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Systematic Review of the Factors Impacting the Agro-processing Sector Towards Economic Growth & Development: A Case for Ghana

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Abstract
In Ghana, the processing of agricultural raw materials into intermediate and secondary, agro-processing, is largely small-scale and informal. Formalizing and expanding the agro-processing sector to increase the share of manufacturing value-add (MVA) on the Gross Domestic Product (GDP) of Ghana is an ongoing struggle. It is also unclear what the impeding growth factors are and what the leaders of Ghana are doing to rapidly fix this fundamental economic problem. This study aimed at bridging the gap between evidence-based research (EBR) and practice to fundamentally understand the growth factors that impact the agro-processing sector of Ghana towards economic growth and development. EBR is a scientific process of gathering the best available evidence to inform evidence-based practice (EBP). EBP requires the use of scientific, accountable, and explicit methods to gather credible and quality evidence for management decision-making. The systematic review methodology, which fits the rationale for EBR, was used to aggregate credible, quality, and best available evidence to help leaders in Ghana and management practitioners to make decisions on why the agro-processing sector of Ghana is still weak and undeveloped today, despite being known as a haven for agricultural raw materials. Thematic synthesis was used to aggregate evidence from 31 included articles, resulting in 7 analytical themes that directly addressed the overarching research question, "What growth factors impact the agro-processing sector of Ghana for economic growth and structural transformation". Theme 1 categorized the growth factors impacting the agro-processing sector into 17 endogenous (e.g., knowledge management, technology, and innovation capability, access to capital, etc.) and 3 exogenous concerns (e.g., the influence of external organizations (e.g., International Monetary Fund (IMF), Foreign Direct Investments (FDI), etc.). Themes 2-7 addressed aspects of economic growth and structural transformation. Though this study was limited by time and the databases used to search for relevant scholarships, it rigorously informed management decision-making on how the agro-processing sector could be used to drive economic and structural transformation in Ghana and other resource-rich developing countries across the globe.
Keywords: Agro-processing, Economic growth, Structural transformation, Economic development, Developing countries, Ghana, Gross Domestic Product (GDP), Growth factors, Manufacturing value-add (MVA), Evidence-based Research (EBR), Evidence-based Practice (EBP), Systematic Review (SR).
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1. Introduction

This evidence-based research (EBR) examined the factors influencing the agro-processing sector, a subset of the formal manufacturing sector of Ghana, towards economic growth and development. The findings from this study inform evidence-based practice (EBP), by helping the government of Ghana understand and make management decisions on why the agro-processing sector of the country is weak and undeveloped despite being a haven for agricultural raw materials. Agro-processing is the conversion of agricultural raw (primary) materials to intermediate or secondary products. The problem is that, according to Ghana's Ministry of Agriculture, Ghana adds value to less than 10% (precisely only 5% as of 2012) of its abundant agricultural raw materials (Owoo & Lambon-Quayefio, 2018). Why is that the case? This study used a scientific and accountable method to explicitly gather credible and quality evidence to address the problem of why the agro-processing sector of Ghana is still weak today. The overarching research question was:

What growth factors impact the agro-processing sector of Ghana for economic and structural transformation?

Ghana is a developing country in Sub-Saharan Africa with a Gross Domestic Product (GDP) of ~$72.35 billion, a world bank recorded annual growth percentage of 0.414, a population of ~30.4 million people, and a GDP per capita of ~$2,200 (World Bank, 2020; UNIDO, 2020). According to the Ghana Statistical Service (GSS) (2019), the major contributors to Ghana's GDP are Agriculture, Industry, and Service sectors. The Service sector holds the largest share of GDP, contributing 46.3% in 2018. The industrial sector is the second largest, contributing ~34% share to the GDP, while agriculture is third and saw a decline from 21.1 % in 2017 to 19.7% share of GDP in 2018. The sub-sectors of agriculture mainly involve raw material from crops (e.g., cocoa, cashew, etc.), livestock, forestry and logging, fishing, etc. The industry share of Ghana's GDP comprises mining and quarry (e.g., oil, minerals like gold, etc.), manufacturing, electricity, water and sewerage, and construction sub-sectors (Ghana

Statistical services, 2019). The processing of agricultural raw materials (agro-processing) to food and other end products, for local and international trade, is a sub-element of the manufacturing industry of Ghana. Agriculture production and agro-processing are, together, a valuable asset to economic growth and development in countries across the world – suggesting an indispensable potential for economic growth since Ghana is a huge ecological environment (Nyamekye et al., 2021). The agro-processing industry, as a matter of direct consequence, adds to the total manufacturing value-add (MVA) of the country. It provides an opportunity for small-scale farmers to increase income, especially through self-processing, as well as diversify into agritourism and other agribusinesses (Lin and Hung-Hao, 2021). According to the World Bank Group, the manufacturing value add contributed ~9.921 % share to Ghana's GDP growth in 2020 (World Bank, 2020), suggesting that a strategic expansion of the agro-processing sector could have a direct impact on GDP growth through the expansion of production activities and boosting employment (Romanian et al., 2020). Though Ghana, since its independence in 1957, has made different strides through various government policies to improve the agro-processing sector of the manufacturing industry, the sector remains weak and underdeveloped (Owoo & Lambon-Quayefio, 2018). Why is that the case?

According to UNIDO (2021), the service sector is first with over 40% contribution to the country's total manufacturing value-added, followed by agriculture and manufacturing at 21% and 12.9% respectively. Agro-processing represents over 50% of the manufacturing value-add, with the food and beverage sub-sector contributing ~33% (Nkechi S. Owoo & Lambon-Quayefio, 2018). Deductively, the agro-processing industry contributes a little over 6% to the country's current GDP. Despite Ghana's agro-processing sector being dominated by small and medium scale capabilities, mostly in rural Ghana, there is potential to formalize and make a remarkable contribution to the economy, as demonstrated in some large economies in the world. In the United States, the world's largest economy, agriculture, food, and related industries contributed $1.109 trillion (a 5.2 percent share) to its gross domestic product (GDP) in 2019 (United States Department of Agriculture, n.d.). The direct output of America's farms contributed approximately $136.1 billion of this total, which is about 0.6 percent of GDP. The overall contribution of agriculture to the US GDP is greater than 0.6 because of agro-processing sectors – food services and eating and drinking places; food and beverage stores; food and beverage manufacturing; forestry and fishing; and textiles, apparel, and leather products, add value to raw or primary materials from the farms. Deductively, ~90% of agricultural raw materials are processed from small to industrial-scale enterprises in the United States. The U.S manufacturing value adds for food, beverages, and tobacco was reported at ~15.16% contribution to US GDP in 2011 (Census and Economic Information Center, n.d.), largely because of processing and adding value to agricultural raw materials. Ghana, on the other hand, has only 5% of food harvested is processed through industries. Ghana has a huge ecological environment for agriculture production and a haven for raw materials, which are mainly exported to countries around the globe with little or no processing or manufacturing value-add. Today**,** economic growth, structural development, and modernization in Ghana, like other developing countries, remain a hot and ongoing topical issue. The problem is Ghana's obvious lack of robust and expanded agro-processing and manufacturing sector to formally convert its abundant agricultural raw (primary) materials into valuable secondary products for local and international trade.

Today, economic growth, structural development, and modernization in Ghana, like other developing countries, is a hot and ongoing topic. Ghana is a huge ecological environment that fosters continuous agricultural production – a strength. It is a haven for raw materials which are exported to countries around the globe with little or no processing or manufacturing value-add. Though there is an established linkage between agriculture, manufacturing, and GDP growth (Nyamekye et al., 2021; Owoo & Lambon-Quayefio, 2018; Romanian et al., 2020; Zayone et al., 2020), the kind and type of decisions Ghana makes on agriculture and its abundant raw materials could make or break its future economic outlook. A vibrant agro-processing sector has the economic potential of reducing or eliminating the continuous and over-reliance on the importation of processed food products from the United States, China, Europe, etc. Given Ghana's abundant raw materials, the question that begs to be asked is how Ghana's agro-processing industry is doing today, and what should be done differently to boost manufacturing value add, cause GDP growth, and accelerate structural development. The purpose of this study is to use evidence-based research (EBR) to gather credible and quality evidence that addresses the problem of why the agro-processing sector of Ghana is still weak today and examine all contributing factors to why that is.

2.0 Theoretical Background

The research question (RQ) of this study is theory-based and it addresses the question about the impact of agro-processing on Ghana's manufacturing sector for economic growth and development. The business case of how agro-processing influences manufacturing value-add, GDP growth, and economic development start with understanding the combined effect and application of a certain series of theories to establish a common characteristic or framework that never existed (shown in 2.1 below) (Lepine & Wilcox-King, 2010; Okhuysen & Bonardi, 2011). According to Salem Press (2017) and Brinkman (1995), economic growth and economic development differ in structure and form, though are often used interchangeably. Economic growth involves a complete shift and quantitative expansion in the economic and social framework of the nation. According to the

world bank, it is the percentage increase in a nation's GDP per annum. Economic development, on the other hand, involves upscaling the social framework and systems, which is not limited to education, healthcare, power distribution, and cultural attitudes (Salem Press, 2017; Brinkman, 1995). It also involves moving resources from low to high productivity areas, a process involving a series of structural transformations (Zulkhibri et al., 2015). Though GDP growth alone cannot lead to structural transformation and economic development, economic growth cannot happen before the required infrastructural and institutional structures are in place (Salem Press, 2017; Brinkman, 1995). This implies that GDP growth and economic development (structural transformation) need to be planned, executed, and matured together – the path to economic development could be measured with accelerated and aggregated economic growth and the thorough transformation of the economic and social infrastructures (Brinkman, 1995). One form of seeing this upward movement and metamorphosis (replication) of the social structure is continuously modernizing and upscaling infrastructure to process agricultural raw materials for economic growth – multiplying resources for manufacturing value-add (MVA) and industrialization of the country (Brinkman, 1995; Zulkhibri et al., 2015).

2.1 Theoretical Lens

Theories of Economic Growth:

There are two main theories of economic growth of developing countries that provide contextual relevance to this study: (1) neoclassical growth theory, and (2) new growth. *The neoclassical theory* is an exogenous theory that emphasizes productivity growth (production output) as a function of capital, labor, and a measure of technology – growth factors external to the system (Robert Solow's basic equation) (Salem Press, 2017; Mankiw, 1995). However. the exclusive addition of capital to the national economy for economic growth and the assumption that the market system will ensure fair allocation of resources are inherent limitations of the theory. Another limitation of the theory is its inability to accurately predict the GDP per capita and population convergence of nations as developing (poor) countries tend to grow faster than developed (rich) countries (Salem Press, 2017; Mankiw, 1995).

Many researchers hold that *the new growth theory*, which is closely associated with American economist Paul Romer, is an endogenous growth theory and a direct response (as opposed) to the limitations of the neoclassical growth theory (Cortright, 2001). An endogenous growth emphasizes change starting from within. The theory believes that economic growth is created and sustained within the nation rather than influenced by external factors not limited to trade and foreign direct capital investments (Salem Press, 2017; Cortright, 2001). Additionally, the theory posits the importance of building knowledge and technology internally for increased economic returns – creating large and small discoveries from a fixed set of raw materials to drive economic growth (Cortright, 2001). For example, literature shows China's entry into the World Trade Organization (WTO), over time, stagnated its dynamic economic growth efforts, while driving higher labor costs and welcoming various foreign direct investments (FDIs) (Yao et al., 2013). With rising income, expanded social infrastructure, coupled with great advances in technology and knowledge, China drew in investors looking for new markets, leading to a bounce back to economic growth and prosperity (Salem Press, 2017; Yao et al., 2013). Economic growth of nations, as facilitated by its endogenous factors and capabilities, is therefore important for economic development, evidenced by structural transformation and industrialization. Total dependence on foreign direct investments to drive all internal economic activities and cause the needed structural transformation is not helpful to developing countries in the long term – there is a need to balance the use of internal (endogenous) and external (exogenous) drivers for economic growth and development until the desired economic maturity is attained.

Modernization and structural change theories also provide contextual relevance to understanding the factors impacting how agro-processing can be leveraged for economic growth and structural transformation. Many researchers have confirmed causality between sustained economic growth and modernization through structural transformation and industrialization of societies (Omolara, 2019; Zulkhibri et al., 2015). Modernization theory emerged in the 1950s and 1960s. Marsh (2014) proposed that a country's level of modernization, as measured by GDP per capita or energy consumption per capita or urbanization, may have a multidimensional aspect of social characteristics such as economic, political, cultural, and psychological. Marsh also asserted that the level of a country's modernization increases with increasing and continuous structural transformation (p. 279).

Modernization theory, nonetheless, over the years, has seen various extensions and revival due to various researchers' intention of fixing observed anomalies in the areas such as understanding its link to evolution theory (Newson and Richerson, 2009; Marsh, 2014), ecological modernization (Levy,1966), risk society (Beck, 999; Marsh, 2014), reflexive modernization (Ulrich Beck 1992; Beck et. al, 1995; Marsh, 2014), values modernization, global modernity (Schmidt, 2010:2011:2012; Marsh, 2014), just to mention a few. Modernization of a society can take an endogenous growth approach, making modernization theory the most suited theoretical basis to support this study. It casts development as a uniform evolutionary route that all societies follow, from agricultural, rural, and traditional societies to post-industrial, urban, and modern forms (Bradshaw, 1987; Escobar, 1995; Chirot and Hall, 1982).

Though often regarded as too deterministic, modernization theory posits that the required economic and social

transformation of developing nations and poorer societies, can be tracked in different structural stages (Salem Press, 2017; Gwynne, 2009; Mankiw, 1995; Zulkhibri et al., 2015). According to W.W. Rostow, the sequence of economic and developmental stages of a nation was pre-determined as follows (Rostow, 1951; Chirot and Hall, 1982: 82):

(1) Traditional Economies: Typically, the structures in these societies are developed with limited production capabilities – the Newtonian belief that the external world "was subject to knowable laws and is systematically capable of productive manipulation" (Rostow, 1951). Though these economies are in no way static, they are characterized with but are not limited to low levels of urbanization, low education, poor transportation, high dependence on subsistence and agriculture, with ad hoc technical innovations to improve production output (Coman et al., 2012; Hunter, 2012; Omolara, 2019; Rostow, 1959).

(2) Transition to takeoff (under-developed economies (Hunter, 2012)): These are societies typically characterized by simple infrastructure, adoption of basic agricultural techniques, very high dependence on imports, unsegmented and fragmented markets, reliance on natural resources, attracting foreign aid and investments. According to W.W. Rostow, a rise in the effective investment and savings to over 10% or more. The informal sector is large.

