

The building industry 19th century construction essay



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The UK Building Industry is described as one lagging in terms of innovation and dominated by conservative professionals, entangled in a fragmented structure where delineation of responsibilities was clearly defined, according to Bowley (1966). In order to clarify the reasoning behind Bowley's conclusion, this chapter draws a portrait of the UK building industry from the mid-19th to the mid-20th century, which epitomizes the span of Bowley's (1966) study.

This chapter is confined into 4 sections; the first depicts the structure of the building industry in relation to the parties involved. The second section is concerned with the role of the professions and their interaction within the industry. The third section identifies the role of the public authorities and professional organisations involved within the industry, and their attitude towards innovation. Also included is an insight of the types of contract and tendering used. The fourth and final section presents Bowley's theories of the UK building Industry and the main arguments leading to the theories.

The Structure of the Building Industry

The building profession emanates from a core system or structure, incarnated by the master builder, which in later days was also referred to the architect as he held the dual role of designer and builder, or the master mason that used to launch building projects (Khan, 1979). However, as the level of complexity in building development increased, the amount of knowledge pertaining to materials, types of structures and production processes represented too much knowledge for one individual. Subsequently fragmentation of the master builder occupation made way to two distinct professions: designers and builders. While, fragmentation was meant to

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promote specialisation through 'division of labour', segregation resulted as a major drawback, as esoteric group was formed in terms of training and knowledge instead of combining resources and working as one entity (Bowley, 1966).

The outcome of fragmentation resulted in a linear structure (now referred as the traditional procurement system), where clients in need of a building seek an architect, and provide him with a brief and an estimate of the capital to be invested in the project. Based on the following information the architect develops a proposal for the client. Once the design of the proposal is completed, a contractor or builder is selected through competitive tendering. While this is the classic structure, other practices were as follows:

The client or architect recruiting individual workmen for each task, while the building owner supplied the materials.

The architect/designer carrying both the functions of designer and contractor.

The master craftsmen could take responsibility for the supply of both materials and workmen.

Other arrangements included the architect or building owner employees in the form of clerk of works or surveyor acting as entrepreneurs.

Though a multitude of alternatives routes exists to undertake the construction process, a standard hierarchical structure or work plan was prevalent, at the top of which was the architect or designer as the client's agent and responsible for the design (of both aesthetic and functional

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features) of the building. The engineer responsibility was restricted to the design of structures in cases where it was beyond the scope of the architect, and the builders the erection of the building. The prevailing structure barred the engineer in enhancing the design physically or economically, though his knowledge and experience was undoubted. Similar to the engineer, the builder's knowledge was extraneous in the eyes of the architect and engineer, as they provided him with completed drawings. The builder's fate was unchanged even in situation where the engineer was the main designer (Bowley, 1966). However, the advancement of larger building in the early 19th century would expose the architect's limited scientific knowledge for the design of complex structures. This developed a dependence on engineers, who had the expertise and knowledge to design large building (Bowley, 1966). It led to claims that architects were inferior to engineers by some section of the engineering society (Bowley, 1966).

Besides the traditional procurement system, others systems such as package deal and negotiated contract were already introduced by the 1960s at a trial level by the Public Authorities in the construction of houses and schools (Bowley, 1966). The package deal system is one where both the design and construction process is the responsibility of one organization, usually the builder (Bowley, 1966). This system is best described as an off the shelf building, which hardly satisfies the client's requirement, due to the bespoke design solution (Bowley, 1966; Masterman, 2007) and involved a shift in role as the builder hold the position of the decision maker compared to the architect (Bowley, 1966).

The dominance of the traditional system between the prewar periods to the 1960's, depicts a fragmented industry dominated by a top-down hierarchical structure with a unidirectional flow of communication; at the top of which was the client or the architect as the client agent. The system did not allow for optimization of the knowledge present within the professionals at lower level of the hierarchy, thereby hindering the process of innovation and buildability. The opportunity for innovating was only in the hand of the architect, who had limited interest in technical innovation. However, engineer and builders could not contribute to technical innovation because of the clustering and delineation of the different professions from each other.

