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Linear Regression Analysis: The Impact of the Total Population on Halal Certification Applicants in Indonesia (2021-2022)

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Abstract

This research investigates the relationship between the total population and the number of halal certification applicants in Indonesia from 2021 to 2022 by employing an applied statistical approach with a focus on the linear regression test. The objective is to discern the extent to which the total population influences the demand for halal certification. The study utilized secondary data collected from various sources and processed through statistical software. The findings reveal a statistically significant relationship between the total population and halal certification applicants, as evidenced by the low significance value (0.001). The regression equation, 49,003-0.000X, indicates a negative correlation, suggesting that as the total population increases, the number of halal certification applicants tends to decrease. The applicative contribution of this research lies in providing valuable insights for policymakers, industries, and halal certifying bodies. Understanding the dynamics of population influence on halal certification demand can guide strategic planning for meeting the growing needs of consumers. However, it is noteworthy that the regression coefficient indicates a nonsignificant contribution of the total population in explaining variations in halal certification applicants, emphasizing the need for additional factors to be considered in comprehensive analyses of halal certification.

Keywords: *Total population influence; Halal certification applicants; Linear regression test*

Introduction

This research is a response to discussions surrounding important terms such as 'halal food', 'halal industry', and 'halal certification' within Indonesia's predominantly Muslim population. As awareness of halal products increases, standardization issues become more critical. The significant Muslim population in Indonesia, as a Muslim majority country, highlights the need for a thorough analysis of this phenomenon using a linear regression test approach (1). The halal food industry plays a significant role in Indonesia's economy and daily life due to the importance of halal in the lives of Muslims. The halal food industry plays a significant role in Indonesia's economy and daily life due to the importance of halal in the lives of Muslims. The halal food industry plays a significant role in Indonesia's economy and daily life due to the importance of halal in the lives of Muslims. To better understand the dynamics of demand for halal certification, it is crucial to consider factors such as the country's large Muslim population (2).

Including a linear regression test in this study is a crucial step. This approach enables us to measure the strength of the relationship between key variables, namely, the total population and the number of halal certification applicants, and provides the ability to make predictions (3). By formulating a mathematical model, such as a regression equation,

this research develops a powerful analytical tool to understand the extent to which changes in one variable can affect another (4). This function enables researchers to use linear regression to identify and quantify the degree of dependency between variables. This approach provides a deeper understanding of the impact of the Muslim population on the demand for halal certification (5). The research aims to answer not only the question of 'what' is happening but also 'how much' and 'how' the relationship between the total population and the number of halal certification applicants is formed (6). Thus, the linear regression test is an important tool for understanding the dynamics of the halal industry in Indonesia (7).

This research provides an in-depth understanding of the population's influence on the demand for halal certification. This research provides an in-depth understanding of the population's influence on the demand for halal certification. This research provides an in-depth understanding of the population's influence on the demand for halal certification. This knowledge can guide strategic planning for policy makers, industry, and halal certification bodies to meet evolving consumer needs. However, it is important to note that the regression coefficient indicates an insignificant contribution from the total population in explaining the variation in the number of applicants for halal certification. This highlights the need to consider additional factors in a comprehensive analysis of halal certification trends (8).

Results and Discussion

This research focused on analysing the correlation between the population by religion and the number of halal certificate registrations in Indonesia during the 2021–2022 period. This research is expected to clarify the dynamics within the scope of Islamic economic development (9). A linear regression test can provide a regression coefficient that indicates how much contribution or influence the population by religion has on the number of halal certificate registrations in Indonesia during the 2021–2022 period (10). The results of this test are subsequently analysed to determine if there is a positive or negative coefficient that represents the effect of variations in population size on the number of halal certificate registrations (11). A positive value indicates that both have a unidirectional relationship, and a negative value indicates an opposite relationship (12). This statistical research aims to determine whether there is a statistically significant relationship between population size and the number of halal certificate registrations in Indonesia (2).

Data Description

This study used data sourced from the central bureau of statistics to determine the population in the 2021–2022 period and used data sourced from the Ministry of Religion of the Republic of Indonesia to determine the number of halal certificate registrations. The data are shown in the table below.(13)

Table 1. Total population (independent variable) and Number of halal certificate registrations (dependent variable)

Province	Total Population	Year	Number of halal certificate	Year
Sumatera Utara	15372437	2022	1711	2022
Sumatera Barat	5664988	2022	2701	2022
Riau	6743099	2022	2255	2022
Jambi	3696044	2022	1381	2022
Sumatera Selatan	8755074	2022	1956	2022
Bengkulu	2065573	2022	556	2022
Lampung	8947458	2022	16055	2022
Kep. Bangka Belitung	1490418	2022	648	2022
Kepulauan Riau	2133491	2022	2085	2022
DKI Jakarta	11317271	2022	8664	2022
Jawa Barat	49339490	2022	27534	2022

