



Structural Characteristics of Ghana's Economy: Identifying Key Inputs for a New Development Pathway

Richard K. Ayisi

Department of Economics, University of Ghana

Abstract

Over the past two decades, Ghana has undergone significant transformations in its structure, behaviour, politics, and social aspects. On the path to economic emancipation, these structural changes necessitate policies commensurate with the country's evolving structure. This study aimed to analyse the changing structure of the Ghanaian economy by identifying the contribution of each sector to output, production, and income growth propensities using Ghana's 2019 Social Accounting Matrix (SAM) and employed the multiplier framework to estimate the growth propensities of the major economic sectors. In particular, this study estimated the propensity to produce, earn income, and be employed. The multiplier propensities suggest that the industrial sector is critical to Ghana's economic growth agenda. However, the agricultural and service sectors remain critical for increasing household income. Therefore, for Ghana to achieve an optimal blend of increasing household income through economic growth, the country should adopt a holistic value chain approach that encompasses agricultural development, industrialisation, and service improvement.

Keywords: *Structural Analysis; SAM multiplier; Development Pathway; Ghana*

1. Introduction

Post-independence Ghana has been characterised by various policies and programs aimed at guiding the country toward economic liberation. In the early stages of economic development, the agricultural sector proved to be the backbone of the Ghanaian economy and has served as a critical primary input for the country's economic growth. However, in recent decades, the economy has undergone significant structural changes, with the service sector increasingly becoming important in Ghana's overall GDP growth, job creation, and household income. Notwithstanding this, the primary sector continues to make a significant contribution to Ghana's development. For example, the primary sector accounts for approximately 19% of the GDP, employs 34% of the workforce, and remains an important source of income for many households (GSS 2017). This renders the sector an

*Corresponding author. E-mail address: rayisi@ug.edu.gh

JEL Classifications: E16, O11, O50

essential tool for income generation and poverty reduction (Mensah, 2019; Danso-Abbeam and Baiyegunhi, 2020).

In its quest for economic development, Ghana has, over the years, adopted various development plans and policies aimed at stimulating the critical sectors of the economy with the highest growth potential, thereby accelerating the country's development. Programs such as the Ghana Strategy Support Program, Poverty Reduction Strategy, Medium-Term Agriculture Sector Investment Plan (METASIP), and Food and Agriculture Sector Development Policy (FASDEP) were designed to tackle specific sectors deemed critical in the development agenda. These policies have contributed significantly to engendering growth and have also helped reduce poverty levels (from approximately 50 per cent in the 1990s to about 25 per cent in the 2000s). and among others. Notwithstanding, the country still lags behind its development targets and continues to battle key economic challenges. High unemployment, inequality, spatial and group disparities, and uneven growth persist. In fact, the new changing structure has posed new challenges. For example, Ghana's rapid urbanisation has not been able to drive growth as it has been the case in East Asia and other parts of the world. This is because the country's evolving structure has been unable to create mid-productivity and mid-skilled jobs for workers moving out of the agriculture sector. To abate this, Ghana will need economic transformation through local and global integration.

To promote the expected development, Ghana's economic transformation agenda must be based on knowledge, analysis of the sectors, economic agents, and the linkages among them. Since prudent economic policies change with changes in the structure of any economy, it is imperative to comprehend the evolving changes in response to the evolution of the economy's structure. In the past, economic policies were rooted in the primary sector as the driver of growth. However, recent data indicate a shift from primary inputs to service activities. Therefore, a detailed understanding of these changes and their relative contributions to the country's development goals is significant for any policy change.

Therefore, this study aims to assess the sectors of the Ghanaian economy. Specifically, this study evaluates the multiplier effects of sectors on output, production, and household income. The findings provide evidence of the critical inputs necessary for the development of the country. In addition, the findings provide insight into developing an economic development pathway that considers sectors that are critical inputs in the country's development agenda. This study achieves the above aim by analysing the impact of demand-side policies on the economy's production, households' income, and job creation. More specifically, the study presents an analysis of multiplier effects using the 2019 SAM for Ghana and completes the analysis by applying structural path and value chain analyses.

The SAM, which is the primary data for multiplier analysis, shows the interaction between production, income, consumption and investment. The information captured in the SAM allows for an analysis of the links among sectors and agents in an economy. Therefore, multiplier analysis is used to show how much output will be generated in each activity of the economy due to the exogenous impacts of new final demand, how many jobs will be created, and the effect of the shock on household income (Arndt et al. 2000). The structural path analysis provides a detailed description of the transmission mechanisms of the effects described for each multiplier. The results indicate that these activities have the greatest potential to generate output, value addition, and employment. It also identifies the impact on the different regions of the country. This allows for the classification of activities according to their capacity to generate economic growth, highlighting those activities to be tackled by policies focused not only on the country's development but also specifically

on equality and development in the neediest sectors.

Previous studies have estimated multipliers for the Ghanaian economy using input-output tables (Nchor 2014; Bentum-Ennin 2018), analysed the sectoral linkages of a specific case in the oil sector (Nchor and Konderla 2016), and evaluated the role of specific sectors, such as agriculture (Ferreira et al., 2022). The multiplier analysis for Ghana was mainly estimated using input-output tables, which abstract many important characteristics of the Ghanaian economy. However, studies that used the SAM analysed specific sector contributions to the economy, albeit using the 2015 SAM. This study uses the recent 2019 SAM to analyse the multiplier effects of the country's activities. This new SAM provides a recent outlook on the Ghanaian economy and highlights the structural changes that have occurred over the years.

The evidence from the analysis showed that industrial sector development is key to Ghana's economic growth agenda. However, the agricultural sector is significant for improving household welfare by improving household income levels and consumption. The study derived these findings following a structured outline in five sections. Following this introduction section is section 2, which presents a brief literature review. Section 3 provides a detailed method and data used for analysis. Section 4 presents the results and findings from the analysis and discusses the findings. Section 5 concludes the study by providing recommendations for policies and procedures.

