is perceived as the system that splits the risks fairly between the building owner and the contractor, and the system that meets the clients' needs of price certainty at the outset (Morledge et al, 2006).

CHAPTER 5: TESTS OF PROPOSITIONS

5.1 Overview

This chapter presents the tests for the propositions and the discussions of the results. The essence of the propositions was to direct focus on the nature of data and the requisite analyses needed to provide answers to the research objectives and the research problem. Figure 17 exhibits the research propositions that were formulated from the research objectives, and the methods used in testing them, as recommended in the literature.

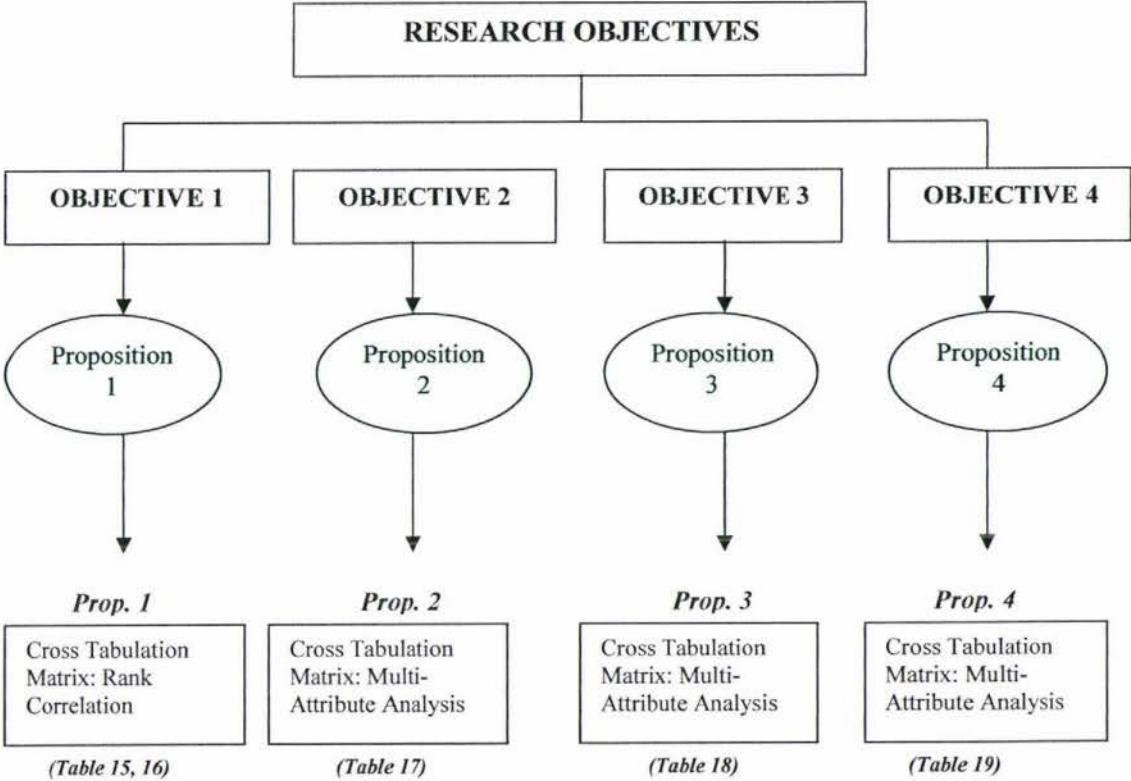


Figure 17: Snapshot of research Propositions and Methods of Analysis

5.2 Test of Proposition 1

The first objective of the study was to identify the priority needs of clients in the procurement process, and the criteria for assessing the extent of fulfillment of these needs. Preliminary investigations revealed thirteen procurement assessment criteria: time; variation; complexity; quality; cost; price certainty; project management responsibility; risk preference, life cycle cost; non-financial issues; limited disruption and project control.

The first proposition was aimed at canvassing the opinions of the respondents on the procurement assessment criteria and their relative levels of importance. To direct data gathering and analysis, the proposition assumes that consensus of opinions exists between the client and service provider groupings on the levels of importance of the procurement needs of clients in the New Zealand construction industry.

Analytical method employed

To evaluate the level of importance of the criteria that encompass the clients' needs the rankings of Mean Rating (MR) values for each criterion were compared for the clients' and the service providers' ratings using the Spearman's rank correlation coefficient method.

This approach was recommended (Fellows and Liu, 2003) as the ideal way of comparing opinions of respondent groupings involving sets of ranks of mean rating scores. First, the proposition was reformulated as a hypothesis to enable statistical test of significance

Spearman's rank correlation test

The Spearman's rank correlation test was used to test the significance of the differences between the two sets of paired ranks of the MR values of the procurement criteria computed from clients' and consultants' and contractors' ratings. The null and alternative hypotheses and the decision rule of the test are as follows.

Test hypotheses

H_0 : $t \leq t_c$ (region of acceptance of H_0) (i.e. significant correlation exists between both sets of paired ranks)

H_1 : $t > t_c$ (region of rejection of H_0) (i.e. no significant correlation exists between both sets of paired ranks)

Decision rule:

Accept H_0 if $t \leq t_c$; reject H_0 otherwise and accept H_1 (i.e. if $t > t_c$)

Where:

t = Student T test statistic computed as a transformation of the Spearman's rank correlation coefficient correlating both sets of paired ranks of the MR values, as computed from clients', consultants' and contractors' ratings

t_c = Critical value of Student T test statistic for a given degree of freedom, df (i.e. $n-2$) corresponding to n number of pairs of ranked objects at 0.05 level of significance.

Table 14 presents a typical rank correlation and student T tests employed in testing the proposition in respect of the level of importance of clients' procurement criteria between clients' and consultants' ratings. Similar tests conducted for the clients' and contractors' ratings are summarized in Table 15.

Result

Result of the Spearman's rank correlation test (Table 14) shows that significant correlation exists between the two sets of paired ranks of clients' and consultants' ratings on the level of importance of clients' procurement criteria. This shows that consultants sufficiently understand the priority requirements sought by clients in their services. However, Table 15 shows that there is no significant correlation between clients' and contractors' ratings. In conclusion therefore, there is statistical evidence to suggest that contractors do not understand the priority requirements sought by clients in their services. This result reveals the misunderstanding of priorities or needs preferences that frequently occurs between client and contractor in a construction project. This misunderstanding often results in client dissatisfaction and inability to meet project objectives. The first proposition that assumes a consensus of opinion between clients, consultants and contractors on the levels of

importance of the procurement needs of clients in the New Zealand construction industry is therefore empirically not supported at five percent level of significance.

