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RESEARCH PAPER

Navigating a sustainable agricultural economy in Indonesia's new capital city

Arfiah Busari[1], Surya Darma [2], Priyagus Priyagus[1], Tetra Hidayati[3*], Dedy Darmawan[4], Dio Caisar Darma[5], Akhmat Rizkuna[2]

[1]*Department of Economics, Faculty of Economics & Business, Universitas Mulawarman, Indonesia*
[2]*Department of Agroecotechnology, Faculty of Agriculture, Universitas Mulawarman, Indonesia*
[3]*Department of Management, Faculty of Economics & Business, Universitas Mulawarman, Indonesia*
[4]*Study Program of Management, Sekolah Tinggi Ilmu Ekonomi Widya Praja Tanah Grogot, Indonesia*
[5]*Study Program of Development Economics, Faculty of Economics & Business, Universitas Siliwangi, Indonesia*

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Abstract. One of the Sustainable Development Goals (SDGs) under the second pillar emphasizes to aim to "*End Hunger, Achieve Food Security and Improved Nutrition, and Promote Sustainable Agriculture*". At the same time, Indonesia is relocating its capital city to Ibu Kota Nusantara (IKN), and the demand for agricultural commodities is increasing in line with population growth. Referring to this phenomenon, this article examines the relationship between labor, employment opportunities, loan value, and entrepreneurship with expenditure and per capita income, and economic growth in the agricultural sector within the IKN region. Secondary data were obtained from government agencies for the period 2015–2023 and analyzed using time-series regression. The empirical findings highlight three important points. First, labor, entrepreneurship, and per capita expenditure positively influence economic growth. Second, these variables also have a positive impact on per capita income. Third, employment, loan value, per capita income, and economic growth are positively associated with per capita expenditure. This case study suggests that stakeholders, including policy makers, academics, businesses, and local communities, should develop more inclusive agricultural economic policies. In the long-term, such approach could help refine and expand existing conceptual frameworks.

Keywords: Agricultural development; employment; financial; entrepreneurship; prosperity; IKN

1. Introduction

Since the enactment of Law Number 3 of 2022 on the relocation of Ibu Kota Negara (IKN), new opportunities as well as challenges have emerged (Kamal, 2022; Priyagus et al., 2024). The decision is rooted in complex issues, including the concentration of economic growth in a single location, imbalances in physical and non-physical development, shrinking agricultural land, limited residential space, and high population density. Without timely intervention, these challenges could trigger significant socio-economic problems in the future.

*Corresponding author. E-mail: tetra.hidayati@feb.unmul.ac.id
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On the other hand, the relocation of IKN offers promising prospects for Indonesia. This strategic move represents a crucial step towards holistic and equitable development. Located in Sepaku, IKN expected to stimulate impressive economy growth, attract investment, create jobs, increase per capita income, and reduce poverty. Socially, it will broaden access to livelihoods, thereby lowering unemployment. Moreover, the development of IKN is projected to address various environmental challenges. The city is being designed to align with the Sustainable Development Goals (SDGs), with the vision of becoming a green, loveable, and live able city (Yenita & Soegiarso, 2024).

BPS-Statistics Penajam Paser Utara Regency (2024) reported that the Gross Regional Domestic Product (GRDP) of Penajam Paser Utara (PPU) Regency, based on constant prices from all sectors, grew by 14.49% in 2022 and 29.85% in 2023. In contrast, GRDP growth in the agricultural sector for the same period was −0.11% and 0.86%, respectively. At current prices, the agricultural sector contributed 19.51% to economy of PPU Regency, as an IKN area, in 2022. However, its share in the GRDP declined by 4.26 percentage points to 15.25% in 2023. This decline is primarily due to land clearing for IKN development. Portions of agricultural land have been converted into state palaces, predecessor palaces, ministry secretariats, educational and health facilities, the Garuda Monuments, official houses, and various other buildings still under construction. Overall economic growth has also been influenced by population migration from outside the region to IKN driven by high expectations for the new capital. In addition, the government's transmigration program has relocated State Civil Apparatus (ASN) from central ministries and institutions to fill administrative positions in newly established offices. Although most agricultural land in PPU Regency remains in operation, the rapid population growth has placed additional pressure on soil productivity, posing a risk to agricultural sustainability.

