

Developing countries face the challenge of maintaining economic growth and socio-economic development, at the core of which sits the construction industry. Much research on construction in developing countries took place in the 1970s and 1980s, but little since: a gap which this book fills.

Including contributions from prominent academics and practitioners in Singapore, South Africa, Portugal, the Netherlands, Switzerland and the UK, this is a truly international analysis of a subject of global interest. The most insightful and relevant recent research, on topics such as the Millennium Development Goals, the informal construction sector, human resource development, technology and social change, is addressed in the context of the construction industry in the developing world.

While the challenge has grown and the needs have become even more pressing, the research to date has rarely presented effective solutions. Focusing on those aspects of the construction industry most crucial to development, this is a much needed up-to-date study that sheds new light on a variety of concepts and issues.

This is essential reading for researchers, professionals and students interested in the construction industry in developing countries. Readers of this book will be interested in its companion volume: *Contemporary Issues of Construction in Developing Countries*.

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CONSTRUCTION MANAGEMENT/ECONOMICS

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3 Construction in the economy and its role in socio-economic development

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Introduction

The contribution of the construction industry to the national economy and its role in socio-economic development has been addressed by various authors and international organisations, and many of them have focused on developing countries. A particular feature is that construction is the only sector of the economy that appears twice in the national accounts of any country: as a major component of fixed capital formation and as a sector that contributes to the gross domestic product (GDP) (Hillebrandt, 2000). Historical reviews point to the importance of construction in the process of industrialisation and urbanisation that followed the advent of the industrial revolution in western and northern Europe and other parts of the globe. As regards the association between construction and economic growth, several writers (Strassman, 1970; Turin, 1973; World Bank, 1984; Wells, 1986; Bon, 1990) have analysed the changing role of the construction industry at various stages of economic development and presented a development pattern for the industry based on the stage of development of a country's economy. One of the main features drawn from these works is the common assumption that directly relates the measures of construction output to a country's level of economic development. Furthermore, in this view, the construction sector, as a major component of a country's physical capital, plays a determinant role in the development process.

The positive association between construction (indeed physical infrastructure) and economic growth has been the subject of debate on the part played by the proponents of endogenous growth theory and international organisations such as the World Bank in the structural adjustment programme for Africa. Indeed, in the aftermath of the 1979–1980 oil-shock and the international financial crisis that followed in 1981, most of the sub-Saharan African countries experienced decreasing growth in per capita income until the late 1990s (see Table 3.1) despite heavy investment in construction and other physical capital over the period 1970–1980. The World Bank (1994) posited that, rather than the quantity of infrastructure, the main concern in developing countries should be the improvement of the quality of infrastructure. According to this reasoning, it could be argued that

this would be achieved through adequate maintenance and upgrading of existing infrastructure stocks and by prioritising investments that modernise production and enhance international competitiveness.

The argument above brings about the other side of the construction industry and ancillary industries. Construction projects, particularly public infrastructure projects, require large amounts of national resources. In less developed countries, quite often, the 'real costs' of a major construction project are understated if one considers the figures presented in the national accounts tables. Technical assistance (usually paid for in foreign currency) and some other unexpected costs can significantly inflate the costs of a construction project. Thus, it could be argued that in the resource-constrained developing countries, part of the scarce resources which are devoted to investment in construction projects could alternatively be used in other important sectors of the economy (such as health, education and agriculture). Therefore, African governments and their development partners shifted economic policies away from infrastructure investment to macro-economic stabilisation accompanied by social intervention.

In the early 2000s, international organisations and development agencies started to become aware of the important role infrastructure would play in the efforts to attain the Millennium Development Goals (MDGs) in sub-Saharan Africa (Organization of African Unity, 2001; Commission for Africa, 2005, cited in World Bank, 2009a). An important question which should be the concern of the construction economics research community and national and international development agencies is how a well-functioning construction industry could contribute to sustainable economic growth and development.

The structure of this chapter is as follows: the next section discusses the concepts of economic growth and economic development, and explores relevant issues in the area of development economics. The main approaches in growth theory are discussed, and a review of the literature on the role of the construction industry in the process of economic growth and development is undertaken. The third section presents quantitative analyses of the relationship between the measures of construction output and those of the national aggregate in two groups of countries in sub-Saharan Africa according to their stages of economic development: low-income countries (LICs) and middle-income countries (MICs). The statistical sources and data are presented and commented upon, and the analysis and discussions of the results are elaborated upon. The fourth section explores the link between construction investment and economic and social targets related to the MDGs. A concluding section finalises the analysis presented in this chapter.

Economic growth and development: an overview

The study of modern economic growth can be traced in the literature to Adam Smith's *Wealth of Nations*, published in 1776. From then on, economists have

tried to understand what makes national economies progress. For about as long, they have analysed how income distribution and growth are connected (Todaro, 1992; Thirlwall, 1994). This section discusses the main features of the determinants, measurement and comparability of economic growth and development. Then it presents a review of the literature on growth theory and the role of capital formation, and a discussion of the role of construction in economic development.

Determinants, measurement and comparability of economic growth and development

The major determinants in the process of economic growth and development are increase in population; increase in per capita and total national output; and external relations among countries. These have determined the common historical trends in the process of development of nations, particularly of the advanced industrial countries (Kuznets, 1968). However, the role of capital formation is central in any discussion of economic growth and development. Indeed, as Maddison (1987, p. 656) pointed out in his study of six advanced industrial countries, the close correlation between capital and output movements over the long run is the reason why simple regressions find capital such a powerful explanation of growth. It is worth pointing out that the concept of capital has been evolving. The World Bank (1998) identified four types of capital: (i) human capital (the stocks of knowledge and skills in the population); (ii) physical capital (the plant, machinery, equipment and economic infrastructure); (iii) natural capital (natural resources and the environment); and (iv) social capital (the shared values and institutions which give cohesion to society). More recently, Hess (2010), in a study of the determinants of growth in developing economies, used the concept of 'adjusted net saving rate', which incorporates not just physical capital depreciation, but natural capital depletion and environmental damage.

'Economic development' and 'economic growth' are terms often used interchangeably in much of the economics literature (Low, 1994). However, economic growth can be defined as the steady process by which the productive capacity of the economy is increased over time to bring about high levels of national income (Todaro, 1992). In his study, *Economic Growth in the Third World*, Reynolds (1985, pp. 7–8) suggests that the process of economic growth generally comprises two phases, both of which deserve special study: (i) a period of *extensive growth*, a situation in which population and output are growing at roughly the same rate, with no secular rise of per capita output; (ii) a period of *intensive growth* in which, after a certain point in time, a sustained rise in a country's per capita income occurs. The beginning of this sustained rise in per capita income is called the *turning point*. It should be noted that the reaching of the turning point is not a guarantee for growth in the long-term future, and there are cases where growth has changed to stagnation or decline (p. 8). This concept of economic growth appears to be appealing, and it also seems to be shared by Kuznets (1968), so that it has the

merit of placing population analysis in a prominent place in the development process. With respect to the turning point, the development pattern of most sub-Saharan African countries since the 1960s appears to have added value to Reynolds's (1985) development paradigm.

Development, and to a certain extent economic development, is a more ambiguous concept among policy makers and social scientists. The World Bank (1989) refers to 'sustainable development', that is, a strategy of development in which growth in real output must be accompanied by measures that address poverty alleviation, and does not compromise the welfare of the next generations. Goulet (1971, cited in Thirlwall, 1994, p. 8) distinguishes three components in his wider view of development, which he calls life-sustenance, self-esteem and freedom. It follows that, in this view, development is a process that pursues continuous improvement in these issues. In a similar vein, Todaro (1992, p. 487) defines development as the process of improving the quality of human lives through three equally important aspects: (i) raising people's incomes and consumption levels of food, medical services, education and so on; (ii) creating conditions conducive to the growth of people's self-esteem through the establishment of social, political and economic systems and institutions that promote human dignity; and (iii) increasing people's freedom to choose by enlarging the range of their possible choices in consumer goods and services. Mabogunje (1989), adopting a multi-dimensional perspective with regard to the concept of development, points out that any theory of development will ultimately reflect the social, historical and national background of its author.

