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FACILITIES MANAGEMENT, PROCUREMENT SYSTEMS
AND PUBLIC PRIVATE PARTNERSHIP

DELIVERING VALUE TO THE COMMUNITY

**DEPARTMENT OF CONSTRUCTION ECONOMICS AND MANAGEMENT
FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT • UNIVERSITY OF CAPE TOWN**

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CLIENTS AND THEIR PROFESSIONAL ADVISERS' ROLES IN CONSTRUCTION MATERIAL PURCHASING FUNCTIONS

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The material purchasing function is the central factor to minimise the overall cost of a building construction project as it contributes to approximately half of the final construction cost. Contractors, subcontractors, clients and consultants are the key personnel involved in the purchasing function in most building construction projects. Clients and their professional advisers could play a significant role in material purchasing functions, but there is evidence to suggest that far too little attention has been paid to their relevance in developing material purchasing strategies. Literature does not provide answers on how the roles of clients can be described in relation to various purchasing activities such as sourcing, selection and procurement of key material inputs; and other routines including feedback and evaluation in relation to price. The paper presents information to show the significance of clients and professional advisers in material management. The paper is an aspect of a wider research that explores how contractors could secure best prices for key materials on construction projects in New Zealand. It describes the methodology for data collection and analyses that will meet the research objectives identified. It is hoped that the result of the research investigations will be beneficial to project participants and the wider construction industry by understanding the complexities involved in procurement decisions and strategies for securing best prices for construction materials.

Keywords: clients, construction materials, purchasing function

INTRODUCTION

A large portion of total construction costs is constituted by construction materials which is usually between 40-50% of the total construction cost for many types of projects (Agapiou et al. 1998). Therefore, maintaining an efficient and effective material purchasing system as well as purchasing materials at the right price, quality and time, are essential for contractors to remain competitive in today's environment. There appears to be opportunities to minimise costs through purchasing strategies particularly with respect to prices. Fellows et al. (2002) confirm that a small percentage reduction in materials costs could bring about a sizable increase in profits for building contractors. However, questions have been raised about how construction materials prices can be better managed considering that it is affected by trade deals between merchants and contractors, and by factors (e.g. political, social, etc.) external to construction (Vidalakis & Tookey 2005). Thus careful materials selection, sourcing and purchasing is essential if it must contribute positively to the realisation of optimum benefits in projects. Key project participants (clients, contractors, architects and designers) should be involved in the material acquisition process so that the best value is realisable on particular projects. Decision making for material acquisition could be associated with economic, technical and aesthetic (comfort and prestige) reasons. However, it is important that the construction materials are suitable to meet functional requirements which satisfy all project participants. Construction management literature show that far too little attention has been paid to cost minimisation strategies in terms of construction materials prices. Sourcing best prices for materials is as much an issue for clients as for contractors and is also an aspect that has rarely received any attention. Eitelberg et al. (2010) conclude that clients' leadership is vital to achieving the best value (Eitelberg et al. 2010) from construction materials. Similarly decisions taken by clients and their professional advisers have a significant impact on the successful construction procurement process (Brisco et al. 2004). The authors believe that it is worthwhile to incorporate clients' decisions into the construction materials purchasing process.

The paper reviews extant literature on the material purchasing and the roles that clients and their professional advisers could play in construction materials purchasing decisions. The paper is an aspect of a larger research programme which explores the opportunities for securing the best prices for key materials used in construction projects in New Zealand. The paper concludes with contextual information on the larger research on which this paper is based. Information provided includes the overarching aim of the research, its objectives and a brief description about the research methods which will be adopted to accomplish the given research objectives.

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MATERIALS CONTRIBUTION TO TOTAL CONSTRUCTION COST

The ultimate price of a constructed building or a structure is an end result of various cost components mostly associated with contractors and clients of that particular project (Statistics Explained 2011). For a client the total cost includes output prices, value added tax (VAT), site cost, architecture fees and other costs. Altogether, these components are called the clients' costs. In addition, there can be profit margins if the client is not the final owner of the building.

Contractors' main cost components consist of construction costs of which material cost is a major component, productivity costs and profit margins. The general cost distribution among these parties can be represented as shown in Figure 1.