Table 14: Priority criteria of procurement criteria rated by clients and consultants

Level of importance of clients' procurement criteria						
Clients' procurement criteria	Clients			Consultant		
	TR	MR	Rank	TR	MR	Rank
Cost ¹	20	3.00	1	32	2.78	1
Lowest price ²	20	3.00	1	32	2.00	7
Quality ³	20	3.00	1	32	2.28	6
Risk preference ⁴	20	3.00	1	32	2.00	7
Time ⁵	20	3.00	1	32	2.66	3
Variation ⁶	20	3.00	1	32	2.00	7
Project control ⁷	20	2.70	7	32	2.72	2
Price certainty ⁸	20	2.30	8	32	2.34	5
Life cycle costs ⁹	20	2.00	9	32	2.00	7
Limited disruptions ¹⁰	20	2.00	9	32	2.00	7
Project management responsibility ¹¹	20	2.00	9	32	2.00	7
Non-financial issues ¹²	20	1.85	12	32	1.00	13
Complexity ¹³	20	1.55	13	32	2.63	4

(*Procurement assessment criteria: details are given in Table 11, Chapter 4)

Number of objects ranked, n =	-	13
Spearman's rank correlation coefficient, R	-	0.323
t-score =	-	1.135
degree of freedom, $df = n-2$ =	-	11
t-critical (at 5% level of significant) =	-	2.201
Acceptance region:	-	$t \leq 2.201$
Result: $t_{score} < t_{critical}$ (i.e both sets of ranks are significantly correlated)		
Decision: Accept H_0 and conclude that statistical evidence suggests that there are correlations between the two sets of ranks.		

Table 15: Priority criteria of procurement criteria rated by clients and contractors

Clients' procurement criteria	Clients			Contractors		
	TR	MR	Rank	TR	MR	Rank
			k			
Cost ¹	20	3.00	1	8	3.00	1
Lowest price ²	20	3.00	1	8	2.63	3
Quality ³	20	3.00	1	8	3.00	1
Risk preference ⁴	20	3.00	1	8	2.00	7
Time ⁵	20	3.00	1	8	2.50	4
Variation ⁶	20	3.00	1	8	2.50	4
Project control ⁷	20	2.70	7	8	2.00	7
Price certainty ⁸	20	2.30	8	8	2.25	6
Life cycle costs ⁹	20	2.00	9	8	2.00	7
Limited disruptions ¹⁰	20	2.00	9	8	2.00	7
Project management responsibility ¹¹	20	2.00	9	8	1.38	13
Non-financial issues ¹²	20	1.85	12	8	1.63	12
Complexity ¹³	20	1.55	13	8	1.75	11

(*Procurement assessment criteria: details are given in Table 11, Chapter 4)

Number of objects ranked, n =	=	13
Spearman's rank correlation coefficient, R =	=	0.830
t-score =	=	4.943
degree of freedom, df = n-2 =	=	11
t-critical (at 5% level of significant) =	=	2.201
Acceptance region:	=	$t \geq 2.201$
Result: $t_{score} > t_{critical}$ (i.e both sets of ranks are not significantly correlated)		
Decision: Reject H_0 and conclude that statistical evidence suggests that there are no correlations between the two sets of ranks.		

5.3 Test of Proposition 2

The second objective is to establish the ideal procurement arrangement option (PAO) that best meets the needs of the clients.

Based on extensive literature review, the second proposition was formulated with the assumption that construction management is the ideal procurement system that best meets the needs of New Zealand clients.

Analytical method employed

A modified version of Turner (1990) matrix chart for choosing the procurement arrangement option that best meets the needs of client is adopted. The chart shows a list of client procurement assessment criteria incorporating additional needs established at the pilot interview stage. Also the list of procurement arrangement options (PAOs) was increased to include additional types identified during the interviews. On the chart, an 'X' is marked in a matrix cell where a given PAO meets the preferences of the client in relation to the preference eliciting optional answers. By summing the 'Xs' under each PAO column, the ideal procurement system is found as that corresponding to the column with the highest sum of 'Xs'. In other words, this indicates the PAO that best addresses the needs of clients in the procurement process.

Result

Table 16 shows that construction management was perceived to be the ideal procurement system for New Zealand private sector construction clients. This procurement system offers a number of properties that best meets majority of the criteria underlying the New Zealand private sector construction clients' needs. Therefore, in this case, Proposition 2 is supported.

5.4 Test of Proposition 3

The third objective is to identify the most popular procurement system in New Zealand. Based on the insights gained from extensive literature review and informal interviews with building practitioners in New Zealand, the third proposition was developed. It was assumed that the traditional sequential procurement system is the most popular procurement system in New Zealand.

Analytical method employed

Cross tabulation matrix was used to test this proposition in Table 17 as recommended by Zikmund (1987). This involves cross tabulation of the frequency scores for the use of procurement systems.

Result

Table 17 shows that the traditional sequential procurement system was perceived to be the most popular procurement system for the New Zealand private sector construction clients. This is evident from the highest MR value of 2.72. Feedback from the respondents during the interviews showed that most clients and practitioners were familiar with, and had better knowledge of this system. Proposition 3 is therefore supported.

Table 16: Matrix chart of procurement arrangement option (PAO) and procurement assessment criteria

Seq = sequential; Accel = Accelerated; Comp = Competitive; D&C = Design & construct; MC = Management contracting; CM = Construction management; Cr PM = Contractor prjk management; CsPM = Consultant prjk management; BOOT = Build-operate-own-transfer; Trky = Turnkey; Ptng = Partnering; S.Allnc = Strategic alliancing; FIDIC = International federation of constructing engineers; NEC = New engineering contract

Procurement assessment criteria (PAC)	Possible answer	No	%	*Procurement arrangement options (PAO)														
				Traditional		Design & build			Mgt		D&M		Total Packag		Collaborative		Engineering	
				Seq	Accel	Direct	Comp	D & C	MC	CM	Cr PM	CsPM	BOOT	trky	Ptng	S.Allnc	FIDIC	NEC
TIMING ¹	Important	25	52		X	X	X	X	X	X	X	X	X	X	X	X	X	X
CONTROLLABLE VARIATION ²	Yes	37	77	X	X				X	X	X	X	X		X	X	X	X
COMPLEXITY ³	Moderately so	26	54		X	X	X	X	X	X	X			X	X	X		
QUALITY ⁴	Good but not special	25	52	X	X	X	X	X	X	X	X	X	X		X	X	X	X
PRICE CERTAINTY ⁵	Yes	38	79	X		X	X	X	X		X			X				
COMPETITION ⁶	Yes	23	48	X			X	X	X	X	X	X	X	X				
DIVISION OF RESPONSIBILITY ⁷	Separately	35	73	X	X				X	X					X	X	X	X
PROFESSIONAL RESPONSIBILITY ⁸	Yes	39	81	X	X				X	X		X					X	
RISK PREFERENCE ⁹	Yes	22	46			X	X	X			X		X	X				
OPERATIONAL COSTS ¹⁰	Yes	29	60	X						X		X	X		X	X		X
SOCIAL ASPECTS ¹¹	No	33	69	X		X	X	X	X	X	X			X				
ON GOING BUSINESS DISRUPTIONS ¹²	Yes	46	96							X	X	X		X	X	X	X	X
CONTROL OVER PROJECT ¹³	Yes	38	79		X					X	X	X			X	X	X	X
Total				8	7	6	7	7	9	11	10	8	6	7	8	8	7	7

1. How important is on-time completion to the success of your project?
2. Do you foresee the need to alter the project in any way once it has begun on site?
3. Does your building (as distinct from what goes in it) need to be technically advanced or highly serviced?
4. What level of quality do you seek in the design and workmanship?
5. Do you need to have a firm price for the project construction before you can commit it to proceed?
6. Do you need to choose your project team by price competition?
7. Can you manage separate consultancies and contractors, or do you want just one firm to be responsible after the briefing stage?
8. Do you want direct professional responsibility to you from the designers and cost consultants?
9. Do you want to pay someone to take the risk of cost and time slippage from you?
10. Do you have a need for reasonable running costs for your building in the operation phase?
11. Are cost-benefit, socio-cultural and political issues important parameters that inform your decisions in the procurement process?
12. Do you have a need to minimise disruptions to ongoing business activities during the construction phase?
13. Do you have a desire to be in control, or actively involved during the implementation of the project?

