

(Research) Article

Analysis of The Determinants of Layer Chicken Egg Supply in Tabanan Regency

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Abstract: This research is motivated by the dynamics of the layer chicken egg supply in Tabanan Regency. The purpose of this study is to analyze the factors that have the effect on the supply of layer chicken eggs, particularly the policy of banning the use of Antibiotic Growth Promoters (AGP), the number of layer chicken breeders, and the selling price of layer chicken eggs. The research method used is quantitative analysis with a multiple linear regression approach, using primary data obtained through questionnaires distributed to 101 layer chicken farmers in Tabanan Regency and analyzed with the assistance of EViews 12 software. The results show that the policy variable of banning the use of AGP has a negative and significant effect on the supply of layer chicken eggs. In contrast, the number of layer chicken breeders and the selling price of layer chicken eggs have a positive and significant effect on the supply. The coefficient of determination (R^2) value of 0,316 indicates that the three independent variables are able to explain 31,6% of the variation in the supply of layer chicken eggs, while the remaining variation is affected by other factors outside the research model.

Keywords: AGP; Egg Selling Price; Layer Chicken Breeders; Multiple Linear Regression; Tabanan Regency.

1. Introduction

According to Law (UU) Number 18 of 2012 concerning Food, food security can be defined as a condition in which the food needs of all Indonesian people are adequately fulfilled. This is reflected in the sufficient availability of food, both in terms of quantity and quality, that is affordable to the purchasing power of the community. Food commodities, often referred to as staple goods, are the primary needs of the Indonesian population. The availability of staple goods plays a very strategic role in strengthening food security, economic stability, and national political stability. Therefore, the issue of staple food availability receives serious attention from the government.

As one of the staple needs, chicken eggs play a crucial role in meeting the nutritional requirements of society and ensuring a balanced intake of nutrients. Eggs are not only an essential commodity for household consumption but also for hotels and food industries such as street vendors, restaurants, and others (Lestariasih, N. K. L., Sudiana, 2019). Along with the increasing public awareness of the importance of healthy eating patterns, the demand for eggs as an affordable and nutritious source of protein tends to rise in various regions. However, despite its great potential, farmers in many areas still face diverse challenges.

In recent years, the poultry industry, particularly layer chicken egg production, has encountered several challenges. One noticeable phenomenon is the decline in layer chicken egg consumption across several regions in Bali, including Tabanan Regency, which is one of the main centers of egg production. The consumption of layer chicken eggs serves as an important indicator for determining demand in a given region. Data on per capita egg consumption in Tabanan Regency in Table 1 show fluctuations from 2018 to 2024. In 2018,

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consumption was recorded at 2.130 eggs per capita per week, which gradually increased to its peak in 2021 at 2,806 eggs per capita per week. However, after 2021, consumption began to decline, reaching 2.308 eggs in 2022, 2.292 eggs in 2023, and 2.047 eggs in 2024. This decrease may be attributed to several factors, such as changes in purchasing power, fluctuations in egg prices, or shifts in consumption patterns.

The decline in layer chicken egg consumption among the public may be caused by several factors. The growing awareness of the importance of a healthy and diverse diet has led consumers to shift to other protein sources that they perceive to be more suitable for their dietary preferences, which potentially reduces egg demand in local markets. Another suspected cause of the decline in consumption is the price disparity between local markets and markets outside the region, where egg prices in local markets tend to be lower. Consequently, when prices increase in the local market, the percentage change in the quantity of eggs demanded becomes smaller.

Table 1. Average Weekly Per Capita Consumption of Layer Chicken Eggs by Regency/City in Bali, 2018–2024 (Units)

Kabupaten/Kota	2018	2019	2020	2021	2022	2023	2024
Jembrana	1.656	1.907	2.263	1.945	1.819	1.997	1.994
Tabanan	2.130	2.208	2.233	2.806	2.308	2.292	2.047
Badung	2.250	2.137	2.204	2.323	2.082	2.158	2.160
Gianyar	1.840	1.839	1.954	2.143	1.750	1.972	2.019
Klungkung	2.118	1.783	2.020	1.875	2.098	2.015	2.092
Bangli	2.233	2.029	1.808	2.136	2.185	2.124	2.074
Karangasem	1.626	1.598	1.800	1.791	1.537	1.662	1.546
Buleleng	2.025	1.899	2.112	2.063	1.934	1.946	1.891
Kota Denpasar	2.109	2.248	2.360	2.516	2.418	2.368	2.308

Source: Central Statistics Agency, 2025 (processed data).

