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GROWTH, EMPLOYMENT AND THE CONSTRUCTION SECTOR IN TRINIDAD AND TOBAGO

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Introduction

A major objective of development policy is not only the creation and expansion of production capacity, but the generation of employment opportunities to accommodate a growing labor force. The post-war experience has shown that the growth of income is not always accompanied by greater equity in its distribution, or by higher levels of employment. In fact because of the structure of production, income and employment levels tend to fluctuate wildly in many developing countries which have not succeeded in diversifying the economic base and creating greater inter-sectoral linkages in the economy. In small open economies in particular, heavily dependent on foreign sources for food, consumer goods, technology, skills, materials and equipment, a significant part of the multiplier effect associated with public and private spending is lost. Boom and bust episodes which may result from both internal or external shocks are not unusual for an economy, but whether a boom succeeds in leaving a permanent change in wealth depends on how the additional resources are used. An emphasis on consumption rather than investment often leaves the economy in a more precarious state than before a windfall since expectations may have changed, debt levels increased and critical distortions exacerbated.

Both in boom and bust, the construction sector remains an important part of an economy. Infrastructural development, construction of houses and new buildings, repairs and maintenance are ongoing activities that vary in intensity overtime with the boom/bust cycle that is not infrequently associated with terms of trade movements in developing countries. Some of these activities are income initiating while others may be pulled along by higher incomes. Construction is not only an integral part of the modernization process, but its labour intensive nature makes it particularly attractive as a means of creating employment in developing countries. It is also a training ground for technicians,

managers, craftsmen and entrepreneurs who are essential for the growth of any economy. Incentives for home construction are also seen as part of social programmes designed to help a wide range of income earners to own their homes. Trinidad and Tobago is a small open oil and gas based economy that has experienced the effects of boom and bust and the associated fluctuations in income and employment. This paper focuses on the behavior of the construction sector and its relationship to income and employment over the last three decades. The first part outlines the pattern of growth and structural change in the Trinidad and Tobago economy since the 1950s. The second discusses some perspectives on the role of the construction sector in economic development. The third and major part of the paper explores the nature of the relationship between growth, employment and the construction sector in Trinidad and Tobago in recent years. In the fourth section we discuss some of the constraints facing the sector and in the fifth we offer some concluding observations.

1. The Trinidad and Tobago Economy – Structure and Change in Boom and Bust

An examination of the Trinidad and Tobago economy since the early 1950s shows that periodic high growth rates is not unusual for this economy. Between 1955 and 1957 growth of real GDP averaged 13.5% per year and for the period 1952 to 1961, the rate averaged over 8% per year. Reflecting the significant increase in oil production[i] in the 1950s the petroleum sector contributed around 30% to real GDP as compared to 12.4% for manufacturing (including sugar processing). Agriculture's share declined steadily from 17.3% in 1951 to 12.1% in 1961. Corresponding with the rapid expansion of the economy from the middle of the decade, the share of construction increased from under 3% in the early 1950s to over 4% in the later part of the decade. Between 1951 and 1961 it grew at an average rate of 16.6% per year – a rate greater than that of the economy as a whole (8.5%), and also greater than that of petroleum and asphalt (9.7%) and manufacturing (excluding sugar) 9.4% (Rampersad, undated). This growth corresponded with an investment rate of over 25% of GDP in the period.

Trinidad and Tobago attained political independence in 1962, the terminal year of the first five-year development programme (1958 – 62) which concentrated heavily on basic infrastructure such as roads and bridges, electricity and water (Budget Speech 1958). This was followed by two other Five- year programmes 1964-68 and 1969- 73 respectively, both of which recognized the need for diversification in a situation where petroleum and petroleum products were accounting for 80% of gross exports, 28% of government current revenue and 25% of GDP (Third Five Year Plan).

Between 1966 and 1973 the economy grew on average by 3.2% per year – less than half that of the 1950's growth rate. While real value-added in manufacturing increased by some 80% between 1966 and 1973, there was hardly any growth in the petroleum sector (including petrochemicals and oil refining) which contributed over 30% (on average) to GDP in the period (see table 4). Construction on the other hand grew by an average of over 9% per year, compared to 5.8% for total real GDP, in the process increasing its share of GDP from 6.5% in 1966 to 9% in 1973.

By the late 1960s/ early 1970s the economy was in difficulty with the growth of real production fluctuating between 1.7% and 5.8% per year between 1967 and 1973. The un-employment rate which was estimated at 13% for most of the 1960s was increasing steadily reaching over 15% at the end of 1973. At the end of the latter year the net foreign reserves level had fallen to US$32.5 million, the equivalent of just over one month's imports.

Sharp increases in oil prices resulting from decisions of the Organization of Petroleum Exporting Countries (OPEC) between 1973 and 1981 and increased oil production again ushered in a boom period with government's current revenue increasing from US$233 million in 1973 to US$2,762 million in 1981 (see Table 1). The value of merchandise exports in current prices increased almost tenfold between 1973 and 1981. The country's net foreign reserves increased from US$32.5 million at the end of 1973 to US$3,203 million at the end of 1981. Real GDP grew at an average rate of over 5% per year between 1973 and 1981. Real per capita GDP increased by 45% over the period. The

unemployment rate fell from 15.4% in 1973 to 10% in the early 1980s. The share of the petroleum sector in GDP which averaged over 30% in the late 1960s, fell in the 1970s while the share of manufacturing fluctuated between 10 and 15%. Construction's contribution rose from 7% in 1974 to 16.1% in 1981/82. Agriculture's share in GDP, however, continued to decline, reaching 2.3% in 1981.

It is worth noting that the "petroleum sector does not by itself make much of a direct impact on the rest of the economy. It is mainly through Government spending of revenues derived from this sector that the growth of the non-oil sectors and activities is stimulated" (*Imperatives of Adjustment, 1984, pg 5*). It does, however, have a negative effect on the other lower productivity sectors of the economy, (including the government sector), through the push/spread (demonstration) effect on wages and salaries which may bear no relationship to productivity changes, thus undermining the competitiveness of non-oil activities. A boom not only affect money wages but the increased demand puts pressure on the prices of land, buildings and materials which are then reflected in property costs.

The decline in petroleum prices in the 1980s led to a sharp contraction of the economy in terms of both output and unemployment. Between 1982 and 1989 total real GDP fell by almost 30% with private consumption declining by some 45%. Gross capital formation as a percentage of GDP declined from 23% in 1982 and to 12% in 1989. Despite the fall in value added in the 1980's, the petroleum industries' contribution to GDP averaged around 25%, as compared to 8% for the manufacturing sector. Construction's share fell dramatically from 17% in the 1981/82 period to 7.7% in 1990. In fact the fall in real output in the construction sector was more catastrophic than the fall in total GDP. It was not until 2000 did the economy attain the output level of 1982. Following the declining trend in output, the unemployment rate increased sharply from 9.9% in 1982 to 22% in the late 1980's.