(3) The takeoff itself (Developing economies (Hunter, 2012)): New industries expand rapidly, yielding profits, and stimulating re-investments in new plants and other modern industrial plants, paving way for the increased requirement for workers, coupled with increased services and manufacturing to support the growing population. There are growing investments but there is dependence on developed countries for imports. It requires access to markets. The manufacturing sector is growing but is largely informal in nature. Commercialization of agriculture increases and manufacturing value-add increases as agro-processing (processing of agricultural raw materials like timber) increases. Importation of processed food and beverages decreases. The political and social structures of these developing economies are transformed over time. There is a desire for high market concentration and drive

(4) Drive to maturity: It is characterized by the nation's ability to move beyond the original industries which powered its take-off (Rostow, 1951), demonstrating the technological and entrepreneurial capability to produce whatever it chooses. Technology and industry become complex and any observed changes in the domestic economy are typically attributed to technology and industrialization. Imports, for instance, are replaced by domestic production and manufacturing and there are increased exports and access to international markets – exports exceeding imports. There is also increased diversification, specialization, innovation, and investments towards economic stability.

(5) Age of high mass consumption: Here, there is a shift towards durable consumable goods and services - a consumer-oriented economy. As the income per head increases, savings and consumption increase. Increased savings resulting from a stable savings rate typically displace consumption and cyclically become a source for business investments.

Developing countries desire to have high economic growth but that process lacks spontaneity and automation (Riaz et al 2020). As described above, structural transformation forms an integral part of modern economic growth theory, making structural change theory relevant to this study. Structural change, as defined by Van Neuss (2019) in Riaz et al. (2020), is the "reallocation of economic activity across the three broad sectors agriculture, manufacturing and services." One major aspect of structural change theory, which involves the shift of labor from agriculture to industries, is not limited to agro-processing and/or agro-based manufacturing (Kuznets, 1973; Lewis, 1954).

Additionally, with an endogenous economic growth mindset, developing countries, given the abundance of agricultural raw materials can begin processing and adding value for modern economic growth. To formalize agro-processing and agro-based manufacturing requires deliberate structural transformation, evidenced through rapid industrialization – the springing up of industries including agro-based processing facilities. The conceptual model below is based on economic growth (neo-classical growth and new growth), modernization, and structural change theories, and shows how the relationship between agro-processing or agro-based manufacturing, total manufacturing value add, and industrialization leads to sustained economic growth and development (structural transformation) – a take-off to economic to maturity. The concept areas are (1) factors impacting agro-processing, (2) how agro-processing increases manufacturing value-add, (3) how agro-based manufacturing value- add cause economic (GDP) growth and drives structural transformation (industrialization), and (5) take-off to economic maturity.

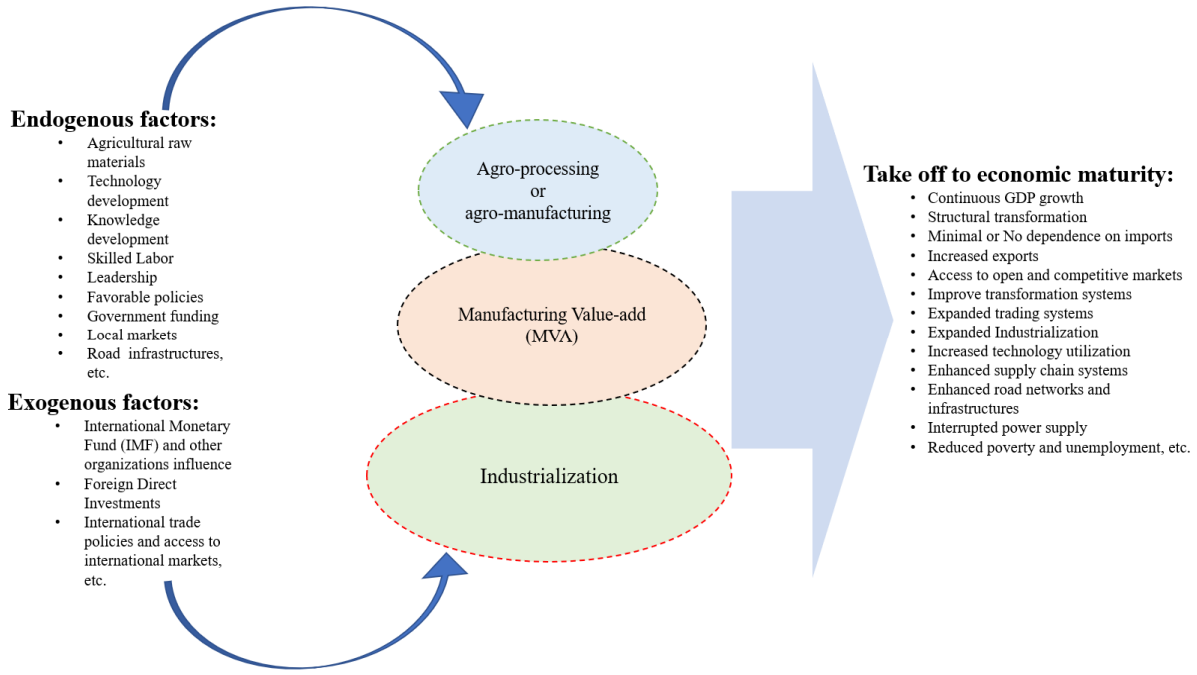

Figure 1: Conceptual model of how agro-processing can drive manufacturing value-add, engendering endogenous economic growth and structural transformation through (Gabardo et al., 2017; Kuznets, 1973; Lewis, 1954; Riaz et al., 2020; Rostow, 1959; van Neuss, 2019)

1.1.1 Heading 3

3. 0 Methodology

This evidence-based research (EBR) examined the factors impacting the agro-processing industry of Ghana towards economic growth and development. EBR leads to credible and quality evidence, required by leaders of developing nations and management practitioners to make effective decisions on which factors impact a developing nation's economic growth and development. The process of rigorously gathering and synthesizing the required, quality, and most appropriate evidence possible to answer a research question (RQ) is evidence-based research (EBR) (Titler, 2008). The purpose or rationale for an EBR approach is to inform evidence-based management (EBMgt) and Evidence-based practice (EBP). EBP enables practitioners to support decisions with quality, valued, and the most reliable evidence possible (i.e. the most appropriate information available) (Petticrew and Roberts, 2006; Kent et al., 1999). EBMgt is the process of "making decisions through the conscientious, explicit, and judicious use of four sources of information: practitioner expertise and judgment, evidence from the local context, a critical evaluation of the best available research evidence, and the perspectives of those people who might be affected by the decision" (Briner et al., 2009, p.19). The integration of EBR and EBMgt helps practitioners and researchers to solve complex management and organizational challenges through a well-defined and practical course of action. The cornerstone of EBMgt is a systematic review (SR) (Briner et al., 2009). An SR uses scientific, systematic, explicit, and accountable methods " to comprehensively identify, appraise, and synthesize all the relevant studies on a given topic," instead of a single study, to answer a research question (Petticrew and Roberts, 2006, p.15-19; Gough et al., 2012). The utilization of the EBR framework for this study makes an SR the best and appropriate design choice for this study. The rationale for choosing SR is inherent in its contribution of rigor and transparency to the process of reviewing and gathering credible and quality evidence to support decision-making. It bridges the gap between research and practice. SRs exposes studies to rigorous scientific and methodological scrutiny (Tranfield et al., 2003). Scientific rigor is the backbone of an SR. It also adopts a detailed, replicable, and transparent process that aims at minimizing bias by providing an audit trail of the reviewer's decisions, procedures, and conclusions (p. 209). Other traditional methods were not considered for the lack of rigor and transparency.

Therefore, to find the best and credible evidence-based solutions for the problem posed in this study, a SR was conducted to bridge the gap between research and practice. A SR of scientific literature on the factors that impact the agro-processing sector for economic growth and development was conducted with the required rigor, transparency, and accountability while limiting bias. The objective, comprehensive, rigorous, and transparent nature of the SR projects confidence in the quality and credibility of the evidence gathered on the agro-processing industry towards the economic growth and development of Ghana. A SR can use either aggregative or configurative logic in the review process. This study employed an aggregative approach because it sought to gather

and add up (aggregate) evidence from studies that support each other on the factors (interventions) that impact agro-processing in developing countries, in this case, Ghana (Gough et al., 2012). Configurative SR logic, on the other hand, interprets and arranges (configures) information and develops concepts.

The systematic review (SR) employed a Six (6) stage modified approach from Pollock & Berge (2018) and Nurmala et al.(2017) to explicitly gather and synthesize credible and quality evidence to address the problem statement.

Stage One - Formulating research question (RQ)

The aim and objective at this stage were to define an overarching research question(s). According to Tranfield et al. (2003), the relevance of a study is partly dependent on the research question. A well-formulated and clear research question determines the eligibility for inclusion and exclusion of relevant and irrelevant studies. This study underwent a series of iterations to formulate the research question below by the application of the CIMO (Context, Intervention, Mechanism, and Outcome) logic:

"What growth factors impact the agro-processing sector of Ghana for economic growth and structural transformation?"

Using the CIMO logic: The CIMO logic applies an analytical framework to the research question. According to CIMO, in a specific context (C), an intervention (I) is initiated to generate mechanisms (M) to deliver expected outcomes (O) (Pilbeam et al., 2012; Denyer & Tranfield, 2009; Nurmala et al., 2017)). In this study, the context is developing countries (in this case, Ghana), the Intervention (I) is growth factors, the mechanism (M) is agro-processing/manufacturing, and the Outcome(O) is sustainable economic and structural transformation. Below is how the CIMO logic fits the RQ.

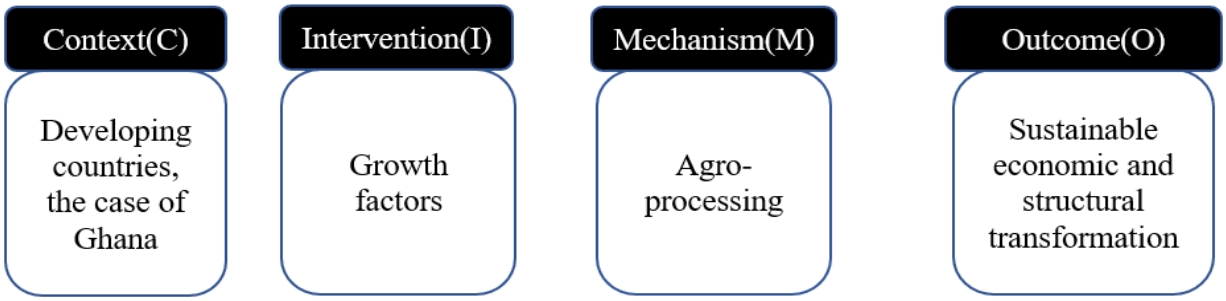

Figure 2: Application of CIMO Logic on the research question

Stage Two - Locating and Selecting Relevant Studies

At this stage, the strategy to search and retrieve relevant data was developed involving: (1) The selection and utilization of databases

(2) Formulation of search strings

(3) Establishment and application of inclusion and exclusion criteria

(4) Determination of eligibility of relevant studies.

The study used a blending effect of snowball and building-block approaches, a complementary approach to the literature search. With the snowball effect, the study used focal articles and searches backward for references in that article while the building-block approach involved the iterative interrogation (queries) of databases using a search string formulated by the combination of keywords and synonyms, AND and OR Boolean search connectors and modifiers, and search delimiters (as per databases used below) to identify relevant studies on the research question (Goodman et al., 2014). The 'OR' connector broadened and 'AND' connector narrowed the scope of the search respectively (p.324). Boolean search modifiers, such as '*' and '?', were used to retrieve likely variations of search phrases or words. The study conducted six searches using carefully formulated search strings based on keywords in RQ in the databases below:

- University of Maryland Global Campus (UMGC) OneSearch
- Business Source Complete (BSC)
- ABI/INFORM (ABI)

For ensuring a comprehensive, exhaustive, and aggregative literature search, the study also utilized the google scholar (GS) search engine to gather other study-relevant literature (Higgins & Green, 2011). The study applied inclusion and exclusion criteria to the database search results to assess the relevance of each piece of retrieved literature to the research objectives (Nurmala et al., 2017), as summarized in Table 1 below. The Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) chart (seen in figure 2 below), was also used to provide a schematic depiction of the screening, application of inclusion and exclusion criteria to the search, screening, determination of eligibility, and selection of literature included and synthesized for the study (Moher et al., 2009). Table 2 also shows the search strings, databases used, and search results. A total of 9202 articles emerged from 6 searches (UMGC OneSearch= 48, BSC=8564, ABI = 35, GS=555), with the addition of 31 articles

from other sources including the snowball effect. Removal of duplicates, application of the inclusion and exclusion criteria, and search limiters resulted in 107 articles. The 107 articles were further assessment of the 107 articles for scope, detail, and rigor to yield 44 articles that were eligible for TAPUPAS (Transparency, Accuracy, Purposivity, Utility, Propriety, Accessibility, Specificity) critical appraisal (approach discussed in stage four below) (Porter, 2007). The critical appraisal of 44 articles yielded a selection of 31 relevant articles for thematic synthesis and extraction of relevant evidence to address the research question. * is used to indicate each of the 31 included articles in the references.