The issue of economic development not only connotes different implications for different people, but also defies exact measurement (Low, 1994). However, there is an increasing consensus among authors concerned with the issue of development that any notion of strictly economic progress must, at a minimum, look beyond growth in per capita income to the reduction of poverty and greater equity, to progress in education, health and nutrition, and to the protection of the environment (World Bank, 1991). From this definition, it is clear that the issues of poverty, growth and the protection of the environment underlie the development agenda as reflected in the UN's Millennium Declaration (UN, 2000).

The main indicators of the national output of a nation are gross national income (GNI) and gross domestic product (GDP). Basically, the latter indicator measures what is produced within a country's borders, and is a better measure of growth in productive capacity. GNI measures how much of what is produced belongs to residents of the country, and is more closely related to changes in welfare. In the UN Systems of National Accounts (SNA), GNI is derived from the GDP adjusted to the net factor incomes (labour and capital) with the rest of the world. Alternatively, one can consider GNI per capita and GDP per capita when the variable, population, is introduced. In modern history, since the Second World War, growth in output per capita, generally, runs 0.5 to 1.5 per cent below growth in output in developed countries, and 2.0 to 2.5 per cent below in developing countries, so that the population

growth rates are typically in these ranges for developed and developing countries, respectively (see *UN Demographic Yearbook*, various years).

GNI per capita has been utilised by institutions such as the World Bank and Organisation for Economic Co-operation and Development (OECD) to compare living standards among their member countries. In order to facilitate international comparisons, a common currency is used, usually the US dollar. The World Bank publishes annually the *World Development Indicators* in which member countries are ranked and classified according to GNI per capita measured in US dollars. The income groups are as follows: low-income economies (LIE); middle-income economies (MIE); and high-income economies (HIE). The middle-income group is further divided into two sub-groups: lower-middle-income and upper-middle-income. The value limits for each group tend to vary annually upwards, because the overall size of the world's economy tends to generally grow.

From the discussion above, it can be suggested that the development process is not merely an increase in the national output per capita. Furthermore, the weighted average of the growth of income of different groups of people pays no regard to the distribution of income. One of the measures used to express income inequality in any economy is the *Gini coefficient of distribution* (for the method for calculating this index, see, for example, Thirlwall, 1994), which varies from 0 (complete equality) to 1 (complete inequality). According to Kuznets (1965, cited in Thirlwall, 1994, pp. 13–14), the gap between rich and poor would initially increase in less developed countries, and only in later stages of industrialisation will the degree of inequality tend to decrease. Deininger and Squire (1996) examined the relationship between growth and inequality in all regions in the world. Their findings seem to contradict those of Kuznets. They calculate the average Gini coefficients for the world's regions for the period 1960 to 1990, and their main results show that, although differences in inequality among regions are very large (from around 0.5 in Latin America and slightly less than 0.5 in sub-Saharan Africa to a value of about 0.35 in high-income countries), they have changed little over time. Since, in that period, different regions of the world have experienced varied growth rates (an upswing in East Asia and stagnation in sub-Saharan Africa), the stability of the Gini coefficient would suggest that economic growth does not necessarily increase inequality. However, Barro (2000), using the framework for the determinants of growth that was developed in his earlier studies, offers some support to Kuznets's findings. The *Kuznets curve* – whereby inequality first increases and later decreases during the process of economic development – emerges as a clear empirical regularity. However, this relationship does not explain the bulk of variations in equality across countries over time (Barro, 2000, p. 29).

Other measures of the welfare of a nation are health-related and education indicators. In the former, the indicators which are most often used to find out the stage of development of a nation are the number of people per doctor, life expectancy at birth, infant mortality rate and the percentage of

people with access to safe water and sewerage. With regard to education, the most common measures used in the statistics are the percentage of the age groups enrolled in primary, secondary and tertiary educational institutions. Since 1990, the United Nations Development Programme (UNDP) publishes annually the *Human Development Report* (UNDP, 1990–), which gives alternative measures of the welfare of nations that do not necessarily accord with the standard measure of the level of income per capita. Thus, the UNDP constructs a Human Development Index (HDI) which takes into account the measures of income per head (adjusted for international comparisons) combined with measures of life expectancy and literacy. Countries are then ranked by the index, from lowest (0) to highest (1), and compared with the ranking of per capita income. In the low- to middle-income range, some countries rank low by per capita income and high (relatively) by the HDI, and vice versa. In the high-income economies, although there may be relative variations in a country's ranking using the two indices, a high income per capita tends to generally correspond to a high HDI.

Another attempt to improve comparison of living standards of different economies is through the *purchasing power parity* among countries, especially between nations at different stages of development. It is well known that the exchange rates are, in the main, determined by the demand and supply of goods and services which are traded on the international market. The rationale for the determination of the purchasing power parity is that the national output of a country comprises not only traded goods but also non-traded goods (and also government services) in which prices are determined by unit labour costs, which tend to be lower, the poorer the country. There are several methods for determining purchasing power parity ratios and prices (see UN, 1985; Summers and Heston, 1991) to make international comparisons in which the currency of a country (usually international US dollars) or a group of countries acts as the unit of account without altering the ratios of living standards between countries. This methodology has been utilised by the OECD in the compilation of the national accounts statistics of its members.

Apart from the World Bank classification of the economies of the world (HIEs, MIEs and LIEs), other country group classifications have been used in much of the social science literature. The UN and its agencies, and also the World Bank, use the terminology of 'developing countries' to represent a wide group of countries at varied stages of development, excluding the former Union of Soviet Socialist Republics (USSR) and OECD countries. Another criterion for classifying economies is according to the degree of industrialisation. In this view, economies are classified as advanced industrial countries (AICs), newly industrialised countries (NICs) or less developed countries (LDCs). Basically, the HIEs correspond to the AICs, the upper-middle-income economies correspond to the NICs, and lower-income economies added to the lower-middle-income economies represent the LDCs (Bon, 1992; Ruddock and Lopes, 2006).

Growth theory: a brief review

Growth theories have been evolving from a classical approach, focused primarily on physical capital accumulation as the main engine of growth, to one where technology and knowledge play an increasing role in the development process. The recent literature on economic growth has emphasised the importance of both human capital and the quality of institutions for economic development. A debate has emerged about the relative importance of these two factors, and the extent to which institutions cause human capital accumulation and growth, or vice versa (Eicher *et al.*, 2009).

The classical approach to growth theory envisaged that output per capita would be stationary as the rate of output declined, with diminishing improvements in productivity. Rosenstein-Rodan (1943) postulated 'the big push' by which output would grow in proportion with capital and then an economy would propel itself into self-sustaining industrialisation and growth. Along the same lines, Lewis (1954, p. 150) stated:

the central problem in the theory of economic development is to understand the process by which a community which was previously saving 4 or 5 per cent of its income converts itself into an economy where voluntary saving is about 12 to 15 per cent of national income. This is the central problem because the central fact of economic development is rapid capital accumulation including knowledge and skills with capital.

Rostow (1960, 1963) proposed the theory of stages by which it is possible to identify stages of development and to classify societies according to those stages. He distinguished five stages: traditional, transitional, take-off, maturity and high mass consumption. Central in Rostow's thesis is the transition from take-off to maturity, that is the beginning of industrialisation. According to Rostow (1960), the take-off is a short stage of development during which economic growth becomes self-sustaining. Thus, investment must rise to a level of over 10 per cent of national output in order for per capita income to rise sufficiently to ensure adequate levels of investment. Another condition is that one or more 'leading growth sectors' must emerge. Investment in the transport infrastructure was singled out as an important component for facilitating this successful transition. Rostow's propositions were the subject of some debate. Kuznets (1963) argued that Rostow's findings lacked statistical evidence, and the analysis of take-off and preconditions of the stages neglected the effect of historical heritage and the time of entry into the process of modern economic growth (Kuznets, 1963, p. 40). It is also worth noting that De Long and Summers (1991) distinguish two types of capital (machinery and equipment, and construction investment), which have different influences in the growth process. They analysed data on 61 countries of all continents over the period 1960–1985,

and found no significant association between construction investment and economic growth. In contrast, they reported that economic growth was strongly associated with investment in machinery and equipment. Despite these criticisms, Rostow's preconditions for take-off have highlighted the need for investment in construction projects and its role in the development process (Low, 1994).