The total population of PPU Regency in 2022 was 183,043, increasing to 196,566 in 2023, an overall growth of 7.39% during this period. Meanwhile, data from the Population and Civil Registration Office of Penajam Paser Utara Regency (2025) and Sari (2024) indicate that the population in the second semester of 2024 is estimated to reach 199,600, with numbers expected to continue rising until the end of the year. In the first semester of 2024, alone, the population increased by approximately 4,000 people.

Among the four regions in PPU regency, Penajam recorded the largest population in the second semester of 2024, with 98,387 residents, followed by Babulu (40,591), Sepaku (41,677), and Waru (21,412). However, when viewed in terms of population growth from 2022 to 2023, Sepaku experienced the highest rate at 8.85%, followed by Penajam (7.93%), Babulu (7.82%), and Waru (1.66%). Overall, PPU Regency has undergone significant demographic changes, especially in Sepaku, which serves as the core area for IKN development.

The development of IKN inevitably impacts the availability of open space, with agricultural land among the most affected. Such open spaces should ideally be preserved for the agricultural industry, where labor resources are determined by technology, education, and health (Surgawati et al., 2025). Access to sufficient, safe, and nutritious food also determines workforce skill levels (Fanzo et al., 2015; Hendriks et al., 2023; Nam & Suk, 2024; Silva et al., 2023; Ziso et al., 2022). Substantively, rapid population growth increases food consumption intensity (Darma et al., 2020). Rising demand for food is likely to attract investors to the agricultural sector.

Currently, investment credit policies have made more flexible to facilitate entrepreneurship. Both foreign direct investment and domestic investment can benefit banks through loan schemes, which are used to purchase capital goods such as machinery, production equipment, and commercial property, rehabilitate or modernize productive assets, establish new projects, and refinance productive assets, thus enabling the agricultural sector to expand. According to Kamenya et al. (2022) and Petre & Ion (2019), substantial agricultural investment capacity can further affect population income and economic interconnectedness. In the IKN context, Jiuhardi et al. (2024) found that Small and Medium Enterprises (SMEs) and food consumption have significant causal with food security, whereas population size and agricultural economic growth show insignificant correlation with food security.

The issue of sustainable agricultural economic development in IKN remains underexplored. Given the limited attention to this premise, this article examines the linkages between employment, finance, entrepreneurship, and prosperity in IKN, with a focus on agricultural economics. The aim is to provide both academic insight and practical policy alternatives.

2. Literature review

2.1. Theoretical basis

Globally, one measure of successful development is achieving a balance between economic prosperity and the preservation of environmental and social well-being (Hirai, 2022; Jackson, 2009; Mensah, 2019; Vivien, 2023). According to Fitriadi et al. (2023), economic prosperity is closely related to the growth of Gross Domestic Product (GDP). Yet, GDP alone does not necessarily reflect social and environmental welfare equally.

In terms of social welfare, parameters such as access to health care and education are sometimes not accompanied by a supportive environment condition (Arifudin et al., 2024). Similarly, in many countries, environmental consideration remains secondary, with economic and social factors often viewed as more urgent. As a result, economic progress, especially in developing markets, is not always matched by improvements in social and environmental outcomes. Environmental degradation, including carbon emissions that contribute to air pollution, and broader ecological footprint resulting from human activities that disregard water and soil quality, is often overlooked and rarely examined in depth.

Currently, there is a universal standard to diagnose development revitalization in an accurate and systematic manner. At the international, national, or regional levels, the most feasible and widely applicable framework is the SDGs. The SDGs consist of seventeen pillars: no poverty; zero hunger; good health and well-being; quality education; gender equality; clean water and sanitation; affordable and clean energy; decent work and economic growth; industry, innovation, and infrastructure; reduced inequalities; sustainable cities and communities; responsible consumption and production; climate action; marine ecosystems; terrestrial ecosystems; peace, justice, and resilient institutions; and partnerships for the goals. In total, the SDGs include 289 indicators, distributed across the seventeen pillars (SDGs National Secretariat, 2024a). as explained by Fitriadi et al. (2023), by encompassing various dimensions of human life, the SDGs require countries, whether at the urban, rural, or national level, to remain committed and accountable in achieving each target.

