IJMSSSR

International Journal of Management studies and Social Science Research
A Bi-Monthly, Peer-Reviewed, Open-Access Journal

2026 Vol. 08, Issue 05
ISSN: 2582-0265
www.ijmsssr.org

RESEARCH ARTICLE

Production Performance and Supporting Factors for Improving the Competitiveness of Native Chicken Farming in The West Timor Buffer Area of Kupang

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ABSTRACT

A survey study was conducted to determine the production performance and factors supporting the competitiveness of native chicken farming businesses in the West Timor region, which serves as a supply base for the Kupang City market. Two sample regencies, two sample districts, and four sample villages were selected in stages using purposive sampling, based on the largest native chicken populations. A total of 300 respondents from the sample villages were selected using non-proportional random sampling. Data were analyzed using production performance ratios, profit ratios, and SEMPLS with smartPLS 4 software. The analysis results showed that: 1) the production performance of village chicken farming businesses was relatively good, as evidenced by the low mortality rate (5.65%). Business productivity of 16 birds per farmer per production period and profit of Rp 1,303,200 per production period (7.5 months) were categorized as low; 2) Supporting factors significantly influencing competitiveness include price and market conditions, farmer human resource competence, availability of production inputs, and productivity. Efforts to improve the competitiveness of the native chicken farming business require support from various parties within the framework of controlling prices and markets for both inputs and outputs, as well as enhancing farmers' competencies

Keywords: *competitiveness; enabling factors; production performance; productivity;local chicken farming.*

ARTICLE INFO

Received:	[08/08/2026]
Accepted:	[22/08/2026]
Published:	[03/09/2026]
Issue Period:	September – October 2026 (Bi-Monthly)
DOI:	https://doi.org/10.56293/IJMSSSR.2026.6402

1. Introduction

One of the current phenomena in Central and Eastern Indonesia is the widespread distribution of frozen broiler chicken products originating from outside the region in both traditional and modern markets (Jojo, 2021), including the markets of Kupang City. This apparent gap between local production and market demand should provide an opportunity for the supply of locally produced broiler chickens and indigenous (native) chickens from various regions of Indonesia ((Bakrie et al., 2021); (Coyne et al., 2020)). A similar situation also occurs in the areas surrounding the Kupang City market. However, the oligopolistic structure

of the input market and the oligopsonistic structure of the output market in the broiler chicken industry have significantly limited the opportunities for local broiler production to expand ((Rahmatin et al., 2019); (Ilham, 2019); (Riwukore et al., 2020)).

The most viable alternative is indigenous chicken farming. (Dhita et al., 2024) reported that the strong consumer preference for indigenous chickens has led to a steady increase in demand over the years, indicating that indigenous chicken farming has promising prospects for meeting the continuously growing market demand. Indigenous chickens are raised by nearly every household in the West Timor region, although generally on a small scale (Sahala et al., 2024). Nevertheless, indigenous chicken production is still predominantly managed under traditional extensive free-range systems, resulting in low productivity (Lalus et al., 2022). The major constraints to the development of indigenous chicken farming include limited market access, disease outbreaks, high feed costs, limited labor availability, and the inadequate supply of Day-Old Chicks (DOC) (Yudiarini et al., 2022). Consequently, low productivity has contributed to a dramatic decline in the indigenous chicken population in Kupang Regency, from 2,454,684 birds in 2020 to 650,133 birds in 2021, before slightly increasing to 689,141 birds in 2022 (Dirjen Peternakan dan Kesehatan Hewan, 2023).

Low production and limited supply have subsequently contributed to the high market price of indigenous chickens. The price of indigenous chicken is nearly twice that of locally produced broiler chicken and approximately three times that of frozen broiler chicken ((Rusdiana & Soeharsono, 2019). Because indigenous chicken can be substituted by fresh broiler and frozen chicken products, its relatively high price suppresses consumer demand (Amelia et al., 2018). This situation highlights the need to develop indigenous chicken farming through more intensive production systems characterized by higher productivity and greater efficiency in order to improve its competitiveness.

