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Role of Agribusiness in the Development of Robust Manufacturing Sub-Sector

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Abstract:
Manufacturing sub-sector activities constitute an important component of total economic output in Ghana; and in many economies throughout the world. This affirms the need for leaders of various economies including Ghana to pay close and important attention to this component that could positively define and shape their respective economies; and positively enhance national development and growth. Ghana's agricultural sector has the potential to provide the requisite raw materials to positively affect performance of the manufacturing sub-sector. However, one observes fluctuations in growth of the manufacturing sub-sector in recent years. The purpose of this research was to examine how the activities of agribusiness could be effectively harnessed to provide the requisite raw materials to improve manufacturing sub-sector's performance; and contribution to national economic growth. The quantitative approach to scientific inquiry was applied to the current research. Specifically, a cross-sectional design was adapted and used in the study. This allowed the researchers to gather relevant research data over a specific period of time. Data required for the research were obtained mainly from secondary sources including research papers, newspaper publications, peer-reviewed articles published in journals, text books; Google Search Engine, financial websites such as The Global Economy.com; and electronic databases of the Bank of Ghana and Ghana Statistical Service; the World Bank and World Economic Outlook, among others. Annual data on Ghana's total gross domestic products (GDPs) and manufacturing sub-sector values denominated in Ghana Cedis for the period 2000 through 2018; and data on the world's and Ghana's total manufacturing values denominated in United States Dollars from 1997 through 2016 were used in the study. Findings from the research revealed positive, but non-significant relationships between manufacturing and the industrial sector, manufacturing and Ghana's GDP; and negative relationship between Ghana's manufacturing value and the world's total manufacturing values during the period. The findings suggested annual figures released for manufacturing activities are at variance with the sub-sector's actual performance. Ghana's manufacturing value accounts for only about 8.92% of the variation in world's total manufacturing values during the period. Recommendation was made for manufacturing development to constitute an integral part of government's scheme of programmes aimed at ensuring equitable distribution of resources and development of various communities; creating job opportunities, especially for the youth; and accelerating national development and growth. Stakeholders in the manufacturing sub-sector must ensure due diligence in the collation and release of annual data for the sub-sector to assure reliability and credibility of same. Expedition of government initiatives such as the one district, one factory concept through early identification of strategic investment partners would be useful to the course of accelerating growth in the manufacturing sub-sector. Innovation and infrastructure are essential requirements for successful implementation of any given policy on manufacturing; and therefore, deserve the attention of key stakeholders. Ghana must strive to develop robust and resilient economy; and guard jealously against her current stable political, social and economic climate to be more attractive to the international investor-community. Ghana must take advantage of implementation of the African Continental Free Trade Area (AfCFTA) agreement; and utilisation of the Eco in the West African Sub-Region to increase her manufacturing potential and growth while contributing meaningfully to national economic development.

Keywords: Agribusiness, gross domestic product, industrial sector, manufacturing sub-sector, manufacturing theory

1. Introduction

Throughout the world, the agricultural sector has been identified as essential for the provision of raw materials needed to boost activities and performance of the manufacturing sub-sector. Role of the manufacturing sub-sector in the socio-economic development of countries across the globe cannot be overemphasised. Manufacturing plays a significant role in the economic success of advanced and emerging countries such as China, the United States of America (USA), Japan, Germany, South Korea, India, Italy, France, United Kingdom, Brazil, Indonesia, Mexico, Russia, and Canada (Levinson,

2018), among others. To this end, strategic adaption and implementation of key manufacturing concepts in developing and other emerging economies including Ghana would yield positive dividends.

The Ghanaian economy is categorised into and dominated by three major sectors namely agricultural, industrial and services sectors. The *agricultural sector* comprises crops and other commodities which constitute an integral part of agribusinesses such as cocoa and cashew; livestock; forestry and logging; and fishing, among others. Economic activities categorised under the *industrial sector* include manufacturing; mining and quarrying such as gold, diamond, bauxite, manganese and crude oil; electricity; water and sewerage; and construction, among others. The *services sector* of the Ghanaian economy comprises trade; repair of vehicles; household goods; hotels and restaurants; transport and storage; information and communication; financial and insurance activities; real estate; professional, administrative and support services activities; public administration and defence; social security; education; health and social work; community, social and personal services activities (Bank of Ghana, 2019; Ghana Statistical Service, 2019).

Ghutidze (2017) revealed the objectives underlying the European Union's common agricultural policy (CAP) formulated in 1962 are categorised into three significant parts. These include development of agriculture, provision of market support, and financial aid. The main purpose of this policy is to ensure the availability of food to consumers at reasonable prices while assuring normal living conditions for farmers. Further, it seeks to assure increase in biodiversity and agricultural productivity; and stable climate. In 2009, the European Union included risk management tools in the common agricultural policy originally developed in 1962. These tools include the introduction of an *income stabilisation tool (IST)* to mobilise and provide financial support for farmers who record severe income losses, especially losses in excess of 30% of average annual income; provision of financial support to farmers in insurance premium payments to insure crops and livestock against losses arising from farm and animal diseases, and unfavourable weather patterns; and the establishment of mutual funds to provide the necessary compensation for production losses incurred by farmers owing to unfavourable events related to the environment and climate. Implementation of the common agricultural policy among the 28-member states has affected, positively, the lives and activities of about 12 million farmers; and has contributed to the employment of about 4 million people in the food sub-sector.

Agribusiness involves the conduct of agricultural activities and production in commercial quantities. It refers to a group of individuals, companies or industries engaged in the production of goods and services required in farming. Thus, agribusiness involves growing, harvesting, processing, storage, and distribution of farm produce by individual or group of farmers. Agribusiness relates to manufacturing and distribution of supplies and equipment needed for effective operations by commercial farmers; it relates to businesses that market farm produce through the activities of retail, wholesale, processing and warehouse. A Commercial farmer is an individual or organisation engaged in farming with the underlying aim of harvesting in large quantities for sale in the domestic and international markets. A commercial farmer is a sharp contrast to a subsistence farmer who grows essentially to meet his or her home or domestic needs (Chait, 2016). Some organisations whose operations contribute directly and indirectly to the promotion of agribusiness in countries across the globe are Deere and Company, Dow AgroSciences LLC, Archer Daniels Midland Company, Monsanto Company, WH Group, and Agro Africa. Deere and Company is an organisation that deals in farm equipment such as John Deere tractor and baler. Dow AgroSciences LLC is a wholly owned subsidiary of the Dow Chemical Company engaged in the manufacturing of pesticides, herbicides, and fungicides. It also markets seeds. Archer Daniels Midland Company transports crops to farmers at national and international levels; it processes corn into ingredients such as corn syrup, dextrose and starch; and processes oilseeds like canola and soy. Monsanto Company deals in the manufacturing of herbicide Roundup (glyphosate) and various genetically modified seeds of Roundup Ready. WH Group is Chinese Company formerly called Shuanghui International. It owns Smithfield Foods, Incorporated, the largest United States producer of pork. Smithfield Foods, Incorporated, owns and runs its own farms. WH Group is now the world's largest producer of pork; and China's largest meat producer (Onuh, 2016; UNIDO, n.d.d). Agro Africa is located in Ghana. It is the country representative for Big Dutchman, a global leader in animal farming technology. The Company sells farm equipment such as tractors, tillers, planters, seed drills, crop treatment, fertilizer spreaders, sprayers, harvesters, threshers, shellers, trailers, silos, millers, dryers, among others. Agro Africa assists commercial farmers with logistics, including extension services in crops and piggery farming. Activities and operations of the foregoing agribusinesses create the enabling environment for the supply of raw materials needed by the manufacturing sub-sector to boost its performance and contribution to national economic development and growth.

1.1. Background of the Study

Manufacturing sub-sector activities and related ones constitute an important component of total economic output in Ghana; and in many economies throughout the world. This affirms the need for leaders of various economies including Ghana to pay close and important attention to this component that could positively define and shape their respective economies; and positively enhance national development and growth. In Ghana and many other economies, manufacturing is a sub-sector of the industrial sector. Discussion in this section is centred on industrial development in Ghana.

1.1.1. Industrial Development in Ghana

On 6th march, 1957, Ghana attained independence from Great Britain; and on 1st July, 1960, the country attained a Republican status. Since then several measures have been rolled out by governments to assure massive industrialisation of the Ghanaian economy. Prior to Ghana's independence, the industrial sector constituted a small segment of the colonial economic system; the colony's (Gold Coast) natural resources were exported to the United Kingdom in their raw state for processing; and finished goods were imported to meet the needs of the people. The industrial sector under the colonial administration was dominated by the domestic manufacturing sub-sector; and the sector's contribution to national

economic growth was relatively insignificant. Generally, the occurrence or implementation of Ghana's industrialisation drive could be categorised into three: *import substitution industrialisation (ISI)* strategy from 1965 to 1983; *liberalised industrialisation (LI)* strategy from 1984 to 2000; and *accelerated industrial development (AID)* strategy from 2001 till date (Ackah, Adjasi & Turkson, n.d.).

The import substitution industrialisation strategy which spanned from 1965 to 1983 was inward and provided overprotection for local manufacturing companies. Thus, protectionism was the dominant industrial strategy during the period under review. Protectionism, as the name connotes, ensures the formulation of policies that encourage local manufacturing while discouraging massive importation of goods. This helps to reduce the level of competition likely to be introduced and posed by the latter. Ghana's pioneer political administration led by Osagye Dr. Kwame Nkrumah perceived industrialization as the catalyst for modernising the economy; and accelerating its development and growth. As a result, several programmes were implemented by Ghana's first political administration to ensure the success of the industrialisation strategy. That is, manufacturing goods locally to substitute for imports. The overarching idea was to reduce Ghana's dependence on colonial and western influence, reduce the nation's dependence on primary exports, and reduce the level of poverty, so her intended objectives (modernisation and accelerated development and growth) could be realised within the shortest period. It was intended to correct unfavourable balance of payments attributable to high imports and low export earnings. Massive transformation of the small industrial sector inherited from the colonial administration resulted in the provision of infrastructural facilities in key areas across the country.

State-owned manufacturing industries dominated the import substitution industrialisation strategy; agricultural produce provided the raw materials needed to sustain production by established manufacturing companies in strategic parts of the country. One of the important considerations under the ISI strategy was proximity to raw materials. To practically illustrate this important industrial need most of the processing factories were established close to farming areas with large scale output, so they could provide the requisite raw materials to facilitate production. Industries were established for machinery, electrical, electronic, and building materials. The ISI strategy led to the construction of the Akosombo Dam to generate electricity for domestic and commercial consumption. Electricity generated by the Akosombo dam was in excess of immediate consumption capacity. The idea was to make provision for energy needs for industrial expansion and development in the medium- and long-term. Similar monumental companies that emerged from the ISI strategy and have survived till date are the Tema Oil Refinery (TOR) and Ghana Cement (Ghacem). Some factories and companies that could not survive till date were the Benso Oil Palm Plantation, Pwalugu Tomato Paste Factory, Bonsa Tyres, among others. The success of the ISI strategy at the early stages manifested in gross manufacturing output figures. Available statistics indicate the contribution of state-owned enterprises (SOEs) to gross manufacturing output increased from 19% in 1962 to 32% and 42% in 1966 and 1967 respectively (Ackah et al., n.d.; Steel, 1972; Killick, 2010). However, fluctuating contributions were recorded from non-Ghanaian privately-owned enterprises to gross manufacturing during the same period. These manufacturing setbacks were attributed largely to the government's decision to takeover many of the privately-owned enterprises in the country (World Bank, 1985).

On 24th February, 1966, the Nkrumah-led administration was overthrown through a bloodless coup d'état. The Military government of the National Liberation Council (NLC) led by General Joseph A. Ankrah abandoned most of the industrial projects initiated by the previous regime. In October 1969, the Busia-led administration assumed the reins of government following the conduct of general elections earlier in the same year. The latter changed the economic direction of the country from centrally-planned to market-based. The latter strategy implied more private participation and less government control over manufacturing and other industrial activities in the country. Thus, there was a paradigm shift from protectionism to trade liberalisation. The austere economic measures such as development levy, import taxes, trade liberalisation, withdrawal of subsidies, abolishing of free transport and free education, and devaluation of the Ghanaian currency by 44%, among others, introduced by the Busia-led government were short-lived by a Military overthrow on 13th January, 1972. The National Redemption Council (NRC) led by General Ignatius K. Acheampong promised to propel Ghana's economy to greater heights. The NRC sought to abolish the market-oriented economic approach. Further, benefits to public sector workers were fully restored; the country's currency (Cedi) was revalued by 42%; most of the country's foreign debts were cancelled by the NRC – refused to pay; development levy was abolished; and efforts were made to achieve food sufficiency through Operation Feed Yourself (OFY). The NRC's economic measures gained immediate domestic popularity, but later worsened the nation's economic position. The NRC regime was believed to be characterised by economic mismanagement. This affected the nation's foreign exchange earnings; and her ability to import spare parts and other raw materials to meet the growing needs of numerous manufacturing factories and industries across the country (Brydon, 1999; Brydon and Legge, 1996; Nugent, 1995). Further, in the 1970s, the Office of Business Promotion which was later called the Ghana Enterprise Development Commission (GEDC) was established by the Government of Ghana to provide financial and technical support for manufacturing companies. It was the sole government body responsible for co-ordination and strengthening of small scale manufacturing firms in the country.

In 1981, the National Board for Small Scale Industries (NBSSI) was established through an Act of Parliament, Act 434, to provide training, advice, and loan schemes for small scale manufacturing companies. The NBSSI was established to operate as an arm of the Ministry of Industries, Science and Technology. Ntiamoah, Li and Kwamega (2016) identified lack of adequate funding, political influence and poor remuneration of employees as major setbacks to the successful performance of NBSSI's role as facilitator of manufacturing improvements in Ghana. And during the same year, Ghana was heavily dependent on international trade and foreign aid for economic survival. As of 1983, the nation's coffers were virtually empty; the country was in disarray; Ghana's economic ranking in the world has shrunk considerably; and the nation did not have the economic and political muscle to be independent of the western economies. Ghana's economic conditions were worsened further by the Nigerian government's decision to repatriate over one million Ghanaians in

January 1983. The preceding factors subjected Ghana to the dictates of external forces, especially the industrialised (now called advanced) economies (Ahiakpor, 1991; Azindow, 2005; Boafo-Arthur, 1999b).

The second major economic reforms in the annals of Ghana's history were the introduction of the *Structural Adjustment Programme (SAP)* under the leadership of Flt. Lt. Jerry John Rawlings**.** Ghana's SAP had two dimensions: political and economic. *Politically*, government machinery must be structured on democratic lines. Thus, the Provisional National Defence Council (PNDC) was to ensure a transition from military rule to democratic rule. *Economically*, government must embrace market-oriented policies, including privatisation, trade liberalisation, and fiscal discipline, among others. The SAP is a generic phrase used by the International Bank for Reconstruction and Development (World Bank) and the International Monetary Fund (IMF). Adaption and implementation of the SAP vary from one country to the other. In Ghana, SAP was launched and implemented under the caption, "*Economic Recovery Programme (ERP).*" The ERP was launched in Ghana in 1983 under the guidance of the World Bank and IMF. The overarching objective of the ERP was to create the enabling environment for capital creation in the Ghanaian economy; and to improve Ghana's trade position in the international market while reducing debt to an appreciable level. The ERP was designed to curb inflation through stringent monetary, fiscal, and trade policies; increase Ghana's foreign exchange inflows; direct the foreign exchange inflows to prioritised sectors of the Ghanaian economy; restore incentives for production in the economy; restructure economic institutions; rehabilitate infrastructure to increase production and export; and increase supply of essential goods in the Ghanaian market (Ahiakpor, 1991; Azindow, 2005; Boafo-Arthur, 1999a; Boafo-Arthur, 1999b).

The ERP was carried out in three phases: ERP I; ERP II; ERP III. In phase I of the ERP (1983 - 1986), emphasis was on creation of incentives for private production; reduction in government expenditures; improvement in tax collection; reduction in budget deficit (6.3% of GDP in 1982; 0.1% of GDP by 1986); and easing government's pressure on the banking system. Phase II of the ERP (1987 - 1989) was characterised by divestiture of state assets through privatisation; introduction of more stringent foreign exchange reforms, leading to further devaluation of the Cedi; and introduction of foreign exchange bureaus in 1987 to minimise, if not eliminate, the activities of black market operators. In Phase III of the ERP (1990 - 1991), Ghana witnessed reduction in private corporate tax; private sector growth; more monetary reforms; improvements in repayments of international debt; improved economic reputation in the international community; and first entry into the international market after over two decades of exit (Ahiakpor, 1991; Azindow, 2005; Boafo-Arthur, 1999a; Boafo-Arthur, 1999b). Implementation of the liberalised industrialisation (LI) strategy was dominant during this period. These reforms had positive effect on the performance of the industrial sector and manufacturing sub-sector of the Ghanaian economy. Ackah et al. noted annual average growth rate of 11.2% over a five-year period (1984 through 1988) in the industrial sector following an implementation of the ERP. This was significant improvement over the successive three negative growth rates recorded by the industrial sector prior to the launch of the ERP in 1984. However, the industrial sector's performance took another nose dive from 1989 through 1994. Findings from a committee set up by the government to examine factors that accounted for the industrial sector's uninspiring performance identified three significant challenges: local industries that enjoyed protection were overexposed to competition from imported manufactured inputs; exchange rate reforms and liberalisation of the financial sub-sector led to rapid fall in value of the Cedi and corresponding increase in costs of production. Many manufacturing firms met this challenge with production cuts; and most industries could not adjust and restructure adequately due to limited time. Recommendations of the committee led to the establishment of various bodies by the government to mitigate the potential negative economic effect. Some of these include the Ghana Trade and Investment Gateway (GHATIG) project, Fund for Small and Medium Enterprises Development (FSMED), Export Processing Zone (EPZ), Business Assistance Fund (BAF), Trade Investment Programme (TIP), and the Private Enterprise and Export Development Fund (PEED).