Basically, the five stakeholder elements such as philanthropy, government, community/ society, media, and companies, are considered successful if they are able to achieve more than 50% of the SDGs or at least 145 indicators. The number or percentage of indicators achieved depends on the location coverage mentioned above. In practice, 139 indicators (62.5%) of the total SDGs targeted by Indonesia for 2030 have been optimally implemented. This achievement is significantly higher than global average of only 17% and also surpasses the average achievement at the Asian level (Ministry of State Apparatus Empowerment and Bureaucratic Reform - Republic of Indonesia, 2024). To drive development transformation, the government has initiated the relocation of the national capital (IKN) from Jakarta to East Kalimantan, specifically to Sepaku in PPU Regency, under the management of the IKN Authority.

The development of an inclusive IKN is closely linked to the SDGs. Among the seventeen pillars, the second pillar plays a crucial role in ensuring that all people have access to sufficient, safe, and nutritious food. The orientation of this pillar includes end all forms of undernutrition, maintain genetic diversity in food production, ensuring that everyone has adequate access to quality food, eradicating hunger in all its forms by 2030, and increasing the productivity and income of small-scale farmers. To implement these five priorities, both government and non-government organizations can collaborate in promoting healthy and nutritious food consumption patterns; improving access to land, resources, and knowledge; improving the knowledge of poor farmers, sharecroppers, and fisherfolk; ensuring market stability for food commodities; improving access to land, technology, and markets; strengthening financial services, knowledge, and value-added opportunities; promoting public awareness on health, nutrition, sanitation, hygiene, and care; and increasing investment through international cooperation. In other words, the second pillar addresses the very fabric of human life (SDGs National Secretariat, 2024b).

Demographic growth is closely linked to agriculture, which has been a cornerstone of human civilization (Pawlak & Kołodziejczak, 2020; Viana et al., 2022). The agricultural sector contributes significantly to improving the well-being of individuals, groups, and households. In his theory, Malthus argued that population growth follows a geometric (exponential) progression, whereas the increase in food production follows an arithmetic (linear) progression (Montano & García-López, 2020). This means that while the population multiplies exponentially, the quantity of food increases only at a constant rate (Snider & Brimlow, 2013). Under these circumstances, the quantity of food will not be sufficient to meet the needs of the entire population. At some point, this will lead to food shortages with the potential to cause famine. Population and agriculture are closely interconnected, as rapid population growth generally reduces the availability of agricultural land. Uncontrolled population growth which often leads to excessive exploitation resources, will hamper agriculture productivity. The conversion of agricultural land to non-agricultural uses, if not managed comprehensively, creates overlapping claims. Recurrent land disputes between farmer groups and business actors or entities further obstruct agricultural development. These challenges contribute to rural-to-urban migration, as villagers seek alternative employment opportunities in the cities, abandoning farming as a livelihood. Over time, this migration leads to a loss regeneration and a shortage of successors in the agricultural sector.

Agriculture also has a direct relevance to population dynamics. Failure to develop the agricultural sector can worsen human quality, such as food shortages. From this perspective, the reduction of agricultural land, the decline in planting and harvest areas, the decrease in production volume, the imbalance between food demand and supply, and low food security will all threaten population growth. Jiuhardi et al. (2022) predict that Indonesia's population density, as a consequence of rural to urban migration, creates demographic pressures that could drive a contemporary increase in agricultural value added.

The achievement of agricultural economic development in the regions (provinces, cities, and districts) is generally measured by agricultural GRDP, while at the national level it is measured by agricultural GDP. Both agricultural GDP growth and agricultural GRDP growth can be calculated through the same formula applied in measuring GDP and GRDP growth (Rosyadi et al., 2023). However, while GDP and GRDP growth are calculated for the entire economy, agricultural GDP and agricultural GRDP refer to the agricultural sector. The calculation of agricultural GRDP growth is shown in Equation (1).

$$EG_{Ag} = \frac{GRDP_{Ag_t} - GRDP_{Ag_{t-1}}}{GRDP_{Ag_{t-1}}} x\ 100\% \quad (1)$$

where, EG_{Ag} = Agricultural economic growth, $GRDP_{Ag}$ = Gross Regional Domestic Product of agriculture, t = base period, and t–1 = previous period.

