The Role of Global Agrifood Value Chain Participation and Position on Industrialization in Africa[1]

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Abstract

This paper examines how participation in global agrifood value chains (GAVCs) relates to industrialization in Africa, while also considering how a country's position within these value chains shapes industrial outcomes. Industrialization is measured using industry, manufacturing, and service value added as shares of Gross Domestic Product, alongside employment indicators in industry and services, including gender-disaggregated employment shares. GAVC participation indicators are constructed from the EORA multi-region input–output (EORA-MRIO) tables, while value chain position is captured using a downstreamness indicator. Using a two-way fixed effects estimator and a Bartik shift-share instrumental variable approach, the results show that overall GAVC participation is negatively associated with industry value added but positively related to service value added. Forward participation is positively linked to industry value added, while backward participation is associated with higher service value added. GAVC participation also increases industrial employment but reduces male employment, highlighting the complex role of agrifood value chains in Africa's structural transformation..

Keywords: Agrifood; Trade; Global value chains; Industrialization; Employment
JEL Codes: C33; C55; Q17; Q18; Q27

1. Introduction

Global value chains (GVCs) have become a defining feature of modern production systems, shaping how countries specialize and participate in international trade through increasingly fragmented production processes (World Bank, 2020). This fragmentation allows countries to specialize in specific stages of production rather than entire industries, deepening the global division of labor and transforming patterns of economic development. These dynamics are particularly evident within agriculture and food systems, where global agrifood value chains (GAVCs) have reshaped production, processing, and distribution structures across the world (Barrett et al., 2022).

Participation in GAVCs has been associated with several economic and development outcomes. For example, engagement in agrifood value chains has been linked to improvements in agricultural productivity, including higher agricultural value added per worker (Montalbano and Nenci, 2022). It has also been associated with improvements in food availability and dietary energy consumption (Tabe-Ojong et al., 2024). At the same time, participation in globalized food systems may generate unintended consequences for nutrition and health. Increased access to processed and ultra-processed foods through global supply chains has been connected to rising rates of overweight and obesity alongside persistent undernourishment (Hashad et al., 2024; Tabe-Ojong et al., 2024). Beyond food and nutrition outcomes, GAVCs also influence broader economic transformation. By connecting domestic producers to

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international markets, they may stimulate growth, create employment opportunities, and facilitate structural change (Lim, 2021; Lim and Kim, 2022; Nana and Tabe-Ojong, 2025). However, despite this growing literature, the relationship between GAVC participation and industrialization remains unclear. While value chains may support economic upgrading and diversification, they may also lock countries into lower value-added activities or shift economic activity toward services rather than manufacturing (Alessandria et al., 2021).

Another dimension that remains underexplored concerns countries' positions within value chains. Participation alone does not fully capture how countries engage in global production networks. A country may participate primarily in upstream activities such as primary production, or in downstream activities such as processing, distribution, or retail. These differences in position can significantly influence the economic benefits derived from value chain participation. Measures such as upstreamness and downstreamness capture the distance between production stages and final consumption, offering insight into where countries sit within global production structures (Antràs et al., 2012; Fally et al., 2012; Mancini et al., 2024).

This paper contributes to the literature by examining how both participation in and positioning within global agrifood value chains relate to industrialization outcomes in Africa. Industrialization is measured through several indicators capturing both structural and labor market dimensions: industry value added as a share of GDP, manufacturing value added as a share of GDP, and service value added as a share of GDP. In addition, employment-based indicators are used to assess structural transformation in labor markets, including employment shares in industry and services as well as gender-specific employment patterns.

By combining cross-country data on value chain participation with measures of industrial and employment outcomes, the study provides new evidence on whether GAVCs contribute to or hinder industrial development in African economies. Understanding these dynamics is particularly important given the growing role of agrifood systems in African development strategies and the increasing integration of African economies into global production networks.

2. Data

The analysis relies on several international data sources. Measures of industrialization and employment are drawn from the World Development Indicators (WDI) database of the World Bank. These indicators include industry value added as a share of GDP, manufacturing value added as a share of GDP, and service value added as a share of GDP. To capture labor market dimensions of structural change, the study also includes industrial and service employment shares, along with gender-disaggregated employment measures.

