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Factors Affecting The Cost of Building Work - An Overview

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FACTORS AFFECTING THE COST OF BUILDING WORK

An Overview

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Introduction

The issue of the cost of construction work is one that is rarely far from the minds of construction clients, design teams, constructors and, of course, quantity surveyors. The cost of constructing a building project is a primary concern for the vast majority of construction clients. Indeed one of the most common initial questions a client has is '*what is it going to cost me*?' often followed closely by '*can we do it any cheaper*?' Providing answers to such questions is a key objective of quantity surveyors, whose task it is to predict the likely cost of building work and to manage the evolving project design to ensure that the client's approved budget is not exceeded. This is a challenging task, which frequently involves one-off, unique, purpose made buildings, and the QS typically operates within a design team brought together specifically for that particular project.

Clients are often somewhat aware of what their building should cost. Indicative cost ranges for various types of development are regularly published by the larger quantity surveying practices and are also found in construction price-books. It is only natural for a client to question why their development cannot be budgeted at the lower end of the indicative cost range. In these situations the QS will need to explain that the cost of construction work is influenced by a wide range of factors. These include the identity and priorities of the client, the nature of the project and who is responsible for developing its design, the choice of procurement options, the prevailing market conditions and legislative constraints. Many of these factors are interlinked. Priorities directly influence the choice of procurement strategy and associated contractual arrangements, which regulate how the contract is to be operated and how risks are to be allocated between the contracting parties. These, in turn, impact on how the work is planned and carried out on site and influence the eventual level of productivity

achieved. The aim of the quantity surveyor in this process will be to maximise the value for money of the client.

Value for Money

It is not the cheaper things in life that we want to possess, but the expensive things that cost less – John Ruskin

Achieving value for money may be seen as being a balance between satisfying client needs and expectations and the resources required to achieve them. *The Code of Practice for Project Management* summarises typical expectations thus: "*The client expects that effective project management will enable the projects completion, by the time when it is wanted, of a standard and quality that is required and a price that is competitive*" (Chartered Institute of Building, 2002). Standards and quality expectations are, however, constrained by cost and time and therefore objectives must be prioritised. Clamp, Cox and Lupton. (2007) recognise these constraints and comment that:

> "there may be clients who . . . think it is now possible to construct a quality building at break neck speed and for a knock down price. Any such unfounded euphoria needs to be dispelled at the outset. . .The reality is that although the three most important considerations for any client are usually cost, time and quality, the business of building procurement invariably calls for some comprise or a consensus balancing of these priorities. This requires adequate thinking time and careful thought."

The Client's Priorities

All construction work is ultimately undertaken for the benefit of a client. Clients fund the construction process, whether they are individuals extending their homes, or a multi-national corporation developing a cutting-edge production facility, or a government department providing much needed social infrastructure. The importance of clients cannot be over-emphasized. Very often clients do not get the building they want, because they do not know how to ask for it and the architect or other consultants think the building should look a different way. Clients expect that the project will be a success and that the providers will deliver a competent service. They will be dissatisfied, if these expectations are not met.

David Keane (2001) quotes *Hudson's Building Contracts (1995 p.284),* in describing the remit of the architect, provides a useful synopsis of what clients' expectations may be:

- *a design which is skilful, effective to achieve his purpose within any financial limitations he may impose or make known and comprehensive in the sense that no necessary work or foreseeable work is omitted;*
- *the obtaining of a competitive price for the work from a competent Contractor, and the placing of the contract accordingly in terms which afford reasonable protection to the Employers interest both in regard to price and quality of the work;*
- *efficient supervision to ensure that the works as carried out conform in detail to the design; and*
- *efficient administration of the contract so as to achieve speedy and economical completion of the contract.* (Keane 2001 pp.27-28)

Priorities vary amongst clients and a critically important factor for one client may be insignificant for another. It is also clear that the broad priorities of time, cost and quality are complex and interrelated.

