KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF ART AND SOCIAL SCIENCES
FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF ECONOMICS

ECONOMIC GROWTH THROUGH STRUCTURAL CHANGE IN PRODUCTION ORGANISATION IN THE MANUFACTURING SECTOR IN GHANA

A THESIS SUBMITTED TO THE DEPARTMENT OF ECONOMICS IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF PHILOSOPHY (ECONOMICS) DEGREE

BY

MICHAEL KESSEH ABOAGYE

BA ECONOMICS

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DECLARATION

I hereby declare that this submission is my own work towards the Master of Philosophy and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgment has been made in the text.

ABOAGYE MICHAEL KESSEH ..... 19TH APRIL, 2012 .....

(PG 3401309) Signature Date

Certified by:

MR. K. J. OPOKU-AFRIYIE ..... 20-04-02 .....

(Supervisor) Signature Date

Certified by:

HEAD OF DEPARTMENT ....

Signature Date

DEDICATION

I specially dedicate this work to the Lord God Almighty who has been my guide, and provider.

ACKNOWLEDGEMENT

To God be the glory for helping me fight all obstacles to complete this MPHIL program.

I wish to express my sincere gratitude to my supervisor, Mr. K. J. Opoku-Afriyie for his unflinching support and guidance in making this project a great success.

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ABSTRACT

With the motivation to find out the role of Ghana's manufacturing sector in economic growth, this study realized the need for a structural change in manufacturing. The study analyses secondary time series data to establish that growth of the manufacturing sector negatively affects the growth of GDP. A possible explanation of this is that the use of low levels of production technologies in Ghana, and the associated inefficiency, leads to high cost of production. This means that the manufacturing sector draws resources from the other sectors, implying high opportunity cost of manufacturing. The growth in the manufacturing itself is brought about by structural change in the sector. Thus, in the case of Ghana, the test of Kaldor's law which postulates that there is positive relation between the growth of manufacturing output and GDP growth, was found not to hold. From trend analysis, using the data on manufacturing, it was also found out that the growth trend of the sector is declining. Furthermore, the study found out that growth of the manufacturing sector Granger-causes growth in GDP.

Based on these findings, the study recommends; a well structured expenditure for the manufacturing sector, organization of more researches for the sector and also allowing the technocrats rather than politicians manning the sector. There is also the need to bring together talents from all relevant fields that can help identity the key structures in Ghana's manufacturing that require change to improve growth.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Ghana has recently been blessed with the discovery of crude oil and it has been found that its oil wells in the territorial waters can fetch as much revenue for the economy as it has done for other oil-rich countries. This boon has been lauded by all our international allies and trading partners. In all these others are making a prognosis of the whole chunk of accruing benefits that it would bring to the country. This, all other things being equal is a great opportunity for Ghana to embark on social, economic, and political changes. With the current trend of events and aspirations of government to build a better Ghana, there is a dire need for structural change in order to leapfrog poor economic, social, and political institutional setups. The countries of the Arab world witnessed massive social, economic, and political transformations in the past three decades. The secret behind these transformations is the pivotal role played by the oil sector at different historical junctures [Al-Moneef, 2006: 11]. In most cases, the advocacy and commitment to institute changes is hampered by the lack of resources to manage growth. This is because, theoretically, availability of resource is supposed to provide the economy with the investment capital and advanced technologies needed for the "big push." Bringing structural change in one sector can have ripple effects on the rest of the Ghanaian economy if it is worked at assiduously. With the discovery of this oil which is being drilled in commercial quantities, it would be possible to forecast trends in the growth of some industries and productivity because we have been able to jump the huddle of limited resources to purchase and install state-of-the-art equipment to enhance growth. In the

World Bank's forecast for Ghana's commencement of oil production in commercial quantities, the Ghanaian economy is expected to realize a 13.4 percent growth for 2011, and also one of the fastest growing economies in Sub-Saharan Africa. Oil being the mainstay of the Nigerian economy has played a vital role in shaping the economic and political destiny of the country. The oil is the major player in the country's quest for industrialization due to the benefits accruing from the foreign exchange reserves [Odularu, 2008:2]. This implies that one of the goals of economic policy makers in Ghana should be to fight for the changes in structures within sectors vital to national growth. Economic growth and structural change is better linked when resources from the oil sector are well managed.

Studies have shown that structural change is important to economic growth and that it is influenced by many factors including technological changes and a shift in consumer preferences which have important impact on economic performance through the reallocation of resources from one economic activity to the other [Cretengy, 2005: 2]. In most cases when an economy, a country or an institution wants to improve performance it begins to investigate the factors which are obsolete and need replacement in order to be successful. Growth is in stages and the stage in which a country may be is a clear distinction that marks the kind of structures in place. The depth and success with which a country may reach in establishing structural changes would tell whether it is either a developed or a developing nation. China, particularly over the last two decades, has been going through a series of major structural changes. As a result of this it has achieved great growth performance, making it one of the fastest growing economies in the world. The production apparel in a competitive growth environment would determine the speed and success with which innovations may be achieved. Structural change and growth go together since structural change in a competitive economy should relocate resources from low-productivity sectors towards high-productivity

sectors on the one hand; and from low stages of value-added (production of simple intermediate products) to more advanced stages (semi-finished goods) and finally to the production of finished goods [Welfens and Borbély, 2009: 9]. When Ghana's growth is driven by such innovations, an important two-way causality between growth and structural change may be produced. On the one hand, the aggregate growth rate depends on structural change because innovation incentives are crucially determined by the growth rates in the new industries. On the other hand, the speed of structural change would then be determined by aggregate growth [Foellmi and Zweim, 2005: 4].

Structural change is considered a powerful source of economic growth. It is associated with more changes in the macro-economy and with increasing returns to scale derived from specialization. A growing economy is one that becomes more complex and sophisticated as new sectors of economic activity are created and as new, more knowledge-intensive firms enter it. The surest way to be certain with economic progress in Ghana is when structural change becomes the masterminding force. Concomitantly, new institutions, skills, and learning processes develop right across the production and social structure. This is the process that led Kusnets and Abramovitz to differentiate between "immediate" and "ultimate" sources of economic growth. They view an expanding capital-to-labour ratio – resulting from a higher rate of investment to GDP as an "immediate" source of growth, while learning, the accumulation of domestic technological capabilities, institutional changes and the improvement of production organization capabilities as "ultimate" sources of economic and social development and represent hidden social forces at work under the surface [Katz, 2006: 58]. Structural change would be a good source of productivity growth for Ghana after investing a greater part of her resources to transform the production base. Therefore with

sectoral factor improvement in the Ghanaian economy the role of structural change would be a key condiment in achieving aggregate performance.

1.2 Statement of Problem

It is sometimes an irony to read that the country since independence has set a goal to transform the economy into an industrialized one but traces of this aim seems to be a mirage. Records as of 2011 from the sectoral shares to GDP are given as agriculture 29.9%, industry 18.6% and the services 51.4% [CIA World Factbook, 2011]. The question is what are the implementations in place monitoring the status of the country with reference to this goal? We can count a number of goods that the economy cannot produce on its own but has no other alternative than to import. So the question is how vibrant is our manufacturing sector to help consumers to get most of the goods they prefer to consume. The Manufacturing sub-sector maintained its lead as the largest contributor to industrial GDP. Over the period 1998-2002, manufacturing share of GDP stood at 9.12%, Construction, 8.02%, Mining and Quarrying, 5.42%, and Electricity and Water, 2.68%. Petroleum, food and textiles dominated manufacturing production. Together they accounted for about 47% of total manufacturing output in 2002. The sub-sector labelled as the "engine of growth" has been growing at a rate far below the 8% growth rate necessary to propel the economy towards the middle income status. It continued to be affected negatively by high cost of credit, depressed local demand and unfair competition from abroad due to distortions in tariffs, import duties and the domestic tax system, [ISSER, 2005: 20]. Due to the fact that Ghana's manufacturing sector is not so resilient most Ghanaians continue to prefer foreign goods to the home made one's due to low standards as compared to foreign substitutes even though Ghana is now respected worldwide in the African sub-region due to the few improvements made that outsiders see.

This puts to question the capacity and efficiency within the manufacturing sector. What then are the factors that are misplaced and hence not making the manufacturing sector as vibrant as it should be? How can productivity in our manufacturing sector improve so as to meet competition on the world market? Has the trade liberalization of the economy which has led to the influx of so many goods and services promoted or hampered the dreamed about route to industrialization?

In addition to this, [Breisinger et al., 2008: 11] using six countries which are, Brazil, Malaysia, Thailand, China, India, and Vietnam showed that rapid growth in these countries was accompanied by significant structural changes in the economy. The growth momentum was wheeled by increases in industry (manufacturing) share in GDP. Comparatively manufacturing share of GDP in Ghana has been very low. Compared with that of the six reference countries at the time when their per capita GDP levels were around US$400, the share of agriculture in total GDP was much higher in Ghana in 2005 than in the initial years of the six studied countries. The dominance of export of agriculture products which was characteristic of Brazil's economy in 1965 could still be found in the Ghanaian economy as at 2005 compared to Brazil when it began treading the path of transformation in export of manufactured goods in 1974 with 24 percent share contribution to GDP. [Gillis et al., 1987: 523] states that when productivity growth is being explained, manufactured export shares appear to be more important. This situation informs that there are a lot of lapses which need to be corrected in the manufacturing sector of Ghana. Is it therefore possible to implement some of the policies of these referenced countries in order to transform our manufacturing sector in reaching great heights? What are the rigidities within the manufacturing sector hampering growth?

It is a worthy idea to find out that in the annals of Ghana's economic history it set the goal of reaching middle – income status since 1993. This goal was one of the tenets of the vision 2020 program, the GPRS II and as one of the targets of the Millennium Development Goals. Even though, it was declared in the last quarter of 2010 after statistical adjustment that Ghana obtained this status and showing the brighter side of a future Ghana, reality shown in growth statistics have always reflected a need to push the frontiers of mechanisms masterminding this dream. GDP targets are for some years below projected rates. This has mostly been attributed to structural constraints to growth and development and sectoral bottlenecks. The GDP growth values at constant price between the periods 1980 – 2009 shows a lot of variability. These statistics shows that Ghana has never had consecutive increases in growth even for more than five years. This reflection puts the efficiency of the factors of production in the economy very questionable and hence the need to find a means to promote a consistent growth pattern. The fact that the country is mostly falling below its projected growth target demands restructuring of production within the economy. In these modern times we should be asking if whether it is possible for our country to show consistent growth rates fostered by reliability in productivity. How can we do away with the rigidities that seem to scare productivity and efficiency in the face of growth forecasts? Is our manufacturing sector therefore tooled to satisfy domestic demand and to face competition on the world market of output so as to show clean sheet in our growth statistics? If they can then what must be done?

It has been evidenced, that slow economic growth for most of the last four decades has been a consequence of the lack of adequate attention to structural change. Indeed a feature of the Ghanaian economy that most analysts have agreed on over the years has been the absence of structural change. The study by [Aryeetey and Fosu, 2003] have evidenced that Ghana's growth record is uneven. Thus there have been periods such as in 1966, 1972, 1975, 1976, 1979, 1980, 1981, 1982 and 1983, where negative growth rates were recorded. These results

can be explained partly by the fact that a lot of productive resources are lying idle and most industries produce below capacity. This scene is evident throughout the agricultural as well as the manufacturing sector. Despite the vastness and fertility of land to engender agricultural activities we find that raw material that could be produced internally are imported to beef up supply in the local market. The prediction of many economic policy makers for countries looking out to grow in leaps and bounds is the advocacy for a strong production basis. Research and development (R&D), innovation and technology are props supporting strong economies prominent in the world today and so how well can other countries especially developing ones like Ghana reach their standards as it tows the same lines? What are the ways to override competiveness and the speed of change within Ghana's manufacturing sector so as to promote economic growth? Is there any possibility to realize sustained economic growth to make way for economic development? And can structural change to the sectors of the economy be beneficial?

1.3 Objectives of the Study

The main objective of this study is to determine the importance of structural changes in Ghana's manufacturing sector on the overall GDP growth.

In pursuing the main objective, the study looks at three specific objectives. These are

To analyse the efficiency of the factors of production in the manufacturing sector.

To show the growth trends of the manufacturing sector.

To examine the causality between the growth of Ghana's manufacturing sector and overall economic growth.