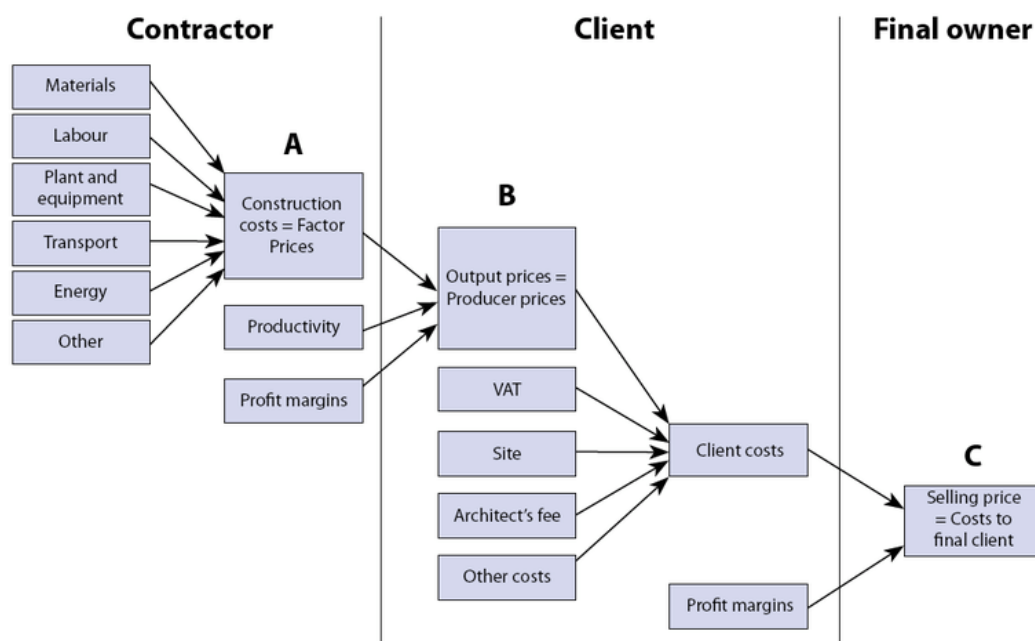


Figure 1: Cost distribution of a construction project (Source: Statistics Explained 2011)

Although the overall building construction cost is distributed over materials, labour, plant and equipment, transport, energy and other components, construction materials comprise a significant part of construction value, approximating 50% of the cost of all construction works (Abdul-Malak et al. 2000; Agapiou et al. 1998; The Business Roundtable 1982; Zavadskas et al. 2005). An examination of cost structures of construction projects reveals that a larger portion of the total construction cost is constituted by construction materials which is usually between 40-50% of the total construction cost for many types of projects (Agapiou et al. 1998). This view is supported by the Construction Industry Institute (1988) which suggests that materials and equipment comprise more than half of a project's cost. Although there is a strong relationship between various project types and their main input contributions (Hillebrandt 1988), as indicated in Table 1, the proportional contribution of material is significant in all circumstances. Bernold and Treseler (1991) commented that the contribution of materials to total construction cost could become even greater in the future due to their increasing cost and increasing usage of materials input in building production. This proportional value further highlights the extent to which construction cost can be influenced through a focus on the proper management of materials.

Table 1: Estimated percentages of various inputs for different project types

Project type	Operative manpower (%)	Materials (%)	Plant (%)	Other (%)
New housing	30	43	2	25
New other building	28	42	4	26
New civil work	15	35	22	28
Repair and maintenance	46	30	2	22
All work	35	37	5	24

(Source: Hillebrandt, 1988 (as cited in Agapiou et al. 1998))