2. Literature Review

Ghana has implemented various development plans and policies to promote economic growth and achieve sustainable development. These plans have been designed to target critical sectors with high growth potential to accelerate the country's development. Several scholarly papers have examined these development plans and their impacts on Ghana's economic trajectory.

One of the significant development plans in Ghana is the Ghana Strategy Support Program (GSSP), which aims to reduce poverty and drive economic transformation. In their analysis, Smith and Johnson (2018) highlighted the GSSP's emphasis on promoting the agriculture, industry, and services sectors as key strategies for achieving sustainable development. This comprehensive approach recognises the importance of these sectors in generating employment opportunities, improving productivity, and enhancing economic growth. The GSSP's focus on agriculture acknowledges its crucial role in food security and rural development.

Another important plan in Ghana's agricultural sector is the Food and Agriculture Sector Development Policy (FASDEP). Abayomi et al. (2021) examined the impact of the FASDEP on agricultural transformation and rural development. The policy strategies are centred around sustainable agriculture, rural infrastructure improvement, and enhanced market access for farmers. By promoting sustainable agricultural practices, such as efficient resource management and climate resilience, the FASDEP aims to ensure long-term productivity and environmental sustainability. Additionally, the plan recognises the significance of rural infrastructure development, including roads, irrigation systems, and storage facilities, to support agricultural activities and improve farmers' access to markets. These strategies collectively contribute to increased agricultural productivity, income generation and poverty reduction in rural areas.

The Poverty Reduction Strategy (PRS) in Ghana is another notable plan that focuses on poverty alleviation and socioeconomic development. Mensah and Adu-Gyamfi (2017)

discuss the objectives and strategies outlined in the PRS, including human capital development, infrastructure improvement, and agricultural productivity enhancement. In the agricultural sector, the Medium-Term Agriculture Sector Investment Plan (METASIP) plays a crucial role. Adjei et al. (2019) provide an in-depth analysis of METASIP, highlighting its objectives, targets, and implementation strategies. The plan focuses on improving productivity, promoting value addition, and ensuring food security in the country.

Ackah et al. (2019) focused on implementing development plans in the Western region of Ghana, specifically in petroleum-producing areas. It examined the Development Plans of three district assemblies in this region and highlights key issues such as pressure on social amenities, decline in electricity access, incomplete infrastructure projects, and youth unemployment. The study recommended that district assemblies prioritise the completion of existing projects before initiating new ones, and suggests the development of innovative youth skills development programs as part of a national local content strategy. In the case of the paper titled "National Sustainable Development Strategies for Ghana: Approach and Guidance" by Vordzorgbe et al. (2005), it emphasises the importance of a comprehensive review of National Sustainable Development Strategies (NSDS) in Ghana and proposes a framework for designing and managing these strategies.

Tandoh-Offin (2013) sheds light on the implications of development plans for the country's decentralisation process, emphasising the importance of proper implementation and drawing lessons from the experiences of other countries. The study conducted by Abubakari et al. (2018) focused on Ghana's sustainable development, specifically examining the 40-Year National Development Plan. This study provides insights that can be useful for stakeholders to critically assess and discuss the plan, potentially offering recommendations applicable to other developing countries. It explores the connection between long-term planning and sustainable development, highlighting the interdependent aspects of environmental, social, and economic considerations.

The Bunkpurugu-Nakpanduri District Assembly (2018-2021) contributes to the literature by examining the Medium-Term Development Plan (MTDP) for the Bunkpurugu-Nakpanduri District Assembly in Ghana. This study emphasises the importance of effective and efficient institutions for governance and public accountability. It identifies key development issues, such as population projection, education, water and sanitation, agriculture, governance, corruption, and public accountability, as well as community aspirations. It analyses the potential strengths, weaknesses, opportunities, and threats (SWOT) to address these issues. Their study sheds light on the effectiveness of district-level development plans.

Mensah (2005) explores the challenges faced by District Assemblies in implementing Medium-Term Development Plans (MTDPs) in Ghana. This paper discusses weak institutional structures, inadequate resources, chieftaincy and land disputes, low stakeholder commitment, and ineffective teamwork. The study suggests that addressing these issues requires human resource development, provision of logistics, effective mobilisation and utilisation of financial resources, institutional strengthening, awareness-raising, resolution of chieftaincy and land disputes, good governance, and an effective monitoring and evaluation system. This study highlights the need for effective implementation strategies.

2.1. Empirical literature review

In addition to development plans, several empirical studies have examined specific aspects of Ghana's economic development and the role of different sectors in driving that

growth. Anaman (1985) estimated multipliers for the Ghanaian economy using input-output tables. Input-output tables were constructed to capture the flow of goods and services between sectors. They analyse inter-industry linkages and the impact of different sectors on output, employment, and income generation. The input-output model analysis of the economy of Ghana in 1960 showed that the economy was labour-intensive and primary-oriented. The paper stated that the linkages between the domestic industries were weak, except for the manufacturing, electricity, and public utilities industries. In addition, the use of domestic inputs was marginal.

Nchor and Konderla (2016) also studied the role of the oil sector in Ghana's development. This study assessed the structure of Ghana's economy before and after oil production in commercial quantities. analyzed the sectoral linkages and multiplier effects of the oil industry. This study employed input-output modeling techniques to investigate the oil sector's impact on Ghana's economy. The study found that the agricultural sector initially experienced a decline in growth, while the industry sector saw an increase; however, the services sector remained relatively stable during the study period. Trade concentration declined, although the concentration index remained high. The study concluded that the discovery and production of oil in Ghana impacted the country's economic structure.