Table 1

Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
Peer-reviewed articles/journals	Non-peer reviewed articles
Year of Publication 2000-2021	Articles not published from 2000-2021
Articles are written in English	Articles not written in English
Key terms from RQ and/or its synonyms found in abstract	Key terms in RQ and/or its synonyms not found in abstract

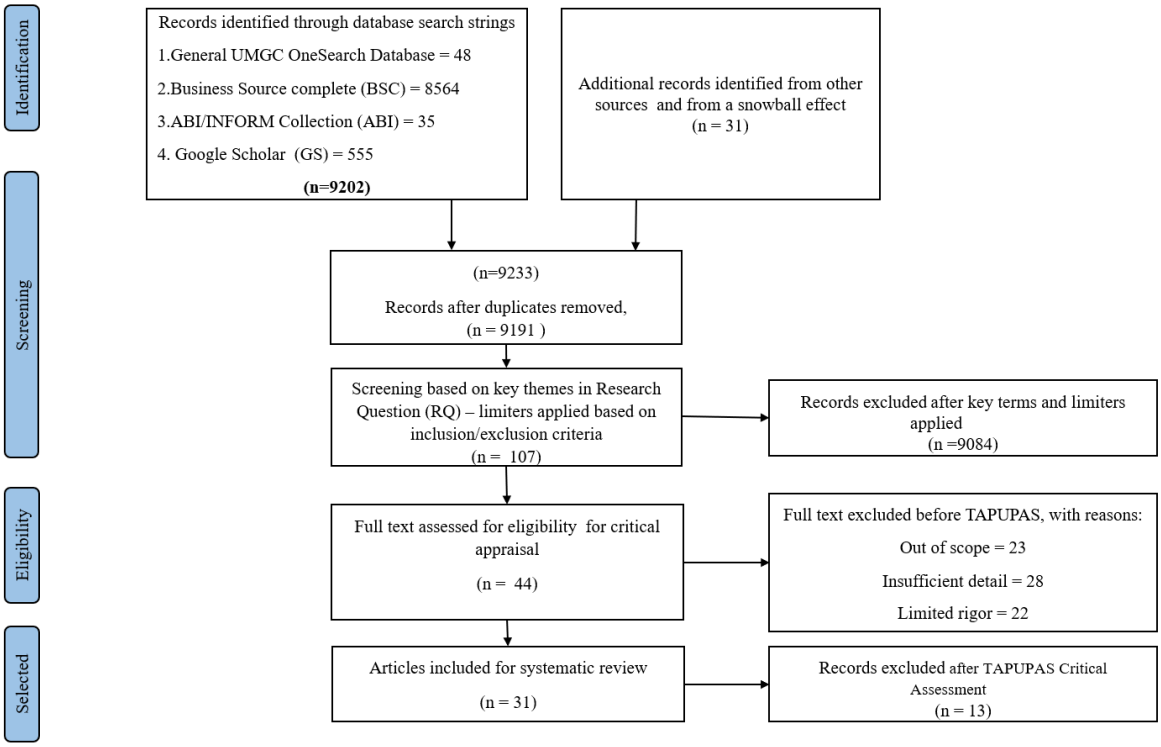

Figure 2: Search process and results flow chart. Adapted from "The Preferred Reporting Items for Systematic Review and Meta-Analyses: The PRISMA Statement" by Moher et al., (2009)

Table 2
Search results from database searches

#	Search string	Database	Search results
1	econom* n5 (grow* OR develop*) AND (factor* OR barrier* OR facilitat* OR challenge* OR problem* OR issue*) AND (agro-based* OR "agricultur* processing" OR "food process*") AND (manufactur* OR industr* OR process*) AND ("developing countr*" OR "third-world countr" OR "third world countr*" OR "developing countr*" OR "poor countr* OR " african countr*") AND ("developed countr*" OR "advanced countr*" OR USA OR "United States" OR "United states of America" OR Japan OR China OR Europe OR "European Countr*" OR germany OR "asian countr*" OR "western countr*")	1. UMGC database 2. GS	48 84
2	("agro processing" OR "agro-based manufact*") OR ("manufacturing value add")	BSC	1293
3	noft(agro-based industry) AND noft(development and economic growth)	ABI	23 after duplicates were removed.
4	noft(agro-based industry or agro-based manufacturing) AND noft(economic development and growth or gdp growth)	ABI	12
5	(agro-based or agricultur*) and ("manufacturing or structural transformation or industri*) AND econom* n5 (grow* OR develop*)	1. BSC; 2. GS	7271 (with duplicates) 471
6	("agro processing") AND ("manufacturing)	BSC	32

Stage Three - Data Extraction

Data collection is an important step in the systematic review process. Essential text and data from the selected articles studies were systematically obtained explicitly and consistently according to a defined data extraction strategy and conduct of research design (Cruzes & Dybå, 2011; Pollock & Berge, 2018). This study adopted a modified extraction template from Cruzes & Dybå (2011) (see appendix A for additional detail) and it included the following headings: (1) title of the study, (2) the author and year of publication (3) types of factors impacting agro-processing and/or link to economic growth and structural transformation, (4) study aim and objective, (5) study design approach, (6) main/key findings, and (7) implication to management practice.

Stage Four – Quality Assessment of Included Studies – A Critical Appraisal

Assessment of the methodological quality of the included studies is a key stage of the SR methodology. It involves critical appraisal and judgment to establish potential risks of bias within each eligible study. Pawson et al (2003), in Kneafsey (2007), asserted that the TAPUPAS framework provides a generic standard to evaluate the quality of evidence derived from practitioner research; policy; user and organizational sources of knowledge and addresses the transparency, accuracy, purposivity, utility, propriety, and accessibility of the evidence. Each article eligible for critical appraisal was rated for quality per each of the 7 dimensions of the TAPUPAS framework. Each scored either Low (score=1), Medium (Score =2), or High (Score=3) on Transparency, Accuracy, Purposivity, Utility, Propriety, Accessibility, and Specificity. A rating of Medium (score=2) across all 7 TAPUPAS dimensions results in an average score of 14. For this study, an article is rated poor quality and excluded when it received a total score below the average of 14. As evidenced in figure 2 above, 13 articles were considered poor quality following the TAPUPAS critical appraisal, scoring below the average of 14. 31 articles were considered average or above-average quality and included for the thematic synthesis of relevant evidence to address the RQ. Appendix B shows the critical appraisal results of the 31 included articles.

Stage Five – Analysis and synthesis

All SRs should involve the analysis and synthesis of the evidence found from the included studies (Pollock & Berge, 2018). Synthesis involves summarizing the results in tables or producing a narrative summary. Synthesis of relevant and quality evidence is crucial to evidence-based management decision-making. This is the stage where meaning was generated from data gathered and aggregated from the included studies to address the RQ of this study. SR methodology advocates for various methods of qualitative research synthesis including but not limited to thematic, mixed knowledge, meta-ethnography, and 'meta synthesis', and mixed-method synthesis approaches (Gough et al., 2012; Thomas & Harden, 2008). According to Thomas & Harden (2008) in Cruzes & Dybå (2011), thematic synthesis draws on the principle of thematic analysis identifying recurring themes or issues in the primary studies, analyzing these themes, and concludes in systematic reviews. This study employed the thematic synthesis approach to evidence extraction from 31 included articles to address the research question through identification, analysis, and reporting of patterns (themes) within the available evidence. Hence, the reason why thematic coding was relevant.

This study deployed three levels of coding: (1) the free line-by-line coding of the findings and conclusions from included studies; (2) the organization of the resulting 'free codes' into related areas to develop 'descriptive' themes; (3) and the generating 'analytical' themes (Gough et al., 2012; Thomas & Harden, 2008).

Step one - Coding included studies for text: ATLAS.ti software version 9.1.6.0 was used to code studies included in this study. The line-by-line coding of the findings and conclusions from included studies resulted in 35 codewords (see Appendix C for detail). Table 3 shows the codewords and their frequency of relatability in the different included studies. ATLAS.ti software was used to extract the hierarchical representation of each codeword and any associated quotation(s) from some of the articles included in the study (Appendix D has extra detail).

Table 3

Shows The 35 Code Words and their frequencies of Appearance during the Coding Process

#	Codewords	Frequency of relatability in included articles
1	Agricultural development and growth on manufacturing	5
2	Agro-business access to capital	10
3	Agro-processing or agro-based manufacturing employment	28
4	Agro-processing or agro-manufacturing causes GDP growth	8
5	An environment that fosters entrepreneurship and innovation	4
6	collaboration and coordination between agro-businesses	3
7	A competitive marketplace facilitates agricultural growth and manufacturing	22
8	Enabling resources and capability growth of agro-based industry	2
9	Endogenous factors	2
10	Exogenous factors (e.g., IMF, WTO, etc.)	4
11	Favorable economic policies, institutions, and structures	28
12	financial structure, tools, and alternatives	5
13	Foreign direct investment (FDI)	6
14	Geography impacts agricultural production and industrialization	4
15	Impact of the formal nature of agro-processing value chain	1
16	Increased and demand-driven exports of manufactured goods	9
17	innovation and technology capability	9
18	Institutions for Research & Development	1
19	interruption of energy supply to firms for continuous production	3
20	Knowledge development	8
21	Lack of a safe and social environment	3
22	lack of process and structure in managing an agro-enterprise	6
23	Lack of technological or technical advancement	25
24	Land availability and impact on agricultural production	4
25	Management efficiency	9
26	Merger and cooperation of small and medium scale agro-based enterprises	2
27	Natural disasters and unexpected weather circumstances	1
28	open, uneven market competition, and opportunities for international trade	39
29	productive labor force with the technical know-how	22
30	the proximity of raw materials can maximize the productivity of firms	5
31	Quality products, packaging, and branding	4
32	Reducing agricultural taxation for trade expansion	9
33	Skill development and continuous training of labor force	11
34	Structural transformations to GDP growth	10
35	Supply chain constraints such as poor road infrastructure	8

Step Two - Develop descriptive themes: In this step, primary code words were grouped into related areas to develop 10 descriptive themes (see example in Appendix E). The descriptive themes are the following:

(1) Agricultural production impacts manufacturing growth,
(2) Agro-processing increases employment and reduces poverty,
(3) Competitive marketplace facilitates agricultural growth and manufacturing,
(4) Endogenous factors impacting agro-processing or agro-manufacturing,
(5) Exogenous factors impacting agro-processing/manufacturing,
(6) Exports of agro-processed or manufactured goods is a growth factor,

(7) Favorable policies requirements help businesses to thrive, grow and expand,
(8) Merger and cooperation of small and medium scale boost agro-industrialization,
(9) Smart Government funding is instrumental to boosting agro-processing, and
(10) Social and structural transformation is evidence of economic growth and

Step 3 - Developing analytical themes: At this step, seven (7) analytical themes were developed from the 10 descriptive themes above. Each analytical theme was linked back to the primary codes, as shown with theme # 3 in the Appendix F example. Appendix G also tabulates the analysis of the formation of the analytical themes from primary codes and descriptive themes**.** Each analytical theme is analyzed and discussed in the "Findings and Discussions" section below.

Stage Six - Interpretation and Reporting

At this stage, the study presents results from the SR. A good systematic review should make it easier for practitioners to understand by providing specific exemplars and a trail of evidence to support conclusions (Tranfield et al., 2003). The analytical themes were summarized and discussed in the 'Synthesis & Discussion' section for the benefit of management practitioners, according to how they addressed the overarching research question in this study (Pollock & Berge, 2018).

4.0 Findings/Results

This study, again, identifies and examines growth factors that impact the agro-processing industry, a subset of the manufacturing sector of Ghana, towards sustainable economic and structural transformation. The thematic synthesis approach to evidence extraction was used to derive seven (7) analytical themes that directly addressed the RQ below:

What are the growth factors that impact the agro-processing industry for economic and structural transformation?

The seven analytical themes address the RQ. Theme 1 addressed the 'growth factors' aspect of the RQ, and Themes 2-7 affirmed the link towards economic growth and structural transformation (all themes are discussed in detail in the next section). The themes are also a direct reflection of the conceptual framework and highlight the impact of endogenous and exogenous factors on agro-processing-driven industrialization, coupled with the requirements towards Ghana's take-off to economic maturity. Twenty (20) growth factors were discovered. Of the 20, technology and innovation capability, favorable policies for agro-processing, and a competitive and open market growth factor recorded the highest percentages of 42, 45, and 55 respectively, as it relates to the common themes from the 31 different articles that were included, which stresses their weight and impact on agro-processing and manufacturing value-add (MVA) in general.

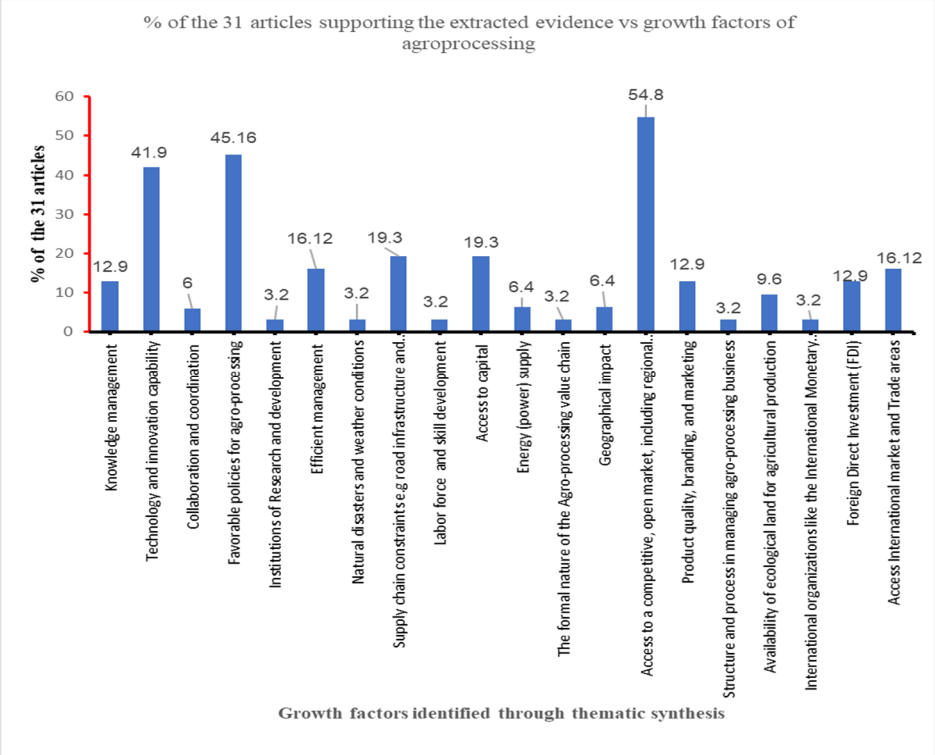

Figure 3: A plot of growth factors impacting the agro-processing sector versus the percentage of common themes from the 31 articles that were included.

5.0 Synthesis & Discussion

This study is a systematic review, an evidence-based research approach, to examine the factors that influence the agro-processing and manufacturing value add towards economic growth and development of Ghana. Evidence-based management (EBMgt) utilizes the best available evidence to make management decisions. Accelerating economic development in Ghana is a matter of practice. However, leaders in Ghana and other developing countries require the best, quality, credible and available evidence to inform the required economic growth and development decision-making, which helps to bridge the gap between research and practice in Ghana. The RQ for this study was:

What are the growth factors that impact the agro-processing sector of Ghana for economic and structural transformation?

The thematic synthesis resulted in 35 initial code words, which were further grouped based on related concepts into 10 'descriptive' themes. The seven (7) analytical themes that were developed from the 10 descriptive themes are discussed as follows.