Quality Considerations

"*Quality is remembered long after the price is forgotten*" Sir Henry Royce

A project may be completed on time and within budget, but unless it achieves the specified quality or performance criteria it will be considered to be a disappointment or even an outright failure. High profile building failures such as Priory Hall only serve to strengthen the public concern expressed in the *Egan Report*'s findings that 30% of buildings fail to meet the expectations of their owners. Such failures may be prohibitively expensive to rectify, dangerous and can ruin reputations overnight.

The notion of 'quality' is multidimensional and includes aspects which may be appraised subjectively. *The Latham Report* identified a number of quality aspects which clients may seek in a satisfactory construction project: '*pleasing to look at; free from defects on completion; fit for the purpose; supported by worthwhile guarantees;*

satisfactory durability and customer delight (1994). Several of these aspects are inherent in the design of the project, while others relate to how successfully the contractor constructs that design on site. The designers will aim to produce an effective and attractive spatial and structural solution to the client's brief. This should provide sufficient, well planned accommodation, using appropriate materials, components, equipment, fittings and furnishings to enable the building to perform effectively and efficiently. Ideally it should generate a sense of delight amongst it users and the public at large.

Ashworth (2004) relates performance to five attributes: appearance; quality; function; durability and maintenance. He adds that these are matters addressed in the specification, which must be adequate and must be constructed by an experienced contractor under competent supervision. He notes that inadequate design and/or incorrect specification leads to poor performance. He also identifies the implications of maintenance requirements and notes that many clients now view total project costs rather than initial construction costs as an important factor in the success of the project.

The quality of the building will express the client's ambitions for a prestigious development. This may range from a top quality building with minimal maintenance requirements where all matters relating to the design are controlled by the design team to developments such as retail or industrial process where the detailed design is not critical and can be undertaken by the contractor. It may be essential to use high quality materials in conservation projects or where planning conditions have been imposed. High standards of craftsmanship will also be required on alterations and extensions to listed or historic buildings. (Clamp et al. 2008)

The Latham Report (1994) notes that

> "The project should be effective for the purposes for which it is intended. A well designed building need not be to a high level of specification. Evidence to the review has suggested that some UK buildings are over specified and thus unnecessarily costly. A well deigned project will impact upon the satisfaction, comfort and well being of its occupants, and, if it is a commercial building, upon their productivity and performance. …Quality should be the overriding consideration."

Cost Considerations

"*It is unwise to pay too much, but it is worse to pay too little*". - John Ruskin

The relationship of quality to cost is often expressed in the saying that 'you get what you pay for.' Regardless of Ruskin's advice, cost is a critical factor in most building projects and some clients will seek a low price. Low price and maximum price competition, however, often have negative impacts on quality standards and achieving best value for money overall. In the current economic climate below cost tendering has heightened the risk of contractor insolvency and it may be difficult and expensive to obtain protection from this risk. Unrealistic and inadequate budgets often lead to projects becoming finance driven where cheaper options are preferred to better or more sustainable alternatives. Certain clients may have fixed budgets which may not be exceeded in any circumstances. In such circumstances the client will expect the quantity surveyor to maintain rigorous cost control during the project in order to deliver the project within budget. Designing to achieve such cost limits might curtail the introduction of beneficial features and/or variations which may result in excessive running and maintenance costs later on.

The *Latham Report* comments on the link between initial and future costs noting that '*good design does not necessarily involve high cost*.' … *Good design will provide value for money in terms of both total costs and costs in use. The energy and maintenance equations should be uppermost in the minds of the designer and client, as well as the appearance of the façade and the effective use of space* (1994) The *Report* notes, however, that paying a high price, in itself, does not guarantee quality.

Certainty over the outturn price is a priority for many clients and is a particular concern of Irish public sector contracting agencies. Public works projects are now required to be undertaken on the basis of the GCCC fixed price lump sums contracts. These appear to promise cost certainty, but in order to deliver this objective the project must be fully and comprehensively designed before the price is agreed. This is rarely fully achieved in practice and the *Egan Report* found that 40% of projects exceed their budgets.

Other client priorities relate to cost issues. Certain clients may be bound by standing orders such as a requirement to accept the lowest tender or obtain a detailed cost

breakdown. The need to demonstrate accountability is a particular concern of public sector clients.

