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AN OUTLINE OF THE ROLES OF THE PRINCIPLE PARTICIPANTS IN THE 'TRADITIONAL' CONSTRUCTION PROCUREMENT PROCESS

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Introduction

Major building construction projects in Ireland are becoming increasingly complex in terms of scale, organizational structures, statutory regulation and budgetary requirements. Many construction projects are complex, take a long time to complete, are expensive and involve a wide range of participants. The successful management of any project, whether large or small, depends for its success on the effective input of all those involved throughout the various stages of the project. Effective team-working is the key to achieving successful project outcomes. Success, however, is not easily achieved in an industry that is highly fragmented, where the various groupings often hold competing priorities, and are known to be mutually suspicious of each other's objectives and operating methods. Difficulties are likely to arise in these situations. It is very important therefore, that the various participants should be fully competent in performing their particular role and understand and appreciate the roles, expertise and contributions of their colleagues/collaborators in delivering successful projects.

Hackett and Statham (2016) comment that the composition of a building team depends on the size and '*complexity of the project and the contractual arrangement selected. There are already many different methods of managing a project and, no doubt, others will be developed in the future.*' This study focusses on the 'traditional' or 'general contracting' procurement arrangement which remains the most widely used approach in procuring substantial building in the Republic of Ireland.¹

¹ The study relates to substantial building works rather than single 'owner-occupier' house building projects.

The standard contractual relationships within the ‘traditional’ arrangement are indicated in Figure 1 below.

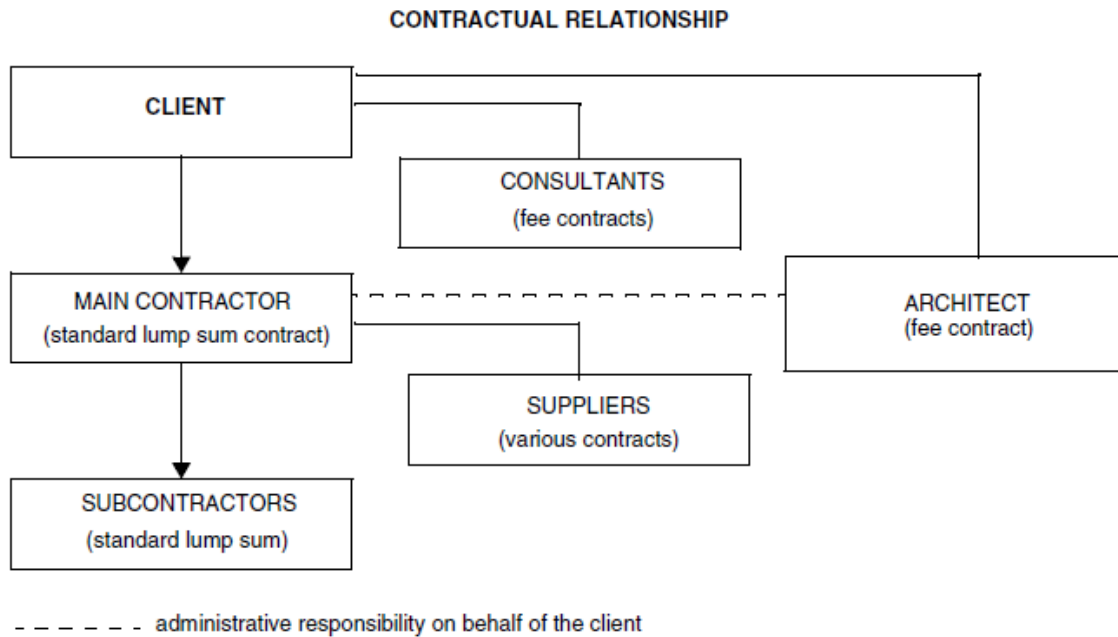


Figure 1 Contractual Relationships under ‘Traditional’ Contract Arrangements (RICS 2003)

This diagram indicates that the client (Employer) commissions an architect (or an architectural practice) to assist in formulating a comprehensive client brief which is subsequently developed into an effective design. In carrying out this commission, the architect is typically supported by a range of consultants offering specialist design services and expert cost advice. Taken together the architect and the various consultants are commonly referred to as the ‘Design Team’. It is normal practice for the client to arrange separate contracts for services with each of the individual design consultants.

