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THE CONSTRUCTION INDUSTRY AND ITS LINKAGES TO THE GHANAIAN ECONOMY-POLICES TO IMPROVE THE SECTOR'S PERFORMANCE

Victor Osei

Bank of Ghana, Research Department, Special Studies Office,
P.O .Box 2674 High Street Accra. Ghana Tel: +233-264-562673

Abstract: *The study suggests that the construction sector plays a leading role in the improvement of socio-economic conditions and the built environment in every country. The study revealed that the construction sector remains as one of the key sectors in the economy in terms of its share of GDP (i.e. 9.1% for 1993-2011 period) and the overall industrial output(i.e. 35.9% for 1993-2011 period). Also, the paper estimated Construction Sector Index for Ghana for the first time and the index revealed that construction sector has improved significantly over the past two decades. Similarly, some empirical evidence from the econometric estimation using the Engel Granger Causality and Johansen Co-integration methodologies confirmed the evidence that the construction sector activity promoted economic growth in Ghana and the relationship remains positive. Finally, the paper concluded that, the construction sector when given the needed push in terms of capacity building, good policy initiatives and regulatory guidelines can provide the necessary impetus for socio-economic development in Ghana.*

Keywords: Construction Index, GDP, Credit, Industry's Output and Economy

1.0 Introduction

The construction industry plays an essential role in the socio economic development of a country. The activities of the industry have a lot of significance to the achievement of national socio-economic development goals of providing infrastructure, sanctuary and employment. It includes hospitals, schools, townships, offices, houses and other buildings; urban infrastructure (including water supply, sewerage, drainage); highways, roads, ports, railways, airports; power systems; irrigation and agriculture systems; telecommunications etc.

The construction sector holds immense potential for stimulating growth, boosting project exports and generating employment. The domestic construction sector happens to be one of the fastest growing sectors, with an impressive average growth of 7-8 per cent per annum. The foundation of a higher growth rate rests on a sound and efficient infrastructural development which makes the construction sector a key sector.

The rapid expansion of infrastructure by both government and the private sector has triggered off construction activities and fuelled demand in many key sectors like cement, steel, paints and chemicals, glass, timber and earth moving equipment and machinery. The construction sector is a crucial industry having strong backward and forward growth linkages.

It deals with all economic activities directed to the creation, renovation, repair or extension of fixed assets in the form of buildings, land improvements of an engineering nature. Besides, the construction industry generates substantial employment and provides a growth impetus to other sectors through backward and forward linkages. The main purpose of this study is to assess the economic contribution of the construction industry in Ghana and to throw light on the emerging opportunities and challenges.

Construction in any country is a complex sector of the economy, which involves a broad range of stakeholders and has wide ranging linkages with other areas of activity such as manufacturing and the use of materials, energy, finance, labor and equipment (Hillebrandt, 1985). The contribution of construction industry in the aggregate economy of a country has been addressed by a number of researchers and valuable literature available on the linkage between construction sector and other sectors of the economy.

Several researchers conclude that the construction sector has strong linkages with other sectors of the national economy. Hirschman (1958) first defined the concept of 'linkage' in his work on ''Strategy of Economic Development''. He emphasized the significance of 'unbalanced' growth among supporting sectors of the economy as opposed to a balanced development of all interrelated economic activities (Lean, 2001). Park (1989) has confirmed that the construction industry generates one of the highest multiplier effects through its extensive backward and forward linkages with other sectors of the economy. It is stated that the importance of the construction industry stems from its strong linkages with other sectors of the economy (World Bank, 1984). However, interdependence between the construction sector and other economic sectors is not static (Bon, 1988; Bon, 1992). Strout (1958) provided a comparative inter-sectoral analysis of employment effects with an emphasis on the construction. Ball (1981) and Ball(1996 and 1995) addressed the employment effects of the construction sector as a whole. Many studies (Fox, 1976; Bon and Pietroforte, 1993) use the strong direct and total linkage indicator to explain the leading role of the construction sector in the national economy.

Field and Ofori (1988) stated that construction makes a noticeable contribution to the economic output of a country; it generates employment and incomes for the people and therefore the effects of changes in the construction industry on the economy occur at all levels and in virtually all aspects of life (Chen, 1998; Rameezdeen, 2006). This implies that construction has a strong linkage with many economic activities (Bon, 1988; Bon and Pietroforte, 1993; Bon et al., 1999; Lean, 2001; Rameezdeen, 2006), and whatever happens to the industry will directly and indirectly influence other industries and ultimately, the wealth of a country. Hence, the construction industry is regarded as an essential and highly visible contributor to the process of growth (Field and Ofori, 1988).

The significant role of the construction industry in the national economy has been highlighted by Turin (1969). On the basis of cross section of data from a large number of countries at various levels of development, Turin (1969) argued that there is a positive relationship between construction output and economic growth. Furthermore, as economies grow construction output grows at a faster rate, assuming a higher proportion of GDP (Turin, 1969, Hua, 1995, Wells, 1986). In a recent article Drewer (1997) returns to the 'construction and development' debate. Using data for 1990 similar to that assembled by Turin for 1970, he shows that global construction output has become increasingly concentrated in the developed market economies. He goes on to argue that this new evidence does not support Turin's propositions (Drewer, 1997, Wells, 1986).