THE MATERIAL PURCHASING PROCESS

According to the definition provided by McConville (as cited in Hadikusumo, Petchpong, & Charoenngam 2005: 737), purchasing is “a fundamental function of material procurement that refers to the acquisition of goods and services and an establishment of mutually acceptable terms and conditions between a seller and a buyer”. Considerable attention has been paid to the purchasing function mainly due to its contribution to profitability, survival of business organisations and firms’ performance (Bayazit et al. 2006; Carr & Pearson 1999). Gadde and Hakansson (2001) found that purchasing is not seen as a separate function and is an integral part of running a company. As far as the construction industry is concerned, purchasing can occur in all phases of a construction project. Anderson and Katz (1998) stated that when a sourcing strategy is developed, particularly to secure the best prices for construction materials, the essential question of ‘how to buy?’ should be answered at the beginning. The sourcing strategy basically depends on whether materials are purchased internally or externally. The next priority should be given to the purchasing function and its associated factors. The purchasing function of a construction firm is a central part of materials management and involves the commitment of project funds for construction materials. The general functions of a purchasing department are defined below (Barrie & Paulson 1992; Dobler & Burt 1996 ; Hadikusumo et al. 2005):

- Identification or recognition of needs via coordination with user departments
- Issuance and processing of internal requisitions
- Discussion with sales representatives
- Identification of potential suppliers
- The conduct of market studies for important materials
- Solicitation of bids and price quotations
- Negotiation with potential suppliers
- Analysis and evaluation of proposals
- Select and award supplies
- Issuance of purchase orders, subcontracts or leases
- Administration of contracts and resolution of related problems
- Tracking and expediting
- Delivery and inspection of goods supplied
- Maintenance of a variety of purchasing records

Depending on the size and scope of the project, these purchasing activities can be achieved by the home office, field, or a combination of both (CII 1988). Few studies have considered any structured research on the purchasing functions and the strategies adopted in the construction industry (Hashim & Ahmad 2006). Therefore, there is a significant requirement for research on the construction purchasing function and especially on the role of the client and their professional advisers in the building construction industry.

THE TRADITIONAL CONSTRUCTION MATERIAL PURCHASING PROCESS

The main concerns of the materials purchasing process are the provision of the right materials at the right time, in the right place and to an agreed budget, such that progress on site is uninterrupted (Kong 2001; Moynihan et al. 2006; Sun et al. 2011). Initiation of construction materials purchasing starts at the tender stage (when the designs are concluded) in a traditional contractual environment. Once the tender document is received, contractors commence project estimation by sending enquiries to their selected suppliers. Afterwards, the contractors evaluate and select the best-received quotes and complete the tender document. Under this traditional contractual environment, material purchasing is limited to the contractors’ three departments namely the purchasing department/purchasing agent, the project management team and the field staff. If the contractor wins the tender at a later stage, the validity of the supplier’s original quote is reconfirmed by the purchasing department. Sometimes there might be a requirement to negotiate a revised price for materials. The next main step after selecting an appropriate supplier is to raise and issue a purchase order to the supplier. In effect, the order becomes a written commitment to accept and pay for goods under an agreed set of terms and conditions and becomes a legal contract. Kong (2001) outlined that there are limitations to traditional construction materials purchasing systems as suppliers may only be selected from a defined geographical location. The system may not allow adequate time for proper supplier selection wherein adequate information about suppliers and their products can be obtained.

In addition, Kong (2001) has reported regularly-encountered trading situations in construction material trading based on the professionals’ ideas in the construction industry. Bargaining, bidding, auction and contract are the main existing trading conditions. Bargaining is a trading condition in which the buyer negotiates with the supplier to accomplish a satisfactory deal. In this case a buyer initiates contact with a supplier, researches the product details including price, and negotiates continuously until a better deal is obtained. Bidding involves a buyer and many potential suppliers. The best deal is selected by the buyer out of the received bids and this follows the typical bidding process. In the case of an auction, a new party called an ‘agent’ who handles the auction, comes in

to the purchasing process compared to the bidding procedure. The buyers bid sequentially to compete for the materials to be sold. During a contractual trading condition, both buyers and suppliers are controlled by a set of mutually agreed rules.

CONSTRUCTION CONTRACTOR AND CLIENT'S RELATIONSHIP

Generally, the building construction industry is project oriented and each project can be considered as unique even though there are common parallel sets of phases. In other words, each construction project is named as a prototype due to its unique site layout and designs. Because of this uniqueness, project team's perspective on the entire construction process could be different. Each project team members such as architects, engineers, contractors and many subcontractors would all have their own opinions on each construction project. Therefore, a construction project is regarded as an order-delivery process and it involves all the parties along the logistic chain. Materials play an important role throughout this order delivery process for the ultimate satisfaction of the customer. When customer's needs are satisfied through the suppliers, contractors, architect and clients, construction materials also transfer among them. In essence, strategies to get best prices for construction materials should be agreeable to all these parties (suppliers, contractors and clients).