This fluctuating consumption trend may also have the effect on the supply of layer chicken eggs in Tabanan Regency, considering that consumption levels are closely related to production and distribution. When demand decreases, farmers may face challenges in maintaining stable selling prices. Conversely, when consumption increases, higher production levels are required to meet market demand. This condition needs attention given that Bali is one of the main poultry centers and a strategic area supporting the production of layer chicken eggs. Based on data from the Central Bureau of Statistics of Bali Province, Tabanan Regency, as one of the largest producers, recorded a production decline from 7.187,56 tons in 2020 to 7.024 tons in 2022, as illustrated in Figure 1 below.

Figure 1. Production of Layer Chicken Eggs in Tabanan Regency, 2012–2022 (tons)



Source: Central Statistics Agency of Bali Province, 2025 (processed data).

The challenges faced by layer chicken egg farmers are not limited to demand fluctuations but also extend to various factors that can affect the supply of eggs and production sustainability. One of the main factors is the policy banning the use of Antibiotic Growth Promoters (AGP) based on Law No. 18/2009 in conjunction with Law No. 41/2014 concerning Livestock and Animal Health, which has a significant effect on production efficiency. This policy requires farmers to find alternative ways to maintain the health and productivity of laying hens, such as the use of natural feed additives. However, these alternatives may increase feed and maintenance costs, reducing production incentives for farmers.

In addition, the number of laying hens is a crucial factor in determining production capacity. The more hens a farmer owns, the greater the number of eggs that can be produced and supplied to the market. However, limited capital and fluctuating feed prices often restrict farmers' ability to increase their flock size. Another factor that affects the egg supply is the selling price at the farm level, which tends to fluctuate due to market dynamics and production costs. When farm-level egg prices decrease, farmers may experience financial pressure, leading them to reduce production or even cease operations.

This study aims to analyze the effect of the AGP ban policy, the number of layer chicken breeders, and the selling price of layer chicken eggs on the supply level of layer chicken farmers in Tabanan Regency. Based on the observed decline in egg consumption and production in the Tabanan region, which disrupts farmers' ability to meet both local and regional market demands and ultimately affects the stability of the egg supply chain in Bali, this study is expected to provide strategic recommendations for layer chicken egg farmers in Tabanan Regency as key suppliers in Bali to maintain production sustainability and business stability.

2. Materials and Method

This study employed a quantitative approach with an associative design to analyze the effect of the policy banning the use of Antibiotic Growth Promoters (AGP), the number of layer chicken breeders, and the selling price of layer chicken eggs on the supply level of layer chicken eggs in Tabanan Regency. The research location was selected purposively because Tabanan is one of the main centers of layer chicken egg production in Bali, with a population of approximately 8,000 hens and 133 active farmers. Egg production in this region not only fulfills local demand but also makes a significant contribution to the supply of surrounding areas such as Denpasar and Badung. The phenomena of production fluctuations and the decline in per capita consumption in several areas make Tabanan a relevant location for studying the factors that have the effect on the level of layer chicken egg supply (Department of Agriculture of Tabanan Regency, 2023; Sugiyono, 2013).

The object of this research is the supply level of layer chicken eggs (dependent variable), which is affected by the policy banning the use of AGP, the number of layer chicken breeders, and the selling price of layer chicken eggs (independent variables). The data used include primary data obtained through questionnaires distributed to 100 farmers, as well as secondary data from the Department of Agriculture of Tabanan Regency, journals, and previous reports. The number of samples was determined using the Slovin method from the total population of 133 farmers, resulting in 100 respondents representing each district in Tabanan. Data collection techniques included observation and direct interviews, while data processing was carried out using multiple linear regression analysis with the assistance of the EViews 12 software to test the relationships among the research variables (Nurdin & Hartati, 2019; Sugiyono, 2013).

