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The Influence Warehouse Location, Transportation, and Inventory on Distribution Performance Logistics in Perum Bulog Branch Office Madiun

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ABSTRACT

Objective: *This study examines the influence of warehouse location, transportation, and inventory on logistics distribution performance at Perum BULOG Madiun Branch, focusing on identifying key factors impacting operational efficiency in rice distribution.* ***Methods:*** *A quantitative approach was employed using a survey method. Data were collected via an online questionnaire distributed to 30 employees at the Perum BULOG Madiun Branch. The responses were analyzed using statistical techniques with SPSS Version 26 software to assess the individual and combined effects of the variables on logistics distribution performance.* ***Results:*** *The findings reveal that, individually, warehouse location and transportation have no significant effect on logistics distribution performance, while inventory has a significant positive influence. Simultaneously, all three variables—warehouse location, transportation, and inventory—contribute positively to logistics distribution performance, explaining 87% of the variation. The remaining 13% is attributed to other factors not included in the study.* ***Novelty:*** *This research provides critical insights into the specific factors affecting logistics distribution within a state-owned enterprise. By highlighting the dominant role of inventory management, the study offers actionable recommendations for improving operational efficiency and bridging the supply-demand gap in rice distribution. This research enhances the understanding of logistics performance determinants in public-sector organizations.*

INTRODUCTION

In the industrial world, logistics plays an important role related to decision making and determining distribution routes Kristanto & Suryani (2015). According to Chandra (2013), some of the factors that companies consider include inventory location and strategic warehouse placement for customers. Distribution logistics is a crucial aspect of the supply chain that manages the flow of goods and services from producers to end consumers. This process involves the movement of goods, storage, and delivery of products or information Samidin (2017). Therefore, distribution is an important stage in the supply chain and involves coordination between factors such as warehousing, transportation, and inventory management Chandra (2013).

Perum BULOG has a strategic role in maintaining the availability and distribution of staple foods, especially rice for the people of Nabilla (2023). Rice is the main food for the people of Indonesia that is consumed every day. Therefore, sufficient and stable availability of rice will prevent scarcity and price fluctuations. Especially now that rice prices are soaring, the availability must be sufficient to maintain the stability of rice prices. To support this role, Perum BULOG cooperates with Rumah Pangan Kita (RPK)

and Toko Pangan Kita (TPK) to distribute rice to various regions. Rumah Pangan Kita (RPK) is an official outlet of Perum BULOG that cooperates with small businesses by establishing points of sale, while Toko Pangan Kita (TPK) is a grocery store that cooperates with Perum BULOG to distribute food to the community.

Distribution has the task of planning, implementing, and controlling the flow of goods from producers to consumers with the aim of making a profit Bastuti & Teddy (2017). In general, logistics is the process of delivering goods or services from their source to their destination. Distribution logistics includes the delivery of goods from producers to end consumers through a network of distributors, warehouses, transportation systems, and other logistics infrastructure, which includes shipping, storage, and inventory management activities in the supply chain. The main objective of distribution logistics is to ensure the availability of goods to consumers efficiently and effectively. Optimizing the logistics distribution flow is essential for businesses to provide the best delivery service.

Distribution logistics performance covers the movement of products from suppliers to end customers, aiming to improve availability and cost efficiency Samidin (2017). This performance assessment includes quality, time, cost, and flexibility, reflecting the efficiency and effectiveness of the distribution process Chandra (2013).

An optimal warehouse location strategy must balance cost reduction and improved customer service. According to Kartikasari et al. (2021), the conditions and situation of the warehouse location greatly affect the performance of logistics distribution. Piech & Grodzki (2020) state that the optimal warehouse location should consider the number, size, direction, and speed of shipments, all of which affect logistics distribution performance.

Transportation is essential for connecting a company's products with geographically remote markets, serving as a key component in logistics and supply chain performance (Tracey, 2004). Raimbekov & Stadkowski (2022) pointed out that the role of transportation and logistics depends on the logistics system, goods traffic, and geographic location. Sahara & Saputra (2023) added that land transportation has a positive impact on the efficiency of the logistics distribution system.

According to Samidin (2017), a strategic warehouse location that is close to distribution centers and major transportation reduces delivery time. Reliable means of transportation are important for fast and safe delivery of goods, and reduce the risk of damage and delays. Adequate product availability and good inventory management ensure products are always available, avoiding stock-outs. Effective management of these factors ensures logistics distribution runs smoothly and efficiently, increasing partner and customer satisfaction.