Theme 1: *The agro-processing or agro-manufacturing industry is impacted by endogenous and exogenous growth factors.*

This study categorized the growth factors that have a potential impact on the agro-processing industry in Ghana into 17 endogenous and 3 exogenous concerns. Endogenous factors are internal to a system, influencing the system from within (Shifa, 2015). The influence of exogenous factors, on the other hand, are external to the system. The endogenous factors are the following:

(1) Knowledge management
(2) Technology and innovation capability
(3) Collaboration and coordination
(4) Favorable policies for agro-processing
(5) Institutions of research and development
(6) Efficient management
(7) Natural disasters and weather conditions impacting the ecological landscape
(8) Supply chain constraints e.g., road infrastructure and technology utilization
(9) Labor force and skill development
(10) Access to capital
(11) Energy (power) supply
(12) The formal nature of the Agro-processing value chain
(13) Geographical impact
(14) Access to a competitive, open market, including regional free trade area
(15) Product quality, branding, and marketing
(16) Structure and process in managing the agro-processing business
(17) Availability of ecological land for agricultural production

The exogenous factors are also as follows:

(1) International organizations like the International Monetary Fund (IMF)
(2) Foreign Direct Investment (FDI)
(3) Access to international market and trade

Ghana, as an economic system, is faced with endogenous and exogenous growth factors that directly impact the agro-manufacturing ecosystem. Appendix H tabulates and compares Ghana with the advanced economies in terms of all the growth factors herein found. Knowledge management, as an example, could be achieved through research and development (R&D), continuous human capital development and training, advising, enforcing context-based approaches to learning, and learning by doing techniques in agro-processing and manufacturing industries (Njuguna & Wanjohi, 2021; Osei-Amponsah, 2020; Bjornlund et al., 2020; Thindisa & Urban, 2018; Rae & Josling, 2003; Tandoh-Offin, 2011). Promotion of effective knowledge management leads to organizational and technical efficiencies in especially small and medium scale agro-processing industries towards economic growth (Njuguna & Wanjohi, 2021; Osei-Amponsah, 2020). Building technology and innovation capability is also a huge growth factor. Investments in technology and innovation hubs, especially when formulated on a bedrock of sound and favorable economic policies, promote entrepreneurship in the agro-processing sector and should be encouraged in developing countries like Ghana. Asare & Essegbey (2016) affirmed the need to also commercialize technology development, innovation capability, and government investment towards agro-processing. There is also the added need to move away from only niche-specific and internet-based knowledge acquisition to a more formal and institutional capacity building founded on deliberate and effective technology utilization (Osei-Amponsah, 2020).

Theme 2: *Governments should focus on smart economic policies, regulations, and funding mechanism that accelerates* agro-*processing/manufacturing industrialization.*

This study underscored and advocates the need for developing economies, like Ghana, to invest time and

efforts in formulating policies that encourage entrepreneurship in the agro-processing or manufacturing industrial landscape. It asserts the need for policy experiments in the areas of economic, social, and structural transformation, not limited to road infrastructure, fostering agro-processing entrepreneurship, enabling financial structures and access to capital for agro-business, foreign direct investment (FDIs), local and international trade and marketing, technology innovations and capacity building efforts, just to mention a few, to drive accelerated growth in the agro-processing sector. This assertion is echoed by Newfarmer et al. (2018), who affirmed the need for increased formulation of liberal policies and regulations, for example, that creates the enabling environment for businesses to thrive and fosters agricultural production, technological innovation, financial sector regulations, and sustained manufacturing value-add.

Theme 3: *Merger and cooperation of small and medium scale industries expands the agro-processing sector and accelerates industrialization*

Small and medium scales firms often face a range of issues from access to capital to being able to afford technologies for enhanced productivity, which hinders their growth and access to local and international markets. For rapid industrialization, merger and cooperation are encouraged. Small agro-processing companies can merge and cooperate with other entities to allow rapid scaling. Derbile et al. (2012) confirmed that issues, not limited to access to capital and credit, technology, lack of marketing innovation, and simple ignorance, hinder the growth and scaling of small agro-processing industries. In India, for example, the work of Bedi (2010) confirmed that merger and acquisition deals in the manufacturing sector increased by 272 percent, allowing sectoral growth and increased competition in the global market.

Cooperatives could be used as a vehicle for industrialization while finding opportunities to correct structural imbalances while reducing or eliminating differences in sectors and regions (Katundu, 2018). The vehicle of cooperation could take the form of various regional policy arrangements between countries that fundamentally bolster integrated trade and production towards industrial and structural transformation of local economies (Kozul-Wright & Fortunato, 2019). As a result, regional value chains can be improved and structural development centers can be built to support competitiveness among domestic firms in member countries. It is recommended for developing countries, like Ghana, to adopt strategic policy measures both at the domestic and sub-Saharan regional levels. Developed countries are aligned to making arrangements for Free Trade policies (Feinberg, 2003), which Ghana can replicate and continuously encourage. The most recent and useful strategic policy arrangement that Ghana part took in is joining the African Continental Free Trade Area (AfCFTA). This arrangement continues to afford industries, not limited to agro-processing firms in Ghana, the regional opportunity to trade in goods and services with 31 other member countries.

Additionally, small and medium-scale agro-processing firms could garner several benefits upon joining cooperatives. Cooperatives could be a platform for knowledge and experience sharing, coupled with access to various forms of training programs and facilities (Boodhoo et al., 2010). Some of the training benefits may include but are not limited to improving work skills and know-how, improving product quality and marketing, new product development, and business management It is also an opportunity to improve and increase the competitiveness of firms.

Theme 4: *Increased agricultural productivity causes continuous growth in agro-processing/manufacturing*

Sustained agricultural productivity remains an asset to agro-processing/manufacturing. This study found that agricultural production has a significant and positive impact on manufacturing growth (Shifa, 2015). Continuous production of raw materials leads to continuous supply input to agro-manufacturing. A shortage of raw materials due to low agriculture total productivity has a direct and consequential impact on agro-processing. A developing economy, like Ghana, needs to focus on productive agriculture production that ensures the continuous provision of raw material to the agro-processing sector towards economic growth. However, in the wake of increased agro-manufacturing and industrialization, leaders of Ghana need to be mindful of the possible shift of labor from agriculture to production sector manufacturing, which can hinder economic growth. Ghana will need to find the balance, an assertion confirmed by Johnston & Mellor (1961) in the work on "The Role of Agriculture in Economic Development."

Other studies also confirm why scarcity of agricultural raw materials makes the agro-processing sector suffer. Chavas (2008) stated that, amidst diminishing marginal productivity, obtaining higher outputs becomes increasingly difficult. This implies that significant effort is required to ensure increased raw materials for the agro-processing or manufacturing sector. Despite the assertion that this sector is marked with low margins, seasonality, variability, and perishability (Chengappa, 2004; Asokan & Singh, 2003) of raw materials, Asokan & Singh (2003) suggested the need for the agro-processing firms to properly understand the supply chain dynamics to prevent any loss in business. Agro-processing firms in Ghana can, therefore, purchase or make strategic arrangements to access raw materials on time and in the right quantity to ensure business assurance, continuity, and customer satisfaction, while maintaining increased competitiveness on both local and international markets.

Theme 5: *Increased and continuous access to international trading markets and demand-driven exports of agro-manufactured boosts economic growth*

This study asserts that access to the international market and trading opportunities for agro-manufactured products is a booster of economic growth by creating employment opportunities. Awad (2019) confirmed that a nation's openness to the global trade market lowers the unemployment rate of the country. Openness to the international market is an economic step for Ghana. Advanced economies like the United States are often open to open markets. Open and wider markets serve to catalyze wider trade agreements, support domestic market-oriented reformers, strengthen strategic partnerships, etc. (Huang & Xiong, 2018).

Theme 6: *Enhancement of local value chain mechanisms through policy, efficient management, branding, and packaging of agro-processed/manufactured products can boost economic growth.*

This study shows that the growth of the agro-processing sector is hinged on policies that encourage technological innovations and utilization in the agro-processing value chain. Small and medium-scale agro-enterprises are encouraged to establish efficient structures and processes towards efficient business management. This ultimately feeds into better marketing, rebranding, and packaging agro-manufactured products – a competitive presence in the local and international markets. The competitive presence and sales of manufactured products both on the local, regional, and other international markets is a driver of economic (GDP) growth, reducing unemployment and poverty rates (Awad, 2019; Ntara, 2016).

Theme 7: *Access to foreign direct investment and government funding to the agro-industrial sector is an economic development accelerator*

Access to foreign direct investments (FDIs) is an economic growth factor and could sometimes be more effective than trade by generating sales of products from the agro-industrial complex. This study also confirmed that carefully leveraging FDI and government funding can propel rapid agro-processing industrialization. FDI can be used to afford the training and development of technological innovations towards increased manufacturing value-add and enhanced marketing capacity that allows for industrial scaling and facilitation of global market and product competition. FDI is an enabler of the transition to market and economic growth (Popescu, 2014). Abor et al (2008) also confirmed that FDI could be used to sponsor an export performance of most products, not limited to products from the agro-processing sector to the international market for an accelerated marketing presence and competitiveness.

6.0 Conclusion & Recommendations

This evidence-based research sought to bridge the gap between research and practice, help leaders I Ghana and other developing countries to make decisions that solves the challenges faced with the agro-processing using the best available, quality, credible, and synthesized evidence. The problem is that the agro-processing sector of Ghana is still weak today despite Ghana being known as a haven for agricultural raw materials. The systematic review methodology used to explicitly examine the growth factors that impact the agro-processing sector of Ghana for economic growth and development. Evidence from 31 included/selected articles were aggregated and analyzed through a 3-step thematic synthesis approach to yield seven (7) analytical themes (discussed above). The analytical themes directly bridge the gap between research and practice to allow leaders in Ghana and all interested stakeholders to make decisions on how to leverage the agro-processing sector for economic growth and structural transformation of the nation, possible by understanding all the possible growth factors. The following are therefore recommended for the government of Ghana and other developing countries in Sub-Saharan Africa and around the world:

1. Understand and work out an implementation plan on all the endogenous and exogenous growth factors impacting the agro-processing or agro-manufacturing industry. Endogenous factors include but are not limited to knowledge management, technology and innovation capability, favorable economic policies, etc. Exogenous factors include the influence of external organizations like IMF, Foreign Direct Investments (FDIs), International trade and markets, etc.

2. Deliberate focus on smart economic policies, regulations, and funding mechanism that accelerates agro-processing/manufacturing industrialization.

3. Create a business environment that encourages merger and cooperation of small and medium scale industries towards an expanded and accelerated industrialization

4. Ensure a careful increase in agricultural productivity to continuously provide agricultural raw materials as an input to the sustainable growth of agro-processing/manufacturing. However, as the country rapidly industrializes, there is a need to be mindful of labor shifts from the agriculture sector to the manufacturing industrial complex.

5. Ensure increased, continuous, and facilitated access to international trading markets and demand-driven exports of agro-manufactured as a boost for economic growth.

6. Enhancement of local value chain mechanisms through policy, efficient management, branding, and packaging of agro-processed/manufactured products can boost economic growth.

7. Encourage controlled access and utilization of foreign direct investments and government funding to grow and cause structural transformation of the agro-industrial complex.

7.0 Study Limitations

This study used an academic constraint of seven (7) weeks to conceptualize and complete the systematic review and report findings. It also used UMGC OneSearch, Business Source Complete, ABI/INFORM, and Google Scholar databases such that, additional databases could have added to the comprehensiveness of the search for other credible scholarships. Additionally, the selection and inclusion of 31 articles, thematic synthesis, and evidence extraction from the articles were conducted by only the researcher. Additional time and third-party reviews may have allowed an extra layer of scrutiny of the analysis and findings coupled with reducing any possible biases.

8.0 Implications for Practice

This study is a resource for management practitioners in Ghana, government leaders, and economic development consultants to understand the growth factors that can either hinder or facilitate the utilization of agro-processing/manufacturing as a means to economic growth and structural transformation. The growth of the agro-processing sector directly increases manufacturing value-add and grows the GDP of the country. Also, the expansion of the agro-processing sector leads to industrialization, typically evident in structural transformation. This evidence-based research provides credible and carefully synthesized evidence to help decision-making on why the agro-processing sector of Ghana is still weak today, despite its independence in 1957.

9.0 Future Research

This study is a foundational work on the factors impacting agro-processing for economic growth and development. Recommended future studies are to look at each endogenous and exogenous factor and perform a country-specific or general impact analysis.

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Appendix A
Data Extraction Table

Author(s) & year of publication	Study Title	Types of factors impacting the agro-processing industry and/or link to economic growth and development	Aim/Objective	Study Design/ Approach	Main findings	Implication to practice
(Ahmed et al., 2014)	A Nonparametric Estimation of Total Factor Productivity Growth of Manufacturing Firms	Technology, training, social environment or technical change (technical efficiency), natural disasters, open market and international trade, power supply to agro-based manufacturing plants,	Used Malmquist Total factor productivity (TFP) to evaluate factors that impact the performance of agro-based manufacturing firms in developing countries	Follows a non-parametric approach to measure TFP growth of manufacturing firms. Used randomly selected firm-level data from 2007 to 2009 299 firms. 141 out of the 299 forms fit the requirements	Key findings are that Technological advancement, continuity or interruption energy and power inputs, lack of robust social environment and security, natural disasters, and open, uneven and opportunities for	Managers and practitioners at various manufacturing firms in developing to ensure to: (1) Push the frontiers of agro-based manufacturing through technological advancement (2) endeavor open, free, and international trade opportunities (3) continuously training their employees (4) beware of natural disasters and how they impact productivity (6) power interruption is a factor and so there is a need to ensure there is the reliable power supply
(Munyi, 2020)	Africa's stalled structural transformation: the end of the flying geese?	FDI Structural transformation	To understand if structural transformation is happening in Africa, and can African states count on the neoliberal flying geese paradigm for industrialization.	Literature review with quantitative analysis	Analysis of data from the world bank suggests that the required structural transformation is not occurring in Africa as it should. The Huge capitalization in the G20 States (especially China) has stalled development in Africa and other developing countries, forcing most African states to rely on debt from China for _capital formation.	FDI-based structural transformation should be done with care, with a careful understanding of the repercussions and conditions.
(Atayi et al., 2021)	Agriculture, Manufacturing and Economic Growth in Nigeria	Agricultural production and its impact on manufacturing	This study addressed "the positive effect of Agriculture on the manufacturing sector in Nigeria." (p.337)	Utilized secondary data and the Ordinary Least Square Method estimation techniques	The study found that: "The agricultural production coefficient also verified the a priori expectation. It has a positive symbol, suggesting that MVA and agricultural production have a positive relationship." (p.337) The AGRQ coefficient is (0.045142), meaning that a 5% shift in AGRQ would result in a 5% change in Manufacturing Value Added." (p.345)	Government can develop a spend plan policy to boost agricultural production and manufacturing value add (MVA). MVA has a direct impact on GDP.
(Adaku et al., 2018)	Delays in new product introduction: Experiences of a food processing company in a developing economy	-Structure and process -inefficient management -unfavorable Government regulations and policies	Understanding delay factors in introducing new agro-based products to the market	Used the case study of a large processing firm in Ghana and a two-stage survey approach to understand the underlying reasons impacting delayed product introduction to the market	Critical causes of product introduction are: poor project management and Prioritization, limited expertise, non-favorable external factors like government regulations on, for example, product testing and lack of communication, limited production capacity	Practitioners and management to ensure the labor force is trained with the requisite technical skill and know-how Project management skills and structure to be utilized. Government in developing countries to ensure that policies and regulations in place for product testing are streamlined and can be exercised easily by agro-processing companies when introducing new products to the market.