Time Considerations

'*Time is money'*. – Benjamin Franklin

Once a decision to build has been reached the client will be anxious to have the building completed as quickly as possible. For many clients early completion may be the overriding priority, for example where staging a major sporting event is scheduled, or where a client is attempting to establish a market presence ahead of competitors, or to avail of tax incentives. Time is also of the essence in emergency situations such as fire or flood damage or where stabilisation works are required to dangerous structures.

Speedy completion is often required on commercial developments. The pressure to achieve early completion intensifies when financing and interest costs associated with acquiring the site begin to mount. Clients will seek the early appointment of a contractor in these situations to enable a fast start up on site and will favour 'fast track' design approaches where the design is developed in parallel with site construction operations. Such approaches risk allowing insufficient time to identify or consider beneficial design options, and may, on occasion, lead to abortive working and/or losing time. Speedy construction on site often requires accelerated working and/or shift or overtime payments, more intense management presence, and the use of dependable subcontractors and suppliers, all of which add to the cost of the project. Fast track approaches rule out cost certainty and the client will become aware of the eventual cost only at an advanced stage of the project.

Clients who prioritise cost over speed or who require fixed price lump sums will generally experience longer development programmes, as designs must be substantially completed before tenders can be obtained. This process may take a considerable amount of time as careful thought is required to develop and refine the scheme design. The design, in turn, influences the contractor's construction methods which determine length of time taken to complete the contract on site.

The Nature of the Project

Many construction projects involve the design and construction of a building which is tailored to meet the client's specific requirements. No two construction projects are identical - there is no such thing as the average building project. The cost of the building will depend on its particular characteristics and these are largely determined by the architect. The design options are almost limitless and the resulting costs can be difficult to forecast reliably in many cases. On the other hand, certain types of buildings such as schools have well established cost histories and are usually subject to a cost limit. For example, the current cost limit, for primary schools is €930 per square metre of floor area including VAT. (Department of Education and Science, 2010)

The Choice of Architect

The choice of the architect as lead designer is a key decision on any project and will reflect the client's priorities, particularly those related to cost and quality. Clients who plan to develop high quality or landmark developments often employ high profile design practices. Indeed internationally acclaimed architects including Daniel Liebskind, Santiago Calatrava and Dublin-born Pritzker prize-winning Kevin Roche have completed projects in Dublin in the recent past. The leading Irish architectural practices are likewise normally in high demand and clients are keen to buy into their 'signature'. High expectations are usually linked to high prices and such clients will expect to pay a premium on prestigious projects. Nevertheless, they may not be prepared to provide total *carte blanche* to the architect. Architects, quite naturally, may be reluctant to drop quality standards and compromise their 'brand' to reduce costs and it may difficult for the quantity surveyor to control costs in these circumstances. In this regard Ashworth (2004) refers to a cynic who described architecture as the design of beautiful buildings that satisfy only the architect and not the client. At the other end of the cost spectrum a client may require a practical, no-nonsense design to accommodate a production process. Such designs are often developed by architects operating within a design and build arrangement where providing an economic design is essential to winning the contract.

The Function of the Building

It is clear that the purpose of a building will have a major bearing on its cost. Housing has a very different cost range to apartments and commercial development. Likewise the cost of providing public amenities such as conference centres, theatres and sports stadia cannot be directly related to the provision of public infrastructure such as hospitals or schools. The cost of each building must be related to its individual design, which may be benchmarked against similar national and international projects.

The Cost of the Design

The geometry of a building has a major impact on costs. Building morphology is concerned with the size, shape and complexity of the building. This section provides a very brief outline of the principle morphological factors which influence the cost of building work. The reader is referred to the numerous publications which examine this topic in greater detail. The following are useful sources: Seeley (1996) Chapter 2, Ashworth (2004) Chapter 5, Smith and Jagger (2007) Chapter 2, Kirkham (2007) Chapter 10, and Cartlidge (2013) Chapter 2. The main design factors which impact on cost are:

- plan shape,
- size of building,
- wall to floor ratio
- degree of circulation space,
- storey heights
- total height of the building
- grouping of buildings (Seeley, 1996; Ashworth, 2004)

In general it can be said that larger buildings with simple, rectangular, regular floor plans and elevations will be less expensive per sq.m. of floor area than smaller, complex shaped, curved or angular buildings. Economies of scale apportion fixed overheads to a larger extent of ‘productive’ space. Simple setting out and buildable solutions encourage greater plant use and generate higher productivity and less waste.