2.2. Empirical foundation

Manuscripts discussing the linkages between employment, finance, entrepreneurship, and prosperity in agricultural context have been widely published. First, studies has examined the role of employment, finance, and entrepreneurship on agricultural economic growth. Ringga et al. (2022) found that labor represent attributes that influencing the rate of agricultural sector growth in Aceh Province. Similarly, it was noted that abundant agricultural labor fosters value-added industry both structurally and dynamically in fifteen EU countries (Bilenko, 2022). Blanco and

Raurich (2022) confirmed that cross-country differences in agricultural performance are largely tied to labor advantages.

In practice, agricultural productivity in both developed and developing countries tends to be more advanced than the non-agricultural sector (Achmad et al., 2025). Price changes in agricultural goods often favor labor-intensive agriculture over capital-intensive agriculture. As economies develop, capital accumulation can further strengthen labor-intensive agriculture. Consequently, structural shifts such as changes in distribution of farmers and land tend to favor capital-intensive production, ultimately reflected in labor productivity. In Nigeria, agriculture is the primary production enterprise in the entrepreneurial ecosystem in Nigeria as it is considered the engine of job creation and economic growth (Kolomi et al., 2021). The agricultural sector is capable of providing employment to a large section of the society. Agricultural sub-sectors such as forestry, livestock, fisheries, and food crop production facilitate and contribute the largest segment of entrepreneurship (Nurjanana et al., 2024).

Second, employment, finance, entrepreneurship, and prosperity also influence per capita income. From an empirical perspective, there is a long-term causal relationship between GDP per capita and agriculture in India (Singariya & Sinha, 2015). Ramachandran (2021) confirmed that reduced employment in agriculture was accompanied by slower economic growth in the modern industrial sector largely due to the rapid urbanization. In Africa, the faster growth of urban populations compared to rural populations are not connected to higher agricultural productivity. Instead, low agricultural yields are accompanied by rising food prices, high consumption costs make employment more challenging. Inadequate wage levels in the industrial further indicate a failure to develop intensive infrastructure.

Using panel data from thirty provinces in China, Wang et al. (2023) found that credit supply and fiscal mechanisms positively influence farmers' incomes. In Ghana, agriculture remains a fundamental sector of the national economy, with external debt serving as a catalyst for maintaining stability and revitalizing the agricultural sector (Sogah et al., 2024). Beyond GDP, Afonso and Blanco-Arana (2024) argue that financial inclusion also plays a bridging role in improving agricultural economic conditions in Least Developed Countries (LDCs). Pan et al. (2024) examined the spatial impact of farmers' innovative entrepreneurship on agricultural and rural economic clusters, finding that areas with low levels of farmer entrepreneurship exhibited spillover effects to household income, especially in areas with heterogeneous urbanization levels. Rural farming models that integrate entrepreneurship and innovation require different, targeted incentive measures.

Third, employment, finance, entrepreneurship, and prosperity also influence per capita expenditure. Moeis et al. (2020) found that structural progress affects household welfare in the agricultural sector. In the early 2000s, agricultural land ownership and labor mobility had a significant impact on the welfare of Indonesian farmers. Similarly, Wang et al. (2023) estimated that fiscal support and agricultural credit are key drivers of income growth for Chinese farmers. This also evident in Jiangsu Province, where Zhang (2014) observed a correlation between farmers' per capita net income and financial expenditure on agriculture. A crucial determinant of rural entrepreneurship is the standard of living, with per capita wealth as an indicator of individual well-being, including that of farmers. Del Olmo-García et al. (2023) emphasized the importance of human capital through entrepreneurial competence and competitiveness in accessing the Spanish agricultural market. Zhu et al. (2022) highlighted that entrepreneurship is a vital driver of agricultural and rural economic growth in China, as entrepreneurial activities expand. In an enabling environment characterized by access to credit and investment in research and development, rural entrepreneurs have great opportunities to innovate. Ultimately, entrepreneurship in the agricultural sector can introduce advanced technologies, diversify agricultural products, and enhance efficiency and profitability (Kharga et al., 2021). In line with these findings, Megbowon et al. (2022) emphasized that the effectiveness of per capita agriculture expenditure in the Kingdom of Lesotho depends on the overall performance economic growth.