Indicators of participation in global agrifood value chains are derived from the EORA multi-region input–output (EORA-MRIO) tables. These data allow the construction of value chain participation measures that capture both forward and backward linkages following the methodology developed by Koopman et al. (2014) and Borin and Mancini (2019). Forward participation measures the domestic value added that is embodied in other countries' exports, while backward participation captures the extent to which a country relies on imported inputs in its exports.

To examine countries' positions within value chains, the analysis uses indicators developed by Mancini et al. (2024). These indicators build on the concepts of upstreamness and downstreamness. Upstreamness measures how far a sector's output is from final consumption, while downstreamness reflects the degree to which production relies on intermediate inputs rather than primary production factors (Antràs et al., 2012; Fally et al., 2012; Mancini et al., 2024). Because upstreamness and downstreamness capture similar dimensions of value chain

position, the empirical analysis focuses on downstreamness as the primary positioning indicator.

Together, these datasets enable the construction of a panel dataset covering African countries across multiple years. This dataset allows the analysis to explore how variations in value chain participation and position are associated with differences in industrial structure and employment patterns.

3. Empirical strategy

We are interested in understanding the association between the participation and position of GAVCs and various aspects of industrialization and employment. As we have a long panel of countries over time, we exploit the nature of the dataset to estimate two-way fixed effect regressions of the form:

$$Y_{ct} = \beta_1 + \boldsymbol{\beta_2 GAVC_{ct}} + \boldsymbol{\beta_3 X_{ct}} + c_c + t_t + \varepsilon_{ct} \quad (1)$$

Where Y_{ct} refers to our measures of industrialization as earlier highlighted for country c in time t. $GAVC_{ct}$ refers to our measures of GAVC participation (including forward and backward participation) and position (downstreamness). Its parameter estimate (β_2) represents our key interest in the paper which is the association between GAVC and industrialization. X_{ct} refers to a battery of controls which we add to the empirical model to reduce the pathways through which GAVCs may be associated with industrialization. Some of these controls are foreign direct investments, unemployment, fertilizer use, labour force participation, arable land, population density, free trade agreement, currency union, food production, tree cover, average temperature and average rainfall. Since we are estimating a two-way effects model, c_c refers to country fixed effects while t_t represents time fixed effects. ε_{ct} is the error term. Including country fixed effects helps address issues of time-invariant unobserved heterogeneity that might be linked to industrialization. These factors could encompass time-invariant technological variations across countries, aspects of absolute and relative convergence, labor market and other institutional differences, structural differences in trade policy, and other possible time-invariant differences or confounders (Montalbano and Nenci, 2022). Moreover, the time fixed effects could account for global trends such as technological innovations and shifts in the international business landscape.

So far, we have been able to address one of the three sources of endogeneity – time invariant unobserved heterogeneity. We are left with two others – reverse causality and measurement error. It is hard to refute the existence of reverse causality as industrialization may drive GAVCs participation. Moreover, the desire for countries to industrialize may push them to engage in production networks. To address this issue, we rely on the Bartik shift share IV approach (Bartik, 1991; Goldsmith-Pinkham et al., 2020). For measurement error, it remains hard to argue about the data generating process since these are secondary data sources. However, we relied on data from reputable databases that have been extensively used in the literature. In any case, there is evidence indicating that IV estimation can effectively address measurement error caused by endogenous regressors, especially within a standard linear framework (Aldrich, 1993; Pancost and Schaller, 2021).

Our analysis is well suited to the Bartik shift-share approach because we use sectoral GAVC data for agriculture and the food and beverage sectors, from which shares can be constructed. This approach has also been applied in related studies (Lim and Kim, 2022; Dalheimer et al., 2023; Tabe-Ojong et al., 2024), while Goldsmith-Pinkham et al. (2020) provide a detailed discussion of the instrumental variable framework. Our instrument is a shift-share measure where the shift represents the sum of a country's sectoral participation in the agrifood sector,