Complex layouts and details are slower to assemble and may involve a number of trades with a consequent greater risk of mistakes and defects. The degree of compartmentation and repetition will also affect the overall cost of the work. New building work is considerably cheaper than work of a repairing nature or work in existing buildings. Single storey structures tend to be more costly than buildings up to three storeys high, beyond which point they become progressively more expensive.

Choice of Materials

The materials specified and the proposed construction details will have an important bearing on the cost of the project. The relationship of quality to cost has been commented on above, and buildings which incorporate high quality and/or innovative features are invariably more expensive than those which are purely functional. The choice depends on what the client is willing to pay. The materials, nevertheless, should be appropriate for their use; over-specification is wasteful.

The choice of the material, and hence the cost, may be influenced by factors other than aesthetic qualities. For example fast-track construction projects may use a steel frame in preference to an in-situ or precast concrete frame in order to reduce overall programme durations. Although the concrete option may be cheaper, the shorter programme achieved by using steel may offset this initial cost advantage. Technical decisions such as these are made for each building element and these have a direct bearing on the eventual cost. Where considerable repetition can be achieved it may prove economical to prefabricate certain structural elements or to standardise various components and fittings.

The Attitude Towards Sustainability and Whole Life Costs

The client's attitude towards initial versus the whole life cost of the building can significantly influence the specification. Buildings incur costs over their life time; these include initial capital costs, operating costs, maintenance, disposal and finance costs. The key decision is whether to spend more money initially on better alternatives in order to save money in maintaining and operating the facility. The factors influencing this decision include:

- Is the more expensive option a worthwhile investment? If it can be demonstrated that savings will arise as a consequence of incorporating the more expensive

alternative, then the client is well advised to choose this option. The quicker the payback period, the more likely it is that the more expensive option will be chosen.

- How flexible is the client's budget to finance more robust, better quality or more economic structures or systems? Regardless of whether the client wants the more expensive alternative he or she may not be able to afford it. Retrofitting, however, is inconvenient, disruptive and much more expensive subsequently.

- Will the client occupy the building? Clients who develop to sell or lease may be less concerned with the operating and maintenance costs of the facility which will be passed onto the eventual purchaser or user of the facility. Clients who spend more initially will seek to recover their investment through higher rents or sales price. This approach may be adopted by future oriented private sector clients concerned with sustainability and green building issues.

- What is the life-span of the building? The shorter the planned life span of the building the less appropriate it is to incorporate robust and durable materials and systems.

The Nature of the Site

Location

The location of the project will influence its cost. High value sites attract high value developments and it is inappropriate to locate low value projects on valuable sites. Local development plans will constrain what can be built on such sites in any case. In general, urban locations are more expensive than their rural equivalents due to higher local wages, costs associated with access constraints, limited space for staff accommodation facilities and material storage, and the additional security measures required.

Physical Site Conditions

The site topography i.e. the natural site features, ground conditions and obstructions, existing and adjoining building, and underground and over-ground services all impact on how the building is designed and subsequently constructed. The nature of each site

must be individually checked to establish potential problems. 'Greenfield' developments cost less than 'brownfield' sites which may incur significant demolition, site clearance and remediation costs. Heavily sloped sites require extensive stepping or cut and fill operations and such sites may be dangerous and adversely affect the working conditions and productivity of operatives and plant output. Sites with poor loadbearing capacity will require more expensive foundations while exposed or waterlogged sites will also reduce overall productivity. The cost of dealing with unforeseen ground conditions, archaeological finds and encountering uncharted buried services may be substantial and will be borne by either the client or contractor, depending on the form of contract employed.

Availability of Services

The availability, location and capacity of existing utilities must be considered in the design. Connecting to these may involve significant costs particularly where they are inconveniently located or are distant from the site. For example septic tanks or pumping plant may be required to drain a site, easements may be required to cross neighbouring land, and diversions of live services may be required to accommodate the development.