1.4 Statement of Hypothesis

This study hypothesizes that;

1. Structural change in Ghana's manufacturing sector would speed up the growth of the sector.
2. Structural change improves efficiency in production to enhance growth.

1.5 Justification of Study

The study results would be of a great benefit to a target group like the government of Ghana as well as those in other developing economies, it would also stir up the need among people in academia to organize more research in the study field and also to policy makers as they may have to reconsider or affirm their policy trends.

Firstly, the conclusions and suggestions drawn from this research would serve as a guide to the manufacturing sector of the economy as to how it can add to and improve productivity. Secondly, it would task the need to revamp our import substituting industries after finding out the loopholes in the manufacturing of various goods for domestic consumption. Hence exportation of goods can therefore be seen to be of a world standard and hence fetching the required foreign exchange for the economy.

It would also show the need to improve the sectors and institutions of Ghana's economy that are needed to help enhance productivity and hence the need to pay a particular attention to it to promote increasing growth.

1.6 Scope of the Study

This study considers the contribution that the manufacturing sector of Ghana can make to overall GDP growth. In that, based on the growth trend of the manufacturing sector between the periods 1965 – 2009, the study hypothesizes that structural change would promote growth. Where structural change here engulf all the necessary economic factors that would help the manufacturing sector to be more vibrant.

1.7 Outline of the Study

This research covered five (5) chapters. Chapter One is the introduction for this study. The Chapter Two covers the Literature Review and considered under this is the subsections, 2.1 Concept of Economic Growth, and 2.2 Empirical Review. Chapter Three presents the Method of Study and Chapter Four which is the Analysis of Findings. Lastly Chapter Five presents the Summary of findings, Conclusions, and Recommendations from the Study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

From the time of the work of Adam Smith in 1776, economic growth has been a central objective of the study of economics as a scientific discipline. Through the last two centuries, with the consolidation of the national states, the quest of sustainable growth paths became a key subject for scrutiny of economic policy for the different governments all over the world. Orthodox models such as that of the neo-classical economists were used in the study of economic growth but since such traditional models did not provide satisfying answers to the central issues of this topic, a theoretical development in the field of economic growth was realized with the work of Romer (1986) and Lucas (1988). Their models addressed the inadequacies of the earlier ones. In a quest to think differently about what drives economic growth, the manufacturing sector has been suggested to be the engine of growth because it's thought of to possess special growth inducing features. Among these is the specialization in the production organisation which helps technological development and spreading, throughout the economy. Also there is the idea that developing vibrant manufacturing sector is essential to national prosperity and further gains to productivity growth and profitability. This section of the study discusses the concept of economic growth and the various empirical structures that have been put in place to promote economic growth.

2.1 Theoretical Review

2.1.1 Concept of Economic Growth

In general economic growth defines a rise in the real per capita income and product over a certain period of time. Most often an increase in real per capita GDP is used as a proxy for

the measure of economic growth. Economic growth is marked by rate. It can be slow or fast either in the short or long run. In the short run fluctuations in economic growth is marked by the business cycle which consist of booms and slumps in production. Processes in the short run determine long run growth and models of economic growth have mostly centered on long run. These long run models are designed to explain the general upward path of output over time. The models help us to address crucial economic policy issues about growth [Hall and Taylor, 1986: 61].

There are three fundamental components which are of prime importance to economic growth. These components are;

i) Capital accumulation (includes all new investment in land physical equipment and human resources through improvement in health, education, and job skill.

ii) Growth in population and hence eventual growth in the labour force.

iii) Technological progress – new ways of accomplishing task

Capital accumulation results when some proportion of present income is saved and invested in new factories, machinery, equipment, and materials which lead to increases in physical stock. These direct productive investments are supplemented by social and economic infrastructure which includes roads, electricity, water, and sanitation, communications and all relevant facilities which facilitates and integrates economic activities for economic growth.

Aside the investment in physical capital for economic growth, human capital is also a great necessity. These human resources help improve the quality of physical capital and hence have a great impact on production. The means to develop human capital includes formal schooling, vocational and on-the-job training programs and informal education. Also the proper facilities to enhance and provide health needs of human capital are relevant to the level of productivity to spur growth.

Also population growth and the associated eventual increase in the labour force has traditionally been considered a positive factor in stimulating economic growth. A large labour force means more productive workers.

Lastly, technological progress is considered the most important source of economic growth. Simply it results from new and improved ways of accomplishing traditional tasks. Technological progress may be classed as neutral, labour-saving or capital-saving. Where neutral technological progress means a higher output level is achieved with the same quantity and combination of factor inputs. Also labour saving technical progress is defined when state-of-the-art machinery is provided to produce higher output with the same quantity of labour. But for capital-saving technological progress, it results in more efficient labour-intensive methods of production for higher output to promote economic growth [Todaro, and Smith, 2009: 142].

Economic growth is an indicator of the rate at which living standards are changing. Other benefits associated with it includes; stimulation of employment, improvement in government expenditure, and investment in new machinery. On a production possibility frontier potential growth would be marked by an outward shift of the frontier. Increases in productivity or economic efficiency of the factors of production have positive impacts on economic growth [Gillis et al., 1987: 7].

Economics literature shows that basically there are two categories of economic growth theories; those based on the traditional Solow (1956) growth model or the neo-classical growth model and those based on the concept of endogenous growth or new growth theories. Both theories agree that growth is an increase in the real per capita income and product, but their differences lie in the approach to such. The Solow model emphasizes capital

accumulation and exogenous rates of change in population and technological progress. This model predicts that all market-based economies will eventually reach the same constant growth rate if they have the same rate of technological progress and population growth.

On the other hand endogenous growth theory or new growth theory is based on the idea that long-run growth is determined by economic incentives. This theory holds that unlike physical objects, knowledge and technology are characterized by increasing returns, and these increasing returns drive the process of growth. Also it views technological progress as a product of economic activity. Thus economic growth is generated from within a system as a direct result of internal processes which includes inventions, and innovations [Gould and Ruffin, 1993: 28].

In contrast neo-classical economics had a different theory of growth, devised by Robert Solow during the 1950s. This argued that a sustained increase in investment increases an economy's growth rate only temporarily, that is, the ratio of capital to labour goes up, the marginal product of capital declines and the economy moves back to a long-term growth path. Output will then increase at the same rate as the growth in the workforce plus a factor to reflect improvements in productivity. This theory predicts specific relationships among some basic economic statistics. Moreover, although the model says that economic growth ultimately depends on the rate of technological change, it fails to explain exactly what determines this rate. Technological change is treated as exogenous. Some economists like Romer and Lucas argued that doing this ignored the main engine of growth. Therefore the endogenous growth economists developed a new growth theory, in which improvements in productivity were endogenous, meaning that they were the result of things taking place within the economic model being used and not merely assumed to happen, as in the neo-classical models. Endogenous growth was due, in particular, to technological innovation and investments in human capital (knowledge). In looking for explanations for differences in

rates of growth, including those between rich and developing countries, the new growth theory concentrates on what the incentives are in an economy to create additional human capital and to invent new products. Factors determining these incentives include government policies. Countries with broadly free-market policies, in particular free trade and the maintenance of secure property rights typically have higher growth rates. Upon this, open economies have grown much faster on average than closed economies. [Bishop, 2004:119]

If we should side with Romer (1986) a proponent to endogenous growth, that economic growth occurs whenever people take resources and rearrange them in ways that are more valuable, then it presupposes that growth is not just about accumulation of capital but a further move to improve the production apparel through what may be called structural changes. The distinction that is being made by endogenous growth economist is that economic growth is driven by ideas or knowledge which is not subject to diminishing returns unlike physical capital. In essence rearranging these physical capital or better coined, causing structural changes is what can engender growth.

From these two models, it can be distinguished that the potential causes of economic growth can be summed up in factor accumulation (which embeds physical capital and human capital), technological progress (inventions and innovation) and institutions. It should be acknowledged that growth is a complex phenomenon and as such its causes cannot be summed in one factor but on many factors. A similar contemplation by [Fatás and Mihov, 2009:10] have grouped the causes of growth under the caption 4'I's. These I's are Innovation, Initial Conditions, Investment and Institutions.

Basically, this study considers both the neoclassical growth and endogenous growth theories to be qualifications for structural change in developing economies particularly Ghana for its

manufacturing sector growth. It therefore requires a better linkage of factors discussed under each model. Structural change in this study refers to the improvement of the methods of production and the composition of output which will bring about a long-term rather than a short-term transformation to promote output growth. In the neoclassical or Solow model the component of structural change for this study is capital accumulation and technical progress while in the case of the endogenous growth model knowledge for innovation and invention is considered.

In the quest to know more about Growth it has best been described as a process of transformation. Whether one examines an economy that is already modern and industrialized or an economy at an earlier stage of development, one finds that the process of growth is uneven and unbalanced. Economic historians have attempted to develop a theory of stages through which each economy must pass as it grows. Early writers, given to metaphor, often stressed the resemblance between the evolutionary character of economic development and human life, example growth, maturity and decadence. Later writers such as the Australian economist Colin Clark have stressed the dominance of different sectors of an economy at different stages of its development and modernization.

For the American economist W.W. Rostow, growth proceeds from a traditional one (in which the foundations for growth are developed), to the "take off" society (in which development accelerates), to the mature society. Various theories have been advanced to explain the movement from one stage to the next. Entrepreneurship and investment are the two factors most often singled out as critical.

Economic growth is usually distinguished from economic development, the latter term being restricted to economies that are close to the sustainable level. The term economic growth is applied to economies that are already experiencing rising per capita incomes. In Rostow's phraseology economic growth begins somewhere between the stage of take-off and the stage

of maturity; or in Clark's terms, between the stage dominated by primary and the stage dominated by secondary production (manufacturing). The most striking aspect in such development is generally the enormous decrease in the proportion of the labour force employed in agriculture. There are other aspects of growth. The decline in agriculture and the rise of industry and services has led to concentration of the population in cities, first in what has come to be described as the "core city" and later in the suburbs. There has also been a rise in the importance of durable consumer goods in total output. In the U.S experience, the rate of growth of capital goods production at first exceeded the rate of growth of total output, but later this was reversed [Macropaedia, 1974: 879].

Showing the fact that there are stages in growth, [Romer, 2006: 5] stating some basic facts about economic growth brings to the fore that worldwide growth is far from constant. But rather it has been rising over most of modern history. Average growth rates in the industrialized countries were higher in the twentieth century than in the nineteenth. Proving a point on structural changes and its effect on productivity, he shows that average incomes on the eve of the Industrial Revolution even in the wealthiest countries were not dramatically above subsistence levels; this tells us that average growth over the millennia before the Industrial Revolution must have been very, very low.

2.1.2 Growth Models

Various models over time have been developed in the quest to explain the growth equation especially among developing countries. One of such models includes that of the Harrod-Domar. This model has the underlying assumption that output of any economic unit whether a firm, an industry, or the whole economy depends on the amount of capital invested. Thus concluding that capital created by investment in plant and equipment is the main determinant

of growth and that, it is savings by people and corporations that make investment possible.

For Harrod and Domar, given the growth equation

$$g = \frac{s}{k}, \quad \ldots\ldots 1$$

where g = rate of growth, s = saving and k= capital; planners can either target the rate of economic growth to determine the level of savings and investment or target the level of saving and investment to determine the rate of growth.

But then [Gillis et. al 1987: 45] shows that, economist such as Robert Solow and Edward Denison have attempted to explain the sources of growth with a different form of the production function, one that allows the analyst to separate out the various causes of growth rather than subsume all these causes in the capital – output ratio. This is because they found that the simple Harrod-Domar production function obscures some of the basic differences in growth performance between countries. In an analysis depicting a production function like that of the neoclassical more factors were included and the function has been stated as;

$$Y = (K, L, R, A). \quad \ldots\ldots 2$$

Though it uses the neoclassical production function it included other variables. Where

Y = output or natural production.

K = stock of the labour force.

L = size of the labour force.

R = Stock of arable land and natural resources.

A = Increase in the productivity or efficiency with which inputs are used.

In that, output depends not only on capital and labour but natural resources and also efficient use of inputs. They affirm that most efforts to measure the sources of growth have indicated

that increases in productivity or efficiency accounts for a much higher proportion of growth than was believed to be the case before calculations were made.

Furthermore, they assert that structural changes in the course of economic development thus involves rises in productivity and also increases in the capital stock relative to other inputs such as labour and that it involves major shifts between the sectors that make up the output side of the production function equation.

