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ECONOMIC EFFICIENCY AND POLICY DISTORTIONS IN WHEAT PRODUCTION IN JIGAWA STATE, NIGERIA: A POLICY ANALYSIS MATRIX (PAM) APPROACH.

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ABSTRACT

Several policies were designed to create a protected market environment that incentivizes wheat farmers to engage in and expand wheat cultivation. However, a critical concern is whether the observed growth in wheat production in Jigawa State is driven by genuine economic efficiency and a comparative advantage or it is primarily a creation of substantial government policy support. The current study assessed the competitiveness and comparative advantage of wheat production in the state. A multi-stage random sampling procedure was employed to select 312 farmers. The study employed the Policy Analysis Matrix (PAM) framework was the analytical tool to assess the economic efficiency and policy distortions in wheat production. Results revealed that wheat production is financially profitable at Private Profit of ₦619,390/ha and exhibits a strong comparative advantage with a Domestic Resource Cost of 0.52, indicating efficient use of domestic resources. However, high policy transfers significantly inflate profitability, as evidenced by substantial output protection Nominal Protection Coefficient on output of 1.56 and a net positive incentive Effective Protection Coefficient of 1.59. The study concludes that while Jigawa State possesses an inherent comparative advantage for wheat production, its current profitability is heavily sustained by policy support. The study recommends facilitating a shift from import bans to tariffs, reforming input subsidies towards productivity enhancing investments, implementing farmer capacity building programs, and strengthening local input supply chains to ensure long term sector sustainability.

Keywords: Wheat, Policy Analysis Matrix, Comparative advantage, Competitiveness, Jigawa

INTRODUCTION

Agriculture remains the bedrock of the Nigerian economy, employing a significant portion of the labor force and contributing substantially to the nation's Gross Domestic Product (GDP). Despite its potential, the sector is plagued by a persistent reliance on food imports, which drains scarce foreign exchange and exposes the country to vulnerabilities in the global food market. Among the commodities constituting a major drain on Nigeria's import bill is wheat (National Bureau of Statistics 2022). Wheat is a strategic staple crop, critical for the production of bread, noodles, pasta, and other confectioneries whose consumption has become deeply entrenched in the Nigerian urban and semi-urban diet due to rapid urbanization and changing consumer preferences (Adeyemo and Ogunlana, 2022).

The demand for wheat in Nigeria far outstrips domestic supply. According to the United States Department of Agriculture (USDA, 2023), Nigeria's wheat production for the 2022/2023 marketing year was approximately 60,000 metric tons, while consumption was projected at over 5.6 million metric tons. This significant gap, representing over 99% of domestic needs, is bridged through massive imports, costing the nation an estimated \$2 billion

annually (Central Bank of Nigeria, 2024). This heavy import dependency poses a significant threat to national food security, economic stability, and the conservation of foreign reserves.

In response to this challenge, successive Nigerian governments have initiated several policies and programmes aimed at boosting domestic wheat production and achieving self-sufficiency. A cornerstone of recent efforts has been the CBNs Anchor Borrowers' Programme (ABP), launched in 2015, which provides credit in kind (inputs) and cash to smallholder farmers for the production of key commodities, including wheat (CBN 2015). Furthermore, the government has employed trade policies such as import restrictions and tariffs on wheat to make imported wheat less competitive and encourage local production. The most notable of these was the closure of land borders between 2019 and 2022 and the explicit restriction of foreign exchange access for wheat importers (CBN, 2021). These policies are designed to create a protected market environment that incentivizes farmers to engage in and expand wheat cultivation.

Jigawa State, has emerged as a potential hub for wheat production in the country. The state government and the CBN have identified it as a priority state for the wheat

value chain development under the ABP. With its relatively cooler dry season and available irrigation facilities, Jigawa possesses a comparative advantage for dry season wheat farming (Jigawa State Agricultural and Rural Development Authority, 2023). Significant resources have been channeled into the state to support wheat farmers, including the provision of improved seeds, fertilizers, and irrigation equipment. Preliminary reports suggest that these interventions have led to an expansion in the area of land under wheat cultivation and an increase in output at the farm gate.

