Chapter 1

Economic context, policy environment and the changing role of design economists

Herbert Robinson and Barry Symonds

1.1 Introduction

Construction projects are essential for industrial development, business growth and economic transformation However, major industry reviews and current challenges in the UK construction industry have identified a number of problems forcing both construction firms and their clients to reconsider the way they procure and manage projects. A number of criticisms have also been directed specifically at quantity surveying firms assuming the role of economists focusing on cost management and a range of services to provide value for money for clients of the construction industry.

This chapter provides the economic context for construction projects, examines the policy environment and underlying implications for design economists. First, the role of construction in economic development is explored followed by a discussion of the global construction market, the drive towards international trade and the internationalisation of construction services. Second, the policy environment is examined and policy measures to stimulate construction investment are discussed with examples of how fiscal, monetary and industry specific policies affect construction processes, resource markets which in turn affect construction costs. Third, the role of the design economists in responding to the policy environment and increasingly complex challenges to reduce social and environmental costs, as well as economic costs through efficiency, and productivity are discussed. Throughout the chapter, reference is made to how various sections or subsequent chapters relate to the current, emerging and the future role of the design economists in applying theories and principles, and developing practical tools and techniques to respond to new challenges and policy initiatives influenced by the global and national agenda such as climate change, sustainability and building information modelling (BIM).

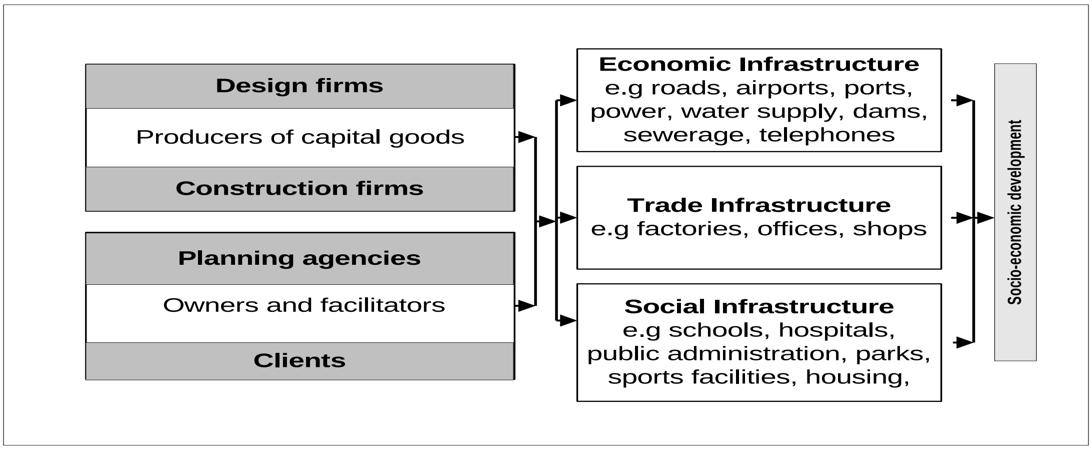
1.2 The Economic Context

Construction projects are capital intensive requiring resources for various activities from concept design to construction and use of the end product, whether it is for self-use as with owner occupiers, for sale or investment as with some developers, for human development, or as capital goods for use in the economic production process.

Understanding the dynamics of the construction industry is critical in tackling central economic and policy issues such as role of infrastructure (including buildings) in economic growth, employment, investment, inflation, exports and imports. There are several reasons why construction is often seen as an ‘engine’ for economic growth. First, *economic and trade* infrastructure, a key product of the construction industry, such as roads, ports, power supply, airports, telecommunication systems, factories, warehouses, business parks and offices are required for industrial production, manufacturing, retail and the services sector. Social infrastructure such as educational, health, sports and recreational facilities are also directly related to improving living standards, quality of life and to facilitate human capital development and productivity.

For example, labour productivity will increase through provision of good education, healthcare and recreational infrastructure. Figure 1.1 illustrates the need to understand the role of construction actors (design and construction firms as producers of capital goods) and other actors (such as planning agencies and clients as facilitators and owners) in the development process.

Figure 1.1: Actors in the construction development process



Why is design economics important? The cost of infrastructure (or a building) matters. Understanding the cost drivers of infrastructure or building projects is key to the design of construction projects and recognising this factor is central to the discipline of design economics. Infrastructure (or buildings) are critical inputs in production processes and contributes to a nation's productivity as they directly affect the cost of goods and services and their competitiveness in the global market place. Industries, manufacturing and the service sectors are therefore primarily concerned with minimising both initial capital (construction costs) and operational costs to maximise the returns on investment and increase profitability. Construction investment varies directly with business profits (or expectation of profits). As industries and businesses continue to grow through profitability and further investment, an expansion in buildings and infrastructure facilities will be needed.