Based on the growth experience of the United States, Solow (1956) developed the neo-classical model of economic growth. In this approach, the permanent rate of growth of output per unit of labour input is independent of the investment rate and depends entirely on technological progress. Some figures from the World Bank (1991) illustrate Solow's (1956) model. The total output of the United States in the first part of the twentieth century grew at about 3 per cent per year. Its capital stock also grew at about 3 per cent per year, whereas the labour input grew at only about 1 per cent per year. In the capital-labour mix, capital accounts generally for about one-third, and labour two-thirds. Thus, inputs were rising at 1.7 per cent per year. The residual (i.e. increase in total factor productivity), which Solow called 'technological progress in the broadest sense', accounted for the major part of the growth in output. However, most of technological progress finds its way into actual production only with the use of new and different capital equipment (Solow, 1988, 1994). That is, countries would grow only through exogenous technological changes embodied in machinery and equipment. As an implication of diminishing returns, this model also postulates that growth rates would be expected to converge across countries.

However, the growth rates of developing countries have diverged particularly since the first oil-shock in 1973–1974. This seemed to contradict the expectation of convergence, and has been a major concern among development economists and development agencies, but in practice the path of technological change has not been similar. Neither has it been transmitted in most developing countries. It has been argued (see, for example, Agarwala, 1983) that excessive industrial protection, tariffs and other import restrictions, and market distortions have encouraged an inefficient pattern of production and growth. Thus, development economists have felt the need to go beyond the neo-classical theory to understand the experience of developing countries (Romer, 1989, p. 203).

The endogenous economic growth approach (Lucas, 1988; Romer, 1989, 1990) envisages that investment in human capital produces increasing externalities in the development process. Central in Romer's thesis is the role played by research and innovation in the process of development. Romer's (1990) model uses a simplified version of the production function which combines labour input and capital input with a variable that represents technology. However, technology corresponds to the number of intermediate capital inputs for which satisfactory designs have been developed. The model postulates that growth in the variable technology can sustain

long-term growth of per capita income and explains why growth rates have been diverging, particularly since the post-Second World War period. Thus, technology and knowledge are taken as factors of production and are not left aside in the peripheral concept of the 'residual' in the neo-classical approach. The role of the government, then, is to ensure a macro-economic environment that favours these dynamics of permanent innovation (Romer, 1994). Barro (1991), using a cross-sectional study of data on almost 100 countries for the period 1960–1985, found that the growth rate of GDP per capita was positively related to the initial human capital and the average rate of physical investment, and negatively related to the initial level of GDP per capita in the beginning of that period. Barro (1997) extended the sample period to 1995 and reported similar results. O'Neil (1995) seems to confirm these findings and suggests that the divergence in growth rates is a consequence of different levels of human capital across countries. The spectacular growth process of some Eastern Asian economies in the period after the Second World War offers some support to the endogenous economic growth approach.

Since the founding article of the endogenous growth theory (Romer, 1986), various versions of the endogenous growth model have been proposed (see Madsen, 2008, for an extensive review of the literature). Some of the studies can be seen as a revival of the neo-classical approach (see, for example, Mankiw *et al.*, 1992). Jones (1995), using a modified version of the endogenous growth model, concludes that, although economic growth is generated endogenously through research and development, the long-run growth rate depends only on parameters that are exogenous, including the rate of growth of population.

Another strand of the literature on economic growth has been revolving around the notion that heterogeneity of a country's growth process is of fundamental importance in the study of economic growth (Owen *et al.*, 2009). A number of studies which apply cross-country growth regression models (see, for example, Barro, 1991) treat all countries of a continent as belonging to a homogeneous group, after conditioning on other relevant variables (such as investment ratios, initial GDP levels and school enrolment ratios).

These models typically use a parameter of heterogeneity that depends upon the geographical grouping of countries, and includes interactions of terms of continent dummies with explanatory variables. Regarding sub-Saharan Africa, explanations for the continent's long-term stagnation that have been put forward in the literature are diverse. They include geographical location; ethnic diversity; choice of political and economic institutions; insufficient infrastructure; limited openness to international trade; and the lack of social capital (Paap *et al.*, 2005). Some of these works point to the existence of a 'poverty trap' (i.e. zero growth in a long-term perspective) in developing countries and could be considered a revival of the Big Push theory (Bloom *et al.*, 2003). According to Easterly (2006), this renewed interest in the classical approach of growth theory as a framework for shaping development policy

making is partly motivated by the international effort to meet the MDGs in developing countries by the year 2015. It is worth noting that Easterly (2006) found that there was no clear evidence of a poverty trap and that the evidence of divergence between rich and poor nations in 1960–2002 was associated more with the quality of institutions than with initial per capita income. However, a report of the UN Millennium Project (UN, 2005, cited in Easterly, 2006, p. 290) argued that poor countries were in a poverty trap. Escaping the trap requires:

A big push of basic investments between now and 2015 in public administration, human capital (nutrition, health, education), and key infrastructure (roads, electricity, ports, water, and sanitation), accessible land for affordable housing, environmental management.

Other writers (see, for example, Paap *et al.*, 2005; Owen *et al.*, 2009) have contended that group membership is not determined by geography and that the quality of institutions is an important factor that sorts countries into different growth regimes. Paap and colleagues (2005) analysed a data set on growth rates of real GDP per capita in 69 countries in sub-Saharan Africa (34), Latin and Middle America (14), Asia (13) and North Africa and the Middle East (8) over the 40-year period from 1961 to 2000. They found that there were three clusters of growth rates in that sample (low, medium and high growth rates) and that one out of four countries in sub-Saharan Africa presented a development pattern similar to those of many Asian and Latin American countries. These results are in line with the findings of a recent study (Radellet, 2010, cited in Center for Global Development, 2010) that the steady economic growth achieved by 17 emerging countries in sub-Saharan Africa since the mid-1990s has been driven by five fundamental changes: (i) more democratic and accountable governments; (ii) more sensible economic policies; (iii) the end of the debt crisis and changing relationships with donors; (iv) the spread of new technologies; and (v) the emergence of a new generation of policy makers, activists and business leaders.

Role of construction in economic development

Historically, the construction industry has been linked with the process of economic growth and development. It has been noted above that the economic growth of a nation can be defined as a sustained increase in its population and product per capita. With growth in population, there is a need for more products 'that permit us to feed, clothe, and shelter ourselves – the structures in which our goods are produced and stored, over which goods are shipped to market and in which goods are consumed' (Lange and Mills, 1979, p. 1). The increase in per capita and global product is related to the construction industry in the sense that various activities of the industry provide the facilities indispensable for undertaking activities in, and thus for

developing, other sectors of the economy, and the construction industry has direct links with the manufacturing industry – the main partner of construction in the process of economic growth and development.

Although the direct contribution of the construction industry to economic growth is significant, it also contributes to the basic objectives of development including employment creation and income generation and redistribution. The extent to which growth and employment creation should be balanced depends largely upon technical, economic and social conditions. Construction could play an important role in resolving this conflict because it is technologically flexible, implying that many of its operations can be more or less labour-intensive depending upon technical conditions and available resources in the country at the time (Moavenzadeh and Koch Rossow, 1976).

Ducio Turin (1966) was one of the first authors to analyse the relationship between the construction industry and the macro-economy in economic development. Turin (1973, p. 1) highlighted the purpose of a later study as:

to provide guidance to the policy-making bodies responsible for the development of the construction industry by drawing their attention to the nature of the construction process . . . to the steps that could be taken to remove some of the existing and future constraints in the vital areas of materials, manpower, financial resources, organisation and management, institutional set-up and statutory requirements.