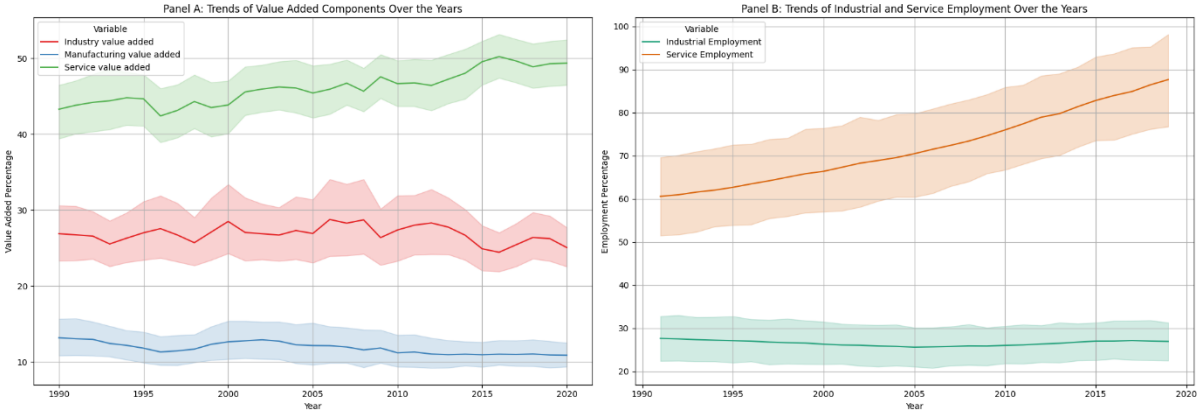
and the share captures the sectoral contribution of each country within the GAVC. As with any IV strategy, we consider relevance, exogeneity, and the exclusion restriction. Relevance is evaluated through the relationship between initial exposure of agrifood sub-sectors to global shocks and subsequent changes in GAVC participation. The initial sectoral distribution is likely driven by natural endowments and geographic conditions, making it plausibly exogenous to industrialization. We also perform a robustness check using the Lewbel IV approach (Lewbel, 2012).

4. Results

4.1Descriptive insights

Figure 1 depicts the evolution of five key industrialization outcomes over time. Notably, there is a clear upward trajectory in service value added as a share of GDP, signaling its growing importance in the overall economy**.**

Figure 1: Visualizing trends in outcome variables over time



Notes: Figure 1 illustrates the temporal trends in key outcome variables related to industrialization. The shaded region surrounding each line represents the 95% confidence interval, providing a visual measure of the variability or certainty around the annual means. Wider bands indicate greater uncertainty or fluctuations in the data, while narrower bands suggest more consistent trends over time.

Figure 2: Gender disaggregated employment shares in industry and service sectors

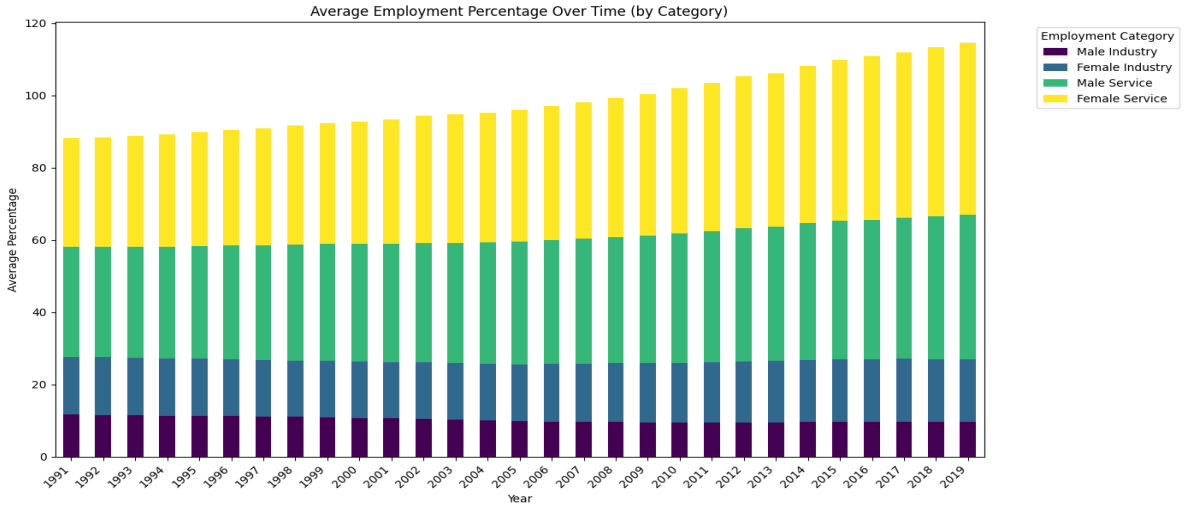
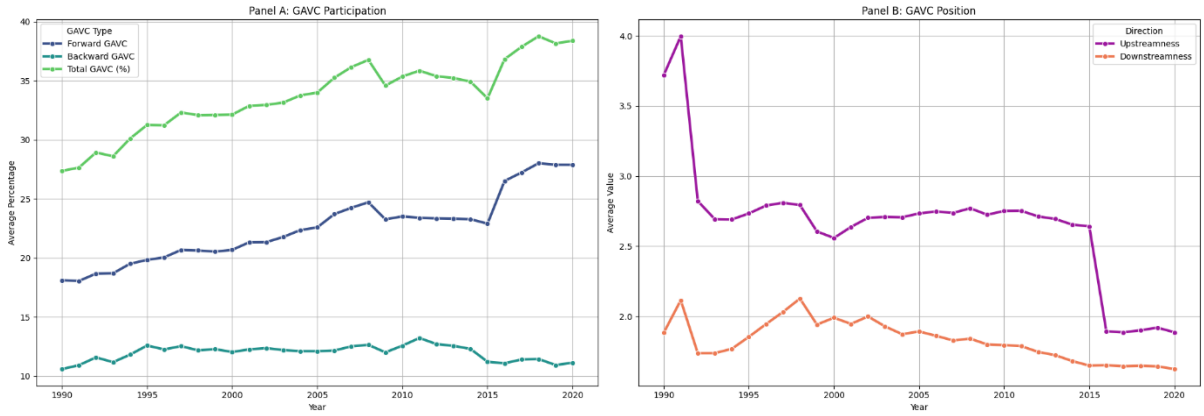