Ferreira et al. (2022) focused on the agricultural sector and its impact on Ghana's development. This study examined the agricultural value chain, identified constraints to growth, and proposed policy recommendations to enhance the sector's productivity and contribution to the economy. Appiah-Kubi and Bokpin (2019) examine the relationship between financial development and economic growth in Ghana. The study utilized an autoregressive distributed lag (ARDL) bounds testing approach and found a positive long-run relationship between financial development and economic growth. This study suggests that improving financial systems and institutions is crucial for sustaining Ghana's economic development.

Antwi et al. (2016) investigated the impact of foreign direct investment (FDI) on Ghana's economic growth using sectoral analysis. This study utilizes secondary data collected from various sources, including the World Bank's World Development Indicators, and explores the relationship between foreign direct investment (FDI) and economic growth in Ghana from 1980 to 2010. Utilizing time-series data, this study employs various econometric techniques to explore the impact of FDI on Ghana's economic growth. The study revealed that FDI inflows significantly contribute to economic growth in sectors such as manufacturing, mining, and services. The authors highlight the importance of attracting and channelling FDI into productive sectors to enhance Ghana's development prospects.

Gyimah et al (2023) examined the relationship between energy consumption, prices, and economic growth in Ghana. The study employed an autoregressive distributed lag (ARDL) model and found a positive long-run relationship between energy consumption and economic growth. This study emphasised the need for efficient energy policies and investments to sustain Ghana's economic development. The results indicate that both renewable energy and fossil fuels contributed to carbon emissions in Ghana during the years under review. However, economic growth did not significantly impact carbon emissions. The findings indicate that both renewable energy and fossil fuels exert a positive and noteworthy influence on carbon emissions. The shift from fossil fuels to renewable energy in Ghana is progressing gradually, and its impact is not yet evident.

In summary, the literature review provides a comprehensive exploration of Ghana's development plans and policies, highlighting initiatives such as the Ghana Strategy Support Program, the Food and Agriculture Sector Development Policy, and the Poverty Reduction Strategy. District-level studies emphasise the importance of effective institutions and SWOT analysis in local governance, while empirical research explores the economic impact of sectors such as oil, agriculture, finance, and foreign direct investment (FDI). Gyimah et al. (2023) noted that the transition to renewable energy is characterised by gradual progress. This body of work emphasises the interconnected dimensions of Ghana's development efforts and underscores the need for ongoing research and policy measures to address challenges and promote sustainable development.

3. Data and method

In this section, we describe the multiplier framework and its related extensions for the analysis. The study's broad goal of evaluating the respective sectors of the Ghanaian economy requires an approach capable of assessing the sectors' propensity to generate value. As a result, the SAM multiplier analysis is used for this purpose because of its simplicity and ability to estimate the propensity of the sector of the economy. This section describes the social accounting matrix, which is the main data used for the analysis. This is followed by a description of how the multipliers are estimated and the challenges that confront the estimation. The section further describes the value chain and structural analysis, an extension to open the black box of the estimated multipliers.

3.1. SAM: Linkages and Economic Structure of Ghana

A national Social Accounting Matrix (SAM) is an economy-wide data framework that provides a comprehensive understanding of the socioeconomic system that captures the interdependence of activities, commodity sectors, and domestic institutions. SAMs provide both a conceptual framework and a data system that can support analyses of socioeconomic policy issues and can also be used to evaluate the socioeconomic impact of exogenous changes. Owing to their accounting consistency and comprehensiveness in recording data for the entire economy, SAMs have become the preferred database for general equilibrium models such as CGE and multiplier analysis.

Ghana, through the efforts of the Ghana Statistical Service, Institute of Statistical, Social and Economic Research (ISSER), and the International Food Policy Research Institute (IFPRI), recently updated its 2015 SAM to reflect the structure of the economy in 2019 with greater detail. This update not only ends the stretch of the 55-sector SAM calibrated to the economy in 2015, but it was also an upgrade of the 2005 supply and use table (SUT). The 2015 SAM was developed using the 2005 SUT, which no longer reflects the Ghanaian

economy after the economy was rebased in 2018 using a 2013 base year. In view of this, the 2019SAM used recent data that reflected the 2013 base year. The updated data were sourced from the national accounts, trade figures, household surveys such as GLSS7, and international data from the IMF (such as Government Finance Statistics and Balance of Payments).

The SUT is the main tool that helped build and further disaggregate the SAM. It checks whether the supply of goods (from local production and imports) matches how they are used, that is, whether the produced goods are consumed, invested, exported, or used as intermediate inputs for producing other goods. The 2019 SAM used the 2013 SUT as a base but was updated using new data to reflect the 2019 economy. The 2013 SUT provides information on the breakdown of public consumption spending across public administration, health and social work, and education. This was updated using GDP estimates for public administration, education, and health in national accounts. However, the national accounts provided GDP estimates for only 22 sectors, which were further disaggregated into the standard Nexus 90 sectors using crop and livestock production and producer price data from FAOSTAT and gross output values for manufacturing subsectors from Ghana's Industry, Business, and Enterprise Survey. Furthermore, the 2016/17 Ghana Living Standards Survey (GLSS7), which is a nationally representative household data, was used to disaggregate total private consumption spending across activities and commodities. The final 90-sector SAM for Ghana in 2019 has commodity and activity exchanges across 38 agricultural, 40 industry, and 12 service sectors.

Overall, the structure of the SAM consists of nine main blocks, as described below.