Figure 1 also indicates that the client will enter into a contract with a ‘main’ contractor to construct the proposed design. The contractor typically subcontracts much if not nearly all of the work to various subcontractors and suppliers. In certain instances, particular subcontractors and/or suppliers may be specified by the client or architect through a process termed ‘nominated’ or ‘reserved specialist’. Such subcontractors, nevertheless, are contracted to the main contractor who remains fully responsible for their performance. The dashed line in Figure 1 indicates that there is a control function

between the architect and the contractor. This function seeks to ensure that the agreed quality and safety standards, timely delivery and, ideally, cost targets are achieved.

Hughes, Champion and Murdoch (2015) explain that *‘Everyone who is paid for their involvement, [in Figure 1 above] whether designer or builder, is involved through a contract. This will connect a purchaser with a supplier or with a provider of services. The document may be a building contract, a sub-contract or a professional’s appointment document. ... Contracts are commercial in nature, being records of business transactions’* which the courts will enforce.

It should be noted that while Figure 1 uses the term ‘client’ and ‘architect’; these terms are interchangeable with various other titles such as ‘employer’ (client) and ‘employer’s representative’, or ‘supervising officer’ (architect) depending on the wording of the particular contract being used. In the Republic of Ireland, most **private sector** construction contracts are carried out using one of the Royal Institute of the Architects in Ireland (RIAI) forms of contract and are administered by the ‘Architect’. Public sector construction projects are carried out using one of the Public Works Contract Forms (PW-CF) and are administered by the ‘Employer’s Representative’ (ER). Various other terms may be used to describe this role, all of which essentially refer to the person who is the primary point of contact between the client and the contractor. This study is concerned with the administration of the principle Irish forms of building contract: the RIAI ‘Yellow’ Form with Quantities (2017), and the PW-CF1 (Version 2.4) ‘Major Works’ Form where the Employer provides the Design.

Regulation of Construction Activity

In the first instance a range of legislation relates to construction activity and imposes specific obligations on those involved in the development process. In the context of this study, the most important of these are the Planning and Development Acts, The Building Control Act; The Safety, Health and Welfare at Work Act, together with the statutory regulations made under these Acts. In addition, payment procedures are now regulated under The Construction Contracts Act (2013). An examination of the relevant legislation

is beyond the intention of this work, but the main requirements as they relate to the various participants are commented on below.

Planning legislation exists to ensure that development is in the public interest and that the environment and public amenities and facilities are protected. Ideally the proposed development will be attractive and well designed. Except for permitted exemptions, the general rule is that *'permission is required for development'* (Keane, 2003). The Planning and Development Act² stipulates that *'A person shall not carry out any development in respect of which permission is required ... [and that the project is subsequently constructed] in accordance with [this] permission'*. The Act³ states that *'Any person who has carried out or is carrying out unauthorised development is guilty of an offence.'* Unauthorized building potentially exposes the client to a demolition order or *'very heavy fines and imprisonment. However, if a genuine mistake has been made, it is possible to apply for planning permission to retain an unauthorised development. This permission may be refused, in which case, the unauthorised development will have to be demolished'* (The Citizens Information Board).

The primary purpose of **building control and regulation** *'is to provide for the health, safety and welfare of people in and around buildings'* (Department of Housing, Planning and Local Government). The building control system imposes minimum standards for the design and construction of buildings and seeks to achieve better building construction by promoting good practice. Buildings must be designed and built in accordance with the Building Regulations which impose duties on building owners, contractors and designers. Designers, builders and certifiers must be competent in performing their role and exercise due diligence and skill in carrying out their respective tasks. A Building Control Authority has the power to order redesign if the proposed design fails to meet the prescribed standards. In addition, where work is found to be non-compliant, the Authority

² 2000, Section 23(2)

³ Section 151

may issue an enforcement notice requiring the rectification of the non-compliant work, such rectification may give rise to substantial additional rectification costs.

Health and safety legislation primarily focus on the prevention of workplace accidents, illnesses and dangerous occurrences in the construction and maintenance of buildings. The legislation creates a broad set of duties for employers, employees, designers, manufacturers and suppliers in order to protect the safety, health and welfare of those at work. Breaches of safety legislation is a criminal offence which may result in a range of enforcement measures and may expose offenders to fines and/or imprisonment.