Table 1
Selected Data on the Petroleum Sector, 1966-2002

	1	2	3	4	5	6	7	8
	Current Revenue (US$mn)	Current Revenue/GDP (%)	Oil revenue as % of Current Revenue	Oil Production (000 bpd)	Natural Gas Production (mcm)[1] per annum	Oil prices US$ per barrel[2]	Growth rate of Real Value-added in Petroleum (%)	Petroleum Exports as a % of Total Exports[3]
1966	125.4	18.0	39.6	149.59	3367.6	1.33	..	74.2
1967	130.3	17.8	38.9	178.05	3973.9	1.33	9.65	77.8
1968	134.0	18.5	41.0	183.28	4288.4	1.33	5.01	70.0
1969	151.8	21.8	35.7	157.3	3893.5	1.28	-13.32	74.8
1970	156.6	20.1	36.0	139.84	3480.1	1.3	-8.62	70.7
1971	173.6	20.4	40.4	129.15	3109.6	1.65	-3.05	65.2
1972	203.2	19.0	37.2	140.28	2954.5	2.7	3.55	69.4
1973	232.6	19.5	41.3	170.44	3397.4	3.14	13.70	75.7
1974	560.9	29.3	73.1	186.65	3632.8	11.2	7.10	86.6
1975	688.6	31.9	74.8	217.14	3580.2	10.6	9.66	86.1
1976	870.9	34.8	68.1	212.76	3906.5	11.83	2.11	87.5
1977	1145.5	36.6	64.4	229.06	4236.2	12.84	5.38	90.7
1978	1154.0	32.1	62.6	229.49	4471.3	12.95	0.74	90.2
1979	1518.2	31.8	65.1	214.35	4805.4	29.22	-6.20	92.3
1980	2414.8	36.8	71.4	214.53	5601.2	36.68	-1.51	94.6
1981	2761.9	37.5	64.2	189.34	5604.1	35.27	-10.25	90.7
1982	2786.2	32.1	49.0	177.03	5841.7	32.45	-5.11	90.8
1983	2634.5	31.9	38.9	159.81	6318.9	29.66	-11.16	90.6
1984	2728.5	34.8	42.1	169.55	7229.4	28.56	6.12	92.0
1985	2596.4	34.7	38.6	177.84	7413.3	27.31	6.45	91.9
1986	1454.1	30.6	32.3	169.82	7585.5	14.23	-2.13	86.0
1987	1453.3	31.1	37.4	156.06	7688.4	18.15	-7.09	84.8
1988	1285.7	29.7	31.2	152.13	7438.9	14.72	-1.11	81.1
1989	1170.0	28.4	40.3	149.34	7239.4	17.84	-0.59	78.9
1990	1332.4	26.7	40.9	152.23	6499.1	22.97	1.69	80.1
1991	1595.1	30.4	40.1	144.08	7405.1	19.33	0.68	79.8
1992	1462.5	27.8	29.2	135.69	7410.6	19.03	-2.69	77.0
1993	1276.7	29.4	26.4	122.19	7080.6	16.8	0.37	72.7
1994	1267.7	25.7	25.2	128.77	7700.4	15.9	-0.37	71.9
1995	1421.1	26.6	30.0	131.78	7762.3	17.16	0.37	72.4
1996	1589.5	27.6	31.5	129.04	9058.2	20.42	1.95	71.7
1997	1460.1	26.0	22.7	123.56	9137.1	18.8	0.07	69.0
1998	1543.2	25.8	17.6	121.1	10294	11.1	4.38	65.2
1999	1540.6	22.9	20.7	126.8	13240	19.3	11.56	73.1
2000	2084.4	25.3	34.2	130.46	15092.6	30.3	5.23	82.6
2001	2140.8	23.6	27.7	113.52	15960	26.1	0.61	79.8
2002	2289.6	24.7	26.7	130.62	18260	26	9.99	79.1

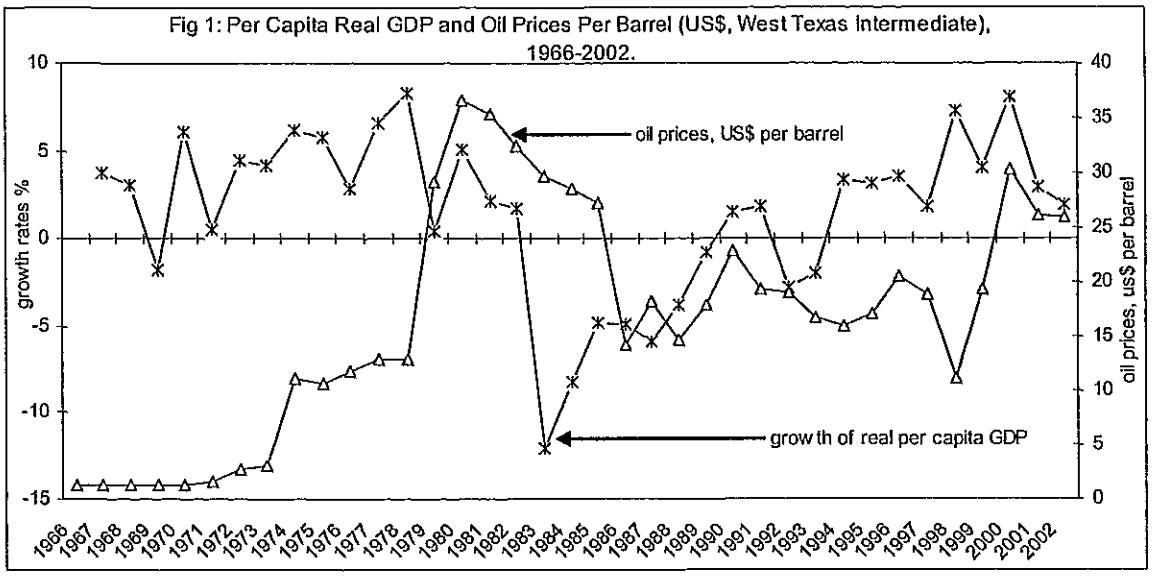
1: mcm – metric cubic metres
2: West Texas Intermediate
3:Includes Petrochemicals
Source: Official Publications.

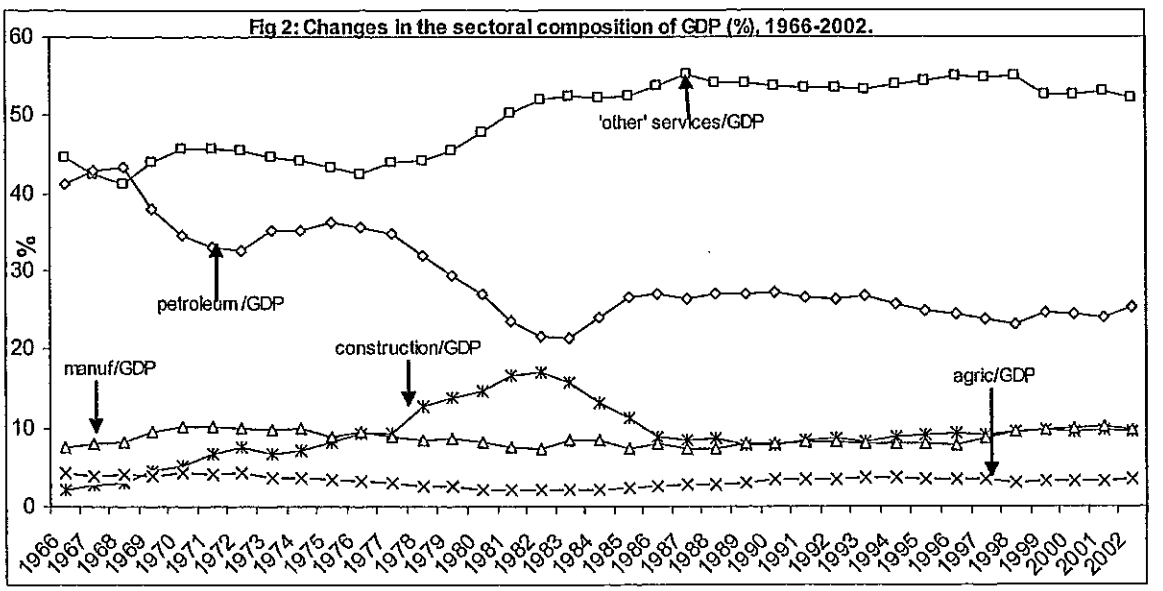
In 1990 and 1991 the economy began to show some signs of recovery, but declined in the following two years. Since 1993, growth of GDP has averaged 4.6% per year, with the petroleum industries expanding at an average rate of over 5% per year and the non-oil sector at 4.5%. In the latter group real value added in agriculture grew by 3.4% annually as compared 3.8% for manufacturing, and 3.4% for services. With this expansion, the unemployment rate also declined from 22.0% in 1989 to 10% in 2002, but increased slightly in 2003 despite an estimated growth rate of 6.7%. Notwithstanding the key position of the petroleum industries in the economy, the services sector account for over 60% of GDP.