The Professions

As mentioned earlier, fragmentation of the master builder functions led to new professions. This section explores the roles and responsibilities of the various professions prevalent during the period spanning the First World War to the 1960's.

Designers – Architects

Sir John Soane's classic definition of the professional responsibility of the architect published in 1788

“ The business of the architect is to make the designs and estimates, to direct the works and to measure and value the different parts; he is the intermediate agent between the employer, whose honour and interest he is to study, and the mechanic, whose rights he is to defend. His situation implies great trust; he is responsible for the mistakes, negligences, and ignorances of those he employs; and above all, he is to take care that the

workmen's bills do not exceed his own estimates. If these are the duties of an architect, with what propriety can this situation and that of the builder, or the contractor be united?" (Kostof, 1977).

150 years later, the architect's responsibilities were reduced as a result of further fragmentation. Their main functions and liability were limited to the design of the aesthetic and structural components of building and the monitoring of the construction process (Khan, 1979). However, to demonstrate a more client related approach in 1887 the RIBA ruled its members from having any direct benefits in any building firm (Bowley, 1966).

The employment of architects in the early 20th century was restricted to projects where appearance was of concern such as the house of the wealthy, churches and public buildings such as hospitals and schools (Bowley, 1966). Hence, the architects focused towards aesthetic innovation instead of technical innovation. Moreover, the absence of demand for buildings requiring new functions led the architect to believe there was no need for technical innovation (Bowley, 1966). This period is denoted by an absence of interest to neither improve functionality in design nor reduce cost on behalf of designers (Bowley, 1966).

The privatization of housing development in the 1920s saw many builders seize the opportunity to become speculative builders, subsequently the architects were found working for the builder, who was considered inferior by the former (Bowley, 1966). The conservatism nature prevalent among the architects meant they were reticent to take this position (Bowley, 1966). The

architect's position at the top of the hierarchy suffered another blow in the 1930s, following the introduction of braced and skeleton structures, which raised the interest towards the design of larger buildings (Bowley, 1966). The architect's limited knowledge in the design of complex structures meant they were dependant on the engineer for such designs (Bowley, 1966). Eventually engineers became more important than architect where large commercial buildings were concerned, even pushing some section of the engineer to claim that they were more important than architects (Bowley, 1966).

The architect profession in the 1960s was distributed as follows; 42% in the public sector and 52% in the private sector (Bowley, 1966). The private sector was represented by a pyramidal structure, dominated by a large number of 1 person firm to a few employing over 50 architects and other assistant such as draughtsman, technicians and clerks. The lack of technical knowledge in the architects' offices meant they needed to consult experts such as heating engineers and ' floor and roofing' experts whenever technical knowledge was required. Hence, to maintain the expert advice, architects were often led to nominate the experts as sub-contractors on the project (Bowley, 1966). The period was defined by buildings of poor operational features and high maintenance cost, for which the architects were being blamed. The lack of standardization of design and absence of alternatives in the structural systems used, were some of the prevalent issues in design (Bowley, 1966). The inefficiency of the design process had an adverse effect on the whole building industry. On the other hand architectural firms were being blamed for the poor quality of building services, a result of the lack of employed specialists, since they were

composed mostly of architects (Bowley, 1966). The artistic view adopted by architects at the time led to neglects in the design element of the production process for the building and simultaneously forsaking many of their previous responsibilities like engineering, technician and cost experts, while holding to the administrative tasks involved in the function as the client's agent.

