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IMPACT OF GLOBAL SUPPLY ON AFRICAN PRODUCTIVE CAPACITY

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Abstract

Africa stands at a critical juncture in its economic transformation with its abundant natural wealth and youthful demographics. This portrays a huge potential in economic transformation. Unlocking this potential hinges on navigating the intricate interplay between global supply chains (GSC) and productive capacity. This study delves into this important relationship aiming to assess the impact of global supply on productive capacity in Africa. According to the UNCTAD report, limited diversification causes several nations to be chained to volatile commodity exports yet diversification into high-value manufacturing and service is crucial. The study applied descriptive and correlational research design and data was analysed using E-views software. Descriptive design was used to identify the characteristics of the variables in the study. Correlational design was used to show the relationship between the variables. A stationarity test was conducted on the variables, revealing a unit root at levels. Using first differencing, this was resolved. A simple linear regression analysis was performed after the Johansen test for co-integration trace statistics showed that there was no co-integrating equation. The results of the regression analysis demonstrated that global supply had a favorable impact on economic growth. The coefficient (R) for global supply was 0.8020 and it

was statistically significant at 5% level. The recommendation from the study is that authorities should adopt policies that encourage economic integration that will ease global supply chains thus spurring economic growth.

Keywords: Global Supply; Productive Capacity, Economic Growth, Value Chains

INTRODUCTION

In this era of globalization, global supply and value chains have become inherent aspects of modern economic structure, shaping the trajectories of productive capacity and worldwide growth. In Africa, the interaction with these economic forces at a global capacity poses opportunities and challenges that warrant careful assessment. As nations in Africa, strive to improve their productive capacity and foster sustainable growth of the economy, understanding these multifaceted macroeconomic factors is crucial. The World Bank (2020) asserts that cross-border trade in commodities and services has long been seen as a catalyst for economic expansion. However, a number of factors, including trade connections, export diversification, and integration into global value chains, determine how much global supply helps Africa's productive potential.

According to UNCTAD (2021), one of the most prominent aspects of the modern global economy is the global supply chains, which are networks of production and distribution that span several countries. Similarly, World Development Report (2020), revealed that African countries posed a relatively weak performance in trade and global supply averaging 8% compared to 11% in Asia and 14% in first class countries in the period between 2000-2015. This is a clear indication that Africa follows the global trends in GVCs exports which have been buffeted by the financial crisis in 2008, trade conflicts, COVID -19 and other uncertainties around trade agreements between the major trading partners (World Development Report, 2020). World Bank (2021), reported that the global supply highlighted fragility during COVID-19 pandemic, and this underscored the importance of resilience and diversification strategies for African nations. UNIDO (2022), revealed that embracing GVCs brings the promise of productivity improvements, technology transfer and product innovations hence the risks connected to it should be closely monitored.

Statement of Problem

Enhancing productive capacity across African nations supply, value chains and global trade pose both challenges and opportunities through integration of economies in Africa, yet the extent, nature and scope of this impact remain inadequately understood. In as much as

globalization offers access to larger markets, increased potential of investment, and transfer of technology, it also allows threats such as vulnerability to supply chain disruptions, dependency on external markets and marginalization's of domestic industries (Kilaku, Byaruhanga, & Ali, 2023). Therefore, it is important to comprehensively establish the economic implications of global supply on production capacity in Africa. This will promote diversified strategies that will increase benefits while ultimately fostering sustainable growth of the economy as well as mitigating risks.

Economies of scale have been hindered in African markets because of fragmentation in local markets and barriers of trade set across regions (World Trade Review, 2023). Since these are complex macroeconomic issues, to solve them, a comprehensive knowledge of the effects of global supply chains on African productive capacity is important. In a world Bank report (World Bank, 2021) notes that there is a lack of thorough knowledge of the dynamics and ramification of global supply chains for African productive capacity. This paper seeks to bridge this gap.