Author(s) & year of publication	Study Title	Types of factors impacting the agro-processing industry and/or link to economic growth and development	Aim/Objective	Study Design/ Approach	Main findings	Implication to practice
(Dorosh & Thurlow, 2018)	Beyond Agriculture Versus Non-Agriculture: Decomposing Sectoral: Growth–Poverty Linkages in Five African Countries	Agro-processing or manufacturing reduces poverty and boosts GDP per capita	Understanding what constitutes agriculture and non-agriculture and how either or reduces poverty	Case study of five countries: Malawi (MAL), Mozambique (MOZ), Tanzania (TZA), Uganda (UGA), and Zambia (ZAM) and using poverty growth elasticity measures	Agro-led processing or manufacturing impacts GDP per capita (economic growth) by reducing poverty per head in households in developing	Leaders in developing countries to encourage agro-based processing or manufacturing towards reducing poverty
(Klasen et al., 2021)	Does the designation of least developed country status promote exports?	Least developed country status Export demand	The study sought to 1. "examine to what extent developing countries export more as a result of having the official Least Developed Country (LDC) status" 2. "estimate a gravity model of trade over the period 1973–2013, in which identification is achieved by exploiting the particularities and asymmetries of 'inclusion' and 'graduation' criteria of LDC status" (p.157)	Various empirical analysis and modeling efforts, (the augmented gravity model of trade)	The study found that countries designated as Least Developed Countries (LDC) led to aggregated and increased exports and access to other international markets. Individual trade preferences are not always beneficial	Policy strategies that helped to establish an environment for increased exports and access to local and international markets.
(Hawkes, 2005)	The role of foreign direct investment in the nutrition transition	Foreign direct investment	To determine the impact of foreign direct investment (FDI) on processed food	Data analysis and Literature review	FDI has proven more effective than trade and leads to increased and proliferation of processed foods. It creates more opportunities and infrastructure for accelerated production, marketing, and sales of agro-based manufactured foods.	FDI as a strategy provides the resources to accelerate infrastructure development, leading to more agro-manufactured foods on the market
(Wattanapruttipaisan, 2003)	ASEAN-CHINA Free Trade Area: Advantages, Challenges, and Implications for the newer ASEAN Member countries	Foreign direct investment, domestic, regional, and international trade. Free and open markets for agro-based or manufacturing products	Uses literature and secondary data to establish advantages, challenges, and implications for the newer ASEAN member countries	Not explicitly stated but alludes to a kind of literature review and use of secondary data	1. China's access to ASEAN free trade enables trade in agro-based products with other neighboring countries 2. Free trade area enables technological and labor competitiveness 3. inter-firm networking and advocacy for domestic entrepreneurship is focal to economic growth and development 4. developing countries to engage and allow for smart foreign direct investments	Developing nations should forge and establish a free trade area to allow trade of agro-based manufactured products among their neighboring countries
(Shehrawat, 2006)	Agro-Processing Industries---A Challenging Entrepreneurship for Rural Development	Technology, markets, efficient management, entrepreneurship, the proximity of raw materials, government policies, and availability of capital.	Aimed to establish the training requirement of entrepreneurs to set up sustainable agro-based units	A total of 120 entrepreneurs were used. Responses from each entrepreneur were measured against 55 factors on a 4-point continuum rating scale	The factors impacting agro-based entrepreneurship are 1. Capital accessibility, 2. Access markets (local and international) 3. Manufacturing product quality and packaging	There is a need for nations to create the enabling environment for agro-based entrepreneurship to access capital for agro-based manufacturing. Access to markets is also an essential requirement. However, agro-based entrepreneurs should look for innovative ways of attractive, competitive packaging of agro-based manufactured products
(Sanida et al., 2016)	Challenges for agricultural development in a resource-rich developing country: a case study of Papua New Guinea	1. Supply chain constraints impacts manufacturing output towards economic growth: poor road infrastructural network 2. agro-based manufacturing reduces poverty 3. technology advancement	The study used a dynamic computable general equilibrium model to analyze some options to boost growth in the agro-based manufacturing sector in resource-rich and dependent developing countries	Case study approach and various dynamic modeling approaches (including capital utilization, labor, etc.) of Papua New Guinea – a resource-rich developing country	Policy approaches in 1. Increased investment in agriculture and infrastructure like road networks, 2. Improved agro-based manufacturing, increases employment and leads to economic growth through employment and However, poor infrastructure like roads impacts manufacturing outputs Agro-based manufacturing creates employment and reduces poverty; boosting economic growth	Government to invest in road infrastructure to reliably transport agricultural raw materials from source to manufacturing industries Investment in agro-processing to create employment and reduce poverty towards economic growth and development There should be a deliberate investment in technology to improve productivity in the agro-based manufacturing sector

Author(s) & year of publication	Study Title	Types of factors impacting the agro-processing industry and/or link to economic growth and development	Aim/Objective	Study Design/ Approach	Main findings	Implication to practice
(Abid Sultan & Deepak, 2017)	Competitiveness of agro-processing firms: productivity approach	Technology and/or technical efficiencies	The study measures total factor measurement on agro-processing	Uses the Malmquist productivity index (MPI_ to measure the productivity of the agro-processing industry	-slow growth in the agro-processing industry decreases employment - productivity regress of the agro-processing industry is due to technical inefficiencies	Practitioners to ensure the resources are trained with the right technical skillset to increase productivity -lack of growth leads to unemployment and poverty
(Shifa, 2015)	Does Agricultural Growth Cause Manufacturing Growth?	Competitive business environment -marketing -trade	The study was interested in understanding the impact of agricultural growth on manufacturing growth using random variations in the weather as instruments for agricultural growth	Used regression analysis	A competitive market and business environment is necessary to promote agricultural growth towards agro-based manufacturing -economies that open to trade	Nations to enable a competitive business environment that allows the growth of the agricultural growth towards manufacturing growth. Nations to ensure their economies are open to trade
(Martin, 2019)	Economic growth, convergence, and agricultural economics	-Taxation and trade expansion -Road infrastructure	aims to identify the key ways in which the changes in rich and poor country growth rates matter for agricultural economists, as a basis for formulating better research agendas.	Literature review and lecture	Used literature review and a lecture style to recommend 1. the need for lower taxes, which allows for expansion in trade and markets for products 2. Poor investments in infrastructural road systems is a great constraint	Government to enable policies that reduce taxes on agricultural products – expanding trade locally and internationally. Developing countries to invest
(Trusova et al., 2019)	Financial Mechanism and Tools of Provision the Sustainable Development of Agricultural Enterprises	Budget constraints without state support and options – process and structure	Expand on the theoretical and methodological foundations of a financial system supporting agricultural enterprises	The theoretical and methodological approach	A financial policy or regulation for sustainable development is contingent on the structural systems in place for finance	Good financial policies
(Dao, 2016)	From agriculture to manufacturing: How does geography matter?	-Geography -Technology	To advance a theory about the impact of geography on agricultural production, manufacturing (industrialization), technology, and labor	Theoretical	The theory proves that the geography of agricultural production could delay manufacturing and industrialization. Geography is proven to have a direct impact on obtaining skilled labor required to support technological advancement	Leaders in development need to understand that the geography of agricultural production can impact agro-manufacturing and industrialization. It has an impact on labor structure and technological advancement
(Panda, 2015)	Growth determinants in small firms: drawing evidence from the Indian agro-industry	Management intensity, skilled labor, technology, open and accessible markets	To find the determinants of growth of small agro-based enterprises in India	Data was collected using a stratified random sampling method. A structured but pretested questionnaire was used to collect data. Data analysis by a descriptive statistics and multivariate technique	Small agro-based manufacturing enterprises give skill development, product diversification, and integrated markets. Labor skills and structure, as well as technology utilization, are strong predictors of growth.	Practitioners to endeavor continuously train and development talents while exposing them to the needed technologies. Advancement in product diversification and access markets, both locally and internationally) should be prioritized. These factor areas align small firms to rapidly scale and contribute to manufacturing growth and industrialization in developing countries
(Ruslan, 2018)	Productivity For Agro-Based Industrial Sub-Sector in Malaysia Using Malmquist Index	Technical efficiency and availability of technology Marketing	Used the Malmquist productivity index to observe the productivity efficiency trend of the agro-based industry in Malaysia	Malmquist productivity index (MPI) to measure productivity	Malmquist productivity index (MPI) showed that technical factor/efficiency, rebranding, expanded marketing strategy for cocoa processing subsector of the agro-based industry in Malaysia led to increased productivity and access to markets	A strategy to enhance technical efficiency for a certain product of choice (cocoa, coffee, etc.) is essential for productivity. Also, a strategy to brand and rebrand agro-manufactured products is key to accessing bigger and integrated markets, locally and internationally.
(Kodama, 2017)	How strongly can industrial structural transformation affect GDP?	Structural transformation leads to GDP growth Access and availability of Land and low agricultural total factor productivity	The study was focused on the measure of the impact of industrial structural transformation (agriculture to non-agriculture sectors) on GDP	Using Japanese agricultural data to estimate GDP growth and Survey data of the Farm Household Economy (SFHE)	Comparison between Japan's Actual GDP and counterfactual GDP, which is specialization in agriculture only, shows that Japan's GDP will decrease by a tenth if Japan specializes in agriculture only. Japan's GDP will	Government to invest in arable land, to ensure there is increased agricultural productivity. The strategy to invest in the industrial structural transformation from solely agriculture production to agro-based manufacturing and industrialization.

Author(s) & year of publication	Study Title	Types of factors impacting the agro-processing industry and/or link to economic growth and development	Aim/Objective	Study Design/ Approach	Main findings	Implication to practice
(Manonmani, 2015)	Impact of Global Economic Crisis on the Productivity Performance of Agro-based Industries in India: A Malmquist DEA Approach	Technical efficiency and scale Technology change Scaling factor and challenges	The study was focused on finding the total factor productivity of agro-based industries in India, in the global economic crisis period of 2008-2009,	Using Malmquist approach to measure Utilized Annual Survey of Industries (ASI) published by Central Statistical Organization (CSO) of India	The analysis showed that the manufacture of wood and wood products has the best performance due to technical and scale efficiencies – implication that technical efficiency and technology utilization is a growth factor. This helps agro-based manufacturing to survive in the wake of the global economic crisis.	Management of agro-based industries in developing countries needs to focus on technical efficiency and technology advancement and scale in the processing of raw materials and marketing.
(Watanabe et al., 2009)	Is the development of the agro-processing industry pro-poor? The case of Thailand	Agro-based industry boosts economic growth and reduces poverty Employment creation	Examine how the development of the agro-based industry leads to poverty reduction	A quantitative study utilizing data from both the National Economic and Social Development Board (NESDB) and the LFS and the Household Socio-Economic Survey (SES) published by the National Statistical Office (NSO) of Thailand for the analysis	The quantitative analysis showed that agro-based industry creates more employment and gets the poor in the country employed. Farmer's income increases through two channels: 1. purchasing of agricultural products by ago-based manufacturing industries leads to increased agricultural manufacturing 2. employment of the poor in agro-based processing or manufacturing industries	Agro-based industrialization is critical when the economy is at its developing stages of industrialization
(Mashimba & Kühl, 2014)	Performance of Micro and Small-Scale Enterprises (MSEs) in Tanzania: Growth Hazards of Fruit and Vegetables Processing Vendors		To analyze the growth performance of smallholder agro-based enterprises on the processing of Tanzania		The study showed that factors below slowed the growth of small and medium scale agro-based industries for several reasons such as: 1. Access to operational capital 2. access to market sources and information 3. Owner experience 4. Supportive systems	
(Rae & Josling, 2003)	Processed food trade and developing countries: protection and trade liberalization	Impact of trade-economic growth	Used the comparative static approach to quantify the impact of trade liberation in developed and developing countries	An applied general equilibrium model	Lowering of agricultural trade barriers by the developed countries resulted in increased processed food exports from all of the modeled developing regions, their total value increasing by 6 percent above the base value, at the expense of exports from developed countries.	Governments of developing countries to should policy to liber
(Osei-Amponsah, 2020)	Innovation capabilities and learning mechanisms: insights from Ghanaian fresh fruit processing enterprises	Innovation capability Knowledge development Technology management	a multi-case qualitative research approach to understand innovation capability building processes for	Multi-case qualitative research approach (case study approach	The key findings are in the area of learning by doing and context-specific intervention The findings stressed the need for policy to enable enhanced technology and capability management	Contest-based learning and policy for technology advancement
(Breisinger et al., 2009)	Modeling growth options and structural change to reach middle-income country status: The case of Ghana	Agricultural production of raw materials Increased exports Labor Capital investment	This study developed a recursive dynamic computable general equilibrium (DCGE) model to access sources of accelerated growth and structural transformation.	recursive dynamic computable general equilibrium (DCGE) model	The study showed that there is increased export for manufacturing goods than other sectors. High primary agricultural product export can be replaced by high agro-processing products, with value-added content. Manufacturing growth, including agro-processing can be accelerated by high capital investment Agricultural production (input) accelerates manufacturing growth	Manufacturing growth is enhanced with capital investment coupled with increased focus and increased agricultural input productivity. The policies, institutional reforms, and public investments should focus on agricultural productivity and economic and structural transformation.
(Bjornlund et al., 2020)	Why agricultural production in sub-Saharan Africa remains low compared to the rest of the world – a historical perspective	External factors/systems: IMF	Tracing the role of agriculture through history in sub-Saharan Africa.	Literature review	The key finding is that external factors manipulated the agricultural production and manufacturing systems to favor the export of raw materials, inhibiting Africa's growth and development.	Leaders should be mindful of how much dependence they have on external organizations like IMF, and developed governments. Rather focus on organic growth using endogenous growth factors