The concept of competitiveness is closely associated with productivity and efficiency. The greater the ability of production factors to generate output, the higher the resulting productivity (Pawlak & Poczta, 2020). Maintaining and enhancing productivity through the revitalization of its supporting factors is essential to ensure sustainability, growth, and (Flores-Tapia et al., 2022). Strategies to sustain and improve competitiveness can therefore be pursued by revitalizing strategic supporting factors that possess strong leverage points (Fischer et al., 2022). Competitiveness represents an essential effort that economic actors must continuously undertake in order to remain viable in their business activities (Sitorus et al., 2024).

This study aims to analyze the production performance of indigenous chicken farming and to examine the influence of supporting factors and the role of productivity in enhancing the competitiveness of indigenous chicken enterprises in the West Timor region surrounding the Kupang City market. The study is strategically important because it seeks to strengthen the capacity of indigenous chicken farmers to compete with various poultry products in an increasingly competitive market, thereby improving their income and welfare. It is expected that even modest interventions in these strategic supporting factors will generate substantial improvements in competitiveness. Accordingly, this research was conducted to evaluate the production performance of indigenous chicken farming and to identify the key supporting factors with the greatest leverage for sustaining and enhancing the competitiveness of indigenous chicken enterprises.

2. Materials and Methods

This study was conducted in the West Timor region, East Nusa Tenggara Province, Indonesia. The West Timor region, which serves as the hinterland of the Kupang City market, comprises six regencies. A multistage sampling procedure was employed to purposively select two sample regencies, two sample districts from each regency, and four sample villages from each district, based on the criterion of having the largest indigenous chicken populations.

The sample size was determined to be 300 farmers, following the rule of six times fifty questionnaire items, while also considering the number of questionnaire indicators, the required statistical power, and general recommendations for sample size determination in quantitative surveys and multivariate analysis (Memon et al., 2020). Respondents were selected using non-proportional random sampling, with 75 farmers drawn from each sample village.

Primary data were collected through field observations and face-to-face interviews using a structured questionnaire based on a five-point Likert scale. The collected data were tabulated and subsequently analyzed using production performance ratios, profitability analysis, and Structural Equation Modeling (SEM) based on the Partial Least Squares (PLS) approach with SmartPLS 4 software. The PLS-SEM analysis involved the following stages: measurement model specification, structural model specification, path diagram construction, conversion of the path diagram into a system of equations, evaluation of model goodness-of-fit, and hypothesis testing.

3. Results and Discussion

Mortality-The average mortality rate of indigenous chickens in the hinterland of the Kupang City market was 5.65% of the total flock population. This finding indicates that the mortality rate of indigenous chickens in the study area remains relatively low. Indigenous chickens possess several advantages, including rapid growth, a low mortality rate (approximately 5%), and strong adaptability to local environmental conditions.A study by (Supriyanto 2020) on *Ayam Kampung Super* reported a mortality rate of 5.55% during the production period, indicating that mortality remained at a relatively low level. Likewise, (Hadi et al., 2021a) demonstrated that intensive management practices in indigenous chicken farming achieved the expected production targets. This was reflected in higher growth rates, a shorter production period of 10–12 weeks, and a low mortality rate of approximately 5%.

Productivity-The average productivity of indigenous chicken farming in the hinterland of the Kupang City market was 16 birds per production cycle (6–8 months). The production was allocated for several purposes, including the sale of seven birds, household consumption of two birds, and customary ceremonial purposes involving seven birds (Table 2). The selling price ranged from IDR 60,000 to IDR 80,000 per bird. The average production cycle remained relatively long, averaging approximately seven months.

This production period differs considerably from the intensive production system reported by (Hadi et al., 2021a) in which indigenous chickens reached a body weight of 800–1,000 g after only three months of rearing. At that stage, the chickens were sold live for approximately IDR 40,000 per bird.

The relatively long production cycle observed in this study can be attributed to the extensive production system commonly practiced in the West Timor region surrounding the Kupang City market. Under this management system, chickens are allowed to roam freely without permanent housing, receive supplementary feed only in the morning and afternoon, and obtain the remainder of their feed by scavenging around farmers' households.

Farm Profitability-Indigenous chicken farming is generally operated as a small-scale supplementary enterprise. Consequently, production costs are relatively low and consist primarily of feed expenses. Farmers supplied an average of 0.35 kg of maize per day over a production period of 7.5 months (231 days), resulting in a total feed requirement of 80.85 kg per production cycle. No other production costs were considered because the extensive management system substantially reduced operating expenses.