Table 17: The frequency usage of procurement systems by all respondents

PROCUREMENT ARRANGEMENT OPTIONS (PAO)		Frequency of use						TR	MR	Ranks	Frequency
		Rarely (1)		Occasionally (2)		Frequently (3)					
		No	%	No	%	No	%				
Traditional	Sequential	2	3%	13	22%	45	75%	60	2.72	1	Frequently
	Accelerated (fast tracked)	20	33%	27	45%	13	22%	60	1.88	7	Occasionally
Design & Build	Direct	11	18%	33	55%	16	27%	60	2.08	4	Occasionally
	Competitive	13	22%	19	32%	28	47%	60	2.25	2	Occasionally
	Develop and construct	32	53%	17	28%	11	18%	60	1.65	8	Rarely
Management	Management contracting	35	58%	16	27%	9	15%	60	1.57	10	Rarely
	Construction management	17	28%	16	27%	27	45%	60	2.17	3	Occasionally
Design & Manage	Contractor Project Mgt	30	50%	21	35%	9	15%	60	1.65	8	Rarely
	Consultant Project Mgt	18	30%	21	35%	21	35%	60	2.05	5	Occasionally
Total package	B-O-T/ B-O-O-T	47	78%	7	12%	6	10%	60	1.32	12	Rarely
	Turnkey	47	78%	8	13%	5	8%	60	1.30	13	Rarely
Collaborative	Partnering	19	32%	28	47%	13	22%	60	1.90	6	Occasionally
	Strategic alliance	33	55%	21	35%	6	10%	60	1.55	11	Rarely
Civil engineering/ international procurement systems	FIDIC	53	88%	7	12%	0	0%	60	1.12	14	Rarely
	NEC	54	90%	5	8%	1	2%	60	1.12	14	Rarely

Overall Frequency Ratings: Rarely ($1.67 < MR$); Occasionally ($1.67 < MR < 2.33$); Frequently ($MR > 2.33$)

5.5 Test of Proposition 4

The final objective of the study is to explore the prospects and challenges facing the ideal procurement arrangement option (PAO). It was proposed that the insistence of project financiers on the use of only tried and tested procurement systems is the most profound constraint to the adoption of the ideal procurement system, where this differs from the popular system.

Analytical method employed

Cross tabulation matrix was used to test this proposition (see Table 18). This involves cross tabulation of the overall agreement scores for the reasons advanced by the respondents for clients' unwillingness to adopt novel but unpopular procurement system.

Result

Result showed a consensus of opinions existed between clients and service providers on the levels of influence of the reasons behind clients' reluctance to embrace new but ideal systems (see Table 18). Both clients and service providers concurred that new systems are often not tried and tested which consequently could introduce additional risks in project implementation. With the mean rating (MR) value of 2.25 by clients' respondents and 2.33 by service providers' respondents, this significant reason is viewed as the main challenges to the adoption of the ideal procurement system in New Zealand. Therefore, proposition 4 is not supported in this case.

Table 18: Reason of clients for not adopting other procurement systems

Reasons for not adopting a different procurement system	Clients' responses								Service providers' responses							
	Level of agreement			TR	MR	Ranks	Result	Level of agreement			TR	MR	Ranks	Result		
	A	S.A	S					A	S.A	D						
	3	2	1					3	2	1						
	%	%	%					%	%	%						
Risks: New systems are often not tried and tested and could introduce additional risks	55	45	0	20	2.55	1	A	38	58	5	40	2.33	1	S.A		
They prefer the system that is most widely used in New Zealand	50	40	10	20	2.4	2	A	30	60	10	40	2.20	3	S.A		
Lack of familiarity with other terms and conditions or obligations inherent in other systems	25	75	0	20	2.25	3	S.A	23	70	8	40	2.15	4	S.A		
Project financiers often insist on the use of the popular systems that have tried and tested.	45	35	20	20	2.25	3	S.A	28	65	8	40	2.20	2	S.A		
They feel they don't need new system; their preferred system adequately addresses their needs in the procurement process	10	85	5	20	2.05	5	S.A	13	63	25	40	1.88	5	S.A		

Agreement Ratings : 3 (A) = Agree; 2 (S.A) = Somewhat agree; 1 (A) = Disagree

Overall Agreement Ratings : D(1.67 < MR); S.A (1.66 < MR < 2.33); A (MR > 2.33)

5.6 Summary of the tests of Propositions

The propositions and their corresponding tests aim to direct research and to achieve the research objectives through relevant investigations and analyses

Results showed that two out of the four propositions made in this study were supported:

- Proposition 1 states that there is a consensus of opinions between clients', and service providers' (i.e. consultants' and contractors') groupings on the levels of importance of clients' procurement needs in New Zealand. The result of the survey revealed that consensus of opinions existed only between clients' and consultants' groupings and none existed between clients' and contractors' groupings. This proposition was not supported in this study.
- Proposition 2 states that Construction management is the most ideal procurement system for New Zealand private sector construction clients. The result of the survey revealed that construction management system procurement system offers a range

of benefits that meet majority of New Zealand private sector construction clients' procurement needs.

- Proposition 3 states that traditional sequential procurement system is the most popular or frequently adopted procurement system in the New Zealand construction industry. Results of the proposition testing confirmed that traditional sequential procurement system was in deed the most popular.
- Proposition 4 was not supported in this study. This proposition assumed that *the insistence of project financiers on the use of only the tried and tested procurement system would be the most serious constraint to the adoption of the most appropriate procurement system*. The most profound constraint to the adoption of novel system was found to be that *the new systems are often not tried and tested enough, with the perception that its use could introduce additional project risks*.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

This study aimed to identify the priority procurement needs of the New Zealand private sector construction clients, the criteria for assessing the extent of fulfillment of these needs, the ideal procurement arrangement option (PAO) that best meet the needs of the clients, the most popular PAO used and the prospects and challenges facing the ideal PAO.

From the results of investigations and analyses carried out, the following conclusions were reached in relation to the key objectives of the study:

1) Priority needs of clients in the procurement process: The orders of importance of these needs are as follows:

- Zero cost overrun
- On time completion
- Quality
- Project control
- Lowest price tender
- Flexible variation
- Risk preference
- Price certainty
- Complexity
- Limited disruption
- Life cycle cost
- Project management responsibility
- Non Financial issues

2) Ideal procurement system for the New Zealand construction clients:

Results the most ideal procurement system that best meets the needs of private sector construction clients in New Zealand is construction management. This system was perceived to provide client with more control over the project, expedite the construction

process through overlapping of design and construction phases and reduce adversarial relationship

3) Most popular procurement system in the New Zealand construction industry:

The traditional sequential procurement system is the most popular and widely adopted procurement system. There was a consensus amongst the respondents that clients, consultants and contractors have better working knowledge of this system.

4) Prospects and challenges facing the ideal procurement system:

- Bright prospects exist for the adoption of the ideal procurement system in the New Zealand construction industry due to the willingness of the majority of clients to adopt systems other than those they were used to, provided that the new system could eradicate shortcomings of their prevalent system and satisfy their procurement needs.
- However, constraints exist to the adoption of the ideal procurement system, the most profound constraint being the perception that new systems are often not tried and tested and could introduce additional project risks.