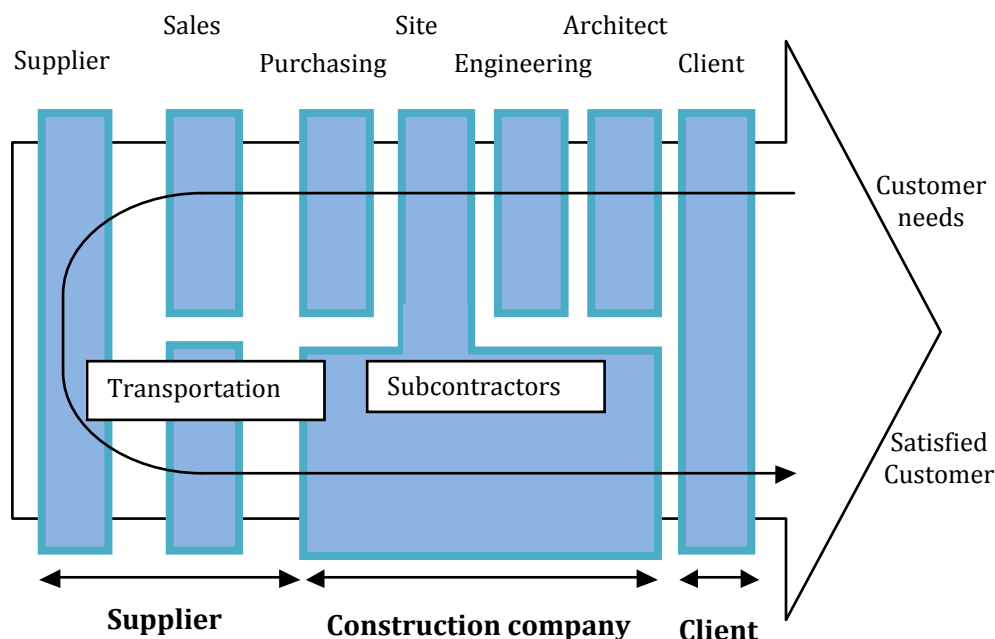


Figure 2: Order-delivery process of the construction project (Source: Wegelius-Lehtonen 2001)

For many industries, one key objective is to achieve the best value for money and the construction industry is no exception. Having realised this, the industry is starting to move away from the limitations of traditional project relationships and lowest-price tenders to other, more collaborative forms of contract procurement. Compared with traditional construction procurement systems, collaboration offers greater opportunities and benefits for the client, contractors, and all other parties to commit to construction project objectives. The inter-relationship between clients and contractors leads to greater client satisfaction, better project quality, shorter construction period and reduced project costs (Boon 2007). In the existing aggressive business mentality of the industry and the non-trusting climate, contractors have greater tendency to pay attention to client/s that provide their workload.

Abdul-Malak et al. (2000) discussed client intentions for managing construction materials purchasing activities. Control of contractor's ordering policies and scheduling contractors payments should be carried out by the client in order to reduce the overall costs of acquiring materials for construction. Due to the clients' responsibility, it is important to ensure that contractors adopt wise procurement plans. However, this depends on the contractual types as well. In order to do that, clients should require the submittal (e.g. shop drawings, material data, samples, and product data, etc.) of a procurement schedule of all major materials against partial payments that apply along with the schedule of work. This can be done through the conditions of the contract. After this schedule is approved by the owner, the contractor is expected to follow it during purchasing of the required construction materials. When the schedule of work is updated, the procurement schedule should also be updated. The contractor's payments for the purchased materials are done in accordance with this schedule to avoid paying for materials that are prematurely delivered to the site. Assume the case that the contractor has already ordered materials according to the approved schedule and work schedule delays were experienced due to reasons outside the control of the contractor. In this case however, the owner will have to issue payments against such delivered materials even if these arrives earlier than it is now required.