2.0 The Construction Sector in Ghana: Overview

The construction industry has made significant contribution to both industrial output and overall Gross Domestic Product (GDP) in Ghana over the years. With reference to available country-wide statistics, the impact of the built environment sector as a whole is much greater; including segments of the manufacturing, mining, quarrying, electricity and water sectors.

From observations and reference to legal and regulatory documents such as the Building Regulations (ROG 1996), it suggests that the Ghanaian built environment sector is modeled on the UK regulatory system. The Ghanaian construction sector is akin to the UK construction sector about 20 years ago. There are serious shortfalls in materials handling, safe working practices, quality and timeliness of construction. Another widely applicable feature of the Ghanaian built environment sector, common to many developing countries,

is that labour is comparatively cheap. This means that greater emphasis is put on selection of materials and components by price rather than might be expected in countries where there is a higher labour cost.

The key players involved in the Sector are:

- The Client Community – both public and private sectors.
- The Design Community
- The Supply Chain – Materials Suppliers, Machinery Manufacturers, Sub-assemblers.
- Main Contractors and Sub-Contractors of every tier.
- Universities and technological institutions and Professional associations.
- Economic drivers such as Banks and other financial corporations
- Trade Unions, including regulation and standards authorities.

The following is a brief look at 4 categories of built environment stakeholders:

2.1 Users and consumers of the built environment

The government is a major user and consumer of the built environment in the form of infrastructure, housing and tertiary buildings. Ownership of the government estate is held at National government, metropolitan and district assembly levels and follows largely the dispersal of assets determined by the 1992 constitution and subsequent decentralization policies.

Responsibility for and jurisdiction over, the built environment is shared mainly between two government ministries, namely, The Ministry of Housing and Public Works and the Ministry of Roads. State-Owned corporations and government ministries are major owners and occupiers of infrastructure such as schools, hospitals, ports and harbours, power stations, refineries, water and electricity distribution networks, dams, airports, railways and road networks. Until the recent sale of government's Seventy percent (70%) out of the hundred percent (100%) stake in Ghana telecom to Vodafone UK, the telecommunications sector was still largely state owned although private companies are driving the expansion of mobile telephone and satellite communications.

Private sector users include:

- A growing number of home owners as individuals become land and home owners in their own right outside of traditional ownership patterns.
- Business and industry interests requiring production, sales and office facilities.
- Non-governmental and civil society organizations developing their own health, education and welfare facilities.
- Unregistered businesses, mainly traders or craftsmen, informally developing workshops and stalls.
- Unregistered residents, informally developing housing.

2.1.1. Demand side operators

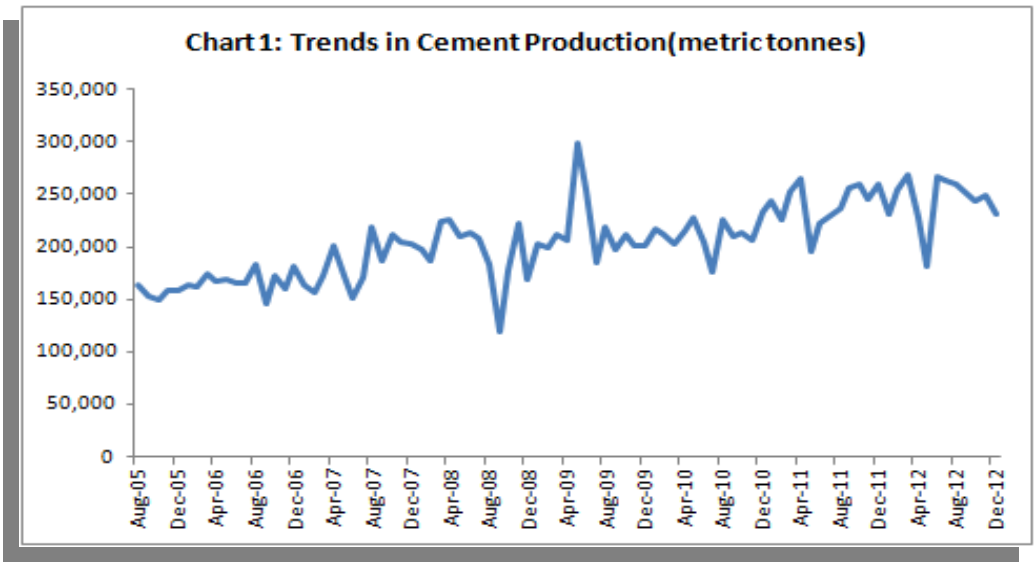
The government and state owned enterprises (with loans from development partners) are the major investors in the built environment although businesses are increasingly investing in property in Ghana. Property and real estate developers provide both speculative and client specific developments and it is often the same organizations acting as agent and developer.

2.1.1.1 Supply-side operators

The supply side operators of the Ghanaian built environment can best be described as 'traditional'. Traditional professional groups such as Architects, Civil Engineers, Mechanical and Electrical engineers, Quantity Surveyors and supplies of raw material (e.g. cement, see Chart 1) are well represented in Ghana. Most professionals register locally and are often accredited to professional bodies. Large contractors play a substantial role in the sector and are, perhaps, the most visible stakeholders in the built environment. The

large contractors are mainly subsidiaries of international construction groups such as Skanska, Taysec and Sonitra.