6.2 Recommendations and implications of the findings to construction industry and practice

The choice of the appropriate procurement system is vitally important in ensuring the success of any construction project. This means that the use of inappropriate procurement system will lead to project failure. Unfortunately, the selection of an ideal or appropriate procurement system in the construction industry has been made on the basis of rule of thumb without a methodical approach. As a result of this, projects have been executed using inappropriate or unsuitable procurement systems which fail to address the needs and preferences of clients in the procurement process. The prevalent client dissatisfaction attests to this. This study has provided a methodical approach to ensuring the selection of an ideal procurement system that would best address the needs of the private sector construction clients and ensure more satisfactory outcome. The methodology developed could be followed by clients, clients' agents, and the project team in making optimal selections that could ensure the achievement of project objectives.

Based on the result of the study, the sequential traditional system was the most popular and widely adopted by clients, consultants and contractors. Since the philosophy of sequential traditional system runs deep in New Zealand culture, the use of partnering clause in this prevailing system is recommended to ensure win-win outcomes for all stakeholders and to motivate service providers to deliver more satisfactory outcomes to the clients. This recommendation attempts to eradicate the pitfalls in this system without trying to eliminate this popular system due to the familiarity of this system by clients and service providers.

6.3 Recommendations for further studies

As established in the demographic analysis of the respondents in Section 4.2.2, the respondents were largely involved with five distinct purpose groups of building/facilities: commercial/retail/office (50%), residential (39%), industrial (8%), and others (3%) comprising largely airport facilities. None of the respondents were involved with school/institutional. Overall, this result indicates that the findings and conclusions reached for the ideal procurement system decisions are mainly applicable to commercial/retail/office, residential and industrial, and may not be applicable to school/institutional. Further studies may be needed to canvass the opinions of clients, contractors and consultants who are involved in these classes of building/facilities.

It is also recommended that further studies made in relation to the public clients in New Zealand. This is because their requirements on a construction project are slightly different from private sector clients; their criteria for choice of procurement routes usually include non-financial matters such as cost-benefit outcomes, political, social, and cultural issues.

6.4 Summary of key research findings

Research Objectives 1

To identify the priority procurement needs of the New Zealand private sector construction clients, and the criteria for assessing the extent of fulfillment of these needs

Findings

Results of investigations and analyses into the series of clients' procurement criteria reveal that the orders of priority of those criteria were as follows:

- Zero cost overrun
- On time completion
- Quality
- Project control
- Lowest price tender
- Flexible variation
- Risk preference
- Price certainty
- Complexity
- Limited disruption
- Life cycle cost
- Project management responsibility
- Non Financial issues

Research Objectives 2

To establish the ideal procurement arrangement option (PAO) that best meet the needs of the clients.

Findings

Construction management was perceived as the ideal procurement system which offers a range of benefits that meet clients 'procurement needs.

Research Objectives 3

To identify the most popular PAO used

Findings

The traditional sequential procurement system was the most popular and widely adopted; clients, consultants and contractors were familiar with and have better knowledge of this system.

Research Objectives 4

To explore the prospects and challenges facing the ideal PAO, if this differs from the prevalent PAO.

Findings

Bright prospects exist for the adoption of an ideal procurement system to be introduced in New Zealand construction industry due to overwhelming number of clients' willingness to adopt any other system that could minimize or eradicate the shortcomings of their prevalent system and satisfy their procurement needs. However, several challenges could constrain the use of the ideal procurement system; the most profound constraint being the concern that the new systems are often not tried and tested enough and could introduce additional project risks.

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APPENDICES

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APPENDIX A1: LETTER OF REQUEST FOR INTERVIEW



Massey University

Department of Construction
Institute of Technology & Engineering
College Of Sciences
Massey University At Wellington
TEL: 021 2941076; FAX: +64 4 801 2694; e-mail: W.N.WanIsmail@massey.ac.nz

AEK Group Ltd
Green Building,
23 Wilson Street,
Box 6643,
Wellington 6141.

Phones: [REDACTED]

Date: 10th June 2007

Dear Sir,

Research on the ideal procurement system for New Zealand construction clients

The choice of a procurement system has profound impact on the project implementation process and the delivery outcomes. Making the right choice of procurement system ensures successful project delivery, a satisfied client, a successful service provider, and a reputable construction industry. Research has shown that client's requirements have not been properly addressed due largely to wrong choice of procurement systems.

Consequently, I am undertaking an MPhil dissertation in the Department of Construction, Massey University, which is aimed at identifying the needs and preferences of clients in procuring a construction project. The findings will benefit both service and client organizations by identifying the priority needs of clients and the appropriate procurement system that can ensure the delivery of satisfactory outcomes. It is hoped that the application of these findings will improve levels of client satisfaction in the construction industry.

Feedback from representatives of reputable organizations, such as you, will help to achieve the objectives of the study. I will be grateful if you could grant us a twenty-minute interview for this purpose. I assure that your responses will be treated in strict confidence and will be used solely for the purpose of this research.

Enclosed is a schedule of possible appointment dates and times. Kindly indicate any two preferred appointments and return it by fax as indicated

We anticipate your kind response soonest.

Sincerely yours

Wan Norizan

Wan Norizan Wan Ismail
(Researcher)

Jasper MBachu

Dr. Jasper I. Mbachu
(Supervisor)

APPENDIX A2: INTERVIEWEE'S CHOICE OF DATE AND TIME SLOTS

IDEAL PROCUREMENT SYSTEM FOR PRIVATE SECTOR CONSTRUCTION CLIENTS

Research survey by Miss Wan Norizan Wan Ismail, Department of Construction, Massey University at Wellington

INTERVIEWEE'S CHOICE OF DATE AND TIME SLOTS

Kindly tick any date and time slots among the options indicated below:

PREFERRED DATE

- | | |
|------------------------------------------|-----------------------------------------|
| <input type="checkbox"/> 18/06/07 (Mon) | <input type="checkbox"/> 21/06/07(Thu) |
| <input type="checkbox"/> 19/06/07 (Tues) | <input type="checkbox"/> 22/06/07 (Fri) |
| <input type="checkbox"/> 20/06/07 (Wed) | |

TIME

- | | | |
|--------------------------------------------|----------------------------------------------|------------------------------------------|
| <input type="checkbox"/> 8.00am - 8.30am | <input type="checkbox"/> 10.30am - 11.00am | <input type="checkbox"/> 2.30pm - 3.00pm |
| <input type="checkbox"/> 8.30am - 9.00am | <input type="checkbox"/> 11.00am - 11.30am | <input type="checkbox"/> 3.00pm - 3.30pm |
| <input type="checkbox"/> 9.00am - 9.30am | <input type="checkbox"/> 11.30am - 12.00noon | <input type="checkbox"/> 3.30pm - 4.00pm |
| <input type="checkbox"/> 10.00am - 10.30am | <input type="checkbox"/> 2.00pm - 2.30pm | <input type="checkbox"/> 4.30pm - 5.00pm |

Please indicate your name: _____

Physical contact address
for the interview: _____

Kindly fax this sheet to XXXXXXXXXX

Thank you

APPENDIX A3: LETTER OF CONFIRMATION OF INTERVIEW SCHEDULE



Massey University

Department of Construction
Institute of Technology & Engineering
College Of Sciences
Massey University At Wellington
TEL: 021 2941076; FAX: +64 4 801 2694; e-mail: W.N.WanIsmail@massey.ac.nz

Attn: Mr David Green
David Builders Limited

██████████
Petone,
Lower Hutt

Date: 15th June 2007

Dear Mr Green,

CONFIRMATION OF INTERVIEW SCHEDULE

This is to thank you for granting my request for research interview and to notify you that the exact date and time scheduled out of the two preferences you earlier indicated.