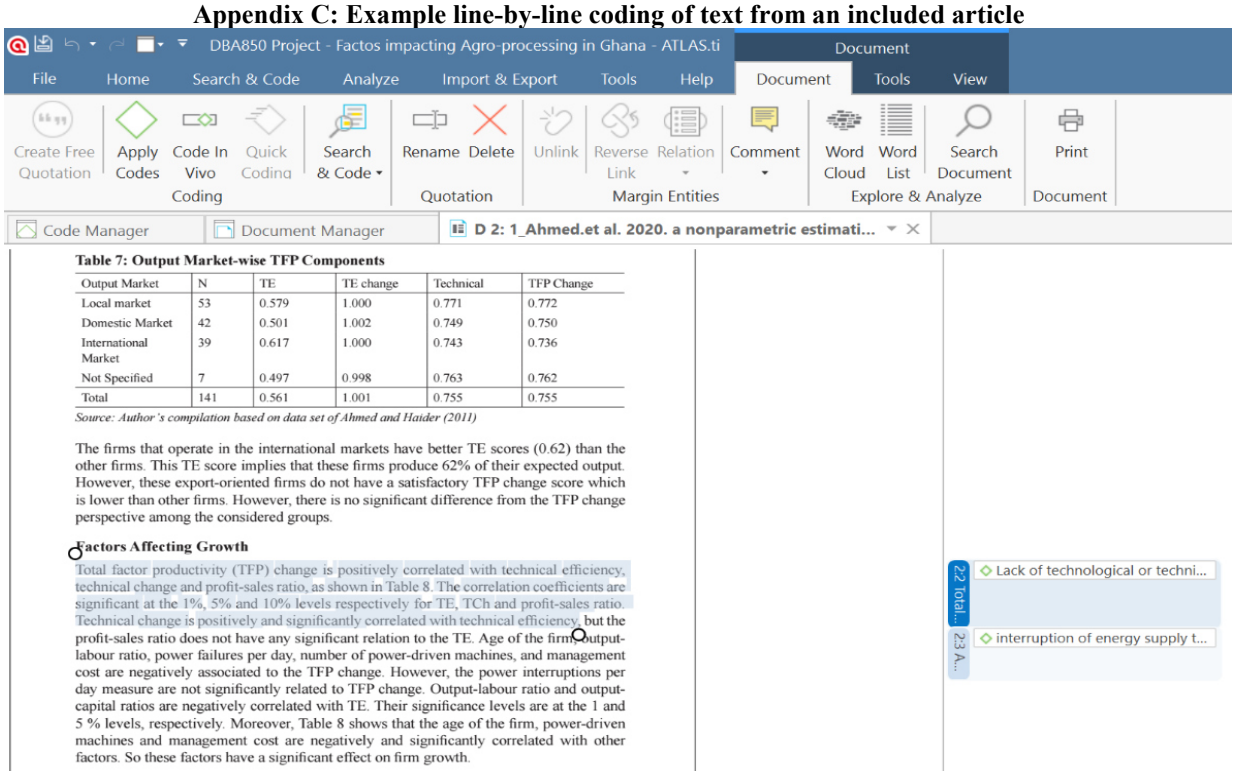
Author(s) & year of publication	Study Title	Types of factors impacting the agro-processing industry and/or link to economic growth and development	Aim/Objective	Study Design/ Approach	Main findings	Implication to practice
(de Vries et al., 2015)	Africa's stalled structural transformation: the end of the flying geese?	Structural transformation for economic growth Trade Transportation Access Markets	African growth experience, long-run, and international perspective, emphasizing the movements of labor across sectors and its impact on aggregate productivity growth.	Parsimonious approach: a literature and leveraging secondary data	Structural transformation is growth-enhancing and accounts for manufacturing productivity	Strategy to accelerate manufacturing growth is encouraged
(Ncube, 2018)	The southern African poultry value chain: Corporate strategies, investments, and agro-industrial policies	Trade Policies Favorable business environment	This paper adopts a modular approach to understand the governance structures in the poultry value chains in Botswana, South Africa, Zambia, and Zimbabwe.	Descriptive framework approach. Primary and secondary data approaches	The study found: 1. many stakeholders influence the poultry value-chain, depending on the formality of the 2. A policy geared at streamlining the regional value chain is critical	Leaders of developing counties formulate trade policies that help to encourage productivity and streamline the value chain process for agro-based manufactured and processing foods.
(Caselli & Coleman II, 2001)	The US structural transformation and regional convergence: A Reinterpretation	Structural transformation Labor shift from agricultural production to non-agricultural manufacturing efforts	It is a joint study of US structural transformation and regional convergence	Model of structural transformation and regional convergence	The study finds that regional convergence of wages is partly due to structural transformation. Structural transformation leads to labor shifts to non-agricultural value-add activities	Leaders to develop policies to cover regional convergence instead of creating wage disparities. Structural transformation leads to labor shift from agricultural production to non-agricultural manufacturing
(Thindisa & Urban, 2018)	Human–social capital and market access factors influencing agro-processing participation by small-scale agripreneurs: The moderating effects of transaction costs	Human capital: skilled labor, education, and training Social capital	The study is about human and social capital factors while accounting for the moderating effects of transaction costs.	Questionnaires	The key findings are that human (previous education and training) and social capital factors influence agro-processing plant	Policy on how human capital factors such as previous education and experience impact participation in agro-processing activities and help to mitigate transaction costs are essential
(Ahmad, 2020)	Unlocking the potentials of Micro and Small Enterprises (MSEs) in building local technological capabilities in the agro-processing industry	Endogenous factors: Technology ca Value chain development	This research feeds into establishing ways of advancing Africa's effort to industrialization. Investigated the difference between local production and technological production	Mixed research method: Qualitative and Qualitative analysis	The study found a link between technological capability and value chain can prove to be difficult for countries at different developmental stages. Strengthening local value chain strategies leads to advancement in technological/innovative capabilities.	Practitioners to ensure strategies and policies that enable local value chain development can lead to technological innovativeness.
(Venkatesh et al., 2017)	Agro-Processing Industry and Farmers' Linkages: Pattern and Impact on Enhancing Farmers' Income in Tamil Nadu	Poverty reduction Export demand Raw materials Government policy	The purpose of the study was "to assess the linkage mechanisms and institutional arrangements between farmers and markets and also to quantify the extent of income gains across the marketing channel, particularly in the processor and non-processor outlets" (p.24)	A comprehensive survey approach using primary and secondary data.	Based on the comprehensive approach and analysis, the study found growth in many agro-processing companies. The growth factors include 1. increased export demand 2. proximity and availability of raw materials 3. government policy incentive. Farmers linked to agro-processing got increased income. An indication of continuous employment towards poverty reduction. "The empirical evidence suggests that with the emergence of processing industry in major mango growing areas, the farmers' income would increase to the extent of 49 percent" (p.24)	Government policy incentive that facilitates a business environment for increased exports and production of agricultural raw materials to support agro-processing/manufacturing.

Appendix B
Critical Appraisal Using TAPUPAS

Item #	Study Title	Author(s)	Transparency (T)	Accuracy (A)	Purposivity (P)	Utility (U)	Propriety (P)	Accessibility (A)	Specificity (S)	Score
1	A Nonparametric Estimation of Total Factor Productivity Growth of Manufacturing Firms	(Ahmed et al., 2014)	3(H)	3(H)	3(H)	3(H)	3(H)	3(H)	3(M)	20
2	Agriculture, Manufacturing and Economic Growth in Nigeria	(Atayi et al., 2021)	3(H)	3(H)	3(H)	2(M)	2(M)	3(H)	3(M)	19
3	Delays in new product introduction Experiences of a food processing company in a developing economy	(Adaku et al., 2018)	3(H)	3(H)	3(H)	3(H)	2(M)	3(H)	3(H)	21
4	Beyond Agriculture Versus Non-Agriculture: Decomposing Sectoral: Growth–Poverty Linkages in Five African Countries	(Dorosh & Thurlow, 2018)	3(H)	3(H)	3(M)	3(H)	2(M)	3(H)	2(M)	19
5	Competitiveness of agro-processing firms: productivity approach	(Abid Sultan & Deepak, 2017)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	3(H)	15
6	Does the designation of least developed country status promote exports?	(Klasen et al., 2021)	2(M)	2(M)	3(H)	3(H)	3(H)	1(L)	3(H)	17
7	Financial Mechanism and Tools of Provision the Sustainable Development of Agricultural Enterprises	(Trusova et al., 2019)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	14
8	From agriculture to manufacturing: How does geography matter?	(Dao, 2016)	2(M)	2(M)	3(H)	2(M)	2(M)	2(M)	2(M)	15
9	Growth determinants in small firms: drawing evidence from the Indian agro-industry	(Panda, 2015)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	14
10	The role of foreign direct investment in the nutrition transition	(Hawkes, 2005)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	14
11	How strongly can industrial structural transformation affect GDP?	(Kodama, 2017)	3(H)	3(H)	3(H)	3(H)	2(M)	3(H)	2(M)	19
12	Impact of Global Economic Crisis on the Productivity Performance of Agro-based Industries in India: A Malmquist DEA Approach	(Manonmani, 2015)	3(H)	3(H)	2(M)	2(M)	2(M)	2(M)	2(M)	16
13	Is the development of the agro-processing industry pro-poor? The case of Thailand	(Watanabe et al., 2009)	3(H)	3(H)	3(H)	2(M)	2(M)	3(H)	3(H)	19
14	Performance of Micro and Small-Scale Enterprises (MSEs) in Tanzania: Growth Hazards of Fruit and Vegetables Processing Vendors	(Mashimba & Kühl, 2014)	3(H)	3(H)	3(H)	3(H)	3(H)	2(M)	2(M)	19
15	Processed food trade and developing countries: protection and trade liberalization	(Rae & Josling, 2003)	2(M)	2(M)	3(H)	2(M)	2(M)	2(M)	2(M)	15
16	Innovation capabilities and learning mechanisms: insights from Ghanaian fresh fruit processing enterprises	(Osei-Amponsah, 2020)	3(H)	2(M)	2(M)	1(L)	2(M)	2(M)	2(M)	14
17	Modeling growth options and structural change to reach middle income country status: The case of Ghana	(Breisinger et al., 2009)	2(M)	2(M)	3(H)	3(H)	2(M)	3(H)	3(H)	15
18	Why agricultural production in sub-Saharan Africa remains low compared to the rest of the world – a historical perspective	(Bjornlund et al., 2020)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	14
19	Africa's stalled structural transformation: the end of the flying geese?	(Munyi, 2020)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	14
20	Structural Transformation in Africa: Static Gains, Dynamic Losses	(De Vries et al., 2015)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	3(H)	15
21	The southern African poultry value chain: Corporate strategies, investments and agro-industrial policies	(Ncube, 2018)	2(M)	3(H)	3(H)	3(H)	2(M)	3(H)	3(H)	20
22	The U.S. Structural Transformation and Regional Convergence: A Reinterpretation	(Caselli & Coleman II, 2001)	3(H)	3(H)	3(H)	2(M)	2(M)	2(M)	2(M)	17
23	ASEAN-CHINA Free Trade Area: Advantages, Challenges, and Implications for the newer ASEAN Member countries	(Wattanapruttipaisan, 2003)	3(H)	3(H)	3(H)	3(H)	2(M)	3(H)	2(M)	19

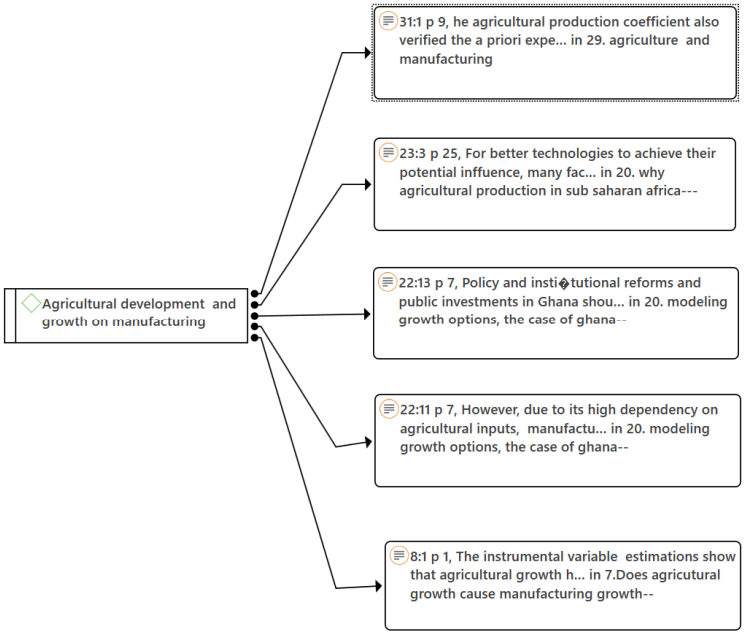
Item #	Study Title	Author(s)	Transparency (T)	Accuracy (A)	Purposivity (P)	Utility (U)	Propriety (P)	Accessibility (A)	Specificity (S)	Score
24	Human–social capital and market access factors influencing agro-processing participation by small-scale agripreneurs: The moderating effects of transaction costs	(Thindisa & Urban, 2018)	3(H)	2(M)	3(H)	2(M)	2(M)	3(H)	2(M)	17
25	Unlocking the potentials of Micro and Small Enterprises (MSEs) in building local technological capabilities in agro-processing industry	(Ahmad, 2020)	3(H)	3(H)	3(H)	2(M)	3(H)	2(M)	3(H)	19
26	Agro-Processing Industry and Farmers' Linkages: Pattern and Impact on Enhancing Farmers' Income in Tamil Nadu	(Venkatesh et al., 2017)	3(H)	3(H)	3(H)	3(H)	2(M)	2(M)	3(H)	20
27	Agro-Processing Industries---A Challenging Entrepreneurship for Rural Development	(Shehrawat, 2006)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	14
28	Does Agricultural Growth Cause Manufacturing Growth?	(Shifa, 2015)	2(M)	3(H)	3(H)	2(M)	2(M)	2(M)	2(M)	16
29	Challenges for agricultural development in a resource-rich developing country: a case study of Papua New Guinea	(Sanida et al., 2016)	3(H)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	15
30	Economic growth, convergence, and agricultural economics	(Martin, 2019)	3(H)	3(H)	3(H)	3(H)	2(M)	3(H)	2(M)	19
31	Productivity For Agro-Based Industrial Sub-Sector in Malaysia Using Malmquist Index	(Ruslan, 2018)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	2(M)	14