Data analysis was conducted using a multiple linear regression model complemented by classical assumption tests, such as normality, multicollinearity, and heteroskedasticity tests, to ensure the model's validity. Furthermore, the F-test was performed to examine the simultaneous effect of the three independent variables on the dependent variable, while the t-test was used to determine the partial effect of each variable. The results of this analysis are expected to provide a comprehensive understanding of the extent to which the AGP ban policy, the number of layer chicken breeders, and the selling price of layer chicken eggs have the effect on the supply level of layer chicken eggs in Tabanan Regency. Therefore, the findings may serve as a basis for policymaking in the poultry farming sector (Utama, 2016; Wirawan, 2017).

3. Results

Data analysis

Results of Multiple Linear Regression Analysis

Multiple linear regression analysis is used to measure the strength of the relationship between two or more variables and to indicate the direction of the relationship between the independent variables such as the policy banning the use of Antibiotic Growth Promoters (AGP), the number of layer chicken breeders, and the selling price of layer chicken eggs and the dependent variable (layer chicken egg supply). The results of the multiple linear regression analysis are presented in Table 2 below.

Table 2. Results of Multiple Linear Regression Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0,113544	3,404009	-0,033356	0,9735
AGP	-0,349536	0,123021	-2,841263	0,0055
PARENT	3,66E-05	1,32E-05	2,771338	0,0067
SELLING PRICE	0,000179	7,27E-05	2,460596	0,0156

Source: EVIEWS 12 output (processed data), 2025

Based on the results of the multiple linear regression analysis in Table 2, the regression model can be expressed as follows:

The interpretation of the model is as follows

- The constant value of $-0,114$ indicates that if there are no changes in the independent variables (the AGP ban policy, the number of layer chicken breeders, and the selling price), the dependent variable (supply) is expected to have a negative value of $-0,114$.
- The regression coefficient of the AGP ban policy (X_1) is $-0,350$, which is negative. This means that the implementation of the AGP ban policy decreases egg production by approximately 350 eggs per 1.000 chickens.
- The regression coefficient of the number of layer chicken breeders (X_2) is $0,00000366$, which is positive. This means that if the number of layer chickens increases by one bird, while other independent variables remain constant, the supply of eggs will increase by $0,00000366$ eggs.
- The regression coefficient of the selling price of layer chicken eggs (X_3) is $0,000179$, which is positive. This means that if the selling price of layer chicken eggs increases by Rp1.000, the egg supply will increase by approximately $0,179$ eggs.

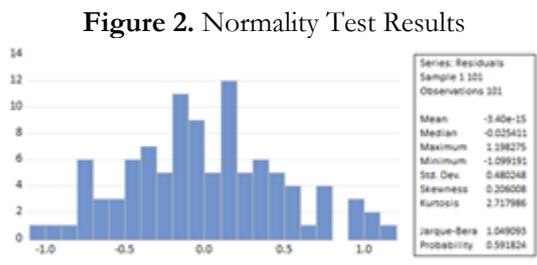
Classical Assumption Test Results

a. Normality Test

The normality test aims to determine whether the residuals produced by the regression model are normally distributed or not (Utama, 2016). There are two approaches commonly used to detect the normality of residuals, namely graphical analysis and statistical analysis. In this study, the normality test was conducted using a statistical method, specifically the Jarque-Bera Test. The decision-making in the Jarque-Bera test is based on the probability value (p-value) compared with the significance level of $\alpha = 0,05$. The basis for decision-making is established as follows:

- If the probability value $> 0,05$, the residuals are considered normally distributed.
- If the probability value $< 0,05$, the residuals are not normally distributed.

The results of the normality test using statistical analysis can be seen in the following figure.



Source: EViews 12 output (processed data), 2025

Based on the results of the normality test using the Jarque-Bera test in Figure 2, it is known that the probability value is 0,59. Since the probability value is greater than the significance level of 0,05, it can be concluded that the normality assumption is satisfied.

b. Multicollinearity Test

The multicollinearity test aims to determine whether there is a relationship or correlation among the independent variables in a regression model (Utama, 2016). If the independent variables are correlated with each other, the model experiences a multicollinearity problem. To detect this issue, the Variance Inflation Factor (VIF) value can be used, where a regression model is considered good if the VIF value is < 10. The results of the multicollinearity test are presented in the following table.

Table 3. Multicollinearity Test Results.