Hypotheses in the context of research are initial responses to research problems and are formulated in the form of questions. This hypothesis is based on related theories and not on actual information obtained from data collection Priadana & Sunarsi (2021). This hypothesis functions as a theoretical alternative in answering research problems, not as

an empirical solution. The following is a hypothesis of the framework: H1: Warehouse Location (X1) has a positive effect on Logistics Distribution Performance (Y). H2: Transportation (X2) has a positive effect on Logistics Distribution Performance (Y). H3: Inventory (X3) has a positive effect on Logistics Distribution Performance (Y). H4: Warehouse Location (X1), Transportation (X2), and Inventory (X3) simultaneously have a positive and significant effect on Logistics Distribution Performance (Y)..

RESEARCH METHOD

This research uses a quantitative approach with a survey method. According to Sugiyono (2019), the survey method is effective for collecting data related to beliefs, opinions, traits, behaviors, and variable relationships. Priadana & Sunarsi (2021) emphasize that surveys collect reliable and relevant field information. The survey method was conducted through a questionnaire shown to employees of Perum BULOG Branch Office Madiuntotaling 30 respondents as part of the population and sample in this study. The questionnaire was distributed online via google form. Furthermore, the data obtained was tested using analysis techniques using SPSS Version 26 software

RESULTS AND DISCUSSION

1. Classical assumption test:
   1) Normality test: carried out to determine whether the residual values have a normal distribution using the Kolmogorov - Smirnov method whose significance value exceeds 0.05.

One-Sample Kolmogorov-Smirnov Test

			Unstandardized Residual
N			30
Normal Parameters[a,b]	Mean		.0000000
	Std. Deviation		1.59131502
Most Extreme Differences	Absolute		.128
	Positive		.113
	Negative		-.128
Test Statistic			.128
Asymp. Sig. (2-tailed)[c]			.200[d]
Monte Carlo Sig. (2-tailed)[e]	Sig.		.233
	99% Confidence Interval	Lower Bound	.222
		Upper Bound	.244

Figure 1. Normality Test Results
Source: SPSS output, 2024

In the table above, it is known that the significance value is 0.200 where the value is greater than the significance value of 0.05, so the regression model fulfills the normality assumption.

2) Multicollinearity Test
This test is done by comparing the Variance Inflation Factor (VIF) and tolerance value.

Coefficients[a]			
Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Lokasi Gudang	.120	8.368
	Transportasi	.163	6.118
	Persediaan	.145	6.919
a.Dependent Variable: Kinerja Distribusi Logistik (Y)			

Figure 2 Multicollinearity Result

Source: SPSS output, 2024

Based on the multicollinearity test results from the table above, it is known that the VIF value of each independent variable is smaller than 10 and the tolerance value is more than 0.10.

3) Heteroscedasticity Test

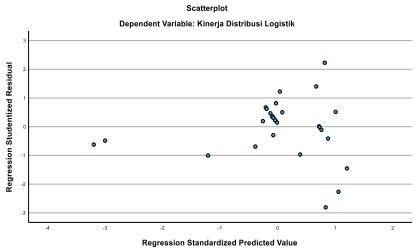


Figure 3 Heteroscedasticity Result

Source: SPSS output, 2024

If the plot shows the spread of dots and no pattern is formed then the regression model does not have heteroscedasticity.

4) Linearity Test

Interpret the linearity test with if the p value (significance) of the lack-of-fit test is smaller than the predetermined significance level which is α = 0.05.

Table 1.1 Linearity Test Result

No	Variable	Sig. Deviastion from Linearity
1.	Werehouse Location	0.062
2.	Transportation	0.558
3.	Inventory	0.085

Source: SPSS output, 2024

As a result, it can be concluded that the overall independent and dependent variables can be considered linear, and the linear regression model can be used for further analysis.

2. Multiple Linear Regression Analysis

This multiple linear regression analysis aims to evaluate the impact of Warehouse Location (X1), Transportation (X2), and Inventory (X3) variables on Logistics Distribution Performance (Y).

$$Y = \propto + \beta\_1 X\_1 + \beta\_2 X\_2 + \beta\_3 X\_3 + e$$

$$Y = 0{,}090 + 0{,}072 X\_1 + 0{,}432 X\_2 + 0{,}613 X\_3 + e$$

The test results show that the variables of Warehouse Location (X1), Transportation (X2), and Inventory (X3) have a positive effect on Logistics Distribution Performance (Y). The constant (α) of 0.090 indicates that logistics distribution performance is positive even though the independent variables are constant. The regression coefficients of Warehouse Location (X1) of 0.072, Transportation (X2) of 0.432, and Inventory (X3) of 0.613 each indicate that an increase in these variables will improve logistics distribution performance. Thus, improvements in warehouse location, transportation, and inventory can improve logistics distribution performance at Perum BULOG Madiun Branch Office.