This study examined how global supply affected African productive capacity, taking into account the intricate relationships between these variables and their consequences for structural change, industrial development, and economic growth. By examining the dynamics of global economic integration and its effects on African economies, this research sought to provide insights into policy interventions and strategies that can enhance productive capacity, promote inclusive growth, and reduce disparities.

THEORETICAL REVIEW

Dependency theory

This theory states that emerging countries like most African countries are inherently dependent of wealthier countries because of past economic dominance and exploitation patterns (Frank, 1967). This relationship is such that African countries supply the developed nations with raw materials while the developed countries supply the African countries with manufactured goods (final goods). This means that Africa is not able to develop its industries thus diminishing its productive capacity. This has had the negative effect of keeping Africa underdeveloped and thus African countries are not able to reach their full potential in terms of production (Wallerstein, 1974)

Global Value Chain (GVC)

Gereffi, Humphrey and Sturgeon developed the GVC theory. The groundwork for GVC theory was defined in the early 2000s, primarily through their seminal paper. According to

Gereffi, Humphrey & Sturgeon (2005) the idea describes how global output is distributed among various enterprises and regions. It focuses on how value is added at each level of the production process, from raw materials to ultimate consumption, as well as how enterprises and countries integrate and move within these chains. The theory distinguishes many forms of governance structures (or coordination mechanisms) in value chains, ranging from market-based to hierarchical, based on transaction complexity, ability to codify information, and supplier competency.

GVC theory states that international trade and investment have facilitated the fragmentation of manufacturing processes across national borders. Under this paradigm, African countries usually dominate low-value-added global value chain sectors such as primary production or assembly. The integration of African economies into global production networks, mostly for labour-intensive sectors, may limit prospects for technological advancement and skill development. This implies that developing countries are frequently stuck in low-value-added industries (for example, raw material supply) and may become reliant on lead enterprises from rich countries. Value generation and capture differ across countries; leading corporations in the Global North frequently reap disproportionate earnings relative to suppliers in the Global South (Kaplinsky and Morris 2001).

Nevertheless, GVC theory also emphasizes how technology innovation, talent building, and deliberate governmental interventions targeted at capturing higher value-added activities can lead to chances for upgrading within value chains. This may result in a restricted advancement of technology and skill. But the GVC theory also points to ways to improve value chains through innovative technology, skill building, and well-timed policy interventions meant to capture higher value-added activities (Gereffi et al., 2005; Kaplinsky, 2000).

Empirical Review

Banga & te Velde (2020) carried out a study on COVID-19 and Disruptions to Global Value Chains: Insights for Developing Countries; Overseas Development Institute (ODI). The study focused on how supply chain shocks affected African economies during COVID-19. Panel Data Regression (Fixed & Random Effects) and Case Study Approaches (e.g., during COVID-19, Ukraine war) methodologies were applied. The findings of the study realised that Africa's exports were heavily disrupted during COVID-19 due to reliance on non-diversified suppliers. While the current study was conducted post the COVID pandemic.

UNCTAD (2022) reported on global supply chains using African Perspective. The main objective was on global supply chain disruptions and African trade capacity. Vector Autoregressive (VAR) approaches were mainly employed and data was extracted from

UNCTAD-stat. The results revealed that Africa's over-dependence on external supply chains creates vulnerabilities; intra-African trade remains underutilized. The study had little empirical analysis.

Brenton and Ikezuki (2017) looked at how trade liberalization affected African industrial productivity. The findings of their study suggested that while trade liberalization led to increased export-oriented industrialization, African countries often struggled to compete in global markets due to limited productive capacity and infrastructure constraints (Brenton & Ikezuki, 2017). A study by Adamu (2017) on the relationship between trade openness and GDP development in African nations revealed a strong positive correlation between the two. In a similar vein, Essien and Udah's (2018) investigation on how trade affects economic growth in Nigeria came to the conclusion that trade significantly influences GDP growth in the country.