From a business perspective, the drive to minimise capital and operational costs is important. Poorly designed and maintained infrastructure whether they are factories, warehouses and offices, power supply, roads, telecommunication, ICT systems and water supply networks increases the whole life costs of infrastructure (or buildings) which can render production processes too expensive. There is therefore a need for well-designed and properly maintained energy efficient buildings with reliable provision of infrastructure services (e.g. power, roads, water, communications) to raise both the productivity of inputs (e.g. machinery and equipment), and to lower cost of industrial production and business services. For example, to facilitate exports of goods and services, it is essential to reduce production, distribution and transaction costs by improving energy efficiency of buildings and expanding road, rail and other communication infrastructure. Construction therefore plays a crucial role in production processes and to accelerate socio-economic transformation. However, it is the nature of the design of projects, and the efficiency of construction processes that determines the unit (capital and operational) costs and performance of the end product.

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Second, the demand for construction (whether new projects or maintenance) is derived from other goods and services such as agriculture, industry, manufacturing, services and the retail sectors which in turn depend on the state of the national economies and global markets. As a result, there is significant volatility or fluctuation in national and global construction output due to inter-linkages between various economies in the world. A mismatch between the supply and demand for construction output and services affect project costs in various ways. For example, when demand for construction exceeds supply in a particular country (i.e. the capacity of the construction supply chain), there are problems with implementing projects due to over commitment of firms or constraints in local capacity resulting in excessive delays, poor delivery (with higher future costs), increased costs triggered by shortages of resources in the short term. As a consequence inflation rises as resource markets are overheated. The inputs of construction - labour, materials, plant and equipment cost therefore rises as a result of inflationary pressure leading to increases in the overall unit cost of construction projects. Where supply exceeds demand, there will be significant underutilisation of resources and skills leading to intense competition and reduction in unit costs of construction. The globalisation of construction through the international trading system where a company from one country competes for design and/or construction services in another country helps to tackle the problems of mismatch between national and global demand and supply of construction services.

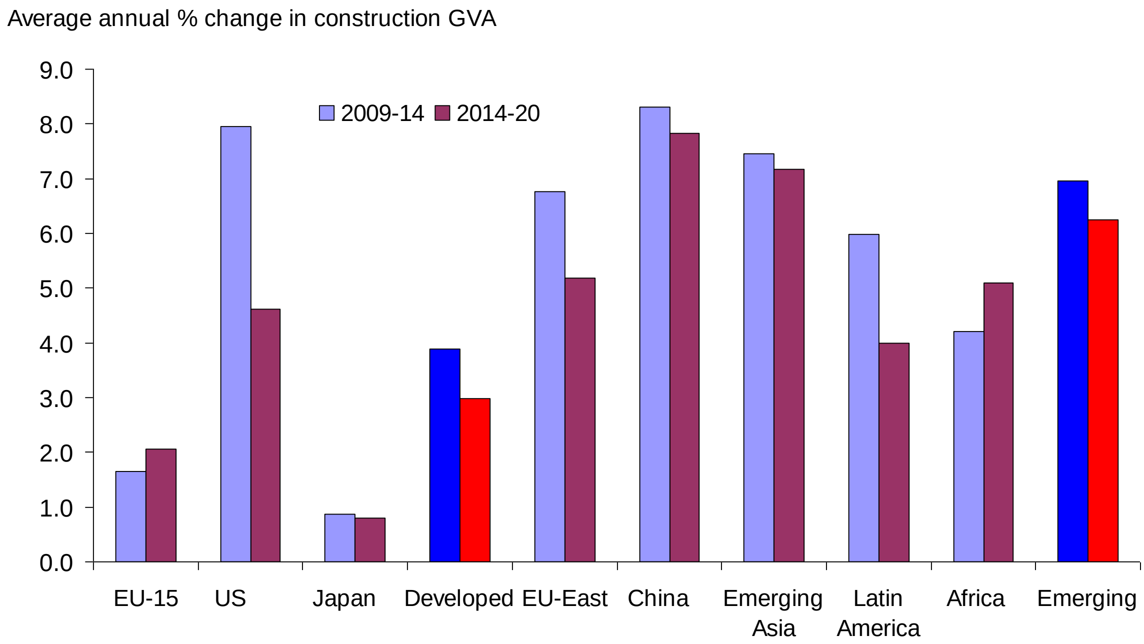
Third, the construction industry generates significant employment depending on the design chosen, type of projects and method of construction which determines the resource mix and utilisation. Employment is created as a result of the inputs required such as materials, equipment and plant, craft skills (e.g. carpenters, bricklayers, plumbers, steelworkers) and professional services needed (e.g. building, engineering design, architectural design, quantity surveying and real estate). Short-term jobs from concept design to construction stages and long-term employment opportunities are created due to the ‘multiplier’ effect in terms of new demands in other industries, manufacturing, businesses, retail and service sectors. This is as a result of the forward and backward linkages of the supply chain including maintenance services required for the life cycle of construction assets.