Designer – Engineers

Prior to the 19th century, it was still difficult to draw a demarcation line between the engineer and architect in term of their responsibilities and function since both cumulated the role of designer. While the engineer focus was in the performance of functions, the architect's interest lied in the aesthetics of the building (Bowley, 1966). This difference between the engineer and architect was also prevalent in the type of project each were designing; the engineer was mostly employed for the design of industrial and commercial work, compared to the architect employment for the design of churches and the house of the wealthy (Bowley, 1966). However in the 1950's as appearance became an important feature of industrial buildings, the architects found new openings, to the detriment of the engineer's. However, in the 1930s the introduction of new materials like reinforced concrete and steel and the growing interest of architects in larger buildings redefined the importance of the civil engineers in the building industry (Bowley, 1966). Subsequently, the ' structural engineer' as a profession would be recognized by the ICE, due to the increased market for complex structures and the availability of large number of choices of materials to be used for in the erection of structures.

The industrial revolution in the 1950s led to an increased demand for larger and more complex buildings, such as factories and workshop and for improved building services (central heating, lavish plumbing and lighting were in demand) in both commercial buildings and the housing industry. These changes in demand meant that specialist engineers such as electrical and mechanical engineers' role in the industry was suddenly enhanced.

Quantity Surveyor

Quantity surveying as a profession has emerged from the architect's profession, as the latter were demonstrating a lack of interest towards the cost element of project development. While the quantity surveyor was meant to fill the gap left by the architect, their function was initially limited to the drafting of bill of quantities (its purpose was to allow the builder to estimate the total tender prices, and ensure that such prices provided by the builder were not absurd) and the measurement of variations and other works excluded from detailed specification (Bowley, 1966). While, comparative cost analysis of designs alternative, should have been integral part of the quantity surveyors role, the format of the bill of quantities in the 1960s was not appropriate as the builder tendered prices was inclusive of overhead cost, which were not a separate item in the bill (Bowley, 1966). However, though the QS experience and knowledge of material, labour and building cost made him an ideal candidate to advise on cost reducing initiatives, it was not the case. The QS were therefore not incentivised to develop the scientific knowledge required for a better cost analysis method.

Builders

The responsibility of builders in the early years of the 20th century was limited to the construction process of a building, wherever an architect or engineer was employed to design the project, except in the case where package deal or negotiated contract were used (Bowley, 1966). Planning and coordinating of the site related activities were the daily chore of the builder, of which the supply chain coordination was the most strenuous activity (Bowley, 1966). The building process being a labour intensive task, improper coordination of material supply could lead to hours or days of idleness. However, in the mid-30s with the opportunities in the housing market, many builders would swap for the double coat of builder and developer (Bowley, 1966). Also the housing and school schemes proposed by the government for non-traditional houses would see builders come up with number of innovative proposal. It is one of the few opportunities whereby builders did put into practice their knowledge from the design stages, the period was marked as one with large advances in technical innovations and cost reducing initiatives.

Others

The other professional associated in the industry were specialised sub-contractors, who were skilled in one specific craft, such as masons, floor specialist, electrician, plumbers etc. However, as the complexity of buildings would increase and the requirement for services raised more and more, specialised jobs were being created.

Government, Local Authorities & Regulatory Bodies

The UK Government and other Public Authorities

The UK Government acts as the main regulatory body of the building industry, through the use of tools such as Bylaws and Acts of parliament to dictate the actions of the building industry. Therefore, the Government can intervene to enhance, control or limit innovations within the industry. Over the course of her study, Bowley (1966) points out numerous government interventions between the First World War up to the 1960s. This section provides a brief chronological review of the influence of the UK Government on the building industry within that period.

1919 - The Local Government Board (LGB) refused to grant loan to local authorities for reinforced concrete projects, on the basis that the UK building industry lacked the knowledge and expertise with respect to reinforced concrete. Though reinforced concrete had already been used previously in the UK and was widely popular in countries such as the US, France, Denmark and Germany at the time. Few years later, following pressure from municipal engineers, the LGB would alter its decision and grant loan for reinforced concrete structures at only a 15 years period compared to a 30 years period for steel framework structures; Steel was considered a traditional material in the UK and professionals were more conversant with steel than reinforced concrete, the conservative attitude towards the new material hindered the use of it, and the action of the LGB had only contributed as a retardant to the use of reinforced concrete in the UK.