The extensive production system therefore provides considerable cost savings for farmers. However, despite its low production costs, the system is characterized by relatively low productivity, which ultimately limits farm profitability. The prolonged production cycle and dependence on scavenging reduce production efficiency compared with intensive production systems. Moreover, the sustainability of this

production system is threatened by its vulnerability to disease outbreaks due to limited disease prevention and control measures. Therefore, adopting a housing system with appropriate biosecurity measures, particularly during the transition between the dry and rainy seasons, should be considered. In addition, farmers should be provided with technical training on improving productivity through nutritionally balanced feeding, proper housing management, and effective disease prevention practices.

Table 1. Profit Analysis of Native Chicken Farmers in the Buffer Areas of Kupang City

Description	Quantity	Price	Total
Cost			
Corn (0.35 kg/day for 7.5 months)	80,85	8.000	646.800
Total Cost			646.800
Revenue			
Sales (7 birds/period)	7	75.000	525.000
Household Consumption (2 birds/period)	2	75.000	150.000
Traditional Ceremonial Needs (7 birds/period)	7	75.000	525.000
Remaining Chickens (10 birds)	10	75.000	750.000
Total Revenue			1.950.000
Total Profit			1.303.200

Source: Processed Primary Data, 2024.

The profit analysis showed that native chicken farmers earned a profit of IDR 1,303,200 per production cycle (7.5 months) (Table 1). This result differs from the findings of (Hadi et al., 2021a), who reported that intensive rearing of 200 native chickens, with a 5% mortality rate, generated a profit of IDR 1,400,000 per production cycle (3 months). This suggests that, under an intensive production system, profits over a 7.5-month period could reach approximately IDR 3,500,000. The difference in profitability indicates that the extensive production system practiced by native chicken farmers in the buffer areas of Kupang City has not yet provided optimal income.

On the other hand, although the extensive production system reduces several cost components, its low productivity has limited the profits earned by farmers. Another important consideration is the sustainability and future development of the enterprise, which cannot be assured because of its vulnerability to disease outbreaks resulting from very limited disease control measures. Therefore, the adoption of housing systems with appropriate biosecurity, particularly during the transitional period between the dry and rainy seasons, should be considered. Farmers also need a better understanding not only of improving productivity through nutritionally adequate feeding practices but also of proper housing management and effective disease control.

The evaluation of the outer model aims to define the specification of the relationship between the latent variables (constructs) and their indicators (Krova et al., 2025). The outer model describes how each indicator is related to its corresponding latent variable. The evaluation of the measurement model includes convergent validity and discriminant validity.

The results of the convergent validity evaluation (Table 2) indicate that all retained indicators have outer loading values greater than 0.70 (>0.70). The Cronbach's alpha and composite reliability values for all constructs are above 0.77, indicating that the variables used are reliable ((Sarstedt., n.d.)Similarly, the Average Variance Extracted (AVE) values for all latent variables in this study exceed 0.50. These values indicate adequate convergent validity, meaning that each latent variable is able to explain, on average, more than half (50%) of the variance in its indicators.

Table 2. Outer Loadings, Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE)

Construct	Items	Loadings	Alpha	Rho_A	CR	AVE
X1	X1_2	0,828	0,81125	0.83898	0.88445	0.71848
	X1_4	0,854				
	X1_7	0,861				
X2	X2_1	0,946	0,88926	0.93346	0.93075	0.81819
	X2_2	0,945				
	X2_3	0,817				
X3	X3_3	0,934	0,91751	0.92206	0.94818	0.85932
	X3_4	0,881				
	X3_5	0,906				
X4	X4_1	0,901	0,93362	0.94946	0.94972	0.79135
	X4_2	0,931				
	X4_4	0,791				
	X4_5	0,949				
	X4_6	0,867				
X5	X5_3	0,958	0,72941	1.04518	0.86698	0.76695
	X5_4	0,785				
X6	X6_3	0,981	0,98251	0.98258	0.98848	0.96622
	X6_4	0,980				
	X6_5	0,988				
Y1	Y1_2	0,978	0,95321	0.95357	0.97714	0.95529
	Y1_3	0,977				
Y2	Y2_1	0,845	0,7211	0.7648	0.87529	0.77853
	Y2_2	0,918				

Discriminant validity can be assessed using the cross-loading factor, the Fornell–Larcker criterion, and the Heterotrait–Monotrait ratio (HTMT). The loading values (Appendix 1) show that the loading of each indicator (manifest variable) on its corresponding latent variable (construct) is higher than its loadings on the other constructs. Therefore, discriminant validity is considered to have been established.