The schedule details are as follows:

1. Date: Wednesday, 20/06/07
2. Time: 10.30am
3. ██████████

Please find the attached copy of interview questions.

If you have any reservations in respect of the above, please do not hesitate to inform us. Once again, thank you for your co-operation. I look forward to meeting with you.

Sincerely yours

Wan Norizan
Wan Norizan Wan Ismail
(Researcher)

Jasper MBachiu
Dr.Jasper I. Mbachu
(Supervisor)

APPENDIX 4A: INTERVIEW QUESTIONS

RESEARCH SURVEY

IDEAL PROCUREMENT SYSTEM FOR NEW ZEALAND PRIVATE SECTOR CONSTRUCTION CLIENTS

BY

WAN NORIZAN WAN ISMAIL

DEPARTMENT OF CONSTRUCTION, COLLEGE OF SCIENCE

MASSEY UNIVERSITY AT WELLINGTON.

1 In procuring your buildings, which procurement system do you adopt most of the time?

2 What reasons influence the choice of the procurement system you use most of the time?

a

b

c

d

e

f

g

3 While choosing a particular system for the procurement of your buildings, what criteria do you usually consider in the choice of the system(s)?

a

b

c

d

e

f

g

h

i

APPENDIX 4A: INTERVIEW QUESTIONS (Cont'd)

4 If a different procurement system other than your preferred system is recommended to you, what prospects and challenges are involved in its implementation?

Prospects?

1 _____

2 _____

3 _____

4 _____

5 _____

Challenges/ constraints/ barriers to adoption of a different procurement system

1 _____

2 _____

3 _____

4 _____

5 _____

APPENDIX B: DOCUMENTS USED IN PLANNING AND CONDUCTING THE QUESTIONNAIRE SURVEYS

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APPENDIX B1: QUESTIONNAIRE COVERING LETTER



Massey University

Department of Construction
Institute of Technology & Engineering
College Of Sciences
Massey University At Wellington
TEL: 021 2941076, FAX: +64 4 801 2694, e-mail: wanbravo81@yahoo.com

Attn: Mr. Pritchard
Wellington Region Manager
Fletcher Construction
236 Middleton Road,
Box 548, Johnsonville, Wellington.

Date: 23rd July 2007

Dear Mr. Pritchard,

Research on the ideal procurement system for New Zealand construction clients

The choice of a procurement system has profound impact on the project implementation process and the delivery outcomes. Making the right choice of procurement system ensures successful project delivery, a satisfied client, a successful service provider, and a reputable construction industry. Research has shown that client's requirements have not been properly addressed due largely to wrong choice of procurement systems.

Consequently, I am undertaking an MPhil dissertation in the Department of Construction, Massey University, which is aimed at identifying the needs and preferences of clients in procuring a construction project. The findings will benefit both service and client organizations by identifying the priority needs of clients and the appropriate procurement system that can ensure the delivery of satisfactory outcomes. It is hoped that the application of these findings will improve levels of client satisfaction in the construction industry.

Feedback from representatives of reputable organizations, such as you, will help to achieve the objectives of the study. I will be grateful if you could find 10 – 15 minutes to respond to the attached questionnaire. I assure that your responses will be treated in strict confidence and will be used solely for the purpose of this research. By participating in the questionnaire survey, I undertake to provide you with a summary of the research findings, if you could indicate your interest by filling the enclosed form for this purpose. Kindly fill the attached questionnaire and fax it to the address indicated.

I will appreciate your kind response on or before 30 September 2007.

Sincerely yours

Wan Norizan
Wan Norizan Wan Ismail
(Researcher)

Jasper MBachu
Dr.Jasper I. Mbachu
(Supervisor)

APPENDIX B2: SAMPLE COPY OF QUESTIONNAIRE (page 1 of 6)

RESEARCH SURVEY: Ideal Procurement system for New Zealand Private Sector Construction Clients By: Miss Wan Norizan Wan Ismail Department of Construction, Institute of Technology and Engineering, College of Science Massey University at Wellington			
SECTION 1			
A The following questions relate generally to building owners' preferences in the procurement of building projects. Drawing from your knowledge of clients'/ employers' needs preferences, kindly respond to each question by ticking (<input type="checkbox"/>) the optional answer that aligns with your views.			
Preference-eliciting question	Optional answers		
1 How important is ontime completion to the success of clients'/ employers' projects?	<input type="checkbox"/> Crucial	<input type="checkbox"/> Important	<input type="checkbox"/> Not as important as others
2 Usually, do you foresee the need for clients'/ employers to alter the projects in any way once they have begun on sites?	<input type="checkbox"/> Yes	<input type="checkbox"/> Definitely not	
3 Do most buildings in New Zealand (as distinct from what goes in them) need to be technically advanced or highly serviced?	<input type="checkbox"/> Yes	<input type="checkbox"/> Moderately so	<input type="checkbox"/> No, just simple
4 What level of quality do most clients'/ employers seek in the design and workmanship?	<input type="checkbox"/> Basic competence	<input type="checkbox"/> Good, but not special	<input type="checkbox"/> Prestige
5 Do clients'/ employers need to have a firm/fixed price for the project construction before they can commit it to proceed?	<input type="checkbox"/> Yes	<input type="checkbox"/> A target plus or minus will do	
6 Do clients'/ employers usually choose their project teams by price competition?	<input type="checkbox"/> Certainly for all construction work	<input type="checkbox"/> Construction & management team	<input type="checkbox"/> No, other factors are more important
7a Do clients'/ employers choose to manage separate consultancies and contractors, or do they want just one firm to be responsible after the briefing stage?	<input type="checkbox"/> Can manage separate firms	<input type="checkbox"/> Must have only one firm for everything	
7b Do clients'/ employers prefer direct professional responsibility to them from the designers and cost consultants?	<input type="checkbox"/> Not important	<input type="checkbox"/> Yes	
8 Do clients'/ employers prefer to pay someone to take the risk of cost and time slippage from them?	<input type="checkbox"/> No, prefer to retain risk and therefore control	<input type="checkbox"/> Prepared to share agreed risk	<input type="checkbox"/> Yes
9 Do most clients'/ employers have a need for reasonable running costs for their building in the operation phase?	<input type="checkbox"/> Yes	<input type="checkbox"/> No, initial costs are paramount	
10 Are cost-benefit, socio-cultural and political issues important parameters that inform their decisions in the procurement process?	<input type="checkbox"/> Yes	<input type="checkbox"/> No, only returns on investment are paramount	
11 Do they usually have a need to minimise disruptions to ongoing business activities during the construction phase?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
12 Do they desire to be in control, or actively involved during the implementation of the project?	<input type="checkbox"/> Yes	<input type="checkbox"/> No, prefer not to be involved.	
<i>Other clients'/ employers' needs or preferences in the procurement process? (Please specify):</i>			
13			
14			