Also, producers of key construction raw materials such as GHACEM, DIAMOND, Dankote(Cement producers), Aluworks, Tema Steel Compnay(Iron Rods for fabrications), Raincoat, DBS, Rocksters(roofing companies), transport companies, producers of painting and coating materials and many more remain key to the construction sector. For instance, total cement production has trended up significantly during the 1993-2011 period as indicated by trends in cement production by both GHACEM and DIAMOND as shown in Chart 1 below.



2.1.1.1.1. Regulators

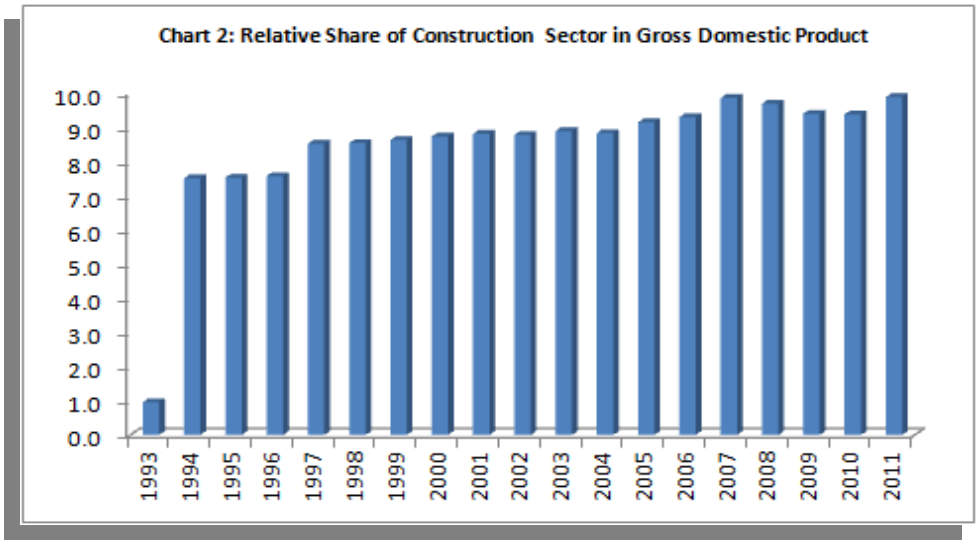
Ghana has planning and building regulations both of which are based on the UK system. Environmental regulations have been developed and enforcement is largely in the hands of the Environmental Protection Agency (EPA) through Environmental Impact Assessments (EIAs). Also, development control is carried out by local government officials in Metropolitan and District assemblies. There are guidelines (GCS, 2003) covering the submission and approval of plans however, there are numerous examples of informal development that infringe both planning and building regulations. However, due to major skills and staff shortages these infringements are rarely punished.

2.2 Economic Contribution: Construction Sector

2.2.1. Construction Sector's Contribution to Gross Domestic Product

The Construction sector's share to overall Gross Domestic Product (GDP) has improved significantly over the past two decades. The sector's share as percentage of GDP was 7.6 per cent in 1996 and this improved to 8.5 per cent of GDP in 1997. Due in part to the overall improvement in the macroeconomic landscape of the country as a result of the implementation of good macroeconomic policies, the sector's contribution to GDP rose steadily to 9.1 per cent of GDP in 2005 from 8.8 per cent in 2004 (See Chart 2). The sector's share of GDP improved further 9.8 per cent in 2007 from 9.3 per cent recorded in 2006. Again, the construction sector's contribution to the overall economy picked up to 9.9 per cent of GDP in 2011 from

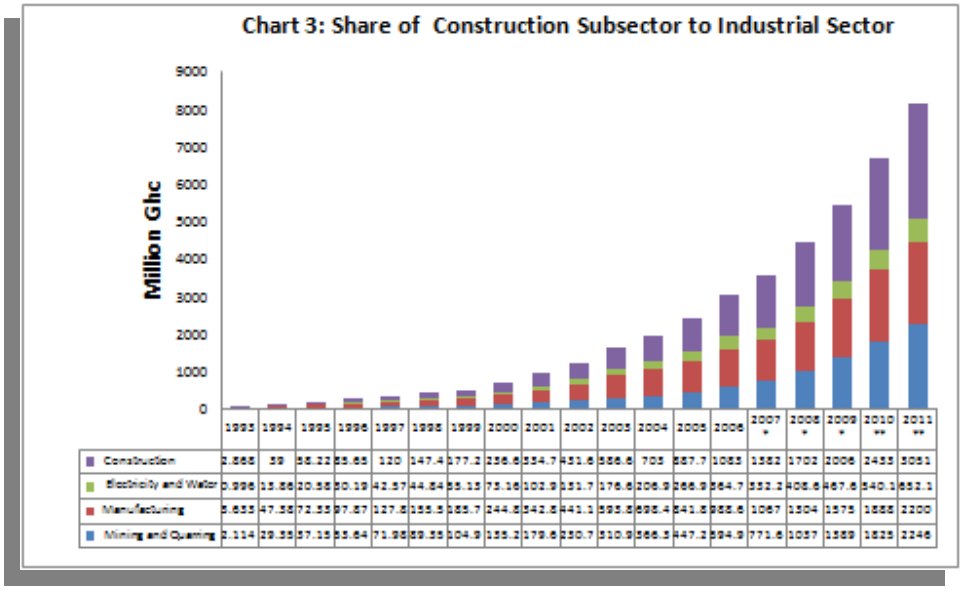
9.4 per cent of GDP registered in 2010 and which compares favorably with 1993-2011 period average of 9.1 per cent of GDP.