Fourth, the variation in the size and nature of construction markets, composition and type of projects over time depends on the specific needs of countries, whether it is the least developing countries (LDCs), newly industrialised countries (NICs) or advanced industrial countries (AICs). The construction market is made up of construction services relating to the activities of design and construction firms and construction products and supplies such as materials and equipment used for production. The output consists of different types of buildings, infrastructure or market segments – trade infrastructure (e.g. domestic, commercial, industrial and manufacturing such as factories and warehouses), social (e.g. education, health) and economic infrastructure (e.g. roads, railways etc.). The markets in LDCs are characterised by low levels of demand (although the need is great), weak supply chain due to constraints in design and construction capacity, skills shortages, poor quality and underdeveloped resource markets resulting in shortages of materials, equipment and plant. There is also the problem of significant volatility and unpredictability in input prices sometimes resulting in costly projects. On the other hand, the markets in AICs are characterised by high levels of demand (as effective demand is a function of population and income) and a well-developed supply chain with many national and international consulting firms, contractors, supported by international materials suppliers, equipment and plant manufacturers creating very competitive conditions.

1.3 Globalisation of Construction Market

The global construction market is vast accounting for approximately 13-15% of global GDP. In 2012, the total output of the global construction sector is estimated at $7.2 trillion. Currently the western economies of Europe and North America account for over 60% of global output but due to growth in the emerging economies of Brazil, Russia, India and China (the BRICS) it is predicted that output will grow more than 50% estimated to about $12 trillion by 2020. However, the share of construction spending by world region is likely to shift significantly over time from the western economies to Asia (Global Insight, 2011). Figure 1.2 below shows the change in Gross Value Added (GVA) in the developed and emerging nations. The indications are that the output in the western economies will fall or stagnate whilst output in emerging counties will grow enormously.

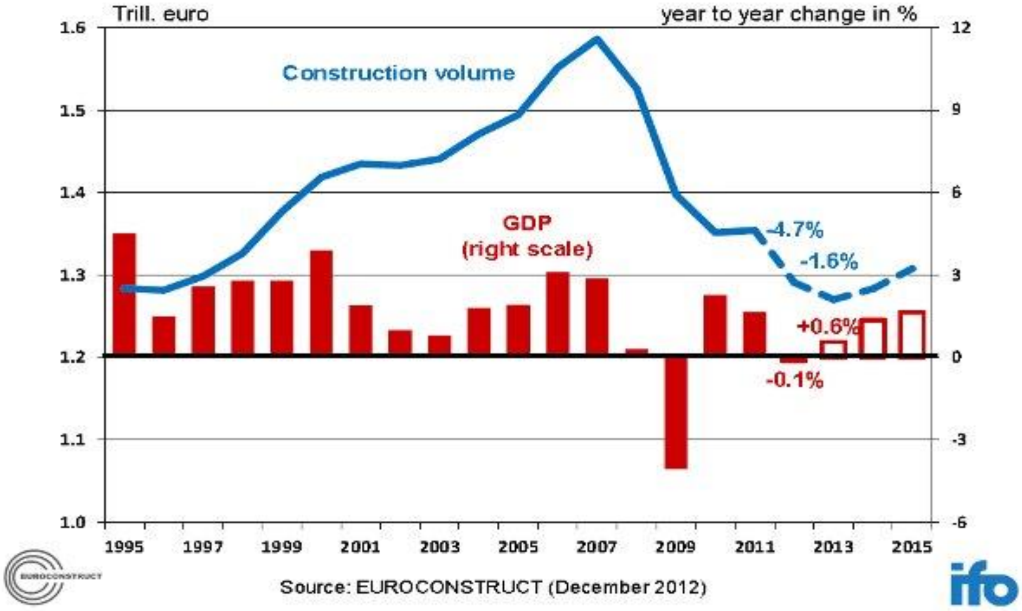
Figure 1.2: Growth in construction GVA: Developed & Emerging World



Source: Oxford Economics

The shift from the European market to Asia is further highlighted by Euroconstruct, an organisation representing nineteen (19) of the European countries that provides statistical information and forecast trends (Euroconstruct, 2012). As can be seen from Figure 1.3, the European construction volumes are largely shrinking due to problems with sovereign debt and austerity measures to bring down the level of indebtedness. However, some growth is predicted by 2015 from Germany, the UK and Ireland, although this is unlikely to change the aggregate picture of continued stagnation throughout the EU 19, due to levels of GDP growth.