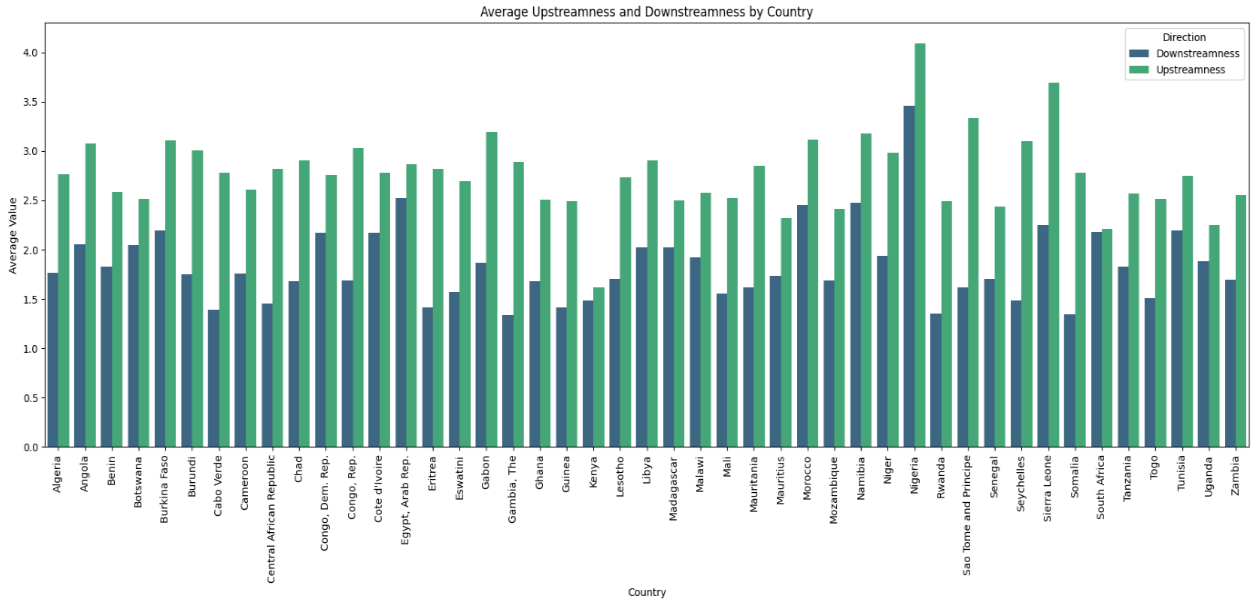
Figure 3: GAVC participation and position over time



Notes: Figure 2 illustrates the temporal trends in key outcome variables related to industrialization. The shaded region surrounding each line represents the 95% confidence interval, providing a visual measure of the variability or certainty around the annual means. Wider bands indicate greater uncertainty or fluctuations in the data, while narrower bands suggest more consistent trends over time.