However, a critical question remains: is the observed growth in wheat production in Jigawa State driven by genuine economic efficiency and a comparative advantage, or is it primarily a creation of substantial government policy support? While policies can successfully stimulate production in the short term, their long term sustainability is contingent upon the underlying economic efficiency of the production system (Monke & Pearson, 2021). A sector that is profitable only because of subsidies and protectionism is vulnerable to fiscal shocks and policy shifts, which can lead to collapse once support is withdrawn. This situation creates a triad of critical uncertainties for policymakers and stakeholders.

Therefore, a rigorous investigation is imperative to peel back the layers of policy distortions and reveal the true economic efficiency of wheat production in Jigawa State. The study, employed the Policy Analysis Matrix framework to directly address this problem. It will systematically quantify the competitiveness, comparative advantage, and the precise effects of agricultural policies, thereby providing the empirical evidence needed to inform sustainable agricultural policy and strategic investment in Nigeria's quest for wheat self-sufficiency.

METHODOLOGY

Description of the study area

The study was conducted in Jigawa State, located in the northwestern Nigeria. The state is geographically positioned between latitudes 11°00'N and 13°00'N and longitudes 8°00'E and 10°30'E (Jigawa State Government, 2024). It shares international borders with the Republic of Niger to the north and is bounded domestically by the Nigerian states of Yobe to the northeast, Bauchi to the southeast, Kano to the southwest, and Katsina to the northwest. The state's topography is predominantly characterized by the vast plains of the Hadejia-Jama'are River basin, this area features a semi-arid climate, with a distinct wet season from May to September and a long, hot dry season for the remainder of the year, supporting an agro-economy largely dependent on rain-fed and

irrigation agriculture (Saleh et al., 2023). Based on an average annual growth rate of approximately 2.99% for Jigawa state the projected population was 7.1 million people as at 2024 (National Bureau of Statistics, 2024). The state's economy is overwhelmingly agrarian, with key crops including rice, wheat, maize, sorghum, and millet, while the Hadejia-Nguru Wetlands provide essential resources for fishing and seasonal farming, underpinning both food security and livelihoods (Babale et al., 2022).

Sampling Procedure

A multi-stage sampling procedure was employed to ensure a representative sampling.. Jigawa state was purposive selected due to prominence and high level of activity in wheat production. The first stage involved the selection of three major wheat producing Local Government Areas (LGAs) in the state. The LGAs selected for this study were Dutse, Ringim, and Jahun. The second stage involved the selection of four key wheat producing communities from each of the three identified LGAs to give a total of twelve farming communities. The sample size was determined using Yamane (1967) formula for a finite population, which established a sample of 312 wheat farmers at a confidence level of 5%. Proportionate Sampling was used in the third stage to select the 312 wheat farmers using the expression below;

$$n = \frac{X}{D} * N \dots\dots\dots(1)$$

Where: n = sample size of Jth wheat farmers selected per community

X = Number of Jth wheat farmers in a farming community

D = Total number of Jth wheat farmers in all 12 farming communities

Data Collection

Primary and secondary data were used for the study. The primary data was collected with the aid of a structured questionnaire administered to the sampled wheat farmers by trained enumerators between, 15th - 22th August, 2025. The data collected include, inputs and output data on wheat production, domestic market price of output per kg, cost of various inputs used such as fertilizer, seed, land, labor, fuel, water, capital, and agro-chemical. Secondary data for international market prices (Free On Board (FOB) and Cost, Insurance and Freight (CIF) of wheat output per kg and the unit prices of all tradable inputs and the exchange rate for computing social prices was obtained from Central bank of Nigeria (CBN) and World Bank.

Analytical Techniques

The data collected were analyzed using a Policy Analysis Matrix (PAM) framework developed by (Monke and Pearson 1987). The PAM is a robust analytical tool used to measure the effects of existing policies and market failures on agricultural production systems. The PAM is a

double entry accounting framework that organizes costs and revenues into two scenarios: private prices (observed market prices distorted by policies and market failures) and social prices (efficiency prices that reflect the true opportunity cost to the economy in the absence of distortions).

Table 1: The structure of the PAM is presented below:

	Revenue	Input Cost		Profit
		Tradable inputs	Domestic Factors	
Private	A	B	C	D
Social	E	F	G	H
Policy Transfer	I	J	K	L

Source: Monke and Pearson, (1989) as cited by Aya et al. (2023)

Where:

A, B, C, D represent the financial analysis at market prices.