The Roles of the Participants

The Client

The client's primary contractual duty is to pay the contractor

The client and the contractor are *the* parties to a building contract⁴.

“Implementation begins with clients. Clients are at the core of the process and their needs must be met by the industry.” The Latham Report para 1.11 (1994)

The Department of the Environment and Local Government (1997) (The Barry Report) identified that:

The needs of clients are the basis on which the industry exists. The image and standing of the industry is dependent upon the degree to which it satisfies these needs. Each individual project must be seen as an important step in the building of confidence and trust and the improvement of that image and standing. All clients, large and small, are entitled to a professional service from all members of the construction team.

⁴ The employer also undertakes certain obligations arising from its contracts with the various design team consultants. The *RIAI Agreement between Client and Architect for the Provision of Architectural Services* (RIAI, 2014) and the *Government Standard Conditions of Engagement for Construction Consultant* are examples of these agreements. These are not further examined in this study.

Hughes *et al.* (2015) explain that ‘*All construction work is ultimately undertaken for the benefit of a client*’. Clients are diverse and may be investors and/or end users, Hughes *et al.* use the term ‘purchasers’ to describe ‘*everyone who buys construction work, from a householder buying a garage, a multi-national corporation buying a factory complex,*’ to ‘*municipalities*’ developing local infrastructure. They add that ‘*The importance of purchasers cannot be over-emphasized. Construction is about providing a service ... and that clients ‘have expectations.*’ The Chartered Institute of Building (2002) summarise typical client expectations thus: ‘*The client expects that effective project management will enable the project’s completion, by the time when it is wanted, of a standard and quality that is required and a price that is competitive*’. Where these expectations are not met, the result is likely to, at best, disappoint the client.

One of the main challenges encountered in implementing building contracts is that, in many cases, contracts involve clients who have little or no experience of the construction process. It is clear in these circumstances, that such clients need considerable assistance from competent professionals to advise them and to perform many of the day-to-day functions and duties which they would otherwise be contractually and legally bound to perform. The architect / employer’s representative / contract administrator in these instances assumes the role of an agent acting on behalf of the client. Nevertheless, even where the client is experienced in construction practice and procedure, he/she would normally appoint a suitably qualified person to perform these routine functions.

Client’s Express Obligations Arising under the Building Contract

In the context of this study, the extent of the client’s contractual obligations is set out in the particular form of contract agreed by the client and the contractor. Hughes *et al.* (2015) explain that the client ‘*appears to have relatively few express contractual obligations and to play a merely passive role, [because] ... the contract allocates numerous duties to the contract administrator*’. They add that ‘*many of these duties are the employer’s responsibility in the sense that, if the contract administrator fails to perform, the contractor may claim against the employer for breach of contract*’. It is not practical to detail these individually here, but the most important contractual duties borne by the client are:

- To provide a site and grant possession of the site to the contractor.
- To pay the contractor in accordance with the contract's provisions⁵.
- To maintain property insurance where works are being carried out in existing buildings

A fuller list of the client's, contractor's and architect's duties under the RIAI 'Yellow' form of contract is set out in a separate study by this author '*The RIAI Standard Form of Contract 2017 version*' – An Overview <https://arrow.dit.ie/beschreoth/74/>

Client's Implied Obligations under the Law of Contract

Regardless of the express terms stated in the contract, written contracts are rarely exhaustive, particularly in dealing with non-routine issues that may arise during the course of the contract. Where a contract is silent on a particular matter, the law of contract may *imply* a term(s) to give effect to the presumed intentions of the parties. Implied terms often relate to customary industry practice, or give effect to statutory requirements. Terms may also be implied in order to make the contract workable - to give it 'business efficacy'. Terms, however, will *not* be implied to make a contract more reasonable or where a term would be inconsistent with the express terms of the contract.

For instance, although certain contracts, such as PW-CF1 expressly call for co-operation between the contracting parties, many contracts, including the RIAI contract, remain silent on this point. Hughes *et al.* (2015) explain that building contracts imply '*two general obligations on the part of the employer*' the so-called non-hindrance and co-operation principles. These are: (i) the client '*will not hinder or prevent the contractor from ... [and (ii)] ... will take all steps reasonably necessary to*' enable the contractor '*to execute the works in a regular and orderly manner*'.