Table 2
Selected Economic Indicators, 1973-2002

	Real GDP Growth Rate (%)	Gross Savings Rate[1] (%)	Gross Investment Rate[2] (%)	Unemployment Rate (%)	Inflation Rate (%)	Net Foreign Reserves[3] (US$mn)	Net Foreign Direct Investment Flows (US$m)
average 1973-81	6.10	38.70	27.10	13.20	14.80	1420.0	102.2
1973	1.70	31.70	26.00	15.40	14.90	32.5	62.6
1982	3.80	20.60	29.10	9.90	11.4	2983.3	211.0
1983	-10.31	15.80	25.70	11.1	16.8	2079.4	81.5
1984	-5.80	22.40	24.00	13.3	13.3	1187.5	113.2
1985	-4.12	22.90	18.80	15.7	7.7	994.6	49.7
1986	-3.28	16.10	21.60	17.2	7.7	329.0	19.9
1987	-4.57	20.70	19.30	22.3	10.8	79.6	33.1
1988	-3.92	17.90	13.00	22	7.8	-23.8	63.0
1989	-0.83	24.50	16.60	22	11.4	434.3	148.9
1990	1.50	29.50	12.60	20	11.0	187.5	109.4
1991	2.69	24.60	16.30	18.5	3.8	3.4	144.1
1992	-1.65	24.70	13.80	19.6	6.5	-36.7	171.0
1993	-1.46	22.70	13.60	19.8	10.8	206.3	372.7
1994	3.57	28.00	14.40	18.4	8.8	514.5	521.4
1995	3.96	35.30	20.80	17.2	5.3	460.2	295.6
1996	3.83	34.80	24.30	16.2	3.3	700.1	356.4
1997	2.82	33.00	36.20	15	3.6	854.3	999.9
1998	7.77	28.00	33.40	14.2	5.6	984.9	731.9
1999	4.39	26.80	21.00	14.6	3.4	1073.4	379.0
2000	5.80	33.80	20.00	11.6	3.5	1619.7	654.0
2001	2.80	32.80	22.30	10.8	5.6	1890.7	685.0
2002	4.60	30.20	23.10	10.4	3.9	2085.2[a]	587.0

1: Gross Domestic Savings as a % of GDP at current market prices
2: Gross Domestic Investment as a percentage of GDP at current market prices.
3: end of period
4: end of May.
Source: Official Publications.





Growth in the Trinidad and Tobago economy has been driven both by public spending and private foreign capital which has been attracted largely to the highly capital-intensive petroleum and petrochemicals sectors. Gross Domestic Savings as a percentage of GDP averaged over 35% in the 1970s while the Gross Capital Formation ratio was in the region of 25%. With the decline of the economy in the 1980s, both the savings and investment rates fell with the latter moving from 26% in 1983 to 14% in 1994. Despite a significant improvement in the government's saving effort in the 1970s, the external

public debt outstanding increased fourfold between 1973 and 1980, and increased further in the 1980s reaching US$2.5 billion (50% of GDP) in 1990. At the end of 2002 the outstanding public external debt stood at US$1.6 billion. Foreign direct investment flows which averaged US$117 million per year in the 1970s and US$105 million per year in the 1990s increased to US$503 million per year in the 1990s. The stock of foreign direct investment in Trinidad and Tobago is estimated to have grown from US$976 million in 1980 to almost US$6 billion in 1998.

2. Perspectives on the Construction Sector

The construction industry is closely associated with the process of economic development. About one-half of gross fixed capital formation normally takes the form of construction output (World Bank, 1984). By its very nature, construction has strong backward and forward linkages with other sectors of the economy. Wells (1985) uses the term 'construction' to describe the activity of the creation of physical infrastructure, superstructure and related activities. According to Wells (1984), this encompasses *"the creation of physical infrastructure (roads, railways, harbors), other civil engineering works (dams, irrigation projects, power plants), all building work (including housing) as well as the maintenance and repair of existing structures."* Since construction is closely associated with the production of a wide range of material and equipment in the manufacturing sector as well as with the provision of technical, professional crafts and transport services, it was noted that the value added or 'net' output of construction is only a small part of the total construction process, given that a large percentage of total construction output consists of intermediate inputs from other sectors of the economy. One scholar has put the 'multiplier' effect of on-site construction activity at two or two and a half times the net value of construction output (Wells 1984).

Some types of construction activities are income driven while others may be income initiating, particularly those associated with infra-structural development which is intended to encourage directly productive activities. The industry converts financial assets into physical assets, while the latter in turn provides the foundation, directly and

indirectly, for generating income and employment. The extent of this 'multiplier' effect in the home economy depends on how much of the required goods and services are sourced locally. The use of local materials and services is often affected by poor quality and shortages of certain kinds of skills. On the other hand, the availability of foreign exchange will determine the extent to which skills and materials can be imported.

The structure and organization of the construction industry varies considerably among countries (World Bank, 1984, p. 29). The three main factors shaping the industry are as follows:

1. *Nature of the work to be done* which, in turn is a function of factors of scale, geographic, dispersion, function and specialization (building or civil engineering construction, for example).
2. *The choice of technology*, which depends on the industry's state of technological development, the relative abundance or scarcity of labour and capital (and prices for them) climatic and physical conditions, government policies, and the overall development level of the economy.
3. *Social and economic environment*, which is conditioned by the general structure and state of the economy, political organization, and the traditions affecting the manner in which business is carried out.

In the literature there is some controversy over the nature of the relationship between the construction industry and economic growth, and whether the conclusions of time series analysis could be applied to cross sectional studies. Some writers (e.g. Strassman, 1970) argues that the construction sector, like agriculture or manufacturing, follow a pattern of change that reflects a county's level of development. After lagging in early development, construction accelerates in middle-income countries and then falls off. Using a series of cross sectional studies and 1960s data, Turin (1978) made the following observations:

(i) the share of construction in the national product and the value added in construction per capita grow with economic development;

(ii) the ratio of net output in construction to net output in manufacturing and the share of infrastructure in total construction output decrease with economic development;

(iii) value-added per person employed in construction and employment in construction per thousand population grows with economic development, but at different rates of change;

(iv) the gap between construction and manufacturing, in terms of net output per person employed and hourly earnings tends to close with economic development; in the richer countries net output per person tends to be the same in construction and manufacturing and hourly earnings are actually higher, but changes in productivity tend to be lower.

Turin concluded that to the extent that economic growth is linked to the level and efficiency of capital formation, an association between construction investment and growth is not surprising given that construction output accounts for about 50% of gross fixed capital formation in most countries. In fact in some circumstances construction should grow faster than GDP, and if it fails to do so construction capacity may become a serious constraint to a sustained capital investment programme. While subscribing to the link between investment and growth some scholars (J. Lopes et al.) make a distinction between machinery and equipment investment (which have a strong association) and investment in structures (which has a weak association). Strassmann (1970) using a much smaller sample of countries supported Turin's hypothesis linking per capita GDP with various measures of construction output. Wells (1984) subscribed to the view that during periods of growth construction activity grows faster than the economy as a whole because of the linkages with other sectors. Not all scholars agree with the modernization perspective and some (e.g. Drewer, 1980) have put forward a structuralist alternative stressing the supply and structural constraints when attempts are made to raise construction output. Drewer criticized the Turin thesis on the ground that he did not establish causal relationships i.e. whether construction in total or in part – was being pulled by or was pushing the national economy. Drewer argues that the central problem is to remove those constraints on development which are a consequence of the 'lack of fit'

between an economy's demand for construction and its capacity to absorb construction output. An efficient indigenous construction capacity is an integral part of social and economic development. In most developing countries, however, the problem is a weak local construction capacity and inefficiency at all levels.

3. Growth, Employment and the Construction Sector in Trinidad and Tobago – Trends and Relationships

In an earlier section, we outlined some general trends in the economy in the post war period, and concluded that the ebb and flow in the petroleum and petro-chemicals sectors still drive the economy, in the process influencing all the major economic aggregates. In this section we look at some specific relationships and more particularly the impact of growth in the construction sector and on employment.