Paul Strassman was also one of the pioneers in the study of the macro-economics of the construction industry and its role in socio-economic development. Strassman (1970, cited in Han and Ofori, 2001, p. 190) argued that construction was a major force replacing the manufacturing industry to drive economic growth after the initial stage of development, and he postulated the 'middle-income country bulge' concept.

Turning back to Turin's (1973) purpose, it covered all levels of economic activity and concerned all vital players in the construction industry. The sample analysed by Turin (1973) consisted of 85 countries in all continents representing all stages of economic development, in the period 1955–1965. Countries were ranked in five groups in decreasing order of average per capita product, from a maximum (at the time) of US\$3,130 (North America) to a minimum of US\$130 for some countries of Asia and Africa. The observations made by Turin (1973) can be summarised as follows:

- 1 Construction value added (CVA) was 3 to 5 per cent of GDP in developing countries and 5 to 8 per cent in industrialised countries.
- 2 Capital formation in construction was 6 to 9 per cent of GDP in developing countries and 10 to 15 per cent in industrialised countries. In all countries, construction gross output accounted for 45 to 60 per cent of gross capital formation.

- 3 Using cross-country comparisons, there exists a direct relationship between the level of GDP per capita and the level of the construction industry activity (measured by the share of CVA in GDP).
- 4 The construction industry bought between 50 and 60 per cent of its non-primary inputs from other sectors of the economy. The building materials sub-sector accounts for most of these inputs.
- 5 Developing countries directed 30 to 50 per cent of construction investment to civil engineering whereas the developed nations devoted 25 to 30 per cent.

The World Bank (1984) corroborated the findings of Turin's (1973) study by considering data for the period 1970–1980, and ranked the construction industry in developing countries as fourth out of 20 sectors of the economy in terms of inter-sectoral linkages. The importance of the construction industry in economic growth in the developing world has long been recognised by the World Bank and its affiliates. This is not surprising given the nature of the World Bank since its conception at the Bretton Woods Conference just before the end of the Second World War. Although it has the name of a bank, its original aim was the promotion of economic and financial co-operation among member states. Later, with the formation of other international and regional groupings concerning the richer countries of the world (such as the then European Economic Community and the OECD), the World Bank diverted its attention from its original concern and started to address the financing and monitoring of development projects in less developed countries and the newly independent states of Africa and Asia. According to its own statistics, 44 per cent of the total cost of projects approved for assistance by the World Bank and its affiliates in the three-year period fiscal 1980–1982 went to construction work. Besides addressing the macro level of the construction industry, the World Bank (1984) went further. It suggested directions for future actions to promote the development of its member states and proposed a set of measures for all levels of construction industry activities (demand-side, supply-side, institutional set-up and research activities) to improve the efficiency of this important sector of the national economy. It should be noted that earlier and further works commissioned or supported by other international development agencies addressed the same issue, with a particular concern on developing economies (see, for example, Moavenzadeh and Rossow, 1976; UNCHS, 1982; UNIDO, 1985). The first two works address the contribution of construction to socio-economic growth and development; the last-mentioned deals with the role of the building materials sub-sector in a developing country's industrialisation strategy.

Wells (1986) analysed a sample of more than 100 countries in all continents, representing all stages of economic development, and followed closely the methodology adopted by Turin (1973). However, an important contribution from her work was the establishment of a mathematical model

relating different measures of construction activity – construction value added, gross construction output, and employment in construction – to the level of GDP per capita. It should be noted that, compared with Turin's 1973 study, the work by Wells benefited from a longer period of consideration in the analysis (1960–1980) and the continuous improvement in statistical coverage, not to mention the number of separate countries which then existed (by 1980). Again, the countries were grouped according to the level of income: from group 1 with an average income over US\$2,000 to group 4 with an average income under US\$350 in 1980. The main findings of Wells (1986) can be stated as follows: (i) the construction output as a percentage of GDP is related to GDP per capita in an increasing form of income level; and (ii) if the relationship between countries at different income levels at a fixed point in time also occurs within any country over time, then construction output increases, in relative terms, with increasing per capita GDP in any country over time. The changes in this ratio would be faster for countries in the middle-income range.

Turin's (1973) analysis, and those of the researchers who adopted methods similar to his, have been challenged on a number of grounds: the reliability of the data, the limitations of the coverage, the appropriateness of the methods of analysis employed and the assumption of construction as an engine of economic growth and development. Regarding the last-mentioned point, Drewer (1997, cited in Han and Ofori, 2001, p. 191) suggested that, at best, construction could be an effective motor of economic growth in a limited context, and over a short period, whereas, at the other extreme, economic growth led by uncontrolled expansion of the construction industry might lead to disastrous economic consequences.

Bon (1990) analysed the relationship between the construction industry and the national economy, and presented an overview of several global trends concerning the changes in construction employment and sectoral share in GDP over six continents for the period 1970–1985. The analyses on the changing role of the construction industry at various stages of economic development and the development pattern of the construction industry within the historical processes of industrialisation and urbanisation were further developed in Bon (1992). The main aspect of the propositions was that, in the first stages of economic development, the share of construction in GDP increases, and this proportion decreases in the last stages of development. At some stage, construction volume will decline, not only relatively, but also absolutely. However, Ruddock and Lopes (2006) found that there was no clear evidence of an absolute decline of construction activity in advanced industrialised countries.

Other researchers on the development process might put particular emphasis on the expansion of other sectors of the economy based on their perceptions of the most appropriate strategy for development, but they generally tend to agree on the need for the construction sector to grow (Ofori, 1990, 1993). Some of the authors focus on the issue of employment creation

(Ganesan, 1979, 1994); others emphasise the multiplier effect on other sectors of the economy (Currie, 1974; Bon, 1991). Currie (1974) proposed a development strategy for a developing country based on the 'leading sectors', by which an export-led promotion strategy added to an expansion in the building industry would lead a country to sustained economic growth and development. In this view, for a sector to qualify as a 'leader', it should have two characteristics: an unexplored or latent demand that can be actualised and a sufficiently large demand to cause its satisfaction to have a significant impact on the whole economy; another qualification is that an increase in the sector's growth can be exogenous and occur independently of the current overall growth rate of the economy (Currie, 1974, p. 6). In a similar vein, Low (1994, p. 7) proposes a strategy that focuses on the roles construction and marketing play in the development process, and argues that there is a need for these two factors to be balanced and synchronised for economic development to proceed effectively.

Existing paradigms on the structural change in the construction industry, as a national economy develops over time, tend to be based on cross-sectional data across countries rather than longitudinal studies based on one country's time-series statistics. However, a number of longitudinal studies pertaining to developing countries have been developed (Lopes, 1998; Han and Ofori, 2001; Lopes *et al.*, 2002). Lopes (1998) analysed the role of construction in economic development of countries in sub-Saharan Africa. The development patterns of construction and related sectors were modelled on the basis of data for the period 1980–1993 and a sample of 15 countries exhibiting two different patterns of growth in that period. He argued that the share of construction in GDP and GDP per capita grow at the same rate only in a declining economy, and that, in a growing economy, construction volume, typically, would not grow faster than the rest of the economy. Han and Ofori (2001) studied data on the geographical distribution of construction activity among the provinces of China over the period 1990–1998. They reported that there was a positive correlation between economic growth and growth rate of construction value added, and an inverse relationship between the growth of GDP and the share of construction in GDP.