- Activities: 42 sectors, including farming, mining, health, and trade
- Commodities: Goods and services that are produced and sold
- Factors: Land, capital, and labour (with labour split by education levels)
- Households: 10 household groups (5 rural and 5 urban) based on per capita consumption quintiles
- Enterprises: Businesses that own and earn income from capital
- Government: Collects taxes and provides services
- Taxes: On income, trade, and goods
- Savings and Investment: Tracks what's saved and where it goes
- Rest of the World: Includes imports, exports, remittances, and foreign aid

3.2. Multipliers, Value Chain, and Structural Path Analysis

3.2.1. Multiplier Analysis

The SAM provides information on economic sector interlinkages, showing how production activities are linked to consumption and all the economy's accounts. The information contained therein helps assess changes in elements to evaluate the potential impact of the changes through economic sectors, showing the effects generated on the economic activity of different agents due to the relationships of the circular flow of income (Pyatt, 1988).

Multiplier analysis was used to evaluate the transmission process. The multipliers estimate the effects of exogenous changes on the outputs of the sectors in the economy or on income earned by households or employment (jobs) created in each sector because of new outputs. Multipliers measure the difference between the initial and total effects of an exogenous change. The total effect is the sum of the direct and indirect effects arising from exogenous changes affecting the economy. The standard representation of exogenous change, translating to a change in demand by sectors, is given by the equation (1)

$$\Delta Z = (I - M)^{-1} \times \Delta E \quad (1)$$

The multiplier is obtained from the expression $(1 - M)^{-1}$, where the matrix M is the coefficient matrix (calculated by dividing each element of the endogenous accounts in the SAM by the total of their corresponding column). The elements in $(1 - M)^{-1}$ show how an account responds to an increase in the final demand of the account (Mainar-Causapé et al. 2020). Multipliers can only be obtained when at least one exogenous account is defined in the model (Acharya, 2007). In a conventional classification, the public sector, the rest of the world, and investments and savings accounts are typically treated as exogenous (Defourny and Thorbecke 1984; Pyatt and Round 1985).

The multiplier analysis is an approach to impact assessment that ranks sectors according to their capacity to generate economic growth. The multipliers help measure how much output will be generated in the economy and each activity due to exogenous shocks, how many jobs will be created, and the effect of the shock on households' income (DiPasquale and Polenske 1980).

This paper evaluates the economic contribution of each sector to Ghana's growth path. We achieve this by analysing the economic impacts of new final demand in each commodity and its distributed effects measured by the variation in the output of the activities, the value added generated in the economy, the jobs created, and the increase in households' income (Miller and Blair 2009). We analyse these impacts using the output, employment, household income, and value-added multipliers.

The output multiplier for sector j is defined as the total value of production in all sectors of the economy that is necessary to satisfy a unit worth of final demand for sector j 's output. Formally, the simple output multiplier is given as:

$$m(0)_j = \sum_{i=1} l_{ij} \quad (2)$$

An increase in demand leads to an increase in the output and the inputs used to produce it, including the employment generated and the income households receive. The household income and employment multipliers indicate the impact on each household's income and job creation, respectively, due to a unit increase in final demand for the corresponding commodity. This multiplier illustrates the increase in household income and the corresponding rise in each household group (Husain and Khondker, 2016; Pal and Bandarlage, 2017).

While the SAM multiplier approach is powerful for analysing economic impacts, it faces several challenges, such as the potential for unrealistic assumptions of fixed prices and technologies over time. SAM multipliers are typically based on a static framework, where they assume fixed production technologies and constant returns to scale. This can be a significant limitation in dynamic economies where structural changes, technological advancements, or shifts in consumer preferences are occurring. Also, SAM multipliers rely

on behavioural assumptions about how households respond to income changes that may not always hold in reality. These assumptions can influence the size and direction of the multiplier effects.

To address the above concern of fixed prices, the Pyatt-Round (P-R) multiplier decomposition has been recommended. However, the P-R has an operational limitation, i.e., it is difficult to identify what the important paths (loops) are in the process. As a result, the Defourny-Thorbecke (D-T) decomposition presents the structural path analysis to compute every conceivable loop by following through an exogenous injection and its resultant impact on endogenous accounts (see section 3.2.3 for details).

Notwithstanding the above, the results of the multiplier need to be interpreted with caution. This is because responses at the margin might differ from those on average. Specifically, bottlenecks and price effects may cause multiplier effects to be overestimated. Also, the limited endogenous behaviour may mean the effects are underestimated. Therefore, the combined effects of these limitations may be ambiguous depending on the true behaviour reflected in the economy. Irrespective of this, the multiplier results provide an important insight into the growth propensities of the economy.

3.2.2. Value Chain Analysis

Value chain analysis examines production activities in terms of cost and value delivery, and how they can be optimised to align with a competitive strategy. The SAM, by tracing the interlinkages among the sectors of the economy, presents the cornerstone for value chain analysis. The inherent interlinkages of the sectors in SAM help trace the impact of value-added induced by the increase in demand for each commodity depicted in the activities of the economy. A demand shock to a sector translates into a need for increased production, which involves an increase in the use of factors of production and consequently leads to an increase in production in other sectors. This process is a cycle of effects that impacts many sectors, which is analysed using the value chain analysis.

The value chain analysis is a complementary approach to the multiplier analysis to better understand the economic structures, the sectors' interrelationships, and the effect that economic shocks through policies on the most important sectors would have on the rest of the activities (Mainar-Causapé et al. 2020). This approach helps explore the study's objective of evaluating the sector's contribution to the economic goals of growth, job creation, and closing the inequality gap, among others.

3.2.3. Structural Path Analysis

While the multiplier gives the quantitative effects of an exogenous shock, the path analysis shows how the effects are transmitted to other activities and sectors. The path analysis decomposes the multiplier effect into different paths to investigate the role played by the different accounts and to identify those that are important transmitters of economic influence (Defourny and Thorbecke 1984), thereby helping open the 'black box' of the SAM multipliers by understanding the structure and behavioural mechanism of the economic effects (Itoh 2016).