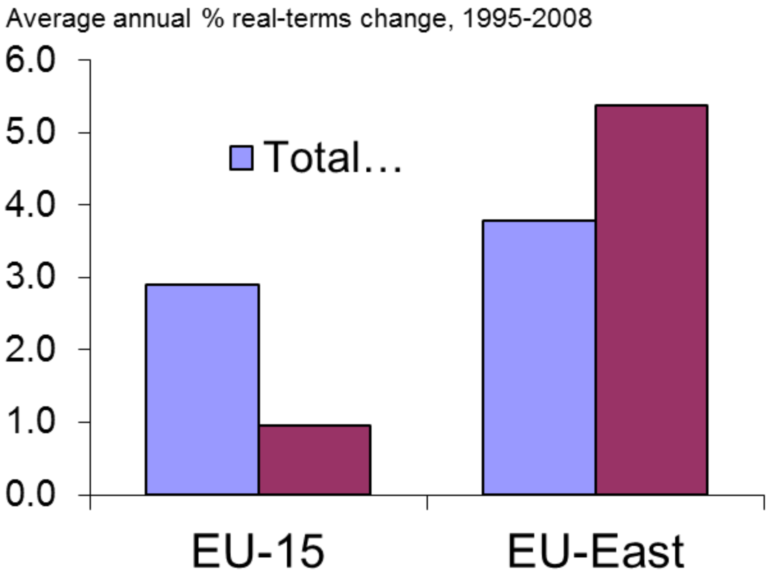
Figure 1.3: Construction volumes and GDP in Euroconstruct countries in 2012



Source *Euroconstruct (2012) * Based on 2011 prices

Furthermore, there are also major differences between future prospects for Eastern Europe, particularly in countries such as Poland, where significant growth in construction volumes is likely due to demand and relatively small debt-GDP ratios. Indeed, it is predicted that the construction output of Russia and Poland together is set to double by 2020 (Staubli, 2013). This view is supported by Goddard (2009) as illustrated in Figure 1.4 below.

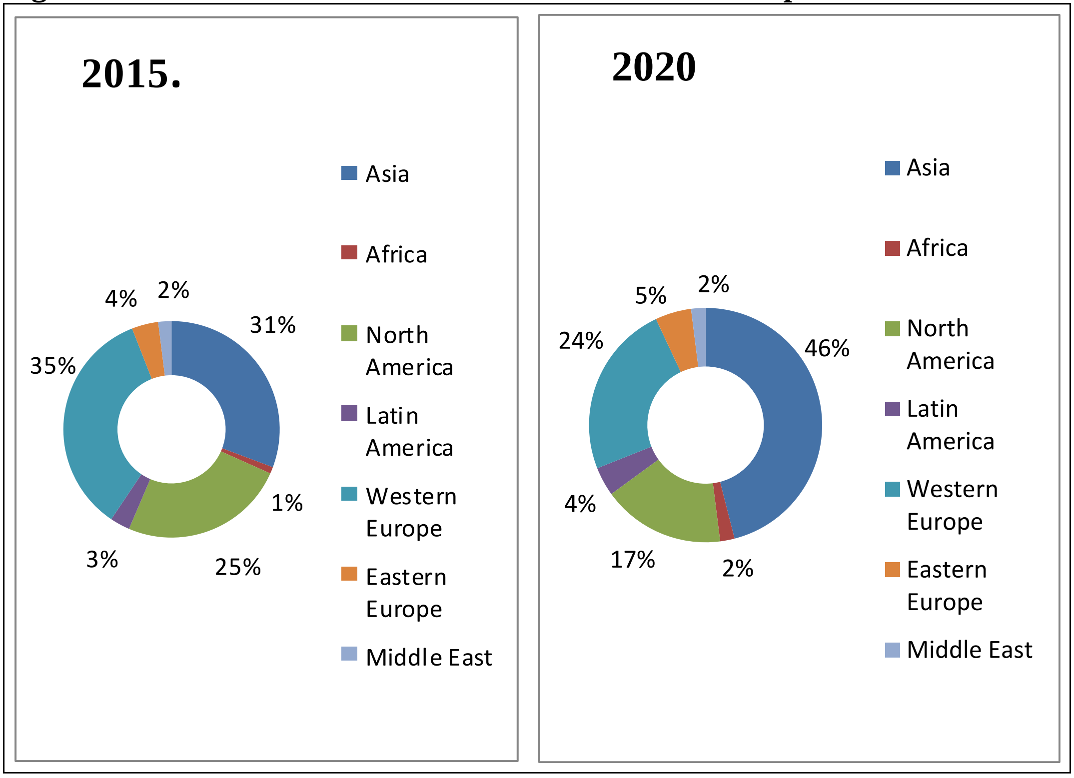
Figure 1.4: Changes in GVA between the EU15 (Western Europe) and Eastern European sectors.