1919 - The Housing and Town Planning Act was implemented, and Local Authorities were given the power to waive any bylaws preventing the use of novel methods and materials, provided it was approved by the Standardisation and New Methods of Construction Committee (SNMCC). The SNMCC was a committee set-up to develop the standardization of fittings and to investigate new methods of construction. The SNMCC would eventually setup the Building Research Board in 1924, which is now known as Building Research Establishment or BRE. The latter would proceed with a number of research on materials and new techniques of construction over the decades.

1925 - New Methods of House Construction committee was set up to investigate substitutes for materials requiring labour intensive techniques such as clay tiles and slates, traditional lath and plaster. However, the committee was unable to provide any relevant alternative for these materials.

1937 - Establishment of the National House-Builders Registration Council, led to the enactment of specification model for work to be executed, as well as standard of materials to be used for houses. In order to control quality of houses, councils were made to issue conformance certificates for houses meeting the set specification.

1939 - Enactment of the Building Societies Act - The Act introduced a quality certification system for houses, such as to reduce malpractices prevalent among builders at the time.

1939 to 1945 - Committee of Wartime Building instigated the Building Research Station to conduct a number of researches. In 1941, a series of expert committees was setup by the Ministry of Work to review the major problems likely to affect post war building, and thus provide recommendations to minimize materials used and improve speed of construction in the postwar period. In 1944 the Committee on Walls, Floors and Roofs reported that during wartime period considerable improvement were achieved in terms of economy in labour and reduction in use of scarce materials. Also experience in standardization, prefabrication, transport and erection were all widely used during wartime.

1943 - Local Authorities and the London City Council in particular made attempts to transfer the innovative ideas developed for non-traditional houses to the construction of flats.

1947 - The government decision to abolish the expansion of the building industry, through the removal of subsidies for non-traditional houses in favour of the export programme, led to a consequent decline in the total number of non-traditional houses completed

1953 - Control of steel use in the building industry by government, encouraged building professionals to devise or make use of other method of constructions with minimum steel consumption. In the 1950's the UK Government was in control of buildings both directly and indirectly, as well as prices of materials and their uses were being controlled. While in 1954 the BRS led research on cost-reducing methods of building high blocks- the first result of the research were not available before 1957 and 1963. Government

had set subsidy policy to avoid encouraging expenditure in high blocks except where really necessary, and the special subsidy for flats was restricted to urban sites of high value.

1955 – A letter addressed to the Minister of Works, recommending the ministry to convene a meeting to solve the problem of high steel usage in the industry, was rejected, the Minister reply was “...it is inopportune to adopt such issue at the present time” (Bowley, 1966). Which demonstrate a lack of interest in cost and materials optimisation initiatives at the time.

As much as the influence of the UK government on the building industry is undeniable, poor decision making of the latter has had major consequences on the industry. The skepticism pertaining to the introduction of reinforced concrete, the altering of subsidies pertaining to non-traditional houses are examples of poor decisions that have led the UK building industry to lag behind with respect to other European Countries such as France and Germany. While the introduction of BRE and the setting up of quotas with respect to steel usage, have contributed as enhancers of innovation and the introduction of the Building Act and other regulatory acts to raising the quality of the final products, the government then have demonstrated a mixed feeling about their objectives towards improving the industry.

RIBA, RICS & ICE

Based on finding from Bowley (1966) it can be observed that the professional organisations such as RIBA, RICS and ICE were very static during the first half of the 20th century where innovation was of concern. The conservative attitude of its members is the main reason behind this static situation.