Resource Availability

Local contractors are usually at an advantage when competing for work. Contractors who have the capacity to construct work from within their own organisation should, in theory at least, be more competitive than those who sub-contract large proportions of the work. Current site management practice however tends to favour the widespread use of subcontractors. Nevertheless, the ability to attract labour and to source materials in the locality is an important factor in ensuring that unnecessary travelling and transport costs are not incurred in carrying out the work. Seeley (1996) notes that contractors will have to consider whether management, labour and plant resource requirements can be met from within the contractors own organisation or whether it will be necessary to recruit specifically for the project. The contractor will also have to consider what demands the proposed project would put on own plant, scaffolding and equipment.

Climate

Meteorological conditions vary immensely throughout the world and although Ireland experiences a temperate climate all year round, the weather conditions on individual sites in different parts of the country may be very different from each other. Of particular concern may be sites that are prone to flooding, or are exposed or elevated sites where high winds may curtail the use of plant.

The Method of Procurement

Procurement refers to '*the process of obtaining goods and services from another for some consideration*' (Hackett et al. 2007). They describe the process as being simple in theory – balancing quality, time and cost priorities, but complicated in practice by legislation, the need to achieve value for money, demonstrate accountability and coordinate consultant and contractual roles and obligations to achieve a satisfactory outcome. The procurement strategy identifies how the project is structured (Murdoch and Hughes, 2008) and establishes where responsibility for design is to be placed, how the work is to be co-ordinated, and on what price basis the contract is to be awarded. The procurement strategy also directly affects the level of risk borne by the contractor and leads to choices regarding the conditions under which the work will be executed. For example the provisions of the GCCC forms of contract emphasise cost certainty. These risks must be appraised and managed by the contractor and has a direct impact on the price tendered by the Contractor

There are various means by which buildings may be procured depending on the client's priorities, the three most common approaches are:

Traditional Procurement

This is where a client appoints consultants to produce the design, select the contractor and supervise the work through to completion. The contractor is usually selected on some basis of competition. The traditional procurement route prioritises quality aspects of the project and is also effective in delivering economic designs on most projects. The chief drawback of the approach is the extended project duration due to the need to complete the design prior to tender.

Design and Build Procurement

This is where the contractor provides the design and construction under one contract. 'Turnkey' projects and many public private partnership developments are examples of this approach. Design and build offers the client competitively priced projects completed within rapid time frames by enabling the contractor to value manage the employer's requirements and overlap design and construction operations. It is not successful where the employer's requirements are poorly defined and the approach tends to produce 'functional' architecture in terms of appearance.

Management Procurement

This is where the contractor works alongside or within the design team providing a construction management service. The management contractor does not undertake either the design or the direct construction work. The physical construction is carried out by specialist subcontractors (package contractors). There are two main forms of this approach: *Management Contracting* where the contractor employs the subcontractors and *Construction Management* where the subcontractors are employed directly by the client and the project is managed by the construction manager - there is no actual 'main' contractor. Management procurement routes are associated with fast moving, complex construction projects. The early appointment of manager within the design team allows the design and construction operations to be fast-tracked while also ensuring that the required quality standards are delivered. These projects, however, tend to be expensive.

Figure 1 sets out a summary of the advantages and disadvantage of various procurement approaches which may be of use in meeting project objectives.

Project Objectives		Appropriateness of Contract Strategy in Meeting Project Objectives				
Parameter	**Objectives**	**Traditional**	**Construction Management**	**Management Contracting**	**Design & Manage**	**Design & Build**
Timing	Early Completion	❑	■	■	■	■
Cost	Price certainty before construction start	■	❑	❑	❑	■
Quality	Prestige level in design and construction	■	■	■	❑	❑
Variations	Avoid prohibitive costs of change	■	■	■	■	❑
Complexity	Technically advanced or highly complex building	❑	■	■	❑	❑
Responsibility	Single contractual link for project execution	❑	❑	❑	■	■
Professional Responsibility	Need for design team to report to sponsor	■	■	■	❑	❑
Risk Avoidance	Desire to transfer complete risk	❑	❑	❑	❑	■
Damage Recovery	Ability to recover costs direct from the contractor	■	❑	■	■	■
Buildability	Contractor input to economic construction to benefit the department	❑	■	■	■	❑

■ - appropriate ❑ - not appropriate

Figure 1. - Summary of the Advantages and Disadvantage of Various Procurement Strategies (Source Latham, 1994).