Appendix C: Example line-by-line coding of text from an included article



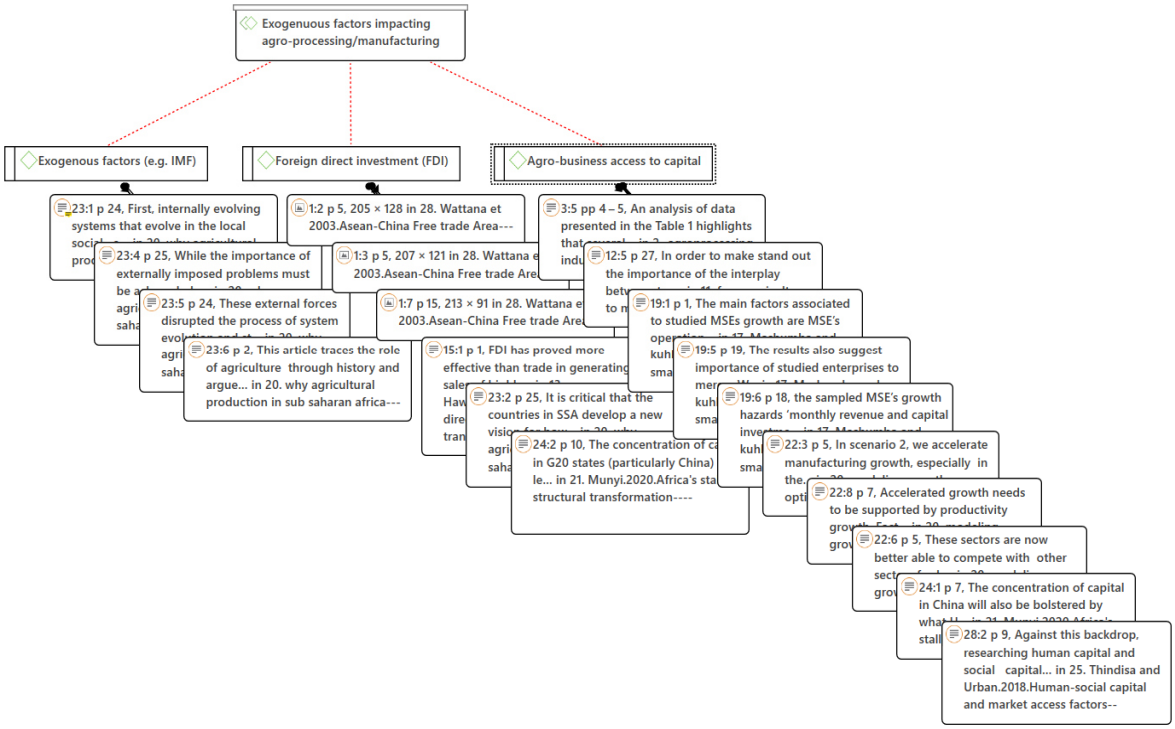
Note. This is a screenshot example of using ATLAS.ti software version 9.1.6.0 to do line-by-line coding of included articles.

Appendix D: Example hierarchical network diagram of a codeword linked to its sample quotations



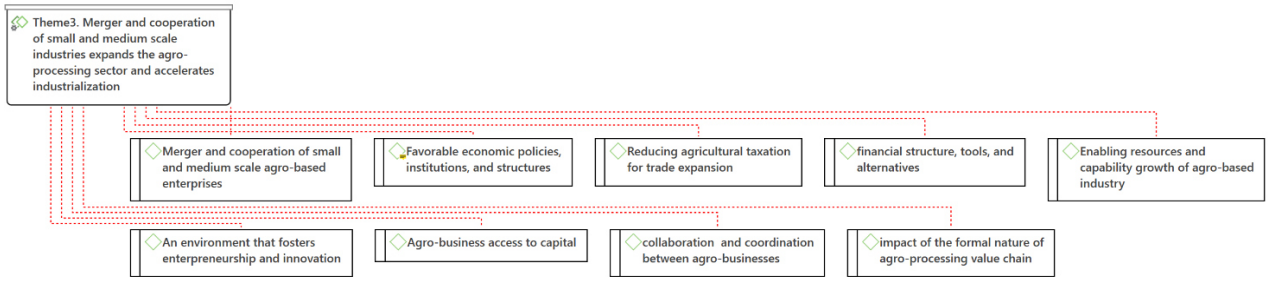
Note. This is a representation of a codeword linked to quotations from the different included articles, generated using ATLAS.ti software.

Appendix E: An example generation of a descriptive theme from codewords



Note. An example network diagram generated from ATLAS.ti. software version 9.1.6.0. Its shows how the descriptive theme "Exogenous factors impacting agro-processing/manufacturing" and its link to the 3 primary codes coupled with samples of supporting quotes.

Appendix F: An example generation of an analytical theme



Note. An example network diagram showing a linkage between analytical theme # 3 and primary codes. Network diagram generated using ATLAS.ti software version 9.1.6.0

Appendix G: Analysis of the formation of 'Analytical themes' from primary codes and descriptive themes

Analytical themes	Addressing the Research Question (RQ)	Focus area	# or density of Supporting quotes	Specific articles	% of the 31 articles impacted
Theme 1: The agro-processing or agro-manufacturing industry is impacted by endogenous and exogenous growth factors.	Growth factors on agro-processing	Endogenous factors:			
		• Knowledge development	8	(Osei-Amponsah, 2020; Bjornlund et al., 2020; Thindisa & Urban, 2018; Rae & Josling, 2003)	12.9
		• Technology and innovation capability	9	(Ahmed et al., 2014; Adaku et al., 2018; Sanida et al., 2016;Abid Sultan & Deepak, 2017;Dao, 2016;Shehrawat, 2006;Panda, 2015; Ruslan, 2018; Manonmani, 2015; Rae & Josling, 2003; Osei-Amponsah, 2020; De Vries et al., 2015; Ahmad, 2020)	41.9
		• Collaboration and coordination	3	(Osei-Amponsah, 2020; Munyi, 2020)	6
		• Favorable policies for agro-processing	28	(Wattanapruttipaisan, 2003; Shehrawat, 2006; Adaku et al., 2018; Sanida et al., 2016; Trusova et al., 2019; Mashimba & Kühl, 2014; Rae & Josling, 2003; Osei-Amponsah, 2020; Breisinger et al., 2009; Bjornlund et al., 2020; Ncube, 2018; Ahmad, 2020; Venkatesh et al., 2017; Atayi et al., 2021)	45.16
		• Institutions of Research and development	1	(Martin, 2019)	3.2
		• Efficient management	9	(Ahmad, 2020; Shehrawat, 2006; Adaku et al., 2018; Panda, 2015; Osei-Amponsah, 2020)	16.12
		• Natural disasters and weather conditions	1	(Ahmed et al., 2014)	3.2
		• Supply chain constraints e.g road infrastructure and technology utilization	8	(Sanida et al., 2016; Martin, 2019; Mashimba & Kühl, 2014; De Vries et al., 2015; Ahmad, 2020; Venkatesh et al., 2017)	19.3
		• Labor force and skill development	11	(Ahmed et al., 2014; Shehrawat, 2006; Panda, 2015; Osei-Amponsah, 2020; Bjornlund et al., 2020)	3.2
		• Access to capital	10	(Shehrawat, 2006; Dao, 2016; Mashimba & Kühl, 2014; Breisinger et al., 2009; Munyi, 2020; Thindisa & Urban, 2018)	19.3
		• Energy (power) supply	3	(Ahmed et al., 2014; Osei-Amponsah, 2020)	6.4
		• The formal nature of the Agro-processing value chain	1	(Ncube, 2018)	3.2
		• Geographical impact	4	(Dao, 2016; Kodama, 2017)	6.4
		• Access to a competitive, open market, including regional free trade area	39	(Wattanapruttipaisan, 2003; Ahmed et al., 2014; Shehrawat, 2006; Sanida et al., 2016; Shifa, 2015; Klasen et al., 2021; Martin, 2019; Panda, 2015; Ruslan, 2018; Hawkes, 2005; Watanabe et al., 2009; Mashimba & Kühl, 2014; Rae & Josling, 2003; Osei-Amponsah, 2020; Breisinger et al., 2009; De Vries et al., 2015; Ahmad, 2020; Venkatesh et al., 2017)	54.8
		• Product quality, branding, and marketing	4	(Shehrawat, 2006; Panda, 2015; Ruslan, 2018; Osei-Amponsah, 2020)	12.9
		• Structure and process in managing agro-processing business	6	(Adaku et al., 2018; Bjornlund et al., 2020)	3.2
		• Availability of ecological land for agricultural production	4	(Kodama, 2017; Breisinger et al., 2009; Bjornlund et al., 2020)	9.6
		Exogenous factors:			
		• International organizations like the International Monetary Fund (IMF)	4	(Bjornlund et al., 2020)	3.2
		• Foreign Direct Investment (FDI)	6	(Wattanapruttipaisan, 2003; Hawkes, 2005; Bjornlund et al., 2020; Munyi, 2020)	12.9
		• Access International market and Trade areas	7	(Sanida et al., 2016; Wattanapruttipaisan, 2003; Shifa, 2015; Klasen et al., 2021; Rae & Josling, 2003)	16.12

Analytical themes	Addressing the Research Question (RQ)	Focus area	# or density of Supporting quotes	Specific articles	% of the 31 articles impacted
Theme 2: Governments should focus on smart economic policies, regulations, and funding mechanism that accelerates agro-processing/manufacturing industrialization	Merger and cooperation of small and medium scale enterprises.	Promoting a policy-driven business environment that enables easy funding of agro-processing	47	(Shehrawat, 2006; Dao, 2016; Mashimba & Kühl, 2014; Breisinger et al., 2009; Munyi, 2020; Thindisa & Urban, 2018; Wattanapruttipaisan, 2003; Osei-Amponsah, 2020; Munyi, 2020; Mashimba & Kühl, 2014; Adaku et al., 2018; Sanida et al., 2016; Trusova et al., 2019; Rae & Josling, 2003; Bjornlund et al., 2020; Ncube, 2018; Ahmad, 2020; Venkatesh et al., 2017; Atayi et al., 2021)	54.8
Theme 3: Merger and cooperation of small and medium scale industries expands the agro-processing sector and accelerates industrialization	Expansion of the agro-processing industries expands manufacturing value add.	Scaling and expansion of agro-processing industries through merger and cooperation of small and medium scale business	2	(Mashimba & Kühl, 2014; Venkatesh et al., 2017)	3.2
Theme 4: Increased agricultural productivity causes continuous growth in agro-processing/manufacturing	continuous growth in the agro-processing sector	Sustained Agricultural productivity ensures continuous growth in the agro-processing sector.	33	(Shifa, 2015; Breisinger et al., 2009; Bjornlund et al., 2020; Atayi et al., 2021; Dorosh & Thurlow, 2018; Sanida et al., 2016; Abid Sultan & Deepak, 2017; Panda, 2015; Watanabe et al., 2009; Mashimba & Kühl, 2014; Rae & Josling, 2003; Breisinger et al., 2009; Munyi, 2020; De Vries et al., 2015; Caselli & Coleman II, 2001; Thindisa & Urban, 2018; Venkatesh et al., 2017; Atayi et al., 2021)	54.8
Theme 5: Increased and continuous access to international trading markets and demand-driven exports of agro-manufactured boosts economic growth	Economic growth (GDP growth)	International trade and exports of agro-based manufactured products	11	(Dao, 2016; Kodama, 2017; Klasen et al., 2021; Hawkes, 2005; Sanida et al., 2016; Wattanapruttipaisan, 2003; Shifa, 2015; Rae & Josling, 2003)	3.2
Theme 6: Enhancement of local value chain mechanisms through policy, efficient management, branding, and packaging of agro-processed/manufactured products can boost economic growth.	Economic growth	Favorable economic policies, efficient management agro-processing firms, packaging, branding, and marketing of agro-manufactured products	22	(Wattanapruttipaisan, 2003; Shehrawat, 2006; Adaku et al., 2018; Sanida et al., 2016; Trusova et al., 2019; Mashimba & Kühl, 2014; Rae & Josling, 2003; Osei-Amponsah, 2020; Breisinger et al., 2009; Bjornlund et al., 2020; Ncube, 2018; Ahmad, 2020; Venkatesh et al., 2017; Atayi et al., 2021; Panda, 2015; Ruslan, 2018)	48.38
Theme 7: Access to foreign direct investment and government funding to the agro-industrial sector is an economic development accelerator	Economic growth and structural transformation	FDI can directly accelerate funding of the agro-industrial complex	20	(Shehrawat, 2006; Dao, 2016; Mashimba & Kühl, 2014; Breisinger et al., 2009; Munyi, 2020; Thindisa & Urban, 2018; Bjornlund et al., 2020; Wattanapruttipaisan, 2003; Hawkes, 2005; Munyi, 2020)	32.25

Appendix H: Comparison of Ghana and other Advanced and Developed Countries

Category	Growth factors	The situation in developing countries like Ghana	The developed and emerging economies
Endogenous factors	Knowledge management	This study found that small and medium-scale agro-processing companies often lack or do not adequately enforce informal and context-specific approaches to learning and learning-by-doing techniques. There are often few or limited research institutions for knowledge development and management. Continuous human capital development through skill training and capacity building are at their low ends. Knowledge development, though the robustness is often questionable, occurs at a few universities and research institutions such as the CSIR, Cocoa Research Institute (CRIG), and the Ministry of Food and Agriculture (MOFA). Knowledge management leads to improvement in organizational efficiency (Njuguna & Wanjohi, 2021; Osei-Amponsah, 2020; Bjornlund et al., 2020; Thindisa & Urban, 2018; Rae & Josling, 2003; Tandoh-Offin, 2011)	According to Mckinsey survey report, executives from 40 companies in Europe, Japan, and United States believed that knowledge management began with building sophisticated information technology systems and linking all the information together to create models/strategies that, for example, increases profitability through the process, products, and customer relationship improvements (Hauschild et al., 2001). Agro-processing companies may have to avoid a top-down approach to knowledge sharing and embrace knowledge pull from employees to build winning strategies. Europeans encourage and fund cross-national networking in research (Boonekamp et al., 1998). Small holder agro-business need to invest in training to increase the knowledge base of the organization (Melembe et al., 2021)
	Technology and innovation capability	This study asserted the need for investment in technology and innovation hubs formulated on a bedrock of sound and favorable economic policies that promote agro-processing entrepreneurship. Asare & Essegbey (2016) confirmed and recommended the commercialization of technology development, innovation capability, and government investment. There is a need to move away from only niche-specific and internet-based knowledge acquisition to a more formal and institutional capacity building founded on a bedrock of deliberate and effective technology utilization (Ahmed et al., 2014;Adaku et al., 2018; Sanida et al., 2016;Abid Sultan & Deepak, 2017; (Dao, 2016;Shehrawat, 2006;Panda, 2015;Ruslan, 2018;Manonmani, 2015;Rae & Josling, 2003, Osei-Amponsah, 2020, De Vries et al., 2015, Ahmad, 2020).	China in the mid-1980s invested heavily in advanced technologies and innovation in most of its agro-processing enterprises, leading to its scaling and competitiveness in the market (OECD, 2000).
	Collaboration and coordination	Ghana to create a business-friendly environment that encourages collaboration and coordination between especially small and medium scale agro-enterprises on products, markets, etc. (Osei-Amponsah, 2020) (Munyi, 2020). The dying process to agro-industrial growth and capability advancement to be encouraged	International networking and collaborative efforts among firms are encouraged, as well as among research centers and organizations (Boonekamp et al., 1998). Considering that small firms are more similar than different in many countries, developed nations understand the die process of networking and how activities and their effectiveness contribute to enterprise growth and die thickening of die industrial base – a dynamic that can be replicated in developing countries (Mcdade & Malecki, 2008).