In the last thirty-six years (i.e. 1966-2002) the economy grew on average by 2.1% per year. The period was characterized by periods of high growth rates and periods of low or negative growth rates. In the period, construction grew by more than three times the average for the economy as a whole and faster than any other sector. Table 3 attempts to compare sector performance in boom and bust periods. The figures show that when the economy is growing, the construction sector tends to grow faster than the other sectors. In fact it tends to grow almost twice as fast as the growth rate for the economy as a whole. When the economy is contracting construction appears to decline at a faster rate than the other sectors and total GDP. The multiplier operates in both directions.

Table 3: Sector performances in Boom and Bust, (Average Growth Rate, %)

Periods	Total Real GDP	Construction	Manufacturing	Agriculture	Petroleum
1951-61	8.0	15.2	8.3	4.4	9.3
1966-73	3.1	8.3	4.2	1.0	1.3
1974-82	6.1	13.4	0.7	-1.6	5.3a
1983-93	-2.2	-9.1	-2.5	2.5	-0.8
1994-2003	4.7	7.0	7.9	3.6	4.7
a: 1974-1978.					

One of the salient features of construction activity is the fluctuation in demand. Work done on other countries indicate that the output of construction fluctuates considerably

more than that of manufacturing and the economy as a whole. "This tendency is inherent in the demand structure of capital goods industries where relatively small changes in demand by consumers will cause the production capacity to be expanded or contracted at a considerably higher rate." (World Bank, 1984, p.39).

Different sectoral growth rates tend to lead to changes in their respective shares in total GDP over time. Table 3 provides some insights into the structural evolution of the economy since the 1950s. With a growth rate of over 15% per year in the 1950s, construction value-added increased from less than 3% of the total in the early 1950s to almost 5% in the late 1950s/early 1960s. The petroleum sector increased its share from around 28% to over 30% in the same period. With the slowdown in the economic growth rate in the late 1960s, construction's share fell slightly, but this was accompanied by a rise in the contribution of the petroleum sector which remained at over 30% until 1978. The share of manufacturing also fell in the late 1960s and continued to decline in the boom period of 1974-82 which saw a sharp increase in the contribution of construction from 7.2% in 1974 to 17% in 1982.

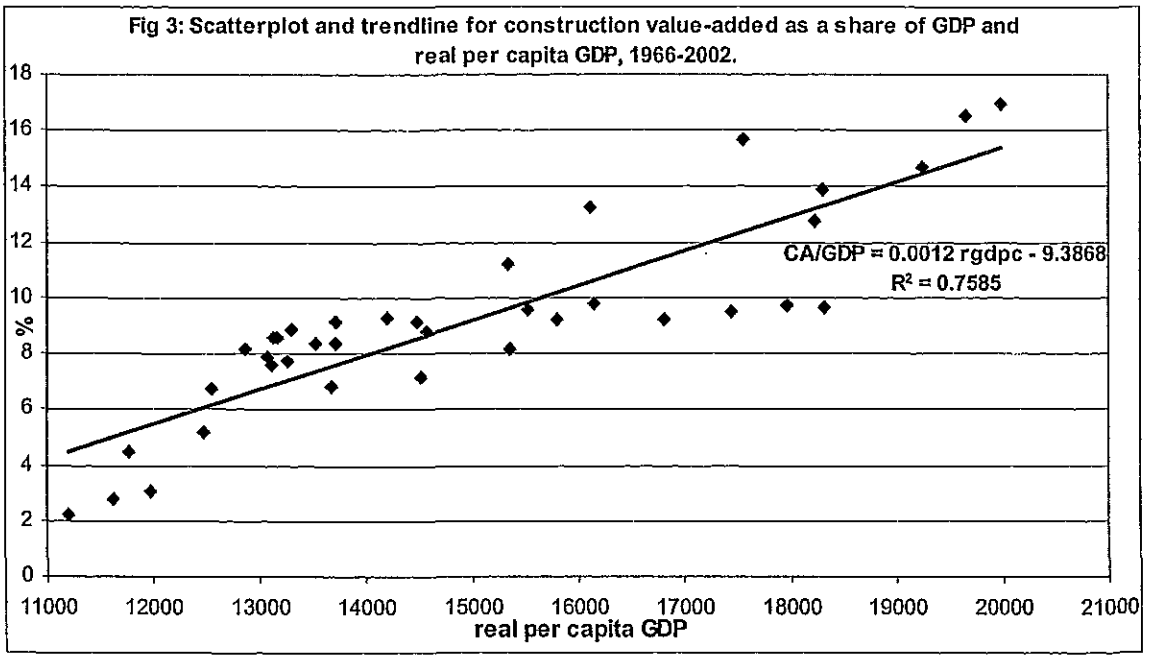
Table 4: Changes in the Sectoral Composition of GDP
(Average for Periods, %)

period	Construction	Manufacturing	Agriculture	Petroleum[1]	Other Services
1955-61	4	12	15	30	40
1966-73	5	9	4	38	44
1974-82	12	9	3	31	46
1983-89	11	8	3	26	54
1990-2002	9	9	3	25	54

1. includes oil refining and petrochemicals.
Note: the shares covering the period between 1966 to 1980 have been derived from a splicing of the 1970-based data series onto the 1985-based data series.
Source: Computed from official publications.

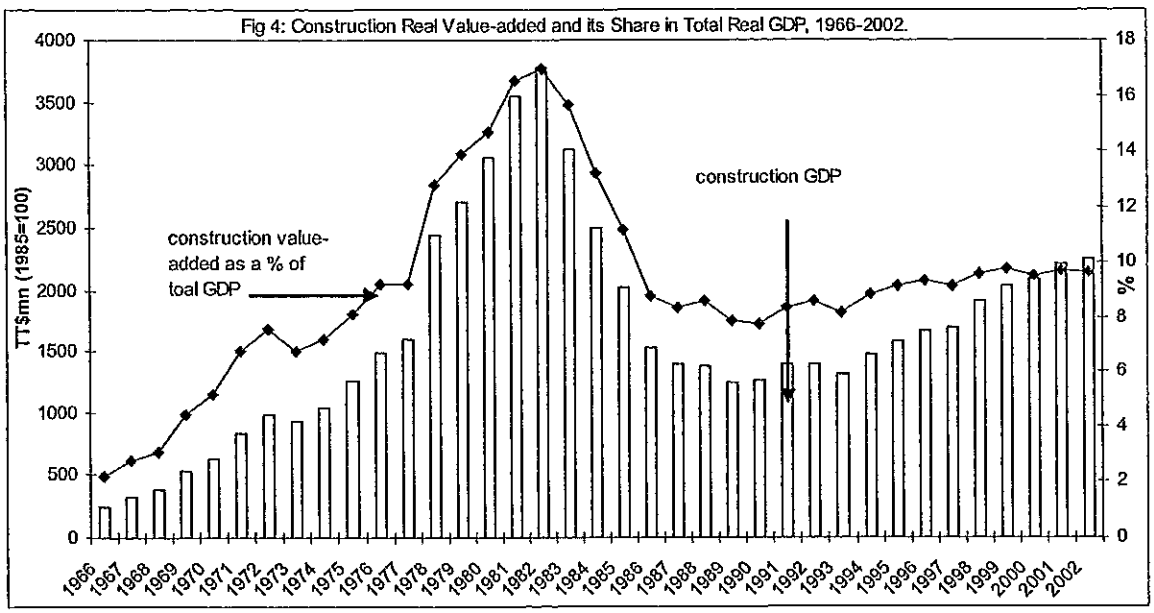
With the decline of per capita income in the post-boom period the share of construction in GDP also fell averaging around 10% for most of the 1980s and 9% in the 1990s. The fall in the contribution of construction has been steeper than that of any of the other sectors since 1982.