With the availability of long and more reliable time-series data and the development of econometric methodology related to the study of economic relationships between variables, a new set of studies has emerged. Some of these studies (Green, 1997; Lean, 2001; Tse and Ganesan, 1997; Yiu *et al.*, 2004; Wong *et al.*, 2008) have applied econometric analyses within Granger's (1969) framework to test the causality link between construction output and GDP. For example, Yiu and colleagues (2004) found that, for Hong Kong, the real growth of the aggregate economy leads the real growth of the construction output and not vice versa, at least in the short term. On the other hand, Wong and colleagues (2008), using more recent data covering a longer period of Hong Kong's high-income status, concluded that the direction of the causality is from the construction sector towards the

the civil engineering sub-sector, to GDP. Along the same lines, Anaman and Osei-Amponsah (2007) analysed the relationship between the construction industry and the macro-economy in Ghana, based on time-series data from 1968 to 2004, and found that the construction industry leads economic growth in that country. Chen and Zhu (2008) analysed provincial data on housing investment in three main regions of China and found that there was a bi-directional Granger causality between GDP and housing investment for the whole country, while the impact of housing investment on GDP behaves differently in the three regions.

The contrasting empirical results on the direction of causality (if any) show that the relationship between the growth of the construction industry and that of the national aggregate is not yet fully understood, even with the use of advanced econometric methods (Lopes *et al.*, 2011). Thus, the question that remains to be answered is whether or not the construction industry is an engine of economic growth and development.

The next section considers the relationship between CVA (as a measure of the construction activity) and GDP in two groups of countries in sub-Saharan Africa according to their stages of economic development.

Quantifying the relationship between construction output and GDP

Statistical sources and methodology of data collection

The main statistical sources used in this analysis are the 2010 edition of the *Yearbook of National Accounts Statistics: Main Aggregates and Detailed Tables* (UN, 2010a), *Africa Development Indicators 2008–2009* (World Bank, 2008) and *World Development Report 2010* (World Bank, 2009b). The internet site of the UN Statistical Office presents data on GDP and its components in both the expenditure and production approaches. It presents various sets of economic series detailing the evolution of GDP and its components in different statistical formats over the long period 1970–2008, in the world, the regions of the world, and individual countries: at current prices in national currencies, constant 1990 prices in national currencies, current prices in US dollars and constant 1990 prices in US dollars.

The indicators of economic activity which are analysed in this chapter are GDP and CVA. Unfortunately, data on gross fixed capital formation in construction (GFCFC) are not provided in the UN publication. Thus, it is not possible to compare GFCFC with gross national income (GNI) (which, as discussed above, are both 'total' figures). For this reason, CVA is used as a proxy for the analysis of the pattern of evolution of construction investment across the sub-Saharan African region. It is compared with GDP as both are measures of value added. In order to facilitate international comparison as well as for aggregation purposes, constant 1990 prices in US dollars are used. With respect to the investigation of the relationship between the

construction industry and the economy according to the stage of economic development of a country (or group of countries), GNI per capita for the benchmark year, 2008, has been chosen. The data for this are provided by the World Bank (2009b). The *World Development Report 2010* presents the following definitions of the income groups of countries, categorising the economies according to the 2008 GNI per capita:

- a low-income countries (LICs), US\$975 or less;
- b lower-middle-income countries (LMICs), US\$976–\$3,855;
- c upper-middle-income countries (UMICs), US\$3,856–\$11,905; and
- d high-income countries (HICs), US\$11,906 or more.

Data on the evolution of economic indicators in the period 1980–2006 were obtained from the *Africa Development Indicators 2008–2009* (World Bank, 2008). Thus, because of data consistency, the quantification of the relationship between the construction sector and GDP is analysed only for the period 1980–2006.

Data

As referred to earlier, the indicator used as a proxy for construction investment is CVA. CVA is calculated in the same way as that for any other sector, but includes only the activities of the construction activity proper. For example, it excludes the building materials industry, which is accounted for in the manufacturing sector. The main indicator of economic activity used in this study is GNI per capita. It adjusts the growth in the economy with the growth in population.

Using data obtained from the *UN Yearbook of National Accounts Statistics* (United Nations, 2010a), data are presented for the share of construction in GDP (at constant 1990 US dollars) for the period 1980–2006. GNI per capita is presented for the year 2008. The evolution of basic indicators, of sub-Saharan Africa as a whole, as well as excluding two important economic players of that region, South Africa and Nigeria, is presented for the period 1980–2006 (Table 3.1).

Table 3.1 GDP per capita in sub-Saharan Africa (SSA) in 1980–2006

	Constant prices (2000 US\$)				Average annual growth (%)		
	1980	1990	2000	2006	1980–1989	1990–1999	2000–2006
SSA	593	532	508	580	-1.0	-0.6	2.4
SSA excluding South Africa	371	339	332	368	-0.9	-0.3	2.6
SSA excluding South Africa and Nigeria	348	331	323	379	-0.3	-0.2	2.3

Cross-matching sources, data are available for 45 countries and these can be split into two groups according to the level of GNI per capita in 2008: LICs and MICs. Tables 3.2 and 3.3 and Figures 3.1 and 3.2 illustrate these two groups. Only Equatorial Guinea could, in theory, be considered a HIC, owing to its high GNI per capita.

Table 3.2 GNI per capita and share of CVA in GDP (%) for selected years (LICs)

Country	GNI per capita, current US\$ (2008)	CVA/GDP (1980)	CVA/GDP (1990)	CVA/GDP (2000)	CVA/GDP (2006)
Benin	690	3.65	3.11	3.56	3.91
Burkina Faso	480	2.90	4.67	5.05	5.49
Burundi	140	3.29	3.35	4.37	3.11
C. African Rep.	410	1.77	2.81	2.57	2.97
Chad	530	1.02	1.69	1.32	1.31
Comoros	374	9.39	3.17	5.38	6.01
Congo, D. Rep.	150	3.65	5.00	3.27	4.24
Gambia, The	390	4.86	4.51	4.05	4.77
Ghana	670	3.30	3.30	3.48	3.56
Guinea	390	10.23	10.20	11.49	12.41
Guinea-Bissau	250	13.71	9.99	6.76	10.63
Kenya	750	3.74	2.92	2.66	2.53
Liberia	170	3.89	3.33	2.07	3.45
Madagascar	410	1.69	1.11	1.45	2.83
Malawi	290	6.81	4.96	3.84	5.10
Mali	580	2.00	2.91	5.14	4.92
Mauritania	840	3.42	4.78	6.27	8.95
Mozambique	370	9.65	5.19	8.40	7.37
Niger	330	2.63	2.45	2.30	2.55
Rwanda	410	6.82	6.78	7.97	9.18
Senegal	970	2.82	3.29	3.94	5.13
Sierra Leone	320	3.31	2.12	2.07	3.96
Tanzania	430	3.57	4.76	6.84	7.81
Togo	400	5.84	5.14	4.44	5.20
Uganda	420	3.51	4.84	6.39	7.58
Zambia	950	2.71	2.56	2.15	3.40
Zimbabwe	340	3.88	2.86	2.22	0.86

Table 3.3 GNI per capita and share of CVA in GDP (%) for selected years (MICs)

Country	GNI per capita, current US\$ (2008)	CVA/GDP (1980)	CVA/GDP (1990)	CVA/GDP (2000)	CVA/GDP (2006)
Angola	3,450	4.64	2.92	2.73	3.45
Botswana	6,470	9.11	7.28	5.88	5.13
Cameroon	1,150	6.92	4.59	3.57	3.58
Cape Verde	3,130	10.39	11.92	8.47	8.76
Congo, Rep.	1,970	7.23	2.99	4.44	5.01
Côte d'Ivoire	980	3.63	1.79	4.04	3.29
Djibouti	1,130	4.19	9.62	5.89	6.84
Equatorial Guinea	14,980	7.25	4.51	3.05	3.38
Gabon	7,240	5.70	6.71	6.37	6.54
Lesotho	1,080	9.63	14.69	13.84	12.45
Mauritius	6,400	5.74	5.62	5.88	5.96
Namibia	4,200	6.51	2.30	2.33	3.20
Nigeria	1,160	3.90	1.69	2.14	2.40
Seychelles	10,290	9.26	4.79	8.51	9.14
S. Africa	5,820	3.82	2.98	2.29	2.62
Sudan	1,130	5.56	6.04	5.01	5.00
Swaziland	2,520	5.84	2.49	6.39	6.70