[Begg et al., 2003: 423] are also of the view that as technical progress takes place we get output from given inputs. They illustrate this with the simple production function

$$Y = A * f(K, L) \quad \ldots\ldots 3$$

where f (K, L) are the available inputs that are combined to produce a given output and the technical progress is captured in the available 'A'. This encapsulates all the other structures needed to enhance efficiency in production and hence increases in productivity. It shows the increases in output not accounted for by increases in labour and capital. This production functions assume constant returns to scale, implying that the sum of physical capital and labour shares in output equal to unity.

In counteracting one of the early doomsters on growing population and production – Rev Thomas Malthus -1798, he stated that even though some poorer developing countries today face what is called the Malthusian trap it has not proved correct for all countries. Today's rich countries managed to break out of the Malthusian trap so the question has then been; how was it done? As a rejoinder to this we can say they managed to improve agricultural productivity without an immediate population increase so that some workers could be released into industrial production as well as seeing to the production of capital goods. The effect of these structural changes were seen in increased output per worker and secondly the

rapid technical progress in agriculture led to large and persistent productivity increase reinforcing the effects of moving to a more capital - intensive production. The consensus made is that labour – augmenting technical progress would do the trick [Begg et al., 2003: 423].

2.1.3 Growth and Structural Change in Production

It is interesting to know that Asian regions were able to make large and speedy transitions out of agriculture and into industries and services, while economies with little structural change lagged behind. Structural change in the economy implies that some sectors or industries grow faster than others in the long-run. For instance in the transition to a market economy the countries of Eastern Europe underwent significant structural changes.

Structural change of an economy refers to a long-term widespread change of the fundamental structure, rather than micro-scale or short-term output and employment. For example, a subsistence economy is transformed into a manufacturing economy, or a regulated mixed economy is liberalized. Structural-change theory deals with policies focused on changing the economic structures of developing countries from being composed primarily of subsistence agricultural practices to being a "more modern, more urbanized, and more industrially diverse manufacturing and service economy." There are two major forms of structural-change theory; W. Lewis' *two-sector surplus model*, which views agrarian societies as consisting of large amounts of surplus labour which can be utilized to spur the development of an urbanized industrial sector, and Hollis Chenery's *patterns of development* approach, which holds that different countries become wealthy via different trajectories. The pattern that a particular country will follow, in this framework, depends on its size and resources, and potentially

other factors including its current income level and comparative advantages relative to other nations.

Structural change can be initiated by policy decisions or permanent changes in resources, population or the society. Structural change involves obsolescence of skills, vocations, and permanent changes in spending and production resulting in structural unemployment.

Structural change leads to a change in the composition of output. It is aimed at economic expansion and sustained growth of the economy. It deals more with the sectoral composition of output.

Correspondingly, most important, one of the primary characteristics of more developed economies is their structural transition away from agriculture toward manufacturing and modern services [Nayak and Mishra, 2009: 2].

Studies by [Isaksson, 2009: 5] shows that firms and resources moving from low-productivity to high productivity sectors contribute to aggregate productivity performance by changing the distribution of activities in favour of the latter or, couched differently, structural change is a source of productivity growth. Whereas relative sectoral productivity levels change and cause structural change, what is important here is the role such that change means for aggregate performance. This aggregate does not have to be at the total economy level, but might as well as occur at total manufacturing level or some other aggregate within, say, manufacturing. In this discussion he stressed that productivity growth can be realized either by the "within" effect or by the "between or reallocation or structural change effect." The "within" effect is where overall productivity change can occur because firms become more technologically advanced and increase their productivity performance while the "between or reallocation or structural change" effect is where a sector's productivity performance can increase because the sectoral composition or population of firms has changed. For example, a positive effect

occurs when firms reduce their activities in sectors with low technological sophistication and move resources and become more active in sectors with higher sophistication. As this involves higher technology levels, overall productivity increases.

In optimal growth studies on developing countries it has been emphasized that after structural changes have occurred; the production technology of the economy becomes the higher. Structural changes push a country's production possibilities frontier outward. [Ni and Wang, 1995: 305].

Lorentz and Savona (2010) maintains from their study that the mechanisms at the core of the process of structural change can be grouped into three main classes:

(i) Structural change can be driven by competition, through international trade and sectorial specialization. Economies tend to specialize in the economic sectors for which they experience or gained competitive advantage. This argument is in line with the traditional Ricardian argument.

(ii) Structural change can be driven by modifications in the production apparel. Transformations in the nature of production or of the production process lead to a transformation of the employment and/or output structure of the economy. These can be driven by productivity differentials, fostering transformations in favour of the reduction of production costs, a macro-level division of labour leading to the emergence of new sector or transformations in the technological and/or organizational structure of the production process.

(iii) Structural change can be driven by transformations in aggregate demand. The structure of final consumption bounds the extension of output. The structure of expenditures relies on the differences in income elasticities and the expansion of

income, shaping the long run structure of the economies and their changes. This approach is in direct line with the more empirical analysis bridging structural transformations and Engel curves.

2.1.3.1 Arguments on Structures and Growth

It is important to investigate how the shifts of resources impact on productivity, the long-run determinant of growth. This issue is of great importance for policymakers because a slow adjustment of productivity bears a cost in the long-run as foregone growth. Two previous studies investigate the relation between the structure and performance of Turkish manufacturing industries. The first decomposes the productivity growth of manufacturing into the contributions of individual industries to aggregate productivity growth (net productivity effect) and the sectoral labour reallocation effect after 1970. They find little structural change to productivity advances under the post-1980 structural adjustment reforms did not bring about gains in real wages. Finally, they argue that post-1980 structural adjustment reforms cannot be a viable strategy of "export-oriented industrialization" as those practiced in the East Asian economies. [Akkemik, 2006: 72]. Researches like that of [Metcalfe et al, 2002: 1] and [Montobbio, 2002: 387] is more related to the issue of structural change among industries within one of the three broad sectors, most notably the manufacturing sector.

In support of a change in structure to enhance productivity so as to promote economic growth, [Todaro, and Smith, 2009: 118] review that like the earlier Lewis model, the patterns – of – development analysis of structural change focuses on the sequential process through which the economic, industrial and institutional structures of an underdeveloped economy is

transformed over time to permit new industries to replace traditional agriculture as the engine of economic growth. Patterns – of – development analyst argue that increased savings and investment are perceived to be necessary but not sufficient condition for economic growth. But then in addition to the accumulation of capital, both physical and human, a set of interrelated changes in the economic structure of a country are required to a modern one. These structural changes involve virtually all economic functions, including the transformation of production and changes in the composition of consumer demand, international trade, and resource use as well as changes in socio-economic factors such as urbanization and the growth distribution of a country's population. This asserts that there is a need for structural changes and in addition such changes should be interrelated in respect to the sectors of the economy.

The argument continues with a study by [Aiginger, 2005: 8] which holds that the three sector hypothesis and the norm structure hypothesis specifically and in general all hypotheses which stress changes in demand and in endowments relative to income per capita, imply that the causality runs from growth to changing structures. [Solow, 1957: 312-320] acknowledges that growth is not mainly caused by the accumulation of physical factors of production like capital and labour. During periods of slow growth, the idea emerges that structures changed too slowly. This was the case in Germany, as growth decelerated during the sixties, following the extraordinary post war growth; in the United Kingdom, as it deplored its industrial decline; and in the USA, as it complained that it was losing competitiveness with respect to the Japanese during the late eighties. This diagnosis returned in the nineties, as Europe also experienced a period of slow growth compared to its performance over the past decades, as well as compared to the USA. It was believed that political or institutional factors prevented adequate change; specifically, it was said that the labour market was not flexible enough;

product market distortions were added (OECD Job Markets Study, OECD indicators on labour and product market regulation).

There is, however, also a strand of literature, which stresses that changes can be too fast. It stresses the burden of change on infrastructure, firms and people. On the one hand, it has to do with sociology or political science, which stresses the social costs to specific groups. Some studies stress that the necessity to change from one industry to another (inter industry change) infers larger adjustment costs, than intra industry change. The latter was intensively measured by indicators of intra industry trade. Structural and regional programs initiated by the EU were designed on the one hand to decrease the burden of sudden change on less developed regions; and secondly, to provide infrastructure and skills, enabling the necessary specialization into products for which these regions had comparative advantages. But the upgrading of infrastructure and of skills takes time, so that the speed of change is sometimes too fast.

In that, in the process to make structural changes in order to effect growth there is the possibility of facing what is termed ***structural contradiction.*** This can only be evident in a situation where measures are not taken to develop and train human capital alongside the structural changes. That is in the case to modernize the manufacturing process in the economy native handicraft industry begin to face out in order to give way to more sophisticated means of achieving greater returns. Developing countries in Asia and Africa have stories to tell in support of this. For instance in the case of Ghana, as a result of the influx of foreign manufactures and goods, most industries especially in the textile sector countenanced severe demand hiccups and the industry began to die. The standards of living of the workers were also reduced as a result of low demand for their services. So the fact that

the native (traditional) industry faced out and the standard of living of workers were downsized then it sums up in what is called 'structural contradiction [Kaname, 1962: 5].

2.1.3.2 The role of dynamics and specialization

Another group of studies investigates specialization in industries which are considered to be important for future growth, specifically in high tech industries, in technology and marketing driven industries [Peneder, 2000: 117], or in information and communication technology [Amable ,2000: 413]. In general, the empirical studies prove that a high share of "promising industries" supports growth, but the contribution of structure to growth remains weak. Many intervening variables exist and the problem of two-way causality is also present in this relation. If we switch to the question whether growth is related to the degree of specialization, the null hypothesis is that higher specialization should imply higher productivity. [Aiginger, 1999: 119] finds no general support for the growth of manufacturing, neither exports nor employment depend on the degrees of specialization. An essential insight of classical development economics was that economic growth is intrinsically linked to changes in the structure of production. According to this view, industrialization is the driver of technical change, and overall productivity increases are mainly the result of the reallocation of labour from low- to high-productivity activities. The best procedure for developing countries to catch up with the developed countries is that economic growth in developing countries should be about changing the structure of production. Thus for developing countries, growth and development are much less about pushing the technology frontier and much more about changing the structure of production.

The empirical research on economic growth indicates that it is not self-evident that a poorer country will grow faster simply because it is starting from a lower level. The findings of [Barro,1996: 11] using cross-country analysis show that the initial levels of per capita income and human capital, and other factors such as the fertility rate, the level of government consumption, the ratio of investment, the rule of law and the terms of trade are all important for growth, with a developed institutional environment and good policies being associated with lower transactions costs and a greater supply of information to reinforce economic decision-making, which if absent can reduce the scope for specialization and economic growth. Similarly, incomplete markets for capital and finance and associated high costs of public funds arising from an inefficient fiscal system can undermine investment required for growth. The importance of maintaining essential complementary public expenditure on infrastructure in order to stimulate private sector investment in productive activities. Growth has also been linked to the political environment and to resource endowments [Lall, 2000: 337].

2.1.3.3 Reallocation of Inputs to Promote Growth

Summary of the recent empirical literature exploring micro datasets for a look at questions of aggregate growth is that "does reallocation contribute significantly to aggregate productivity growth"? For the US manufacturing sector, roughly half of total productivity growth can be accounted for by the reallocation of input and output away from less productive to more productive businesses". He warns, however, that it would also be wrong to always claim that a faster pace of reallocation has to be a signal of greater efficiency or that one would predict a monotonic relationship between the pace of reallocation and growth. [Caballero and Hammour, 2000: 14] claim that the magnitude and timing of reallocation may be inefficient.

Thus, while the evidence suggests that reallocation does contribute positively to growth, there can also be too many micro changes, and there can be inefficiencies in the pace and timing of reallocation.

2.1.3.4 Capital Accumulation and Changes in Structures

China's remarkably rapid growth since 1978 has been driven by four factors. First is a high savings rate, which has supported vigorous rates of investment and capital accumulation. Secondly, Structural change, which has been both a cause and an effect of growth. The third is Pragmatic reforms, which were well suited to China's unusual circumstances and enjoyed broad support. The last is Economic conditions in 1978, which were especially receptive to reform; [World Bank, 1997: 11].

2.1.3.5 Importance of Competition

In addition to these, role of competition in structural change has been examined by [Uchida and Cook, 2005: 258] for developing countries in Latin America and Asia, and the results compared to industrialized countries such as the US, Germany and Japan. Levels of competition among the developing economies were highest in Hong Kong and the Asian economies in general and lower in Latin America. Lower and stagnant levels of domestic competition were evident in Brazil and Argentina. The study concluded that there were no industry specific characteristics with respect to changes in domestic competition except for the food industry. In the food industry high levels of entry are particularly evident.