3. Metodology

This article is based on a quantitative study designed to test causality among variables in the agricultural sector. The data observation focus on PPU as a buffer region for IKN over throughout nine periods (2015–2023). The sample consists of secondary time-series data collected periodically at specific intervals. These data are derived from government documents and compiled from various publications released by BPS-Statistics PPU Regency. Table 1 presents the operational definitions of the data.

The Ordinary Least Squares (OLS) approach was applied using time-series regression to examined the relationship among the selected variables. Data visualization was conducted using the Statistical Package for the Social Sciences (SPSS) version 27. Three modeling scenarios were tested. The first examined the relationship of agricultural sector workers, agricultural sector employment opportunities, value of agricultural sector loans, agricultural sector entrepreneurship, per capita expenditure, and income per capita on economic growth in the agricultural sector. The second explored the relationship of agricultural sector workers, agricultural sector employment opportunities, value of agricultural sector loans, agricultural sector entrepreneurship, per capita expenditure, and economic growth in the agricultural sector on income per capita. The third focused on the relationship of agricultural sector workers, agricultural sector employment opportunities, value of agricultural sector loans, agricultural sector entrepreneurship, income per capita, and economic growth in the agricultural sector on per capita expenditure. The basic OLS regression function is presented in Equation (2).

$$y = \beta_0 + \beta_n X_n + e_{it} \tag{2}$$

where; y = dependent variable (the outcome being predicted); β_0 = intercept (the value of y when all the independent variables are zero), β_n = coefficients (slope parameters representing the relationship between each independent variable and the dependent variable), X_n = independent variables (predictors), e = error term (captures the variability in y not explained by the independent variables), and it = observation period.

Table 1. Data material

Variables name	Indicator	Parameter
Agricultural sector workers	Residents aged 15 years and above working in the agricultural sector	Percent (%)
Agricultural sector employment opportunities	Number of registered job vacancies in the agricultural sector	Placement division
Value of agricultural sector loans	Agricultural sector credit provided by banks	Rupiah (IDR)
Agricultural sector entrepreneurship	Total number of entrepreneurs in the agricultural industry	Business units
Per capita expenditure	Average monthly per capita expenditure on food commodities	Rupiah (IDR)
Income per capita	Average per capita income in the agricultural sector	Rupiah (IDR)
Economic growth in the agricultural sector	GRDP at constant prices in the agricultural sector (proxy)	Percent (%)

Source: BPS-Statistics Penajam Paser Utara Regency (2024)

Then, the second equation function is modified into three models, as shown in Equation (3)–(5).

$$EGAS = \beta_0 + \beta_1 ASW + \beta_2 ASEO + \beta_3 VASL + \beta_4 ASE + \beta_5 PCE + \beta_6 IPC + e_1 \quad (3)$$

$$IPC = \beta_0 + \beta_7 ASW + \beta_8 ASEO + \beta_9 VASL + \beta_{10} ASE + \beta_{11} PCE + \beta_{12} EGAS + e_2 \quad (4)$$

$$PCE = \beta_0 + \beta_{13} ASW + \beta_{14} ASEO + \beta_{15} VASL + \beta_{16} ASE + \beta_{17} IPC + \beta_{18} EGAS + e_3 \quad (5)$$

where β = column vector of coefficients ($\beta_0, \beta_1, \ldots \beta_{18}$) with size [$k$ + 1] x 1), e_1, e_2, e_3 = error terms of the three models; *ASW* = Agricultural sector workers, *ASEO* = Agricultural sector employment opportunities, *VASL* = Value of agricultural sector loans, *ASE* = Agricultural sector entrepreneurship, *PCE* = Per capita expenditure, *IPC* = Income per capita, and *EGAS* = Economic growth in the agricultural sector.

Among the seven variables, data for *ASW*, *ASEO*, *VASL*, *ASE*, *PCE*, and *IPC* are transformed into their logarithms form (log) to normalize units and reduce scale disparities, as each parameter has different magnitudes. *EGAS* data is retained in its original form without logarithmic transformation.

4. Findings and discussion

4.1. Correlation coefficients and descriptive statistics

Econometrically, the descriptive statistics show varying values. Even though the logarithmic transformation simplifies the indicators, the data still reflects the actual proportional relationship. Table 2 presents the descriptive statistics based on mean ($\bar{x}$) and standard deviation (σ). The highest mean value is for *VASL* (11.222), while the lowest is for *EGAS* (0.433). The standard deviation values also vary, with EGAS having the highest variability (1.511) and *IPC* having the lowest (0.036).