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	11,58728	4922,012	NA
AGP	0,015134	2,418714	1,508703
PARENT	1,74E-10	5,066973	1,502502
SELLING PRICE	5,28E-09	4898,491	1,005171

Source: EViews 12 output (processed data), 2025

In this study, the data used in the multicollinearity test were obtained from the independent variables. Based on the table above, the results are as follows.

- 1) The VIF value for the variable AGP usage ban policy is 1,508 < 10, indicating that this independent variable does not show symptoms of multicollinearity.
- 2) The VIF value for the parent stock (INDUK) variable is 1,502 < 10, indicating that this independent variable does not show symptoms of multicollinearity.
- 3) The VIF value for the selling price (HARGAJUAL) variable is 1,005 < 10, indicating that this independent variable does not show symptoms of multicollinearity.

c. Heteroscedasticity Test

The heteroskedasticity test is used to determine whether there is an inequality of variance in the residuals across observations within a regression model. A good regression model is one that is free from heteroskedasticity symptoms. To detect this issue, one of the methods that can be applied is the Glejser Test. This test is conducted by regressing the absolute residual values (AbsRes) on the independent variables. The decision-making criteria in the Glejser Test are as follows:

- 1) If the Chi-Square probability value > 0,05, it can be concluded that heteroskedasticity does not occur.
- 2) If the Chi-Square probability value < 0,05, it can be concluded that heteroskedasticity occurs.

The results of the heteroskedasticity test in this study are presented in the following table.

Table 4. Heteroskedasticity Test Results.

Heteroskedasticity Test: Glejser			
F-statistic	1,785680	Prob. F(3.97)	0,1550
Obs*R-squared	5,286017	Chi-Square Prob.(3)	0,1520
Scaled explained SS	4,975016	Chi-Square Prob.(3)	0,1736

Source: EVIEWS 12 output (processed data), 2025

Based on the table above, it is found that the Prob. Chi-Square value is 0,1520, which is greater than 0,05. Therefore, it can be concluded that the assumption of homoskedasticity is fulfilled, meaning that heteroskedasticity does not occur in the model.

Results of the Coefficient of Determination (R²) Test

The coefficient of determination functions to indicate the extent to which the model is capable of explaining variations in the dependent variable. The value of the coefficient of determination ranges from 0 to 1. The closer the value is to 1, the greater the contribution of the independent variables in influencing the dependent variable.

Table 5. Results of the Coefficient of Determination (R²) Test

R-squared	0,316335
Adjusted R-squared	0,295191

Source: EVIEWS 12 output (processed data), 2025

Based on the results of the coefficient of determination test presented in Table 5, the R² (R-squared) value of the regression model is used to determine the extent to which the independent variables explain the dependent variable. The R² value of 0,316 indicates that 31,6% of the variation in the dependent variable, namely the supply of layer chicken eggs, can be explained by the variations in the three independent variables: the policy of banning the use of AGP, the number of layer parent stock, and the selling price of layer chicken eggs. Meanwhile, the remaining 68,4% (100% - 31,6% = 68,4%) is influenced by other variables outside the scope of this study.

Results of Simultaneous Regression Coefficient Test (F Test)

The simultaneous or overall test is conducted to determine the effect of several independent variables namely, the policy banning the use of AGP, the number of layer parent stock, and the selling price of layer chicken eggs collectively on one dependent variable, namely the supply of layer chicken eggs in Tabanan Regency. The basis for decision-making in the F-Test is as follows:

- If the significance value (Sig.) < 0,05 or F-count > F-table, then the independent variables simultaneously have a significant effect on the dependent variable.
- If the significance value (Sig.) > 0,05 or F-count < F-table, then the independent variables simultaneously have no significant effect on the dependent variable.

Table 6. Results of Simultaneous Regression Coefficient Test (F Test)

F-statistic	14,96078
Prob(F-statistic)	0,000000

Source: EVIEWS 12 output (processed data), 2025

This study used a sample of 101 observations, with three independent variables and a significance level of 5%, resulting in an F-table value of $(k; n-k-1) = (3; 97) = 2,698$. Based on Table 6, the significance value obtained is $0.000 < 0,05$, and the calculated F-value (F-count) is $14,960 > F\text{-table } 2,698$. This means that the independent variables the policy banning the use of AGP, the number of layer parent stock, and the selling price of layer chicken eggs have a simultaneous and significant effect on the dependent variable, namely the supply of layer chicken eggs in Tabanan Regency.