Ghana's industrial development in the new Millennium is dominated by the accelerated industrial development (AID) strategy. This strategy has been characterised by many government and foreign development partners-sponsored medium-term programmes and interventions intended to enhance national economic growth through the various sectors, especially the industrial and agricultural sectors. Some programmes initiated through foreign multilateral financial institutions include the Growth and Poverty Reduction Strategies I and II (GPRS I) and (GPRS II), which were implemented from 2003 to 2005 and from 2006 to 2009 respectively; and the Interim Poverty Reduction Strategy Programme (IPRSP) implemented from 2000 to 2002. The GPRS I and II sought to orient Ghana's private sector to the applications of science and technology to enhance the private sector's participation in and contribution to the performance of manufacturing, industry, and national gross domestic product (Ackah et al.).

It is worth reiterating, following independence from Great Britain in 1957, Ghana's economy was characterised by the following features: well-developed infrastructure for trade servicing; world's leading producer of cocoa; endowed with natural resources such as gold, diamond, manganese, and bauxite in commercial quantities; endowed with oil palms in commercial quantities; relatively advanced system of education; stability and prosperity; central economic planning; availability of resources encouraged the adaption and implementation of State-led economic strategy; limited room for free trade; provision of free health care, housing, and education (Socialist-driven policies); positive economic recognition in the international community; redistribution of national prosperity; agricultural-led economy; State perceived as "mother" and "father" of citizens; and maintenance of an irreversible process of economic, social and political development (Brydon, 1999; Brydon and Legge, 1996; Nugent, 1995).

1.2. Problem Statement

It is estimated the world covers a total land area of 38,575,282,915 hectares. The continent of Africa's share of this *total land area* is estimated at 3,037,000,000 hectares while Ghana covers a total land area of about 23,900,000 hectares. In percentage terms, Africa and Ghana respectively occupy about *7.87%* ((3,037,000,000 hectares ÷ 38,575,282,915

hectares) x 100% = 0.0787 x 100% = 7.87%) and *0.06%* ((23,900,000 hectares ÷ 38,575,282,915 hectares) x 100% = 0.00062 x 100% = 0.06%) of the world's total land area. Ghana's share of the total land area on the African continent is approximately *0.79%* ((23,900,000 hectares ÷ 3,037,000,000 hectares) x 100% = 0.00787 x 100% = 0.79%). Though the second largest continent in the world, Africa's share (7.87%) of the world's total land area is relatively insignificant. Ghana can best be described as a small- to medium-sized country on the African continent. This is affirmed by her (Ghana's) occupation of less than 1% (0.79%) of the total land area on the African continent (FAO, 2014, n.d.).

Similarly, the world's total cultivable land area is approximately 4,893,769,600 hectares. The total cultivable land area on the African continent is about 173,000,000 hectares whereas Ghana has an estimated *total cultivable land area* of 13,600,000 hectares. Africa and Ghana's respective cultivable land areas translate into *3.54%* ((173,000,000 hectares ÷ 4,893,769,600 hectares) = 0.0354 x 100% = 3.54%) and *0.28%* ((13,600,000 hectares ÷ 4,893,769,600 hectares) = 0.00278 x 100% = 0.28%) of the world's total land area available for cultivation purposes (FAO, 2014, n.d.).

Available statistics from the Food and Agricultural Organisation (FAO) (2014) revealed the world has a *total irrigable land area* of about 324,000,000 hectares; the total irrigable land in Africa is estimated at 38,000,000 hectares; and Ghana's share of irrigable land across the globe is approximately 1,900,000 hectares. Respectively, the total irrigable land area in Ghana constitutes about *13.97%* ((1,900,000 hectares ÷ 13,600,000 hectares) x 100% = 0.1397 x 100% = 13.97%) of the country's total cultivable land area; and *7.95%* ((1,900,000 hectares ÷ 23,900,000 hectares) x 100% = 0.0795 x 100% = 7.95%) of the nation's total land area. This implies a significant proportion of Ghana's total land area is conducive for agribusinesses; and fertile for general farming and related activities on subsistent and commercial scales. Further, it implies Ghana's agricultural sector has the potential to provide the requisite raw materials to positively affect contribution of the manufacturing sub-sector to national economic development and growth. However, one observes fluctuating contributions of the manufacturing sub-sector to national economic development and growth in recent years. The imminent question is: *why is the manufacturing sub-sector's contribution to Ghana's national gross domestic product (GDP) relatively low when the economy has the potential to produce the raw materials required to improve on its performance?*

The *general management problem* is inability of leadership to efficiently and effectively harness resources to assure significant contribution of the manufacturing sub-sector to national economic development and growth. Though evidence of this phenomenon exists, there are no scientific studies to establish, clearly, the implications of the manufacturing sub-sector's performance for Ghana's industrial sector development and growth, and GDP; and for Ghana's contribution to world manufacturing values.

The *specific management problem* is how leadership could identify potential manufacturing and agribusinesses, the requisite raw materials; and provide the necessary support through public-private partnerships and other interventions to accelerate the manufacturing sub-sector's performance; its relative contribution to industrialisation drive; and to national economic development and growth. The purpose of this research was to examine how the activities of agribusiness could be effectively harnessed to provide the requisite raw materials to feed the manufacturing sub-sector to improve on its performance; and to contribute meaningfully to the growth of the Ghanaian economy.

1.3. Research Objectives

1.3.1. General Objective

The underlying objective of this research was to examine how agribusiness could provide the requisite raw materials to improve on manufacturing sub-sector's performance and contribution to the Ghanaian economy.

1.3.2. Specific Objectives

Specifically, the research sought to achieve the following objectives:
- Examine trends and challenges associated with the performance of the manufacturing sub-sector.
- Evaluate the contribution of manufacturing to Ghana's industrial sector and gross domestic product (GDP); and to the world's total manufacturing values.
- Assess agribusinesses' ability to provide the requisite raw materials to enhance performance of the manufacturing sub-sector.
- Make recommendations to stimulate improvements in manufacturing sub-sector's contribution to Ghana's industrial sector and GDP; and to global manufacturing values while ensuring effective utilisation of local raw materials and improving on unemployment rate.

2. Literature Review

The present study was conducted under the topic: "Role of Agribusiness in the Development of Robust Manufacturing Sub-Sector." The underlying objective of this research was to examine how the activities of agribusiness could be effectively harnessed to provide the requisite raw materials to feed the manufacturing sub-sector to improve on its performance; and to contribute meaningfully to the growth of Ghana's economy. A review of related and existing literature in the research area is presented in this section. Stated differently, this section presents a synthesis of literature related to the study. Discussion in this section reveals relationship between the reviewed literature and research objectives. Data required for discussion in this section were obtained from text books, peer-reviewed articles published in journals, research papers, newspaper publications; and Google Search Engine, among others. The following key words were used to generate relevant information from the Google Search Engine and other relevant sources: agribusiness, gross domestic product, industrial sector, manufacturing sub-sector, and manufacturing theory. Discussions in this section were

preceded by a theoretical framework. The following sub-themes were used in this section: Policies and strategies for agribusiness and agricultural sector development; and factors affecting manufacturing sub-sector's performance and growth. Discussions in this section contributed significantly to the study objective. That is, identifying factors affecting the meaningful performance of the manufacturing sub-sector; and measures that could be put in place to strategically maximise its contributions to national economic development and growth.

2.1. Theoretical Framework

Different theories have been developed by various seminal thinkers to underlie and explain the operations, performance, success and failure of companies engaged in manufacturing across the globe. One of these protagonist theories is *the emerging theory of manufacturing* by Peter F. Drucker (1990).

In his seminal writing on manufacturing, Drucker (1990) proposed the establishment of a new manufacturing system called the *postmodern factory of 1999*. The essence of this postmodern factory, Drucker (1990) believed, would not be mechanical, although it would involve the use of several machines. Rather, this new manufacturing system would be conceptual in nature and pivoted around four significant concepts. These include *statistical quality control (SQC)*, *management accounting*, *flotilla concept of flexible manufacturing*, and *systems concept*. Drucker (1990) believed, collectively, these concepts would constitute the new approach to manufacturing. He averred social organisation of factories is witnessing significant transformation through statistical quality control while production decisions are transformed to business decisions owing to the introduction of new accounting in manufacturing. The flotilla concept allows for the organisation of the manufacturing process to maximise the advantages of standardisation and flexibility while the systems approach enhances the physical process of transforming materials into economic value, or creating value for the organisation. The evolution and development of these concepts affect our thinking and management of manufacturing in contemporary periods; they affirm the need for a new manufacturing theory. He noted the old paradigm of patching up old theories as innovative ways of advancing improvements in manufacturing only retards economic progress; it subtracts from the economic value likely to be created through and by manufacturing.

In manufacturing domain, statistical quality control refers to "rigorous, scientific method of identifying the quality and productivity that can be expected from a given production process in its current form so that control of both attributes can be built into the process itself" (Drucker, 1990, para. 6). Further, statistical quality control helps in immediate detection of malfunctions and indication of where they occur. Examples of malfunctions include overheating furnace, worn tool, and dirty spray gun. Statistical quality control could rely on a small sample to detect the malfunctions. As a result, malfunctions are reported immediately; and this allows machine operators to resolve operation anomalies in real time. Also, the effect of any change on the performance of the entire process is quickly detected by the statistical quality control. Finally, statistical quality control allows manufacturing managers to identify where, and most often how continuous improvements in the quality and productivity of the whole manufacturing process could be assured. This process has evolved in names: the *Shewhart Cycle*, *Deming Cycle*, and *Kaizen*. The latter is the Japanese term for continuous improvement (Drucker, 1990, para. 6).

The Theorist believed the foregoing engineering features only provide partial explanations for the results likely to be achieved from statistical quality control. However, the features do not explain the productivity gap likely to exist between manufacturing companies incorporated and operating in separate jurisdictions with varying degrees of social values. Effective adaption and implementation of statistical quality control concepts leads to social transformation; and significant improvements in productivity gains. The statistical quality control concept swings the manufacturing pendulum in favour of machine operators; it supports increasing number of machine operators, and less number of non-operators such as inspectors, fire fighters, and repair crews, among others. This concept (SQC) affirms the need for machine operators to be in control of their work; and make such control almost mandatory because constant feedback from statistical quality control could best be provided by machine operators with the hands-on knowledge and experience on the job. For over a century, manufacturing was dominated by two fundamental approaches: the *engineering approach* or *scientific management theory* by Frederick Winslow Taylor; and *human resources* or *human relations approach* propounded before World War I by Andrew Canergie, Julius Rosenwald, and Hugo Münsterberg. These traditional approaches perceive the factory as a "collection of individual machines and individual operations" (Drucker, 1990, para. 56). Although these fundamental approaches have always been considered mutually exclusive, they are not mutually exclusive in statistical quality control; they combine to provide the needed results. It is worth noting, Drucker (1990) admitted SQC is not a new concept; it was initially formulated by Sir Ronald Fisher after it had been originally designed by Walter Shewhart, the laboratory physicist. However, the versions used today were separately developed during World War II by W. Edwards Deming and Joseph Duran; and improving on its application would be essential to increasing productivity in manufacturing.

Drucker (1990) predicted full realisation of the new manufacturing system concept is years away. However, the new system would require very different managers and management to assure its effective implementation and success. To achieve stated and desired objectives, companies would have to consider adopting the Japanese corporate strategy. That is, the "custom of starting all new management people in the plant and in manufacturing jobs for the first few years of their careers" (para. 52). He believed businesses could even "go further and require managers throughout the company to rotate into factory assignments throughout their careers-just as army officers return regularly to troop duty" (para. 52). Importantly, companies such as Caterpillar have already begun to extend the manufacturing systems concept beyond the plant into the market place by supplying and replacing parts across the world within 48 hours. Although the initiatives of organisations such as Caterpillar are an exception, Drucker (1990) believed they must be the rule or norm. That is, manufacturing must not end when goods are shipped from the factory; physical distribution and product servicing should

constitute an integral part of the manufacturing process. To this end, the term manufacturing in the emerging theory is defined by Drucker (1990) as the process of converting materials into economic satisfactions.

In the factory of 1999, Drucker (1990) perceived manufacturing as the integrator that harnesses all activities in the company: manufacturing plays a pivotal role in the creation of economic value that eventually pays everybody and for everything in the workplace. Due to the foregoing, Drucker (1990) noted the greatest impact of the new manufacturing system would not be on the process of production. Rather, its greatest impact would be analogous with that of the statistical quality control, that is, emphasis would be on human and social concerns. This implies the new manufacturing system would seek to transform functional managers into business managers; each manager would be assigned a specific role, but they would all remain members of the same cast and production. Drucker (1990) believed management of manufacturing companies of tomorrow would not be left to lawyers, financial executives and marketers with little or no experience in manufacturing. Rather, to ensure efficiency and higher productivity, businesses would vest day-to-day management of their operations into the hands of professionals who understand and appreciate the dynamics of manufacturing. This would affirm the economic usefulness of the new manufacturing systems concept.

Drucker (1990) identified some significant differences among the four concepts that underlie the emerging theory of manufacturing. He noted in statistical quality control, the phrase, *the factory*, is defined as a place where people converge to work. Similarly, in management accounting and the flotilla flexible manufacturing concept, the factory is described as place where work is ongoing or being done; whether the work is done by robots, individuals or animals does not really matter. However, in the new manufacturing systems concept, "the factory is not a place at all; it is a stage in a process that adds economic value to materials" (para. 54); factory design transcends theoretical and semantic imaginations to include "immediate practical consequences on plant design, location, and size; on what activities are to be brought together in one manufacturing complex; even on how much and in what to invest" (para. 54). The theorist believed each of the foregoing concepts epitomises a mind-set. For instance, the application of statistical quality control does not require thinking; it requires an action or practical illustrations; management accounting lays emphasis on technical analysis; work flow and organisation design are the main stay of the flotilla concept of flexible manufacturing; and the systems concept has the tendency to keep managers thinking "and never get to the doing" (para. 55). Drucker (1990) believed each of the identified concepts has its peculiar language, tools, and addresses different categories of persons.

In spite of their noted differences, the four concepts of the merging theory of manufacturing have a converging point; they have common ground. Drucker (1990) argued the entire process of manufacturing is a configuration; and the whole is far greater than the sum of its adjoining parts. The parts are susceptible to underperformance. However, the entire process could produce positive results. Drucker (1990) argued the emerging theory of manufacturing holds premium over Frederick Winslow Taylor's engineering approach or scientific management theory which emphasises on partition of each work into individual operations; and the "Modern" twentieth century concepts which focuses on assembly line and cost accounting, and defines performance to include the sum of lowest costs of operations. Under the emerging theory of manufacturing, every manufacturing manager is expected to "learn and practice a discipline that integrates engineering, management of people, and business economics into the manufacturing process" (para. 57). Although some manufacturing managers are already practicing this new and important management technique, they may not be aware of its implementation; and thus, not systematised to facilitate its teaching in business and engineering schools.

Drucker (1990) concluded statistical quality control, management accounting, flotilla of flexibility of manufacturing and the systems concept are synergistic in nature; they collectively, but not individually, address issues saddled with traditional and twentieth century mass-production plants. These include conflicts between functions and systems, standardisation and flexibility, time and money, and people and machines, among others. Each of the foregoing concepts defines manufacturing to include the physical process that adds economic value to assembled materials; and define performance as measures put in place by management to ensure increased productivity and output. Although each concept attempts to provide economic value in a distinct way, they share a common manufacturing theory.

2.2. Policies and Strategies for Agribusiness and Agricultural Sector Development

Ghutidze (2017) sought to examine measures that could be put in place to effectively promote agribusiness insurance to accelerate contribution of the agricultural sector to rapid development and growth of the Georgian economy. Ghutidze (2017) noted Georgia is an agricultural-led economy. However, the economy's food potentials are partially harnessed and developed. Thus, efforts at implementing and strengthening existing structures and schemes such as the *agricultural insurance system* to facilitate the evolution and development of agricultural activities require immediate attention and support of all stakeholders. Findings from the research identified specific risk factors such as drought and lack of adequate financial resources as the main challenges to effective development of agribusiness and the agricultural sector in Georgia. Natural disasters including drought are not insured by the agricultural insurance system in Georgia. The findings revealed drought is observed throughout the country; and in early years, it was recorded once every 15 to 20 years. However, in recent periods, drought is recorded once every 6 to 7 years; and cause significant damage to crops across the country. To this end, the researcher believed natural disasters such as drought deserve utmost attention by the Georgian government.

To address the foregoing challenges, the Georgian Ministry of Agriculture has developed an agricultural insurance project to facilitate and support the adaption and implementation of agricultural insurance in the country. The research outcomes revealed challenges to effective performance of the insurance sub-sector have trickle-down effect on other sectors, such as employment, agricultural sector, and the economy as a whole. Thus, efforts by the Georgian government to

address challenges saddled with the insurance sub-sector would immeasurably help to heal the "wounds" of the Georgian economy as a whole. Based on the research findings, the researcher made recommendations that would eliminate obstacles and assure effective development of agricultural insurance in the Georgian economy. Notable among these include the need for the Georgian government to engender national discussion on the European Union's risk management system on agriculture to determine its suitability for the Georgian economy. Similarly, it is imperative to review European Union's existing regulations on solvency; and introduce measures that would stimulate and increase enrolment rate in agribusiness insurance among Georgian farmers. Ghutidze (2017) urged insurance companies to intensify their marketing drive to complement government's efforts at increasing awareness on agro insurance among the farming population. Insurance companies must conduct market research to identify the insurance needs of farmers, so they could diversify and increase their product types.