E, F, G, H represent the economic analysis at social opportunity costs.

I, J, K, L represent the net effect of divergences (policy transfers) between private and social values.

PAM Derived Indicators

From the PAM framework, key indicators were computed to quantify profitability, competitiveness, and the impact of policy interventions. The equations and interpretations for these indicators are as follows: Private Cost Ratio (PCR).

$$PCR = C / (A - B) \dots \dots \dots (2)$$

PCR measures financial profitability. PCR less than 1 indicates that the system is financially viable, meaning the cost of domestic factors is less than the value added at private prices.

Domestic Resource Cost (DRC)

$$DRC = G / (E - F) \dots \dots \dots (3)$$

DRC measures comparative advantage. DRC less than 1 indicates that the country has a comparative advantage in producing the commodity, as it uses domestic resources efficiently to earn or save foreign exchange.

Nominal Protection Coefficient on Output (NPC (O))

$$NPC (O) = A / E \dots \dots \dots (4)$$

NPC (O) measures the extent of output protection. An NPC greater than 1 indicates that producers are protected by policies that raise domestic prices above international levels. Nominal Protection Coefficient on Input (NPC (I))

$$NPC (I) = B / F \dots \dots \dots (5)$$

NPC (I) measures the effect of policies on tradable input costs. An NPC greater than 1 indicates that policies (e.g., tariffs, taxes) make inputs more expensive for farmers than the international price.

Effective Protection Coefficient (EPC):

$$EPC = (A - B) / (E - F) \dots \dots \dots (6)$$

EPC measures the net incentive effect of the entire policy system on value addition. EPC greater than 1 indicates that policies provide a net positive incentive to the production process. Social Profitability Analysis

RESULT AND DISCUSSION

The Policy Analysis Matrix Elements presented in Table 2: Shows the financial and economic costs and returns, calculated at private (market) prices, social

(efficiency) prices, and the resulting policy transfers. The PAM results reveal several critical implications regarding the impact of government policies and the

competitiveness of the wheat production in the study area

Table 2: Policy Analysis Matrix Elements

Cost/ha				
	Revenue (₦)	Tradable Inputs(₦)	Domestic factors(₦)	Profit(₦)
Private	2,108,000.00	471,360.00	1,017,250.00	619,390.00
Social	1,352,078.00	319,729.00	537,720.00	494,629.00
Policy Transfer	755,922.00	151,631.00	479,530.00	124,761.00

Source: Authors Computation, 2025.

The result in Table 2, revealed substantial positive and significance values in the Policy Transfer row across all the components of Revenue, Tradable Inputs, Domestic Factors, and Profit, indicate that government policies are providing significant support to wheat producers. The most pronounced effect is on output, where a transfer of ₦755,922.00 suggests policies on output price supports, tariffs on imported wheat, or direct subsidies are raising the market price received by farmers in Jigawa State far above the international price. This is in consistence with the study on Nigerian agriculture found that output focused policies, such as border closures and tariffs, successfully increase domestic producer prices and farm-gate revenues, leading to high private profitability, much like the results shown here (Oji & Onu, 2023).

The private profit had a positive value of ₦ 619, 390.00. This shows that, under current market prices influenced by policy, wheat farming is a financially profitable enterprise for farmers in the state. This high level of private profitability, driven by policy, is a classic outcome observed in protected agricultural sectors and is consistent with the findings of Oji & Onu (2023), who documented similar financial incentives for Nigerian farmers following border closures and tariffs.

The social profit of ₦ 494, 629.00 is also positive. This is a crucial finding as it indicates that wheat production in the study area is socially efficient. This result provides strong empirical support for the theoretical position held by Adeyemo & Ogunlana (2022), who argue that a positive social profit is a key indicator of a sector's potential for sustainable growth without perpetual government support. It demonstrates that the

fundamental comparative advantage for wheat production exists in the study area, as the sector generates a net social gain even without policy distortions.

The higher policy transfer to primary domestic factors of ₦ 479, 530.00 suggests that policies are artificially increasing the cost of or returns to domestic resources like land and labor. This finding offers a quantitative confirmation of the distortionary mechanism described by Mose & Gichere (2021). Their review of input subsidy programs in sub-Saharan Africa warned that such policies distort farmers' perceptions of real costs and lead to over-allocation of resources. Our result, showing a substantial transfer to domestic factors, provides concrete evidence of this distortion occurring in Jigawa State's wheat sector.