Source: Goddard (2009)

According to Davis Langdon (2012), an AECOM Group company, the general outlook based on Hazelton's (2009) research is that the stimulus for future world growth in construction output will come almost entirely from the emerging economies in Asia, in particular the economies of China and India. Citing IHS Global Insight (2011), it is predicted that whilst Western Europe and North America currently account for more than two thirds (70%) of world output, by 2020 this will have reduced to 41% with shares from North America dropping from 25% to 17% and Western Europe from 35% to 24% (See figure 1.5).

Figure 1.5:   Predicted Shares of Global Construction output in 2015 and 2020



Source: IHS Global Insight (2009) and as adapted by Davis Langdon (2011)

This is in sharp contrast to the share of Asia which will see a significant increase in construction output from 31% to 46% as the industrial base is blossoming and will continue to do so, leading to even stronger infrastructure demands, industrial, commercial and residential buildings to support economic growth. There is also the delocalization of the industrial activities to Asia as manufacturers move their capital investments where labour is cheapest. Africa is expected to benefit from increased manufacturing (and associated construction) activities if governance issues and problems relating to the marginalisation of the continent in the international trading system, infrastructure deficit, stability and conflicts as well as skills shortages are addressed. The prediction for changes in the share of construction output in the other developing regions of Africa is from 1 to 2%, Latin America 3 to 4%, Eastern Europe 4 to 5% are relatively small.

Major construction companies in Western European and North American markets are diversifying and moving to Asia as demand for design and construction services increase. International trade theories argued that countries should specialise and trade in goods and services in which they have a comparative advantage as specialisation can still result in welfare gains. For example, leading UK, Italian, USA and French design consulting firms are excellent in developing innovative design solutions at the concept stage but the detailed design development is often executed by firms from other developing and emerging countries in Asia such as India, Korea or Singapore due to the availability of the technical skills required at lower cost. For countries with competitive advantage, there is the potential for profit and to contribute to national wealth creation through increases in the gross domestic product (GDP) or gross national product (GNP) which is why some countries have specific policies and measures to support the internationalisation of design and construction firms, building materials and plant suppliers. Benefits of international trade include balancing the global demand for design and construction services, avoiding astronomical increases in construction costs in regions where there are excess demand or increase in construction activities with limited capacity. Utilising surplus capacity of design and construction firms that would otherwise be wasted in markets that are saturated are obvious advantages and benefits in international trading, as well as the diversification of project portfolio to act as a cushion in periods of economic decline. For international firms, there is also the prestige factor of gaining international reputation which can attract iconic and landmark projects.

1.4 The Policy Environment and the Construction Industry

The global trading system and different development approaches influences the policy agenda. In classical liberal thinking, development is understood as economic growth and capital-formation is seen as the key to economic development. Hence, the emphasis on the classical liberal development theory is investment on major construction projects to develop infrastructure capital. Social theories of development on the other hand focuses on the importance of "human capital", and associated investment in education, health, recreational infrastructure to improve wellbeing and welfare as the key to economic growth. This approach requires a shift from the overall rate of economic growth to considerations of social disparities, poverty reduction and inclusive growth. In the human capital approach, heavy investment in social infrastructure (and its construction) is seen as an effective means for improving living standards, quality of life and tackling social disparities and poverty. Neo-classical theory focuses on free markets as the key to economic growth, reducing the role of government to allow private investment (including infrastructure investment, design, construction, and maintenance through public private partnerships) to achieve market efficiency but the role of government is still crucial.

Formulating effective policies for construction investment require an understanding of development theories, the role of construction in socio-economic development and the relationship between investment in infrastructure construction and economic growth. According to the Bon's Model, the relationship between '*share of construction*' and '*GDP/capita*' is an inverted 'U' shaped. The relationship between '*increases in the share of construction*' and '*GDP/capita*' normally follows an 'S' shaped according to the Turin/Strassman Paradigm. It is therefore a challenge to develop policies to stimulate investment in construction activities and to facilitate economic growth.