Pagria, Musabelliu and Pipero (n.d.) examined the role of management in the performance of agribusinesses. The researchers sought to examine the effect of prevailing and potential governance structures such as internal governance, hybrid governance, and market governance on the performance of companies in the agribusiness industry. Pagria et al. (n.d.) identified three significant strategies namely vertical integration strategy, horizontal integration strategy, and a third which was less emphasised, but very significant, concentric diversification strategy. Findings emanating from the study revealed a positive relationship between growth strategies and governance structure of companies; the two variables have significant effect on cost reduction and profitability increase, vice versa. An organisation with sound growth strategy is able to mitigate production cost while stabilising and increasing profit levels. The performance of large agribusiness organisations is dependent on the effectiveness of their growth strategies, which are derived from the governance structure. The implementation of a successful growth strategy is contingent on detail analysis and evaluation of the implied company. This must be done in consonance with the framework undergirding the totality of internal and external factors that inform the production process and its completion.

Dale and Currie (2015) evaluated methods that could be adapted and implemented as alternative ways of funding research in the area of agribusiness in the Canadian economy. The research findings revealed government funding for agricultural research in Canada is high due to factors such as low commodity prices. The Canadian Controlled Private Corporations provide research funding through matching grants, tax credits, and investments to agribusinesses and farmers. Dale and Currie (2015) illustrated alternative investment models that could help private organsations and interest groups raise funds to finance agricultural research in addition to tax credits and matching grants. For a research cost of $1 million, an agribusiness would need $181,400 after receiving tax credits and matching grants of 50%. The researchers found private capital investment as viable source of raising the differential; with only an initial investment in the capital markets using options strategy, the investing firm could generate between 30% and 60% each year. This is economical and less demanding, financially, compared with the traditional investment method where an organisation would need to hold over $6 million at an interest rate of say, 3% to provide the necessary funding annually. Risk associated with the proposed alternative investment model is considered low; returns on investments are earned during upward and downward turns in the capital markets. The Canadian government's commitment to funding research is very high. However, the researchers believed agribusinesses' resolve to seek innovative and cost-efficient ways to finance research in the industry would complement government's efforts; and enhance the level of research in the agricultural sector of the Canadian economy. Findings from Dale and Currie's (2015) research affirmed high development standards in the establishment of agricultural insurance in Canada; and corroborates Čolović and Petrović (2014) who found Canada and the United States of America as the joint leading economies with the highest agricultural insurance premium rates (55%) between 2005 and 2014.

Ntiamoah et al. (2016) drew on regression and correlation statistical models to assess the effect of government and other government institutions' support on the general performance of small and medium-sized enterprises (SMEs) engaged in agribusiness in Ghana. Ntiamoah et al. sought to test whether the support from government has a positive effect on the performance of SMEs; whether the support from other government institutions has a direct effect on the performance of SMEs; and whether the support from other government institutions plays a significant mediating role in the relationship between support from government and performance of SMEs in Ghana. The researchers relied on primary source of data collection in the study. In all, six hundred (600) questionnaires were administered to respondents while five hundred and forty-five (545) were retrieved. Selection of respondents for the study was based on a simple random sampling technique. Findings from the research revealed a strong relationship among supports from government, other institutions and performance of SMEs. Based on the research outcomes, Ntiamoah et al. concluded increased productivity of SMEs would be assured through increased government and other institutions' supports. Findings emanating from Ntiamoah et al.'s research relate strongly to Dale and Currie (2015) who found a combination of government and private agribusinesses' research funding as very essential to the development of agribusiness, agricultural sector and the Canadian economy in general.

Merung, Darmawan, Windia and Astiti (2019) drew on the analytical network process (ANP) model to assess how Indonesian youths could be empowered to become pragmatic entrepreneurs in agribusiness. Merung et al. (2019) relied on the social capital-based business model canvas (SCBMC) to examine the value of products offered to customers. Indonesia is an agrarian economy. As a result, Merung et al. were interested in identifying strategic ways of developing youth entrepreneurship in agribusiness to help reduce Indonesia's dependence on other economies. Indonesia's role as an agrarian economy implies the availability of sufficient raw materials to serve as job opportunities for the youth in agribusiness. The youth's involvement in agribusiness became a common place following the Indonesian economic crisis in 1998. The authors noted the Indonesian economy is in a current state of disruption. That is, only those with competitive heart and spirit could survive in the business environment; the business race is not for the faint-hearted. Merung et al.

developed a joint ANP-SCBMC model to select the best priority empowerment strategy from three alternatives including *Preserves*, *Creates* and *Delivers* which are interrelated. All elements and clusters used in the research were placed in a single window; no sub-networks were created for this purpose. A model stability analysis was conducted by the researchers to ascertain stability of the results obtained from the ANP-SCBMC model. Similarly, sensibility analysis and cluster comparisons were carried out by Merung et al. Findings from the research indicated social capital (SC) alone is more significant in influencing alternative empowerment strategies than when combined with the business model canvas (BMC). However, the highest significance is obtained when the ANP-SCBMC model is applied. The research outcomes revealed the following order of importance for the alternative empowerment strategies: creates, delivers, and preserves. Merung et al.'s study provides a strong footing for inculcating entrepreneurial mind-set in the youth; it helps to nurture young graduates to become job providers other than job seekers.

An empirical research conducted by Junais, Samsuar, Useng, Ali and Syarif (2019) sought to examine how socio-spatial approach could be integrated into land use planning for agribusiness products in underdeveloped districts in Indonesia. Consistent with Merung et al., Junais et al. (2019) affirmed Indonesians' strong reliance on agriculture as the major source of income and livelihood. Junais et al. noted imbalance in the practical implementation of agricultural policies in Indonesia due to little attention to space and time while cultural, social, policy, networks, infrastructure, and economic factors attract the needed attention from stakeholders. Junais et al. carried out land feasibility exercise using the Food and Agricultural Organization's Land Suitability Evaluation model to determine suitability of the soil for cultivating agribusiness products. Findings from the research revealed potentials of the underdeveloped districts for agricultural activities in the country. However, lack of clear planning on the part of government in relation to effective utilisation of land is a challenge to effective development of the agricultural sector. The findings revealed twelve (12) agricultural products are cultivable in the research area. However, only six (6) commodities, including potatoes, leeks, celery, coffee, onions, and chili are socially acceptable for agribusiness in the area. Based on the study outcomes, Junais et al. emphasised on the need for the Indonesian government to direct land use to facilitate cultivation of valuable crops to stimulate competitiveness of agribusinesses.

Ghutidze (2017) identified wrong assessment of risk and weak financial management as factors affecting the level of capitlisation and investments in the insurance industry in Georgia. This affirms the arduous task of insurance companies and the government. It is believed steps taken by the government to set high education and promotion standards; and to ensure only individuals with high level of expertise in actuarial and insurance activities are licensed would help improve on the levels of investment and performance of the insurance industry. Efforts by insurance companies to improve on communication, co-ordination, weak corporate management standards; and retrain staff at regular intervals to enhance their hands-on experience and knowledge would contribute meaningfully to improve on the low capitalisation rate prevailing in the insurance industry. The long-term success of agro insurance businesses is negatively impacted by weak corporate management structures and standards. Qualitatively, insurance companies lose money and time through increased administrative and acquisition costs, and reduced sales revenues. Lack of proper co-ordination is a major contributor to the foregoing operation and performance defects.

Dale and Currie (2015) urged small agricultural companies to transition from the cash flow basis of funding research to investment proceeds basis. The latter approach calls for reliance on returns from initial investments as the fundamental source of funding agric research. This would minimise pressures on the companies' finances; and assure uninterrupted funding of future research. Thus, a paradigm shift from annual cash infusion to strategic investment initiatives holds the key to successful research funding in the agricultural industry. Merung et al. identified capital injection, development of business infrastructure, training to improve competencies, and social innovation of human resources as major prerequisites for successful implementation of business models among young entrepreneurs.

An organisation's inability to maintain complete communication methods and systems at both vertical and horizontal levels is likely to be saddled with information exchange challenges. These challenges may affect the accounting costs of specific policy formulation; and operating cost in general. Similarly, the level of academic and professional education of management and operating staff has an effect on the overall performance of any given organisation. Ghutidze (2017) found the general levels of academic and professional qualifications of personnel in the Georgian insurance sub-sector to be low. To assure long-term success of companies in the insurance sub-sector, it is imperative for these companies to consider investment in their human capital as paramount in the immediate- and long-term. The researcher found growth in well-developed agricultural insurance and penetration rates to be a product of high government involvement in sector-by-sector policy formulation and implementation; government's high involvement in the development of institutions and risk assessments; and government's promotion of extension methods and services in a transparent manner.

Extant research reveals Spain has the most sophisticated and advanced agricultural insurance system in Europe. Ghutidze (2017) noted agricultural insurance premium in Spain is subsidised; regional and central governments absorb 60% and 20% of the respective insurance premium cost. Spain's agricultural insurance system is built based on institutional agreement between the Spanish government and the private sector. And as key stakeholders, the farmers' unions play an active role in the implementation of the insurance scheme. The rate of agricultural insurance subsidy for farmers in Poland as at 2016 was 50%. The premium subsidy and other strategy such as the imposition of insurance tariff for non-insurance registration of farm lands have increased the total number of insurance policies in the country.

In spite of the noted challenges, total agricultural insurance premiums at the global level have witnessed steady increases in recent periods. Available statistics shared by Čolović and Petrović (2014) indicated total agricultural insurance premiums accumulated in 2014 amounted to $31 billion. This was about four times the amount ($8 billion) recorded nine years earlier in 2005. The growth recorded in agricultural insurance premiums between 2005 and 2011

was about 20%. However, the penetration rate during the same period was negative 0.83%. The United States of America and Canada recorded the highest increase (55%) in agricultural insurance premiums during the period under review. The respective increase recorded by Asia and Europe during the period were 22% and 18%. The rate of agricultural insurance premium accumulation in emerging economies is progressive and somewhat encouraging. For instance, total agricultural insurance premiums recorded in emerging economies increased from $1 billion in 2005 to $5 billion in 2011; and projected to surge to $19 billion by 2025. About 90% of all signed policies relate to crop insurance; and the remaining 10% include signings for other forms of agricultural insurance.

2.3. Factors Affecting Manufacturing Sub-Sector's Performance and Growth

Olawumi and Ogungbenle (2018) drew on the dynamic panel data analysis tool to examine variables that affect the growth of output in the activities of firms in the formal manufacturing sub-sector of the Nigerian economy. The authors noted the conduct of this research was necessitated by consistent dwindling output and ineffectiveness in the performance of the manufacturing sub-sector despite various attempts and measures by government to revamp it. Data required for the study were obtained from fifty (50) formal manufacturing companies listed on the Nigerian Stock Exchange (NSE); and documented in the NSE's Fact Book and the Statistical Bulletin (2014) of the Central Bank of Nigeria. Estimates applied to the models in the research were adapted from the work of Sangosanya (as cited in Olawumi and Ogungbenle, 2018). Outputs from the statistical analysis showed a negative relationship between the coefficient of operating efficiency and growth of companies in the manufacturing sub-sector. The implication is available figures on the growth of firms in the manufacturing sub-sector is at variance with their performance. Olawumi and Ogungbenle (2018) believed the output is indicative of regulatory and supervision weaknesses on the part of government agencies responsible for the manufacturing sub-sector. Findings from the study revealed significant positive relationship between variables such as managerial efficiency, exchange rate and bank efficiency, and growth of firms' output in the manufacturing sub-sector of the Nigerian economy. However, the impact of variables such as government regulations and policy, financial development, and energy infrastructural facilities on growth of output of firms in the manufacturing sub-sector was found to be negative. Based on the research findings, the researchers suggested the need for the Nigerian government to discourage actors in the formal manufacturing sub-sector from publishing reports that are not representative of the sub-sector's actual performance. Further, government should introduce and implement policies that would increase the prices of imported goods; and institute measures that would reduce and prioritise the cost of borrowing from financial institutions to boost domestic or local production.

A study conducted by Danmola, Olateju and Aminu (2017) sought to assess the effect of foreign direct investment (FDI) on the performance of the manufacturing sub-sector in the Nigerian economy. The research outcomes showed a statistically significant relationship between foreign direct investment and output of firms in the manufacturing sub-sector, affirming the effectiveness of federal government of Nigeria's economic policy which lays strong emphasis on trade and industrial liberalisation. Nigeria's economic policy focuses on improvements in efficiency and productivity; and competitiveness of companies in the manufacturing industry. Danmola et al. (2017) identified positive domestic investment as a major driver for increasing flow of foreign direct and indirect investments into the manufacturing sub-sector. To assure devolution of economic resources and increased performance of the manufacturing sub-sector, the authors suggested the need for significant proportion of foreign direct investment to be channeled into the manufacturing sub-sector. Finally, the implementation of trade liberalisation policy should proceed with caution, so Nigeria does not become an import-led economy.

Hassanzadeh and Cheng (2016) presented comprehensive and critical review on the selection of suppliers by manufacturers. They presented comprehensive review on how manufacturers could develop and formulate different criteria to select suppliers; and how manufacturers could apply and implement selection algorithms and multi-objective decision makings. The researchers presented in-depth analysis of the following individual and integrated suppliers' selection approaches to facilitate decision makings by manufacturers: analytic network process (ANP), integer programming (IP), goal programming (GP), analytic hierarchy process (AHP), linear programming (LP), data envelopment analysis (DEA), and mathematical programming (MP). Hassanzadeh and Cheng (2016) noted consistent increase in manufacturing firms' decision to engage the services of other competent firms in the industry; and to outsource part of their manufacturing processes and business to suppliers across the globe. This strategy is carefully adapted to ensure significant reduction in operating costs, improvements in the quality of final products, expanding existing markets and exploring new ones, and offering better customer services. These variables leave manufacturing firms across the globe with novel challenges. However, the foregoing are essential prerequisites for firms to have competitive edge in the manufacturing industry both at the local and international levels. Evaluation and critical analysis of the strengths and weaknesses of existing and potential suppliers could contribute immensely to the survival of firms in the ever-changing global business environment. Thus, critical evaluation and selection of suppliers should constitute an integral part of manufacturers' strategies.

Contreras and Perez (2018) were interesting in knowing the implications of *internet of things (IoT)* usage for productivity increase in the manufacturing sub-sector with special emphasis on data privacy and security. The researchers argued the research objective was relevant because the gradual and significant influence of the internet of things in different contexts, including businesses is very high. The study involved literary analysis of ninety-one (91) papers focused on how to increase productivity in a business through the use of internet of things; and presented in thirty-one (31) different journals in various countries across the globe: Netherlands, Spain, England, China, and Switzerland. Contreras and Perez (2018) made suggestions on how cyber security, supply chain, large data, digital manufacturing, monitoring and

control systems could be integrated strategically into the implementation of internet of things to ensure productivity increase in the manufacturing sub-sector of economies across the globe.

Mose, Njihia and Magutu's (2013) study was focused on the examination of major factors affecting the success of large manufacturing companies in electronic procurement (e-procurement); and the challenges inherent therein. Mose et al. (2013) sought to establish the extent of adoption of e-procurement among large scale manufacturing companies; identify the underlying factors for the success of e-procurement among large companies; and to determine challenges saddled with large manufacturing companies in the adaption and implementation of e-procurement in Nairobi, Kenya. Cross-sectional survey and descriptive statistical model were adapted and used in the research. Questionnaires were administered to and gathered from forty-six (46) respondents selected from four hundred and fifty-five (455) large scale manufacturing companies in Nairobi, Kenya. Findings from the research revealed widespread adoption and implementation of e-procurement among large scale manufacturing companies. Specifically, the manufacturing companies were found to use e-procurement to advertise tenders online, receive tender proposals submitted online; and to shortlist suppliers online, among other important functions. Some factors identified as essential to the success story of e-procurement among large scale manufacturing companies include effective monitoring of established e-procurement systems; commitment of management and employees to the implementation process; acceptance of e-procurement among users; support from top management; and dependable supplier performance and information technology. Conversely, the following factors were found to be inimical to the successful implementation of e-procurement systems among large scale manufacturing companies: employees' resistance to change; boards' refusal to approve e-procurement systems implementation; lack of management support; and overreliance on outdated computer equipment. To ensure the success of e-procurement in the medium- and long-term, Mose et al. suggested the need for managements of large scale manufacturing firms to encourage employees to embrace the concept of e-procurement systems; and integrate e-procurement into their manufacturing systems.

An empirical research conducted by Nyachanchu, Chepkwony and Bonuke (2017) sought to evaluate the impact of the three (3) dimensions of dynamic capabilities namely reconfiguration, sensing, and seizing capabilities on the performance of companies operating in the manufacturing sub-sector in Nairobi County, Kenya. Structured questionnaire was administered to three hundred and sixty-nine (369) companies sampled from a population of one thousand, four hundred and ninety-six (1,496) manufacturing companies incorporated and operating in the study area. Two hundred and seventy-one (271) of the sampled questionnaire were retrieved and used in the research. Key respondents used in the study were chief executive officers (CEOs). Regression analysis conducted by Nyachanchu et al. (2017) revealed, collectively, dynamic capabilities account for about 25.9% of variation in the performance of manufacturing companies in Kenya. However, each of the three dimensions (reconfiguration: B=0.182, p<0.001; sensing: B=0.215, p<0.01; and seizing: B=0.194, p<0.01) showed significant relationship with the performance of manufacturing firms.

Meghabber (2015) investigated the contribution of the electronic constraint (e-constraint) method and target costing to costs reduction in the modern manufacturing environment in the Algerian economy. Meghabber (2015) shared the contemporary manufacturing environment is characterised by increased global competition and rapid development of information and manufacturing technology. Therefore, it is imperative to assess the role of e-constraint and target costing in the competitiveness and survival of manufacturing firms in the global business environment. The outcomes revealed manufacturing firms that adapt and implement the e-constraint method and target costing enjoy considerable reduction in operating costs. Meghabber's (2015) study could be replicated in other jurisdictions to affirm the economic usefulness and generalisability of the e-constraint method and target costing to manufacturing firms across the globe.