Taglioni and Winkler (2016) investigated how African nations participate in global value chains and discovered that, while some African economies have successfully integrated into global value chains, particularly in agriculture and textiles, their participation is typically limited to low-value-added activities, limiting the possibility of technological advancement and increased productivity.

Kaplinsky (2019) conducted a sectoral assessment of African value chains, focusing on industries such as manufacturing, mining, and agriculture. The study discovered strategies to improve value chains by investing in technology, developing employee skill sets, and increasing institutional capacity. However, it also emphasized the challenges African entrepreneurs face in acquiring access to money, markets, and technology (Kaplinsky, 2019). According to empirical research, exports help to boost African GDP growth.

In their 2020 study, Baruwa and Ogunrinola examined the connection between Nigeria's exports and economic expansion. According to their study, exports of goods and services significantly boosted GDP growth. A different study by Ndako (2017) looked at the relationship between GDP growth and exports. The researcher found out that exports play a big part in Ghana's economic growth.

METHODOLOGY

Research Design and Data

This study employed descriptive and correlational research techniques to determine the relationship between global supply and Africa's productive potential. World Bank and World Development Indicators (WDI) secondary data were used. Annual time series dataset covering thirty-two years running from 1990 to 2022 was analysed keenly under E-views software for the variables of interest (global supply, (GS) and productive capacity (PC)).

Econometric Model Specification

The study employed the regression model to estimate the relationships between global supply and productive capacity. Regardless of whether variables show mixed integration order I (0) or I (1), the regression model can be applied. The econometric model that was chosen was as follows:

$$PC_t = \beta_0 + \beta_1 GS_t + \mu_t \quad (1)$$

Where: PC=productive capacity

β_0=Constant

β_1 =parameter

GS= Global supply

t= time

μ= Error term.

RESULTS AND DISCUSSION

Unit Root Test

The Augmented Dickey-Fuller (ADF) test was used in this study to check for the stationarity of the relevant variables. According to the results of the stationarity test in table 1 below, all of the variables showed a unit root problem at levels that were fixed by the initial differencing in table 2. After first differencing, all variables were found to be significant with pv<0.05.

Table 1. Stationarity Test at levels

Var.	ADF t-statistic	t-statistic (5%)	Prob	Conclusion
PC	-2.6871	-2.95711	0.0873	Unit root
GS	-2.6730	-2.9511	0.0897	Unit root

Table 2. Stationarity Test at first difference

Var.	ADF statistic	t-statistic (5%)	Prob	Conclusion
DPC	-6.6216	-2.9604	0.0000	Stationary
DGS	-8.6660	-3.5629	0.0000	Stationary

Johansen Test for co-integration

Co-integration is the relationship or long-term equilibrium between two or more variables (Gujarati 2004). Johansen's method is better than other co-integration procedures since it is resistant to deviations from normalcy and does not have the normalization problem (Momanyi,

Mohamed & Nyongesa, 2013). There is no co-integrating equation, according to the results of the Johansen test for co-integration trace statistics. Table 3 shows max of 0. In this case, maximum Eigen tests the number of cointegration vectors one-by-one. At the 5% level of significance, the maximum trace statistics fell below the critical values. Since there was no co-integrating equation, the null hypothesis that there is no co-integration was thus accepted.

Table 3. Johansen Test for Co-integration (Trace))

Details	Trace Statistics	0.05 (critical value)	Prob
None*	33.0631	47.85613	0.0010
At most 1	23.4443	29.79707	0.0182
At most 2	10.6841	15.4947	0.0330
At most3	1.0444	3.8415	0.0139

4.3 Simple Regression Analysis

This output was adopted from a study containing global supply, as independent variable. Beers (2025) asserts that regression measures whether or not there is a correlation between variables found in a data set. Table 4 shows simple linear regression findings, with a probability value of 0.0214, the model was significant at the 5% level. There is no autocorrelation issue, as indicated by the Durbin-Watson score of 2.3785 (Garson, 2012). The analysis's independent variable account for 80.21% of the factors that affect Africa's productive capacity.