Payment Arrangements

The payment arrangements adopted on a contract directly affects the level of risk borne by the contractor. Where the contract is let on the basis of a *drawings and specification lump sum* the contractor assumes the risk for both the quantity and pricing. In lump sum *contacts based on bills of quantities* and *remeasurement* contracts the contractor assumes the risk for the pricing only. With *reimbursement contracts* the client assumes the risk for the quantity and pricing. The payment arrangement, therefore, directly motivates the contractor's efforts to carry out the work in an efficient and economic manner. This in turn has a major impact on the final price paid by the client.

Tendering Arrangements

The contractor is selected on the basis of competitive tendering on most building contracts. The price which the contractor quotes for the job is heavily influenced by both the amount and intensity of the competition expected. In an *open tendering* arrangement the level of the competition is at its most intense and contractors must submit highly competitive bids to have any chance of winning the contract. This usually secures a rock bottom price. With *selective tendering* a limited number of competent contractors are invited to tender for the job, this limited competition arrangement results in a keen price being obtained. In the case of a *negotiated tender* there is no explicit competition and the parties seek to agree a fair price for the work, implicit competition exists, however, as the employer can break off negotiations. If there is no competition the contractor can, in fact, 'name his price'. The tendering

arrangement is, therefore, one of the most cost significant decisions a client will make in the course of a building contract.

The Clarity of the Requirements

The contract documents set out what work must be done, and how, and under what conditions it is to be done. They identify the contractor's obligations and liabilities and form the contractual agreement to do the work for the stated price or at the agreed rates. Many if not most financial problems in building originate in inadequate or unclear tender and contract documents, often culminating in disputes between the client and the contractor over what is included in the price for the work.

Legislative Constraints

Construction involves the production of large scale capital assets which affect not only the client, designers and constructors but also users, the public, and the environment at large. Common law regulates the rights and obligations of the contracting parties not only to each other but also their duties of care to society in general.

Buildings affect everyone and can intrude on the freedom, privacy or rights of individuals. Statutory legislation regulates many activities of those who wish to build. Planning legislation controls the appearance and intensity of planning of buildings and may limit the extent of development on particular sites. Building control legislation establishes minimum standards and requires that buildings are safe and efficient to use. Safety legislation sets out to eliminate accidents to persons in the course of constructing the building. Environmental legislation protects society and wider environment from potential negative effects of the development process.

This legislation regulates and constrains how developments are carried out. Rising minimum standards relating to planning, construction, safety and environmental protection certainly lead to better developments, but this comes at a price

Socio/Environmental Factors

Regardless of legislative initiatives, society's expectations of the built environment continue to rise regarding standards of design and construction. These demands, however, are tempered by the need for value for money.

One purpose of legislation is to oblige project teams to consider the impact of a project upon society. People pass buildings, use them and/or are affected by them on a daily basis. It is important, therefore, to take account of public concerns. Property development is a controversial activity and the risk of alienating a section of the public is high. The experience at Rossport is a high profile example of the problems which may occur when members of the public become entrenched in their opposition to a project. Therefore a decision is needed in each project about the extent to which people outside the immediate project team should be involved. Public consultation processes may be necessary at an early stage, but the benefits of this may be far reaching in avoiding protests and boycotts. Nevertheless, it is very unusual to satisfy everyone and usually compromise is necessary. This may require expensive measures to allay public concerns. (Lester, 2008)

Environmental Considerations

The construction industry is a major user of finite resources and energy. In addition processes carried out in buildings releases significant amounts of CO_2 into the atmosphere which contributes to climate change. A major challenge facing the industry is to ensure that its processes and products are sustainable. Action to meet this challenge frequently involves initiatives which exceed minimum standards or are of an innovative nature and as such add to the cost of building.