Osei, Yunfei, Appienti and Forkuoh (2016) examined the role of process innovation in the development of unique growth strategy for small and medium-sized enterprises (SMEs) in the Ashanti Region of Ghana. The unit of analysis was the shoe manufacturing industry in the research area. The process innovation concept was analysed using the three major perspectives developed by Oslo Manuel (as cited in Osei et al., 2016) including new and improved distribution, new process, and improved process. Purposively sampled data from the field were analysed using the Structural Equation Model. This helped in deriving path estimates to measure the relationship between the research variables. Findings from the research revealed a positive relationship between a manufacturing firm's decision to adapt new and improved distribution strategy and growth of small and medium-sized manufacturing firms. Further, the results showed significant reduction in operating costs and increase in customer satisfaction. Firms in the manufacturing industry adapt improved process strategy when they experience increased productivity through significant improvements in quality and quantity of outputs. However, this strategy does not result in significant reduction in costs of production; the increased production costs negatively impact on growth potentials of manufacturing firms. Osei et al. concluded the impact of process innovation on the performance of the shoe manufacturing industry is positive, but not absolute. Therefore, firms in the industry must exercise caution in its adaption and implementation.

Syduzzaman, Rahman, Islam, Habib and Ahmed (2014) evaluated the impact of the total quality management (TQM) model on performance of the garments industry in Bangladesh. Syduzzaman et al. (2014) noted the advent of international trade liberalisation policies has brought in its wake increased competition; and the latter has obliged companies in the garment industry to identify and adapt new strategic approaches to production; and to the international markets. Syduzzaman et al. employed various tools such as check sheet, histogram, control chart, cause and effect diagram, and the Pareto chart to examine the effect of total quality management on the performance of various companies in the garments industry. The study revealed an application of the total quality approach results in significant reduction in the scrape per style and number of rework recorded on a monthly basis. The researchers found the application of TQM in the garments industry is gaining prominence because consumer preferences and expectations are strongly considered.

Iqbal, Ali, Haque and Moin (2018) analysed and identified variations in the performance of sewing workers in the apparel industry attributable to assigned working hours during the day, and different working days. Iqbal et al. (2018) sought to identify possible ways to address the phenomenon. Data collected were analysed to measure variations in the work station, working hours, and working days. The two-way analysis of variance (ANOVA) statistical model was applied to the research. Findings emanating from the research revealed 70% variations occurred in the work station while variations in working hours were 53%. The Delphi technique was adapted by the researchers and a group of experts for analysis, identification; and to find solutions to the variations. Following the analysis, short- and long-term solutions were proffered.

Akewushola and Elegbede's (2013) research sought to examine and identify obvious relationship between outsourcing strategy and performance of companies in the manufacturing sub-sector of the Nigerian economy. The researchers argued intense competition among manufacturing companies and others have compelled them to identify novel strategies that would provide competitive edge; manufacturing companies are constantly looking for strategic ways to assure value-for-money through efficient utilisation of limited financial, human capital, and other resources at their disposal. Stratified sampling technique was used to select one hundred and twenty (120) respondents for the study. Interviews were conducted to elicit further information on the key research variables. Validity and reliability of the research instrument (questionnaire) was tested by the researchers. Data gathered from the field were analysed using the Regression statistical model. Outputs from the statistical analysis revealed considerable benefits associated with the outsourcing strategy. These included reduction in the number of staff, reduction in average production costs, improvement in quality service delivery, streamlining of production process, increase in sales turnover and profitability, reduction in administrative burden, and time savings for other activities, among others. To ensure compliance with best practices in outsourcing, the researchers suggested constant monitoring of outsourced contractors.

An empirical research conducted by Al Hasan and Al-Zu'bi (2014) sought to investigate the relationship between lean manufacturing dimensions such as employees' involvement, lean job characteristics, continuous improvement and waste minimisation, and radical product innovation in the pharmaceutical sub-sector in Jordan. In all, one hundred and sixty-four (164) questionnaires were administered to and collected from ten (10) pharmaceutical manufacturers in Jordan. The research independent and dependent variables were examined using the multiple regression analytical model. The research findings revealed statistically significant relationship between employees' involvement and lean job characteristics (independent variables), and radical product innovation (dependent variable). The study outcomes revealed statistically less significant effect on the relationship between waste minimisation and continuous improvement (independent variables), and radical product innovation (dependent variable). However, the analysis indicated employees' involvement has the most significant effect on radical product innovation. On the basis of the findings, the researchers recommended, among other measures, increased employees' involvement in decision making related to the process of production to enhance their capacity to be innovative.

Obamuyi, Edun and Kayode (2012) evaluated the impact of lending by banking institutions, capacity utilisation by manufacturing companies, and economic growth on manufacturing output in the Nigerian economy. Times series data covering a period of thirty-six (36) years (from 1973 to 2009) were used in the study. The research data were analysed using the *cointegration and vector error correction model (VECM)*. The study outcomes showed no significant relationship between economic growth and manufacturing output. This outcome somewhat corroborates Olawumi and Ogungbenle (2018) who found a negative relationship between the coefficient of operating efficiency and growth of companies in the Nigerian manufacturing sub-sector. However, a positive relationship between manufacturing output, and banking institutions' lending rates and manufacturing capacity utilisation was established. Obamuyi et al. (2012) called for a concerted effort by financial institutions, manufacturers, government, and other key stakeholders to review and improve on existing lending and growth policies to render the Nigerian economy attractive to local and foreign investors.

Bhangale and Mahalle (2013) argue the adaption and implementation of separate traditional manufacturing systems such as flow lines and job shops are too simplistic to assure the survival of manufacturing firms in the competitive global manufacturing business environment. Manufacturers in the automobile industry are responding to variations in demand and multiple features as unique ways of improving on production quality to ensure their competitiveness in the industry. Due to challenges associated with operations and space, manufacturing companies have begun to recognise and accept *cellular layout* as a possible solution to the manufacturing challenges. Bhangale and Mahalle (2013) note widespread acceptability of cellular manufacturing system as a promising alternative to the traditional manufacturing systems. The cellular manufacturing system combines high production rate of flow lines with flexible job shops to meet the design and demand needs of customers in the contemporary manufacturing business environment. The design and implementation of cellular manufacturing systems for real-life situations are challenging. However, the benefits thereof outweigh the challenges when the systems are finally designed and implemented. Validity of models used in deriving solutions for manufacturing challenges under the traditional methods and systems deteriorates over time owing to the models' simplistic assumptions. However, Bhangale and Mahalle (2013) believe an integration of the following simple assumptions would inform the effective implementation of the cellular manufacturing systems; and affirm its ability to provide the needed solutions for the manufacturing sub-sector: first, product demand and product mix should remain fixed over a considerable period of time, usually over the production planning period; and second, each manufacturing task should be performed by a single machine type, that is, the possibility of routing flexibility of parts is not considered in the production process. The authors believe cellular manufacturing systems could employ flexibility in routing; and assume stochastic and dynamic requirements to address challenges inherent in manufacturing.

Garbelli (2014) observes flexible use of time and space by companies in the manufacturing industry to ensure they take and occupy the "best" manufacturing location or locations in their respective countries of operation and across

the globe. This implies firms in the manufacturing industry are constantly searching for solutions; they are constantly looking for innovative ways to effectively combine spatial requirements and time for manufacturing activities to assure strategic location of their manufacturing units across the globe. The author avers a competitive network is often created when two or more companies pool resources together to cede individual absolute control over certain business processes to enjoy mutual advantage; and to ensure maximum use of benefits derived from their union. Competitive networks often stress intense and many relationships among member companies ranging from outsourcing strategies to downsizing of internal skills to ensure cost-efficiency; and implementing competitive relationship with key stakeholders such as distributors, suppliers, and other competitors in the industry. Competitive network systems result in the creation of inter-firm business unit; this unit reflects shared activities of the combined firms.

3. Research Methodology

The quantitative approach to scientific inquiry was applied to the current research. Specifically, a cross-sectional design, an example of survey design, was adapted and used in the study. This allowed the researchers to gather relevant research data over a specific period of time (Ashley, Takyi & Obeng, 2016; Creswell, 2009; Frankfort-Nachmias and Nachmias, 2008). Data required for the research were obtained mainly from secondary sources including text books, peer-reviewed articles published in journals, research papers, newspaper publications; Google Search Engine, financial websites such as The Global Economy.com and Tradingeconomics.com; and electronic databases of the Bank of Ghana (BoG) and Ghana Statistical Service (GSS); the World Bank and World Economic Outlook, among others. Annual data on Ghana's total gross domestic products (GDPs) and manufacturing sub-sector values denominated in Ghana Cedis (GH¢) for the period 2000 through 2018; and data on the world's and Ghana's total manufacturing values denominated in United States Dollars (US$) from 1997 through 2016 were used in the study.

3.1. Analytical Tools

Regression models and descriptive statistics were used to describe the research variables; and to evaluate their behaviour over the stated time frame in the Ghanaian and global economies. Measures such as the range and standard deviation were employed to describe the extent of dispersion about the central tendency (Ashley et al., 2016; Creswell, 2009; Frankfort-Nachmias & Nachmias, 2008). These measures were used to describe trends in Ghana's and the world's manufacturing performance for selected time periods.

3.2. Research Variables

The independent research variable was manufacturing while the dependent research variables were Ghana's industrial sector, Ghana's GDP, and the world's total manufacturing values.

3.3. Regression Model

Regression statistical model was adapted to measure the effect and level of interaction of manufacturing on Ghana's industrial sector, total GDP, and the world's total manufacturing values over the research period. The Microsoft Excel analytical software was adapted and used in the research. Diagrams and tables were derived from Microsoft Excel to explain the research data.

3.4. Research Hypotheses

The study tested causal relationship between manufacturing and the industrial sector; between manufacturing and gross domestic product; and between manufacturing and global manufacturing values using the following null and research or alternative hypotheses:

3.4.1. Research Hypothesis One
- Ho: $\mu1 = \mu2$; this implies manufacturing does not have strong effect on Ghana's industrial sector
- H1: $\mu1 \neq \mu2$; this implies manufacturing has strong effect on Ghana's industrial sector

3.4.2. Research Hypothesis Two
- Ho: $\mu1 = \mu2$; this implies manufacturing does not have strong effect on Ghana's GDP
- H1: $\mu1 \neq \mu2$; this implies manufacturing has strong influence on Ghana's GDP

3.4.3. Research Hypothesis Three
- Ho: $\mu1 = \mu2$; this implies manufacturing does not have strong effect on the world's total manufacturing values
- H1: $\mu1 \neq \mu2$; this implies manufacturing has significant effect on the world's total manufacturing values

4. Research Findings and Discussions

4.1. Potential Agribusinesses and Challenges

One of the significant findings emanating from the current research revealed adequate supply of agricultural produce in the form of raw materials to the various factories and industries in the country would enhance production and capacity of the manufacturing sub-sector. It was therefore imperative to identify various activities in the agricultural and related sectors that could enhance functionality of the manufacturing sub-sector; improve on the sub-sector's contribution

to GDP; expand existing jobs; and create new job opportunities to reduce unemployment levels in the economy. The research findings revealed the following as some key agribusiness areas investors can take advantage of to develop the agricultural sector, add value to agricultural produce through value chain, and maximise profit while feeding the manufacturing sub-sector with the requisite raw materials to enhance productivity and growth.

4.1.1. Seed Production

Growing different types of seedling to meet the demands of farmers in different farming fields in the country and beyond is a lucrative business. Existing and potential investors could take advantage of the Government of Ghana's resolve to invest in quality seedlings to produce or supply seedlings to meet the demands of farmers. Supply of quality seedlings is a strategic way of minimising the harmful effects of pests on crop yields, among other significant benefits. Agribusiness investors must explore ready market opportunities in seedlings supply.

4.1.2. Fertilizer Production

Increasing agricultural yield through improved farming techniques is paramount to the realisation of set economic objectives. Fertilizer production helps to improve soil condition; and the condition of farm produce. Investors in agribusiness can contribute to the realisation of the set economic objectives by producing and supplying farmers with quality industrial or eco-friendly fertilizers to grow and increase their crops yield. Agribusiness investors must take advantage of Ghana Government's decision to invest in fertilizers to produce or supply fertilizers to meet the demands of farmers. Agribusiness investors must explore ready market opportunities in the supply of fertilizers. The supply of government-subsidised fertilizers would increase affordability and purchases; provide protection for crops; and increase crop yields. Smuggling of government-subsidised fertilizers to neighouring countries for sale neither inure to the common economic good of the entire nation nor contribute positively to efforts aimed at improving agricultural sector production to revamp the manufacturing sub-sector and its ultimate contribution to GDP.

4.1.3. Feed Production

Sustained and enhanced production of animals require constant supply of feed to the breeds, including cattle, poultry and piggery. Potential and existing investors in agribusiness are encouraged to consider strongly this lucrative enterprise. Quality feed production would increase the supply of healthy breeds needed by some factories and industries for corned beef and other animal products.

4.1.4. Vegetable and Fruit Farming

Growing crops such as tomatoes, oranges, pineapples, mangoes, among others, are essential to the development of tomato paste and fruit juice companies in the country. Importation of tomatoes from neighbouring countries to meet raw materials demand of tomato paste factories could be curbed through increased tomato yields by farmers in the country. Increased yield from fruit farming would boost the productive capacity of the beverage industries. The Ekumfi Fruits and Juices Factory which was inaugurated in 2017 at Ekumfi in the Central Region of Ghana under the current government's flagship programme, *one district, one factory*, is arguably the largest fruit processing factory in West Africa. It is set to commence operation; and has the capacity to process ten (10) tonnes of fruits per hour. The Fruits and Juices Factory could benefit immensely from large scale pineapple production in the country. Pineapple farms cultivated in close proximity to the juice factory would be cost-effective to both farmers and the juice producing company; it would cut down cost and time of transporting the raw materials (pineapples) from the farm or farms to the factory for processing into fruit juice.

4.1.5. Fish Farming

Fish produced in Ghana attracts the attention of foreign markets, including the Chinese market. Increasing fish farming to meet industry demand; and having excess for export would be economically beneficial to fish farmers and the economy in general. Investors in agribusiness must take advantage of government's favourable policies on inland fish production to increase the sub-sector's contribution to total fish production in the economy.

4.1.6. Maize, Cassava and Rice Farming

Manufacturers of various flour mills such as corn flour, wet cassava flour, dry cassava flour, plantain flour, rice flour, and many others, rely heavily on maize, cassava, plantain, and rice farming and production in the country. State-partnered and abandoned rice farms must be revived to increase rice yield and production in the country; and to reduce considerably the estimated over $1 billion spent on the importation of rice into the Ghanaian economy annually. Although the economy currently produces about 450,000 tonnes of rice annually, the quantity is not sufficient to meet the millions of tonnes demanded by the population. The Aveyime Rice Project in the Volta Region of Ghana alone has the capacity to produce to meet the rice needs of the entire economy. The existence of other small scale rice farms in some parts of the country implies the economy has the capacity to produce rice in excess for exports. Ghana is one of the many African economies that feed on staple products, including rice. Thus, any decision to invest in this area would not be an investment exercise in futility; potential investors are likely to recoup their investments with higher returns over time. The recently established Ghana Commodities Exchange (GCE) has two major commodities trading on it. These include soya beans and maize. However, plans are far advanced to add a third commodity, rice, to the stock of trading commodities. The initiative is intended to increase rice production locally; and to reduce Ghana's high import bills on rice annually.

4.1.7. Cotton and Sugar Cane Farming

Increasing population size coupled with increased professional and social activities has increased the demand for textile products in the country. Today, many television stations in Ghana organise reality and fashion shows; others organise sewing competition for dress designers. All else held constant, the foregoing activities would increase demand for textiles in the country. Active private sector participation means more privately-owned television stations would be established invariably across the length and breadth of the country, implying further increase in the demand for textile products. Regulations on textiles import would protect Ghana's textile industry and encourage strong private sector participation. Operations at the Komenda Sugar Factory are believed to have been stalled by lack of adequate raw materials (sugar canes). Growing more sugar canes would have ready market; ease the operations of the Komenda Sugar Factory; and create job opportunities for factory hands, engineers, professionals, and food sellers, among others.

4.1.8. Cashew and Almond Farming

Ghana ranks considerably high in Africa in terms of cashew production and export. However, little can be said about her ranking in almond farming. Available statistics indicate Ghana's total earnings from non-traditional exports including cashew increased from about $2.55 billion in 2017 to $2.8 billion in 2018. The Ghana Export Promotion Authority (GEPA) attributed the improvement to increasing demand for Ghana's cashew nuts by Vietnam and European countries. Existing and potential investors in agribusiness need to channel part of their investment resources into cashew and almond farming in commercial quantities; they could take advantage of the novel export strategy introduced by the Ghana Export Promotion Authority to increase annual yield; and to announce their presence positively in the international market. Indeed, cashew and almond farming is a lucrative venture; and deserves the investment attention of men and women in agribusiness in Ghana.

4.1.9. Animal Farming

Breeding and producing domestic animals to feed the manufacturing industry are essential to the growth of the Ghanaian economy. Notable animal farming activities include cattle rearing, piggery farming, and poultry farming. Growing cattle would provide leather, shoe and tyre factories with the raw materials needed to expand production to meet growing demands of the population. It would help provide meat for the growing population. However, religious beliefs of Muslims; and some Christians and Traditionalists do not allow them to patronise piggery products. This notwithstanding, piggery production has a growing demand in the country and beyond. Available statistics indicate Ghana spends significant amount on the importation of poultry products. This affirms high consumption rate and ready market for poultry products including chicken and eggs in the country. Recent education through various media including radio on the health benefits of consuming eggs on a regular basis has increased demand for the product and its consumption rate among Ghanaians. All else held constant, increased investment in poultry farming is analogous with increased chicken and egg production for domestic consumption; and as raw materials needed to feed manufacturing firms. Efforts to rear and produce these poultry products in the country would have far-reaching macroeconomic implications: pressure on demand for foreign currency to import these poultry products would reduce; there would be significant improvement in volatilities associated with foreign currency transactions or foreign exchange rate; the Ghanaian currency (Ghana Cedi) would appreciate in value in terms of foreign exchange rate; and job opportunities would be created to reduce the unemployment rate, among other economic advantages.