Results of the Partial Regression Coefficient Test (t-Test)

The partial test (t-test) is conducted to determine the effect of each independent variable on the dependent variable individually. The t-test is performed by comparing the significance value (Sig.) with the alpha level of 0.05, as well as comparing the calculated t-value (t-count) with the critical t-value (t-table). The basis for decision-making is as follows.

- a. If $\text{Sig.} < 0,05$, or for a positive coefficient when $t\text{-count} > t\text{-table}$, and for a negative coefficient when $-t\text{-count} < -t\text{-table}$, then the independent variable has a partial effect on the dependent variable.
- b. If $\text{Sig.} > 0,05$, or for a positive coefficient when $t\text{-count} < t\text{-table}$, and for a negative coefficient when $-t\text{-count} > -t\text{-table}$, then the independent variable has no partial effect on the dependent variable.

This study used a sample of 101 respondents, with three independent variables and a significance level of 5%, resulting in a t-table value of $(\alpha/2; n-k) = (0,025; 98) = 1,984$.

1) The Effect of the Policy Banning the Use of AGP on the Supply of Layer Chicken Eggs

Based on Table 6, the variable representing the policy banning the use of AGP has a significance value of 0,0055, which is smaller than 0.05. Meanwhile, the t-count value is $-2,841 < -1,984$ (t-table), indicating that the policy banning the use of AGP has a negative and significant partial effect on the supply of layer chicken eggs in Tabanan Regency. The regression coefficient of $-0,350$ shows that each implementation of the AGP ban policy decreases the supply of eggs by approximately 350 eggs per 1.000 chickens, assuming other variables remain constant.

2) The Effect of the Number of Layer Parent Stock on the Supply of Layer Chicken Eggs

Based on Table 6, the variable representing the number of layer parent stock has a significance value of 0,0067, which is smaller than 0,05. The t-count value is $2,771 > 1,984$ (t-table), meaning that the number of layer parent stock has a positive and significant partial effect on the supply of layer chicken eggs in Tabanan Regency. The regression coefficient of 0,00000366 indicates that each additional one parent stock chicken increases the egg supply by 0,00000366 units per day, assuming other variables remain constant.

3) The Effect of the Selling Price of Layer Chicken Eggs on the Supply of Layer Chicken Eggs

Based on Table 6, the variable representing the selling price of layer chicken eggs has a significance value of 0.015, which is smaller than 0.05. The t-count value is $2,460 > 1,984$ (t-table), indicating that the selling price of eggs has a positive and significant partial effect on the supply of layer chicken eggs in Tabanan Regency. The regression coefficient of 0,000179 means that for every Rp1.000 increase in the selling price, the egg supply increases by approximately 0,179 eggs per day, assuming other variables remain constant.

Discussion of Research Results

Most of the findings in this study are consistent with the initial hypotheses, showing that the independent variables examined namely the policy banning the use of Antibiotic Growth Promoters (AGP), the number of layer parent stock, and the selling price of layer chicken eggs have a significant effect on the supply of layer chicken eggs in Tabanan Regency. However, the direction of influence varies, with the AGP ban policy showing a negative effect, while the number of parent stock and the selling price have positive effects. Each independent variable's effect on the dependent variable is discussed as follows.

The policy banning the use of Antibiotic Growth Promoters (AGP) was found to have a negative and significant effect on supply, indicating that the implementation of this policy has led to a decline in egg production. Previous studies have also provided evidence regarding the factors that affect the supply of layer chicken eggs. Since the AGP ban policy was enforced in January 2018, the production of layer chicken eggs has decreased (Ilham & Saptana, 2018). This policy requires farmers to shift from AGP-based rearing systems to non-AGP systems aligned with Good Farming Practices (GFP). If this transition is not accompanied by proper adjustments, the productivity of layer chickens may decline, leading to a reduced number of eggs supplied to the market.