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Bowley (1966) stated that besides the publication of articles and regular meetings, the professional bodies did not do much in terms of enhancing innovative ideas. This was supported by the lack of interest in the use or development of materials such as reinforced concrete or mild steel for the erection of building, while these were widely used across Europe and the US (Bowley, 1966). One important element that did affect the industry however, was the decision of the RIBA and RICS to prohibit members of the association from having any direct interest in any building firm so as to demonstrate a more trustworthy attitude towards clients. Whether the decision was beneficial to the industry or not is debatable (Bowley, 1966). However, the fact that architects could have no benefits in building firm, can explain the lack of architect firm applying for the sponsor scheme for the development of non-traditional houses in the aftermath of the war, as it would not have been in their best interest to develop new types of building for which builders would have been taking all the applause.

One of the great contributions to the industry was the involvement of professional bodies like the RIBA in the War Executive Committee, which marked a period of extensive innovation with the advent of prefabrication, standardization of materials and use of reinforced concrete to state a few.

Types of Contracts

Standard form of contract was common by the 1960, as the first form of contract was introduced in 1903 with the collaboration of the RIBA, Institute of Builders and the National Federation of Building Trades Employers of Great Britain and Northern Ireland (JCT, 2012). However, the early history of

Standard Form of Contract did not meet much success; as the Standard Form <https://assignbuster.com/the-building-industry-19th-century-construction-essay/>

of Contract used by the local authorities was considered to be unfair (Bowley, 1966). The consequence was unsuited tenderers winning many of the tenders, as experienced and genuine firms were not willing to bare the risk associated with the unfair contracts (Bowley, 1966). While the RIBA's contract was fairer, the clause pertaining to nominated subcontractors was of concern to the builders, as it meant limited control of the project operation flow and therefore more issues in organizing site works (Bowley, 1966). To bypass these issues Bovis Ltd, one of the large building firm in the early 20th century would come up with the ' negotiated contract' (Bowley, 1966), a system of contract that allowed the integration of the builder at the design stage (the builder was able to contribute his knowledge through collaboration with the pool of experts involved in the design process (Bowley, 1966)). The negotiated contract proved an efficient method where novel methods of construction were concerned. Since it is quite problematic to work out estimates for new method of construction negotiated contract allowed for a better alternative in getting the work done at reasonable prices. Hence, the use of negotiated contract by the public authorities for the construction of non-traditional schools in the 1950s (Bowley, 1966).

The ' Package deal' type of contract was introduced by public authorities during the housing crisis of 1945 (Bowley, 1966), it is an integrated system that provides the client with an off-the shelf like building within a defined cost range. However the be-spoke nature of the design, means in most cases it cannot fully meet the full satisfaction of the client (Masterman, 2007).

In the 1950s, the public authorities would experiment a new type of contract, the ' serial contract' whose purpose was to guarantee a series of contracts to <https://assignbuster.com/the-building-industry-19th-century-construction-essay/>

a firm or group for a specific type of work, this type of contract was established with the objective of capitalising on specialisation of personnel and plant (Bowley, 1966).

The UK industry had had much experience with respect to different types of contract by the 1960s, while some like package deal and negotiated contract was a positive innovation within the industry, others like the local authority standard form of contract was deterrent to any type of innovation.

Tendering

Both selective and open tendering had been introduced by the 1960s, but public authorities had had a mixed feeling about the type of tendering to be used. Starting with the Simon Report in 1944 (Report on the Placing and Management of Building Contracts), which recommended the use of selective tendering over open tendering (Bowley, 1966), to the Model Standing Orders 1957 in which the use of open tendering was recommended to the local authorities by the Ministry of Housing and Local Government.

Bowley's Theories of the UK Building Industry

Marian Bowley was an economist and historian of the economic thought, and a proponent of the classical economics. Throughout her professional career as an academician, at the University College of London, she has contributed to the understanding of the building industry from an economics perspective (Gann, 2003). Throughout her book 'The British Building Industry', Bowley (1966) explores the happening in the UK building industry between the mid-19th centuries to the 1960s. The outcome of the Bowley's study, are three theories of the UK building industry:

Theory 1: The structure of the building industry, leads to problems of economic rationality in the design process.