⁵ The Construction Contracts Act (2013) now regulates payment procedures within the industry, requiring clients to implement an '*adequate payment mechanism*' in order to ensure the main contractor is paid at the agreed time and is advised of the reasons and bases of deductions from the contractor's payment claim. The

Clients' Statutory Obligations

Planning

The client is primarily responsible for obtaining planning permission and ensuring that the development is constructed in accordance with the permission. The client in discharging this duty almost invariably delegates the tasks of designing the project and obtaining the planning permission to the architect, who guides the client through the issues, procedures involved, and performs many of the form-filling and routine tasks involved on the client's behalf.

Building Regulations

The client is also ultimately responsible for ensuring that buildings and building works comply with the Building Regulations. In order to discharge this obligation the client must make the following appointments on all non-exempt⁶ developments:

- competent designers;
- a competent 'Assigned Certifier'⁷ and
- a competent contractor.

These appointments seek to ensure that qualified, competent and adequately resourced persons design, construct, inspect and certify compliance of the work in accordance with the Building Regulations. The Building Control Regulations also require the client to obtain the requisite 'Fire Safety' and 'Disability Access' Certificates, lodge the Commencement Notice, and to maintain the prescribed records.

contractor may seek adjudication of any payment dispute and may threaten to suspend work in the event of under-payment or late-payment of its claim.

⁶ It should be noted that one-off owner-occupied single residential buildings and single-storey home extensions my opt-out of the Building Control (BC(A)R 2014) Regulations.

⁷ Who must be either a Registered Architect, a Registered Building Surveyor, or a Registered Engineer,

Health and Safety

The Health, Safety and Welfare at Work Act⁸ requires ‘A person who commissions or procures a project for construction work’ [clients] to ... *appoint in writing a competent person or persons*’ to ensure, ... ‘*that the project is designed, and is capable of being constructed, [and] ... is constructed, [and] ... can be maintained safely and without risk to health and safety ... and complies ... with the relevant statutory provisions.*’ (ISB.ie) (n.d.). These appointments are specified in Part 2 of the Construction Regulations (2013). Primarily, the client is required to appoint,⁹

- a competent Project Supervisor for the Design Process (PSDP) (this function is usually performed by one of the client’s consultants, often the project architect), and,
- a competent Project Supervisor for the Construction Stage (PSCS) (typically an appointment made within the contracting organization).

The client must be satisfied that these officials are competent to ensure that the project is ‘*designed and constructed by competent persons*. The PSDP and PSCS coordinate the health and safety duties of the respective design team and the construction team to ensure that the client can perform his/her duties under the Act.¹⁰ This is most important as breaches of the Act and/or its Regulations may expose the client to criminal proceedings.

The Contractor

The contractor’s primary contractual duty is to construct the works contained in the contract documents

⁸ Section 17

⁹ Where construction involves a ‘Particular Risk’, involves more than one contractor, is planned to last more than 30 working days or exceed 500 person days, - So called ‘notifiable projects’.

¹⁰ For example; retain and pass on the Safety File, provide tendering contractors with a Preliminary Health and Safety Plan, and submit a commencement notice to the Health and Safety Authority.

The contractor is the second party to the building contract and is the person who is in charge of building the project. Contractors are typically members of the Construction Industry Federation (CIF), ideally, the contractor will be registered with the Construction Industry Register Ireland. (CIRI).

Hughes et al. (2015) comment that the contractor's primary obligations are to '*construct the works in accordance with the [contract] documents within the required time*'. They add that the precise nature of the contractor's obligation depends on the nature and wording of the particular contract. For example, '*If the contract is for a complete building, such as a dwelling, then it is implied that the contractor will provide everything that is indispensably necessary to achieve the result, regardless of what is contained in the specifications.*' Where a project is arranged on the basis of a bill of quantities forming part of the contract, '*the contractor's obligation is limited to providing what is described in the bill*'. Where the bill of quantities descriptions or measurements are inaccurate the errors will be corrected, typically these corrections are made at the expense of the client.

Article 1 and Clause 2 of the RIAI contract sets out the scope of the contractor's obligations which are to complete the works in accordance with the contract documents to the satisfaction of the architect and to comply with architect's instructions which include instructions relating to the modification of the design, quality or quantity of the works. Similar terms are contained in in Article 1 and Clause 4.5 (Instructions) of the Public Works contracts. Both contracts therefore may be characterised as 'with quantities' arrangements.