2.1.3.6 Support for Other Factors Aside Capital Accumulation

According to [Cook and Uchida 2006: 7] there are many factors that influence economic growth. Earlier works stressed the importance of labour and capital accumulation, saving and technical progress [Solow, 1956: 65]. It has also been argued that growth depends on government policies with respect to levels of consumption spending, protection of property rights, and distortions of domestic and international markets. Also likely to be important are infrastructure investments, R&D outlays, the quality of education, and the distribution of income and wealth. [Barro, 1996: 9]. The endogenous growth literature incorporates the importance of human capital. In developing countries it has been argued that accumulating physical capital and labour is more significant for growth where technological development is limited, and where technological development is limited, and where opportunities for specialization exist. While this is the case [Cook and Uchida 2002: 1195] have shown that in the case of the so-called East Asian miracle economies initial impetus to growth through accumulation of factors of production gave way to growth being driven by technical innovation and greater technical efficiency.

2.1.4 Production Organization and Manufacturing

From the detailed structure and explanations of International Standard Industrial Classification (ISIC), reviewed under ISIC Rev.4 Code C, 10-33, manufacturing activities are said to involve the physical or chemical transformation of materials, substances, or components into new products. Distinguishingly these materials, substances or components which are transformed by this sector of production, are raw materials and as well products of agriculture, forestry, fishing, mining or quarrying and other manufacturing activities.

Reference is also made that alteration, renovation or reconstruction of goods is generally considered to be manufacturing.

Noticeably output from manufacturing may be recognized as a finished or semi-finished product. Appendix 'F' shows the various grouping and description of activities which have been internationally considered to fall under the manufactures. The growth of production in sectors such as agriculture and services mostly require inputs from the manufacturing sector. Thus this sector behaves like a central node that receives and gives resources to the other sectors. The quantity and quality of its output is a determining factor especially in addressing importation policies.

Production organization inculcates the production capabilities, technological capabilities and resource availability. Thus the type of technology developed, the human capital needed to use machinery and also to advance them. It involves planning to relate given inputs to a desired output level. The planning aspect is where the manufacturing sector comes in. It must be able to answer basic production questions such as; what to produce, how to produce and whom to produce for. Organisation of production defines the level of sophistication of the manufacturing system. Aside input that may be acquired, government policies and the nature of the political environment considering key sectors of the economy can either promote or floor production activities. For instances in cases where manufacturers have to go through series of registrations to acquires the government's approval before starting operations but bureaucracy on the government's part surfaces, that would delay and disorganise production.

2.2 Empirical Review

In respect of all these, the study found that a causal relationship has been developed by the British Economist Nicholas Kaldor between industrial growth, productivity growth and GDP growth. These have been referred in literature as Kaldor's Growth Laws. Kaldor's first law asserts that manufacturing is the engine of economic growth. In consequence, there is a strong positive correlation between growth of the Gross Domestic Product (GDP) and the output growth of manufacturing. What he tries to affirm is that the faster the rate of growth of manufacturing output, the faster the rate of growth of GDP, which is the manufacturing sector's performance, is matched with the growth in GDP. The test model for this assertion is stated as;

$$q_{GDP} = a_i + a_2 q_m, \quad a_2 > 0 \quad \text{.....4}$$

where q_{GDP} and q_m are the growth of GDP and of manufacturing. This model specifies that there is a positive relationship between growth of GDP and the growth of manufacturing. This was tested against twelve developing countries data and the relationship was found true with an R^2 of 0.959 and the slope value of 0.614. This means the model used was able to verify the law that the manufacturing sector is the engine of growth giving an impetus to overall growth of GDP in these developing countries over the data period 1953-1954 to 1963-1964.

The Second law of Kaldor states that in the manufacturing sector, the growth of productivity is positively associated with the growth of production, to which Kaldor gave the name of "Verdoorn's Law". The Verdoorn's Law is specified as

$$P_M = b_1 + b_2 q_m \quad \text{.....5}$$

Where P_M is the growth rate of labour productivity in manufacturing.

The third law of Kaldor maintains that the growth of productivity of an economy as a whole is positively connected with the growth of output in the manufacturing sector through the labour transferences to the manufacturing sector from the other sectors including agriculture and service. Formally, the model for this assertion has been stated as;

$$P_{GDP} = d_0 + d_1 q_M \quad d_1 > 0 \quad \text{.....6}$$

Critically, these three laws are in support of the fact that there is a strong relationship between the growth of manufacturing output and economic growth that is growth of total output. In that, there is a significant causal relationship between the two [Kaldor, 1975: 891]. The first law was also tested by [Felipe, 1998: 463] using times series data for five Southeast Asian countries and the results showed that manufacturing plays a significant role overall GDP growth for four of the countries except one which is Indonesia for which the regression result showed that the manufacturing sector had a zero impact on the rest of the economy's growth.

The world economic survey 2006 has concluded that productivity growth in developed countries mainly relies on technological innovation. For developing countries, however, growth and development are much less about pushing the technology frontier and much more about changing the structure of production towards activities with higher levels of productivity. This kind of structural change can be achieved largely by adopting and adapting existing technologies, substituting imports and entering into world markets for manufacturing

goods and services, and through rapid accumulation of physical and human capital. A few developing countries have been able to undertake original research and development in some fields, but technological innovation continues to be highly concentrated in the industrialized world. These fundamental differences in the nature of the growth process between developed and developing countries remain a subject for considerable debate among economists. Among the most important analytical developments in recent decades has been the explicit recognition by the so-called new growth theories of the role of external economies in human capital formation and technological innovation, dynamic economies of scale associated to learning by doing, and institutional factors in the growth process. These new insights have moved away from the more traditional perspective that accumulation of capital was the key to economic development. They also held the promise of a better linking of policies to economic growth performance.

According to [Cowling and Tomlinson, 2001: 21] the general principle behind the Western corporation was the realization that large-scale production of a standardized product could achieve greater (internal) economies of scale, higher productivity and lower prices than traditional small-scale craft production. In affirming this [Aoki, 1990:13] as one of the proponents to this, added that, in order to achieve these objectives, large Western firms relied upon raising the rate of mechanization in production and also increasing the division of labour, which was achieved through a greater standardization of workers' jobs. Firms also introduced a system of scientific management, or Taylorist organization, where workers' tasks were periodically monitored and subjected to work measurement audits. These processes were implemented through a hierarchical structure of management and seniority, which acted both as an incentive device for workers to achieve "promotion." Exploiting new opportunities always requires changes, which sometimes lead in the direction of

specialization and concentration, and sometimes make use of a firm's own capabilities to extend operations into other countries.

Empirical results from the Chinese economy prove that structural change has contributed to growth significantly by reallocating resources from low productivity sectors to high productivity sectors. In recent years the Chinese economy has performed spectacularly well. Gross domestic product (GDP) grew at 9.8% per year from 1978 to 1998. The economy has also undergone dramatic and continuing structural changes. China is the fastest- growing economy in the world, with per capita incomes more than quadrupling since 1978. While there have been significant increases in agricultural productivity, the share of agriculture has declined as the manufacturing and services sectors have grown much faster [World Bank, 1997: 11]. In contrast Ghana's manufacturing sector is relatively small and underdeveloped and its contribution to GDP growth was around 10% in the 1990's. It is difficult to identify consistent patterns of change in Ghana's manufacturing sector, however, because of the instability and poor performance of both the economy as a whole and the manufacturing sector in particular [Asante, 2002: 3]. The reports by [UNESCO, 2011: 164] have concluded that, the manufacturing sector holds the key to Ghana's economic growth given the desire to diversify from agriculture to other sectors. Although the sector's contribution to the national economy has not significantly improved lately, there is every reason to believe that with proper policies and investment incentives in place, manufacturing sector is a growth area. This statement is in support of the fact that this sector is in dire need of structural change so as to make it a large contributor in Ghana's growth process. In an analysis from the work of [Krakah et al, 2009: 2] they highlighted that the manufacturing firms in Ghana since independence where the emphasis was on state owned and managed enterprises or firms to our current economic dispensation which focuses on the private sector as the engine of

Ghana's economic growth, where most if not all manufacturing firms are now owned and managed by the private sector have had a chequered history. Their study explain that the sector has been influenced by economic dynamics which have both national and international dimensions. In the international front it has remained subservient to counterparts in the developed world who then determine their fate in international business.

A supporting publication by Yeboah, (2011) has also added that the manufacturing sector of Ghana is finding it difficult to compete on the international market according to 2011 Growth Estimates from the Ghana Statistical services. In that he feels this sector is to be blamed for the unemployment situation in the economy due to it almost moribund nature. GOG, (2012) adds that Ghana's manufacturing sector has not responded well to the various economic and trade policy reforms pursued over the past decade. Manufacturing firms have faced considerable challenges in the form of increased competition in the domestic and export markets and high production and distribution costs arising from high interest rates, aged and obsolete equipment, inefficient infrastructural services and low productivity. Government will initiate and implement policies to develop requisite skills, ensure adequate and cost-competitive production inputs and services and provide needed finance for industrial development.

Likewise a study by [Jenkins and Edwards, 2004: 6] that assessed the impact of China's trade on 18 developing countries (6 in Asia, 6 in Africa and 6 in Latin America) showed that countries that had significant trade with China were mostly exporting primary (agricultural and extractive) products. If this trend continues, little structural change is likely to occur for the exporting countries and therefore not much ground will be gained in terms of value added of output. Definitely, a growing China will keep demand for developing-country exports high

and will possibly keep the commodity prices high as well, but will growth be sustainable without significant structural changes? In other words, the growth in Latin America and Africa resulting from the higher demand following the rise of East Asia and specifically China will remain primary export-dependent unless these economies make efforts to terminate their path-dependent specialization. Alternatively, if the Chinese economy itself undergoes structural changes of the sort observed in other East Asian countries, and continues to climb the technological ladder, it will import more labour-intensive products from its trading partners. This should provide opportunities for other developing countries with a large pool of underutilized labour; but for now, as Jenkins and Edwards demonstrated, the Chinese economy represents a competitor to many developing countries specializing in labour-intensive products. The threat posed by China's low-cost manufacturing arises with respect to both third markets and the competition of imports with the goods of domestic producers. In this sense, China's growing importance in the global market might exacerbate growth divergences. Future prospects depend not only on the structural changes that the Chinese economy will undergo but also on the microeconomic trends related to costs and productivity that follow growth. According to [Amin, 2002: 806] it has now been established that long-term economic growth has been greatly influenced by the literacy level (knowledge) of the population. This empirically infers to the endogenous growth theory. Classic cases are the examples of Japan, Korea and Taiwan, where the educated base provided the necessary institutions and infrastructure for industrial advances that generated economic successes beyond anyone's dreams [Lau and Klein, 1990: 5]. In fact, the rising level of human capital in these countries will continue to increase the technological levels and promote the upgrading of the industrial structures. Examining sources of Chinese economic growth, [Hu and Khan, 1997: 1] found that contrary to the tradition, efficiency was the driving force behind the Chinese economic boom, with sharp productivity increases

explained by economic reforms that started in 1978. Little was said about education. In general, we need more information to explain the variation in factors contributing to output growth, more so as sector analyses may give different outcomes. Recently [Easterly and Levine, 2001:45] have found that most of the income and growth differences across nations are accounted for by the "residual" total factor productivity and not factor accumulation, which tends to persist while growth does not. These stylized facts of economic growth seem to be seen in developed economies more than in the developing economies.

In conclusion there are variant contributions that have been made to the studies of economic growth especially for the developing countries. Though some to the literatures reviewed have shown the need to foresee a structural change whenever economic growth comes to thought, a few also took the vice versa in this case thus advocating that the causality is rather economic growth to structural changes. This implies that there are a lot of ideas that need to be careful linked when we talk about economic growth. This therefore calls for enormous amount of talents and efforts to be invested in understanding the process of structural change and economic growth.

CHAPTER THRÉE

METHOD OF ANALYSIS AND DATA DESCRIPTION

Introduction

This chapter presents the conceptual framework of the empirical model to test theory using data from Ghana. The chapter is made up of two sections. Section one provides the definitions of the variables used in the study and how they are measured. Section two is focused on the specification of the operational models. This section includes the specification of the operational models and time series properties of data.