Fiscal and monetary policies are essential to tackle investment in the construction sector. Fiscal policies dealing with changes in the level and composition of government expenditure in terms of sectors (e.g. education, health, infrastructure, welfare, agriculture) subsidies and taxation affects both the level of construction activity and cost of construction projects. For example, the UK approached the recent credit crunch problems by adopting fiscal policies leading to an ambitious deficit reduction plan, cutting spending on key areas relating to government expenditure affecting public sector investment and its construction activities such as Building Schools for Future (BSF) programme and the Private Finance Initiative (PFI). Monetary policies dealing with broad aggregates of money supply, interest rates and liquidity in terms of debt management also affects the level of investment. Construction investment varies inversely with interest rates. For example, monetary policies adopted in the UK during the credit crunch include lowering interest rates to an all time low and quantitative easing (QE) to enable businesses to expand by creating the conditions for affordable loan to stimulate capital investment in manufacturing and businesses necessary to boost export performance. Such measures were also designed to facilitate the activities of small medium enterprises (SMEs) to accelerate economic growth and employment creation. Problems in the commercial and industrial construction sectors can also be addressed through policies to enhance growth in export-led manufacturing. Other policies could include easing the availability of mortgage facilities to increase the supply and construction of housing in particular areas to respond to chronic shortages and changes in demographic patterns.

Other policies may also be required to address industry specific problems affecting the demand and the supply side. For example, policies to stimulate demand for construction could include changes in planning regulations and land use to facilitate the expansion of housing, commercial and industrial construction projects. On the private sector side, this could include stimulating investment through private sector involvement in infrastructure (such as public private partnerships), manufacturing, industrialisation, and real estate development through tax incentives, grant and subsidies. For example, toll roads are currently being explored by the UK government to stimulate private sector investment in road construction and maintenance in an attempt to ease congestion in the national road network.

Policies on the supply side could include investment in research and development (R & D), training and human capital development, critical in improving design outcomes, productivity and quality, and reducing cost of construction projects. Construction is often seen as a knowledge-based industry with significant level of tacit knowledge used in design and construction processes. Measures could therefore be directed at encouraging design and construction firms to become innovative by providing incentives to invest in R & D through the tax systems. Measures to increase efficiency and productivity of the construction process could focus on increasing the quality of labour supply or human effort required in the design and production process such as investment in skills, education, training and capacity development through the availability of education grant and sponsorships, student education loan with low interest rates with flexible payment regimes. Measures to stimulate supply and its quality could also include on-the-job schemes, compulsory continuous professional development (CPD), other training and certification programmes not only to increase the size of the workforce but to increase the productivity of the entire supply chain. Investment in the nurturing of entrepreneurial talent (such as developers, manufacturers) to identify development and business opportunities, take risks, generate profit and create wealth is also crucial to facilitate investment in construction.

The international agenda also influences national policy. A key international agenda relevant to the built environment is sustainability and climate change through the UN framework convention on climate change. The Kyoto Protocol adopted in 1997 setting targets to reduce greenhouse gas emissions allow developed countries to 'buy in' carbon credits from developing nations to meet their emission reduction targets through the EU Emission Trading Scheme (ETS). Under the 'cap and trade' system businesses are obliged to match their greenhouse gas emissions with equal volumes of emission allowances. According to standard economic theory 'the demand for capital is driven by the level of expected future profits and demand'. However, increased uncertainty about the future due to climate change issues can affect both the level of demand and desire for future investment in construction activities. Collective action is therefore necessary to tackle issues of global warming and climate change.

1.5 Current and Emerging Role of Design Economists

Having an appropriate economic context with the right policies and measures will help build clients' confidence and stimulate investment in construction. Design economists respond to such opportunities by providing advice to clients on costs and a range of other services to ensure value for money. Early accounts by James Nesbit, a quantity surveyor and his contemporaries who were effectively the first "design economists" focused on maximising utility from a project by minimising capital cost. However, construction clients are interested in the reducing both the initial capital costs and whole-life (operating) costs of their built assets to maximise the return on investment. The challenges for design economists range from the application of theories and principles to achieve greater economy, minimising whole life costs (capital cost and operational cost), to developing new areas of expertise. Increasingly, design economists are called upon to provide advice on how to enhance the value of design, carbon management, taxation, productivity and efficiency of construction processes and built assets. These challenges have implications for the development of new skills, and create opportunities for the application of new tools to address emerging initiatives such as sustainability, climate change in a global market within a changing economic and policy environment.

Applying theories and principles for economy and value enhancement

Design economists apply numerous theories and principles such as capital cost and whole life theory, value management, value of design theory and resource based theory (discussed in Chapter 2). Understanding these theories help to minimise initial capital and whole life costs of buildings, to achieve better design outcomes through value enhancement, economies of scale, and greater planning and resource efficiency. For example, resource based theory is crucial for the understanding of resource markets, and the role of resource supply and demand in predicting construction costs. The cost of buildings (or infrastructure), is determined based on the cost of various resources associated with design and the construction processes such as materials, plant and labour including land resources (or space) required which can be expensive (if land resources are limited). First, to address the problem of land which adds significantly to the cost of projects, design economists would come up with a range of solutions and appraisal techniques to optimise the value of land (see chapter 5). For example, a new approach such as activity based design principles (discussed in chapter 14) rather than traditional functional design approach can be adopted to evaluate overall land requirements based on energy demand consumption analysis of various activities. Second, the cost of key resources such as material resources, whether natural (e.g. sand, stone) or manufactured (e.g. cement, glass, doors) required for the construction process and their associated cost depends on industrial production processes influenced by economic policies, monetary or fiscal policies. Other resources required for construction projects affect the workforce and productivity depending on government policies, regulations and initiatives such as apprenticeship schemes, availability of education grant, subsidies for education and regulation on competition in professional services. The need for resource-based cost planning is therefore crucial for understanding resource markets and construction costs.