Furthermore, correlation coefficient (r) measures the strength and direction of the linear relationship between two variables. This study applied Pearson's correlation. The coefficient ranges from −1 to +1, allowing two main interpretations. First, a negative coefficient (r < 0) indicates that the two variables move in opposite directions, while a positive coefficient (r > 0) indicates they move in the same direction. Second, the closer the value is to −1 or +1, the stronger the correlation, values near zero indicate a weak relationship, and r = 0 signifies no relationship or statistical independence. At a probability level of p < 0.05, *ASW* and *ASEO* exhibited a strong positive correlation of (r = 0.707), meaning they move in the same direction. Two strong negative correlations were observed, *PCE* with *ASEO* (r = −0.678) and *IPC* with *PCE* (r = −0.718), indicating they move in opposite directions. At a higher significance level of p < 0.01, *IPC* and *ASW* (r = 0.939) and *PCE* with *VASL* (r = 0.831) showed very strong positive correlations, indicating these pairs of variables move in the same direction.

Table 2. Output of correlation and descriptive statistics.

	ASW	ASEO	VASL	ASE	PCE	IPC	EGAS	Mean	Std. Dev.
ASW	1.000	0.707*	−0.402	−0.500	−0.678*	0.939**	0.550	1.636	0.046
ASEO	0.707*	1.000	−0.557	−0.232	−0.614	0.566	0.340	2.270	0.123
VASL	−0.402	−0.557	1.000	0.223	0.831**	−0.461	−0.088	11.222	1.104
ASE	−0.500	−0.232	0.223	1.000	0.444	−0.613	0.412	2.536	0.249
PCE	−0.678*	−0.614	0.831**	0.444	1.000	−0.718*	−0.193	5.781	0.068
IPC	0.939**	0.556	−0.461	−0.613	−0.718*	1.000	0.386	6.897	0.036
EGAS	0.550	0.340	−0.088	0.412	−0.193	0.386	1.000	0.433	1.511

Source: secondary data is processed using SPSS
Notations: *degree of probability is 5% and **degree of probability is 1%

4.2. Modeling results

The identification results demonstrate the relevance of the proposed model (Table 3). The SPSS output provides three key instruments. First, constant and partial relationships between variables are verified using the beta coefficient (β). The constant predicts the response value when all predictors are equal to zero. In regression analysis, the constant is also referred to as the intercept or constant coefficient. Three are three ways to interpret the constant: a positive constant indicates a unidirectional influence between the independent variables, a negative constant indicates an opposite influence, and a non-significant constant ($p > 0.05$) suggests that the constant does not have a significant influence on the dependent variable.

Second, the simultaneous relationship between variables is assessed using the F statistics (F test), which measures the variance ratio in an Analysis of Variance (ANOVA) framework. This test determines whether the variance of two or more samples differs significantly. Third, the model's explanatory power is evaluated using the coefficient of determination (R^2), which measures how well the statistical model predicts the outcome. The correlation coefficient (r) measures the strength of the relationship between two variables, while the adjusted R^2 account for the number of predictors in the model, providing a corrected measure of model fit that reflects how well the model explains variation in the data.

Compared to the second and third models, the first model is notable for having a negative constant of −4.628. This indicates that if *ASW*, *ASEO*, *VASL*, *ASE*, *PCE*, and *IPC* are all equal to zero ($\alpha = 0$), the value of the dependent variable would decrease by 4.628. In contrast, the second and third models show positive constant of 2.320 and 4.940, respectively. In terms of partial effects, in the first model, *EGAS* is positively influenced by *ASW* (1.660), *ASE* (0.902), and *PCE* (0.119).

Table 3. Evaluation of the proposed model.