3.1 Analytical Approach

3.1.1 Description of Variables

Annual percentage growth rate of GDP at market prices based on constant 2000 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Dollar figures for GDP are converted from domestic currencies using single year official exchange rates. This study takes the sample data for the years from 1960 to 2006.

Total labour force comprises people from ages 15 and older who meet the International Labour Organization definition of the economically active population: all people who supply labour for the production of goods and services during a specified period. It includes both the employed and the unemployed. While national practices vary in the treatment of such groups

as the armed forces and seasonal or part-time workers, in general the labour force includes the armed forces, the unemployed and first-time job-seekers, but excludes homemakers and other unpaid caregivers and workers in the informal sector.

In this study gross capital formation is used as a proxy for capital. Gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales, and "work in progress." According to the 1993 SNA, net acquisitions of valuables are also considered capital formation.

Manufacturing growth per cent of GDP is the contribution that the manufacturing sector makes to the annual GDP. Manufacturing refers to all activities belonging to ISIC divisions (Appendix E).

3.1.2 Model Specification

This study employed the Cobb-Douglas production theory and Kaldor's first law to test data against theory.

3.1.3 Model I Test for Total Factor Productivity

The study employs the Cobb-Douglas production theory thus the aggregate production function to estimate the total factor productivity. The model is stated as;

$$Y = A\ L^{\alpha} K^{\beta}, \qquad \alpha + \beta = 1 \quad \ldots\ldots 1$$

This function has the property of constant returns to scale (CRS) – implying any proportional increase in both inputs results in an equal proportional increase in output; that is, doubling both L and K inputs would double the Y real output. But in this study we relax the assumption of CRS. Relaxing this assumption implies the factor elasticities do not necessarily have to add up to one ($\alpha + \beta \neq 1$). The parameter 'A' captures the increases in output not accounted for growth by labour and capital. It is an amorphous parameter.

In this study 'A' which is the TFP level is a proxy to measure the structural changes in production organization that contributes to output growth. This residual here takes care of both the embodied and disembodied technical progress.

For econometric analyses using linear regression techniques we take a logarithmic transformation of the production function to estimate the unknown parameters '*A*', '*α*', *and* '*β*'.

$$\ln Y = \ln A + \alpha \ln L + \beta \ln K \quad \ldots\ldots 2$$

introducing a disturbance term

$$\ln Y = \ln A + \alpha \ln L + \beta \ln K + \varepsilon \quad \ldots\ldots 3$$

This model was similarly used by [Ozyurt, 2007: 9] for the calculation of the total factor productivity in the Chinese economy for the period 1952-2005.

3.1.4 Model II Relationship between Growth of Ghana's Manufacturing Sector and GDP Growth

Test of Kaldor's First Law

Kaldor's first growth law has been stated as showing a strong positive relationship between growth of Gross Domestic Product and output growth of manufacturing. This model is stated as;

$$GDP_{gt} = a_i + a_2 M_{gt}, \quad a_2 > 0 \quad \text{.....4}$$

This model is stating that growth of the manufacturing sector has an effect on the growth of GDP. The regression model is specified as;

$$GDP_{gt} = a_i + a_2 M_{gt} + \varepsilon \quad \text{.....5}$$

Where GDP_{gt} = growth of GDP and M_{gt} = growth of manufacturing and ε is the stochastic term.

This model would be used to test the certainty of this relationship using data from Ghana.

3.1.5 Granger Causality Test Between GDP growth and Manufacturing growth

The study also tested to find out whether it is GDP growth that causes growth in manufacturing or the other way causality. From the granger causality test, we estimate the following pairwise regressions holding the assumption that the disturbance terms of the two regressions are uncorrelated. The one way causality for GDP growth causing manufacturing growth are given as;

The restricted model is stated as;

$$GDP_{gt}=\sum_{j=1}^{n} b_i\ GDP_{t-i}+\varepsilon_t \quad \text{.....6}$$

and the unrestricted model is;

$$GDP_{gt}=\sum_{i=1}^{n} b_0\ GDP_{t-i}+\sum_{j}^{n} b_1\ MANF_{t-j}\ +\ \ \varepsilon_t \quad \text{.....7}$$

Where GDP_{gt} is the annual GDP growth and GDP_{t-i} are the corresponding lags. $MANF_{t-j}$ is the lagged value of manufacturing growth.

We then compute the F-statistic as; $F = \dfrac{(RSS_R - RSS_{UR})/K}{RSS_{UR}/(n-k)}$

On the other hand we repeat the same procedures for the other way causality with manufacturing causing GDP growth with the following models.

The restricted model is stated as;

$$MANF_{gt}=\sum_{j=1}^{n} b_i\ MANF_{t-i}+\varepsilon_t \quad \text{.....8}$$

and the unrestricted model is;

$$MANF_{gt}=\sum_{i=1}^{n} b_0\ MANF_{t-i}+\sum_{j}^{n} b_1\ GDP_{t-j}+\ \ \varepsilon_t \quad \text{.....9}$$

Where GDP_{gt} is the annual GDP growth and GDP_{t-i} are the corresponding lags. $MANF_{t-j}$ is the lagged value of manufacturing growth.

We then compute the F-statistic as; $F = \dfrac{(RSS_R - RSS_{UR})/K}{RSS_{UR}/(n-k)}$

From these models, we run the regressions and the results that may be obtained for causality may be unidirectional causality in the case where either GDP growth causes manufacturing growth or manufacturing growth causes GDP growth. Bilateral causality may also be the case when GDP and manufacturing coefficients are both statistically significant.

3.2 Data Sources

Data for this study were collected from official sources such as the International Bank for Reconstruction and Development (World Bank) national accounts data, and OECD National accounts data files as well as the World Development Indicators database. All the data that were used for this study were from secondary sources. These secondary sources of information included journals, articles, reports, newspapers, seminar papers and other unpublished materials.

3.3 Analysis of the Time Series Properties of Data.

This study uses annual GDP values which are a time series data. In other to use the regression result for forecasting the data values must be stationary.

$$GDP_{gt} = a_i + a_2 M_{gt} + \varepsilon \quad \text{.....10}$$

Thus the study uses the unit root test to check if the data is not-stationary and thus correct it to be stationary. A time series data is said to be stationary if it's mean and variance do not change systematically over time [Gujarati, 2004:367]. Standard tests for the presence of unit root based on the Augmented Dickey-Fuller test [Dickey-Fuller 1979].

If the data is found to possess a unit root thus are non-stationary purely due to unit roots, they can be manipulated back to stationarity by linear transformations, for example, by differencing, as in $X_t - X_{t-1}$. [Gujarati, 2004:822]

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF FINDINGS

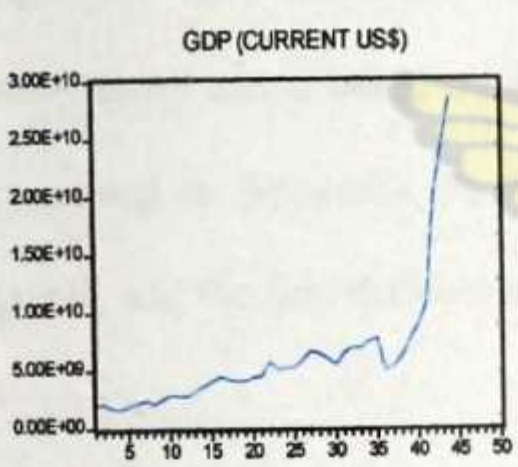
4.0 Introduction

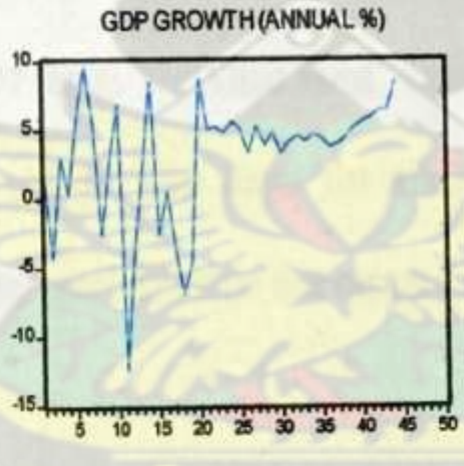
This chapter presents and discusses the test result of the study. This chapter is divided into four sections. The first section considers the econometric properties of the time series data used in the analysis. The preceding consecutive sections are devoted to the result of the models spelled out in Chapter 3. Section

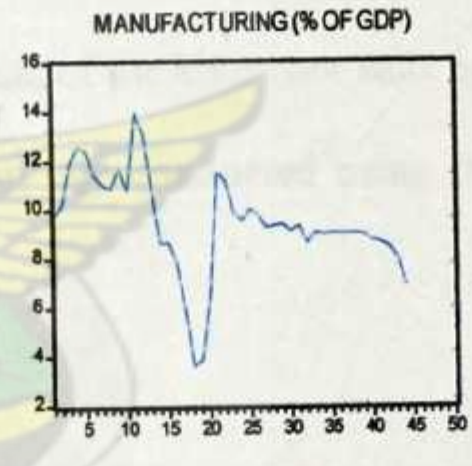
4.1 Unit Root Testing In Time Series Variables.

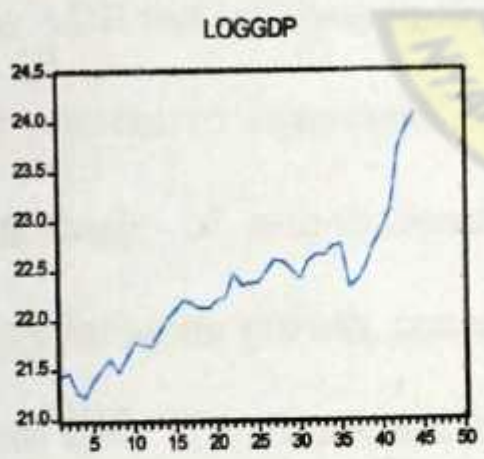
4.1.1 Graphical Test

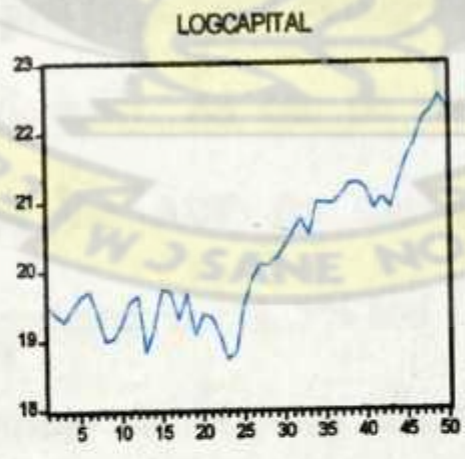
Figure 4.1 Graphical Tests for Unit Root

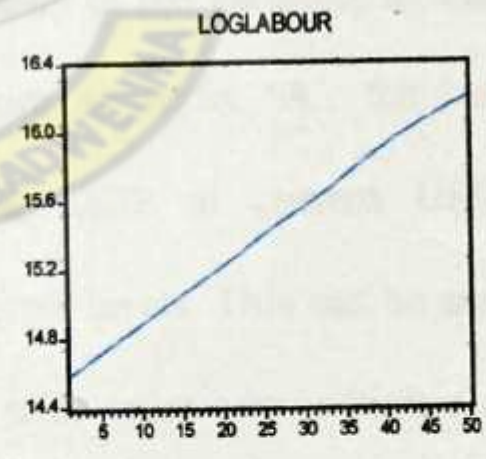












The hypothesis is: Ho: $\delta = 0$ (Unit Root)

H1: $\delta \neq 0$

Table 4.1 Results of Unit Root Test

Variable	Level or 1st difference	ADF statistic	Stationarity
GDP	Level first difference	-3.574446* -2.923780**	Stationary at level and at first
GDP_{gt}	Level first difference	-3.592462 -2.931404	Stationary at first difference
M_{gt}	Level first difference	-3.596616* -2.933158**	Stationary at level and at first
lnY	Level first difference	-3.571310 -2.922449	Stationary at first difference
lnL	Level first difference	-3.574446 -2.923780	Stationary at first difference
lnK	Level first difference	-3.571310 -2.922449	Stationary at first difference

** (*) denotes the rejection of the null hypothesis of unit root at 1% and 5% significance levels.

In other to examine the various equations stated in Chapter three, the stationarity of the variables that entered each equation specified in chapter three are determined. The stationarity test is based on the ADF tests for Unit root. The results of the Unit root tests are presented in Appendix A, for the ADF. The tests for stationarity are conducted using the levels, and the first differences of the variables in the equation.