Similarly, the Fornell–Larcker criterion value of 0.818 is greater than the correlation between X1 and the other constructs in the same column (Krova et al., 2025). Furthermore, the results of this study indicate that all HTMT values are below 0.90, confirming that all constructs in the model demonstrate satisfactory discriminant validity (Henseler et al., 2015).

The inner model was evaluated using several indicators, including the path coefficients, the coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2). The results showed that the coefficient of determination (R^2) for the productivity construct (Y1) was 0.84242, while that for the competitiveness construct (Y2) was 0.6495. According to Chin, an R^2 value greater than 0.70 is considered strong. Meanwhile, the R^2 value of 0.6495 for the competitiveness construct (Y2) is classified as substantial (Purwanto & Sudargini, 2021). The analysis also showed that the Q^2 value for the competitiveness construct (Y2 = 0.446) exceeds 0.35, which is categorized as large. This indicates that the observed values are well reconstructed by the model, demonstrating good predictive relevance. The findings further revealed that input availability had a strong effect on productivity (f^2 = 0.56693), while human resource competency (f^2 = 0.12382) and biosecurity implementation (f^2 = 0.18148) had moderate effects. The remaining supporting factors exerted only weak effects on productivity.

With respect to competitiveness, price and market conditions (f^2 = 0.27605), human resource competency (f^2 = 0.26699), and productivity (f^2 = 0.25024) showed relatively strong effects compared with the other supporting factors. The results also indicated that the Standardized Root Mean Square Residual (SRMR) value was 0.095, which is below the threshold of 0.10. According to (Dirsehan & Henseler, 2023), this suggests that the proposed model has an acceptable fit with the empirical data. Furthermore, the Normed Fit Index (NFI) obtained in this study was 0.685. Although relatively low, it remains within the acceptable range of 0 to 1. Therefore, the proposed model can be considered appropriate and adequately fitted to the data.

Based on the analysis of the path coefficients, t-statistics, and p-values presented in Table 3, the following conclusions can be drawn. Traditional ceremonial needs (X1), price and market conditions (X2), and the supply of frozen chicken (X4) have no significant effect on productivity. Likewise, traditional ceremonial needs (X1), the supply of frozen chicken (X4), and biosecurity implementation (X6) have no significant effect on competitiveness.

In contrast, human resource competency (X3) and input availability (X5) have significant effects on productivity. Furthermore, price and market conditions (X2), human resource competency (X3), input availability (X5), biosecurity implementation (X6), and productivity (Y1) all have significant effects on competitiveness (Y2).

Table 3. Path Coefficients Between Constructs, Mean, Standard Deviation (STDEV), t-Values, and p-Values

	Original Sample (O)	*Sample Mean (M)*	*Standard Deviation (STDEV)*	*T Statistics (|O/STDEV|)*	*P Values*
X1 -> Y1	0,0135	0,0235	0,12144	0,11115	0,9115
X1 -> Y2	-0,33597	-0,3285	0,19842	1,69325	0,09047
X2 -> Y1	0,01626	0,00859	0,07372	0,22054	0,82546
X2 -> Y2	0,39296	0,39479	0,12442	3,15842	**0,0016**
X3 -> Y1	-0,23637	-0,22965	0,09366	2,52361	**0,01165**
X3 -> Y2	0,37241	0,36133	0,18603	2,00186	**0,04535**
X4 -> Y1	-0,03074	-0,04042	0,08475	0,36276	0,7168
X4 -> Y2	0,165	0,15413	0,13557	1,21712	0,22362
X5 -> Y1	0,4504	0,43925	0,08078	5,57542	**2,6E-08**
X5 -> Y2	0,51092	0,49908	0,16737	3,05259	**0,00228**
X6 -> Y1	0,37566	0,39087	0,13889	2,70468	**0,00686**
X6 -> Y2	0,13976	0,1343	0,21892	0,6384	0,52324
Y1 -> Y2	0,74604	0,75235	0,20855	3,57729	**0,00035**

A mediation analysis was subsequently conducted to examine whether productivity (Y1) serves as an intervening variable in the relationship between the exogenous latent variables (all X variables) and the endogenous latent variable, competitiveness (Y2). The results indicate that traditional ceremonial needs, price and market conditions, human resource competency, the supply of frozen chicken, the availability of production inputs (sapronak), and biosecurity implementation all exert indirect effects on competitiveness through productivity.