Altogether, these findings from Figure 3 underscore important structural shifts: as countries deepen their participation in GAVCs, not only does their economic involvement grow in scale, but their roles within value chains also evolve. This increasing integration may have significant implications for patterns of industrialization, employment, and broader economic transformation, setting the stage for further analysis of the complex interplay between GAVC participation, positioning, and industrialization.

Figure 4: Upstreamness and downstreamness for various African countries



4.1 GAVC Participation and Industrial Structure

The empirical results reveal a negative association between overall participation in global agrifood value chains and the share of industry value added in GDP. In other words, greater integration into GAVCs appears to be linked to lower industrial shares in African economies.

This finding suggests that participation in agrifood value chains may not necessarily support industrial expansion in the traditional sense.

Table 1: Global agrifood value chains and industry value added

	(OLS) Industry value added	(OLS) Industry value added	(OLS) Industry value added	(IV) Industry value added
Agrifood GVC (%)	-0.226***			-0.674***
	(0.054)			(0.244)
Forward GAVC		0.131*		
		(0.070)		
Backward GAVC			-0.284***	
			(0.061)	
Constant	145.615*	118.381	145.116*	189.304**
	(76.341)	(76.878)	(76.104)	(82.855)
Observations	880	880	880	880
R-squared	0.193	0.179	0.197	
Number of countries	35	35	35	35
Agriculture controls	Yes	Yes	Yes	Yes
Economic controls	Yes	Yes	Yes	Yes
Demography controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes

Notes: All models are estimated with additional controls such as foreign direct investments, unemployment, fertilizer use, labour force participation, arable land, population density, free trade agreement, currency union, food production, tree cover, average temperature and average rainfall. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Full results are in the supplementary material.

Table 2: Global agrifood value chains and manufacturing value added

	(1) Manufacturing value added	(2) Manufacturing value added	(3) Manufacturing value added	(4) Manufacturing value added
Agrifood GVC (%)	-0.064**			0.048
	(0.032)			(0.132)
Forward GAVC		-0.197***		
		(0.041)		
Backward GAVC			-0.049	
			(0.036)	
Constant	51.478	53.444	48.954	40.572
	(45.091)	(44.488)	(45.129)	(47.149)
Observations	856	856	856	856
R-squared	0.237	0.255	0.235	
Number of countries	35	35	35	35
Agriculture controls	Yes	Yes	Yes	Yes
Economic controls	Yes	Yes	Yes	Yes
Demography controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes

Notes: All models are estimated with additional controls such as foreign direct investments, unemployment, fertilizer use, labour force participation, arable land, population density, free trade agreement, currency union, food production, tree cover, average temperature and average rainfall. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Full results are in the supplementary material.

In contrast, participation in GAVCs is positively associated with the share of service value added in GDP. This pattern suggests that value chain integration may stimulate service-related activities such as logistics, distribution, marketing, and other support services linked to agrifood production and trade.

Table 3: Global agrifood value chains and service value added

	(1) Service value added	(2) Service value added	(3) Service value added	(4) Service value added
Agrifood GVC (%)	0.223***			1.786***
	(0.066)			(0.559)
Forward GAVC		-0.002		
		(0.082)		
Backward GAVC			0.320***	
			(0.070)	
Constant	9.067	20.960	8.109	-74.012**
	(15.934)	(15.676)	(15.707)	(36.003)
Observations	861	861	861	861
R-squared	0.180	0.168	0.189	
Number of countries	34	34	34	34
Agriculture controls	Yes	Yes	Yes	Yes
Economic controls	Yes	Yes	Yes	Yes
Demography controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes

Notes: All models are estimated with additional controls such as foreign direct investments, unemployment, fertilizer use, labour force participation, arable land, population density, free trade agreement, currency union, food production, tree cover, average temperature and average rainfall. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Full results are in the supplementary material.

When distinguishing between forward and backward participation, more nuanced patterns emerge. Forward participation—where domestic value added is embedded in other countries' exports—shows a positive relationship with the industry share of GDP. Backward participation, however, appears to be negatively associated with industry value added. These results indicate that the direction of value chain linkages plays an important role in shaping structural outcomes.

Further analysis reveals additional sectoral dynamics. Participation in forward GAVCs is associated with reductions in manufacturing value added, suggesting that countries engaged in upstream agrifood activities may not experience strong manufacturing growth. Conversely, backward participation is associated with increases in service value added, reinforcing the idea that integration into global supply chains may stimulate service sector expansion.