APPENDIX B2: SAMPLE COPY OF QUESTIONNAIRE (page 2 of 6)

A2 The following have been identified as some of the criteria that could influence decision to use a particular procurement system. Please rate their relative levels of importance in meeting building owners' needs in the procurement process. Kindly tick ()

- | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------------------------------|----------------------------------------|
| <i>Time</i> : Ontime completion | <input type="checkbox"/> Important | <input type="checkbox"/> Somewhat important | <input type="checkbox"/> Not important |
| <i>Variation</i> : flexibility to alter the project requirement at any stage | <input type="checkbox"/> Important | <input type="checkbox"/> Somewhat important | <input type="checkbox"/> Not important |
| <i>Complexity</i> : need for technically advanced construction or highly serviced building | <input type="checkbox"/> Important | <input type="checkbox"/> Somewhat important | <input type="checkbox"/> Not important |
| <i>Quality</i> : Compliance with the specifications; high quality job | <input type="checkbox"/> Important | <input type="checkbox"/> Somewhat important | <input type="checkbox"/> Not important |
| <i>Cost</i> : Zero cost overrun | <input type="checkbox"/> Important | <input type="checkbox"/> Somewhat important | <input type="checkbox"/> Not important |
| <i>Price certainty</i> : Need to have a reliable price estimate for the completion of the project at the onset | <input type="checkbox"/> Important | <input type="checkbox"/> Somewhat important | <input type="checkbox"/> Not important |
| <i>Lowest price</i> : need to have competitive tenders for the job | <input type="checkbox"/> Important | <input type="checkbox"/> Somewhat important | <input type="checkbox"/> Not important |
| <i>Project management responsibility</i> : Need to delegate project management responsibility to others | <input type="checkbox"/> Important | <input type="checkbox"/> Somewhat important | <input type="checkbox"/> Not important |
| <i>Risk preference</i> :Need to pay someone to take the risk of cost and time slippage | <input type="checkbox"/> Important | <input type="checkbox"/> Somewhat important | <input type="checkbox"/> Not important |
| <i>Life cycle costs</i> : Need for reasonable running costs at the operation phase | <input type="checkbox"/> Important | <input type="checkbox"/> Somewhat important | <input type="checkbox"/> Not important |
| <i>Non-financial issues</i> : Need to consider socio-cultural, political and non-financial issues as important parameters that inform decisions in the procurement process | <input type="checkbox"/> Important | <input type="checkbox"/> Somewhat important | <input type="checkbox"/> Not important |
| <i>Limited disruptions</i> : need to minimise disruptions to ongoing business activities during the construction phase | <input type="checkbox"/> Important | <input type="checkbox"/> Somewhat important | <input type="checkbox"/> Not important |
| <i>Project control</i> : Need to be in control, or actively involved during the implementation of the project | <input type="checkbox"/> Important | <input type="checkbox"/> Somewhat important | <input type="checkbox"/> Not important |
| | <input type="checkbox"/> Important | <input type="checkbox"/> Somewhat important | <input type="checkbox"/> Not important |

Others? (please specify):

APPENDIX B2: SAMPLE COPY OF QUESTIONNAIRE (page 3 of 6)

B Below are some commonly used procurement systems. Kindly rate how often or not clients/ employers use them in procuring their buildings. Raing scales are provided.

Procurement system		Frequency of use		
		Rarely	Occasion ally	Frequently
		1	2	3
1 Traditional	Sequential			
	Accelerated (fast tracked)			
2 Design & Build	Direct			
	Competitive			
	Develop and construct			
3 Management	Management contracting			
	Construction management			
4 Design & Manage	Contractor Project Mgt			
	Consultant Project Mgt			
5 Total package	B-O-T/ B-O-O-T			
	Turnkey			
6 Collaborative	Partnering			
	Strategic alliance			
7 Civil engineering/ international procurement systems	FIDIC			
	NEC			

Others (Please specify):

8				
9				

C If a procurement system other their preferred type is suggested to them as the ideal system that would best meet their needs in the procurement process, do you think they would be prepared to adopt the new system? Yes No

D For some clients/ employers that may not be willing to adopt a new system other than their preferred type, several reasons could account for this. Kindly indicate what could be their reasons by ticking () under the options to the responses below that best align with your views. It will be appreciated if you could specify other reasons not included in the list.

Optional responses (Level of Agreement): StA = Strongly Agree (5); A = Agree (4); SwA = Somewhat Agree (3); SID = Slightly Disagree (2); StD = Strongly Disagree (1)

Reasons for not adopting a different procurement system	Level of agreement				
	StA 5	A 4	SwA 3	SID 2	StD 1
1 Risk: New systems are often not tried and tested and could introduce additional risks					
2 Lack of familiarity with other terms and conditions or obligations inherent in other systems					
3 Project financiers often insist on the use of the popular systems that have been tried and tested.					
4 They prefer the most widely used system in New Zealand					
5 They don't have need for new systems: their preferred systems adequately address their needs in the procurement process					

APPENDIX B2: SAMPLE COPY OF QUESTIONNAIRE (page 4 of 6)

SECTION 2 : DEMOGRAPHIC BACKGROUND

1 To what category of private sector commercial property clients does your organization mainly belong?

- Property developer Owner-occupier
 Property/portfolio investor

2 What category of property does your organization mainly procure?

- Commercial/ retail/ office Industrial
 School/ institutional Residential
 Other? (Please specify): _____

2 What is your status in your organization?

- CEO/ Director Manager/ Senior staff
 Supervisor Trainee
 Other (Kindly specify) _____

3 For how long have you been involved in building procurement?

- < 5 yrs 5 - 10 yrs > 10 yrs

APPRECIATION

Thank you for your time. Kindly fax the filled questionnaire to: 04 801 2694; Attention **Miss Wan Norizan Wan Ismail**. If you have any comments in relation to the contents of the questionnaire, you may wish to contact the researcher on 021 2941076 (cell); email: wanbravo81@yahoo.com; else, please state your overall comments below (if any):

DISCLAIMER

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher named above is responsible for the ethical conduct of this research. please contact Prof. Sylvia Rumball, Assistance to the Vice-Chancellor (Ethics & Equity), telephone 06 350 5249, email

APPENDIX B2: SAMPLE COPY OF QUESTIONNAIRE (page 5 of 6)

SECTION 2 : DEMOGRAPHIC BACKGROUND

1 What is your main construction business. (Please indicate only the one that you are engaged in most of the time)

<input type="checkbox"/>	General contractor (building/ civil)	<input type="checkbox"/>	Specialist subcontractor
<input type="checkbox"/>	Subcontractor (building/ civil)	<input type="checkbox"/>	Material/ equipment supplier
<input type="checkbox"/>	Labour-only subcontractor		
<input type="checkbox"/>	Other (please specify) _____		

2 To which trade association do you primarily belong? (Please indicate only one in which you are most actively involved)

<input type="checkbox"/>	NZ Building Subcontractors Federation	<input type="checkbox"/>	Building Industry Federation
<input type="checkbox"/>	Certified Builders Association of NZ	<input type="checkbox"/>	Registered Master Builders Federation
<input type="checkbox"/>	NZ Contractors Federation		
<input type="checkbox"/>	Other (please specify) _____		