Table 4. Specific Indirect Effects, Mean, STDEV, T_Values, P_Values

	Original Sample (O)	*Sample Mean (M)*	*Standard Deviation (STDEV)*	*T Statistics (|O/STDEV|)*	*P Values*
X1 -> Y1 -> Y2	0,01007	0,02523	0,09784	0,10292	0,91803
X2 -> Y1 -> Y2	0,01213	0,00673	0,05767	0,21032	0,83342
X3 -> Y1 -> Y2	-0,17634	-0,16639	0,07552	2,33517	**0,01957**
X4 -> Y1 -> Y2	-0,02294	-0,0328	0,06994	0,32797	0,74295
X5 -> Y1 -> Y2	0,33602	0,32548	0,09428	3,5641	**0,00037**
X6 -> Y1 -> Y2	0,28026	0,29751	0,1495	1,87465	0,0609

Based on the path coefficients, t-statistics, and p-values (Table 4), it can be concluded that productivity does not significantly mediate the effects of traditional ceremonial needs, price and market conditions, the supply of frozen chicken, and biosecurity implementation on competitiveness. However, productivity does significantly mediate the effects of human resource competency and input availability on competitiveness.

These findings indicate that efforts to enhance competitiveness should focus on improving productivity, particularly by strengthening human resource competency and ensuring the availability of production inputs.

The analysis showed that, of the six exogenous latent variables, only three had a significant effect on productivity (Y1), namely human resource (HR) competency (X3), input availability (X5), and biosecurity implementation (X6).

Human Resource Competency (X3). The hypothesis that farmer human resource competency (X3) has a significant relationship with livestock productivity (Y1) was accepted. One of the most important production inputs is labor provided by the farmers themselves. Better human resource capacity in managing native chicken enterprises is expected to improve productivity. HR competency encompasses both quantitative and qualitative aspects. The quality of human resources among farmers in Kupang Regency remains relatively low, with 63% having only junior high school, elementary school, or no formal education, and 22% having no formal education at all. This low educational level affects farm management practices. Effective management functions can only be implemented when farmers possess adequate knowledge and skills. Therefore, improved farm management is expected to enhance the productivity of native chicken farming.

These findings are consistent with the study by Rojas et al., which examined the influence of the Human–Animal Relationship (HAR) on animal welfare and productivity. The study concluded that improved farming technology and automation capable of fostering positive human–animal interactions remain fundamental requirements for enhancing animal welfare, thereby improving animal health and production.

Input Availability (X5). Production inputs are essential for the survival and productivity of native chickens. These inputs include feed, veterinary medicines, housing, and equipment. At the farm level, native chicken feed mainly relies on maize, which also competes with human consumption. Farmers in Kupang Regency generally provide feed based on availability rather than according to the birds' nutritional requirements. This practice negatively affects productivity. In addition, most native chickens are raised under free-range systems without proper housing. Feeding is generally carried out only in the morning and evening, while monitoring of pests and diseases is minimal. According to (Hadi et al., 2021) broiler productivity is positively influenced by (a) the number of chicks, (b) feed quantity, (c) veterinary drugs, vitamins, and

chemicals (OVK), (d) farming experience, (e) partnership arrangements, and (f) integration with core companies, whereas it is negatively affected by larger housing area and split-feeding practices.

Biosecurity Implementation (X6). The analysis showed a significant relationship between biosecurity implementation (X6) and native chicken productivity (Y1). According to Otte et al., rural poultry farmers generally do not prioritize investment in biosecurity, even though it is cost-effective. However, when disease outbreaks pose broader societal risks and generate significant externalities, farmers should be supported in investing in biosecurity measures. Likewise, McMullin emphasized that biosecurity is an essential tool for disease control across all production systems, particularly where disease pressure is high or poultry density is substantial. (Lee et al., 2023) et al. highlighted the importance of establishing national and international poultry biosecurity databases. Such databases would facilitate continuous improvement and encourage stakeholders to strengthen biosecurity standards.