4.2 Employment Effects

The analysis also examines how value chain participation influences employment patterns. The results indicate that participation in GAVCs is associated with increases in industrial

employment. However, no statistically significant relationship is found between GAVC participation and service employment.

Table 4: Global agrifood value chains and industrial employment

	(1) Industrial Employment	(2) Industrial Employment	(3) Industrial Employment	(4) Industrial Employment
Agrifood GVC (%)	-0.046**			-0.104**
	(0.022)			(0.052)
Forward GAVC		0.003		
		(0.031)		
Backward GAVC			-0.129***	
			(0.026)	
Constant	26.043	21.911	31.064	31.065
	(32.838)	(32.895)	(32.460)	(33.228)
Observations	913	913	913	913
R-squared	0.350	0.346	0.364	
Number of countries	35	35	35	35
Agriculture controls	Yes	Yes	Yes	Yes
Economic controls	Yes	Yes	Yes	Yes
Demography controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes

Notes: All models are estimated with additional controls such as foreign direct investments, unemployment, fertilizer use, labour force participation, arable land, population density, free trade agreement, currency union, food production, tree cover, average temperature and average rainfall. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Full results are in the supplementary material.

Despite this overall increase in industrial employment, the effects differ across value chain linkages. Backward participation in GAVCs is associated with lower industrial employment and higher employment in service sectors. This suggests that reliance on imported inputs may shift labor demand toward service activities rather than industrial production.

Table 5: Global agrifood value chains and service employment

	(1) Service Employment	(2) Service Employment	(3) Service Employment	(4) Service Employment
Agrifood GVC (%)	0.081***			-0.079
	(0.029)			(0.070)
Forward GAVC		-0.115***		
		(0.041)		
Backward GAVC			0.230***	
			(0.035)	
Constant	8.110	19.647	-0.983	21.925
	(43.880)	(43.831)	(42.975)	(45.000)
Observations	913	913	913	913
R-squared	0.699	0.699	0.711	
Number of countries	35	35	35	35

Agriculture controls	Yes	Yes	Yes	Yes
Economic controls	Yes	Yes	Yes	Yes
Demography controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes

Notes: All models are estimated with additional controls such as foreign direct investments, unemployment, fertilizer use, labour force participation, arable land, population density, free trade agreement, currency union, food production, tree cover, average temperature and average rainfall. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Full results are in the supplementary material.

Gender-specific analysis reveals additional heterogeneity. Male employment in both industrial and service sectors shows a statistically significant negative relationship with GAVC participation. This finding suggests that the structural changes associated with value chain integration may disproportionately affect male employment patterns.

Table 6: Global agrifood value chains and service employment

	(1) Male industry	(2) Female industry	(3) Male Service	(4) Female Service
Agrifood GVC (%)	-0.275***	-0.023	-0.157**	0.077
	(0.063)	(0.055)	(0.069)	(0.082)
Constant	59.447	12.078	29.861	1.244
	(40.350)	(35.034)	(44.225)	(52.636)
Observations	913	913	913	913
Number of countries	35	35	35	35
Agriculture controls	Yes	Yes	Yes	Yes
Economic controls	Yes	Yes	Yes	Yes
Demography controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes

Notes: All models are estimated with additional controls such as foreign direct investments, unemployment, fertilizer use, labour force participation, arable land, population density, free trade agreement, currency union, food production, tree cover, average temperature and average rainfall. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Full results are in the supplementary material.

These gender-specific outcomes highlight the importance of considering labor market dynamics when evaluating the broader development implications of value chain participation.

4.3 Value Chain Position and Industrialization

Beyond participation, the position of countries within value chains also plays a significant role in shaping industrial outcomes. The downstreamness indicator shows a positive association with several industrialization measures. Countries positioned further downstream in GAVCs tend to exhibit higher shares of industry value added in GDP and higher shares of manufacturing value added.

