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MACROECONOMIC SUSTAINABILITY OF THE CONSTRUCTION INDUSTRY IN SUB-SAHARAN AFRICA

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Abstract

The contribution of construction to the national economy and its role in socio-economic development has been dealt with by various writers and international organizations, and many of them have focused on developing countries. In a macroeconomic perspective, a particular feature is that construction is the only sector of the economy that appears twice in the national accounts of any country: a major component of fixed capital formation; and as a sector that contributes to the gross national product. Another main aspect derived from a seminal work in the field is that there is a changing development pattern of the construction industry based on the stage of development of a country´s economy. The role of construction infrastructure in the process of development has gained a new stimulus following the United Nations Declaration at the Millennium Summit in New York, 2000, where 8 millennium development goals (MDGs), measured through 21 targets, were devised. Some of the MDGs and the soon-to-be adopted sustainable development goals (SDGs), also at the United Nations Conference, September, 2015, have to do with construction infrastructure and/or the services rendered by these infrastructures. As each country is the main responsible for its own economic and social progress and in the face of macroeconomic constraints in many parties of the developing world, an important question that arises is how a well-functioning construction industry could contribute to the attainment of those targets. Using most recent data drawn from United Nations and The World Bank publications, and making use of an analysis developed in previous works, this study presents some insights of the development of the construction industry in two groups of countries in Sub-Saharan Africa, according to their level of economic development. Some preliminary recommendations aimed at public policy development are also drawn.

Keywords: Construction industry, economic development; sustainable development indicators; Sub-Saharan Africa.

1 INTRODUCTION

The relationship between a country's stage of development and the level of activity in the construction sector is one, which has received great attention at the macroeconomic level for a number of years. Some writers have attempted to model the relationship and found a positive correlation between several measures of construction output and the level of income per capita [1], [2], [3]. These findings have been the subject of much argument due to problems related with the reliability of data, limitations of the coverage and methods of analysis employed. 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 seminal work in this field made use of a longitudinal analysis to present a development pattern for the industry, at a global scale, also based in the stage of economic development of a country's economy [4]. An important aspect of the proposition was that, in the early stages of development, the share of construction increases but ultimately declines, in relative terms, in industrially advanced countries - and even at some stage, the decline is not only relative but also in absolute terms. The positive association between construction investment (indeed physical infrastructure) and economic growth has been subject of debate for the part of the proponents of endogenous growth theory and international organisations such as the World Bank in the *Structural Adjustment Programme* for Africa [5]. Indeed, in the aftermath of the 1979-980 oil-shock and the international financial crisis that followed in 1981, most of Sub- Saharan African countries experienced until the mid-1990s a decreasing growth in per capita income (see Table 1) despite heavy investment in construction and other physical capital over the period 1970-1980. It could be argued according to this reasoning that rather than the quantity of infrastructure, the main concern in the developing countries of Africa should be the quality of the infrastructure, and by prioritising investments that modernise production and enhance international competitiveness. In the early 2000s, international

organisations and development agencies started to become aware of the important role infrastructure would play for attaining all the MDGs (and now their substitute, SDGs) in Sub-Saharan Africa.

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 a sustainable economic growth and development [6].

The structure of this paper is as follows: the next section presents a quantitative analysis 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 stage of economic development: Low Income Countries (LICs) and Middle Income Countries (MICs). The statistical sources and data are presented and commented on, and the analysis and discussions of the results are elaborated upon. The third section explores the link between construction investment and economic and social targets related to the SDGs. A concluding remark finalizes the analysis presented in this paper.