The analysis revealed that, of the six exogenous latent variables hypothesized to affect competitiveness, only price and market conditions (X2), human resource competency (X3), input availability (X5), and productivity (Y1) had significant effects. In addition, productivity served as an intervening variable that mediated the effects of HR competency and input availability on the competitiveness of native chicken enterprises.

Price and Market Conditions (X2). The study found that price and market conditions, as well as government policy, did not significantly affect competitiveness. This finding differs from the results reported by Ginting et al., who concluded that the competitiveness of processed cocoa (cocoa butter) from North Sumatra was significantly influenced by export volume, domestic prices, export prices, Ghana's export prices, and export tax policies in the Malaysian and Singaporean markets. Similarly, (Hendri, 2021) found that soybean production and exports positively and significantly influenced Indonesia's soybean competitiveness, whereas exchange rates and government policies had no significant effect. The difference may be explained by the fact that native chickens are local products intended for domestic markets, whereas cocoa and soybeans are high-value export commodities.

(Yudiarini et al., 2022) identified several constraints to the development of native chicken enterprises, including limited market access, disease outbreaks, high feed prices, labor shortages, and the limited availability of day-old chicks (DOC). The study suggested that profitable large-scale native chicken production requires a well-developed breeding industry supplying quality DOC, well-planned biosecurity systems, and sustainable market development.

According to Dhita et al., strong consumer demand indicates substantial business potential for native chicken production. Meanwhile, (Saptana et al., 2022) argued that transforming comparative advantage into competitive advantage requires government policies aimed at reducing market distortions and transaction costs. Furthermore, achieving competitiveness at the national level requires integration between macroeconomic policies and micro-level business activities.

Human Resource Competency (X3). The study by Winarti and Purnomo demonstrated that capital, human resources, product marketing, and government support jointly exert significant positive effects on competitiveness. Similar findings were reported by (Widyaningsih & Rahma, 2022) in the batik industry, where product innovation, product quality, and skilled human resources significantly enhanced competitiveness. Likewise, (Aedah et al., 2016) concluded that native chicken enterprises possess good competitiveness and considerable development potential. Their findings emphasized that competitiveness depends largely on sound farm management, high-quality human resources, and a supportive business environment.

Input Availability (X5). (Syamsu et al., 2020) provided guidance for managers and owners of poultry SMEs seeking to improve business competitiveness by considering entrepreneurship, the business

environment, and internal resources. Their results showed that internal resources have a positive and significant effect on business competitiveness.

Productivity (Y1). The findings of this study indicate that productivity mediates the effects of HR competency and input availability on competitiveness. These findings are consistent with previous studies, although they involved different commodities. According to (Ginting et al., 2021) export volume is a major determinant of competitiveness. Since productivity influences export volume and supply continuity, it indirectly affects export competitiveness. Therefore, improving productivity requires ensuring adequate production inputs. Similarly, Laili found that U.S. GDP, exchange rates, prices, and production jointly influenced Indonesia's footwear exports to the United States. Likewise (Bowo et al., 2016) reported that production, exports, and prices simultaneously had significant effects on Indonesia's soybean competitiveness index.

Based on these findings, efforts to revitalize the factors supporting the competitiveness of native chicken enterprises in the West Timor region, which serves as the buffer area for the Kupang City market, should focus on improving broiler chicken pricing and market conditions, enhancing human resource competency, and ensuring the availability of production inputs. To date, government involvement in the development of native chicken farming has been limited. The government is therefore expected to play a more active role by regulating prices and markets through frozen chicken supply quotas, providing extension services and training for farmers, and ensuring an adequate supply of feed for native chickens.

4. Conclusion

Based on the results and discussion, it can be concluded that the production performance of native chicken farming practiced by rural households in the West Timor region, which serves as the buffer area for the Kupang City market, is relatively good in terms of its low mortality rate of 5.65%. However, productivity, averaging 16 birds per production cycle (7.5 months), and profit, amounting to IDR 1,303,200 per production cycle (7.5 months), remain relatively low. The supporting factors that have a significant direct effect on productivity are the qualifications and competency of farmers' human resources and the availability of production inputs for native chicken farming. The factors that significantly influence competitiveness are price and market conditions, farmers' qualifications and competency, input availability, and productivity. Furthermore, productivity significantly mediates the effects of farmers' qualifications and competency and input availability on competitiveness.

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