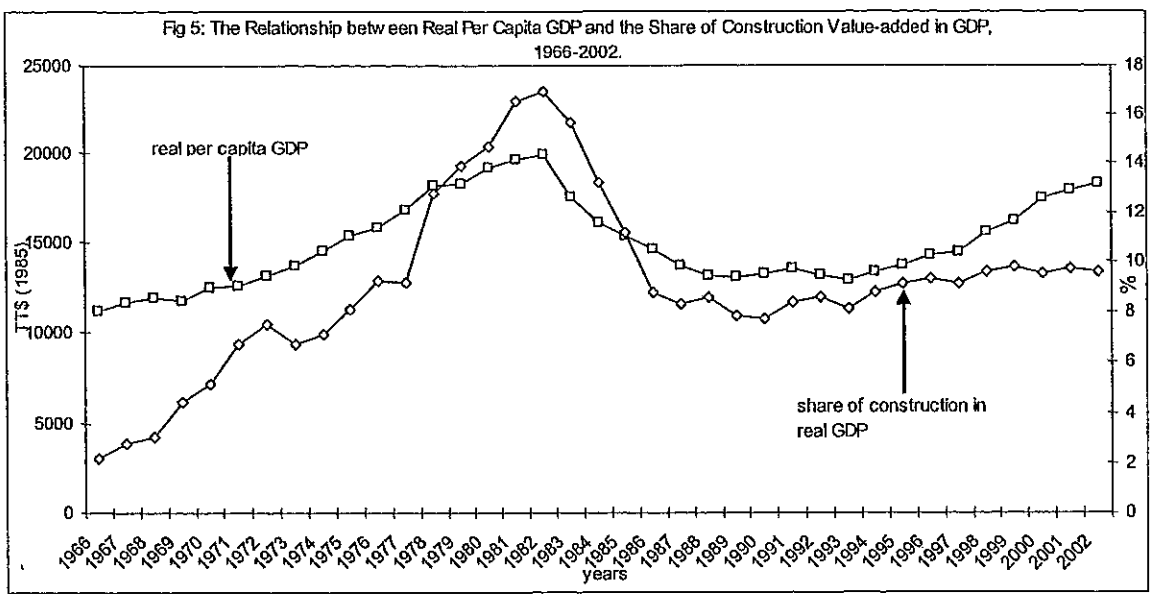
As indicated earlier, because of the heavy dependence of the economy on the petro-chemicals sector, income and employment tend to fluctuate greatly. Real per capita GDP increased by 22% between 1966 and 1973, and by 46% between 1973 and 1982. It fell by 36% between 1982 and 1993. Between the latter year and 2002 it increased by 42%. Over the period 1966 to 2002 real per capita GDP grew at an average rate of 1.4% per year. Construction value-added per capita grew by an annual rate of 5.6% over the period. The correlation coefficient between the share of construction in the national product and per capita GDP was 0.87, while the corresponding statistic for real per capita value-added in construction and total GDP per capita was 0.93. These statistics seem to confirm the Turin's thesis which came out of the cross-sectional studies. Figure 3 provides a scatterplot of the main variables between 1966-2002.

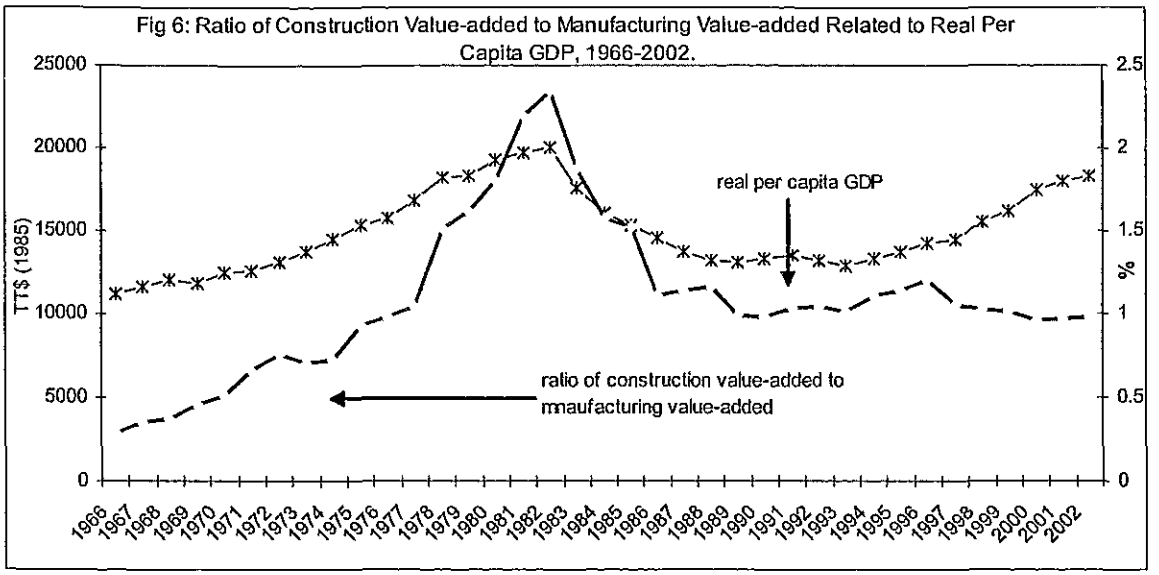


The data presented in table 3 seem to indicate that in periods of high growth, construction grows faster than manufacturing but in downswings it also declines at a faster rate. The data since 1966 show that there is greater fluctuation in the contribution of construction to GDP than that of manufacturing which tends to remain more steady. Despite the fluctuations in the share of construction in GDP, the contribution in the 1990s averaged around 9% which was about twice the average share of the 1950s and 1960s. Overall,

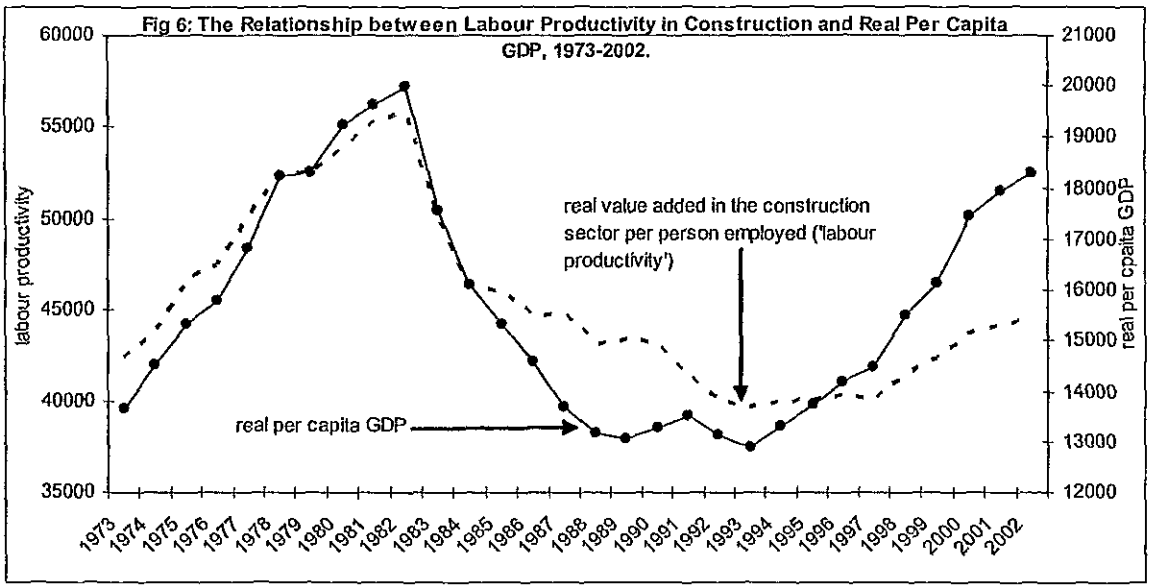
construction has grown at twice the rate of manufacturing (excluding the oil and petrochemicals sector) in the last 36 years.