4.1.10. Fumigation

Routine maintenance on farming activities is an effective way of maintaining and increasing production levels. Farmers need insecticides and herbicides to assure their plants and animals of healthy conditions and environment. Farmers need insecticides and herbicides to minimise the incidence of poor farm harvests due to attacks by predatory insects such the fall army worm. This makes fumigation sales an essential part of the entire agribusiness value chain.

4.1.11. Rental of Equipment

Agricultural production in commercial quantities is aided by the availability of sophisticated equipment. Generally, many farmers cannot afford an outright purchase of tractors, harvesters, and others. An agribusiness that seeks to hire or lease equipment to farmers would make significant gains while contributing to agricultural sector growth; and increasing the opportunity of feeding the manufacturing sub-sector with the requisite raw materials to stimulate and sustain production levels.

4.1.12. Cocoa Farming

Growing cocoa is at the heart of the government's export drive for higher foreign exchange earnings. To this end, investors are encouraged to focus their investment attention on that sub-sector of the Ghanaian economy. In spite of the fluctuations in its price in the world market, cocoa continues to remain a major contributor to Ghana's gross earnings. Measures put in place by the Government of Ghana; and joint efforts by the Governments of Ghana and Ivory Coast to ensure price stability for cocoa farmers throughout the season are an added incentive to existing cocoa farmers in both countries. This price "insurance" is expected to encourage existing cocoa farmers to plant more healthy trees to boost harvests; and to attract potential investors to the business. Recent inauguration for the establishment of a cocoa juice factory at Akrofuom in the Assin South District in the Central Region of Ghana; and memorandum of understanding (MoU) signed by the Government of Ghana (represented by the Ghana Cocoa Board) with the China Development Fund and Genertec International for the establishment of a $100 million cocoa processing plant in early 2020 at Sefwi Wiawso in the

Western Region would help reduce primary import levels, add value to Ghana's cocoa beans, create job opportunities, and accelerate government's *one district, one factory initiatives* in the two hundred and sixteen (216) Districts throughout the country. Consumers would have the opportunity to derive healthy nutritional benefits from Ghana's brown gold cocoa.

4.1.13. Agri-Education

In line with Ghana Government's resolve to encourage electronic agriculture (e-Agriculture), potential investors could establish consultancy firms and training centres to educate farmers on modern farming technologies; educate farmers on use of the Internet; assist farmers to design websites; and help farmers to market their produce (Onuh, 2016).

Some identified challenges to the success of agribusinesses in Ghana are summarised as follows: rapid urbanisation affecting cultivable lands; Ghana's irrigable land is negatively impacted by the activities of "Get them and sell" (Galamsey) operators or illegal miners and real estate developers; complex land tenure systems; absence of effective irrigation system to encourage more farming activities in the dry season; lack of strong interest in agribusiness by the youth; high cost of farm inputs and equipment; inadequate capital injection into agribusinesses; difficulty in accessing loans from commercial banks; and high interest charges on loans, among others.

4.2 .One-Districts, One-Factory and Other Government Initiatives

Findings from the research revealed the accelerated industrial development strategy which commenced from 2001 is continued by successive governments in different forms without undermining its fundamental objective. Currently, Government of Ghana's programme in the manufacturing sub-sector is essentially focused on and driven by the *one district, one factory concept.* Successful implementation of this strategy is expected to bring significant relief to various facets of the Ghanaian economy. Some government expectations from the activities of the manufacturing sub-sector are outlined as follows: encourage more private participation in the manufacturing sub-sector through Public/Private Partnership (PPP) agreements; establish factories in all the 216 Districts across the country; create ready-markets for farm produce; transform the Ghanaian economy from an import-led to export-led by manufacturing more of the imported goods in the country; create significant number of jobs annually; allow the manufacturing sub-sector (led by the private sector) to drive economic growth; improve on quality of agricultural produce exported to the international market; ease the foreign exchange pressure on the Ghanaian currency (Cedi); curb inflation through increased food production; increase manufacturing sub-sector's contribution to GDP; and meet annual GDP growth targets, among other significant expectations.

Some programmes initiated by the Government of Ghana to increase yield in the agricultural sector include One village, One dam; One district, One warehouse; provision of quality seedlings; provision of adequate fertilizer and extension services; assuring ready market for farm produce; encouraging adaption and implementation of electronic agriculture (e-Agriculture); and ensuring sufficient rice production for the country. Current government's expectations from investment in the agricultural sector of the economy include creation of substantial number of direct and indirect jobs in year one of the initiative; creation of more jobs in year two and beyond; rekindling of the "Operation Feed Yourself" (OFY) "spirit" of the 1970s; encouraging more young graduates into agriculture; introducing best farming practices. That is, encouraging use of modern technology in various forms of farming (crop and poultry farming) in the country; encouraging more youth (non-graduates) into agriculture; introducing more loss prevention methods; increasing agricultural production to feed the manufacturing industry; increasing yield from agricultural production; increasing agricultural sector's contribution to GDP; and increasing agricultural production to feed the manufacturing industry. The government's *planting for food and jobs* programme commenced in 2017 with over seventy-seven thousand (77,000) farmers across the country. Through the initiative, the country's food production from different crops in 2018 was 150,000 tonnes; and the country was able to supply 19 different food items to neighbouring West African countries such as Burkina Faso, Niger, and Northern Nigeria. The country's earnings from these exports were in millions of Dollars.

Some measures and initiatives taken by the Ghanaian government to provide the requisite funding for intended activities in the agricultural sector and manufacturing sub-sector of the economy are listed as follows: Ghana Incentive-Based Risk Sharing System for Agricultural Lending (GIRSAL) – UMB ($1 million), AfDB ($10 million); reduction in policy rate from 25.5% to 16%; dialogue with financial institutions to provide loans to investors; secured loan from the Canadian Government (Can. Dollars = $125 million OR U.S. Dollars = $120 million); expression of interest in supporting Ghana Government's agribusiness initiative by the Korean and Israeli Governments. Similarly, the United States, Turkish, and German Governments' representatives have expressed interest in encouraging their citizens to explore investment opportunities in agribusiness and manufacturing in the Ghanaian economy. These initiatives have been complemented with follow-up visits by the heads-of-states of these countries and their representatives to Ghana; and reciprocal visits to some of these countries by Ghana's President, Nana Addo Dankwa Akufo-Addo, his Vice, Alhaji Dr. Mahamudu Bawumia; and other government officials and representatives.

4.3. Performance of the Industrial Sector

As stated earlier, the industrial sector is one of the three major sectors of the Ghanaian economy. Table 1 and Figure 1 depict components of the industrial sector including mining and quarrying, manufacturing, electricity, water and sewerage, and construction. The fourth column in Table 1 presents values for electricity, water and sewerage. Values for the period, 2000 through 2005 in the column cover electricity and water; values from 2006 through 2018 include electricity, water and sewerage. The latter component (sewerage) was included following rebasing of the Ghanaian economy in 2011 using 2006 as the base year.

Year	Mining & Quarrying	Manufacturing	Electricity & Water	Construction
2018	37,999.00	31,441.00	5,648.00	19,683.00
2017	25,917.00	26,860.00	5,805.00	19,433.00
2016	16,831.00	23,922.00	4,791.00	15,165.00
2015	17,131.00	20,506.00	4,162.00	15,357.00
2014	21,705.00	17,605.00	2,274.00	12,183.00
2013	15,933.00	14,523.00	2,007	10,641.00
2012	2,221.00	2,437.00	460	2,541.00
2011	2,116.00	2,242.00	436	2,339.00
2010	690	1,984.00	429	1,949.00
2009	581	1,844.00	398	1,902.00
2008	544.4	1,868.00	370	1,739.50
2007	531.6	1,801.30	345.2	1,251.60
2006	497.4	1,823.50	367.1	1,016.30
2005	33.7	58.9	17.45	55.5
2004	31.7	56.1	15.5	50.1
2003	30.8	53.6	15	47.3
2002	29.4	51.3	14.4	44.6
2001	28.1	48.9	13.8	42.5
2000	28.60	47.2	13.2	40.5

Table 1: Performance of Industrial Sector Components – 2000 To 2018
Values in Millions of Ghana Cedis (GH¢)
Sources: Bank of Ghana (BoG) & Ghana Statistical Service (GSS)

Data in Table 1 and Figure 1 reveal steady increase in contribution values for each of the components to the industrial sector between 2000 and 2005. However, these values are significantly low compared with values recorded from 2006 through 2018. The significant increase in values of the industrial sector components and components of the other two sectors (agricultural and services sectors) could be attributed largely to rebasing of the Ghanaian economy in 2011 and 2017 using 2006 and 2013 as the respective base years. We observe significant increase in manufacturing sub-sector's performance from 2006 through 2018. However, the sub-sector's performance was more phenomenal from 2013 to 2018; the value recorded for the manufacturing sub-sector in 2013 (GH¢14.523 billion) was about 5.96 times the value recorded in 2012 (GH¢2.437 billion). Average contribution of the manufacturing sub-sector to the industrial sector from 2013 to 2018 was GH¢22.476 billion, a little lower than the average contribution of mining and quarrying (GH¢22.586 billion) during the same period.
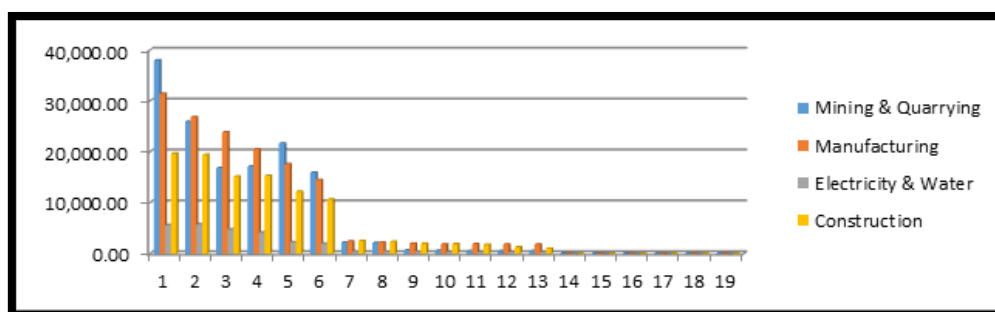

Figure 1: Performance of Industrial Sector Components – 2000 to 2018

Data in Table 1 and Figure 1 indicate consistent dominance of the manufacturing sub-sector in terms of performance and contribution to the industrial sector from 2000 through 2012. However, its dominance from 2013 through 2018 was interspersed with intermittent "takeovers" by mining and quarrying in 2013, 2014, and 2018. Values for mining and quarrying witnessed considerable increase following the discovery and production of crude oil in commercial quantities from 2010. The initial contribution of crude oil to mining and quarrying in 2010 was GH¢65 million; this figure surged to GH¢1.372 billion in 2011. Average contribution of the construction sub-sector to the industrial sector over the period 2000 through 2018 was about GH¢5.552 billion. This figure is about 3.82 times the average contribution of electricity, water and sewerage (GH¢1.452 billion) during the same period. Our statistical analysis in section 4.6 would help determine the significance of manufacturing sub-sector's contributions to the industrial sector, national gross domestic product, and global manufacturing values.

4.4. Performance of Key Economic Sectors
Contributions of key sectors of the economy, including agricultural, industrial and services sectors, to Ghana's gross domestic product (GDP) over a nineteen-year period (2000 through 2018) are presented in Table 2 and Figure 2. Data in the table and figure show *net of indirect taxes*, a fourth component that is included in the computation of Ghana's

total GDP for a given year. Data in Table 2 and Figure 2 reveal relatively close contributions of the agricultural and industrial sectors to Ghana's GDP.

Year	Industry	Agric	Services	Net of Indirect Taxes	GDP*
2018	94,770.30	54,923.50	129,278.90	21,623.00	300,596.10
2017	78,015.00	50,554.00	109,698.00	18,404.00	256,671.00
2016	60,709.00	45,116.00	92,680.00	16,572.00	215,077.00
2015	57,155.00	36,526.00	71,334.00	15,384.00	180,399.00
2014	53,767.00	31,086.00	56,132.00	14,447.00	155,433.00
2013	43,104.00	25,290.00	48,408.00	6,848.00	123,650.00
2012	7,659.00	6,595.00	14,125.00	1,721.00	30,099.00
2011	7,132.00	6,507.00	12,689.00	1,414.00	27,742.00
2010	5,053.00	6,453.00	11,714.00	1,032.00	24,187.00
2009	4,725.00	6,129.00	10,667.00	934	22,454.00
2008	4,521.90	5,716.10	10,106.00	1,248.30	21,592.20
2007	3,929.60	5,322.00	9,358.30	1,303.40	19,913.40
2006	3,704.30	5,415.00	8,690.40	895.40	18,705.10
2005	165.50	237.20	197.10	59.1	658.90
2004	153.80	227.70	184.30	56.6	622.40
2003	146.70	212.90	1,756.70	54.2	589.50
2002	139.60	200.70	1,678.10	51.9	560.10
2001	133.30	192.30	1,602.70	49.80	535.70
2000	129.50	184.90	1,525.30	47.20	514.20

Table 2: Economic Performance of Various Sectors – 2000 To 2018
*Values in Millions of Ghana Cedis (GH¢)
Sources: Bank of Ghana & Ghana Statistical Service

An obvious "outlier" in the contributions to Ghana's GDP is the services sector. This sector, on average, has consistently contributed about GH¢117.379 billion to Ghana's GDP from 2012 to 2018; the sector's contribution affirms its invaluable contribution to the development and growth of the Ghanaian economy. Data on percentage contribution of each of the three sectors to Ghana's economy from 2012 through 2018 are presented in Table 3 and Figure 3. Data for the selected period were computed using values in Table 2. Difference between the sum of percentage contributions of the three sectors for each period and 100% is the percentage contribution of *net of indirect taxes*.

Year	Industry	Agric	Services
2018	31.53	18.27	43.01
2017	30.4	19.7	42.74
2016	28.23	20.98	43.09
2015	31.68	20.25	39.54
2014	34.59	20	36.11
2013	34.86	20.45	39.15
2012	25.45	21.91	46.93
Average	30.96	20.22	41.51

Table 3: Contribution of Each Sector to GDP (%) – 2012 To 2018

Statistics in Table 3 and Figure 3 affirm average contribution of the services sector to GDP in percentage terms from 2012 through 2018 was about 41.51%. Similarly, average contribution of the agricultural sector to Ghana's GDP within the seven-year period in monetary terms was GH¢35.727 billion while the sector's percentage contribution to GDP over the same period was about 20.22%. This compares slightly with industrial sector's respective average percentage contribution of about 30.96%; and monetary contribution of GH¢56.454 billion over the seven-year period. It is worth-emphasising a significant portion of manufacturing activities thrives on the availability of raw materials from the agricultural sector. Thus, the agricultural sector propels growth in the manufacturing sub-sector; and by extension, the industrial sector. This is indicative of the existence of a strong relationship between these two key sectors that is, agricultural and industrial sectors of the Ghanaian economy.
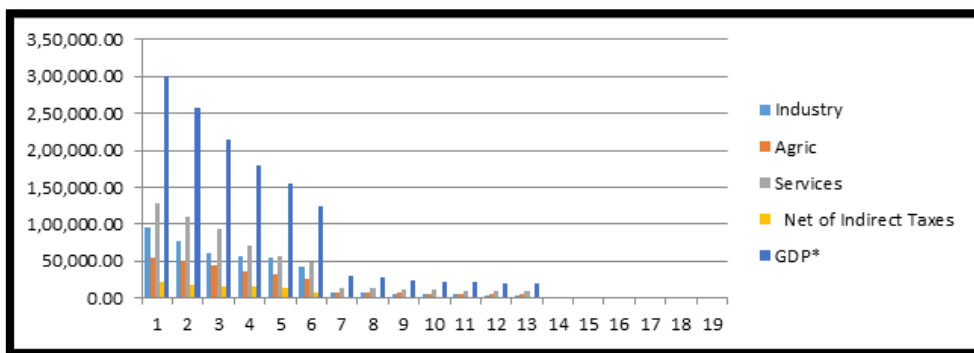
Figure 2: Economic Performance of Various Sectors – 2000 to 2018

Data in Table 2 and Figure 2 depict consistency in Ghana's GDP growth from 2000 through 2018. The data show consistency in the performance of agricultural and industrial sectors over the period. However, the services sector experienced some downturns in 2004 and 2005. Data in Table 4 and Figure 4 provide details on growths in the performance of the various sectors of the Ghanaian economy and GDP over a seven-year period. That is, from 2012 through 2018. Statistics in Table 4 and Figure 4 were computed using values in Table 2.
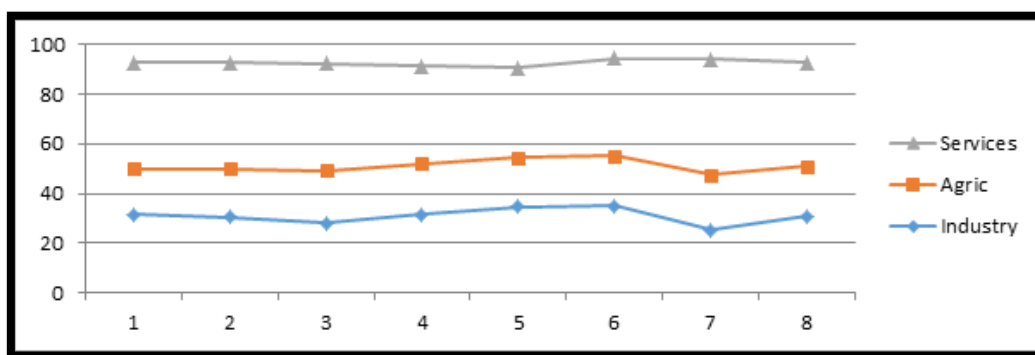

Figure 3: Contribution of Each Sector to GDP (%) – 2012 to 2018

Comparative analysis of the three main sectors using available data in Table 4 and Figure 4 reveals the industrial sector recorded the highest growth rates over the period, followed by agricultural and services sectors respectively. The data show significant increase in growth rates across all the sectors in 2013; and fairly stable growth rates in subsequent years. The growth rates recorded in 2013 could be attributed to rebasing of the Ghanaian economy in 2017 using 2013 as the base year. Average growth rate recorded by the industrial sector over the seven-year period (2012 through 2018) was about 79.62%. Respective average growth rates recorded by the agricultural and services sectors during the same period were 52.78% and 51.89%. It is observed in spite of the challenges that confronted the industrial sector from 2014 through 2017 it continued to maintain an impressive average growth rate above the agricultural and services sectors during the research period. Average growth rate in Ghana's GDP over the seven-year period was about 59.53%. The data show inconsistency in GDP growth rates over the period, although consistent increase in GDP values over the period is observed in Table 2.