2 QUANTIFYING THE RELATIONSHIP BRTWEEN CONSTRUCTION AND GROSS DOMESTIC PRODUCT

2.1 Data and methodological issues

The main statistical sources used in this analysis are the 2015 edition of the *Yearbook of National Account Statistics: Main Aggregates and Detailed Tables* from the United Nations [7] and *Africa Development Indicators 2012-2013* from the World Bank [8]. The internet site of the UN statistical office presents data on gross domestic product (GDP) and its components both in the expenditure, production and income approaches. This publication presents various sets of economic series detailing the evolution of GDP and its components in different statistical formats over the long period 1970-2013, at the world, world regions and country levels. The *Africa Development Indicators 2012-2013* presents a series of national and fiscal accounts for all African countries for the period 1980-2010. In order to place the two country groups in the economic development arena, gross national income (GNI) per capita for the bench mark year 2010 was taken. This report also presents the following definitions of the income groups of countries according to the 2010 GNI per capita: low income countries (LICs), US$ 1,005 or less; lower- middle- income (LMICs), US$ 1,006-3,975; upper-middle-income (UMICs), US$ 3,976 -12,275; and high income countries (HICs), US$ 12,906 or more.
Cross-matching sources, data are available for 38 countries and these can be split into two groups according to the level of GNI per capita in 2010. Group I – LICs comprises the following countries: Benin, Burkina Faso, Burundi Central African Republic, Chad, Comoros, Democratic Republic of Congo, Gambia, Guinea, Kenia Liberia Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Rwanda, Togo, Uganda and Zimbabwe. Group II – MICs comprises the following countries: Angola, Botswana, Cameron, Cape Verde, Republic of Congo, Cote d'Ivoire, Equatorial Guinea, Gabon, Ghana, Lesotho, Mauritius, Namibia, Nigeria, Senegal, Seychelles, South Africa and Swaziland.Thus, Group II comprises both LMICs and UMICs, and only Equatorial Guinea could, in theory, be considered a HIC, owing to its high GNI per capita (US$ 13,720).
Table I presents the evolution of GDP per capita, both of Sub-Saharan Africa as a whole, as well as excluding two important economic players of that region, South Africa and Nigeria, for the period 1980-2010.

Table 1 – GDD per capita in Sub-Saharan Africa in 1980-2010, real.

	Constant prices (2000 US$)				Average annual growth (%)		
	1980	1990	2000	2010	1980-90	1990-2000	2000-10
SSA	594	539	508	653	-0,9	-0.6	2.6
SSA excluding S. Africa	372	344	332	458	-0.8	-0.2	3.2
SSA excluding S. Africa and Nigeria	354	340	323	437	-0.3	-0.2	3.0

Source: [8]

The evolution of the indicator of construction industry activity –share of the construction value added in GDP – is presented in Fig.1 and Fig.2 as the mean average for the two groups of countries for the period 1980-2010.

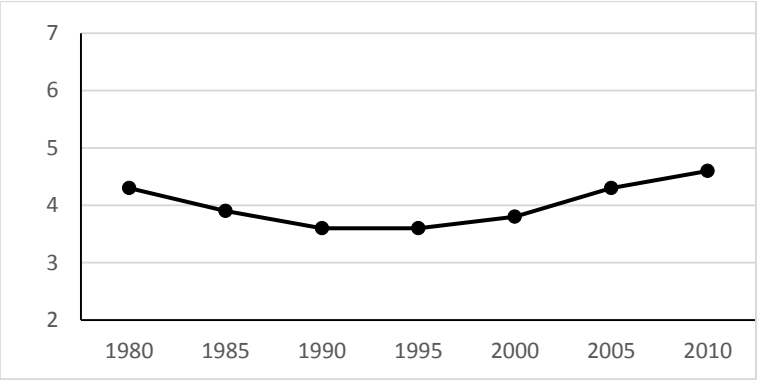

Fig.1 – Share of Construction in GDP (%) in Group I, 1980-2010.

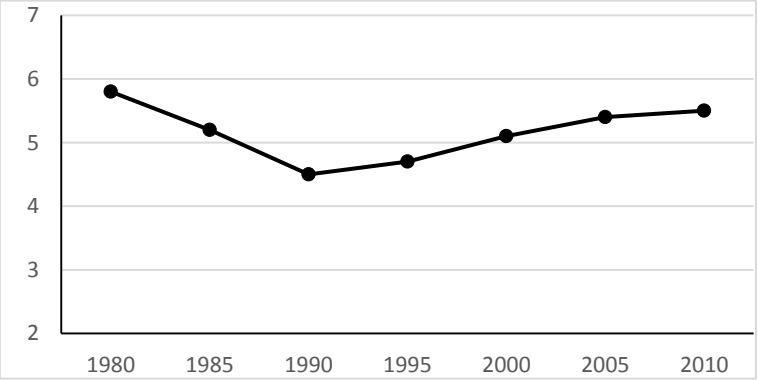

Fig.2 – Share of Construction in GDP (%) in Group 2, 1980-2010.