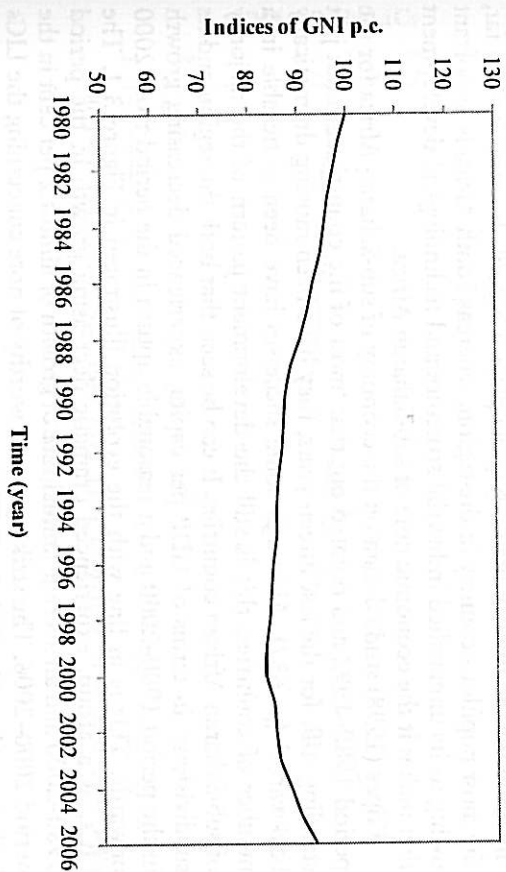


Figure 3.1 Indices of GNI per capita in LICs (mean average; 1980 = 100).

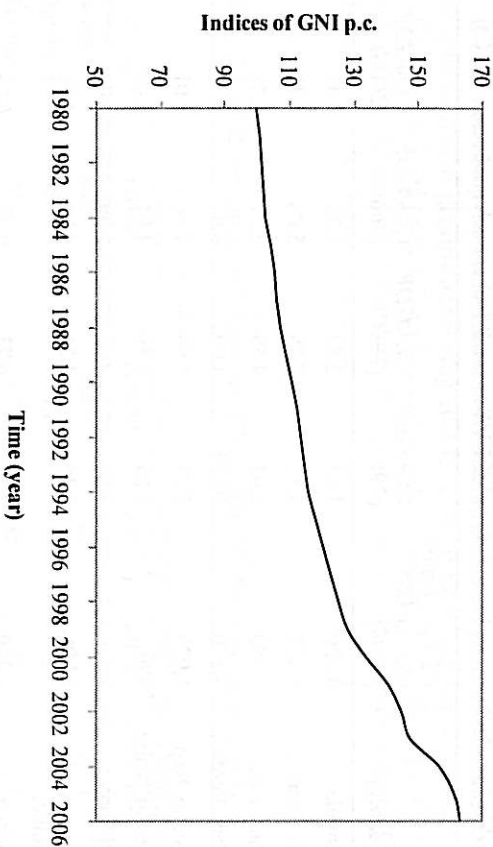


Figure 3.2 Indices of GNI per capita in MICs (mean average; 1980 = 100).

Analysis and discussion

Table 3.1 shows the evolution of GDP per capita in sub-Saharan Africa as well as that of sub-Saharan Africa excluding South Africa, and then sub-Saharan Africa excluding South Africa and Nigeria. The division shown in Table 3.1 is a reflection of the influence those two countries wield in the sub-Saharan African economy. According to the World Bank (2009b), the GDP of South Africa and Nigeria in nominal prices constituted over half (51.4 per cent) of sub-Saharan Africa's GDP. The reasons for this dominance are not the same for the two countries. Nigeria plays a big role because it is, by far, the most populous country in the region, whereas South Africa is important owing to its unmatched industrial structure and technological development that makes it the economic pole of sub-Saharan Africa.

Lopes (1998) studied data on the economy of sub-Saharan Africa for the period 1980–1992 and pointed out that 'most of the countries are not just standing still: for the last fifteen years, they have been moving dramatically backwards' (p. 637). Although some successes have been noticeable in a number of countries, this is still the development pattern of the majority of sub-Saharan African countries. It can be seen that both the region and its subdivisions, in terms of GDP per capita, experienced decreasing growth in the period 1980–2000 and a reasonable upturn in the period from 2000 onwards. This is in line with the evolution illustrated in Figure 3.1. The LICs, as a group, experienced dramatic decreasing growth in the period 1980–2000 and an average annual rate of growth of almost 2 per cent in the period 2000–2006. The striking aspect worthy of note concerning the LICs is illustrated in Figure 3.1. GNI per capita in the LICs in 2006 (measured as an average for the group) was lower than that in 1980. On the other

hand, the MICs, in terms of GDP per capita, grew slightly in the period 1980–2000, with an average annual growth rate of about 1 per cent, and notched up a spectacular rate of growth, more than 4 per cent annually on average in the period 2000–2006. As illustrated in Figure 3.2, GNI per capita for the MICs in 2006 was about 1.65 times that in 1980.

Now, considering the relationship between the construction sector and the national economy, Tables 3.2 and 3.3 and also Figures 3.1 to 3.4 show that the evolution pattern of the share of CVA in GDP in the developing countries of sub-Saharan Africa is markedly different according to the country's stage of economic development as determined by GNI per capita. The share of CVA in GDP in the LICs, despite differences across countries as well as taking into account annual fluctuations, varied, in general, from 4 per cent to 5 per cent of GDP, as is illustrated in Figure 3.3. In terms of the evolution in the period, the share of that indicator was in line with the development pattern of GNI per capita: it decreased in the period 1980–1990, remained practically stagnant in the period 1990–2000, and grew at a reasonable rate in the period 2000–2006. It is worth noting that, in the later years of the period, the share of CVA in GDP was higher than in the earlier years of the same period. That is, in the first stages of economic development, and in an increasing growth pattern, the construction industry tends to grow faster than national output. Conversely, in an economic downturn, the industry tends to decrease not only absolutely but also relatively.

Regarding the MICs, Table 3.3 and Figure 3.4 show that the share of CVA in GDP varied, in general, from 5.0 per cent to 6.5 per cent in the period

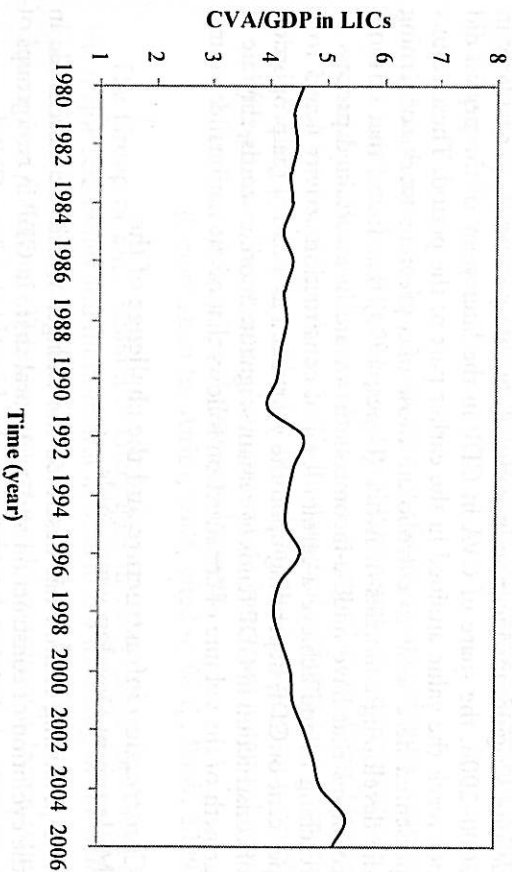


Figure 3.3 Evolution of the share of CVA in GDP (%) in LICs (mean average).