Regarding standards of work, the contractor's main obligation is '*to carry out and complete the Works in a good and workmanlike manner.*' and to comply with the contract's terms. As commented upon in the notes to Figure 1 above, traditionally procured projects now make extensive use of the practice of sub-contracting. The main contractor, nevertheless, remains fully responsible for the compliance of any sublet work with the standards specified in the contract documents.

The site manager/agent / general foreman

The contractor is represented on site by the site manager / site agent / general foreman, who is the person in charge of a building contract, and as such must be aware of and in control of all aspects of site operations (Cartlidge 2017). Clause 10 of the RIAI Contract requires the contractor ‘to constantly keep upon the Works a competent general foreman and any instructions given to him/her by the architect shall be deemed to be given to the Contractor. Similar arrangements are in place under the Public Works Contracts.

Sub-contractors

On most building contracts, the majority of the works are carried out by sub-contractors. ***Domestic sub-contractors*** are chosen by the main contractor. Under this arrangement the main contractor sublets parts of the works but, as noted above, remains fully responsible for them. The employer typically has no contractual link with domestic sub-contractors and the relationship is regarded as a strictly private matter between the main contractor and the sub-contracting firm.

Domestic sub-contracting generally causes few problems. Clause 15 of the RIAI contract, however, indicates that the right of the contractor to sub-let is not altogether unrestricted. The clause states that ‘*the Contractor shall not without the written consent of the Architect sub-let any portion of the Works*’. In effect this clause allows the architect to veto the contractor’s proposed subcontractors. It is in the contractor’s interests, therefore, to obtain approval for any proposed subcontractors during pre-qualification procedures or during post tender negotiations.

The RIAI Form of Contract also allows the architect to appoint a particular subcontractor to carry out a specific portion of the works. This procedure is referred to as ‘nomination’. ***Nominated subcontractors*** are appointed where the architect (or one of the other design consultants) wishes to control the calibre of the subcontractor carrying out the particular section of the works. The procedure is identified with specialist aspects of the project and in many cases the nominated subcontractor finalises the detailed design related to that particular ‘package’. Despite being appointed by the architect, the nominated

subcontractors are employed by the contractor who then assumes responsibility for their performance on-site. Consequently, sub-contractors may be members of the design team as well as members of the construction team (Hackett and Statham 2016). A similar process to nomination is provided for under the Public Works Contracts to appoint 'Reserved Specialists' to carry out specialist sections of the works. Clients, in these instances, often create a contractual link with nominated subcontractors/reserved specialists by means of 'a collateral warranty'.

Suppliers

Material suppliers constitute an important component of the construction supply chain. They feed into the building process. Materials such as bricks, blocks, timber, plumbing plaster, and paint may be supplied through builders' providers. Other materials, such as ready-mix concrete, must come directly from a manufacturer, due to the timescale involved in the setting of concrete. Large precast and prestressed concrete units are also generally supplied directly by the manufacturers, due to the specialised nature of production, transportation and handling (O'Neill, 2000).

The Contractor's Statutory Obligations

The contractor, in the first instance, is required to operate lawfully as a business and comply with business law in general (company law, employment law etc.)

The contractor is also required to comply with all statutory regulations affecting the works, to give all necessary notices and is required to construct the works in compliance with the planning permission granted to the client as shown on the approved plans.

Building Regulations

The contractor must be competent to supervise the construction of the works and is responsible for ensuring that the 'as-built' works comply with the Building Regulations. The contractor is required to sign a certificate of compliance with the Regulations on the completion of the project. The contractor must also provide the various ancillary

certificates, test certificates and other document required by the ‘Assigned Certifier’ to enable him/her to perform their duties under the Act.

Health and Safety

The contractor bears the primary responsibility for ensuring that operatives and other persons are not put in danger on building sites. Under the Health, Safety and Welfare at Work Act the contractor and subcontractors are regarded as **employers** and they assume the statutory duties of employers to employees as set out in the Act. In summary, these duties require employers to operate a safe workplace and a safe system of work, provide safe equipment and employ competent staff. The contractor (and subcontractors) must take all *reasonably practicable* steps to prevent accidents and to comply with the Act. It is common practice for the contractor to be appointed as Project Supervisor for the Construction Stage, with the responsibility for co-ordinating safety matters throughout the construction team and ensuring that the legislative requirements are complied with.