2.2 Analysis and Discussions

Table 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 1 is a reflection of the clout those two countries represent in the Sub-Saharan African economy. South Africa's and Nigeria's GDP in nominal prices comprised over fifty percent (50.4 percent) of Sub-Saharan Africa's GDP in 2010. 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.

Table 1 shows 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. According to data constructed from the World Bank [8], the LCIs, as a group, experienced a dramatic decreasing growth in GDP per capita in the period 1980-2000, and an average annual rate of growth of about 2.5% in the period 2000-2010. Again, data constructed from World Bank show that the countries comprising Group II (MICs), in terms of GDP per capita, grew slightly in the period 1980-2000, with an average annual growth rate of about 1%, and notched up a spectacular rate of growth of an annual average rate of more than 4% in the period 2000-2010.

Now, looking at the relationship between the construction sector and the national economy, Figs 1 and 2 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 Group I (mean average of the group), despite differences across countries as well as taking into account annual fluctuations, varied from 3.6 % to 4.6 % of GDP, as is illustrated in Fig.1. 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 (from 4.3% to 3.6 %), measured as an average for the group), remained practically stagnant in the period 1990-2000, and grew at a reasonable rate in the period 2000-2010 (from 3.8 % to 4.6 %, again measured as an average for the group). It is worth noting that in the latter years of the period, the share of CVA in GDP was higher than that 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 [9].

Regarding the middle-income countries (Group II), Fig.2 shows that the share of CVA in GDP (mean average of the group) varied, in general, from 4.5 % to 5.8% in the period 1980-2010, also disregarding differences across countries as well as annual fluctuations. Fig.2 also shows that the share of CVA in GDP decreased from 5.7% in 1980 to 5.1 % in 2000 (measured as an average for the group) despite a growth in GDP per capita, as already pointed out, at an average annual growth rate of about 1% in the period 1980-2000. From 2000 onwards, the share of construction in GDP increased gradually and then remained practically stagnant at around 5.5% of GDP. The pattern experienced by the MICs is worthy of note: despite a significant increase in national income per capita, particularly in 2000-2010, the share of CVA in GDP in the late years of the period did not reach the value attained in the beginning of the period. It could reasonably be said that the construction industry activity in the MICs reached a peak, in relative terms, in the early 1980s. These results presented here seem to corroborate those of a previous work concerning the developing countries of Africa [9] that found that in the developing countries of Africa that have middle-income status or are in a sustained process of reaching it, and have achieved a certain level of the construction industry activity (say 5 to 6 percent of GDP, depends upon the year taken as basis), the proportion of construction in GDP tends to remain stagnant, i. e. the rate of growth of construction volume follows that of the national economy.

3 CONSTRUCTION IINFRASTRUCTURES AND THE POST-2015 DEVELOPMENT AGENDA

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 in some parts of Latin America. Transport infrastructure facilitated trade and co-operation between countries and also the diffusion of technical innovations from the most advanced to the less advanced areas of the globe [10]. 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 reflex of a better re-distributive economic policy in Europe after World War II. Following the UN Millennium Declaration in 2000, the Heads of State and Government of Sub-Saharan Africa have emphasized the role transport infrastructure can play in enhancing inter-regional cooperation and foster economic and social development [11].

In the early 2000s, the physical infrastructure in Sub-Saharan Africa was in a very poor state. External capital flows (particularly from donor countries pertaining to the Development Assistance Committee of the OECD) for African infrastructure had reached a historic low [12]. The Group of Eight Summit at Gleneagles in 2005 called for action by the major economies and multilateral 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 [12]. One of the practical results of this political arrangement was the publication of the flagship report "*Africa's Infrastructure: A time for Transformation*". This publication diagnosed the infrastructure needs of Sub-Saharan Africa, addressing the twin challenges of financing and sustainability, particularly the attainment of the millennium development goals (MDGs).