Year	Industry	Agric	Services	GDP
2018	21.36	8.64	17.85	17.11
2017	28.51	12.05	18.36	19.34
2016	6.22	23.52	29.92	19.22
2015	6.3	17.5	27.08	16.06
2014	24.74	22.92	15.96	25.7
2013	462.79	283.47	242.71	310.81

Table 4: Sectors and GDP Growth Rates (%) – 2012 To 2018

A major setback to the industrial sector's contribution to GDP and its growth in 2016 was a negative growth rate recorded by the electricity sub-sector in that year. With improved electricity generation and strong oil exploring activities, the industrial sector recorded a significant growth in 2017. Rigorous activities introduced in the agricultural sector such as the *planting for food and jobs initiatives* shored up the sector's growth and contribution to GDP in 2017; and expected to contribute meaningfully to the sector's growth in subsequent years. Measures put in place by the government through its sector Ministry to streamline activities in the financial sub-sector are expected to improve performance of the services sector to assure its significant growth and contribution to Ghana's GDP in the medium- and long-term.
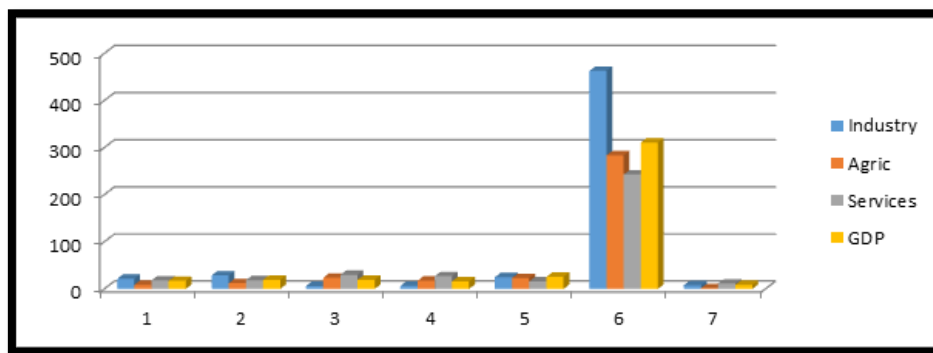
Figure 4: Sectors and GDP Growth Rates (%) – 2012 To 2018

Some of these "hard-line" measures include increase in minimum capital requirement for universal banks from GH¢120 million to GH¢400 million; and the decision to issue GH¢10 billion bond to retire the energy sector debt, among others. The latter measure is intended to settle government's indebtedness to the commercial banks to reduce the surging amount of non-performing loans which stood at about GH¢6.2 billion at the end of 2016; create room for more liquidity in the financial sub-sector to allow commercial banks to process more loans for individuals, investors and businesses; and to allow government to ensure a reduction in the average lending rate charged by universal banks and other lending institutions on loans in the country.

4.5. Descriptive Statistics

Descriptive statistical test was conducted to ascertain the magnitude of Ghana's total manufacturing values during the period – 2000 through 2018. Manufacturing data in Tables 1 and 4 were used for the analysis in this section. Table 5 provides a statistical description for measures of central tendency such as the mean, median, and mode; and measures of dispersion such as the range, minimum, maximum, and standard deviation (Ashley et al.; Frankfort-Nachmias and Nachmias, 2008) for Ghana's total manufacturing values used in the research. The respective highest manufacturing value (GH¢31.441 billion) and the lowest value (GH¢47.2 billion) were recorded in 2018 and 2000. The *range* of total manufacturing values during the period is 31393.8 (GH¢31.3938 billion). This represents the difference between the highest and lowest manufacturing values during the period. Results in Table 5 depict respective *mean* and *median* of 7851.2 and 1868; and standard deviation of 10751.74505. These tell us the extent to which the observations were dispersed around the central tendency. The *mode* explains the variable with the highest frequency in the data. Table 5 shows no absolute value (#N/A) for the mode. This implies no manufacturing value was repeated during the period.

Mean	7851.2
Standard Error	2466.619482
Median	1868
Mode	#N/A
Standard Deviation	10751.74505
Sample Variance	115600021.7
Kurtosis	-0.2392549
Skewness	1.156182173
Range	31393.8
Minimum	47.2
Maximum	31441
Sum	149172.8
Count	19
Largest(1)	31441
Smallest(1)	47.2

Table 5: Ghana's Manufacturing Values – 2000 To 2018

The output in Table 5 shows respective *Kurtosis* and *standard error* values of -0.2392549 and 2466.619482. The standard error value indicates the extent to which the coefficients are significantly different from zero. The *skewness* of the distribution is 1.156182173 while the *sample variance* is 115600021.7. Again, analysis in the following section would help determine the significance of the manufacturing values relative to the industrial sector, Ghana's GDP and global manufacturing values.

4.6. Results

The objective of this research was to test three major hypotheses that is, measure the extent to which the manufacturing sub-sector's performance significantly influences the industrial sector; Ghana's gross domestic product; and manufacturing values at the global level. Statistics in column 2 in Table 6 depict the manufacturing values for Ghana from 2000 through 2018. Data in column 2 show steady increase in manufacturing sub-sector's performance from 2000

through 2018, save 2007 when there was a decline in performance relative to the previous year (2006). Columns 3 and 4 present the respective values for Ghana's industrial sector and GDP during the period. Values for data in Table 6 are in *billions of Ghana Cedis (GH¢)*. Data used in this section were obtained from the databases of the Bank of Ghana and Ghana Statistical Service.

Year	Manufacturing	Industry	GDP*
2018	31,441.00	94,770.30	300,596.10
2017	26,860.00	78,015.00	256,671.00
2016	23,922.00	60,709.00	215,077.00
2015	20,506.00	57,155.00	180,399.00
2014	17,605.00	53,767.00	155,433.00
2013	14,523.00	43,104.00	123,650.00
2012	2,437.00	7,659.00	30,099.00
2011	2,242.00	7,132.00	27,742.00
2010	1,984.00	5,053.00	24,187.00
2009	1,844.00	4,725.00	22,454.00
2008	1,868.00	4,521.90	21,592.20
2007	1,801.30	3,929.60	19,913.40
2006	1,823.50	3,704.30	18,705.10
2005	58.9	165.50	658.90
2004	56.1	153.80	622.40
2003	53.6	146.70	589.50
2002	51.3	139.60	560.10
2001	48.9	133.30	535.70
2000	47.2	129.50	514.20

Table 6: Contribution of Manufacturing to Industry and GDP – 2000 To 2018
Sources: Bank of Ghana & Ghana Statistical Service

Data in Table 6 helped in testing significance of the relationship between the manufacturing sub-sector and the industrial sector; and between the manufacturing sub-sector and Ghana's GDP. Table 7 and Figure 5 present relevant data on total manufacturing values for Ghana and the world's economy spanning over a twenty-year period that is, from 1997 through 2016. The world's and Ghana's manufacturing values presented in Table 7, and in Figure 5 are in *trillions of United States Dollars (US$)*.

Year	World's Manufacturing Value	Ghana's Manufacturing Value
2016	12.313	0.611842624
2015	12.248	0.559051972
2014	12.699	0.607117815
2013	12.276	0.743193108
2012	12.034	0.237403464
2011	11.781	0.254164598
2010	10.557	0.205553641
2009	9.343	0.17592434
2008	10.221	0.215210237
2007	9.436	0.212836837
2006	8.393	0.198961626
2005	7.765	0.928864614
2004	7.245	0.776409116
2003	6.478	0.685048454
2002	5.83	0.556650681
2001	5.768	0.478500628
2000	6.143	0.4493118
1999	5.997	0.696624156
1998	5.842	0.672361592
1997	5.975	0.623779297

Table 7: Manufacturing Values for the World and Ghana – 1997 To 2016
*Manufacturing values in Trillions of United States Dollars (US$)
Sources: The Global Economy.com & World Bank

Data in Table 7 and Figure 5 were useful in testing significance of Ghana's manufacturing sub-sector's contribution to the world's total manufacturing values during the period. Data in the table and figure were obtained from the database of the World Bank; and The Global Economy.com. Available data on Ghana's total manufacturing values at the

World Bank spans from 1965 through 2016. The foregoing is emphasised because a recent study on pensions revealed Ghana had no reliable data on pension fund assets at the World Bank.
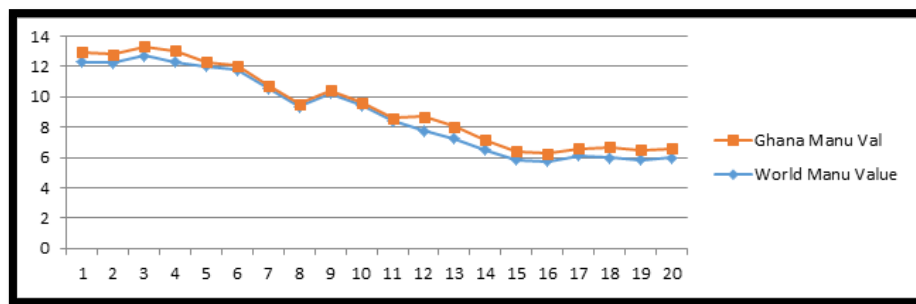

Figure 5: Manufacturing Values for the World and Ghana – 1997 To 2016

4.6.1. Test of Hypothesis One

The alternative hypothesis under the first hypothesis in section 3.4.1 sought to test whether or not manufacturing has strong influence on the performance of the industrial sector in the Ghanaian economy. Output from the statistical analysis on research hypothesis one is presented in the following section.

4.6.1.1. Model Summary

Regression analysis outputs on the first hypothesis are presented in Tables 6 through 9; and in Figures 4 and 5. Summary constitutes an important aspect of a regression model. Table 8 presents an overall description of the regression model. Values for R, R^2, and adjusted R^2 are displayed in Table 8. Value of the multiple correlation coefficients between the independent variable (manufacturing) and the dependent variable (industrial sector) is presented in the R row. The R^2 value in Table 8 tells us the extent to which variability in the dependent variable is accounted for by the independent variable. The R^2 value implies manufacturing accounts for about 99.40% (0.993984917 x 100% = 99.3985% = 99.40%) of the variation in industrial sector's performance. The results suggest less than 1% (100% - 99.40% = 0.60%) of the outcome is explained by external random factors.

Regression Statistics	
Multiple R	0.996987922
R Square	0.993984917
Adjusted R Square	0.993631089
Standard Error	2485.835557
Observations	19

Table 8: Summary Output

One of the measures that determine the generalisability of the regression model is the adjusted R^2. Generally, an ideal adjusted R^2 value is closer to zero or the R^2 value. The adjusted R^2 value (0.993631089) in Table 8 is not significantly different from the observed value of R^2 (0.993984917). This implies the cross-validity of this regression model is good; the model may accurately predict the same dependent variable from the given independent variable in a different group of participants. The R^2 significance was computed using an F-ratio. The ideal F-ratio formula for measuring R^2 significance is:

$$F = \frac{(N - k - 1)\,R^2}{k\,(1 - R^2)}$$

Where:
R^2 = Unadjusted value
N = Number of cases or participants in the study
k = Number of independent variables in the regression model

Value for the F-ratio was determined as follows:

$$F = \frac{(19 - 1 - 1)\,0.993984917}{1\,(1 - 0.993984917)}$$

$$= \frac{16.897743589}{0.006015083}$$
$$= 2809.22867$$

Our computations revealed the change in the amount of variance that can be explained gives rise to an F-ratio of 2809.22867, which is equivalent to the F-value (2809.229) in Table 9. This F-ratio shows a non-significant value (p = 0.676503, p > 0.05) as presented in Table 10.

4.6.1.2. ANOVA

The ANOVA helps to determine whether or not regression analysis provides better and significant prediction on the outcome than the mean. Data in Table 9 show degrees of freedom (between) of 1 (2 - 1 = 1); degrees of freedom (within) of 17 (19 - 2 = 17); total degrees of freedom (df) of 18 (19 - 1 = 18), and an F-value of 2809.229.

	df	SS	MS	F	Significance F
Regression	1	1.74E+10	1.74E+10	2809.229	2.54131E-20
Residual	17	1.05E+08	6179378		
Total	18	1.75E+10			

Table 9: ANOVA

Statistics in Table 9 depict the model sum of squares (SSM) value, represented by *Regression*; the residual sum of squares (SSR) value, represented by *Residual*; the total sum of squares (SST) value, represented by *Total*; and the degrees of freedom (df) for each group of squares. The degree of freedom for the SSM is 1, comprising the one independent variable (manufacturing). The sum of squares divided by the degrees of freedom gives us the mean squares (MS). That is, 1.74E+10 (17359287014.1961) ÷ 1 = 1.74E+10.

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	-302.6664641	712.9428	-0.42453	0.676503	-1806.844356	1201.51143
X Variable 1	2.888356073	0.054495	53.00216	2.54E-20	2.773381534	3.00333061

Table 10: Model Parameters

4.6.1.3. Model Parameters

A normal probability plot on the relationship between manufacturing and industrial sector's values is presented in Figure 6. The figure depicts a steady rise in comparative values over a six-year period. Table 10 presents results on the parameters of the regression model. Data in Table 10 show the coefficients, standard error, test statistic, significance, and confidence intervals for the coefficients. The coefficients in Table 10 hint us on the contribution of the independent variable (manufacturing) to the regression model. Generally, a positive coefficient connotes a positive relationship between the independent variable and the dependent variable; a negative value symbolises a negative relationship between the two variables. Results in Table 10 show a positive coefficient value (2.888356073). This means there is a positive relationship between the manufacturing sub-sector and the industrial sector of the Ghanaian economy. However, relationship between the two variables is not significant (p = 0.676503, p > 0.05); the results suggest manufacturing has no significant influence on industrial sector's performance. This undermines the authenticity of high annual data churned out for the manufacturing sub-sector.
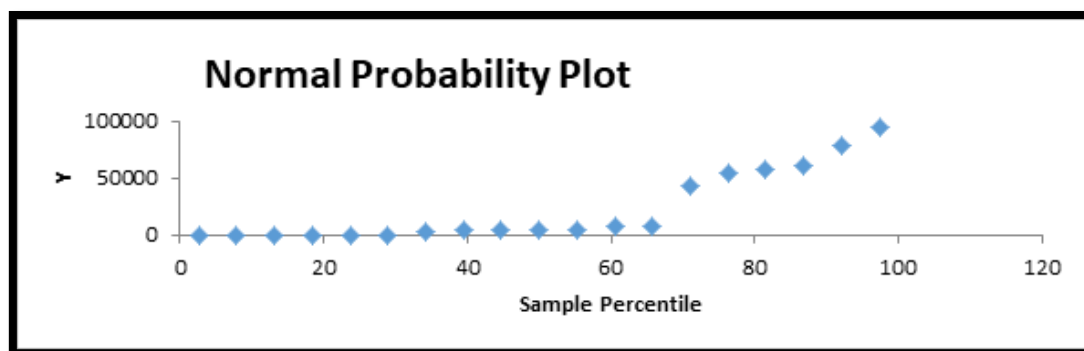

Figure 6: Normal Probability Plot for Manufacturing and Industrial Sector

The magnitude of the t-test in Table 10 tells us the independent variable (manufacturing) has no strong impact on the dependent variable (industrial sector). A standard error is identified with the coefficients in the table. The standard error shows the extent to which the coefficients would vary in different research samples (Field, 2009). The respective Upper 95% values for the *Intercept* and *X Variable 1* in Table 10 are 1201.51142742426 and 3.00333061185457.