Jawa Tengah	37783666	2022	25895	2022
DI Yogyakarta	3693834	2022	515	2022
Jawa Timur	41311181	2022	3086	2022
Banten	12321660	2022	5695	2022
Bali	4304574	2022	557	2022
Nusa Tenggara Barat	5534583	2022	1087	2022
Nusa Tenggara Timur	5543239	2022	313	2022
Kalimantan Barat	4281878	2022	753	2022
Kalimantan Tengah	2706950	2022	1367	2022
Sumatera Utara	15242290	2021	538	2021
Sumatera Barat	5604456	2021	699	2021
Riau	6574931	2021	507	2021
Jambi	3603424	2021	344	2021
Sumatera Selatan	8565798	2021	823	2021
Bengkulu	2037019	2021	82	2021
Lampung	8882101	2021	368	2021
Kep. Bangka Belitung	1461892	2021	192	2021
Kepulauan Riau	2082785	2021	591	2021
DKI Jakarta	11261595	2021	1533	2021
Jawa Barat	48220043	2021	3264	2021
Jawa Tengah	37313056	2021	2844	2021
DI Yogyakarta	3677446	2021	1159	2021
Jawa Timur	41063088	2021	3461	2021
Banten	12030881	2021	1457	2021
Bali	4279126	2021	173	2021
Nusa Tenggara Barat	5432207	2021	123	2021
Nusa Tenggara Timur	5489845	2021	29	2021
Kalimantan Barat	5466908	2021	264	2021
Kalimantan Tengah	2656384	2021	42	2021

Based on the above table, researchers took several samples from provinces in Indonesia to determine whether there is a correlation between population and the number of halal certificate registrations (14). To determine this correlation, researchers have used statistical methods such as linear regression (13).

Regression Test Analysis in Applied Statistical

This study used a linear regression test to determine how the dependent/criterion variable can be predicted through partial or joint/simultaneous variables(15). One parameter that is frequently checked in regression analysis is the regression coefficientdre(16). One statistical method or analysis used to describe the statistical connection between two or more variables is regression analysis(17). Regression analysis is therefore used to investigate the connection of dependence between one or more independent variables (independent variables) and an independent variable (dependent variable)(18). Regression analysis is also used as a tool for forecasting the value of a dependent variable from one independent variable(19).

Usually, a simple linear regression analysis model consists of two variables: one is an independent variable, and the other is an independent variable(20). The independent variable is usually called the criterion variable, and the

independent variable is called the predictor variable, which is the variable whose size determines its effect on the independent variable(21). The following data are the result of observations of the value of service quality (X) and the average sales of certain goods (Y) every month. Then, based on the available data, a simple linear regression equation Y = 1.02 + 5.14X is created(22). The main purpose of using a regression equation is to estimate the value of an independent variable at a given value of the independent variable(23).

Once it has been established that there is a logical relationship between the variables, then to support further analysis, a graph can be used. A graph is called a scatter diagram, or some call it a scatter diagram in which certain points are shown. Each point is given a value as a dependent or independent variable(24).

Linear Regression Test Analysis

Analysis of the coefficient of determination output in the linear regression test between the total population in each province in Indonesia as the independent variable and the halal number of certifications as the dependent variable provides an overview of the extent to which the total population in each province in Indonesia can explain variations in the halal number of certifications (25). A coefficient of determination (R-squared) close to 1 indicates that the total population in each province in Indonesia effectively explains most of the variation in the halal number of certifications, suggesting a strong relationship between the two(26). Conversely, if the R-squared value is low, this may indicate that the total population in each province in Indonesia does not significantly contribute to explaining the variation in the halal number of certifications or that there may be other factors influencing the relationship (27). This analysis has important implications for stakeholders, as it allows them to evaluate the relationship between the independent and dependent variables to provide a basis for strategic decision-making in the development of the halal industry in Indonesia (28). However, in addition to the coefficient of determination, other metrics and test regression assumptions must be considered to ensure the reliability and validity of this linear regression model in the context of this study.(29)

Table 2. Output of Coefficient

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.581[a]	.338	.320	5.100.872

a. Predictors: (Constant), Total Population

b. Dependent Variable: Halal Certification Applicants

The R-square is 0.338; thus, the contribution of the influence of the independent variable (total population) to the dependent variable (number of halal certification applicants) is 33.8%.

In the context of a linear regression test between population as an independent variable and the number of halal certificate registrants as the dependent variable (29), the R-squared result of 0.388 can be interpreted as an indicator of the extent to which population can explain variations in the number of halal certificate registrants. An R-squared value of 0.388 indicates that, in this regression model, the variation in population can explain only 33.8% of the variable number of halal certificate registrants. In other words, the impact of the contribution or influence between the independent variable and the dependent variable is not significant enough.

The t test in regression analysis is used to test the significance of the independent variable on the dependent variable. In the context of population and the number of halal certificate registrants, the t test can be used to determine whether the population is significantly different from the number of halal certificate registrants. A t test produces a high p value, which can be used to determine if there is a significant difference between two groups(36). A small p value indicates a significant difference (37). The t test in regression analysis is used to test the significance of the independent variable on the dependent variable. In the context of Islamic banking asset growth and conventional banking growth(30), the t test can be used to determine whether Islamic banking asset growth is significantly different from conventional banking asset growth(31). A t test produces a high p value that can be used to determine if there is a significant difference between two groups(32). A small p value indicates a significant difference(33).