Source: Ghana Statistical Service

2.2.1.1. Construction Sector's Share of Industrial Output

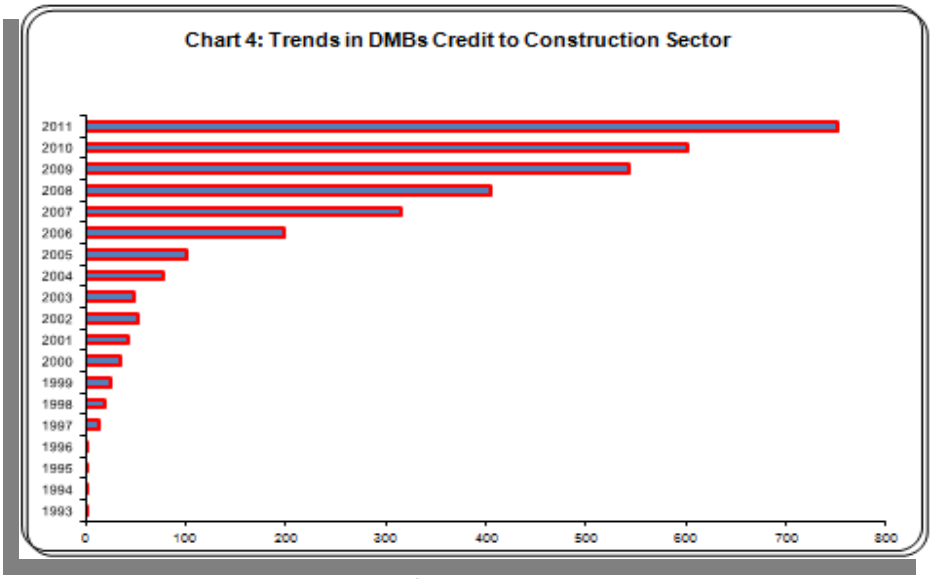
Also, the construction sector's contribution to the overall industrial development grew from 29.8 per cent in 1993 to 30.9 per cent in 1995. The construction sector's share of total industrial output picked up again from 33.9 per cent in 1999 to 34.3 per cent in 2000. The sector's share of industrial sectors output reached 36.3 per cent in 2005 up again from 35.6 per cent registered in 2004. The construction sector's contribution further improved from 36.9 per cent in 2010 to 37.4 per cent in 2011 which compares favorably with 1993-2011 period average of 35.9 per cent (See Chart 3). This remarkable performance was against the backdrop of an expanded credit to the sector by the domestic money banks.



Source: Ghana Statistical Service

2.2.1.1.1. Trends in Credit Extension to the Construction Sector

Aggregate loan portfolio to the construction sector improved by 27.2 per cent to GH¢25.70 million in 1999 from GH¢20.20 million in 1998. DMB's credit to the construction sector again picked up significantly by 26.9 per cent to GH¢53.30 million in 2002 to GH¢42.00 million in 2001.The sector's share of total credit private sector portfolio firmed up significantly by 95.7 per cent to GH¢198.60 million in 2006 from GH¢101.50 million in 2005. The share Private sector credit to the construction sector continued to surge by improving by 24.9 per cent to 751.64 million in 2011 from 601.82 million recorded in 2010. The construction sector benefited from an average credit growth of 35.7 per cent for the 1998-2011 period (see chart 4) which represented a significant improvement in credit extension to the sector alone.



Source: Research department, Bank of Ghana

3.0 Estimating Construction Sector Activity Index for Ghana: Methodology

To help measure construction sector activity in this study, a statistical technique was employed [1](see chart 1). The idea of using leading economic indicators in business cycle analysis was originally developed by (Mitchell and Burns 1938) at the National Bureau of Economic Research (NBER). A composite index of leading indicators is the weighted average of several component series. Composite indexes are constructed because they tend to be more reliable as a performance measuring and signaling indicator than any of its components taken individually. This is partly because much of the independent measurement error and other noise in the component series are smoothed out in an index.

One advantage of composite indices is that they encapsulate information from many variables that could not be included in time series analysis with short sample periods. Moreover, composite indices may be less

[1] Claus and Claus (2002)

subject to instability arising from policy changes. To achieve these, however, two main factors are considered: appropriate composition of underlining variables and the requisite standardization of the component series to ensure that individual volatility of a component does not sway the trend of the composite index. The latter is achieved through statistical consideration; the former on the other hand requires both theoretical and statistical considerations. As a result, we have developed a composite index for the construction sector in Ghana. The objective is to provide some kind of measuring index which could be used to assess the construction sector activities in this study.