In making design decisions to determine the optimum height to minimise cost, it is important to understand the relationship between construction capital cost and building height (discussed in chapter 4). Furthermore, applying whole-life cost theory to minimise total construction cost and carbon emissions over the lifespan of buildings helps to maximise the function of built assets (discussed in chapter 8 and 19). Government policies which influence interest rates and inflation are factored in the capital and whole life costs modelling carried out by design economists to ensure that future prediction on construction costs (both capital and operational costs such as energy, replacement, cleaning) associated with major capital investment decisions and the long-term use of built assets are appropriately determined. The application of value management theory discussed in (chapters 22 and 23) using case studies identifying the key cost drivers and value opportunity points facilitates value enhancement and the elimination of unnecessary costs in the design process.

However, the role of design economists in modelling, predicting and monitoring resources or capital costs (as well as operational costs) and value management rely on accurate information and consistent practices. Measures to improve reliability of cost information and its consistency include new working methods such as the New Rules of Measurement (NRM) discussed in chapter 3, to ensure that cost data is accurate and to facilitate integration with BIM on the cost planning process. For example, the RICS has recently published NRM1 (new rules for standardised cost planning), NRM 2 (new measurement rules) and NRM 3 (rules for life cycle costing - LCC). The NRM is a standardised approach to enable the design economists to easily identify different components of the cost estimate such as facilitating works, building works estimate, preliminaries, overheads and profit, project/design team fees and risk allowances in order to improve predictability and reliability of construction costs. In the new rules of measurement (NRM), the cost limit may be expressed either with or without construction inflation and there are separate calculations for the provision of construction inflation. Changes in inflation and interest rates, influenced by monetary policies, affect both the cost and predictability of construction projects.

Design solutions and construction costs are influenced by fiscal and industry specific policies. An increasingly challenging role for design economists is to provide advice on taxes and fiscal incentives such as VAT, duties, taxes on income, capital investment affecting construction costs so that they are taken into account at the design stage. A comprehensive system of capital allowances and fiscal incentives developed to promote green design to reduce the carbon footprint of construction projects are discussed in chapters 11 and 26.

Improving productivity, efficiency and leveraging new technology

Productivity and efficiency are key economic drivers central to the role of design economists in reducing costs and waste in construction projects. The determinants of productivity and efficiency are addressed using a holistic socio-techno-managerial approach (discussed in chapter 7). Such an approach recognises that productivity can be influenced *technically* by an efficient planning and scheduling of resources, *socially*, by creating a work environment that motivates and lead people effectively, and m*anagerially*, by an efficient management system to communicate, co-ordinate and control design and construction activities. Design economists provide clients with advice on alternative procurement routes (discussed in chapter 9.) based on varying relationships between professional firms to improve risk management, efficiency and the predictability of building costs. The need for optimum space planning to improve organizational performance and productivity of built assets is also an important aspect of improving design outcomes (see chapter 13).

Technology is a key driver in construction processes to improve interdisciplinary collaborative practices, and the design economists have a key role in increasing the level of efficiency. Modern technology including Building Information Modelling (BIM) will challenge the traditional role of construction teams, and change the relationship between main parties - architects, clients, contractors, engineers, and quantity surveyors operating as design economists. The use of knowledge management tools including BIM (discussed in chapter 16 and 21) will result in more integrated design, reduced cost, time, greater efficiency and productivity of construction projects. BIM's impetus is in part enhanced by the UK Government Cabinet Office Efficiency Reform Group with various professional bodies, contracting organisations and other stakeholders to improve construction efficiency.