Policy Analysis Matrix Indicators

The PAM estimated key indicators that measure the effects of Agricultural policies. The table 3, below presents these indicators, their equations, computed values, and implications of each value.

The result revealed that PCR value of 0.62 showing that the system is financially profitable. Farmers incur 62 Kobo in domestic costs to generate one Naira of private value added. PCR less than 1 confirms the activity is financially viable under the current policy regime. The DRC of 0.52 indicates that the wheat production system has a strong comparative advantage. It costs the economy only 52 Kobo in domestic resources to save or earn one Naira of foreign exchange. Since the DRC is less than 1, the activity is

efficient for the national economy (Monke and Pearson, 2021).

NPC (I) of 1.47 indicates that policies are making tradable inputs 47% more expensive for farmers than the international price. This represents an implicit tax on production, often resulting from tariffs, taxes or inefficiencies in the supply chain for inputs like fertilizer and herbicides (Mose and Gichere, 2021). The NPC (O) of 1.56 reveals that farmers receive

output prices that are 56% higher than the international benchmark. This points to significant output price support, likely through mechanisms like tariffs, import bans, or direct price subsidies (Oji and Onu, 2023).

EPC of 1.59 signifies that government policies provide a very high net incentive to the production process. The value added at private prices is 59% higher than it would be at social prices, showing that the system is heavily protected overall (Tsakok, 2023).

Table 3: Policy Analysis Matrix Indicators for Wheat Producers

INDICATORS	PCR	DRC	NPC(O)	NPC(I)	EPC
Equation	$C/(A-B)$	$G/(E-F)$	A/E	B/F	$(A-B)/(E-F)$
Values	0.62	0.52	1.56	1.47	1.59
Effect	Financial Benchmark	Comparative Advantage	Output Protection	Input Taxation	Net Policy Incentive

Source: Authors Computations, 2025.

CONCLUSION

The study concludes that wheat production in Jigawa State is both financially profitable and economically efficient. The positive private profit confirms that wheat farming is a lucrative venture for farmers under the current policy regime, which provides substantial support through output price incentives and subsidies. Crucially, the positive social profit and a Domestic Resource Cost (DRC) demonstrate that the sector possesses a strong comparative advantage. This means that, even in the absence of policy distortions, wheat production in Jigawa State uses Nigeria's domestic resources efficiently to generate a net social gain and save foreign exchange, indicating a sustainable foundation for long-term development.

However, the high policy transfers and indicators such as the Nominal Protection Coefficient on Output (NPC (O) and the Effective Protection Coefficient (EPC) reveal that this profitability is significantly inflated by government interventions. Policies such as import restrictions and input subsidies successfully create a protected environment that incentivizes production but simultaneously distort market prices and artificially raise costs. Therefore, while the inherent comparative advantage justifies strategic investment in the wheat sector, the current heavy reliance on policy support poses a risk. A gradual shift towards improving fundamental productivity and cost-efficiency, rather than perpetual protection, is recommended to ensure the sector's resilience to potential fiscal shocks or policy changes.

RECOMMENDATIONS.

1. It is recommended that the Federal Government should transform from quantitative import restrictions to a tariff-based system. There by mitigating the market distortions indicated by the high Nominal Protection Coefficient on Output.
2. The Central Bank of Nigeria (CBN). Should reform Anchor Borrowers' Programme from blanket input subsidies towards targeted investments in productivity-enhancing technologies, particularly efficient irrigation systems.
3. Jigawa State Ministry of Agriculture: We recommend the implementation of extensive farmer capacity-building programs focused on the optimal management of domestic resources. Such training would amplify the inherent economic efficiency of production, as evidenced by the positive social profit), ensuring long-term sustainability beyond direct policy support.
4. The Private Sector and Agro-Input Suppliers: There is a critical need to invest in and strengthen local input supply chains, particularly for seeds and fertilizers. Collaborative efforts to establish local input manufacturing or distribution hubs are essential to reduce costs and alleviate the implicit production tax reflected in the high NPC(I), thereby improving the sector's overall competitiveness.

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