3.1 Computing the Index

The methodology employed in this demonstration is derived from the methodologies used by The Conference Board (2001) in the construction of Composite Indexes of Leading, Coincidence and Lagging Indicators for Major Economies; and Claus and Claus (2002) in the construction of a leading Indicator of New Zealand Employment. The index measures activities of the construction sector.

The algebraic construction of the composite indexes involves two main steps: (i) standardisation and weighting of the individual component series, and (ii) standardisation and cumulation of the composite value. These can be broken further into six distinct steps. In this presentation, [t] and [t-1] refer to the current and prior month respectively. Also, [x] and [m] refer to a particular component of the index and notation such as ({sum over [x]} w_x) implies that the "w"s for each [x] are added together.

***Step 1**: **Changes are computed for each component**.*

If the component X is in percent change form or an interest rate, simple arithmetic differences are calculated: $x_t = X_t - X_{t-1}$. If t

$$x_t = 200 * \frac{(X_t - X_{t-1})}{(X_t + X_{t-1})}$$

The component is not in percent change form, a symmetric alternative to the conventional percent change formula is used:

***Step 2: The changes are adjusted to equalize the volatility of each component**.*

Standard deviations v_x of the changes in each component are computed. These statistical measures of volatility are inverted:

$$w_x = 1/v_x$$

Their sum is calculated ($k = \sum w_x$), and they are restated so the index's component standardization factors sum to one ($r_x = (1/k) * w_x$, where $\sum r_x = 1$). The adjusted change in each component is the month-to-month change multiplied by the corresponding component standardization factor ($m_t = r_x * x_t$).Note that the use of the volatility measure r_x as the weights for the components ensures that volatile components are prevented from dominating changes in the composite index

. ***Step 3: Add the adjusted changes across the components for each month to obtain the growth rate.***

This step results in the sum of the adjusted contributions ($i_t = \sum m_{x,t\ t}$) which is the monthly growth rate of the index.

Step 4: The sum of the adjusted contributions, i.e., growth rates, of the composite index are adjusted to equate their trends to that of a reference series.

This step is to ensure that the raw composite value i_t has the same historical average (without regard to the sign) as the reference series (say Actual Private Investment). This is accomplished by applying the formula

$$i^s_t = \frac{i_t}{\frac{\sum |i_t|}{\sum |z_t|}}$$

Where z_t is the symmetrical percentage change of the reverence series.

Step 5: The level of the index is computed using the symmetric percent change formula.

The index is calculated recursively starting from an initial value of 100 for the first month of the sample period. The first month's value is $I_1 = 100$. The second month's value $I_2 = I_1 * \frac{(200+i^s_2)}{(200-i^s_2)}$

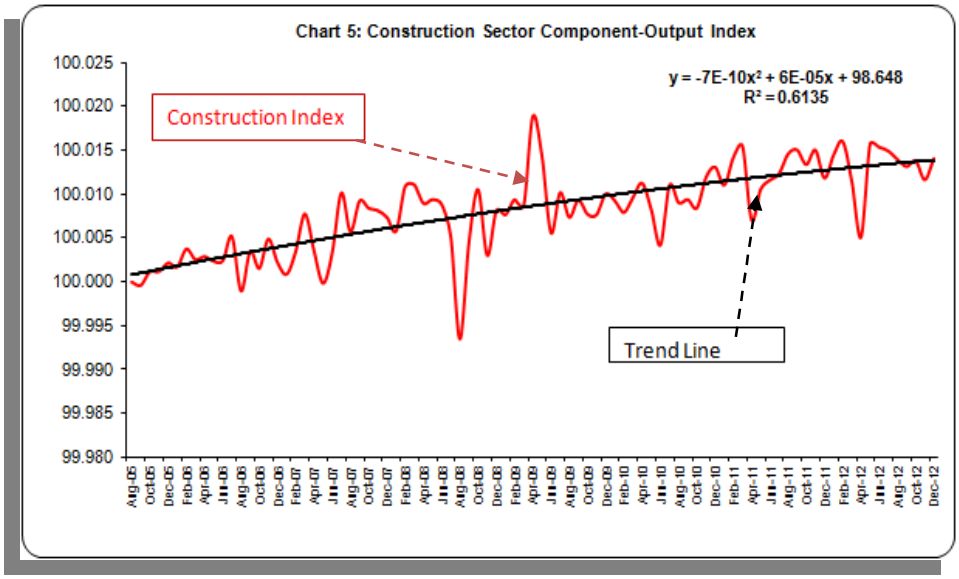
and this formula is used recursively to compute the index levels for each month that data are available.

Step 6: The index is rebased to average 100 in the base year.
The history of the index is multiplied by 100 and divided by the average for the twelve months of the base year.

3.1.1. Others Indicators
There are other construction sector activity indicators such as construction employment, construction earnings, wholesale prices for construction materials, construction cost and tender price inflation dwellings completed, housing loans, house prices, construction confidence, cement production, construction sector output to gross domestic product, domestic credit to the construction sector but due to availability of data, not all of them were discussed.