Items	Model I (EGAS)	Model II (IPC)	Model III (PCE)
Constant	−4.628	2.320	4.940
	(0.941)	(0.432)	(0.694)
ASW	1.660*	3.136	−4.437
	(0.019)	(0.141)	(0.428)
ASEO	−0.415*	−0.789	1.093
	(0.052)	(0.164)	(0.456)
VASL	−0.113	−0.259	0.764
	(0.427)	(0.391)	(0.156)
ASE	0.902**	1.421	−2.191
	(0.006)	(0.275)	(0.474)
PCE	0.119	0.193	
	(0.453)	(0.590)	
IPC	−0.352		2.509
	(0.240)		(0.453)
EGAS		−1.641	0.872
		(0.240)	(0.590)
R	0.997	0.988	0.944
R Square	0.995	0.976	0.891
Adjusted *R* Square	0.979	0.904	0.565
Std. Error of the Estimate	0.218	0.011	0.045
Mean Square	3.029	0.002	0.005
F	64.186*	13.511	2.731
	(0.015)	(0.071)	(0.292)
Obs.	63	63	63

Source: secondary data is processed using SPSS
Notations: *degree of probability is 5% and **degree of probability is 1%

Similarly, in the second model, three variables positively affect IPC: *ASW* (3.136), *ASE* (1.421), and *PCE* (0.193). Unlike the previous models, the third model shows that *ASEO* (1.093), *VASL* (0.764), and *IPC* (2.509) positively influence *PCE*. Regarding statistical significance, at the 5% probability level ($p < 0.05$), *ASW* has a significant effect on *EGAS* in the long term. At the 1% probability level ($p < 0.01$), ASE has a significant effect on *EGAS* in the long term.

The second instrument is the correlation coefficient, *R* square, and adjusted *R* square. The correlation coefficients are exceptionally high, reaching 0.997 for model I, 0.988 for model II, and 0.944 for model III, indicating that all three models exhibit a very strong relationship. In the line with these results, the correlation coefficient of 0.995 in the first model implies that only 0.005 of the variation is due to confounding factors. Similarly, the second model, a coefficient is 0.976 means that 0.024 of the variation lies outside the model. The third model has the lowest coefficient among three, at 0.891, indicating a confounding factor of 0.109. Conceptually, the adjusted *R* square is always less than or equal to *R* square. A small adjusted *R* square indicates that independent variables have limited ability to explain variations in the dependent variable. Based on Table 3, the corrected measure of model accuracy meets the criteria, with adjusted *R* square values are 0.979 for model I, 0.904 for model II, and 0.565 for model III.

The F score statistic is used to test the suitability of the regression model. The simultaneous relationship between variables in all models is positive. The first model is relatively more dominant than the second and third models, with an *F*-score of 64.186, compared to 13.511 for the second model and 2.731 for the third. With a probability level below 5% ($p < 0.05$), the variables in the first model have a significant long-term impact. in contrast, the variables in the second and third models do not have a significant short-term impact.

4.3. Justification

Implicitly, both *EGAS* and *IPC* are positively influenced by *ASW*, *ASE*, and *PCE*. This differs from *PCE*, which positively influenced by *ASEO*, *VASL*, *IPC*, and *EGAS*. Increases in *ASW*, *ASE*, and *PCE* can partially increase *EGAS* and *IPC*. Likewise, improvements in *ASEO*, *VASL*, *IPC*, and *EGAS* can partially reduce *PCE*. In the context of agricultural sector, the positive causal relationships between these research models are drawn from analyses across various scientific publications.

The results of the current analysis are consistent with findings reported in previous studies, although some deviations from earlier trends were also observed. Saban et al. (2023) found that the agricultural sector in Maluku Province contributes the most to output compared to other regions in Indonesia. Agricultural output acts as a driving force in allocating inputs to other sectors, especially primary inputs. Moreover, agricultural production in Maluku Province can stimulate growth in other sectors and meet final demand.

In other regions of Indonesia, such as Central Java, agricultural development has shown significant synergy with labor absorption and income distribution, while agricultural investment has no significant effect on either labor absorption or income distribution (Setiawan et al., 2024). The agricultural sector serves as both a knowledge base and a strategic tool for designing development frameworks at national and regional levels, supporting community income generation, employment creation, poverty alleviation, and food security (Gina et al., 2023).

Agricultural development is also closely linked to financial mechanisms. Vo and Ngo (2021) reported that beyond rural development and progress in the agricultural sector, agricultural financing positively influences sustainable development within the Association of Southeast Asian Nations (ASEAN). Similar experiences are seen elsewhere, for instance, farmers in Angolan use credit to integrate planning into organic farming agroforestry systems (Joao & de Castro, 2023). Investment and credit can foster the growth of agribusiness and strengthen value chains. In fifty developing countries, agricultural value added is heavily dependent on loan availability, while both private investment and government financing contribute significantly to enhancing value-added agricultural production (Mushtaq & Mushtaq, 2023).