The Architect

In the ‘traditional’ general contracting procurement arrangement the client appoints a design team to formulate and develop the brief and design a solution in response to the brief. Cartlidge (2017) explains that traditionally the design team is led by the architect who is usually the first appointment to be made by the client at the start of a new construction project. He comments that the *‘traditional single-stage tendering is sometimes referred to as architect-led tendering’*.

The architect acts as agent and technical advisor to the client, and as such typically assists the client in the selection of additional consultants and quantity surveyors. Keane (2001) cites *Hudson’s Building Contracts* which outlines the general areas for which the architect will be responsible:

- *a design which is skilful, effective to achieve his [the client’s] 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 Employer's 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.*

A comprehensive list of the architect's services is set out in the *RIAI Agreement between Client and Architect for the Provision of Architectural Services* (RIAI 2014).

Statutory Obligations

The term 'architect' is a registered term under the Building Control Act and can only be used by persons or organisations registered as architects with the RIAI. The RIAI requires:

A condition of registration is that RIAI Architects maintain continuing professional training in relevant fields such as regulations, standards, contract administration, project management, construction methods and practice throughout their careers. This means that Registered Architects are aware of and up-to-date with latest building regulations (RIAI n.d.)

Planning

This is clearly the province of the architect, who, in effect, has overall responsibility for the design, and typically produces the master-plan for the project. The architect plays the central role in obtaining the planning permission, managing the emerging planning issues and performing the routine, and form-filling tasks involved on behalf of the client.

Building Regulations

The Building Control Regulations require that architects, and indeed all designers, are competent in performing their respective commissions. The architect must therefore

ensure that his/her designs comply with the Building Regulations. The architect is the person most likely to assume the role of the Design Certifier under the legislation and is consequently responsible for lodging the necessary drawings, specifications and other documents required by the Building Control Authority. The Design Certifier must be provided with the required Ancillary Certificates from the other designers confirming that their designs comply with the Building Regulations.

In many instances the architect may also be appointed as the 'Assigned Certifier' with the overall responsibility for certifying at commencement and completion of the project that the works comply with the Building Regulations. The Assigned Certifier acts '*as the single point of contact with the Building Control Authority during construction*'. (Irish Building Regulations.ie n.d.) The website adds that he/she is responsible for preparing an Inspection Plan and undertakes inter alia '*to inspect, and to co-ordinate the inspection activities of others during construction, and to certify the building or works on completion*'.

Health and Safety

Many clients appoint the architect to perform the role of Project Supervisor for the Design Process whose responsibility is to coordinate the safety responsibilities of the various designers under the Act and the Construction Regulations. The remit of the PSDP primarily involves '*identifying hazards arising from the design or from the technical, organisational, planning, or time-related aspects of the project and where possible, eliminate the hazards or reduce the risk*' (Health and Safety Authority, 2017).

The Clerk of works

Certain (very) large projects may justify the architect in maintaining a permanent presence of staff on site to supervise the contractor's day-to-day construction activities. Normally, however, the architect is not expected to provide '*frequent*' or '*constant - supervision*' (Keane 2001). Contracts, such as the RIAI 'Yellow' and 'Blue' Forms of Contract, therefore, often provide for the appointment of a clerk of works to perform this function.

The Institute of Clerk of Works and Building Inspectors in Ireland.ie (n.d.) website states that:

The role of a Clerk of Works is primarily to represent the interests of the client in regard to ensuring that the quality of both materials and workmanship are in accordance with architect's/engineer's drawings and specifications; [which] is achieved through inspections of materials and workmanship throughout the building process.

The clerk of works is employed by the client, - typically on the recommendation of the architect. He/she may be seen as the 'eyes and ears of the client on site. Cartlidge (2017) comments, nevertheless, that the clerk of works '*must be absolutely impartial and independent in their decisions and judgements.*' ...*Their role is not to judge, but simply to report (through exhaustive and detailed diary notes) all occurrences that are relevant to the role*'. The clerk of works typically has an extensive practical knowledge of construction technology and production processes and often has emerged from a trade background; a '*poacher turned gamekeeper*' as described by Cartlidge.