The ADF test involves testing the null hypothesis of non-stationarity of the variables against the alternative hypothesis of stationarity. As can be seen from appendix 'A', the null hypothesis of non-stationarity by the ADF for the variable GDP at current USD, Manufacturing growth, cannot be rejected at 1%, 5% and 10% error levels. This can be seen from table 4.1. This implies that these variables are integrated with order one or higher as none of them is stationary at the levels by the ADF tests for stationarity. However, as can be seen from the test result in appendix 'A' all these variables become stationary after first differencing tests for stationarity. Thus the first difference of the variables is integrated of

order zero, I (0). The results from the test suggest that all the variables are I (1) in the levels hence indicating the presence of unit root in the data for all these variables. The outcome of unit root underscore the presence of non stationarity in the variables and so the need to do away with it in order to make a valid forecasting after regression analysis. The appropriate remedy is to use the first difference of the variables for estimation and analysis. On the other hand the log level of the variables, total labour force and capital were also not stationary after the ADF test implying the log levels are I (1). They become stationary after first differencing. The only variable that was stationary and hence integrated of order zero I (0) is annual GDP growth. Since the unit root has been eliminated estimation result and forecasting from these variables would not be spurious.

4.2 Ghana's manufacturing growth trend

Figure 4.2 shows the growth trend in Ghana's manufacturing sector. From the period 1965 - 2008 Ghana has had uneven trends for the growth recorded. Starting from1965 a crawling upward trend is seen until it came to peak in 1965 and 1969. But then this growth performance could not be sustained and so the rate declined and picked up again in the 1975 and 1976 fiscal years. The worst performance was recorded in 1982 and 1983. This is shown with the steep trough in the graph. In the period after 1983 when Ghana came under the Economic Recovery Program, the sector's performance improved again to an inconsistent growth but with a less decline as recorded in the period before 1983. This performance all other thing being equal may be attributed to the IMF policies under the Structural Adjustment Program since it sought to improve the industrialisation goal of the country.

Not withstanding this development, the period after 2002 has recorded a steady decline in the growth of the manufacturing sector's contribution to GDP. This status quo, all other things being equal may be attributed to the fact that currently the services sector in Ghana is performing creditably far better than all the other sectors. Most Ghanaian investors have loved to go into trade rather than into the production of goods. This is because they find it simpler recouping returns than in production which requires huge investment in both physical and human capital. Generally most of the large manufacturing industries are owned by foreigners through Foreign Direct Investment. Also the acquisition of machinery by the private sector has always been difficult and as a result of this most viable projects could not be established.

Figure 4.2 Growth Trend of Ghana's Manufacturing Sector.

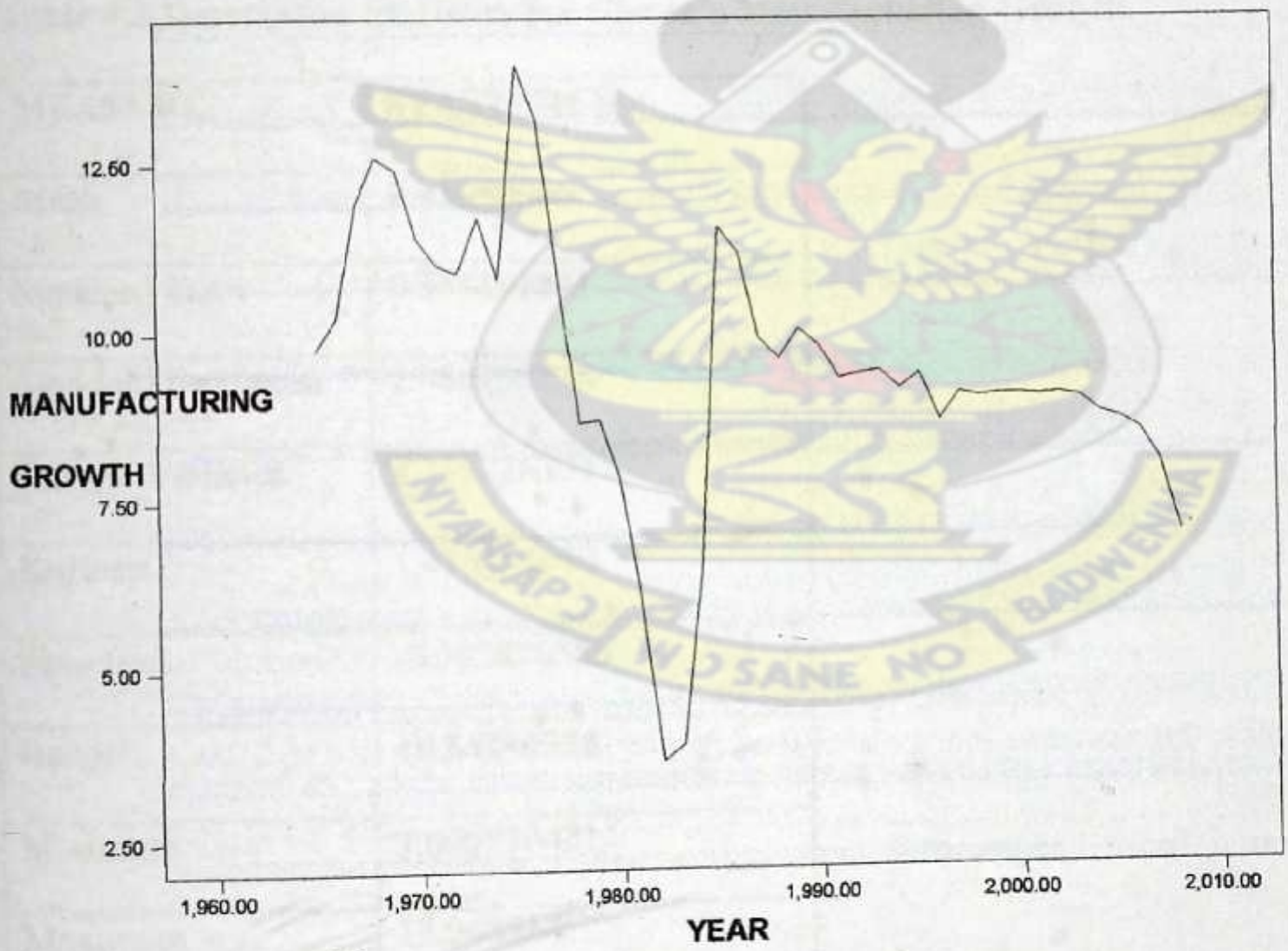


Figure 4.3 Contribution of the Manufacturing Sector to Merchandise Exports

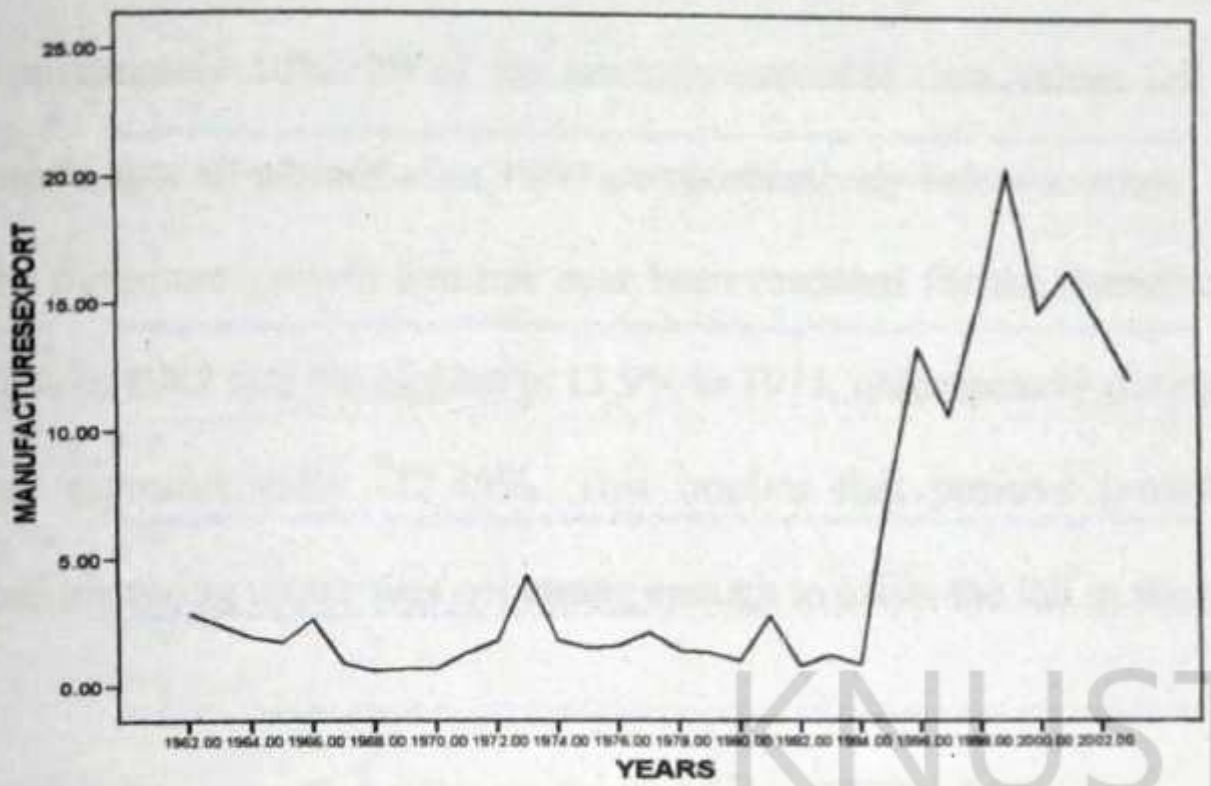


Table 4.2 Descriptive Statistics for Ghana's Manufacturing Growth

MEASURE	STATISTICS
Mean	9.45980686
Standard Error	0.314491881
Standard Deviation	2.086103138
Sample Variance	4.351826304
Kurtosis	1.476454059
Skewness	-0.592876556
Range	10.34300358
Minimum	3.605510421
Maximum	13.948514

Table 4.2 presents the descriptive statistics for manufacturing growth data for Ghana. Between the periods 1965 to 2008, the sector records an average growth of 9.5% which is approximately 10%. 29 of the annually recorded data values fall below this average and surprisingly all periods after 1989 are consecutively below average.

The minimum growth that has ever been recorded for the manufacturing sector's growth is 3.6% in 1982 and the highest is 13.9% in 1975, unfortunately during this period GDP growth was asymmetrically -12.43%. This implies that positive growth contribution from the manufacturing sector was not strong enough to offset the fall in the growth of the GDP.

4.3 Result of the Total Factor Productivity (TFP) of Ghana

This study created ten (10) years interval to measure the total factor productivity of Ghana over the period from 1960 – 2008. The values were derived using the Cobb – Douglas aggregate production function model stated in chapter 3. Regression is reported at Appendix

Table 4.3: TFP Growth over Time

Years	TFP
1960 – 1969	0.000000639
1970 – 1979	-0.976
1980 – 1989	0.115
1990 – 1999	0.587
2000 – 2009	-0.013

TFP growth rate here shows the gap between growth of GDP and the growth of the efficiency of factors of production. Total factor productivity is an implication for future growth. This is

because growth not backed by efficiency improvement but rather just accumulation of inputs makes future growth a great concern.

The increases in TFP could be as a result of or may be induced by increases in human capital, investment in research or infrastructure, innovations, changes in policies, institutions, economic system and hours of work. It is a strong driver of economic growth here. It is the productivity residual which accounts for the labour productivity variation that remains unexplained by proximate factor inputs.

The data presented in Table 4.3 presents Ghana's TFP for ten year interval periods. In the period 1960 – 1969 the value recorded was 0.000000639 which is nearly insignificant thereby reflecting limited potential for long-term growth. During the 'Lost Decade' in Japan evidenced in the 1990's it was realized that a poor value recorded for TFP had the potential of reducing the steady state-growth path. It is therefore not surprising that in the following decade thus 1970-1979 the TFP value record was negative

On the brighter side what was realized is that a consistent pattern of improvement in the country's TFP performance was recorded for three decades beginning after 1970 and ending in 1999 with a value of 0.587. The period after the 1990 – 1999 decade saw a drastic poor performance with -0.013 being recorded. Possible attributing reasons to this performance may be as a result of shift of resources to the services sector in Ghana in this period 2000 - 2009, as can be referenced from the study by [Amador and Coimbra, 2007: 12]. In the UK efficiency losses were recorded between 1960 -1975 and this pattern in total factor productivity were attributed to underinvestment and restructuring in some industries, driving to a shift of resources to services. In no contradiction to the stated, the improved performance recorded in their last decade may reveal some payback of these structural changes.