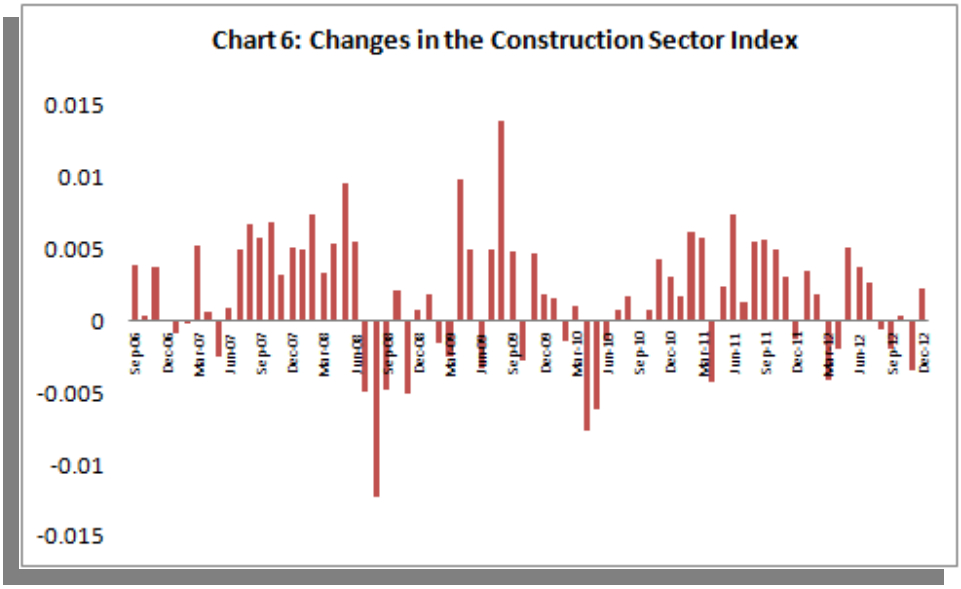
3.1.1.1. Limitation
However, one key limitation of the index is has to do with the underlying variables. It is recommended that more related variables need to be included. This would better reflect development in the construction sector and provide reliable indicator to measure construction activity. Notwithstanding, the index developed remains a good indicator of construction sector activity.

3.1.1.1.1 Results: Trends in Estimated Construction sector Activity Index for Ghana
The construction sector component–out index (see Chart 5) indicates that the growth dynamics within the sector and the upward-trending index suggests that the sector's performance has been remarkable over the 1993-2011 period and would continue to remain one of the key drivers of growth in the economy as infrastructural development remains pivotal growth pole and paramount for promoting economic growth. The index recorded an average growth of 0.0033 per cent for 1993-2011 period. The index suggested 0.002 per cent growth on year-on-year basis at the end of 2012 compared with a negative growth of 0.001 registered in the corresponding period of 2011.



Source: Author's own Estimate

The Chart 6 below suggests that the overall construction sector activity scaled-up over the years and this was as a result of the expansion in the country's infrastructure and scaled-up in real estate construction works and households' construction (i.e. acquisition of properties by individuals). There has been marked improvement in construction activities financed by government, foreign donors and the private sector as a whole. The economy has witnessed a significant scale up in construction sector activities over the past two decades with notable projects such as the construction of four stadia, Golden Jubilee House, Movenpic five-star hotel, airport city project, large scale construction of residential apartments, office accommodations, homes and shopping malls,N1 road project and other several ongoing construction projects,ect.



Source: Author's own Estimate

4.0 Construction Sector and the National Economy: Some Empirical Evidence from Econometric Estimation

4.1 Unit Root Test

A simple Granger-Causality methodology (see Appendix) was applied to the selected variables in order to establish the relationship between the construction sector and economic growth using construction sector output and real gross domestic product. Before the estimation was done, the time series properties of the variables were examined and the results were as follows. The variables found to be unstationary in their levels using the famous Augmentented Dicky-Fuller Unit-Root test at both 1% and 5% levels of significance (See Table 1). However, the first difference of the two variables suggests stationarity both at 1% and 5% significance levels after applying the Augmented Dicky-Fuller Unit-Root methodology.

Table 1: Augmentented Dicky-Fuller Unit Root Test

Variable	**Test Statistics (Level)**	**Critical Value 1%**	**5%**	**10%**	**Test Statistics (Difference)**	**Critical Value 1%**	**5%**	**10%**
Construction Sector Output	3.777153	-3.4743	-2.8805	-2.5768	-1.257545	-3.4746*	-2.8806**	-2.5768***
Gross Domestic Product	3.389865	-3.2743	-2.8805	-2.5768	-0.320723	-3.4746*	-2.8806**	-2.5768***

Source: Author's Own Estimation
Note: *, ** and *** indicate 1%, 5% and 10% significant levels.

4.1.1 Johansen Co-integration Test

The stationary linear combination is called the co-integrating equation and may be interpreted as a long-run equilibrium relationship between variables. Several co-integration techniques are available for the time series analysis. These tests include the Stock & Watson (1988) procedure, the Engle Granger (1987) test and Johansen's (1988) Co-integration test. Their common objective is to determine the most stationary linear combination of the time series variables under consideration. Consequently, Johansen's (1988) co-integration technique was employed for the investigation of stable long run relationships between construction Sector's output and gross domestic product.
The Johansen Co-integration test suggests that the null hypothesis of no co-integration has been rejected at 5% significance level. The results indicate that there is at least one co-integrating equation (see Table 2). Also, the normalized co-integration equation further suggests that there is a stable long-run relationship between the construction sector in Ghana and economic growth.