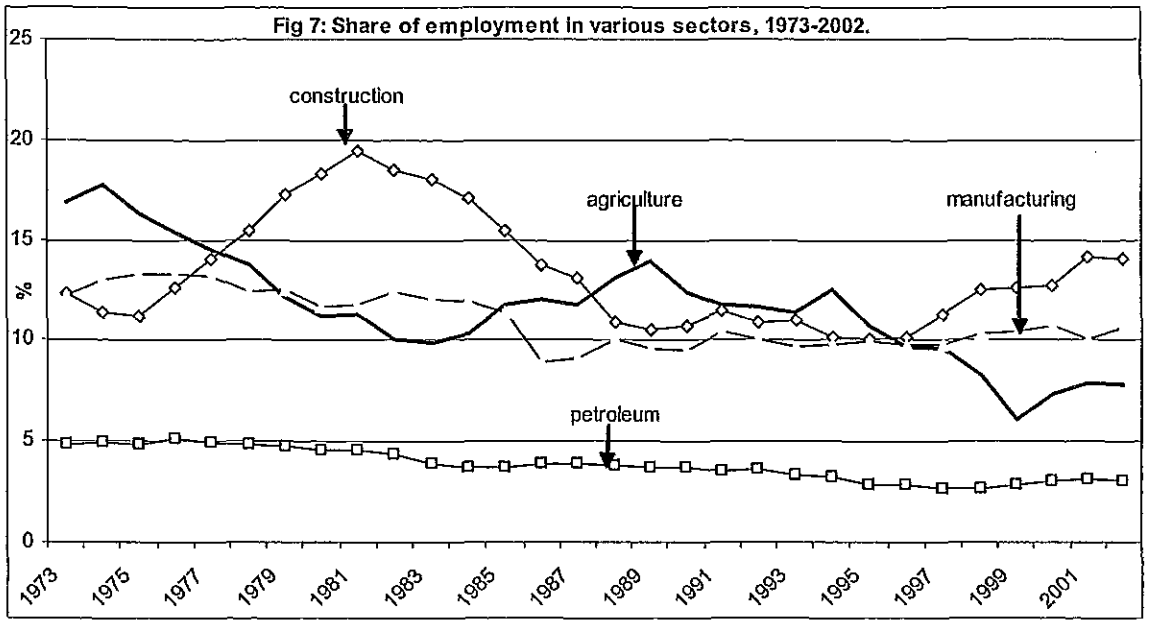




With respect to the suggestion that the ratio of construction value-added to manufacturing output tends to decline with economic development the data indicate that the ratio has been declining since the early 1980s, but the 1980s ratios are still higher than those of the 1950s and the 1960s. The implicit assumption here is that with economic development the manufacturing sector will grow at a relatively faster pace. The large construction projects taking place in recent years have apparently overshadowed the growth of value-added in the manufacturing sector which (excluding the petro-chemicals sector) has not emerged as a vibrant competitive set of activities.



Between 1973 and 2002, the labor force increased by 217,439 at an average annual rate of 1.5%. The economy has never been able to fully employ its labor force, even in times of high spending. Since the mid-1960s the un-employment rate in Trinidad and Tobago has fluctuated between 9.9% and 22.3%, averaging 15% in the period 1966-2003. The un-employment rate fell from over 15% in the 1973/74 period to 10% in the 1980/82 period. It increased to over 20% in the late 1980s, but has been on a declining trend since. The drop in the un-employment rate in the early 1980s coincided with a doubling of the numbers employed in construction between 1974 and 1981. The share of the employed labour force in construction increased from less than 12% in the early 1970s to over 18% in the early 1980s. Though the proportion has declined since, it has not fallen bellow 10% in any year. In the 1990s the percentage of the employed labor force in construction averaged 11.2% as compared to 3.1% for the petroleum sector, 10% for manufacturing, 10.1% for agriculture and 65% for other services. In terms of growth in the provision of jobs, the services sector has been the most significant. Agriculture's share has fallen from over 15% in the early 1970s to around 8% in recent years. The petroleum sector provides about 3% of the jobs and even in the boom years of the 1970s this proportion did not exceed 5%.

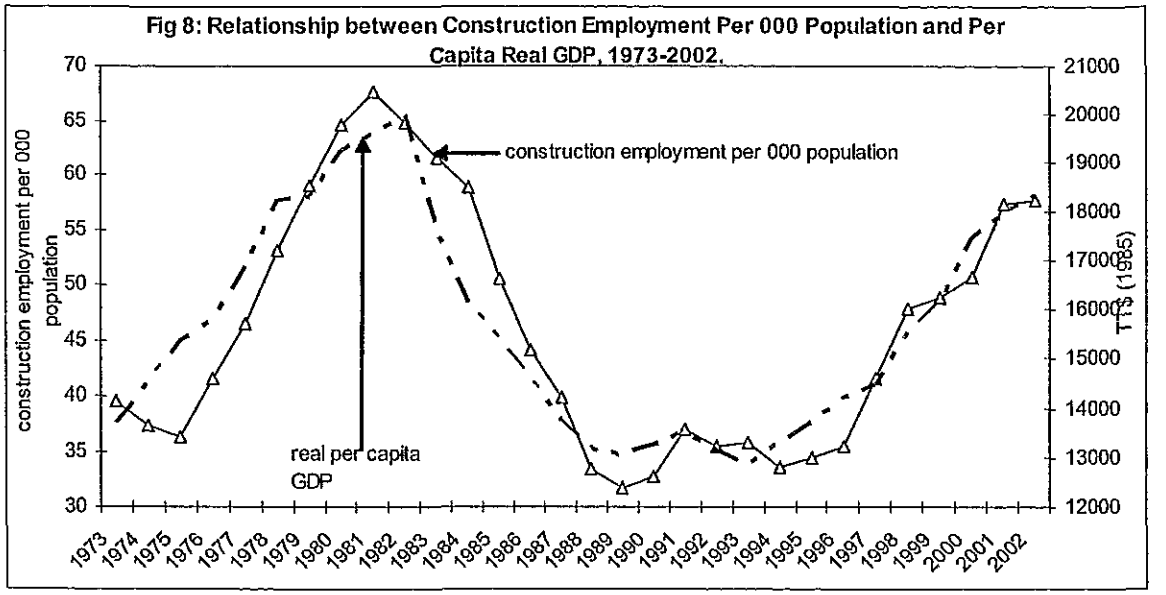


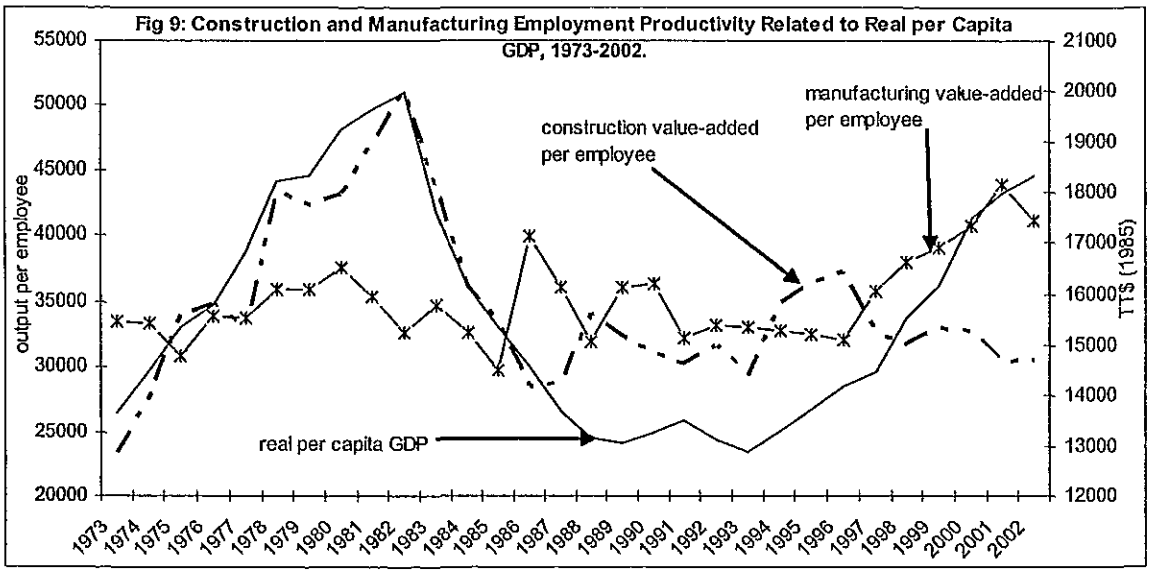
Different economic activities have different production functions, and therefore their respective value-added contribution to total GDP will not correspond to their respective shares of the employed labor force. Both agriculture and construction are labor intensive activities, and therefore it is not surprising that their employment shares are higher than their valued added contributions. On the other hand, petroleum which accounted for 3% of employment in the 1990s contributes about 25% to GDP.