4. Results and Discussion

4.1. Results

The analysis shows the potential of the three main sectors – agriculture, industry, and services - in the Ghanaian economy through their multiplier propensities on production, GDP, and household income. The results for production, GDP, and household income multipliers are calculated using the 2019 SAM. The multiplier values are generated in response to a unit change in activity in the agricultural, industrial, and service sectors. Therefore, the production multiplier for industrial activities indicates an increase in production resulting from a unit increase in exogenous demand for an industrial commodity.

Table 1 presents a snapshot of the production multiplier for all the major sectors of the economy. The results presented in Table 1 show that the industrial sector generates the highest multipliers in terms of both direct effects and cross-effects. For example, the agricultural crop sector responds to unit changes in agricultural, industrial, and service sectors, respectively, by about 30-, 31-, and 25-unit changes, with the industrial sector effect ranking the highest. We further observe that in response to changes in the economy, the manufacturing sub-sector ranks the highest within the industrial sector and across sectors. For example, agricultural, industrial, and service improvements generate about 12-, 70-, and 33-unit changes in the manufacturing sector. This evidence shows the key role the industrial sector holds in the overall growth and development of the Ghanaian economy. Again, the result suggests that the manufacturing sector stands to grow in tandem with the overall development of the economy. Therefore, Ghana’s quest to grow the manufacturing sector should be highly connected with improvements in the agricultural and service sectors. This is because while the agricultural sector provides the necessary input for the manufacturing sector, the service sector acts as a catalyst by providing financial support and the platform to sell manufacturing inputs.

Table 1. Diagnostic Test Results for panel data

	Agric	Industry	Service
Agric - crop	30.10	31.49	24.97
Agric - Livestock	8.73	8.42	7.62
Forestry	1.19	1.52	0.51
Aqua	2.81	3.05	2.61
Industry - Mining	0.08	2.53	0.25
Industry - Manufacturing	11.64	69.63	32.70
Electricity	0.34	3.41	1.29
water	0.38	2.27	1.38
construction	0.04	1.10	0.12
service	2.89	10.40	22.18

Source: Author’s Compilation from Estimation

To identify the sector that is effective in simulating the trifecta goal of increasing production, GDP, and household income, we rank the multipliers by their ability to simulate production, GDP, and household income. We show this ranking in Figure 1. On average, the multiplier results show that the industrial sector is very significant in engineering aggregate production, GDP, and household income. From Figure 1, it is observed that the multiplier impact of industrial activities is the highest in simulating aggregate production. The agriculture sector ranks second with the most impact, while the service sector has the least. We observed similar effects for simulating GDP growth and household income,

albeit quantitatively. This observation highlights the significant role of the industrial sector in driving the growth potential of the Ghanaian economy. This result contrasts with the agriculture sector’s dominant role in the Ghanaian economy, suggesting the critical role of the industrial sector in enhancing Ghana’s developmental quest in terms of output production, GDP growth, and household income generation.

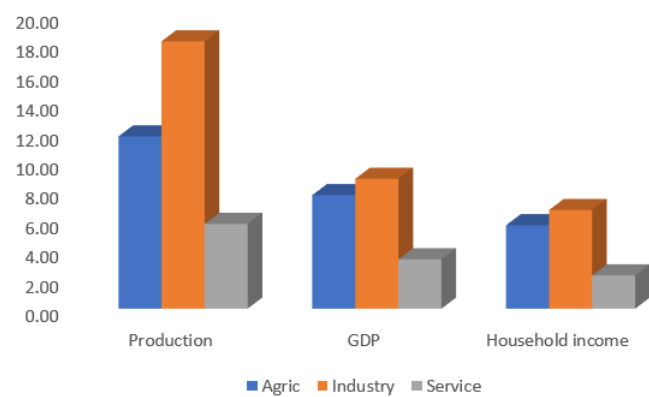


Figure 1. Multipliers (production, GDP, and HH Income) from an increase in the three main sectors

Source: Graphed from the Estimated Results

Furthermore, we decomposed the distribution of the output multipliers for the three main sectors’ activity subsectors. The study found that the industrial sector contribution is the highest among the subsectors (Figure 2). Figure 2 shows that the industrial sector generates the highest value addition to the Ghanaian economy. Following in the ranks are the service and agriculture sectors, the second and least valued contributors to the Ghanaian economy. Whereas agriculture only contributes to agriculture-related activities (such as crop production, livestock, aqua, and agro-processing), industrialisation generates value for all sectors of the economy.

In total, we identify that industrialisation has the potential to propel growth among all the sectors of the economy, both within and between sectors. The total effect of industrialisation is the highest for the Ghanaian economy. Second in rank to the economy’s growth potential is the service sector. The agricultural sector has the least growth propensity, primarily affecting agriculture within sectors, with a minimal impact on other sectors.

The above results suggest that while the agriculture sector may be the backbone of the Ghanaian economy (Diao et al., 2019; Ferreira et al., 2022), its contribution to propel the country’s development goal is only viable via the industrial and service sectors serving as enhancers or enablers. As identified by Alagidede et al. (2013), the Ghanaian economy has transformed significantly, with agriculture alone being the game changer for Ghana’s development quest. The implication is that development frameworks for Ghana’s economic growth and development should be developed in a multifaceted approach to derive the full potential of the respective sectors.

To delve deeper into the characteristics of the propensities, we further decomposed the contributions to study the sub-sector multiplier propensity to production, GDP, and Income. The sub-sector contribution is shown in Figure 3, Figure 4, and Figure 5 respectively for agriculture, industry, and service sub-sectors.