Table 4. Regression Analysis

Dependent Variable: DPC Method; Least squares

Variable	Coefficient	Std. Error	t-statistic	Prob
DGS	0.8021	0.3960	-2.0254	0.0502
C	-0.0325	0.2978	-0.1091	0.9139
R-squared		0.4884		
Adj. R-squared		0.2121		
Prob. (F-stat)		0.0214		
Durbin-watson stat		2.3785		

Specifically, the differenced value of global supply, (DGS) explains 80% of the Africa’s productive capacity. This means when the global supply increases by one unit the productive capacity in Africa tend to increase by 0.8021 units. This reveals a positive significant correlation between the two variables of interest. This conquer with World Bank (2020); UNCTAD (2020)

which noted that integration into global markets and formal supply chains is essential for raising Africa's production levels sustainably.

Test for Autocorrelation- Breusch-Godfrey Test

Since the chi-square probability is higher than 0.05, Table 5 below shows that there is no serial correlation. When an error term crosses into a different period, the resulting time series data exhibit autocorrelation. The linear regression error term suggests that the values of subsequent error terms are sequentially independent, according to Baltagi (2008).

In order to determine whether there was any association, the Breasch-Godfry Langrage Multiplier (LM) test for serial correlation was used under the null hypothesis that there is no serial correlation. If the probability value (p-value) is greater than 0.05, the null hypothesis is not rejected; therefore, the null hypothesis was not rejected because no autocorrelation was detected.

Table 5. Breusch-Godfrey Serial Correlation LM Test

F-statistic	3.8039	prob. F (2, 26)	0.0536
Obs* R-squared	7.2440	prob. Chi-square (2)	0.0672

Normality test

The null hypothesis, which states that residuals are normally distributed, was not rejected at a 5% significance level based on the results of the Jarque Berra test for normality (shown in figure 1), which showed a p-value of 0.478292.

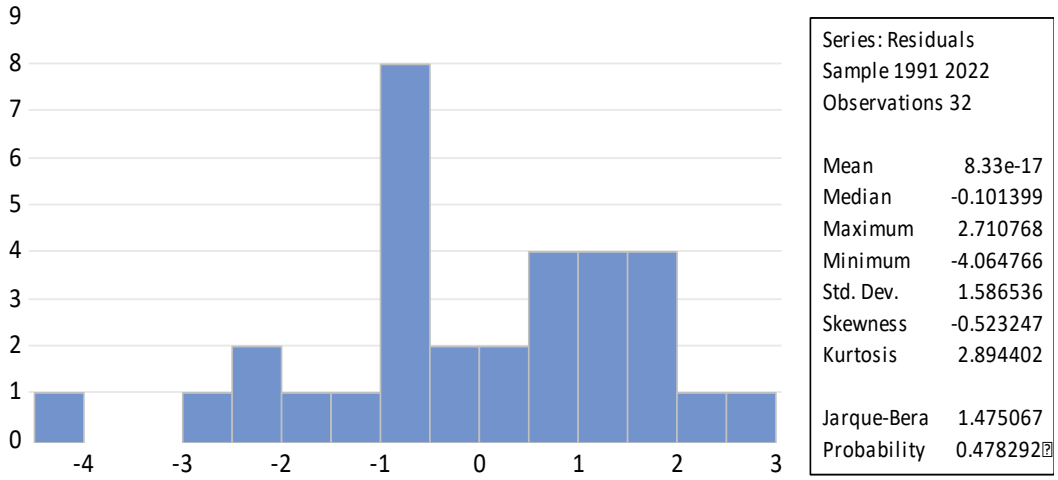

Figure 1. Histogram; Normality test

Breusch- Pagan-Godfrey test for Heteroscedasticity

The study used the Breusch-Pagan test to determine if the model's error term had a constant variance. There is no heteroscedasticity/variance is constant (homoscedasticity) was the test's null hypothesis. If the probability value (p-value) is more than 5%, we fail to reject the null hypothesis. When the variance of the error term varies for every value of the independent variable, heteroscedasticity is typically present. Therefore, the null hypothesis was not rejected since pv revealed was greater than 0.05.