Table: 5
Selected Statistics on the Construction Sector, 1966-2002.

	Construction Value-added as a % of GDP	Rate of Growth of Construction Output (%)	Employment in the Construction Sector	Construction Employment as a % of Total Employment	% Change in (Employed) Labour Productivity in Construction
1966	2.21	..	..	..	..
1967	2.79	33.0	..	..	..
1968	3.07	14.7	..	..	..
1969	4.44	43.0	..	..	..
1970	5.15	16.4	..	..	..
1971	6.74	32.6	..	..	..
1972	7.56	18.3	..	..	..
1973	6.78	-5.9	39688	12.35	..
1974	7.17	13.1	37765	11.33	18.90
1975	8.13	20.9	37106	11.17	23.00
1976	9.24	18.3	42929	12.62	2.23
1977	9.21	7.4	48752	14.00	-5.41
1978	12.78	52.3	56383	15.46	31.67
1979	13.87	10.6	63763	17.22	-2.20
1980	14.68	13.1	70617	18.25	2.11
1981	16.51	16.1	75500	19.42	8.62
1982	16.95	6.5	73800	18.45	8.99
1983	15.66	-17.1	72000	18.03	-15.05
1984	13.24	-20.3	69200	17.02	-17.11
1985	11.18	-19.0	60500	15.45	-7.34
1986	8.77	-24.2	53700	13.76	-14.56
1987	8.36	-9.0	48500	13.03	0.72
1988	8.58	-1.4	40500	10.90	18.11
1989	7.85	-9.3	38600	10.56	-4.79
1990	7.74	0.1	40100	10.73	-3.62
1991	8.37	11.1	45900	11.47	-2.98
1992	8.59	0.9	44200	10.89	4.73
1993	8.15	-6.5	44600	11.03	-7.36
1994	8.83	12.3	42200	10.16	18.69
1995	9.16	7.8	43400	10.06	4.81
1996	9.31	5.5	44800	10.09	2.23
1997	9.14	1.0	51800	11.27	-12.69
1998	9.60	13.2	60000	12.53	-2.31
1999	9.79	6.5	61428	12.55	4.06
2000	9.50	2.9	63900	12.70	-1.06
2001	9.70	5.4	72600	14.12	-7.19
2002	9.62	1.9	73420	13.98	0.73

.. not available
Source: Computed from Official Publications.





The value added in each sector divided by the number of persons employed provides a crude measure of productivity and it was suggested earlier that in the case of construction this should grow with economic development. The premise here is the association of economic development with a higher level of training and the use of modern equipment. In the case of Trinidad and Tobago, the indications are that average productivity in the construction sector has been somewhat erratic. It increased from the early 1970s to the early 1980s declined in the 1980s and remained fairly constant in the 1990s. In the case of petroleum there was a productivity increase in the 1990s over the 1980s, and in

manufacturing while there was no clear trend between 1973 and 1996, this has been a discernible increase since 1997. In the 1970s and 1980s productivity fluctuated in agriculture, but since 1990, there has been an upward trend.

Different types of construction are associated with different levels of productivity and therefore the average for the economy does not tell us a great deal. Comparing real output per employed person in construction and manufacturing does not show any clear trend. In some years (e.g. 1975-85) productivity was higher in the former than the latter. The reverse was the case, however, in the period 1997-2002. Turin had suggested that the value-added per person employed in construction would grow with economic development. The correlation coefficient between construction labour productivity and per capita GDP for the period 1973-2002 was 0.70. In the case of employment in construction per thousand population and per capita GDP, the coefficient 0.94.

4. The Growth of Construction Output-Impact and Constraints

Governments in developing countries tend to pursue several different but related objectives at the same time, hoping that the policies associated with one would reinforce the others. Expanding productive capacity, diversifying the economy, increasing employment and reducing poverty tend to rank high among stated goals. Whether or not growth follows construction or construction follows growth, construction is an important part of the activities of both the public and private sectors. There is both a formal and informal component of construction given that some activities take place without official approval, and therefore official data do not always reflect the 'true' level of activity taking place at any point in time. The demand for and increased production of basic materials, as well as the level of employment in the sectors often a given better indication of the state of the industry than other indicators. When demand exceeds supply this puts increased pressure on prices thus increasing the cost of construction and ultimately the cost of living. Next to food, housing has the largest weight in the Retail Price Index. Interestingly, the inflation rate in Trinidad and Tobago has never been excessively high. Even in the boom years of 1974-81, the rate averaged only 14.7% per year.

There are certain attributes of the construction sector which stand out. First it is largely an investment goods industry i.e. the goods produced lead to the production of other goods and services. Secondly, the government is a major player in the industry being a client for a large part of its work. Thirdly it is labor intensive, employing a wide range of skilled and unskilled persons, and in the process providing on-site training to complement the work of vocational and technical schools. Fourthly, it is associated with a wide range of activities and thus offers opportunities for the development of strong inter-sectoral linkages (backward and forward) and a high multiplier value. "These linkages, combined with a high value added to output ratio, indicate that construction provides a substantive growth stimulus throughout the economy" (World Bank, 1984, p.40). The fact that many of the inputs used carry a high weight/value ratio is an incentive for import substitution and the development of local activities.

The main inputs in construction are management, personnel, equipment materials and capital (World Bank, 1984). Different types of construction are associated with different factor mixes, but the prevailing prices for equipment and labour can also influence the choice of technology. In this context, the availability of trained labour, the organisation of labour market, minimum wage laws, tariffs and the exchange rate come into play when factor mixes are considered.

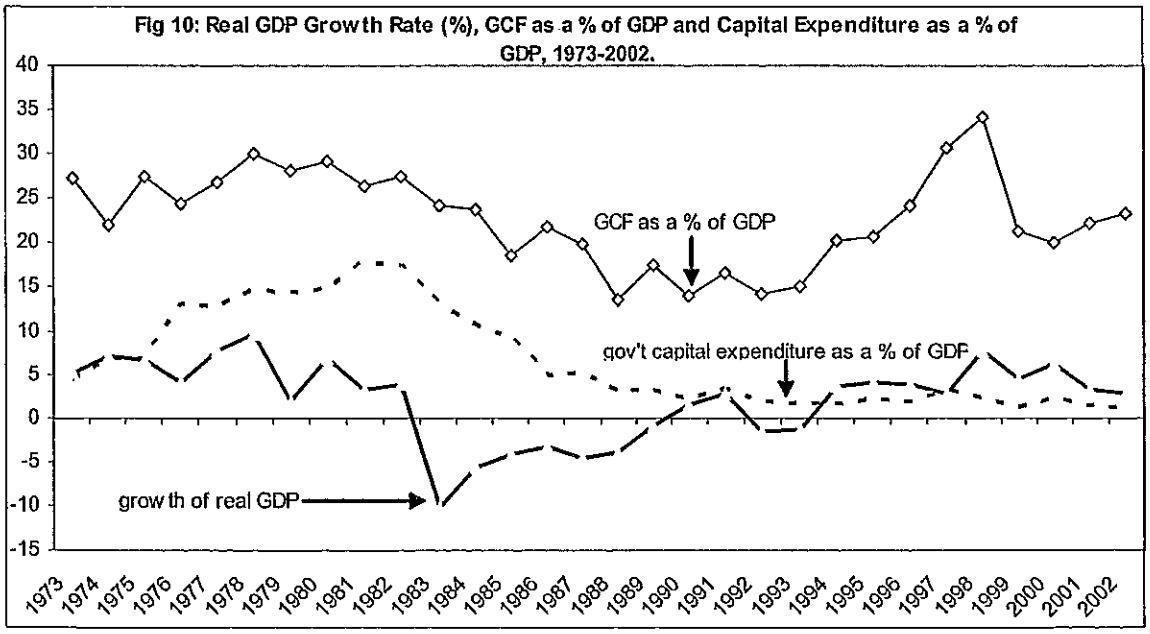
If the capacity of the industry does not develop in tandem with the economy the growth of the economy will not only be slowed, but there is likely to be increased dependence on importation of equipment and materials, leading to a loss of foreign exchange earnings and a reduced local multiplier effect. With respect to the heavy basic materials (sand, gravel, limestone and clay) the requirements to date have largely been met from local sources. Sand and gravel which are the most heavily used are located largely in the Wallerfield-Matura area in the East of the country. Most of the legal operators have exhausted their reserves or are close to doing so. In the absence of new leases, most of the mining takes place through unauthorized quarrying on private and state lands. Through upgrading and refurbishment of plant and equipment, those operations now appear to be reasonably adequate to meet existing demand. Limestone deposits which is a

critical input in cement production are found largely in the Central and Northern ranges. Extensive deposits of clay which is used in brick making are found in the Central Range. Resources are estimated to be good for about 20 years but un-controlled exploitation could lead to early depletion.