4.6.1.4. Test of Assumptions

Statistical tests were conducted to determine the linearity of the relationship between the independent variable (manufacturing) and the dependent variable (industrial sector); and to measure the variance in residual values. The statistical outputs are presented in Figure 7 and Table 11. The scatter plots in Figure 7 are on a straight line. This affirms the relationship between the independent variable and dependent variable is linear; it implies the model fits the analysis.
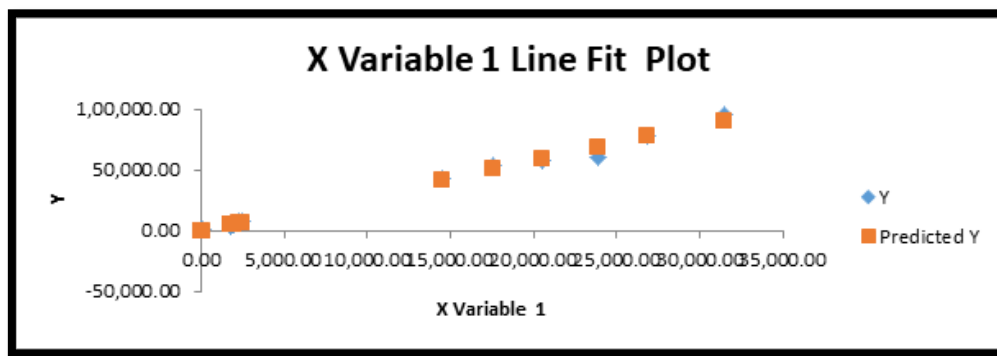
Figure 7: Linear Relationship between X and Y Variables

The *residual* values in Table 11 allow us to test the *homoscedasticity* of the model. That is, whether or not the residual values at each level of the independent variable depict constant variance. Residuals in Table 11 show constant variance values; this implies the assumption of homoscedasticity is met. Further, data in Figure 7 indicate relationship between the X and Y variables were measured at the interval level and beyond while variability of the dependent variable (industrial sector) was not constrained. The foregoing analysis indicates most of the assumptions have been met; this renders the regression model fit and appropriate for the research.

Predicted Y	Residuals	Standard Residuals
90510.13683	4260.163	1.763460067
77278.57766	736.4223	0.304836068
68792.58752	-8083.59	-3.346135632
58925.96317	-1770.96	-0.733075872
50546.8422	3220.158	1.33295826
41644.92879	1459.071	0.603970721
6736.257286	922.7427	0.381961879
6173.027852	958.9721	0.39695876
5427.831985	-374.832	-0.155158667
5023.462135	-298.462	-0.123545985
5092.78268	-570.883	-0.236312265
4900.12933	-970.529	-0.401742762
4964.250835	-1259.95	-0.521546451
-132.5422914	298.0423	0.123372194
-140.6296884	294.4297	0.121876787
-147.8505785	294.5506	0.121926828
-154.4937975	294.0938	0.121737747
-161.4258521	294.7259	0.121999381
-166.3360574	295.8361	0.122458942

Table 11: Predicted Y Values and Residual Values for Variable X

4.6.1.5. Report on P -Value and Confidence Interval

Table 10 depicts *P* value of 0.676503 and positive coefficient value of 2.888356073. These values are not significant at Alpha level α = 0.05. The table further shows a confidence interval of 2.77338153429046 and 3.00333061185457. The Alpha level, a priori, for this study is α = 0.05. This implies there is a 5 per cent probability that we would be wrong; there is a 5 per cent likelihood the population mean would not fall within the interval (Ashley et al.; Bowerman, O'Connell, and Orris, 2004; Frankfort-Nachmias and Nachmias, 2008). However, we are 95% certain our conclusions would be right. Again, the Microsoft Excel output in Table 9 shows degrees of freedom (between) of 1 (2 - 1 = 1); degrees of freedom (within) of 17 (19 - 2 = 17); total degrees of freedom (df) of 18 (19 - 1 = 18), and an F-ratio of 2809.229. These values could be interpreted as:
$F(1, 17) = 2809.229, p > 0.05$, two-tailed.

4.6.1.6. Interpretation and Rejection of Alternative Hypothesis

The foregoing results indicate manufacturing has no strong influence on Ghana's industrial sector. Therefore, we reject the alternative hypothesis (H1: $\mu1 \neq \mu2$), and accept the null hypothesis (Ho: $\mu1 = \mu2$) which states the manufacturing sub-sector does not have strong effect on Ghana's industrial sector.

4.6.2. Test of Hypothesis Two

The alternative hypothesis under the second hypothesis in section 3.4.2 sought to test whether or not manufacturing has strong influence on Ghana's gross domestic product. Results from the statistical analysis on research hypothesis two are presented in the following section.

4.6.2.1. Model Summary

Results from the regression analysis are presented in Tables 10 through 13; and in Figures 6 and 7. As noted earlier, Summary constitutes an important aspect of a regression model. An overall description of the regression model is presented in Table 12. Values for R, R^2, and adjusted R^2 are displayed in Table 12. The R row in the table shows the value of the multiple correlation coefficients between the independent variable and the dependent variable. The R^2 value in Table 12 depicts the extent to which variability in the dependent variable (Ghana's total GDP) is accounted for by the independent variable (manufacturing). The R^2 value implies manufacturing accounts for about 99.65% (0.996455768 x 100% = 99.6456% = 99.65%) of the variation in Ghana's total GDP. The results suggest less than 1% (100% - 99.65% = 0.35%) of the outcome is explained by external random factors.

Regression Statistics	
Multiple R	0.998226311
R Square	0.996455768
Adjusted R Square	0.996247284
Standard Error	6045.612222
Observations	19

Table 12: Model Summary

As stated earlier, the adjusted R^2 is one of the measures that determine the generalisability of the regression model. An ideal adjusted R^2 value is closer to zero or the R^2 value. The adjusted R^2 value (0.996247284) is not significantly different from the observed value of R^2 (0.996455768), implying the cross-validity of this regression model is high; the model may predict, accurately, the same dependent variable from the given independent variable in a different group of participants. The R^2 significance was computed using an F-ratio. The ideal F-ratio formula adapted to measure the R^2 significance is:

$$F = \frac{(N - k - 1)\, R^2}{k\,(1 - R^2)}$$

Where:

R^2 = Unadjusted value

N = Number of cases or participants in the study

k = Number of independent variables in the regression model

Value for the F-ratio was determined as follows:

$$F = \frac{(19 - 1 - 1)\, 0.996455768}{1\,(1 - 0.996455768)}$$

$$= \frac{16.939748056}{0.003544232}$$

$$= 4779.52574$$

Results from our computations showed the change in the amount of variance that can be explained gives rise to an F-ratio of 4779.52574, which is equivalent to the F-value (4779.526) in Table 13. This F-ratio depicts a non-significant value (p = 0.327796, p > 0.05) as presented in Table 14.

4.6.2.2. ANOVA

Statistical data on the ANOVA in Table 13 helps to determine whether or not regression analysis provides better and significant prediction for the outcome than the mean. Figures in Table 13 show degrees of freedom (between) of 1 (2 - 1 = 1); degrees of freedom (within) of 17 (19 - 2 = 17); total degrees of freedom (df) of 18 (19 - 1 = 18), and an F-value of 4779.526.

	df	SS	MS	F	Significance F
Regression	1	1.75E+11	1.75E+11	4779.526	2.83113E-22
Residual	17	6.21E+08	36549427		
Total	18	1.75E+11			

Table 13: ANOVA

Table 13 outlines the model sum of squares (SSM) value, represented by *Regression*; the residual sum of squares (SSR) value, represented by *Residual*; the total sum of squares (SST) value, represented by *Total*; and the degrees of freedom (df) for each group of squares. The degree of freedom for the SSM is 1, comprising the one independent variable (manufacturing). As noted earlier, the sum of squares divided by the degrees of freedom gives us the mean squares (MS). That is, 1.75E+11 (174688939590.042) ÷ 1 = 1.75E+11.

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	1746.988694	1733.894	1.007552	0.327796	-1911.208334	5405.18572
X Variable 1	9.162573973	0.132533	69.13412	2.83E-22	8.882953113	9.44219483

Table 14: Model Parameters

4.6.2.3. Model Parameters

Results on the parameters of the regression model are presented in Table 14. Data in the table depict the test statistic, significance, coefficients, standard error, and confidence intervals for the coefficients. The coefficients in Table 14 reveal the contribution of the independent variable (manufacturing) to the regression model. Generally, a positive coefficient connotes a positive relationship between the independent variable and the dependent variable while a negative value is indicative of a negative relationship between the two variables. Data in Table 14 show a positive coefficient value (9.162573973). This means there is a positive relationship between manufacturing and Ghana's total GDP. However, relationship between the two variables is not significant ($p = 0.327796$, $p > 0.05$); the results suggest manufacturing has no significant influence on Ghana's GDP. Again, the statistical analysis raises concerns about the veracity of the relatively high annual data presented for the manufacturing sub-sector. A normal probability plot on the relationship between the manufacturing sub-sector and Ghana's total GDP is presented in Figure 8. Data in the figure depict a steady rise in comparative values over a six-year period.
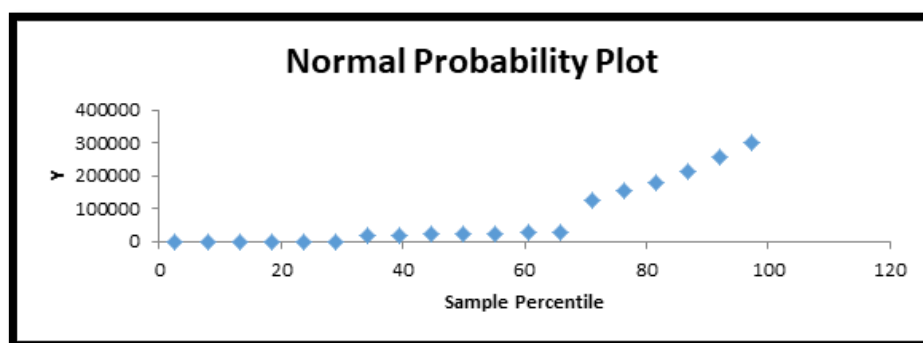

Figure 8: Normal Probability Plot for Manufacturing and Ghana's GDP

A standard error is identified with the coefficients in Table 14. The standard error shows the extent to which the coefficients would vary in different research samples (Field, 2009). Table 14 shows respective Upper 95% values for the *Intercept* and *X Variable 1* as 5405.1857216262 and 9.44219483364362.

4.6.2.4. Test of Assumptions

Statistical tests were conducted to determine the linearity of the relationship between the independent variable (manufacturing) and the dependent variable (Ghana's GDP); and to measure the variance in residual values. The statistical outputs are presented in Figure 9 and Table 15. The scatter plots in Figure 9 are on a straight line. This means the relationship between the independent variable and dependent variable is linear; it implies the model fits the analysis.
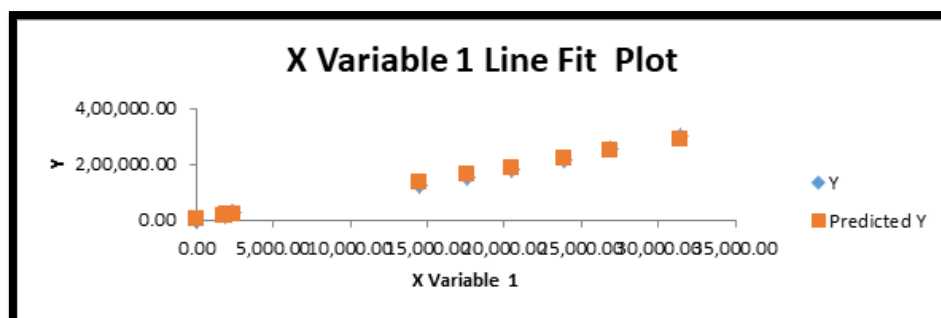

Figure 9: Linear Relationship between X and Y Variables

The *residual* values in Table 15 allow us to test the *homoscedasticity* of the model. That is, whether or not the residual values at each level of the independent variable depict constant variance. Residuals in Table 15 show constant variance values; this implies the assumption of homoscedasticity is met. Data in Figure 9 indicate relationship between the X and Y variables were measured at the interval level and beyond while variability of the dependent variable (Ghana's total GDP) was not constrained. The foregoing analysis indicates most of the assumptions have been met; this renders the regression model fit and appropriate for the research.

Predicted Y	Residuals	Standard Residuals
289827.477	10768.62301	1.832870064
247853.7256	8817.274381	1.50074139
220934.0833	-5857.083285	-0.996903003
189634.7306	-9235.730592	-1.571964596
163054.1035	-7621.103495	-1.297147503
134815.0505	-11165.05051	-1.900343881
24076.18147	6022.818533	1.025111918
22289.47954	5452.520458	0.928044515
19925.53546	4261.464543	0.725321221
18642.7751	3811.224899	0.648688325
18862.67688	2729.523124	0.464577618
18251.53319	1661.866808	0.282857513
18454.94233	250.1576656	0.042578006
2286.664301	-1627.764301	-0.277053107
2261.009094	-1638.609094	-0.278898941
2238.102659	-1648.602659	-0.280599893
2217.028739	-1656.928739	-0.28201703
2195.038561	-1659.338561	-0.282427194
2179.462186	-1665.262186	-0.283435422

Table 15: Predicted Y Values and Residual Values for Variable X

4.6.2.5. Report on P -Value and Confidence Interval

Data in Table 14 show *P* value of 0.327796 and positive coefficient value of 9.162573973. These values are not significant at Alpha level α = 0.05. The table further shows a confidence interval of 8.88295311309066 and 9.44219483364362. The Alpha level, a priori, for this study is α = 0.05. This implies there is a 5 per cent probability that we would be wrong; there is a 5 per cent likelihood the population mean would not fall within the interval (Ashley et al.; Bowerman et al., 2004; Frankfort-Nachmias and Nachmias, 2008). However, we are 95% certain our conclusions would be right. Again, the Microsoft Excel output in Table 14 depicts degrees of freedom (between) of 1 (2 - 1 = 1); degrees of freedom (within) of 17 (19 - 2 = 17); total degrees of freedom (df) of 18 (19 - 1 = 18); and an F-ratio of 4779.526. These values could be interpreted as:

$F (1, 17) = 4779.526, p > 0.05$, two-tailed.

4.6.2.6. Interpretation and Rejection of Alternative Hypothesis

The foregoing results indicate the manufacturing sub-sector has no strong influence on Ghana's total GDP. Therefore, we reject the alternative hypothesis (H1: $\mu1 \neq \mu2$), and accept the null hypothesis (Ho: $\mu1 = \mu2$) which states manufacturing does not have strong effect on Ghana's GDP.

4.6.3. Test of Hypothesis Three

The alternative hypothesis under the third hypothesis in section 3.4.3 sought to test whether or not the contribution of Ghana's manufacturing value has strong effect on the world's total manufacturing values. Results from the statistical analysis on research hypothesis three are presented in the following section.

4.6.3.1. Model Summary

Data derived from the regression analysis on hypothesis three are presented in Tables 14 through 17; and in Figures 8 and 9. One of the important components of a regression model is its Summary. Table 16 presents an overall description of the regression model. Values for R, R^2, and adjusted R^2 are displayed in Table 16. Value of the multiple correlation coefficients between the independent variable and the dependent variable is presented in the R row. The R^2 value in Table 16 reveals the extent to which variability in the dependent variable (world's total manufacturing values) is accounted for by the independent variable (Ghana's manufacturing value). The R^2 value implies Ghana's manufacturing value accounts for only about 8.92% (0.089202026 x 100% = 8.92%) of the variation in the world's total manufacturing values. The results suggest about 91.08% (100% - 8.92% = 91.08%) of the outcome is explained by external random factors.

Regression Statistics	
Multiple R	0.298667081
R Square	0.089202026
Adjusted R Square	0.038602138
Standard Error	2.614564128
Observations	20

Table 16: Model Summary

Again, the adjusted R^2 has been identified as one of the measures that determine the generalisability of the regression model. As indicated earlier, generally, an ideal adjusted R^2 value is closer to zero or the R^2 value. The adjusted R^2 value (0.038602138) is significantly different from the observed value of R^2 (0.089202026), implying the cross-validity of this regression model is low; the model may not accurately predict the same dependent variable from the given independent variable in a different group of participants (Field, 2009, p. 221). We computed the R^2 significance using an F-ratio. The ideal F-ratio formula adapted and used in measuring the R^2 significance is:

$$F = \frac{(N - k - 1) R^2}{k (1 - R^2)}$$

Where:
R^2 = Unadjusted value
N = Number of cases or participants in the study
k = Number of independent variables in the regression model
Value for the F-ratio was determined as follows:

$$F = \frac{(20 - 1 - 1)\ 0.089202026}{1 (1 - 0.089202026)}$$

$$= \frac{1.605636468}{0.910797974}$$

$$= 1.7628898$$

Results from the computations revealed the change in the amount of variance that can be explained gives rise to an F-ratio of 1.7628898, which is equivalent to the F-value (1.7628898) in Table 17. This F-ratio is non-significant (p = 0.201, p > 0.05) as shown in Table 18.

4.6.3.2. ANOVA

In order to determine whether or not the regression analysis provides better and significant prediction on the outcome than the mean, the ANOVA was applied. Data in Table 17 show degrees of freedom (between) of 1 (2 - 1 = 1); degrees of freedom (within) of 18 (20 - 2 = 18); total degrees of freedom (df) of 19 (20 - 1 = 19), and an F-value of 1.7628898.

	df	SS	MS	F	Significance F
Regression	1	12.05101874	12.0510187	1.7628898	0.200857659
Residual	18	123.0470205	6.83594558		
Total	19	135.0980392			

Table 17: ANOVA

The model sum of squares (SSM) value, represented by *Regression*; the residual sum of squares (SSR) value, represented by *Residual*; the total sum of squares (SST) value, represented by *Total*; and the degrees of freedom (df) for each group of squares are outlined in Table 17. The degree of freedom for the SSM is 1 comprising the one independent variable (Ghana's manufacturing value). The mean squares (MS) value in Table 17 equals the sum of squares divided by the degrees of freedom. That is, 12.05101874 ÷ 1 = 12.0510187.