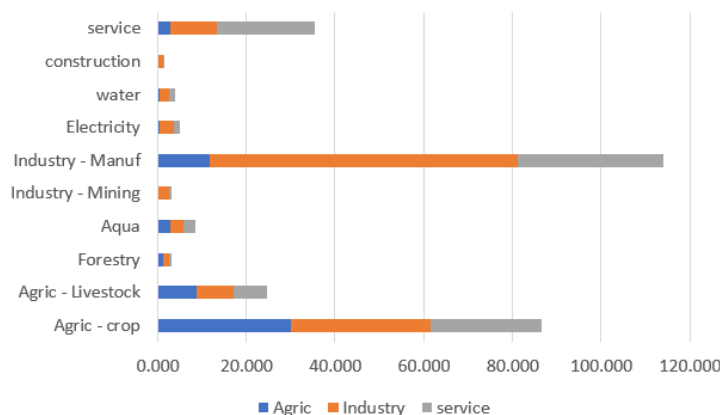


Figure 2. Sectors’ Contribution to Subsectors
Source: Graphed from the Estimated Results

4.1.1. Production Multiplier Analysis

In terms of the production multiplier, Figure 3 shows that investment in agricultural export products generates the highest production multiplier within the agriculture sub-sector. This is followed in ranks by the root, livestock, and cereals, respectively, for second, third, and least propensity. This suggests that Ghana’s investment in agricultural products for export purposes has the potential to increase the country’s total output level. For the industrial sub-sectors’ contribution, Figure 4 shows that the construction subsector generates the highest production multiplier, followed by the mineral exploration sector. Manufacturing generates the least production multiplier within the industry sub-sector. Also, within the service sector, the utility subsector generates the highest production multiplier.

Overall, in comparison with other sub-sectors, the utility sub-sector of the service sector contributes the highest production multiplier (see Figure 6). Next in rank is the agricultural export sub-sector of the agricultural sector.

4.1.2. GDP Multiplier Analysis

The agricultural sub-sectors contribute varying impacts to the GDP multiplier. The export sub-sector contributes about 1.72, representing the highest impact within the agricultural sector. The root sub-sector has the second-highest impact, with about 1.66. Within the industrial sector, the mineral subsector contributes the highest to GDP, at about 1.48, followed by the construction subsector, at about 1.30. The manufacturing subsector contributes the least, at about 0.45. The utility sub-sector within the service sector contributes the highest to the GDP multiplier at about 2.67 propensity.

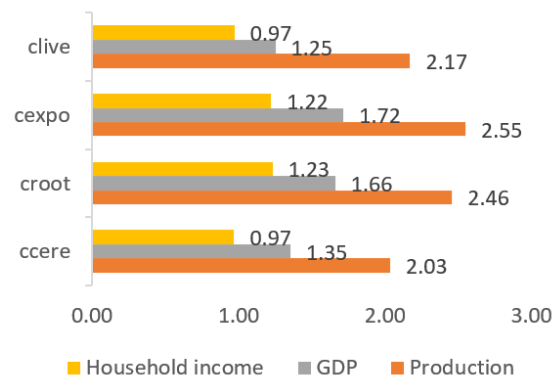


Figure 3. Agriculture Sub-sector Contributions to Multipliers
Source: Graphed from the Estimated Results

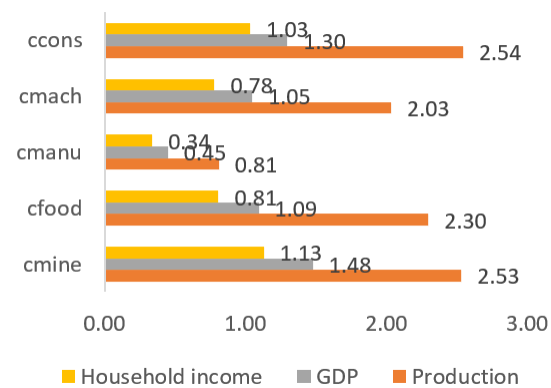


Figure 4. Industry Subsector Contributions to Multipliers
Source: Graphed from the Estimated Results

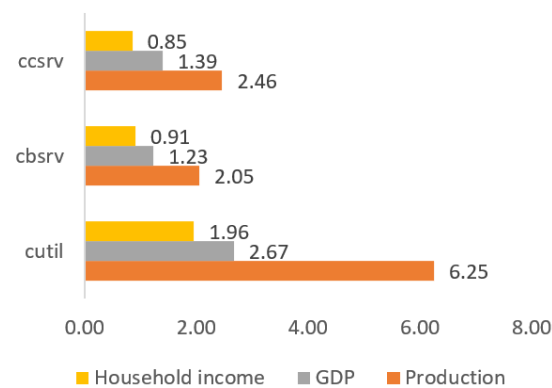


Figure 5. Service Subsector Contribution to Multipliers
Source: Graphed from the Estimated Results

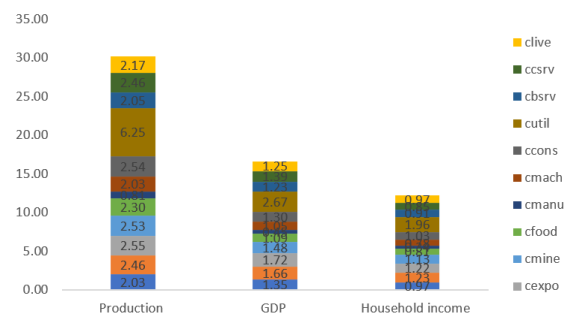


Figure 6. Subsectors' Contribution to Multipliers
Source: Graphed from the Estimated Results

4.1.3. Household Income Propensity Analysis

In terms of household income propensities, industrialisation generates the highest propensity for poor households, both rural and urban poor (see Figure 7). The agricultural sector is next in ranking in contributing to poor household income, while the service sector contributes the least. The evidence from Figure 7 further reveals that any form of development, whether through agriculture, industry, or services, has the propensity to increase poor household income more than that of the rich. However, agriculture contributes the highest to the non-poor rural household income, which contrasts with the non-poor urban household income, who receive the highest contribution from the industrial sector. The result is not surprising, as the agricultural sector mostly employs the low- and medium-skilled labour force of the economy. Therefore, the result revealing that agriculture sector investment generates a higher income level for the poor households highlights the pivotal role of the agriculture sector in narrowing income inequality.