As stated before, the sustainable development goals are part of the post-2015 development agenda. The United nations General Assembly, in its sixty-ninth session, of 12 August 2015, decided "to transmit the outcome document entitled *Transforming our World: the 2030 Agenda for Sustainable Development* to the General Assembly at its seventieth session for action during the United Nations Summit for the adoption of the tpost-2015 development agenda, to be held from 25 to 27 September 2015" [13]

In this new agenda, there are 17 SDGs associated with 169 targets that will stimulate action in the following critical areas: people, planet, prosperity and peace [13]. Some of these goals and targets have to do particularly with construction investment and the construction sector in the developing

world. These are: Goal 6- Ensure availability and sustainable management of water and sanitation for all; Goal 9- build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation; Goal 11- make cities and human settlements inclusive, safe, resilient and sustainable. Of particular relevance for construction infrastructure in Sub-Sharan Africa is target 9.1- develop quality, reliable and sustainable and resilient infrastructure, including regional and transborder infrastructure to support economic development and human weld- being.

Table 2 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% of Sub-Saharan Africa's GDP in 2006. Of this total, about two thirds are for investment and about one third for operation and maintenance. In sectoral terms, about 40% is allocated to the power sector. The second-largest component is water supply and sanitation (WSS) – a key sector for meeting the SDGs – with about 23% of the total and the third largest share of the cost is associated with transport, which is approximately 20% of the overall spending needs.

Table 2 – Overall Infrastructure Spending Needs for Africa, 2006-2005 *(US$ billions annually).*

Sector	Capital expenditure	Operation and maintenance	Total needs	Funding Gap
ICT	7.0	2.0	9.0	1.3
Irrigation	2.7	0.6	3.3	2.4
Power	26.7	14.1	40.8	23.2
Transport	8.8	9.4	18.2	(1.9)
WSS	14.9	7.0	21.9	11.4
Total	60.4	33.0	93.3	30.6

Source:

In terms of regional groups, the burden of the price tag relative to the countries' GDP is markedly different across groups. For middle-income countries and resource-rich countries, the amount is in the range of 10% to13% of their respective GDPs. For low-income countries, as much as 25% of GDP would be needed [12]. 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 Table 2 shows, the funding gap for the infrastructure in Sub-Saharan Africa is US$ 30.6 billion or about 2.5 % of GDP in 2010, taking into account efficiency improvements. About US$ 23 billion a year, or over 70% 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 WSS. The funding gap in the latter sector in the low-income countries looks like 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 2008 global financial crisis.

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 gender equality so that women save time when they begin using an improved water source [6]. Transport fosters trade by reducing the cost for transporting goods and passengers, reduces child/maternal mortality and improves access to education services. Electricity enhances productivity, eradicates poverty by fostering economic growth and reduces child/maternal mortality.

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* [14].

4 CONCLUSIONS

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 gross domestic product 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 slower 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% to 6%) and countries enter into a path of sustained economic growth and development, the construction output tends to grow, in general, with the same rate of growth as that of the general economy.

The results of the study also underlie the twin challenge 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 policy in the two groups of countries? How can the construction industry contribute to this end, and help a country in Group 1 to move to Group 2? For example, further investment in construction infrastructure might be recommended for countries in Group 1 but might not necessarily be a growth priority for countries in Group 2 [10]. For the low – income countries, taking into account the dire financial stress facing these countries, the analyses suggest that most of the effort should be directed at construction investment projects in order to achieve a level of the construction industry activity of, say, 5 to 6% of GDP which is required for a reasonable functioning of the economy. The priority should be given to construction investment projects that have high multiplier effects in the economy, particularly transport and multi-purpose (power and water) infrastructures. A concerted effort to implement sub-regional infrastructure projects seems also to be the way forward.

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