Table 3. Output Coefficients Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	49.003	1.060.916		.046	.963
	Total Population	.000	.000	.581	4.401	<,001

a. Dependent Variable: Halal Certification Applicants

Before interpreting the output table above, it is first necessary to formulate the hypotheses in this study and determine the basis for decision-making via linear regression.

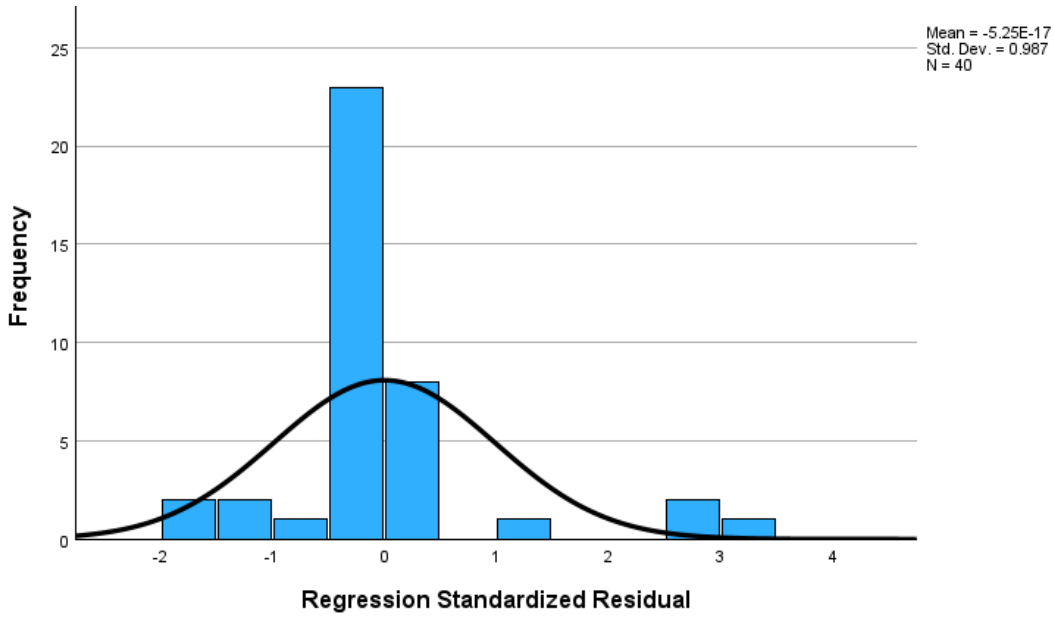
- H0: There is a relationship between population and the number of halal certification registrants.
- H1: There is no relationship between population size and the number of halal certification registrants.
  Decision-making based on significance value
  1. A significance value of the independent variable < 0.05 means that H0 is accepted and H1 is rejected.
  2. A significance value > 0.05 for the independent variable indicates that H0 is rejected and H1 is accepted.

From the results of the table above, the following conclusions can be drawn:

1. The significance value of the independent variable is 0.001 (< 0.05); thus, H0 is accepted, and H1 is rejected, indicating that the independent variable has a relationship with the dependent variable.
2. The following regression equation is obtained: 49,003-0,000X
3. The constant value is obtained equal to 49.003, it can be interpreted that if the independent variable is worth 0 (Constant), then the dependent variable is worth 49, 003
4. The regression coefficient of the independent variable (predictor) is 0.000, indicating that in the regression model, the independent variable does not significantly contribute to explaining variations in the dependent variable. In other words, there is no significant linear relationship between the independent variable and the dependent variable.

Histograms can be used in regression analyses between the total population in each province in Indonesia and the number of halal certificate applicants to better understand the distribution of the data and compare the two variables(39). Histograms can be used to visualize the frequency of occurrence of the growth values of both variables, making it easier to visualize the distribution patterns and differences between them. This approach can help in evaluating differences in the distribution characteristics of two variables.

Picture 1. Histogram of regression analysis of the total population



This histogram is divided into several classes or intervals of regression standardized residual values. The horizontal axis (X-axis) shows the range of regression standardized residual values, while the vertical axis (Y-axis) shows the frequency or number of observations included in each class(34).

Conclusion

From the results of linear regression test analysis in this study, the following conclusions can be drawn:
First, it is known that the significance value of the independent variable is 0.001 (< 0.05), then H0 is accepted and H1 is rejected, meaning that the independent variable has a relationship with the dependent variable; Second, the regression equation is obtained: 49,003 - 0,000X; Third, the constant value is obtained equal to 49.003, it can be interpreted that if the independent variable is worth 0 (Constant), then the dependent variable is worth 49, 003 and the last fourth, the regression coefficient value of the independent variable (predictor) is 0.000, indicating that in the regression model, the independent variable does not make a significant contribution in explaining variations in the dependent variable. In other words, there is no significant linear relationship between the independent variable and the dependent variable.

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