With structural changes in the current period showing the potential for future growth the intuition is that having the manufacturing sector to be the engine of growth because of its special growth inducing features transmitting to the other sectors of the economy, it holds that less attention to structural changes in this sector affects the rest of the economy. Studies are showing that the manufacturing sector is a wealth creating sector for the economy while the services sector is a wealth consuming sector. In that, with the statistics that are showing that the services sector is growing more than all the other sectors of the Ghanaian economy this may explain why there is a negative value recorded for the 2000 – 2009 decade. For instance in the case of employment, when there is a strong manufacturing sector its able to draw surplus labour from the agricultural sector and also send out experienced labour within manufacturing itself into services. This implies structural change in the manufacturing sector requires a thoughtful consideration of its growth transmission mechanism throughout the whole economy.

Figure 4.5 Bar graph of the Value Added of the Manufacturing Sector.

Figure 4.5 shows a graph of the value added of the manufacturing sector. Value add is one of the measuring stick of the manufacturing sector. It leads to the identification of efficiency in

the processes of production. This graph shows the annual trend of the sector's value add based on criterion of the net output of the sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3.

It therefore shows the contribution of the sector to total production. The sections that records negatives shows that work that were actually valuable and results in finished products were poor. The value input is mostly correlated with the price consumers are ready to pay for the product as well as a forecast for all future demand patterns of goods.

The negatives also show that capacities expended were wasted. All other things being equal negative value added may present a reason for overproduction and hence a dire need for structural change.

4.4 Result of Test of Kaldor's First Law

Table 4.4 Kaldor Test Result

Mode l		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	3.060	.697		4.389	.000
	DMANF	-.305	.530	-.089	-.575	.568

a Dependent Variable: GDP

Model Summary

Mode l	R	R Square	Adjusted R Square	Std. Error of the Estimate

1	.089(a)	.008	-.016	4.56576

a Predictors: (Constant), DMANF

$$GDP_{gt} = 3.060 - 0.305M_{gt} \quad \text{.....4.1}$$

The regression result for the test of Kaldor's First Law which states that there is a positive relationship between overall growth of GDP and growth of the manufacturing sector, shows an asymmetry using data values from Ghana. This implies that manufacturing growth is less significant in its contribution to the GDP growth in Ghana. In other words, this is showing that growth in GDP in the country has resulted from other sectors than the manufacturing sector as a whole. This means that share of manufacturing industry in GDP is not the factor in accounting for growth of GDP for the period under study. The R^2 value of 0.008 which is too low tells that the manufacturing sectors overall contribution to GDP growth over the period under consideration is poor.

With this result it therefore means that Ghana must invest as well as jeer towards a policy implication that would bring about structural changes in the manufacturing sector. The reason that may be attributed to the positive relationship that Kaldor found for the developed countries is the fact that these countries have gone through several transitions in the process of industrialisation and that their manufacturing sector has grown to produce in excess to feed markets in other parts of the world. Over the years Ghana's GDP growth performance has been from the primary sector with the export of raw material such as cocoa and gold.

4.5 Result of the Granger Causality Test

Table 4.5 Decision Results for Granger Causality Test.

Direction of Causality	Lag	*F* value	Decision
GDP → MANF	1	1.35372	Do Not Reject
MANF → GDP	1	0.10971	Do Not Reject
GDP → MANF	2	1.95711	Do Not Reject
MANF → GDP	2	1.02082	Do Not Reject
GDP → MANF	3	2.80865	Reject
MANF → GDP	3	0.72330	Do Not Reject

$^{*}F_{(2,40)} = 2.44$

From table 4.5, using the first and second lags of the variables GDP growth and manufacturing growth, the results obtained shows that there is a bilateral causality between them because they were all statistically significant. In this case the causality runs from GDP growth to manufacturing growth, as well as manufacturing growth to GDP growth.

But, when a lag of 3 is used the causality runs from manufacturing growth to GDP growth that is manufacturing growth granger causes GDP growth. The causality from GDP growth to manufacturing growth is rejected.

This explains that, manufacturing growth predicts growth of GDP than the past values of GDP. All other things being equal whenever there is manufacturing growth it gives a momentum to GDP growth.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

The subject matter that this study sought to find is the measures that the manufacturing sector in Ghana can institute which are components of structural change in production organization that would impact the GDP growth. The manufacturing sector in Ghana as the study recognized is small, thus in the sense that its contribution to GDP growth is almost insignificant. It has been overrun by other sectors such as services and agricultural. This being evident Ghana's market is influx with a lot of imported items of which most could have been produce domestically.

In looking at the growth trend of this sector as its performance to GDP growth, manufacturing has not been able to show a sustained growth.

Using the total factor productivity residual to find out the levels of efficiency in production in Ghana, it has been observed after categorizing data into periods of a decade each between 1960 and 2009 that currently the country's TFP is negative.

The test of Kaldor's first law which asserts that manufacturing growth has a positive relationship with GDP growth was found negative in the case of test against Ghana's data. Kaldor conducted his test from data of developed countries.

Lastly the Granger Causality test was also used to find the causal relationship between GDP growth and manufacturing. Bilateral relationships were obtained after using lags 1 and 2 for the variables GDP growth and manufacturing growth. In each of these, the specification was that GDP growth predicts manufacturing growth while manufacturing growth is also predicting GDP growth. But then a clear differentiation was found after using a lag of 3. The causality therefore runs that manufacturing growth granger causes GDP growth.

5.2 Conclusions

The results from the analysis show that the manufacturing sector in an economy plays an important role in its overall contribution to GDP growth. In that the efficiency in production in the sector cannot be underplayed. The eyeing of a high growth performance from Ghana's manufacturing sector has not be achieved, and this may be as a result of the fact that investors from the private sector, public as well as most foreigners have loved to invest in service. Reason being that amounts invested are easily recovered. The competition that stems from outside with imports has killed efficiency in most manufacturing industries.

The fact that the test of Kaldor's first law is not consistent with Ghana's data implies the manufacturing sector is making but little contribution to GDP growth. This spells that there are a lot of structures within the sector that must be finetuned. Thus without addressing the rigidities hampering this sector, it would continue to be a mirage despite its growth targets.

5.3 Recommendations

From the analysis and conclusions made this study recommends that in order to achieve sustained increase in economic growth from production organization in the manufacturing sector;

- The government should diversify its budget composition for the manufacturing sector. What this implies is that it should not be for just a period spending on say infrastructure but rather create a linkage that would make all expenditures for the sector have a relevant interrelationship. For instance expenditure on capital should relate training of human capital (expert labour force), setting up of institutions and monitoring services that would create the environment for work and progress. Notwithstanding relevant infrastructure should be put up within the communities and also proper education given to users for their maintenance. Since aggregate demand counts in the case of structural change markets should be structured well in order inspire production at all times.

- Also an intense research team should be set up by the government involving technocrats and genius fieldworkers and those in academia to find out the key structures that the manufacturing sector of the country is lacking in order to recommend appropriate solutions. The growth of the manufacturing sector of Ghana and its monitoring should be left in the hands of these technocrats rather leaving it in the hands and manipulation of politicians. All other thing being equal this might be able to draw together talents on especially various technologies that may lead to the inventing and innovation of machinery for increased output.

- Furthermore, in order to master our own growth process as part of structural change; research and development should be centered in this process so that the country can develop the machinery and build on the human capital that would push the dream of manufacturing growth. Thus a lot of research work must be organized with the manufacturing sector on structures and its performance. This is because production and operations in most industries have mostly been abrogated with the lack of machinery and human capital.

- Lastly, a lot of research work must be organized with the manufacturing sector and its performance in GDP growth as well as measures to put in place in order to make it the key contributor. This is because there have been few researches in this area but a lot on economic growth which although is the end result that should be coming from a sector such as this. This study suggests that Ghana has the potential to build a vibrant manufacturing sector and this can be realized through structural change in this area.

5.4 Limitations of the Study

A major limitation of the study was lack of data for long periods of time. As a result of this, the time series data that could be used were available for a shorter period than were intended to use. As a result of this the study presumes that a study with data sets for longer periods may arrive at different results or findings.

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APPENDICES

APPENDIX A: UNIT ROOT TEST RESULT

ADF TEST OF UNIT ROOT RESULT FOR GDP.

Null Hypothesis: GDP__CURRENT_US$_01 has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic based on SIC, MAXLAG=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.405198	0.8999
Test critical values:	1% level	-3.574446	
	5% level	-2.923780	
	10% level	-2.599925	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(GDP__CURRENT_US$_01)

Method: Least Squares

Date: 08/11/11 Time: 09:19

Sample (adjusted): 3 50

Included observations: 48 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP__CURRENT_US$_01(-1)	-0.026734	0.065977	-0.405198	0.6873
D(GDP__CURRENT_US$_01(-1))	0.491067	0.212779	2.307874	0.0257

C	3.91E+08	3.77E+08	1.039016	0.3043

R-squared	0.173972	Mean dependent var	5.18E+08
Adjusted R-squared	0.137260	S.D. dependent var	1.74E+09
S.E. of regression	1.61E+09	Akaike info criterion	45.30030
Sum squared resid	1.17E+20	Schwarz criterion	45.41725
Log likelihood	-1084.207	F-statistic	4.738789
Durbin-Watson stat	1.963109	Prob(F-statistic)	0.013564

ADF TEST OF UNIT ROOT FOR GDP ANNUAL GROWTH

Null Hypothesis: GDP_GROWTH__ANNUAL___ has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.494626	0.0008
Test critical values:	1% level	-3.592462	
	5% level	-2.931404	
	10% level	-2.603944	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(GDP_GROWTH__ANNUAL___)

Method: Least Squares

Date: 08/11/11 Time: 09:23

Sample (adjusted): 2 44

Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP_GROWTH__ANNUAL___(-1)	-0.675885	0.150376	-4.494626	0.0001
C	2.134715	0.794462	2.686995	0.0104

R-squared	0.330084	Mean dependent var	0.164221
Adjusted R-squared	0.313744	S.D. dependent var	5.244526
S.E. of regression	4.344595	Akaike info criterion	5.821137
Sum squared resid	773.8958	Schwarz criterion	5.903054
Log likelihood	-123.1545	F-statistic	20.20166
Durbin-Watson stat	1.903486	Prob(F-statistic)	0.000056

ADF TEST FOR MANUFACTURING GROWTH

Null Hypothesis: MANUFACTURING____OF_GDP_ has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic based on SIC, MAXLAG=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.944305	0.0488
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(MANUFACTURING____OF_GDP_)

Method: Least Squares

Date: 08/11/11 Time: 09:27

Sample (adjusted): 3 44

Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MANUFACTURING____OF_GDP_(-1)	-0.277288	0.094178	-2.944305	0.0054
D(MANUFACTURING____OF_GDP_(-1))	0.425328	0.147917	2.875452	0.0065
C	2.577613	0.916706	2.811820	0.0077

R-squared	0.246404	Mean dependent var	-0.077991
Adjusted R-squared	0.207758	S.D. dependent var	1.342836
S.E. of regression	1.195231	Akaike info criterion	3.263306
Sum squared resid	55.71455	Schwarz criterion	3.387425
Log likelihood	-65.52942	F-statistic	6.375920
Durbin-Watson stat	1.881639	Prob(F-statistic)	0.004020

ADF TEST FOR LOG (CAPITAL)

Null Hypothesis: CAPITAL has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=1)

	t-Statistic	Prob.*

Augmented Dickey-Fuller test statistic		0.008929	0.9547
Test critical values:	1% level	-3.571310	
	5% level	-2.922449	
	10% level	-2.599224	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(CAPITAL)

Method: Least Squares

Date: 08/11/11 Time: 09:30

Sample (adjusted): 2 50

Included observations: 49 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAPITAL (-1)	0.000378	0.042276	0.008929	0.9929
C	0.050513	0.853889	0.059156	0.9531

R-squared	0.000002	Mean dependent var	0.058128
Adjusted R-squared	-0.021275	S.D. dependent var	0.293162
S.E. of regression	0.296264	Akaike info criterion	0.444827
Sum squared resid	4.125294	Schwarz criterion	0.522044
Log likelihood	-8.898254	F-statistic	7.97E-05
Durbin-Watson stat	2.025292	Prob(F-statistic)	0.992913