Economic rationality is defined as a decision made with appropriate reasoning and for which the optimum outcome decision is one that is not just reasoned, but is also optimal for achieving a goal or solving a problem (XXXX). Bowley (1966) inferred the economic irrationality in the design process to:

The absence of competition at the design selection process, limits the client ability to acquire the best alternative

The percentage fee payment method did not incentivise the architect to drive cost down; rather it instigates the designer to optimise his earning through the development of higher value than needed by the client.

The absence of comparative cost method contributed to inefficient design, as opportunities for optimization of design through the use of cheaper alternatives was subsequently reduced.

Designers were deterrent on the use of standard components

There was no drive to develop prefabrication on a sufficient scale such as to enable mass production.

Far too many designs were made and used too sparingly. Design with minor or no modifications for different clients were being used only once.

Theory 2: The design and the production processes must be integrated to enhance innovation

The separation of the design and construction process, limited the participation of the different agent involved in the industry to achieve optimized results.

The design of a building must be developed in collaboration with all participants in the project, such as to achieve an optimum result. Absent to do so, can result in inefficient design at the expense of the client.

To achieve the most economic building, the cost element must be an integral part of the decisions, from inception to the completion of the project

The risk bearer in the development of a project should be the one to lead the project. As the risk bearer is more likely to take the risk for innovative ideas.

Theory 3: Integrated procurement system in the form of package deal would enhance innovation and technical progress

The builder being in control of both the design and construction process, is incentivise to take the risk and innovate.

Retrospective of the study

The purpose of this study is to explore the extent to which Bowley's theories of the building industry was still supported in the 21st century. To meet the set objective, an understanding of the building industry in the current period was developed and comparison between the industry now and that of the pre-1960s was made. Our understanding of the modern industry was limited

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to the structure of the industry, the role of the different professions and the influence of the government and professional bodies on the industry in recent years.

If there are differences between the two eras, which we assume there are. The objective of the study would be to expose how the changes in the industry were in phase with Bowley's theories.

The Modern Building Industry odern Building Industry

Introduction

Two successive waves of technological change have taken place since Bowley's study of the UK Building Industry, according to Schumpeterian theory of business cycle. The first is an era of mass production of automobiles and synthetic materials between 1940 and 1990, which overlap with Bowley's period of study. The second the age of microelectronics and computer networks from the 1990s up to now (Freeman & Soete, 1997). Those technological waves have contributed in the moulding of the 21st century building industry. This chapter explores and compares the building industry now with the one in the 1960s; this will help determine the validity of the Bowley's theories in the current context.

This chapter consists of three main sections; the first section explores the UK building industry of the 21st century in term of the procurement systems in use and the professional interactions within the system. The second section relates to the role of the professions within the building industry and the changes since Bowley's study. The third section depicts the contribution and influence of public authorities and professional organisations on the modern

industry. Also an insight on the types of contracts and tendering used are provided.

The structure – Procurement System

As mentioned in chapter 2, there is a multitude of alternatives available to undertake a building project. These different alternatives are characterised by the procurement strategy, which forms the fundamental implementation of the project and defines the interfaces and relationships between participants (ISURV, 2012). While some of the procurement systems such as traditional, package deal and partnering were already introduced prior to the 1960s. Others have been introduced more recently such as construction management, management contracting, pure design and build and Public Finance Initiatives (PFI). Since, the procurement system determines the interaction and relationship within the building industry, this section portrays the UK building industry in terms of the procurement system or strategies in use today.

Traditional Procurement Systems

The traditional procurement system was and remains the prominent system since the 1960s, however, the RICS survey on ‘contract in use’ shows that t