As indicated earlier, construction depends on the availability of a wide range of skills and the growth of the sector makes heavy demands on the existing pool of resources. Shortages not only retard growth, but also lead to increased cost. Appendices 1 and 2 show that the pool of trained engineers in various fields has been increasing in recent years. Appendix 3 also shows that enrolment in technicians and craft courses fluctuates from year to year but on a cumulative basis, the pool would have increased. There has been some improvement from the boom years of the 1970s and early 1980s when there were "significant rises in the costs of land and of buildings and of money wages, partly as a result of shortages of building materials and skilled labour. Productivity almost certainly fell, as unskilled and semi-skilled persons were often hired to do skilled work." *(Imperatives, 1985 p. 2).*

Construction is a major contributor to gross fixed capital formation. In the early 1980s it contributed more than 50% to the total. There was a downward trend until 1997, when construction's share fell to 16%. In 1999 this rose to 35%. As indicated earlier, government is a major player in the construction industry. It not only constructs and maintain houses, apartments, buildings, roads, bridges, etc., but is also owns wholly or in part the utilities such as water, electricity, telephone and transport. In the early 1980s, the government participated in some sixty-six (66) state enterprises, thirty-four (34) of which were wholly-owned, fourteen (14) majority-owned, one (1) jointly-owned, and was a minority owner in seventeen (17) others. Some of these have been privatised or closed since. Recent data on the contribution of the public sector and the utilities to capital formation is not available. In the latter part of the 1980s the public sector's contribution to gross capital formation averaged around 40%. Between 1973 and 1983 the central government's capital spending as a percentage of GDP averaged some 12.5%, but that figure has fallen significantly since. Since 1990 is has averaged 2%. Between 1973 and

2002 the correlation between the central government capital expenditure/GDP ratio and the gross capital formation ratio was 49.2% giving some indication of government's influence in construction. In the recession period 1983-89 the ratio was in the region of 76%. Figure 10 shows that while the government capital expenditure as a proportion of GDP ratio fell in the 1990s the gross capital formation ratio increased, the gap perhaps reflecting the flows of private foreign capital.



Heavy spending associated with boom periods increases the demand for scarce resources, often resulting in higher prices for labour and materials which affect both the public and private sectors. It has been estimated by one source[ii] that the cost of building a three-bed room house increased from an estimated TT$53,000 in 1973 to TT$270,000 in 1983. In the case of the public sector, increased costs can also originate in a host of other factors which may significantly increase the cost of construction. In the 1970s and early 1980s the government complained bitterly about cost overruns and delays in implementation, resulting from organisational shortcomings, inefficient bureaucracies and shortage of staff with relevant training. To deal with the problem a decision was taken to enter into government to government arrangements in which foreign governments would identify competent national firms and guarantee or assume responsibility for the satisfactory

completion of projects (Budget Speeches 1977 and 1982). Subsequent events proved this approach was not the solution and in fact brought problems of its own.

Concluding Remarks

Construction is an important part of the development and modernisation process. In Trinidad and Tobago construction contributed almost 10% to GDP and provided employment for 14% of the employed labour force in 2002. At the height of the 1970s boom, its share in GDP had increased to over 16%, and the employment contribution to close to 20%. Given the linkages with other sectors and the lack of data on the informal sector these figures clearly do not reflect the full contribution or the potential of the sector as an employment generator or as a stimulus for import substitution.

While construction is closely correlated with economic growth, it does not follow that providing incentives and increased spending on projects, large or small, necessarily leads to economic development. Those who point to the lack of institutional and technical capacity as a major constraint are right. In the absence of expanding capabilities on the wide front, greater spending is likely to increase the outflow of foreign exchange earnings. Inappropriate policies and an inefficient bureaucracy can also impact on costs and the utilisation of resources. Construction activity is associated with a great deal of fluctuation, and this is often exacerbated by poor planning and the execution of public sector projects. Governments often can play a more effective role in reducing fluctuations by the better sequencing of capital spending within public sector investment programmes within defined time frames.

Endnotes

[i] Though international oil prices (less than US$2 per barrel) hardly changed between 1951 and 1961 production of crude oil increased from 20.8 million barrels in 1951 to 46 million barrels in 1961. Refinery throughput increased from 35 million barrels to 103.3 million barrels over the same period.

[ii] Quoted by Francis (1997).

Appendix 1

University of the West Indies, St Augustine, Faculty of Engineering, First degree Graduates by Programme Option								
YEAR	Agricultural Engineering	Chemical & Process Engineering	Civil Engineering	Electrical & Computer Engineering	Industrial Engineering	Mechanical Engineering	Surveying & Land Information	TOTAL
1988/89	4	14	26	43	21	33	21	162
1989/90	3	16	14	52	22	30	14	151
1990/91	3	16	12	53	11	31	13	139
1991/92	3	29	19	49	14	24	13	151
1992/93	2	28	14	54	11	32	5	146
1993/94	3	40	28	76	7	47	0	201
1994/95	5	39	34	74	17	39	10	218
1995/96	2	38	29	61	26	48	11	215
1996/97	3	23	47	50	17	51	10	201
1997/98	2	23	44	55	15	44	10	193
1998/99	1	30	35	50	16	52	10	194
1999/00	3	25	37	61	15	72	11	224
2000/01	0	50	31	44	16	64	13	218
2001/02	0	25	44	57	13	74	10	223
TOTAL	34	396	414	779	221	641	151	2636
Source: UWI Database								

Appendix 2: Registered Engineers by Discipline

Year	Civil	Electrical	Mechanical	Project Management	Structural	Total
1987	23	11	41	2	41	1990
1990	78	29	33	2	11	153
1995	217	88	83	4	16	408
2000	274	136	128	4	13	555
2002	296	151	147	4	12	610
Source: Board of Engineering of Trinidad and Tobago						

Appendix 3:Annual Enrolment in Construction-Related Training

	TECHNICIAN COURSES					CRAFT COURSES				
	Full Time		Part Time		Total	Full Time		Part Time		Total
Year	Male	Female	Male	Female		Male	Female	Male	Female	
1980	213	36	333	60	642	151	7	285	4	447
1985	172	18	306	46	542	72	6	69	10	157
1990	130	29	267	29	455	17	1	74	17	109
1991	48	12	282	24	366	52	1	65	3	121
1992	118	20	142	36	316	65	3	129	5	202
1993	131	17	289	43	480	25	2	56	1	84
1994	36	12	205	28	281	87	0	98	3	188
1995	141	42	174	53	410	59	0	127	6	192
1996	175	39	273	38	525	60	1	56	3	120
1997	251	69	166	28	515	114	1	57	4	176
1998	204	32	181	24	441	99	4	70	4	177
1999	157	35	102	12	306	70	4	103	7	184
2000	138	31	192	58	419	84	7	57	1	149

Source: Report on Education Statistics 1980, 1985, 1990-2000.

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