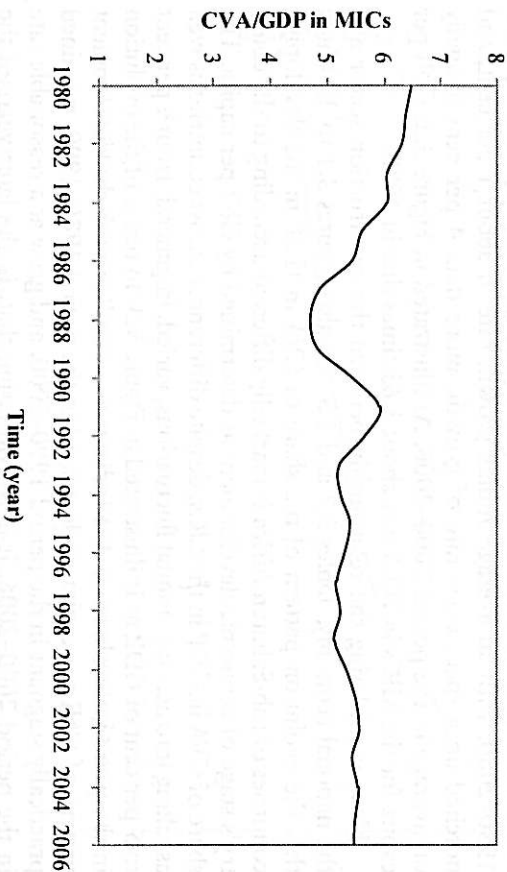


Figure 3.4 Evolution of the share of CVA in GDP (%) in MICs (mean average).

1980–2006, also disregarding differences across countries as well as annual fluctuations. Figures 3.2 and 3.4 also show that a small increase in GNI per capita corresponded to a fairly significant decrease in the share of CVA in GDP in the period from 1980 to the mid-1990s. From then onwards, the share of construction in GDP remained practically stagnant at around 5.5 per cent of GDP. The pattern experienced by the MICs is worthy of note: despite a significant increase in national income per capita, particularly in 2000–2006, the share of CVA in GDP in the later years of the period did not reach the value attained in the earlier part of the period. These results presented here seem to corroborate those of a previous work concerning the developing countries of Africa (Lopes, 1998) that found that in those countries that have middle-income status or are in a sustained process of reaching it, and achieve a certain level of construction activity (say 5 to 6 per cent of GDP, depending upon the year taken as a basis), the proportion of construction in GDP tends to remain stagnant. In other words, the rate of growth of the volume of construction follows that of the national economy.

Construction infrastructure and the challenge of the Millennium Development Goals

The preceding section has described the changes which are discernible in the evolution of construction and its sectoral share in GDP in two groups of countries in sub-Saharan Africa according to their levels of GNI per capita. This section considers the role of construction in socio-economic development, particularly by exploring the link between construction infrastructure and the economic and social targets related to the MDGs.

The results of the analyses in the previous sections suggest that the role of construction in the economy goes beyond its share in national output. As pointed out earlier, the construction industry has historically been linked with the process of industrialisation and development. Railway systems and canals played an important role in the connection of different regions of Europe, North America and some parts of Latin America. Transport infrastructure facilitated trade and co-operation among countries and also the diffusion of technical innovations from the most advanced to the less advanced areas of the globe (Rostow, 1963). The construction industry played a key role in the reconstruction of war-ravaged Europe: the heavy programme of construction improvement of housing and social infrastructure, besides its contribution to the national output, was also a reflection of a better redistributive economic policy in Europe after the Second World War. Following the UN Millennium Declaration in 2000, the heads of state and government of sub-Saharan Africa have emphasised the role transport infrastructure can play in enhancing inter-regional co-operation and fostering economic and social development (Organization of African Unity, 2001).

In the early 2000s, the physical infrastructure in sub-Saharan Africa was in a very poor state. The volume of external capital flows (particularly from donor countries which are members of the Development Assistance Committee of the OECD) for infrastructure in Africa had reached a historic low. As already mentioned, over the 1990s, African governments and their development partners sharply reduced the share of resources allocated to infrastructure, and in the aftermath of the Asian financial crisis, in the early 2000s, private capital flows declined sharply. In 2005, the Commission for Africa, in line with another policy shift on the part of the international development agencies, singled out infrastructure as one of the continent's central development challenges:

Infrastructure is a key component of the investment climate, reducing the costs of doing business and enabling people to access markets; is crucial to advances in agriculture; . . . is critical to enabling Africa to break into world markets; and is fundamental to human development, including the delivery of health and education services to poor people. Infrastructure investments also represent an important untapped potential for the creation of productive employment.

(Commission for Africa, 2005, cited in World Bank, 2009a)

The Group of Eight summit at Gleneagles in 2005 called for action by the major economies and multi-lateral donors in the financing of sub-Saharan African infrastructure. This led to the formation of the *Infrastructure Consortium for Africa*. This consortium would constitute a forum where major donors could work with continental and regional institutions to spearhead economic integration (World Bank, 2009a). One of the practical results of this political arrangement was the publication of the flagship report *Africa's Infrastructure Situation. A Vision for Transformation in 2000*. The

diagnosed the infrastructure needs of sub-Saharan Africa, addressing the twin challenges of financing and sustainability, particularly the attainment of the MDGs.

Table 3.4 indicates that the estimate for the overall cost to build, maintain and operate Africa's infrastructure is US\$93 billion annually over the period 2006–2015, approximately 15 per cent of sub-Saharan Africa's GDP in 2006. Of this total, about two-thirds is for investment and about one-third for operation and maintenance. In sectoral terms, about 40 per cent is allocated to the power sector. The second largest component is water and sanitation – a key sector for meeting the MDGs – with about 23 per cent of the total and the third largest share of the cost is associated with transport, which is approximately 20 per cent of the overall spending needs. In terms of regional groups, the burden of the price tag relative to the countries' GDP is markedly different across groups (World Bank, 2009a). For middle-income countries and resource-rich countries, the amount is in the range of 10 per cent to 13 per cent of their GDPs. For low-income countries, as much as 25 per cent of GDP would be needed, and for a particular sub-group of the latter – fragile states (war-ravaged countries) – the burden would be an astonishing 37 per cent of GDP. If one takes into account that the middle-income countries already spend a reasonable share of their wealth in investing in infrastructure and the spending needs are almost equally divided across groups, one can envisage the implausibility for the poorer countries in Africa to finance the funding gap of their estimated spending needs.

As Tables 3.5 and 3.6 show, the funding gap for infrastructure in sub-Saharan Africa is US\$31 billion or about 5 per cent of GDP, taking into account efficiency improvements. About US\$23 billion a year, or over 70 per cent of the funding gap, is for the power sector. The other significant component of the gap, representing a shortfall of US\$11.4 billion, is associated with water supply and sanitation (WSS). The funding gap in the latter sector in the low-income countries, particularly in fragile states, looks like

Table 3.4 Overall infrastructure spending needs for Africa, 2006–2015 (US\$ billion annually)

Sector	Capital expenditure	Operation and maintenance	Total needs
ICT	7.0	2.0	9.0
Irrigation	2.7	0.6	3.3
Power	26.7	14.1	40.8
Transport	8.8	9.4	18.2
WSS	14.9	7.0	21.9
Total	60.4	33.0	93.3

Source: World Bank (2009a).

Note

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Table 3.5 Funding gaps, by sector and country group (US\$ billion annually)

Country type	Power	ICT	Irrigation	Transport	WSS	Potential for reallocation	Total
Middle-income	10.7	-0.9	0.1	-0.3	0.0	-4.1	5.5
Resource-rich	4.5	0.5	1.8	-1.4	3.7	-0.8	8.2
Low-income non-fragile	4.7	-0.2	0.7	-0.5	5.2	-0.4	9.5
Low-income fragile	2.7	0.7	0.0	2.0	3.9	0.0	9.4
Sub-Saharan Africa	23.2	1.3	2.4	-1.9	11.4	-3.3	30.6

Source: World Bank (2009a).

Note
Totals do not add up because efficiency gaps cannot be carried across country groups.