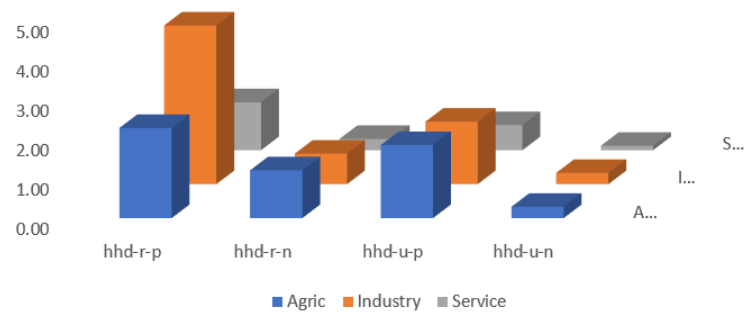


Figure 7. Sectors' Contribution to Household Income
Source: Graphed from the Estimated Results

The conclusion from the above results suggests that investment in the industrial sector is critical to increasing production, GDP growth, and increasing the incomes of households. This finding further strengthens the evidence from Nchor and Konderla (2016), which established that Ghana's industrial sector increased after the country discovered crude oil in commercial quantities.

4.2. The Multipliers and the Vision 2057 Plan

From the seven (7) years Nkrumah development plan, post-independence Ghana has adopted various plans aimed at propelling the Ghanaian economy into sustained growth and development. Currently, Ghana's development plans are guided by a 40-year perspective framework called Vision 2057, which outlines a long-term vision for the country's transformation. This vision is a long-term framework that aims to transform Ghana into a prosperous, self-reliant nation with a strong role in regional and global affairs. The focus areas of the vision include economic growth, social development, environmental protection, and good governance. The economic growth pillar aims to build an industrialized, inclusive, and resilient economy, focusing on macroeconomic stability, private sector development, export-oriented diversification, and investment in infrastructure. The social development pillar seeks to create an equitable, healthy, and prosperous society through enhancing human capital - investing in education, healthcare, and skills development - and improving living standards - improve the living standards of Ghanaians in a structured, measurable, and predictable manner.

Aligning Vision 2057 to data is essential to help develop appropriate policies that will ensure the general well-being of the economy. The result of the multiplier highlights the industrial sector as a major sector in steering aggregate production, GDP, and Income, generating the highest propensities among the other sectors of the Ghanaian economy. The results further revealed that the mining and construction sub-sectors within the industrial sector are the main drivers of growth achievements. However, the manufacturing and food processing sub-sectors are weak in terms of their contribution.

The evidence suggests that to realise the Vision 2057 objective of economic growth, policies geared towards enhancing the mining and construction sectors are critical. However, this may conflict with the Vision's objective on environmental sustainability, especially when the current mining practices in Ghana have been shown to be threatening the environment. Therefore, a framework that optimally harmonises mining activities and practices that sustain the environment is crucial to achieve the overall objective of the Vision.

Again, the multiplier results provide insight into the social development goal of an equitable and prosperous economy. In terms of increasing income levels, the service sector contributes significantly to household income, followed by the agricultural sector. While the utility sector generates about 1.96, followed by the root and tuber sector of about 1.23, the highest contribution from the industrial sector is the mining sector, which stood at about 1.13. The evidence suggests that while the industrial sector may generate the highest levels of aggregate production and GDP, the service and agricultural sectors are driving household income. Therefore, to enhance the welfare of the Ghanaian citizens in terms of increasing household income levels, policies should be directed at the service and agricultural sectors. This action may help bridge the income gap, as the evidence further suggests that increased income benefits the poor, both rural and urban, more than their non-poor counterparts.

In summary, the findings suggest that the thematic areas prescribed in the Vision 2057 remain critical in the country's quest for economic development. However, the policies therein should not be implemented in a standalone manner; rather, they need to be intertwined to achieve maximum impact.

5. Summary, Conclusion, and Policy Recommendation

Ghana's evolving economic structure has necessitated the need to adopt a dynamic policy that collaborates with its evolving structures. To appropriately understand this evolution, the study estimated the multiplier propensities of the various sectors of the economy, with the ultimate goal of identifying the sectors that contribute significantly to the country's production, growth, and household income. The study used the SAM multiplier approach and estimated that the industrial sector is critical for economic growth. However, the agricultural and service sectors remain critical for increasing household income. The study's findings therefore suggest that for Ghana to achieve an optimal blend of increasing household income through economic growth, the country should adopt a holistic value chain approach, encompassing agricultural development, industrialisation, and service improvement.

The implication of the study's findings is prescribed in some policy recommendations as follows:

- i. The country's industrialisation drive should be closely tied to the agricultural sector. That is, policies on industrialisation should focus on agro-manufacturing sectors such as food processing, wood processing, meat processing, agro-input manufacturing, among others.
- ii. The country should prioritise the root, tuber, and export sub-sectors of the agriculture sector to harness the potential of the agriculture sector.
- iii. The utility sector proved significant in generating production, GDP, and household income. Accordingly, the country should increase investment in the sector to create the enabling environment for its growth agenda.

Acknowledgements

We acknowledge the anonymous reviewers whose suggestions contributed to the improvement of this paper.