Table 2: Johansen Co-integration Test

Included observations: 155

Series: LGDP LCS
Test assumption: Linear deterministic trend in the data

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.494900	106.0882	15.41	20.04	None **
0.001441	0.223533	3.76	6.65	At most 1

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

LGDP	LCS	C
1.000000	-0.841074	-3.496016
	(0.00483)	
Log likelihood	2579.169	

Source: Author's Own Estimation

The positive relationship between the construction sector and growth is strongly established as evidence by the 98% correlation coefficients between the construction sector's output and gross domestic product. This results indicates that the construction sector remains a key contributor to overall industrial output and gross domestic product in Ghana (see Table 3 & 4).

Table 3: Correlation Matrix between Construction Output and GDP

	Construction Sector Output	Gross Domestic Product
Construction Sector Output	1	0.99
Gross Domestic Product	0.99	1

Source: Author's Own Calculation

Table 4: Correlation Matrix between Construction Output and Credit to the Sector

	Credit to Construction Sector	Construction Sector Output
Credit to Construction Sector	1	0.92
Construction Sector Output	0.92	1

Source: Author's Own Calculation

4.1.1.1 Granger Causality Test

The result of the Granger-Causality Test (see appendix) indicates that construction sector activities Granger-Causes economic growth in Ghana at 1 per cent significant level. That is, continues improvement in the construction industry can potentially promote economic growth in Ghana (See Table 5).The results also indicates that economic growth drive the construction sector positively by filling the infrastructural gap, hence the relationship is bi-directional.

Table 5: Pair-Wise Granger Causality Test

Sample: 1993:01 2011:12 Lags: 4			
Null Hypothesis:	Obs	F-Statistic	Probability
DCS does not Granger Cause DDGP	152	2.79627	0.02838
DDGP does not Granger Cause DCS		6.37568	9.5E-05

Source: Author's Own Estimation

5.0 Challenges and Opportunities

Despite the fact that many developing countries attach a great interest to the development of their construction industry, the sector is, generally not considered as a clearly identified industry. It is an industrial sector that is often ignored by major actors, Consequently the sector is not planned in a holistic manner, but rather, operates with fragmented and often conflicting components resulting in wastage, inefficiency and inability to plan for total development. In fact, one of the main reasons for these inefficiencies is related to the multi-sectoral nature of the construction industry which requires sound planning.

Apart from not planning the construction sector in an integrated manner, the major problems facing the sector are related to deficiencies in the specific inputs required. A review of the various ways and means of constructing infrastructure suggests that the unsatisfactory performance of the industry is due to several inter-related factors. Furthermore, the construction industry in Ghana has several deficiencies as far as its demand characteristics are concerned. Governments are usually the main clients of the construction industry, with a large demand for several categories of output by very limited financial resources to meet that demand. Some of the problems facing construction industry in Ghana include the following:

5.1. Land Tenure Issues

One of the principal difficulties facing the construction industry in across Africa economies including Ghana is the problem of ensuring land supply. This is by no means a problem confined to many African countries, but the nature of the problem in African cities is almost unique. Traditional or 'customary' land ownership in Ghana is held on a family basis. Under these circumstances, decisions about the use of land are made according to the customs of the family. Hence, decisions may be taken individually by a chief, they may be collectivized within a council of elders, but in any event they are rarely recorded in writing and hence there is no evidential basis for use rights. The concept of any kind of Ownership' may be entirely uncertain.

5.1.1 Lack of Technology and Preference for Imported Raw Material

It has been noted that preference for imported building materials over proven alternative local materials, and the inadequate utilization of the vast local raw material resources remains a key challenge facing the sector. Government should evolve strategies to provide the necessary support and incentives for the production of local building materials to promote appropriate technology and ensure collaboration between research and industry. Slow development of the local manufacturing sector which has led to high importation of materials whereas there is a large volume of exploited local resources which are yet to be exploited.

5.1.1.1 Payment Delays

Delays in the payment for executed projects by government, lack of proper classification for contractors and lack of technical assistance remain a major challenge to the construction sector. On the issue of delays in payment, the delays impacts negatively on the credibility of local contractors with their creditors, therefore government should ensure prompt payment after the execution of projects. The tendency of clients to delay payments due to contractors causes delays in the completion of projects, erodes contractors' profit margins, diverts contractors' attention, ties up capital, and encourages corruption in the industry.

5.1.1.1.1 Financial constraints

Lack of appropriate funding for projects slows down the performance of the construction sector. Most construction projects are donor-funded, so inadequate credit to the players of the industry especially the private sector by banks to complement the efforts of government would definitely affect the growth of the sector. In most cases, access to financial services is limited and this poses problems in the mobilization of personnel and equipment.