Category	Growth factors	The situation in developing countries like Ghana	The developed and emerging economies
	Favorable policies for agro-processing	Ghana to formulate sound economic policies that encourage entrepreneurship in the agro-processing sector, provide access to local and internal markets/trading agencies, encourage innovation and technology capability, foster better cooperation between organizations in the agro-manufacturing sector, access to regional free trade area, enable and encourage a technology-driven agro-processing value chain, and build supply chain infrastructure (like roads) that transports agricultural raw materials, provide robust financial systems and structures for agro-processing companies obtain credit, etc. One of the long-awaited policies is the 'One district one factory policy which aims at creating jobs, bridging income gaps, and boosting economic growth which would mean attracting more foreign investors (Mensah et al., 2021; Wattanapruttipaisan, 2003; Shehrawat, 2006; Adaku et al., 2018; Sanida et al., 2016; Trusova et al., 2019; Mashimba & Kühl, 2014; Rae & Josling, 2003; Osei-Amponsah, 2020; Breisinger et al., 2009; Bjornlund et al., 2020; Ncube, 2018; Ahmad, 2020); Venkatesh et al., 2017; Atayi et al., 2021)	Policies in advanced economies, like China, do not only emphasize agro-processing production output but the quality of processing and products as well (OECD, 2000). Some of the policies are focused on collaborative research across various academic and industrial institutions organizations (Boonekamp et al., 1998). According to Norman & Stiglitz (2017), diffusion policies facilitate dynamic efficiency, especially, those that encourage and push for innovation and technological advancement across the industrial complex is promoted.
	Institutions of Research and development	This study confirms that developing countries, like Ghana, have a large share of food production in their GDP and but it invests less in R&D institutions. Agricultural research and development contribute to economic growth and development. Agricultural R&D, for example, increased since 2002 but not all the institutions experienced even growth, with some losing researchers in 2008 and yet to recover. Most of those research institutions (including the Council for Scientific and Industrial Research (CSIR) and Research Institute of Ghana (CRIG)) are either funded by the government or other donor and loan-funded projects, though there was legislation for R&D facilities to derive 30 percent of funding from private institutions. The funding, the number, and robustness of R&D in Ghana are limiting factors. Asare & Essegbey (2016) confirmed decline in capital investment in R&D 6.7% in 2000 to 0.1% in 2011. Vanlauwe et al. (2013) also confirmed one of the problems of countries in sub-Saharan Africa, including Ghana, is a lack of technical skills and the right policy initiatives in research and development.	Advanced countries ensure increased advocacy for research and development in many institutions (Augusto, 2000), which includes agro-processing industries. Countries like Japan, those in Europe, and the United States apply FDI to building new R&D infrastructures and explore firm-specific advantages that lead to economic growth and development (Kuemmerle,1999).
	Efficient management	This study found that the lack of efficient management leaves the agro-processing industry unsustained, undeveloped, and largely small-scale. The small and medium-scale agro-processing firms lack efficient management and the training to sustain the business. Abor & Quartey (2010) confirmed that one of the constraints of, especially, small and medium-scale firms in Ghana is inefficient management, processes, and training. Government support in, for example, training small and medium scale agro-business owners (who form 90% of market share and about 85% of manufacturing employment) on efficient food safety management mechanisms may have a grave impact on agro-processing industries performance (Brako Ntiamoah et al., 2016)	Efficient management is critical to ensuring value extraction from agro-processing value chain processing. Ajila et al. (2012) confirmed that efficient management practices ensured that ~44% of solid waste is recycled in developed countries. According to Santacoloma et al.(2009) at the Food and Agriculture Organization (FAO) of the United Nations, Hazard Analysis Critical Control Point (HACCP) system is an example of an efficient management mechanism that developed nations use for efficient food safety
	Natural disasters and weather conditions	This study asserts that the agro-processing or manufacturing sector in Ghana, like in other developing countries, can be faced with uncertain and natural disasters and weather conditions. The growth of what types of crops is also a function of the climatic conditions (Chemura et al., 2020). Agriculture provides a source of raw materials for the agro-processing industry. According to the food and Agricultural Organization of the United Nations, least developed countries like Ghana are most impacted by natural disasters and weather conditions, thereby slowing down the agricultural raw material feed to the agro-processing sector of the economy (FAO, 2021). Most natural disaster management systems and institutions are centralized and government-controlled, not well funded, and have no direct impact on agro-processing businesses recover from natural disasters (Enete & Amusa, 2010)	Most institutions for natural disaster management in industrialized countries are well funded and mostly owned by the private sector, which has a direct impact on agro-processing industries. Japan, for instance, uses a bottom-top management system where 13 national research institutes are connected with 255 prefectural research institutes who have direct links with agribusiness without influence by national officers, allowing the direct touch and accountability to agro-businesses impacted in case of natural disasters (Enete & Amusa, 2010)
	Supply chain constraints e.g., road infrastructure and technology utilization	Agricultural production in Ghana is mostly small and medium scale. Transportation of raw materials from farms to agro-processing industries is limited by poor supply chain networks and road infrastructure, as confirmed by (Johnson et al., 2015). This often leads to a supply deficit that deprives the agro-processing sector to collapse. Yow (2002) confirmed the need to encourage information flow through technology-driven vertical and horizontal exchanges in Ghana, especially towards accessing the markets. Supply chain networks are also encouraged for especially small-scale enterprises to allow the benefits of economies of scale (Gachora et al., 2014).	Developed nations, like the United States, Japan, etc. ensures coordination between all supply chain partners to give way for economic growth (Ojo et al., 2018). The road infrastructure in developed countries is well developed to allow for continuous and uninterrupted competitive economic activities though the occupation of land for road transport development is occurring at a pace that is a direct threat to other economic factors like food, and tourism (Prus & Sikora, 2021). Transport policy is an accelerator of sustainable economic growth and development through road infrastructural development.
	Labor force and skill development	Agro-processing and manufacturing industries should invest in continuous technical efficiency and technology know-how of their labor force. Training is confirmed to be essential to labor force skill development especially for small and medium agro-processing enterprises (Johnson et al., 2015; Melembe et al., 2021).	Developed countries, like Japan, etc., use specialized agencies of the United Nations that promote industrial and skill development, The UNIDO-Japan-UNIDO encouraged the member states to identify and apply sustainable solutions to industrial skills development by strategically partnering with private, public, and development partners. United States has the beginning farmer and rancher development program that provides grants to educate and train new agro-business owners on legal, business management, production, etc. (U.S Department of Agriculture, n.d.)
	Access to capital	This study asserts that small and medium scale agro-industries require access to operational capital and credit to help in technology and innovation capability building and scaling	The United States, for example, has favorable policies like the recent Farm Storage Facility Loan (FSFL) for food storage and related equipment. The United States also launched the microloan program which allowed small and medium scale farmers to access loans up to $35,000 after completion of a simple application process (U.S Department of Agriculture, n.d.)
	Energy (power) supply	The agro-processing sector utilizes a lot of power-driven machines. A reliable power supply is a requirement for continuous operation and agro-business performance. Adarkwah & Nyanzu (2016) also confirmed that power supply interruptions are a problem that affects the performance of small and medium scale enterprises, not limited to agro-processing industries. Mehetre (2010) also confirmed that unreliable power supply is one of many challenges faced by the agro-processing sector.	Developed countries are investing in alternate and renewable sources of energy for various industries. The United States has various policy strategies that focus on, for example, modernizing rural electric infrastructure (where agricultural production is massive) (U.S Department of Agriculture, n.d.)
	The formal nature of the Agro-processing value chain	Formalization of the structures within the agro-processing value chain is a key growth factor.	Economic and social upgrades caused by agro-industrialization requires a form of formalization of all value chain processes (Pasquali et al., 2021)
	Geographical impact	Ghana, a developing country, in sub-Saharan Africa is located in ecological geography that allows agricultural production. This can quickly become a disadvantage and delay the timing for manufacturing growth if deliberate and formal approaches are not adopted. There is a need for deliberate plans about the timing, geography, and growth of the agro-industry.	The geographical location of the agro-processing cluster improved the performance of agro-processing firms. The geographical dispersion of agro-processing firms has an impact on the market performance (Huang & Xiong, 2018)

Category	Growth factors	The situation in developing countries like Ghana	The developed and emerging economies
	Access to a competitive, open market, including regional free trade area	Easy access to an open, even, and competitive marketplace allows agro-processing industries to thrive and drives the sustained sale of agro-manufactured products.	Advanced economies like the United States is open for open markets, serve as a catalyst of wider trade agreements, support domestic market-oriented reformers, and strengthen strategic partnerships, etc. (Huang & Xiong, 2018)
	Product quality, branding, and marketing	All Agro-processing businesses in all developing countries, including Ghana, either small, medium, and large-scale enterprises, to invest in competitive product quality, enhanced and technology-driven marketing and branding strategies that drive sales and relevance in the marketplace.	Japan leads the way in the global market with high-technology and innovative products while United States industries are known for breakthrough research (Huang & Xiong, 2018)
	Structure and process in managing the agro-processing business	Properly managing a successful agro-processing firm, especially small and medium scale, requires the institution of formal operational structure and process, including project management techniques and the continuation of project teams.	The United States, like other developed countries, ensures good business process engineering with proper project and management practices born on knowledge, information technology capabilities. (Njuguna & Wanjohi, 2021)
	Availability of ecological or arable land for agricultural production	The growth factor for sustained agricultural production is Land. Continuous agricultural production serves raw materials to the agro-manufacturing sector. The lack of land access is a limiting factor to sustainable agro-processing and increased manufacturing value-add	Developing and emerging economies are invested in arable lands. The United States is the world's largest economy in arable land area and is closely followed by India and China. China since the 1990s has become the largest country in the area of permanent crops, an agricultural area, followed by Australia, the United States, and India which allows agro-processing (Zhang & Liu, 2017).
Exogenous factors	International organizations like the International Monetary Fund (IMF)	It is important for developing countries, like Ghana, to be careful in their partnership with external agencies like the IMF. It is critical to minimize external control and manipulation while promoting internal and organic growth by leveraging relevant internal (or local) institutions.	United States is the largest shareholder of the IMF. A borrowing country voting pattern in UN general assembly makes a huge impact. Countries who visited with the United States received fewer conditions. Otherwise, it would receive loans with more conditions (Dreher & Jensen, 2007). Developed countries do not suffer the consequences of inequality that IMF borrowing inflicts on its citizenry, coupled with the constraints of distributional preferences in that country (Lang, 2020)
	Foreign Direct Investment (FDI)	This study proves that FDI could help accelerate infrastructural development agro-based industrialization. It can help agro-processing industries find leverage and gain power for efficient and unlimited marketing and distribution of agro-manufacture products. Also, Abor et al. (2008) confirmed that FDI can help Ghana to explore and promote its export performance of products, which would include agro-manufactured products. Hence policy initiatives are encouraged to allow of easy inflow FDIs into the country. Ghana's 'One District One Factory' policy is strategic to pull in FDI for economic and structural development (Mensah et al., 2021)	Kuemmerle (1999) concluded that firms in advanced countries like Japan, Europe, and the United States use FDI to build new or explore firm-specific advantages in R&D and associated infrastructure. This exploration will not be limited to agro-manufactured firms and products.
	Access to international markets, trade, and export opportunities	International trade and export opportunities agreement to market and sell agro-processed/manufactured products. Economies that are more open to trade allow growth in agricultural production, which easily translates to agro-processing and manufacturing growth. Trades in most, if not all, agro-processed foods occur in developed countries and are dominated by a few multinational firms (Asokan & Singh, 2003). The free trade area is an important strategic asset for developing countries. China, the largest developing economy, has free trade arrangements with ASEAN - countries (Cambodia, Laos, Myanmar, and Vietnam)(Wattanapruttipaisan, 2003). Likewise, Ghana has recently joined the AfCFTA (African Continental Free Trade Area), the largest trade organization in history, to allow trade partnerships with its fellow African countries and international markets in agricultural and related agro-processed or manufactured products. Ghana, through the trade and investment framework agreement (NITA) with the United States, is the 83rd largest goods trading partner of the United States, exporting agricultural and agro-processed products with leading categories such as cocoa beans, cocoa paste & cocoa butter, rubber & allied products, fresh vegetables ($13 million), and other vegetable oils, to the United States (United States Trade Representative, n.d.). More of such strategic partnerships are to be encouraged.	Developed countries, like the United States, typically dictate the exacting standards of quality for agro-processed products from developing countries, an implication that developing countries need to establish lasting relationships with developed countries (Asokan & Singh, 2003). Developed countries are aligned to making arrangements for Free Trade policies (Feinberg, 2003). According to the Office of the United States Trade Representative (n.d.), the United States has free trade arrangement with about 20 countries namely Australia, Bahrain, Canada, Chile, Colombia, Costa Rica, Dominican, Republic, El Salvador, Guatemala, Honduras, Israel, Jordan, Korea, Mexico, Morocco, Nicaragua, Oman, Panama, Peru, Singapore, and the US-Mexico Canada agreement.