Keane (2001) notes that the clerk of works duties may include

1. 'Condemn (**subject to the Architect's later confirmation**) work which does not conform with the requirements of the drawings or specification. (emphasis added by author)
2. Keep a record of any work which is likely to be covered up, particularly in relation to items of a 'provisional' nature which will be required to be measured by the Quantity Surveyor.
3. Examine and agree day work sheets with regard to time and materials.
4. Confirm any verbal instructions given ... by the Architect.
5. Report, in writing, on a weekly basis to the Architect.

The Supporting Design Professionals

The increasing technological complexity of many building projects has led designers to specialise in specific aspects of the overall design and construction process. All designers must be competent and ensure that their designs comply with building control and health and safety legislation.

Statutory Duties of Designers

Building Control / Regulations

As noted above designers must be competent in performing their role of ensuring their designs comply with the Building Regulations. Designers must also:

- provide the Design Certifier with the necessary documentation at commencement stage and with the ancillary certificates when required:
- provide the required information and proposed inspection regime to the Assigned Certifier to enable them to fulfil their role
- carry out the inspections of their particular elements of the design and provide the required ancillary certificates to the Assigned Certifier and
- maintain records of inspection.

Health and Safety Legislation

The of term ‘designer’ is very widely defined under Health and Safety legislation and ranges from architects, engineers and surveyors to subcontractors providing a design input. The Construction Regulations define designers as persons ‘*engaged in preparing drawings, particulars, specifications, calculations and bills of quantities in relation to a project*’. (Health and Safety Authority, 2017)

The legislation requires designers to ensure that the building is capable of being constructed and can be maintained safely and complies with all relevant health and safety legislation. All designers, including those employed by the contractor and subcontractors must:

- identify any hazards that their design may present and where possible, eliminate or minimise the hazards / risk.

- communicate necessary control measures, design assumptions or remaining risks to the PSDP so they can be dealt with in the safety and health plan;
- communicate with and co-operate with the PSDP/PSCS and the other designers
- comply with any directions issued by the PSDP/PSCS.

Where no PSDP has been appointed, they shall inform the client that a PSDP must be appointed. (Health and Safety Authority, 2017)

Engineers

Consultant engineers are normally employed on medium or large-scale projects where the architect usually needs specialist advice in designing elements such as the structural design, mechanical and electrical services and fire safety. The consultants coordinate and integrate their designs with those of the architect and the other specialist consultants. Engineers typically advise on the selection of specialist subcontractors and may obtain quotations for subcontracts within the scope of their specialism. They also supervise the construction of the specialist work during the construction on site. In Ireland engineers may be members of Engineers Ireland (IEI) or the Association of Consultant Engineers in Ireland (ACEI).

Structural Engineers

The Institution of Structural Engineers, Republic of Ireland Branch (n.d.) website provides the following definition of the role of the structural engineer

Structural engineering is the science and art of designing and making, with economy and elegance, buildings, bridges, frameworks and other similar structures so that they can safely resist the forces to which they may be subjected.

Put simply, structural engineers must ensure that the building doesn't collapse. Wikipedia adds

structural engineers analyse, design, plan, and research structural components and structural systems to achieve design goals and ensure the safety and comfort of users or occupants. ... They are trained to design the ‘bones and muscles’ that create the form and shape of built structures and need to understand and calculate the stability, strength and rigidity and earthquake of built structures.

Building services engineers

If structural engineers may be said to design the ‘bones and muscles’ of the building it may be said that the building services engineers design the systems and organs of the building. Indeed, The Chartered Institution of Building Service Engineers (CIBSE), the UK professional body representing building services engineers, comment that building services engineers are at the ‘heart of the building’. The CIBSE website says:

building services engineers provide the internal environmental conditions that enable business processes to function at an optimum level while providing a safe, comfortable environment for occupants to achieve their maximum performance potential.

Building services engineers are commonly referred to as mechanical and electrical (Mech and Elec or simply M&E) engineers

Cartlidge (2017) explains that

Building services engineers are responsible for ensuring the cost effective and environmentally sound and sustainable design and maintenance of energy using elements in buildings. They have an important role in developing and maintaining buildings, and their components to make the most effective use of natural resources and protect public safety. This includes all equipment and materials involved with heating, lighting, ventilation, air conditioning, electrical distribution, water supply, sanitation, public health, fire protection, safety systems, lifts, escalators, façade engineering and even acoustics.