Market Conditions

Value for money is perceived within a time and location context. Construction activity is highly sensitive to changes in economic outlook and activity in the local and national economy. Construction activity is cyclical and flourishes in times of general economic growth and suffers during economic downturns. Contractors generally win contracts in competition and profit margins reflect the amount of work available at the time. When demand for construction work is high, contractors typically experience supply and capacity constraints, labour shortages, which result in rising tender levels. Conversely, when work is scarce margins are cut in an attempt to secure work, and may be insufficient to adequately cover risks eventuating during a project. In these instances contractors may be trading at a loss, which, ultimately cannot be sustained.

Figures 2 and 3 show that the industry has undergone a severe contraction during the past six years, falling from a peak of approximately €38 billion in 2007 to an estimated €8 billion in 2012 (DKM, 2012). The collapse has led to a return of pricing not seen the late 1990s. This has increased the risks of contractor insolvency recently.

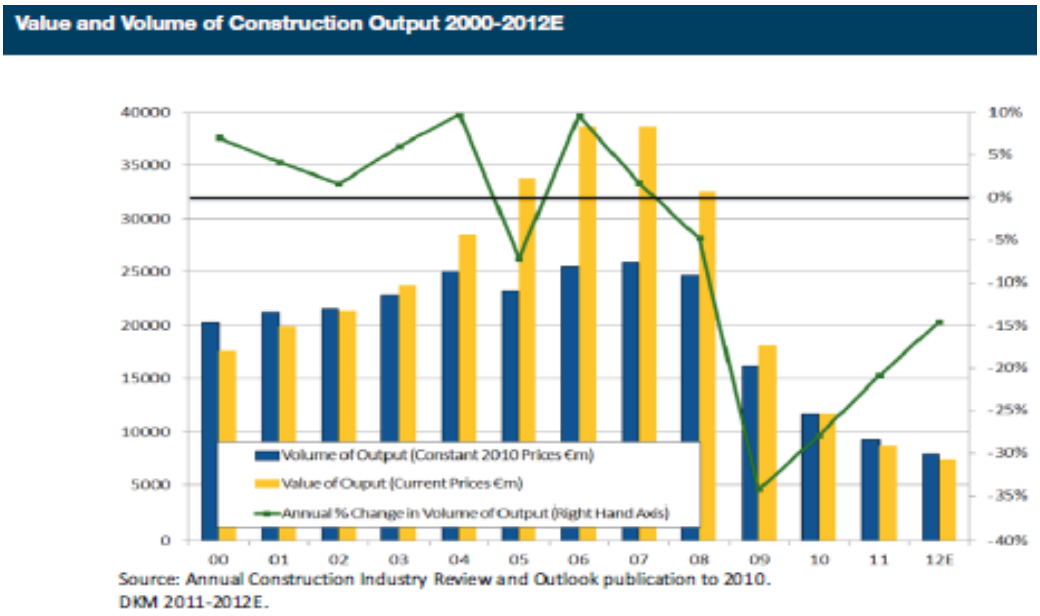

Figure 2. - Value and Volume of Construction Output (Source SCSI 2012)

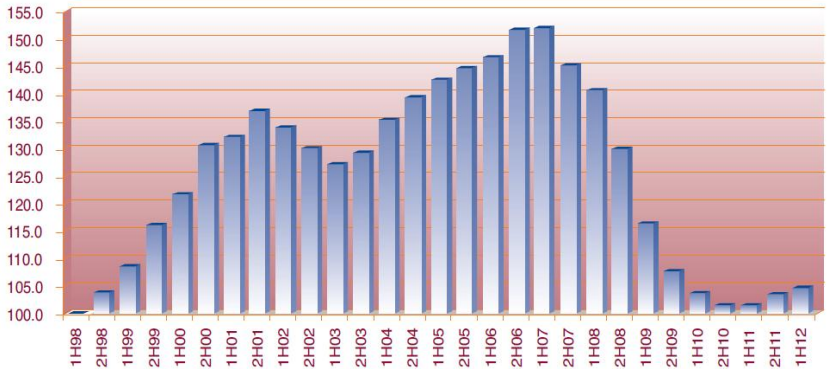

Figure 3 - SCSI Tender Price Index 2012 (Source SCSI 2012)

Method of construction

Ultimately the cost of building is determined by how much the successful tendering contractor charges to carry out the work. This is largely determined by the cost and productivity of the resources employed in its production. These include: the cost of productive labour, the price of materials, the cost of plant, the competitiveness of subcontractors, the cost of running the individual site and the appropriate contribution

towards the cost of running the business as a whole. The contractor will also have to allow for contingencies, and apply a profit margin on which he/she has a realistic chance of winning the contract.