Table 6. Heteroscedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoscedasticity			
F-statistic	0.440621	Prob. F(3,28)	0.7258
Obs*R-squared	1.442595	Prob. Chi-square(3)	0.6956
Scaled explained SS	1.046171	Prob. Chi-square(3)	0.7901

Model Stability Test

The CUSUM test statistics sequence is a sensitive feature that can be used to detect damage in a control chart system, according to Phong (2021). The sequence passes the upper or lower critical line (0.05) after a few cycles of recursive regression, indicating a model fault; a stable model should fall within the significance threshold of 0.05 i.e. within its upper and lower bounds. The stability of the resulting model (CUSUM) was evaluated using the Cumulative Sum Test, and as shown in Figure 2 below, all variables fall between the lower and upper bounds of the 5% significance threshold. Fig.2 below shows model was stable since all the variables were contained inside the critical upper and low bounds, thus it can be used for policymaking.

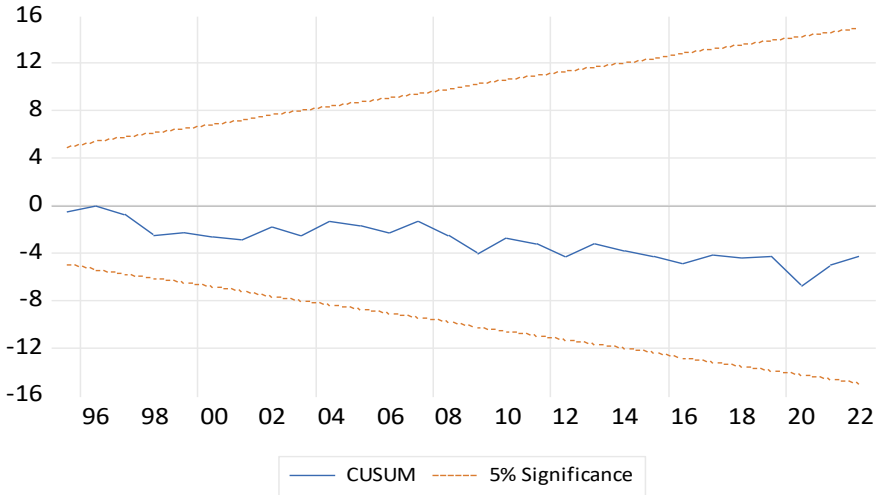

Figure 2. CUSUM TEST

CONCLUSION AND RECOMMENDATIONS

Based on the findings and subsequent debates, it can be said that there is a relationship between African productive capacity and global supply. This means, Africa's productive capability is becoming increasingly important in global supply chains, including agriculture, minerals, manufacturing, and technology services. Africa's production capacity grows, strengthening its position in global supply. Thus, this study recommends that, African producers should use green technologies, regenerative farming, and eco-friendly manufacturing to compete with worldwide markets and earn higher prices. Customs procedures should be made simpler, digital trading systems should be put in place, and tariffs within Africa should be reduced through the African Continental Free Trade Area, (AfCFTA). The AfCFTA presents an unprecedented opportunity to reduce tariffs, harmonize regulations, and create a single market for goods and services. Therefore, member states should accelerate the implementation of AfCFTA protocols to unlock the continent's full production and trade potential.

African countries should prioritize education and vocational training especially in sectors like agri-tech, manufacturing automation and digital services. A skilled workforce is crucial to operating advanced technologies and maintaining global standards. African countries should also collaborate to create regional value chains, where different countries specialize in various stages of production. This promotes efficiency and allows for greater value addition before export.

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