Table 7: Agrifood position and Industrialization

	(1) Industry value added	(2) Manufacturing value added	(3) Service value added	(4) Industrial Employment	(5) Service Employment
Downstreamness	1.051**	0.481*	-0.921	0.318	0.458*
	(0.443)	(0.269)	(0.568)	(0.193)	(0.249)
Constant	109.524	55.813	47.352***	26.994	13.236

	(67.209)	(41.137)	(17.419)	(29.543)	(38.106)
Observations	756	734	737	809	809
R-squared	0.166	0.242	0.154	0.367	0.696
Number of Country	35	35	34	35	35
Agriculture controls	Yes	Yes	Yes	Yes	Yes
Economic controls	Yes	Yes	Yes	Yes	Yes
Demography controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes

Notes: All models are estimated with additional controls such as foreign direct investments, unemployment, fertilizer use, labour force participation, arable land, population density, free trade agreement, currency union, food production, tree cover, average temperature and average rainfall. Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Full results are in the supplementary material.

Downstream positioning is also positively related to service employment. This result suggests that countries located closer to final stages of production such as processing, packaging, and distribution may experience stronger employment growth in service activities linked to these stages. Overall, these findings emphasize that where countries sit within global value chains matters just as much as whether they participate. Downstream activities may provide greater opportunities for industrial upgrading and diversification compared to upstream roles focused on primary production.

5. Discussions

The results highlight the complex relationship between global agrifood value chains and structural transformation in African economies. While participation in GAVCs has been associated with economic growth and employment generation (Lim, 2021; Lim and Kim, 2022; Nana and Tabe-Ojong, 2025), the evidence presented here suggests that these benefits may not always translate into traditional forms of industrialization.

One possible explanation is that agrifood value chains allow countries to bypass manufacturing-led development pathways. Instead of transitioning from agriculture to manufacturing and then to services, some economies may move directly from agriculture toward service-oriented activities connected to global food systems. This pattern is consistent with arguments that developing economies may "leapfrog" manufacturing by expanding agricultural productivity and service sectors simultaneously (Herrendorf et al., 2013).

At the same time, value chain participation can generate positive employment effects in agriculture and services while reducing employment shares in industrial sectors (Lim, 2021; Lim and Kim, 2022; Nana and Tabe-Ojong, 2025). These dynamics may explain the observed shifts in employment patterns across sectors.

GAVCs also create opportunities for productivity gains and job creation, particularly in processed food sectors rather than raw commodity production (Lim and Kim, 2022). This distinction highlights the importance of upgrading within value chains. Countries that remain concentrated in primary production may capture fewer benefits than those that move into processing, packaging, and other downstream activities.

In addition, the literature highlights several broader implications of GAVCs for development outcomes. For instance, participation in agrifood value chains has been linked to improvements in agricultural productivity (Montalbano and Nenci, 2022) and changes in food prices and price volatility (Dalheimer et al., 2023). From a nutrition perspective, GAVCs have also been

associated with changes in dietary energy consumption and various forms of malnutrition (Hashad et al., 2024; Tabe-Ojong et al., 2024).

Taken together, these findings suggest that the developmental impacts of GAVCs are multifaceted. While they can support economic growth and integration into global markets, their implications for industrialization depend heavily on how countries engage with these value chains and where they position themselves within them.

6. Conclusion

This paper investigates the relationship between global agrifood value chain participation, value chain position, and industrialization in Africa. Using data from the EORA MRIO tables and the World Development Indicators, the analysis examines how participation and positioning in GAVCs are associated with structural transformation across African economies.

The results reveal several key patterns. First, overall participation in GAVCs is negatively associated with industry value added as a share of GDP but positively associated with service value added. Second, forward and backward participation exhibit different relationships with industrial outcomes, highlighting the importance of distinguishing between types of value chain linkages. Third, GAVC participation influences employment patterns, with increases in industrial employment but heterogeneous gender effects. Finally, countries positioned further downstream in value chains tend to experience stronger industrial and manufacturing outcomes.

These findings underscore the complexity of value chain dynamics in shaping development trajectories. Participation in global agrifood value chains does not automatically translate into industrialization, particularly when countries remain concentrated in upstream activities. Instead, the benefits of value chain integration appear to depend on upgrading within value chains and moving toward downstream activities that capture higher value added.

For policymakers, these results suggest that strategies aimed at leveraging agrifood value chains for development should focus not only on increasing participation but also on improving the position of countries within these chains. Encouraging domestic processing, strengthening agro-industrial linkages, and supporting value chain upgrading may help African economies capture greater industrial benefits from global agrifood trade.

Future research could further explore the mechanisms linking value chain participation to structural transformation, including the role of technology adoption, trade policy, and institutional factors. Understanding these mechanisms will be crucial for designing policies that harness global agrifood value chains as drivers of sustainable and inclusive development in Africa.

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