ADF TEST RESULT FOR LOG (LABOUR)

Null Hypothesis: LOG(LABOUR) has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic based on SIC, MAXLAG=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.415394	0.5671
Test critical values:	1% level	-3.574446	
	5% level	-2.923780	
	10% level	-2.599925	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LOG(LABOUR))

Method: Least Squares

Date: 08/11/11 Time: 09:31

Sample (adjusted): 3 50

Included observations: 48 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(LABOUR)(-1)	-0.000877	0.000620	-1.415394	0.1638
D(LOG(LABOUR)(-1))	0.806570	0.088902	9.072615	0.0000
C	0.019830	0.011010	1.801131	0.0784

R-squared	0.708425	Mean dependent var	0.033107
Adjusted R-squared	0.695466	S.D. dependent var	0.003391
S.E. of regression	0.001872	Akaike info criterion	-9.663689
Sum squared resid	0.000158	Schwarz criterion	-9.546739
Log likelihood	234.9285	F-statistic	54.66699
Durbin-Watson stat	2.005268	Prob(F-statistic)	0.000000

ADF TEST RESULT FOR LOG (GDP)

Null Hypothesis: LOGGDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.346067	0.9784
Test critical values:	1% level	-3.571310	
	5% level	-2.922449	
	10% level	-2.599224	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGGDP)
Method: Least Squares
Date: 04/03/12 Time: 07:00
Sample (adjusted): 2 50
Included observations: 49 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGGDP(-1)	0.010415	0.030095	0.346067	0.7308
C	-0.168246	0.667441	-0.252077	0.8021

R-squared	0.002542	Mean dependent var	0.062614
Adjusted R-squared	-0.018681	S.D. dependent var	0.148435
S.E. of regression	0.149815	Akaike info criterion	-0.918869
Sum squared resid	1.054895	Schwarz criterion	-0.841652
Log likelihood	24.51229	F-statistic	0.119762
Durbin-Watson stat	1.596561	Prob(F-statistic)	0.730837

APPENDIX B: Regression Result of Cobb – Douglas Aggregate Production Function for TFP

1960 – 1969

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	6.39E-007	.078		.000	1.000
	DlnCapital	.402	.122	.772	3.305	.013
	DlnLabour	1.899	2.427	.183	.783	.459

a Dependent Variable: DlnGDP

1970 – 1979

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	-.976	2.721		-.359	.730
	DlnCapital	.148	.058	.691	2.547	.038
	DlnLabour	31.068	80.839	.104	.384	.712

a Dependent Variable: DlnGDP

1980 – 1989

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	.115	.354		.324	.755
	DlnCapital	.151	.112	.452	1.350	.219
	DlnLabour	-2.993	10.248	-.098	-.292	.779

a Dependent Variable: DlnGDP

1990 – 1999

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	.587	.507		1.160	.284
	DlnCapital	.033	.162	.075	.207	.842
	DlnLabour	-15.419	14.238	-.395	-1.083	.315

a Dependent Variable: DlnGDP

2000 – 2009

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	-.013	.079		-.167	.872
	DlnCapital	.877	.299	.730	2.935	.022
	DlnLabour	.978	1.842	.132	.531	.612

a Dependent Variable: DlnGDP

APPENDIX C: Granger Causality Test Result

Pairwise Granger Causality Tests

Date: 08/11/11 Time: 09:15

Sample: 1965 2008

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Probability
MANUFACTURING__OF_GDP_ does not Granger Cause GDP_GROWTH_ANNUAL___	43	0.10971	0.74220
GDP_GROWTH_ANNUAL___ does not Granger Cause MANUFACTURING__OF_GDP_		1.35372	0.25152

Pairwise Granger Causality Tests

Date: 08/11/11 Time: 09:15

Sample: 1965 2008

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
MANUFACTURING__OF_GDP_ does not Granger Cause GDP_GROWTH_ANNUAL___	42	1.02082	0.37022
GDP_GROWTH_ANNUAL___ does not Granger Cause MANUFACTURING__OF_GDP_		1.95711	0.15562

Pairwise Granger Causality Tests

Date: 08/11/11 Time: 09:16

Sample: 1965 2008

Lags: 3

Null Hypothesis:	Obs	F-Statistic	Probability

MANUFACTURING__OF_GDP_ does not Granger Cause GDP_GROWTH_ANNUAL___	41	0.72330	0.54509
GDP_GROWTH_ANNUAL___ does not Granger Cause MANUFACTURING__OF_GDP_		2.80865	0.05419

Appendix D: Manufacturing growth, GDP (Current US$) and GDP growth (annual %) Data

Years	Manufacturing (% of GDP)	GDP growth (annual %)	Years	GDP (current US$)
1965	9.75177305	1.368997659	1960	1217152698
1966	10.2081138	-4.258289218	1961	1301712191
1967	11.89922198	3.075363287	1962	1381791710
1968	12.58675497	0.368860808	1963	1540270760
1969	12.39566132	6.00617415	1964	1730669617
1970	11.40176112	9.723472954	1965	2052919008
1971	11.00179978	5.216124439	1966	2125717555
1972	10.86524142	-2.487655112	1967	1734263371
1973	11.69027805	2.884583358	1968	1666209190
1974	10.76800905	6.852517139	1969	1960701626
1975	13.948514	-12.43162831	1970	2214131704
1976	13.1393469	-3.530183433	1971	2429084894
1977	10.78255681	2.2741077	1972	2125150895
1978	8.640481046	8.475935637	1973	2465633787
1979	8.670541215	-2.514941333	1974	2894472084
1980	7.808270074	0.471695791	1975	2810106288
1981	5.973066994	-3.50306747	1976	2765339025
1982	3.605510421	-6.923650299	1977	3189542912
1983	3.858442412	-4.563737719	1978	3662495575
1984	6.396339186	8.647569256	1979	4020227804
1985	11.53249658	5.091617972	1980	4445228031
1986	11.14993705	5.199160071	1981	4222441904
1987	9.882036741	4.794898731	1982	4035994542
1988	9.563392949	5.628169742	1983	4057275047
1989	10.0065977	5.085872512	1984	4412279889
1990	9.762846332	3.328818229	1985	4504342092
1991	9.271911976	5.28182614	1986	5727602711
1992	9.331058176	3.87941917	1987	5074830092
1993	9.382505617	4.85	1988	5195042325
1994	9.106628242	3.3	1989	5248940866
1995	9.326986338	4.112418938	1990	5886003649
1996	8.634146772	4.602460956	1991	6599578349
1997	9.051681381	4.196357878	1992	6412625105
1998	8.987627197	4.700390795	1993	5965704272
1999	9.024383133	4.399996536	1994	5440519991
2000	9.016849277	3.7	1995	6457441706
2001	9.002986549	4	1996	6925530172
2002	9.027260448	4.5	1997	6884024596
2003	8.975523635	5.2	1998	7474018854
2004	8.741998633	5.6	1999	7709811561

2005	8.655388399	5.900003848	2000	4977488790
2006	8.474580772	6.4	2001	5309158304
2007	7.998498617	6.45973558	2002	6159567360
2008	6.932495719	8.430504083	2003	7624164926
			2004	8871872035
			2005	10720345993
			2006	20388317032
			2007	24632480407
			2008	28526922399
			2009	26169336384

Source: World Bank Data (2011)

Appendix E: Manufacturing Sector's Contribution to Merchandise Export and Value Added of the Manufactures

YEARS	MANUFACTURING EXPORT	years	VALUE ADDED OF MANUFACTURES
1962	2.85	1966	-1.14
1963	2.38	1967	12.31
1964	1.92	1968	17.24
1965	1.71	1969	16.37
1966	2.6	1970	4.45
1967	0.9	1971	-6.16
1968	0.61	1972	-9.14
1969	0.68	1973	23.59
1970	0.68	1974	-5.69
1971	1.3	1975	9.25
1972	1.77	1976	-4.52
1973	4.33	1977	3.27
1974	1.78	1978	-3.51
1975	1.5	1979	-16.84
1976	1.59	1980	-1.37
1977	2.1	1981	-19.3
1978	1.4	1982	-20.47
1979	1.32	1983	-11.11
1980	0.99	1984	12.84
1981	2.75	1985	24.32
1982	0.8	1986	10.95
1983	1.22	1987	10.01
1984	0.87	1988	5.06
1992	7.74	1989	0.59
1996	13.32	1990	5.88
1997	10.63	1991	1.05
1998	14.96	1992	3.5
1999	20.37	1993	-44.77
2000	14.75	1994	1.65
2001	16.35	1995	1.63
2002	14.35	1996	3.47
2004	12.1	1997	7.47
		1998	4.08
		1999	5.99
		2000	3.91
		2001	6.07
		2003	-1.38

Source: World Development Indicators Database.

Appendix F: Types of Manufacturing and their Activities.

TYPE OF MANUFACTURE	ACTIVITY BREAKDOWN
Manufacture of food products	• Processing and preserving of meat • Processing and preserving of fish, crustaceans and molluscs • Processing and preserving of fruit and vegetables • Manufacture of vegetable and animal oils and fats • Manufacture of dairy products • Manufacture of grain mill products, starches and starch products • Manufacture of other food products • Manufacture of prepared animal feeds
Manufacture of beverages	• Manufacture of beverages(alcoholic and non-alcoholic beverages) • production of fruit and vegetable juices
Manufacture of tobacco products	Manufacture of tobacco products
Manufacture of textiles	• Spinning, weaving and finishing of textiles • Manufacture of other textiles
Manufacture of wearing apparel	• Manufacture of wearing apparel, except fur apparel • Manufacture of articles of fur • Manufacture of knitted and crocheted apparel
Manufacture of leather and related products	• Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness; dressing and dyeing of fur • Manufacture of footwear
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	• Sawmilling and planning of wood • Manufacture of products of wood, cork, straw and plaiting materials
Manufacture of paper and paper products	Manufacture of paper and paper products
Printing and reproduction of recorded media	• Printing and service activities related to printing • Reproduction of recorded media
Manufacture of coke and refined petroleum products	• Manufacture of coke oven products • Manufacture of refined petroleum products
Manufacture of chemicals and chemical products	• Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics and synthetic rubber in primary forms • Manufacture of other chemical products • Manufacture of man-made fibres
Manufacture of rubber and plastics products	• Manufacture of rubber products • Manufacture of plastics products
Manufacture of other non-metallic mineral products	• Manufacture of glass and glass products • Manufacture of non-metallic mineral products
Manufacture of basic metals	• Manufacture of basic iron and steel • Manufacture of basic precious and other non-ferrous metals • Casting of metals
Manufacture of fabricated metal products, except machinery and equipment	• Manufacture of structural metal products, tanks, reservoirs and steam generators • Manufacture of weapons and ammunition • Manufacture of other fabricated metal products; metalworking service activities

Manufacture of computer, electronic and optical products	• Manufacture of electronic components and boards • Manufacture of computers and peripheral equipment • Manufacture of communication equipment • Manufacture of consumer electronics • Manufacture of measuring, testing, navigating and control equipment; watches and clocks • Manufacture of irradiation, electro-medical and electrotherapeutic equipment • Manufacture of optical instruments and photographic equipment • Manufacture of magnetic and optical media
Manufacture of electrical equipment	• Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus • Manufacture of batteries and accumulators • Manufacture of wiring and wiring devices • Manufacture of electric lighting equipment • Manufacture of domestic appliances • Manufacture of other electrical equipment
Manufacture of machinery and equipment	• Manufacture of general-purpose machinery • Manufacture of special-purpose machinery
Manufacture of motor vehicles, trailers and semi-trailers	• Manufacture of motor vehicles • Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers • Manufacture of parts and accessories for motor vehicles
Manufacture of other transport equipment	• Building of ships and boats • Manufacture of railway locomotives and rolling stock • Manufacture of air and spacecraft and related machinery • Manufacture of military fighting vehicles • Manufacture of transport equipment
Manufacture of furniture	• Manufacture of furniture and related products of any material except stone, concrete and ceramic.
Repair and installation of machinery and equipment	• Repair of fabricated metal products, machinery and equipment • Installation of industrial machinery and equipment
Other manufacturing	• Manufacture of jewellery, bijouterie and related articles • Manufacture of musical instruments • Manufacture of sports goods • Manufacture of games and toys • Manufacture of medical and dental instruments and supplies • Other manufacturing

Source: UNStats (2011)