Responding to the international agenda

Design economists have a critical role to play in responding to international agenda such as sustainability and climate change as key drivers affecting the design cost and efficiency. For example, the objectives of the UK Climate Change Act is leading to new ways of thinking about design and the development and application of new tools and approaches to reduce the cost of energy supply and carbon management (chapter 12). It is increasingly recognised by design economists that carbon will have to be managed in a proactive way using the cost plan and other tools as powerful communication systems. This approach will ensure that the environmental cost due to the embodied energy of building materials, construction processes, recycling practices are adequately captured so that alternative design and materials are explored with full knowledge of their environmental cost. New materials such as low carbon concrete have been introduced to reduce environmental impact and advances in nanotechnology provide opportunities for developing other types of building materials with totally new properties. Examples of nano-sized particles that have been applied in the construction industry include Titanium dioxide (TiO_2) used to break down dirt and pollution and Carbon nanotubes (CNT's) used to strengthen concrete. There are several implications for the design economists. First, they need to have knowledge of specific materials with low and high embodied carbon and their cost implications.

Second, the traditional cost plan would have to be modified to manage carbon explicitly and to inform clients about the embodied carbon of materials, and the carbon footprint of alternative designs to achieve optimum solutions. Third, there will be a need to adopt a consistent approach in determining what factors to take into account in measuring and calculating embodied energy to be included in the capital cost plan. Design economists also need to have a better understanding of the trade-off between whole-life costs (capital costs and operating costs) and the carbon performance of different materials and alternative design (See chapter 19). New approaches include dealing with carbon emissions in whole life analysis by treating carbon emission as external costs in terms of the costs of emission certificates (Chapter 8) and the eco-cost/value ratio (EVR) tool based on life cycle analysis (LCA) to assess the ecological impact of materials and alternative design solutions (chapter 6).

Increasingly, there are environmental costs influenced by legislation, planning and building regulations such as the taxation and capital allowances system. It is therefore important for design economists to play a critical to ensure that buildings are designed to take account of fiscal incentives and carbon implications in project investment decisions to mitigate the impact of climate change and sustainability. For example, responses to these challenges include a range of sustainable and renewable alternatives particularly in M & E and fiscal incentives with actual examples discussed in chapters 11 and 26.

Changes in the priorities of clients brief such as promoting sustainability to achieve a higher BREEAM rating affect construction costs. There is a growing trend in using tools for carbon mitigation in project design. Given the intense debate on carbon emissions and cost, it is increasingly relevant to reduce carbon emissions in building design, construction and operation. The application of BREEAM and LEED (similar to the Energy Star used in Australia) discussed in chapter 12 will help to achieve low carbon design solutions. For the design economists, such tools provide a coherent and consistent framework not only to evaluate sustainability of design, but to assess the carbon cost implications (in terms of both capital and whole life costs) of different design scenarios and to allow clients to make trade-off decisions between construction and environmental costs in an informed way. For example, the additional capital costs for achieving a higher BREEAM requirement could result in a reduction of whole life costs through enhanced capital allowances, lower energy costs, reduced costs associated with extended void periods, and other costs/tax advantages. There are benefits and opportunities for significantly higher rental returns as sustainable property investment is likely to influence the value of buildings (chapter 10 and 27). Empirical evidence suggests that the economic benefits of buildings or impact on selling price/property value due to sustainable credentials range from 0.2% to 35% based on experiences cited from Germany, Switzerland, Netherlands, and USA (discussed in Chapters 10 and 12).

Strengthening the curriculum and training in design economics

Finally, it is expected that there will be profound changes in the future as a result of the drive for carbon-friendly design solutions, lower whole life costs, value enhancement, and the leveraging of technology for greater efficiency and productivity. Quantity surveying firms providing advice on design economics face intense competition both within and outside the construction industry. As a consequence, quantity surveying firms now provide a range of specialist technical, management and consultancy services compared to the traditional services (see chapter 16). The education and professional training of design economists will therefore be crucial in future to ensure that they continue to play a leading role in the construction process working alongside other members of the design team to achieve efficient design and cost solutions. There will be a need to review both the curriculum to capture new knowledge, and the matrix of competencies and skills discussed in chapter 17. This will be required to respond to new challenges and complexity as a result of the emerging national and international agenda including the sustainability and climate change debate.

The implications are that quantity surveying firms as design economists will have to adopt new strategies to deal with the changes in the business environment. QS firms also need to explore further options which may include repositioning from the historically narrow focus on cost management, rebranding and diversification strategies such as mergers and acquisitions, alliancing, and joint ventures that will facilitate the acquisition and leveraging of new knowledge to cope with the uncertainties arising from new challenges and technologies including BIM. The past two decades have witnessed a significant transformation of many well-known leading quantity surveying firms through mergers and acquisitions to achieve intensive growth and to enhance their competitive edge. Mergers and acquisitions provide opportunities for expanding geographical presence to attract large corporate clients, reduce costs as a result of economies of scale (and scope) which is vital to increase revenue and profit. There is the added opportunity for greater investment in knowledge tools and technology such as BIM and human interactive systems to create networks of experts and a wider pool of high quality specialist skills necessary to respond to new challenges faster.

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