Credit in the agricultural sector foster entrepreneurship, which in turn drives growth in the sector (Fitz-Koch et al., 2018). According to Alisherovna (2025), promoting agricultural entrepreneurship not only stimulates the rural economy but also contributes to poverty alleviation. In West Kalimantan Province, capital expenditure in the agricultural sector serve as a key economic driver by absorbing labor, thereby increasing household income and reducing poverty (Restiatun et al., 2024). Similarly, Sogah et al. (2024) found that government spending positively affects agricultural productivity in Ghana, especially by increasing farmer's incomes. Adam and Alzuman (2024) further emphasized that per capita expenditure plays a crucial role in creating job opportunities and supporting economic activity across all layers of the agricultural economy in Gulf Cooperation Council (GCC) countries.

Universally, anomalies in agricultural sector employment in developing countries are linked to factors such as productivity, education, wages, gender equality, and labor roles, which form important strands in the family farming (Mizik et al., 2025). Kichuk et al. (2022) note that employment and rural entrepreneurial activity in Ukraine are likely influenced by resource-intensive agriculture. Low job welfare negatively affects the quality of the agricultural workforce in Trinidad and Tobago (Ramdwar et al., 2020). In Indonesia, access to assets in the form of credit has a significant impact on farm businesses performance (Haryanto et al., 2023), and conventional banks play a crucial role in distributing loans to farmers, who are considered the backbone of agricultural sector sustainability (Putra et al., 2021).

Similarly, in Nigeria, interest rates, credit facilities, and guarantee guidelines from both commercial and cooperative banks influence agricultural production (Emenuga, 2019; Udoka et al., 2016). In China, Cheng et al. (2021) examined the multiplier effect of agricultural business entities on economic prosperity, using farming households from 29 provinces as a sample. Their findings show that the performance of these entities can increase both the per capita income and per capita consumption expenditure of farming families. According to Harkness et al. (2023), variations in agricultural intensity, reflected in consumption spending, can affect farmer income. In Sindh Province, Pakistan, farmers' incomes and profits are reduced by the high cost of living required to support family members (Amanullah et al., 2020). In Bangladesh, extensive traditional agricultural production places pressure on economic growth by expanding agricultural trade liberalization (Ghimire et al., 2021).

5. Conclusion

This paper synthesizes the relationship between agricultural sector workers, agricultural sector employment opportunities, the value of agricultural sector loans, agricultural sector entrepreneurship, per capita expenditure, income per capita, and economic growth in the agricultural sector, with thematic relevance to IKN. A time-series regression covering the period 2015–2023 was conducted, evaluating three models. The first model shows that agricultural sector workers, agricultural sector entrepreneurship, and per capita expenditure have a positive effect on economic growth in the agricultural sector, while agricultural sector employment opportunities, the value of agricultural sector loans, and income per capita do not. The second model indicates that agricultural sector workers, agricultural sector entrepreneurship, and per capita expenditure positively influence income per capita, while agricultural sector employment opportunities, the value of agricultural sector loans, and economic growth in the agricultural sector do not. The third model demonstrates that agricultural sector employment opportunities, the value of agricultural sector loans, income per capita, and economic growth in the agricultural sector positively affect per capita expenditure, while agricultural sector workers and agricultural sector entrepreneurship do not.

Apart from serving as an inspiration for similar research, the results of this analysis allow for replication and further development. The main limitation of the study lies in the data, as the dataset is relatively shallow in volume and should be addressed in future research. Beyond overcoming data constraints, methodological aspects, such as the refinement of analytical tools, can also be strengthened. For stakeholders, follow-up action is recommended to ensure that IKN development policies contribute directly to community prosperity, particularly for farmers. Employment opportunities in the agricultural sector can be maximized if supported by accessible capital assistance, especially through bank credit. With improved financial access, entrepreneurship, an inseparable element of agricultural business can be further encouraged. Policy decisions should prioritize concrete measures, such as strengthening fiscal stimulus, to stimulate economic growth in the agricultural sector. Enhancing per capita income and expenditure requires a holistic approach to agricultural economic reform.

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