Table 3.6 Funding gaps, by sector and country group (percentage of GDP)

Country type	Power	ICT	Irrigation	Transport	WSS	Potential for reallocation	Total
Middle income	3.9	-0.3	0.0	-0.1	0.0	-1.5	2.0
Resource rich	2.0	0.2	0.8	-0.6	1.7	-0.4	3.7
Low-income non-fragile	4.2	-0.2	0.6	-0.4	4.7	-0.3	8.6
Low-income fragile	7.1	1.9	0.1	5.3	10.2	0.0	24.6
Sub-Saharan Africa	3.6	-0.2	0.4	-0.3	1.8	-0.5	4.8

Source: World Bank (2009a).

Note
Totals do not add up because efficiency gaps cannot be carried across country groups.

an unattainable target in the foreseeable future in the light of the present economic situation and prospects of the countries themselves, and the challenges posed to the development partners by the recent global financial crisis.

As pointed out above, international development agencies and bilateral donors have emphasised infrastructure (more precisely the services provided by the infrastructure) as the key factor for the attainment of the MDGs. The MDGs are the world's time-bound and quantified targets for addressing extreme poverty in its many dimensions – income poverty, hunger, disease, lack of adequate shelter, and exclusion – while promoting gender equality, education and environmental sustainability (UNDP, 2005). Following the adoption of the UN Millennium Declaration at the Millennium Summit in

New York in September 2000, eight MDGs, measured through 21 targets, were devised. Most of the MDG targets have a deadline of 2015, and 1990 is the baseline against which progress is quantified.

Restricting here the analysis to those infrastructure items which incorporate mainly construction investment (WSS, transport and electricity – note that a significant part of the investment in the power sector is for multi-purpose use), construction infrastructure has an important role to play in the process of attaining the MDGs in sub-Saharan Africa. MDG 7 – Ensure environmental sustainability – is particularly relevant to the construction industry. This goal is translated into the following targets: (i) integrate the principles of sustainable development in country policies and programmes and reverse the loss of environmental resources; (ii) halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation; and (iii) have achieved by 2020 a significant development in the lives of 100 million slum dwellers.

Table 3.7 suggests that sub-Saharan Africa, as a whole, is unlikely to achieve, by the deadline of 2015, the targets related to access to safe drinking water and basic sanitation. However, some middle-income economies of Africa such as Cape Verde, South Africa, Botswana, Namibia, Seychelles and Mauritius are either on track or experiencing good progress towards achieving the targets, particularly in access to safe drinking water (WHO/UNICEF, 2010). Regarding the urban population living in slum areas, whereas some progress was noticed in relative terms, the absolute number of slum dwellers has actually been growing and will probably continue to increase in the near future.

With respect to the emission of CO₂, sub-Saharan Africa registered 0.9 metric tons per capita in 2007 compared with 12 metric tons per capita in the developed world, and, in deforestation, the rate of increase started to decrease in the period 1990–2010.

The WSS sector, besides its direct effect on the provision of water and sanitation services, has a pervasive impact on other social targets, namely in the prevention of disease, improvement in education and promotion of

Table 3.7 MDGs in sub-Saharan Africa: Goal 7 – Ensure environmental sustainability

	Proportion of people with access to improved water source (%)		Proportion of urban population living in slum areas (%)		Forested area as a percentage of land area (%)		Emission of CO ₂ (billions of metric tons)	
	1990	2008	1990	2010	1990	2010	1990	2007
49	60	28	31	70	62	31	28	0.5
								0.7

Source: UN (2010b).

gender equality so that women save time when they begin using an improved water source. Transport fosters trade by reducing the cost of transporting goods and passengers, reduces child and maternal mortality and improves access to education services. Electricity enhances productivity, eradicates poverty by fostering economic growth and reduces child and maternal mortality.

One important area related to the construction industry which needs special attention on the part of government agencies is urban planning. The rate of urbanisation in sub-Saharan Africa is increasing sharply. This has its merits. For example, higher population densities lower the per capita costs of providing safe water, sewer systems, waste collection and most other infrastructure and public amenities. Moreover, sound urban planning restricts development in flood-prone areas and other hazardous places and provides critical access to services, and infrastructure developments can provide physical protection for the natural environment. On the other hand, most of the urban areas have been unable to cope with the increasing populations, and large numbers of their inhabitants have a poor quality of life. As pointed out by the World Bank (2009b), overcrowding, insecure tenure, illegal settlements sited in landslide- and flood-prone areas, poor sanitation, unsafe housing, inadequate nutrition and poor health exacerbate the vulnerabilities of the population in urban slums. These are the realities for millions of people in sub-Saharan African countries. An efficient construction industry can contribute to the efforts to tackle these problems. For example, it can address the vulnerabilities of slum dwellers by devising labour-intensive and cost-effective technologies, and by implementing practical sustainable measures in the framework of the *Agenda 21 for Sustainable Construction in Developing Countries* (International Council for Research and Innovation in Building and Construction [ICIB] and United Nations Environment Programme [UNEP] 2002). This framework for a co-ordinated response to the challenges of limiting the impact of construction on the environment puts an emphasis on collaboration among different stakeholders of the construction industry. To this end, three types of interdependent and multi-dimensional enablers were identified: technological enablers, institutional enablers and enablers related to value systems. The development of these enablers requires an approach that operates simultaneously at different scales, as well as over different time horizons (Du Plessis, 2007, p. 71). Indeed, it is the flexibility of the construction industry in being able to adjust to different framework conditions that makes it such a great contributor to the process of economic development.

Concluding remarks and policy implications

The picture that emerges from the analysis of the evolutionary process of the construction industry and its role in national socio-economic development suggests that the share of construction in GDP tends to increase with the

level of per capita income in the first stages of economic development. When countries reach a certain level of economic development, the construction output will grow more slowly than national output in the later stages of their development. That is, it decreases relatively but not absolutely. Thus, it is reasonable to assume that, when a certain level is achieved (say the share of CVA in GDP at around 5–6 per cent) and countries enter into a path of sustained economic growth and development, the construction output tends to grow, in general, at the same rate as that of the broader economy.

The analysis also suggests that the role of construction in economic development is by no means a fully understood process. Two barriers appear to be particularly relevant: (i) the relative lack of attention paid to the construction industry by international organisations which aim to promote economic co-operation and development (for example, in comparison with the manufacturing and transport sectors); and (ii) the scarcity and unreliability of the data on the construction industry and related sectors which are needed to undertake longitudinal country studies, particularly in developing countries. These studies are the sub-stratum for generating good understanding of the process of the economic development of nations. The development of Brazil, China and India might, at last, provide the time-series data which are required to build appropriate models of the role of construction in national socio-economic progress, and strengthen the argument on the importance of the industry (Ofori, 2007, p. 7).

The results of the study also underlie the need to address the twin challenges of finance and sustainability in sub-Saharan Africa in the effort towards attaining the MDGs, and the situation is particularly acute in the low-income countries in the light of the countries' own economic circumstances and prospects, and the current global financial crisis. The results of the study may have some implications for public policies. Given the experience of the growth process in sub-Saharan Africa, what should be the focus of growth-enhancing policies in the two groups of countries? How can the construction industry contribute to this end, and help a country in the LIC group to move to the MIC group? It is evident that further investment in construction infrastructure might be recommended for LICs but might not necessarily be a growth priority for MICs. Most recent data indicate that there is no significant funding gap in infrastructure investment in the MICs of sub-Saharan Africa in order to achieve the economic and social targets of the MDGs. These countries should prioritise their investment projects by balancing economic and financial factors with social targets. For the low-income countries, taking into account the financial stress facing these countries, the analyses suggest that most of the effort should be directed at investment in construction projects in order to achieve a level of construction industry activity of, say, 5–6 per cent of GDP, which some studies have shown to be required for a reasonable functioning of the economy. The priority should be given to construction projects which have high multiplier effects in the economy, particularly transport and multi-purpose (power

and water) infrastructure. A concerted effort to implement integrated sub-regional infrastructure projects seems also to be the way forward.

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