3 For how long have you been in construction business?

< 5 yrs
 5 - 10 yrs
 > 10 yrs

4 Kindly indicate your status in your organization:

<input type="checkbox"/>	CEO/ Director	<input type="checkbox"/>	Manager
<input type="checkbox"/>	Foreman/ Supervisor	<input type="checkbox"/>	Apprentice/ unskilled
<input type="checkbox"/>	Skilled tradesman/ ganger		
<input type="checkbox"/>	Other (please specify) _____		

APPRECIATION

Thank you for your time. Kindly fax the filled questionnaire to: 04 801 2694; Attention **Miss Wan Norizan Wan Ismail**. If you have any comments in relation to the contents of the questionnaire, you may wish to contact the researcher on 021 2941076 (cell); email: wanbravo81@yahoo.com; else, please state your overall comments below (if any):

DISCLAIMER

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher named above is responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher, please contact Prof. Sylvia Rumball, Assistance to the Vice-Chancellor (Ethics & Equity), telephone 06 350 5249, email humanethics@massey.ac.nz

APPENDIX B2: SAMPLE COPY OF QUESTIONNAIRE (page 6 of 6)

SECTION 2 : DEMOGRAPHIC BACKGROUND

1 What is your main profession? (Please indicate only the one that you are engaged in most of the time)

Architecture
Project management
Engineering

Quantity surveying
Construction management

Other (please specify)

2 To which professional association do you primarily belong? (Please indicate only one in which you are most actively involved)

NZIOB
NZIQS

NZIA
IPENZ

Other (please specify)

3 For how long have you been in professional practice?

< 5 yrs

5 - 10 yrs

> 10 yrs

4 Kindly indicate your status in your organization:

Director/principal partner
Senior staff

Associate partner
Trainee/intern

Other (please specify)

APPRECIATION

Thank you for your time. Kindly fax the filled questionnaire to: 04 801 2694; Attention **Miss Wan Norizan Wan Ismail**. If you have any comments in relation to the contents of the questionnaire, you may wish to contact the researcher on 021 2941076 (cell); email: wanbravo81@yahoo.com; else, please state your overall comments below (if any):

DISCLAIMER

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher named above is responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher, please contact Prof. Sylvia Rumball, Assistance to the Vice-Chancellor (Ethics & Equity), telephone 06 350 5249, email humanethics@massey.ac.nz

APPENDIX B3: REQUEST FORM FOR SUMMARY OF KEY RESEARCH FINDINGS

Form for requesting summary of the key research findings

ATTENTION: MISS WAN NORIZAN WAN ISMAIL



**RESEARCH ON:
IDEAL PROCUREMENT SYSTEM FOR NEW ZEALAND PRIVATE SECTOR
CONSTRUCTION CLIENTS**

I would like to receive a summary of the key findings of the research. My contact details are as follows:

Name and address of company (*optional*):

Fax:

Attention:

Email:

APPENDIX B4: QUESTIONNAIRE RESPONSE REMINDER



Massey University

Department of Construction
Institute of Technology & Engineering
College Of Sciences
Massey University At Wellington
TEL: 021 2941076; FAX: +64 4 801 2694; e-mail: W.N.WanIsmail@massey.ac.nz

Attn: Mr. Paul Critchley
Paul Critchley Building & Joinery
[REDACTED]

Date: 25th July 2007

Dear Mr. Critchley,

Research on the ideal procurement system for New Zealand construction clients

We wish to remind you regarding the questionnaire on the above subject which was mailed to you some weeks ago.

If you have already filled and mailed back the questionnaire, then accept our appreciation for your time and participation in the research. If otherwise, kindly do so urgently. The questionnaire would take approximately 15 minutes to be completed.

Your input is very valuable for my research; I would appreciate it if you could find some 15 minutes to complete the questionnaire and return it to me by fax or mail as soon as possible. Your comments on the relevance or clarity of the questions will also be appreciated.

If you are receiving this mail for the first time, or the original questionnaire mailed to you is no longer available, please open and print the attached covering letter and questionnaire. Then kindly return the completed questionnaire using the freepost address indicated in the covering letter.

Thank you for supporting this study.

Sincerely yours

Wan Norizan
Wan Norizan Wan Ismail
(Researcher)

Jasper MBachu
Dr. Jasper I. Mbachu
(Supervisor)

APPENDIX C: SUMMARY OF KEY RESEARCH FINDINGS AND SUPPORTING CHARTS AND TABLES



Massey University

Department of Construction
Institute of Technology & Engineering
College Of Sciences
Massey University At Wellington
TEL: 021 2941076, FAX: +64 4 801 2694, e-mail: W.N.Wanlsmail@massey.ac.nz

Attn: Mr. Paul Critchley
Paul Critchley Building & Joinery
[REDACTED]

Date: 25th July 2007

Dear Mr. Critchley,

SUMMARY OF THE KEY RESEARCH FINDINGS: “IDEALPROCUREMENT SYSTEM FOR NEW ZEALAND PRIVATE SECTOR CONSTRUCTION CLIENTS”

Thank you very much for participating in the above research survey and for your helpful inputs that contributed to the successful completion of the project.

As promised during the survey, I am pleased to provide you with the summary of the key findings of the study (see attached documents). Your responses were treated with utmost confidence as pledged. All responses have been destroyed in line with the requirements of Massey Human Ethics Committee. The findings of the study will be presented in conferences and will be published in journals subsequently.

Once again, thank you very much!

Sincerely yours

Wan Norizan
Wan Norizan Wan Ismail
(Researcher)

Jasper MBachu
Dr. Jasper I. Mbachu
(Supervisor)

APPENDIX D: APPROVAL FOR MUHEC LOW RISK NOTIFICATION

D1: Letter of Approval for MUHEC Low Risk Notification.....	119
D2: Form for Notification of Low Risk Research Involving Participants.....	120

APPENDIX D1: APPROVAL FOR MUHEC LOW RISK NOTIFICATION



Massey University

4 July 2007

Wan Norizan Wan Ismail



OFFICE OF THE ASSISTANT
TO THE VICE-CHANCELLOR
(Ethics & Equity)
Private Bag 11 222
Palmerston North
New Zealand
T 06 350 3000/050 8575
F 06 350 3522
humanethics@massey.ac.nz
ethics@massey.ac.nz
ethics@massey.ac.nz
www.massey.ac.nz

Dear Wan

Re: Ideal Procurement System for New Zealand Private Sector Construction Clients

Thank you for your Low Risk Notification which was received on 27 June 2007.

Your project has been recorded on the Low Risk Database which is reported in the Annual Report of the Massey University Human Ethics Committees.

Please notify me if situations subsequently occur which cause you to reconsider your initial ethical analysis that it is safe to proceed without approval by one of the University's Human Ethics Committees.

A reminder to include the following statement on all public documents:

"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research."

If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor Sylvia Rumball, Assistant to the Vice-Chancellor (Ethics & Equity), telephone 06 350 5249, e-mail humanethics@massey.ac.nz."