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	10.59562055	1.392765572	7.60761234	4.9782E-07	7.669528666	13.52171243
X Variable 1	-3.394585286	2.556666859	-1.3277386	0.20085766	-8.765943032	1.976772459

Table 18: Model Parameters

4.6.3.3. Model Parameters

Table 18 presents results on the parameters of the regression model. Data in the table show the test statistic, significance, coefficients, standard error, and confidence intervals for the coefficients. The coefficients in Table 18 indicate the contribution of the independent variable (Ghana's manufacturing value) to the regression model. Generally, a positive coefficient connotes a positive relationship between the independent variable and the dependent variable; a negative value is indicative of a negative relationship between the two variables. Results in Table 18 depict a negative coefficient value (-3.394585286). This means there is a negative relationship between Ghana's manufacturing value and the world's total manufacturing values. The results suggest Ghana's manufacturing value has no positive and significant influence on the world's total manufacturing values. A standard error is identified with the coefficients in the table. The standard error shows the extent to which the coefficients would vary in different research samples (Field, 2009). The respective Upper 95% values for the *Intercept* and *X Variable 1* in Table 18 are 13.5217124308647 and 1.97677245945489. A normal probability plot on the relationship between Ghana and world's manufacturing values is presented in Figure 10. Data in the figure depict a steady rise in comparative values over the period.
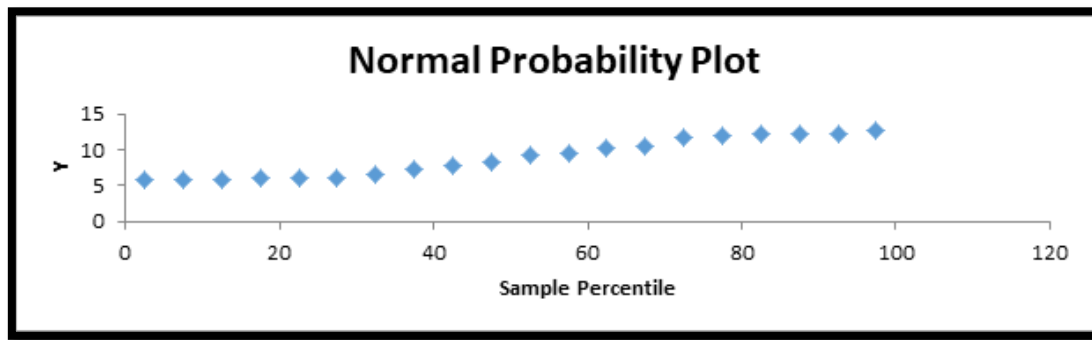
Figure 10: Normal Probability Plot for Ghana and World's Manufacturing Data

4.6.3.4. Test of Assumptions

Statistical tests were conducted to determine the linearity of the relationship between the independent variable (Ghana's manufacturing value) and the dependent variable (world's total manufacturing values); and to measure the variance in residual values. The statistical outputs are presented in Figure 11 and Table 19. The scatter plots in Figure 11 are on a straight line. This affirms the relationship between the independent variable and dependent variable is linear; it implies the model fits the analysis.
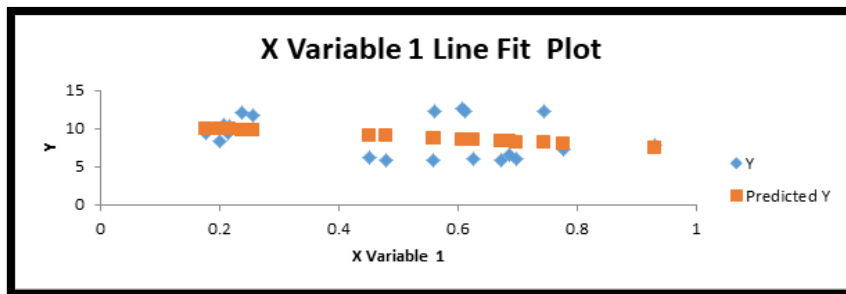

Figure 11: Linear Relationship between X and Y Variables

The *residual* values in Table 19 allow us to test the *homoscedasticity* of the model. That is, whether or not the residual values at each level of the independent variable depict constant variance. Residuals in Table 19 show constant variance values; this implies the assumption of homoscedasticity is met. Data in Figure 11 indicate relationship between the X and Y variables were measured at the interval level and beyond while variability of the dependent variable (world's total manufacturing values) was not constrained. The foregoing analysis indicates most of the assumptions have been met; this renders the regression model fit and appropriate for the research.

Predicted Y	Residuals	Standard Residuals
8.51866858	3.79433142	1.490996114
8.697870948	3.550129052	1.39503592
8.534707345	4.164292655	1.636373706
8.072788159	4.203211841	1.651667139
9.789734244	2.244265756	0.881892263
9.732837142	2.048162858	0.804832927
9.897851184	0.659148816	0.259014887
9.998430373	-0.655430373	-0.257553711
9.865071044	0.355928956	0.139863558
9.873127753	-0.437127753	-0.171770915
9.920228341	-1.527228341	-0.600129844
7.442510395	0.322489605	0.126723445
7.960033586	-0.715033586	-0.280975007
8.270165146	-1.792165146	-0.70423771
8.706022335	-2.876022335	-1.130143272
8.971309356	-3.203309356	-1.258751879
9.070393322	-2.927393322	-1.150329685
8.230870438	-2.233870438	-0.877807385
8.313231782	-2.471231782	-0.971079375
8.478148525	-2.503148525	-0.983621174

Table 19: Predicted Y Values and Residual Values for Variable X

4.6.3.5. Report on P -Value and Confidence Interval

Statistical values in Table 17 depict *P* value of 0.201 and negative coefficient value of -3.394585286. These values are not significant at Alpha level α = 0.05. The table further shows a confidence interval of -8.7659430323792 and 1.97677245945489. The Alpha level, a priori, for this study is α = 0.05. This implies there is a 5 per cent probability that we would be wrong; there is a 5 per cent likelihood the population mean would not fall within the interval (Ashley et al.; Bowerman et al.; Frankfort-Nachmias and Nachmias, 2008). However, we are 95% certain our conclusions would be right. Again, the Microsoft Excel output in Table 17 shows degrees of freedom (between) of 1 (2 - 1 = 1); degrees of freedom (within) of 18 (20 - 2 = 18); total degrees of freedom (df) of 19 (20 - 1 = 19), and an F-ratio of 1.7628898. These values could be interpreted as:

F (1, 18) = 1.7628898, p > 0.05, two-tailed.

4.6.3.6. Interpretation and Rejection of Alternative Hypothesis

The foregoing results indicate Ghana's total manufacturing value has no positive and significant influence on the world's total manufacturing values. Therefore, we reject the alternative hypothesis (H1: μ1 ≠ μ2), and accept the null hypothesis (Ho: μ1 = μ2) which states Ghana's total manufacturing value does not have strong effect on the world's total manufacturing values.

5. Recommendations

Rapid development of the Ghanaian economy is predicated on effective functioning of its various sectors. Therefore, it would be economically suicidal to supervise any sector of the economy to its dissipation. To avert any economic dissipation, it has become increasingly necessary to identify ways in which the under-performing sectors of the Ghanaian economy could be transformed to increase their potential contribution to GDP. Strengthening the relationship between the agricultural and industrial sectors is essential to positive prediction of accelerated development and growth of the Ghanaian economy. It is believed effective adaption and implementation of cogent, strategic and diligent measures would result in significant growth in the agricultural and industrial sectors while making remarkable contributions to Ghana's GDP. In view of the foregoing, the ensuing recommendations are proffered:

- The global economy is driven by information technology and industrialisation. The latter plays a significant role in the economic success of many advanced and emerging economies such as China, United States of America, Germany, Brazil, India, and Indonesia, among others. Therefore, it is imperative for Ghanaian leaders to consider industrialisation and for that matter manufacturing as one of the bedrocks for national development, success, prosperity, and perpetuity. To this end, manufacturing activities should form an integral part of Ghanaian leaders' scheme of programmes aimed at ensuring equitable distribution of resources and development of various communities; creating job opportunities, especially for the youth; and accelerating national development and growth. Existing national enactments related to investments in the manufacturing sub-sector by local and foreign investors must be activated and implemented and where necessary, reviewed to serve as an effective attractive tool to all investors. The President Nana Akufo-Addo-led administration's resolve to amend Ghana's Company Act of 1963 is laudable. The amended Company Act is expected to be more investor-friendly to help attract more local and foreign investors into the Ghanaian economy, especially into the manufacturing sub-sector. The amended Company Act is expected to be a "game changer" in the area of foreign direct investment (FDI) for Ghana's economy. The presence of multinational companies through foreign direct investment would facilitate innovativeness and competitiveness of indigenous firms in the manufacturing sub-sector. This would enhance the quality of final products to extend the market frontiers beyond the immediate Ghanaian market to Sub-Saharan Africa and global markets.

- Results from test of hypothesis one revealed positive, but non-significant relationship between the manufacturing sub-sector and industrial sector of the Ghanaian economy. Similarly, results from test of hypothesis two indicated positive, but non-significant relationship between the manufacturing sub-sector and Ghana's GDP. However, annual data released for the manufacturing sub-sector are not only impressive, but also appear significant to both the industrial sector and national gross domestic product. The statistical analysis indicated annual data presented for the manufacturing sub-sector are not representative of the sub-sector's performance. Stated differently, the annual manufacturing data do not reflect the sub-sector's actual performance; it implies stakeholders in the manufacturing sub-sector do not present statistical data on the sub-sector's actual annual performance. To address this phenomenon and remedy the situation, stakeholders must ensure due diligence in the collation and release of annual data for the manufacturing sub-sector to assure reliability and credibility of same.

- Expedition of government initiatives such as the One District, One Factory programme through early identification of strategic investment partners would be useful to the course of accelerating growth in the manufacturing sub-sector. Initial strategic partnerships at the national level may be bureaucratic, time-consuming; and would require due diligence from both parties. Where the foregoing processes are stalling the materialisation of the One District, One Factory concept, government could initiate establishment of the factories in the various or selected districts; and allow private participation at a later date. This would assure job creation, utilisation of locally-produced raw materials, increased production, price stability, and increased government revenue through taxes. Recent measures adapted and implemented by the Bank of Ghana to clean-up the financial sub-sector are yielding positive dividends; the actions of the Regulator have ensured significant paradigm shift from numbers to quality of banks and specialised deposit-taking institutions. This has improved efficiency and effectiveness in the operations of various financial institutions across the country. The general regulatory environment plays a pivotal

role in the success of the manufacturing sub-sector; and other businesses. Healthy and vibrant financial sub-sector serves as an attractive tool for both local and foreign investment. Therefore, the Regulator must not rest on its oars; and not relent in its efforts to ensure sanity in the financial sub-sector.

- The recent memorandum of understanding (MoU) signed between the Government of Ghana represented by the President, Nana Addo Dankwa Akufo-Addo, and the Chief Executive Officer (CEO) of Toyota Tsusho Corporation, Ichiro Kashitani, for the establishment of Toyota and Suzuki assembly plant in Ghana; and another initiative by the government for the construction of a fertilizer factory at Somanya in the Yilo Krobo Municipality in the Eastern Region of Ghana would not only add up to the success of the One District, One Factory initiatives, but also make Ghana competitive in the areas of automobile manufacturing and fertilizer production in the West African Sub-Region. The Government of Ghana could partner Kantanka Group to increase its productive capacity in the manufacturing of cars in the country to encourage and increase local participation and investments in the automobile industry. The fertilizer production project is intended to demonstrate and promote economic use and management of sanitation and waste materials in the country. Similar automobile agreements signed between the Governments of Ghana and Germany to assemble some German cars in Ghana is commendable. More of such agreements are needed to introduce variety and innovation to the manufacturing sub-sector; and to boost national GDP.
- The Ghana Association of National Best Farmers must not only exist in name; members must justify their achievements by providing the requisite professional, technical and intellectual assistance to young and aspiring best farmers at all levels: district, regional and national levels. Heads of various farmers associations must periodically invite financial advisors to provide essential education on bookkeeping to help members acquire and enhance their basic financial knowledge; and ease their access to loans from commercial banks and other lending institutions. This would help increase farm yields to meet the raw material needs of and demands by industries in the manufacturing sub-sector.
- Available statistics on population trends in Ghana reveal the youth constitute a significant portion of the population. Further, most young graduates in Ghana come from less affluent homes. As a result, it becomes very challenging for these young graduates to translate their innovative entrepreneurial ideas in manufacturing and agribusiness acquired through their academic education and other sources into production and job-creation opportunities. To address this phenomenon, it is incumbent on leadership of the country to formulate and implement policies through the Bank of Ghana to transition from collateral based lending to performance based lending to young graduates from various tertiary institutions with crafty ideas in manufacturing and agribusiness, but lack the financial wherewithal to transform those ideas into practicable and profitable manufacturing and agribusiness initiatives and ventures. This model would allow young graduates to raise the needed initial capital to finance their small manufacturing and agribusinesses to reduce the level of unemployment rate; and over-dependence on government for job creation in the country. A policy on performance based lending would accelerate the discovery and development of many renowned manufacturing and agribusiness stalwarts in the Ghanaian economy. The performance based lending concept argues, since it is difficult for most young graduates in Ghana to provide the collateral required to secure a loan, approval for loan applications submitted by these young graduates should be based on the economic relevance of their proposed manufacturing and agribusiness ventures. Further, each banking institution is expected to strengthen its Business Development Division; assign a Representative to interact, constantly, with the young entrepreneur after loan approval. The bank's representative would share business ideas with the young entrepreneur, embark on routine visits to the manufacturing or agribusiness site; and collaborate to address pertinent operation challenges. This initiative would assure the eventual success of the business, allow the young entrepreneur to pay the principal loan and any interest that may be connected to it. It would facilitate the discovery of more talents in manufacturing and agribusiness, ease the perennial challenges associated with efficient and effective management of businesses in Ghana; and over time, help Ghanaian young graduates to become job providers other than job seekers.
- Use of sophisticated technological equipment in manufacturing to increase productivity and profitability of companies in the sub-sector must be the utmost concern of key stakeholders, including government. Model economies such as China, Germany, United States of America, and Japan rely extensively on modern and advanced technology to enhance manufacturing activities; and the sub-sector's contribution to overall national gross domestic product. Innovation and infrastructure are essential requirements for successful implementation of any given policy on manufacturing. Thus, development of modern infrastructure to make many parts of the country investor-friendly and accessible would enhance the prospects of manufacturing. Efforts by government and other key actors to institute continuous development programmes would be paramount to the success of implemented policies in the manufacturing sub-sector of the Ghanaian economy.
- Measures aimed at easing business registration processes in the Ghanaian economy should be supported by all and sundry. Removal of administrative bottlenecks and processes that unnecessarily delay business registration would encourage the registration of more manufacturing companies and agribusinesses by both local and foreign investors in the country. The current Government of Ghana under the leadership of President Nana Akufo-Addo and Vice President, Alhaji Dr. Bawumia, is ensuring thorough digitisation of the Ghanaian economy, including the Registrar General's Department, the government's agency responsible for registration of businesses in the country. One of the expected outcomes of this initiative is online registration of businesses and significant reduction in the number of days for issuance of business certificate to businesses in Ghana. The global economic

ranking of Ghana in the ease of doing business is expected to witness an improvement as a result of these initiatives.

- Factors such as costs of energy and transport, and tax policies impact on the manufacturing sub-sector's performance and contribution to national development and growth. Thus, measures put in place by the government to ensure stable, reliable and affordable power supply; reduced transportation and imported input costs through reduction in import duties on spare parts, among others, should be sustained to enhance potential growth of the manufacturing sub-sector and the national economy.

- A country that is devoid of political and social unrest is more likely to attract foreign direct investment, vice versa. This implies Ghana must strive to develop robust and resilient economy; and guard jealously against her current stable political, social and economic climate to be more attractive to the international investor-community. The quality of labour force is one of the major factors that affect the success story of the manufacturing sub-sector and the economy as a whole. It is hoped various technical institutions and universities across the country would live up to their practical meaning by installing modern equipment to provide students with the hands-on experience required to perform efficiently and effectively on the job. Strengthening the country's educational system to assure training and development of highly qualified human capital would improve management innovation and magnanimity, essential requirements for success and growth of the manufacturing sub-sector; and acceleration of national development.

- West and Lansang (2018) found unfavourable tax policies, limited investments in infrastructure and education as major setbacks to the development of rigorous manufacturing sub-sector in the economies of India, Russia, Mexico, Indonesia, and Brazil while significant investments in infrastructure and human capital; and cost considerations and policies accelerate growth of the manufacturing sub-sector in Canada, Japan, United States of America, Switzerland, and the United Kingdom (UK). Key stakeholders in the Ghanaian manufacturing sub-sector could diligently analyse the foregoing variables and combine their "strengths" to assure considerable improvement in the sub-sector's performance and growth. The existing Economic Partnership Agreement (EPA) between the Government of Ghana and the European Union (EU) could be reviewed to provide some competitive "respite" for local manufacturing firms. Further, implementation of the EPA must proceed with tact and utmost diligence, so Ghana does not become an import-led economy in perpetuity.

- Ghana must take advantage of implementation of the African Continental Free Trade Area (AfCFTA) agreement; and utilisation of the Eco in the West African Sub-Region to increase her manufacturing potential and growth while contributing meaningfully to national economic development. Implementation of AfCFTA implies Ghana's "unfettered" access to African markets through the following regional bodies: Economic Community of West African States (ECOWAS), Intergovernmental Authority on Development (IGAD), Arab Maghreb Union (UMA), East African Community (EAC), Economic Community of Central African States (ECCAC), Common Market for Southern and Eastern Africa (COMESA), and the Community of Sahel-Saharan States (CEN-SAD). The AfCFTA is more private-sector driven with governments of various African States serving as facilitators. An implementation of the AfCFTA agreement grants member countries access to a common market with an estimated population of 1.313 billion (actually 1,313,435,041), equivalent to 16.72% of total population across the globe (Worldometers, 2019). Total gross domestic product for this common market is estimated at US$3 trillion. The AfCFTA agreement presents Ghana and other member countries with a unique opportunity to witness expansion in the manufacturing sub-sector; and to accelerate development and growth of their respective economies.

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