6.0 Conclusion

The study suggests that the construction sector plays a leading role in the improvement of socio-economic conditions and the built environment in every country. The sector is an important contributor to capital formation and the rate of activities in the sector is a major indicator of the health of the economy. The study revealed that the construction sector remains as one of the key sectors in the economy in terms of its share of GDP(i.e. 9.1% for 1993-2011 period) and the overall industrial output(i.e. 35.9% for 1993-2011 period). Also, the paper estimated Construction Sector Index for Ghana for the first time and the index revealed that construction sector has improved significantly over the past two decades. Similarly, some empirical evidence from the econometric estimation using the Engel Granger Causality and Johansen Co-integration methodologies suggested that the construction sector activity promote economic growth in Ghana and the relationship remains positive.

The study further revealed that the construction sector in Ghana can promote infrastructural development such as hospitals, schools, townships, offices, houses, urban infrastructure (including water supply,

sewerage, and drainage), highways, roads, ports, railways, airports, power systems, irrigation systems, and telecommunications. Finally, the paper concludes that, the construction sector when given the needed push in terms of capacity building, good policy initiatives and regulatory guidelines can provide the necessary impetus for socio-economic development in Ghana.

7.0 Policy Discussions

Construction sector activity is an integral part of a country's infrastructure and industrial development. The construction industry also generates substantial employment and provides a growth impetus to other sectors of the economy through backward and forward linkages. It is, essential therefore, that, this vital activity is nurtured for the healthy growth of the economy. As a result, there is the need for good policies to be instituted by policy-makers in order to regulate and promote growth in the sector. Hence, the following policy recommendations are worthy of note.

- The construction industry in Ghana in particular plays a pivotal role in the development of the national economy. Its sustainability is crucial to the growth and survival of the economy. The industry is currently characterized by a large number of small contractors, and a small number of large foreign contractors dominating the construction market especially in the area of donor-funded projects. Sustainable capacity needs to be built through the strengthening of the local contractors and other actors in the industry without prejudice to their foreign counterparts. Growth and sustainability will not come overnight. It can only be achieved through the creation of an appropriate business environment where both local and foreign partnerships can flourish, thus facilitating technology transfer.

- Proper systems must be put in place to enable contractors to grow step by step. The classification of contractors on the basis of clearly defined criteria based on capability is an important component of such a system. Such classification does not only guide clients and other business partners of the contractor as well as the general public, but it also helps to inform the contractor where the company stands in relation to others.
- Involvement of contractors in planning and implementation of programmes for their own development is crucial for their success. Most of local contractors are very much aware of their problems and their causes. What is then required involves appropriate interventions at both policy and technical level and support to overcome these problems.
- The high resource requirements of the construction industry are not matched by the availability of finance. The high cost of raising finance also translates into high costs, which again has a cascading effect on the economy. Appropriate measures and instruments should be formulated and implemented to reduce financing costs and ease the flow of funds to the industry.
- The high cost of operation has been identified as one of the major problems that not only affects the construction industry directly but also the overall economy indirectly, as high input and process costs are reflected in high cost of infrastructure, which, in turn, translates into higher user charges. This also reduces the surplus that can be ploughed back into construction technology upgradation and labour welfare. As part of the process of standardization and improving efficiency in the construction sector, harmonized bidding conditions and standard bidding documents for domestic construction contracts must be developed and circulated to all stakeholders in the industry as guidelines.
- Finally, there is a need to enhance productivity through appropriate mechanization to build up the sector's capacity and deliver the critical infrastructure needed for economic development. The poor state of technology adopted by the construction sector adversely affects its performance. Upgrading of technology is required both in the manufacturing of construction material and in construction activities specifically.

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Corresponding author's email address: victor.osei@bog.gov.gh or osei_victor@yahoo.com

Appendix

A. Granger Causality Approach

The different possible Granger causal relations between construction sector's output and economic growth proxied by gross domestic product in levels can be expressed using the parameters of equations (1) and (2) which form a vector autoregressive system:

$$\ln rcs_t = \sum_{i=1}^{\infty} \alpha_i \ln rcs_{t-i} + \sum_{i=0}^{\infty} \beta_i \ln rgdp_{t-i} + \varepsilon_t \qquad (1)$$

$$\ln rgdp_t = \sum_{i=1}^{\infty} \gamma_i \ln rgdp_{t-i} + \sum_{i=0}^{\infty} \delta_t \ln rcs_{t-1} + v_t \qquad (2)$$

Thus there is Granger causality from economic growth to construction sector's output if $\beta_i \neq 0$ and $\delta_i = 0 \ \forall$ i. Similarly, there is causality from construction sector's output to economic growth if $\beta_i = 0$ and $\delta_i \neq 0 \ \forall$ i. The causality is considered as mutual if $\beta_i \neq 0$ and $\delta_i \neq 0 \ \forall$ i. Finally, there is no link between construction sector's output and economic growth if $\delta_i = 0$ and $\beta_i = 0 \ \forall$ i.

B. **Table: Descriptive statistics**

	Construction Sector Output	Gross Domestic Product
Mean	5.989042	8.533136
Median	5.980494	8.52713
maximum	6.397763	8.853737
Minimum	5.658785	8.261656
Std. Dev	0.20607	0.169733
Skewness	0.213106	0.147767
kurtosis	2.016785	1.898544
Jacque-Bera	4.512246	4.507729
Probability	0.1023374	0.1014209
Sum	5.980494	8.52713
Sum.sq.Dev	6.397763	8.853737