He notes that building services engineers typically specialise as mechanical, electrical or public health engineers and their tasks are related to their particular discipline. Nevertheless, he lists typical duties undertaken by building services engineers:

- ‘advising clients and architects on energy use and conservation in a range of buildings and sites, aiming to minimise the environmental impact and reduce the carbon footprint;
- managing and forecasting spend, using whole-life-cycle costing techniques, ensuring that work is kept to budget;
- developing and negotiation project contracts and agreeing these with clients, if working in consultancy, and putting out tenders;
- attending a range of project group and technical meetings;
- working with detailed diagrams, plans and drawings;
- using specialist computer-aided design (CAD) [and BIM - author] software and other resources to design the systems required for the project;
- designing site-specific equipment as required;
- commissioning, organising and assessing the work of contractors;
- overseeing and supervising the installation of building systems and specifying maintenance and operating procedures;
- monitoring building systems and processes;
- facilities management;
- ensuring that the design and maintenance of building systems meets legislative and health and safety requirements.’ (p21)

The Quantity Surveyor

The quantity surveyor is a building economist concerned with the financial management of the building project. The QS advises building owners and architects on the probable costs of construction schemes and on the costs of alternative designs. The QS prepares cost plans for projects which enables the design team to arrive jointly at practical designs for projects while staying within budget. His/her advice enables design and construction at all stages to be controlled within predetermined expenditure limits.

The QS advises on the appropriate procurement options and, in particular, plays a key role in the preparation, compilation and distribution of the tender documents. The QS is most readily associated with the production of Bills of Quantities which fully measure

and accurately describe the proposed works. Bills of quantities significantly ease the contractors' task of pricing and submitting a tender for the project. The QS conducts the tender evaluation and recommends the appointment of the contractor. Where appropriate he/she will negotiate with potential main contractors on behalf of the client prior to the client's entering into contract with the contractor.

During the construction phase, the QS verifies progress valuations for payments to the contractor as the work proceeds. Cost reports are provided to the client and design team which forecast the anticipated final cost of the construction which enables the design team to implement cost control measures in order to keep the project within budget. The QS is responsible for the valuation of variations in the work during the contract and for the preparation of the final account on the basis of which the architect certifies final payment to the contractor.

Building owners, contractors and subcontractors employ quantity surveyors. Consulting quantity surveyors working in private practice generally work for building owners. Chartered Quantity Surveyors are members of the Society of Chartered Surveyors Ireland (SCSI) or the Royal Institution of Chartered Surveyors (RICS).

The Project Manager

The appointment of a project manager is becoming more frequent particularly on larger complex building projects. The project manager is usually drawn from one of the construction professions or may be a member of a specialist construction project management consultancy. Indeed, many quantity surveying companies provide project management services and may be appointed as the project manager where the client requires a high degree of cost control on the project.

The project manager may be seen as the employer's representative who represents the client's interest throughout the development process. He/she is normally appointed at the outset of the project and advises the client on all matters related to it including the appointment of the design team members and the proposed procurement arrangements. He/she assumes responsibility for controlling and co-ordinating the whole development

process. The project manager acts as the single point of contact between the client, the project team and the regulatory bodies. and seeks to ensure that the client's requirements successfully delivered.

End Users

The end users of construction projects can include the client, purchasers, tenants and the wider public. When a building is purpose-built for the client's own use, he/she is likely to have engaged heavily with the builders and designers throughout the development. In many instances, however, the end users may have had little if any input into the development (O'Neill, 2000). Hughes et al. (2015) argue that '*The products of the construction sector affect everyone*'. They call for construction and property professionals to be mindful of the potential impact of the development on individuals and society and the advisability of engaging in wider consultation in order to reduce the risk of '*alienating potential clients or public support*'.

Conclusion

The construction industry is a complex and fragmented industry comprised of a wide range of participants. This study examines the roles of principle participants in the process, and focusses on the role of the client, the contracting organisation, the architect and design and management professionals including the quantity surveyor. Other parties who are indirectly involved in the industry including the regulatory authorities, the wider property sector and end users are commented upon, but are not examined in great detail. The study has identified that effective teamwork is crucial to successfully achieving the goals of delivering the project safely, to the specified quality standards, on time and within budget.

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