Funding

There is no funding associated with this study

Data Availability

The study used the 2019 SAM of Ghana. This data is an open source available at <https://hdl.handle.net/10568/131976>

Competing Interests

There is no competing interest associated with this study.

References

1. Abubakari, M., Asamoah, P. K. B., & Agyemang, F. O. (2018). Ghana and sustainable development: The 40-year National Development Plan in retrospective. *Journal of Human Resource and Sustainability Studies*, 6(1), 24–36. <https://doi.org/10.4236/jhrss.2018.61024>
2. Acharya, S. (2007). Flow structure in Nepal and the benefit to the poor. *Economics Bulletin*, 15, 1–14.
3. Ackah, I., Osei, E., Tuokuu, F. X. D., & Bobio, C. (2019). Oiling the wheels of sub-national development: An overview of development plan implementation in the Western region of Ghana. *The Extractive Industries and Society*, 6(2), 343–357.
4. Alagidede, P., Baah-Boateng, W., & Nketiah-Amponsah, E. (2013). The Ghanaian economy: An overview. *Ghanaian Journal of Economics*, 1(1), 4–34.
5. Anaman, K. A. (1985). *Application of the input-output model analysis to the economy of Ghana: A case study of the 1960 inter-industry accounts* [Master's thesis, University of Ghana].
6. Antwi, S., & Zhao, X. (2013). Impact of foreign direct investment and economic growth in Ghana: A cointegration analysis. *International Journal of Business and Social Research*, 3(1), 64–74.
7. Arndt, C., Jensen, H. G., & Tarp, F. (2000). Structural characteristics of the economy of Mozambique: A SAM-based analysis. *Review of Development Economics*, 4(3), 292–306.
8. Bentum-Ennin, I. (2018). Economic impact of the demand for human capital in Ghana: An input-output multiplier analysis. *International Journal of Development and Sustainability*, 7(2), 533–557.
9. Danso-Abbeam, G., & Baiyegunhi, L. J. S. (2020). Do farm-level technical efficiency and welfare complement each other? Insight from Ghana's cocoa industry. *Journal of Economic Structures*, 9, 16.
10. Defourny, J., & Thorbecke, E. (1984). Structural path analysis and multiplier decomposition within a social accounting matrix framework. *The Economic Journal*, 94(373), 111–136.
11. DiPasquale, D., & Polenske, K. R. (1980). Output, income, and employment input-output multipliers. In S. Pleeter (Ed.), *Economic Impact Analysis: Methodology and Applications* (pp. 85–113). Springer.
12. Diao, X., Hazell, P., Kolavalli, S., & Resnick, D. (2019). *Ghana's economic and agricultural transformation: Past performance and future prospects*. Oxford University Press.
13. Ferreira, V., Almazán-Gómez, M. Á., Nechifor, V., & Ferrari, E. (2022). The role of the agricultural sector in Ghanaian development: A multiregional SAM-based analysis. *Journal of Economic Structures*, 11(1), 6.
14. Gyimah, J., Fiati, M. K., Nwigwe, U. A., Vanessa, A. E., & Yao, X. (2023). Exploring the impact of renewable energy on economic growth and carbon emissions: Evidence from partial least squares structural equation modeling. *Plos one*, 18(12), e0295563.

15. Husain, M. J., & Khondker, B. H. (2016). Tobacco-free economy: A SAM-based multiplier model to quantify the impact of interventions in Bangladesh. *Economic Systems Research*, 28(2), 244–260.
16. Itoh, H. (2016). Understanding of economic spillover mechanism by structural path analysis: A case study of interregional social accounting matrix focused on institutional sectors in Japan. *Journal of Economic Structures*, 5, 23.
17. Kolavalli, S., Diao, X., Folledo, R., Ngeleza, G., Robinson, E., Alpuerto, V., ... & Asante, F. (2012). Economic transformation in Ghana: Where will the path lead?. *Journal of African Development*, 14(2), 41–78.
18. Mainar Causapé, A. J., Boulanger, P., Dudu, H., Ferrari, E., McDonald, S., & Caivano, A. (2020). Policy impact assessment in developing countries using Social Accounting Matrices: The Kenya SAM 2014. *Review of Development Economics*, 24(3), 1128–1149.
19. Mensah, J. (2005). Problems of District Medium-Term Development Plan implementation in Ghana: The way forward. *International Development Planning Review*, 27(2), 199–214.
20. Miller, R. E., & Blair, P. D. (2009). *Input-output analysis: Foundations and extensions* (2nd ed.). Cambridge University Press.
21. Ministry of Food and Agriculture. (2010). *Medium Term Agriculture Sector Investment Plan (METASIP) 2011–2015*.
22. Nchor, D., & Konderla, T. (2016). Economic multipliers and sectoral linkages: Ghana and the new oil sector. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 64(2), 635–642.
23. Pal, B. D., & Bandarlage, J. S. (2017). Value-added disaggregated social accounting matrix for the Indian economy of the year 2007–2008. *Journal of Economic Structures*, 6(1), 14.
24. Pyatt, G. (1988). A SAM approach to modeling. *Journal of Policy Modeling*, 10(3), 327–352.
25. Pyatt, G., & Round, J. I. (Eds.). (1985). *Social accounting matrices: A basis for planning*. World Bank.
26. Ricky-Okine, C. K., & Amankwaa, T. (2020). Financial Development and Economic Growth in Ghana: Evidence from ARDL Model.
27. Tandoh-Offin, P. (2013). Development planning in Ghana since 1992: Implications for the decentralization process. *Journal of International Relations and Diplomacy*, 1(2), 61–68.
28. Vordzorgbe, S. D. (2005). National sustainable development strategies for Ghana: approach and guidance. *UNDP/GoG Environmental Resource Management Programme, Accra*.
<https://sustainabledevelopment.un.org/index.php>