Similarly, Widiatmoko from the Faculty of Animal Science, Gadjah Mada University (2020), explains that without AGP use, farmers face new challenges, particularly concerning livestock health and production. Chickens become more vulnerable to diseases such as necrotic enteritis and dysbacteriosis, which can increase mortality rates and lower egg productivity. According to an interview with Mr. Ketut Sawer, a layer chicken farmer in Banjar Kesambahan Kaja, Penebel District, the government's policy of banning AGP was implemented without providing viable alternative solutions, making it difficult for farmers to maintain the health and productivity of their chickens. Similarly, Mr. Nengah Sumerta, a

farmer from Rejasa Village, reported that since the policy was enacted, his livestock has become more susceptible to contagious diseases. Before the ban, he kept around 4.000 chickens, but due to high feed costs and the effects of the AGP ban, he has reduced his stock to around 2.000 chickens. His pig farming business has also been affected by the same policy.

In addition to the AGP policy, the number of layer parent stock plays a crucial role in determining egg supply. This study found that the number of parent stock has a positive and significant effect on supply. According to Lestariasih and Sudiana (2019), factors such as capital, production, price, and livestock population significantly affect farmer income in Penebel District. The number of chickens maintained determines production capacity the more hens there are, the higher the potential egg supply. Similarly, a study by Aden, Kadir, and Jakfar (2020) showed that the number of chickens raised at the UPTD Balai Ternak Non-Ruminansia in Aceh Besar directly determined egg availability in the market, regardless of whether they were kept in open or closed housing systems.

An interview with Mr. Mertajaya, a farmer in Ubung Village, Penebel District, revealed that he manages three poultry farms with relatively large populations. Interestingly, he distributes his production strategically one farm is dedicated to supplying the market in Lombok, while the other two serve local demand in Bali. This reflects that production capacity in Tabanan not only meets local needs but also supports inter-regional distribution. Large-scale farms like these play an essential role in maintaining the stability of egg supply in Bali and demonstrate Tabanan's potential as a key supplier for out-of-island markets.

The selling price of eggs also significantly affects supply. A study by Sitompul, Lubis, and Hutajulu (2013) found that egg prices and the population of laying hens contribute around 85% to the egg supply in North Sumatra. Meanwhile, Nursida, Kusumawati, and Minanga (2021) discovered that egg prices negatively affect sales volume, meaning that price increases can reduce the number of eggs sold, as observed at PT. Manuntung Raya in Balikpapan Utara.

An interview with Mr. Kadek Putra Adnyana, a farmer in Senganan Village, revealed that egg prices in Bali generally follow price references from Java. Even though Bali's egg production is relatively high, market mechanisms and distribution systems are still strongly influenced by price fluctuations in Java the main production center. This situation limits local farmers' control over pricing. Thus, even when egg supply in Tabanan is abundant, farmer profits remain heavily dependent on market dynamics outside the region. The interregional price integration forces farmers in Bali to adjust their business strategies based on market changes in Java.

Logically, when selling prices decline, farmers face financial pressure since production costs especially feed do not decrease proportionally. This makes poultry farming less profitable, prompting farmers to minimize losses through strategies such as early culling of their layer chickens. This phenomenon was observed in Tabanan, where Mr. Made Artajaya, a farmer from Senganan Village, reported that due to low egg prices and high feed costs, he had to reduce his flock by selling some hens before they reached their full productive age. This early culling directly reduced daily egg production capacity, thus lowering overall egg supply in the market. This finding highlights that selling prices not only influence sales volume but also shape farmers' strategic decisions in maintaining or reducing their livestock population.

4. Conclusion

Based on the results of the analysis and discussion in the previous chapter, it can be concluded that the supply of layer chicken eggs in Tabanan Regency is influenced by several main factors, namely the policy prohibiting the use of Antibiotic Growth Promoters (AGP), the number of layer breeder hens, and the selling price of layer chicken eggs. The AGP ban policy has been proven to have a significant negative effect on supply, as it leads to a decrease in the productivity of layer chickens due to increased susceptibility to disease. Conversely, the number of layer breeder hens shows a significant positive effect, where the greater the population of hens raised, the higher the egg production capacity that can be achieved. The selling price factor also has a significant positive effect on supply, although the price determination mechanism in Bali is still influenced by market fluctuations in Java. Simultaneously, these three variables are able to explain 31,6% of the variation in the supply of layer chicken eggs, while the remaining percentage is influenced by other factors outside the model of this study.

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