Please note that if a sponsoring organisation, funding authority or a journal in which you wish to publish requires evidence of committee approval (with an approval number), you will have to provide a full application to one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

Yours sincerely

Sylvia V Rumball (Professor)
Chair, Human Ethics Chairs' Committee and
Assistant to the Vice-Chancellor (Ethics & Equity)

cc Dr Jasper Mbachu
Institute of Technology and
Engineering
Wellington

Prof Don Cleland, Hol
Institute of Technology and
Engineering
PN456

Massey University Human Ethics Committee
Accredited by the Health Research Council



APPENDIX D2: FORM FOR NOTIFICATION OF LOW RISK RESEARCH INVOLVING PARTICIPANTS



Massey University

Te Kunenga ki Pūrehuroa

NOTIFICATION OF LOW RISK RESEARCH/EVALUATION INVOLVING HUMAN PARTICIPANTS

(All notifications are to be typed)

SECTION A:

1. Project Title IDEAL PROCUREMENT SYSTEM FOR NEW ZEALAND PRIVATE SECTOR CONSTRUCTION CLIENTS

Projected start date for data collection 11 July 2007 Projected end date 31 August 2007

2. Applicant Details *(Select the appropriate box and complete details)*

ACADEMIC STAFF NOTIFICATION

Full Name of Staff Applicant/s _____

School/Department/Institute _____

Region *(mark one only)* Albany Palmerston North Wellington

Telephone _____ Email Address _____

STUDENT NOTIFICATION

Full Name of Student Applicant WAN NORIZAN WAN ISMAIL

Postal Address ████████████████████ ████████████████████
6001, NEW ZEALAND ████████████████████

Telephone ██████████ Email Address ██████████████████

Employer *(if applicable)* _____

Full Name of Supervisor(s) DR JASPER IKEOKWU MBACHU

School/Department/Institute CONSTRUCTION, INST. OF TECH & ENGINEERING, COLLEGE OF SCIENCES

Region *(mark one only)* Albany Palmerston North Wellington

Telephone X 6442 Email Address J.I.Mbachu@massey.ac.nz

GENERAL STAFF NOTIFICATION

Full Name of Applicant _____

Section _____

Region *(mark one only)* Albany Palmerston North Wellington

Telephone _____ Email Address _____

Full Name of Line Manager _____

Section _____

Telephone _____ Email Address _____

APPENDIX D2: FORM FOR NOTIFICATION OF LOW RISK RESEARCH INVOLVING PARTICIPANTS (continued)

3. Type of Project <i>(mark one only)</i>			
Staff Research/Evaluation:	<input type="checkbox"/>	Student Research:	<input checked="" type="checkbox"/>
Academic Staff	<input type="checkbox"/>	Qualification (MPhil-Sciences)	
General Staff	<input type="checkbox"/>	Points Value of Research	100
If other, please specify:			
4. Describe the peer review process used in assessing the ethical issues present in this project.			
Supervisor assessment and approval MUHEC "Screening Questionnaire"			
5. Summary of Project			
Please outline in no more than 200 words in lay language why you have chosen this project, what you intend to do and the methods you will use.			
<i>(Note: all the information provided in the notification is potentially available if a request is made under the Official Information Act. In the event that a request is made, the University, in the first instance, would endeavour to satisfy that request by providing this summary. Please ensure that the language used is comprehensible to all)</i>			
My research is entitled, "Ideal procurement system for New Zealand private sector construction clients". I have chosen this research project because it is concerned with a topical issue in the Construction Procurement field – which I intend to pursue as my future career. This study aims to identify the criteria of the New Zealand private sector construction clients' procurement needs and to establish the ideal procurement arrangement option that best meets those needs and also to address the most popular procurement arrangement option used in the New Zealand as well as the reason for its use. The research findings would encompass the prospects and challenges that would face the established ideal procurement arrangement option.			
Descriptive survey method will be used, which will involve questionnaire survey of the registered members of the New Zealand Institute of Building (NZIOB) and the Property Council of New Zealand- the target population. The questionnaires will be self-administered; participation is voluntary. Questionnaire forms will be distributed by posts. Completed questionnaires will be returned using enclosed stamped and self-addressed envelopes. For participating, respondents will be assured of anonymity and their responses will be used solely for statistical analysis			
Please submit this Low Risk Notification (with the completed Screening Questionnaire) to:			
<p>The Ethics Administrator Research Ethics Office Old Main Building, PN221 Massey University Private Bag 11 222 Palmerston North</p>			

APPENDIX D2: FORM FOR NOTIFICATION OF LOW RISK RESEARCH INVOLVING PARTICIPANTS (continued)

SECTION B: DECLARATION *(Complete appropriate box)*

ACADEMIC STAFF RESEARCH

Declaration for Academic Staff Applicant

I have read the Code of Ethical Conduct for Research, Teaching and Evaluations involving Human Participants. I understand my obligations and the rights of the participants. I agree to undertake the research as set out in the Code of Ethical Conduct for Research, Teaching and Evaluations involving Human Participants. My Head of Department/School/Institute knows that I am undertaking this research. The information contained in this notification is to the very best of my knowledge accurate and not misleading.

Staff Applicant's Signature _____ Date: _____

STUDENT RESEARCH

Declaration for Student Applicant

I have read the Code of Ethical Conduct for Research, Teaching and Evaluations involving Human Participants and discussed the ethical analysis with my Supervisor. I understand my obligations and the rights of the participants. I agree to undertake the research as set out in the Code of Ethical Conduct for Research, Teaching and Evaluations involving Human Participants. The information contained in this notification is to the very best of my knowledge accurate and not misleading.

Student Applicant's Signature _____ Date: 22/06/2007

Declaration for Supervisor

I have assisted the student in the ethical analysis of this project. As supervisor of this research I will ensure that the research is carried out according to the Code of Ethical Conduct for Research, Teaching and Evaluations involving Human Participants.

Supervisor's Signature  _____ Date: 22/06/07

Print Name Jasper Mbachu _____

GENERAL STAFF RESEARCH/EVALUATIONS

Declaration for General Staff Applicant

I have read the Code of Ethical Conduct for Research, Teaching and Evaluations involving Human Participants and discussed the ethical analysis with my Supervisor. I understand my obligations and the rights of the participants. I agree to undertake the research as set out in the Code of Ethical Conduct for Research, Teaching and Evaluations involving Human Participants. The information contained in this notification is to the very best of my knowledge accurate and not misleading.

General Staff Applicant's Signature _____ Date: _____

Declaration for Line Manager

I declare that to the best of my knowledge, this notification complies with the Code of Ethical Conduct for Research, Teaching and Evaluations involving Human Participants and that I have approved its content and agreed that it can be submitted.

Line Manager's Signature _____ Date: _____

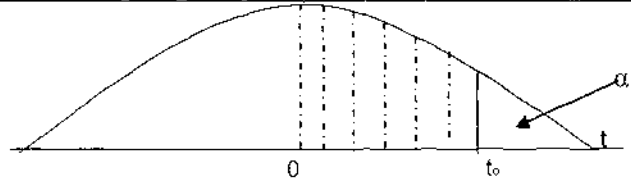
Print Name _____

APPENDIX E: STATISTICAL TABLE USED FOR DATA ANALYSIS

Table E1: Critical value of Student t test statistic (Source: Bradley and South (1981) p.573)

Student- Distribution

Table gives t_{α} such that $P(t > t_{\alpha}) = \alpha$



df	$\alpha = 0.10$	$\alpha = 0.05$	$\alpha = 0.025$	$\alpha = 0.01$	$\alpha = 0.005$
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
α	1.282	1.645	1.960	2.326	2.576