DESIGN OF THE RESEARCH STUDY

This paper is an outcome of a larger study (on-going doctoral research project) that is at a relatively early stage in New Zealand. The overarching aim of the doctoral research is to determine how small to medium scale (SME) construction contractors could secure 'best prices' for their key material inputs. The study will be undertaken in conjunction with clients and professional advisers, BMs, manufacturers and building suppliers based in New Zealand. This research study is expected to provide opportunities for the New Zealand construction industry to reduce their construction materials costs. Some research information in this larger study are outlined in the following section.

The following research objectives were formulated to help achieve the overarching aim of the research study.

1. To review and analyse the nature of the construction materials purchasing process and to identify existing problems in this process by conducting a comprehensive literature review.
2. To identify:
 - Buying behaviour of contractors and subcontractors
 - Supply behaviour of BMs, manufacturers, and suppliers
 - Procurement behaviour of clients and their professional advisers
3. To develop a rationalised model/framework to explain construction buying behaviour with a particular focus on prices of building materials
4. To understand the impact of contractor's buying behaviour, suppliers' supply behaviour and clients' procurement behaviour in relation to prices
5. To validate the research findings by subject matter experts in the New Zealand construction industry.

Information will be gathered through surveys and case studies throughout New Zealand. A questionnaire survey will be administered to contracting and client organisations following an extensive literature survey. The case study investigations will involve document analysis of project management procedures and contract documents of selected building construction projects in New Zealand.

In relation to objective 4, it will be necessary to research the types of frameworks developed by other researchers with the form, content, and scope of the synthesised framework depending on the findings of the third objective. There may also be a need to set up mathematical models to explore some of the main findings arising from the third objective. The relationships among sets of many interconnected variables can be represented by identifying a relatively small number of factors using a statistical technique called factor analysis (Norusis 1993). Factor analysis is a collection of methods used to examine how underlying constructs influence the responses on a number of measured variables. Given the likely form and type of data to be obtained from the surveys, it is likely that exploratory factor analysis (EFA) which will attempt to discover the nature of the constructs influencing a set of responses will be used. The impact of various behaviours mentioned above will be evaluated in order to understand their impact on material prices using mathematical models. However, given that, there could be many types of behaviour (and many factors affecting price), it will be necessary to narrow down to a few key types of behaviour for further evaluation using appropriate methodologies.

The following are the key research questions which underpin this exploratory study. This list of questions will be addressed at different stages in the course of the larger research.

1. How do contractors and subcontractors make their materials purchasing decisions in choosing and evaluating supply sources?
2. How can the roles of different project participants be described in relation to various purchasing activities such as quantities needed, quality of materials, potential sources, selection of suppliers and order routines including feedback and evaluation in relation to price?
3. What mix of strategies could/should a contractor or a subcontractor adopt to ensure they secure best possible prices?
4. What are the costs and benefits of these strategies?
5. What project management strategies can be adopted in order to ensure best possible prices are available to clients?

CONCLUSIONS

Sourcing best prices for materials is as much an issue for clients as for contractors and is an aspect that has rarely received any attention. Hardly any study has taken an integrated and holistic approach to material procurement and the achievement of best prices for construction projects. There are a number of issues surrounding the materials purchasing process including the involvement of clients and professional advisers in materials purchasing decisions. It was suggested throughout this paper that clients' role in

the materials purchasing function is critically important. Since their involvement makes more opportunities to secure best prices for construction materials there should be well-defined criteria indicating their roles and that of their professional advisers in the construction materials purchasing function. The fundamental to achieving a better value for construction procurement is effective leadership of the project owners. How collaborative the project team is, is equally important in accomplishing a successful procurement process and deriving best value for procurement decisions. Transparency in the procurement decisions can further enhance the value. However, preliminary and anecdotal findings of the on-going doctoral research on which this paper is based, is indicative that the roles that the clients and consultants play in relation to construction materials purchasing decisions are not clearly defined.

More so there have been no controlled studies related to construction material purchasing issues, especially concerning prices in New Zealand. This reinforces the need for a study into issues around material purchasing in the construction industry. This first time holistic study will help to understand the intricacies involved in construction materials procurement management from an organisational perspective. The study will benefit construction academics and practitioners as it cuts across many bodies of knowledge, from organisational buying behaviour to supply chain management and production management to marketing.

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