According to (Brook, 2008: pg. 111) a typical breakdown of a contractor's costs on a construction project may be:

- Direct work, - Labour 23%
- Direct work, - Plant 5%
- Direct work – Materials 28%
- Domestic subcontractors 44%

It is clear that contractors who can minimise these costs will gain a significant competitive advantage over their rivals.

Labour Costs

Generally direct labour costs tend to offer little room for manoeuvre for a contractor. There are obvious advantages in trying to replace labour intensive activities with a cheaper or faster mechanical based approach. Seeley (1996) identifies a number of factors which affect labour costs but which can also boost productivity: better training, realistic performance-based incentives and effective organisation and supervision. The contractor's commitment to workers in terms of providing training and offering better rates of pay and conditions to 'core' staff is normally a worthwhile investment, which is repaid in quality work and a reduced need for supervision. Temporary labour which may be obtained at lower cost normally incurs higher supervision and can damage to a firm's reputation and incur considerable remedial costs if the quality of work is poor.

Productivity

Site productivity is influenced by a range of human and site related factors which combine to affect output. Human factors include the skill of the operative, familiarity with the operation (learning curve), equipment used and motivation. Human needs such as job security and satisfaction and health also influence productivity. External

Conditions such as climate, the degree of supervision, the complexity of design, site layout and organisation, and overall mechanisation will also affect the productivity achieved on site. For example, difficult working conditions such as working at high level or working on scaffolding generates less output than working at ground level.

Materials

Contractors establish a competitive market by using their in-depth knowledge of suppliers within their locality to obtain the best possible quotations and business terms from suppliers. However, this 'market' tends to be small and there are limited benefits in going over the top in shopping around. Contractors usually concentrate on developing good relationships with a number of key suppliers, thereby improving credit terms, service in ensuring good delivery times, credits for returns etc. A key aspect of materials management is the avoidance of wastage of materials.

Site Overheads

Site overheads are often referred to as 'preliminaries' and these reflect the cost the contractor incurs in setting up and running the site. Preliminaries represent a significant portion of a typical building contract. On most contracts they amount to approximately 10 to 15% of the contract sum. As building operations become more complex and the contracting role increasingly involves off site construction and the coordination of subcontractors, the pricing of the preliminaries takes on added importance to the main contractor. By choosing efficient methods of carrying out the work the contractor can reduce programme times, producing significant savings in management and accommodation costs, thereby gaining a competitive advantage over rival companies.

The Project Programme.

The client's requirements will dictate the amount of time available to construct the project. From the contractors perspective there is an optimum time for completing a project. Contracts periods shorter than the optimum will result in the contractor incurring additional cost in terms of non-productive overtime, more intensive management input and coordination of subcontractors. These include, for example, increased health and safety management issues arising out of more intensive site

activities. On the other hand, extended contract programmes involve the contractor in unnecessary site preliminaries and overhead and financial costs.

Summary

The issue of the cost of building work is important to the vast majority of construction clients. This study has outlined the principle factors affecting the cost of building work within the Irish context. The study identified that the client's priorities in relation to quality, cost and time constraints are key factors in forming an effective brief. The appointment of the design team is shown to be a key decision in the process of developing this brief and determining the nature, and hence the cost of the project. Design factors affecting the cost of buildings include their function, geometry, specifications, emphasis on whole life costs, legislative constraints and socio-economic factors. The location, physical and environmental conditions of the site also exert a considerable bearing on costs. The study also examined the impact of procurement choices, and market conditions and concluded with an overview of the factors affecting the contractor's site production costs.

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