3. Hypothesis Test

The accepted significance value is 0.05, so the alternative hypothesis (Ha) is accepted if the significance value is less than 0.05, indicating that the independent variable significantly affects the dependent variable.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,090	2,121		,043	,966
	Lokasi Gudang	,072	,165	,085	,438	,665
	Transportasi	,432	,214	,334	2,020	,054
	Persediaan	,613	,196	,551	3,133	,004

a. Dependent Variable: Kinerja Distribusi Logistik

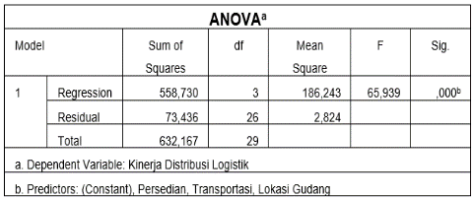
Figure 4 Hypothesis Test Result
Source: SPSS output, 2024

H1 : Warehouse Location (X1) has a positive and significant effect on Logistics Distribution Performance (Y). Based on the calculation, it is found that T count 0.438 < T table 2.056 and sig 0.665 > ∝ (0.050), then H1 is not accepted.

H2 : Transportation (X2) has a positive and significant effect on Logistics Distribution Performance (Y). Based on the calculation obtained that T count 2.020 < T table 2.056 and sig 0.054 > ∝ (0.050), then H2 is not accepted.

H3 : Transportation (X3) has a positive and significant effect on Logistics Distribution Performance (Y). Based on the calculation, it is found that T count 3.133> T table 2.056 and sig 0.004 < ∝ (0.050), then H3 is accepted.

The F test is used to ascertain whether the independent variables jointly affect the dependent variable. According to Hardani et al. (2020), the independent variable has a significant effect on the dependent variable if the significance value is less than 5%.



ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	558,730	3	186,243	65,939	,000[b]
	Residual	73,436	26	2,824		
	Total	632,167	29			

a. Dependent Variable: Kinerja Distribusi Logistik

b. Predictors: (Constant), Persedian, Transportasi, Lokasi Gudang

Figure 5 Hypothesis Test Result
Source: SPSS output, 2024

Based on the table above, it is known that the sig value is 0.000 and f count 65.939, then the calculation is obtained: F Count 65.939> F table 2.98 and Sig 0.000 < ∝ (0.050) then Warehouse Location (X1), Transportation (X2), and Inventory (X3) on Logistics Distribution Performance (Y)

4. Analysis of the Coefficient of Determination (R Square)

   The purpose of this test is to ascertain the extent to which the independent variable can explain the dependent variable as indicated by the coefficient of determination. The Adjusted R Square value is 0.870 or 87%.

   Based on the analysis with T count 0.438 < T table 2.056 and sig 0.665 > ∝ (0.050), then H1 is not accepted.In Haryotejo & Kusumawardhani (2015), study, it was found that the location of the distribution center warehouse has no significant effect on logistics distribution performance. At Perum BULOG Madiun Branch Office, although the distance from the warehouse to the RPK and TPK partners may be long, the operational model where partners pick up the rice themselves at the warehouse reduces the impact of distance on logistics distribution performance. As a result, delivery costs are not the responsibility of Perum BULOG Madiun Branch Office, allowing them to maintain operational efficiency without having to address logistical issues caused by distance.

   Based on the analysis with T count 2.020 < T table 2.056 and Sig 0.054 > ∝ (0.050), transportation has no significant effect on logistics distribution performance, as found in research by Utami (2023) and Diva Ariesthana Sadri et al. (2023). The distribution model of Perum BULOG Branch Office Madiun. Allows partners to take the rice to the warehouse themselves, reducing dependency on direct distribution services from Perum BULOG Branch Office Madiunand maintaining the company's operational efficiency.

   Based on the analysis with T count 3.133 > T table 2.056 and sig 0.004 < ∝ (0.050), it is proven that Inventory has a positive and significant influence on Logistics Distribution Performance. By ensuring rice supplies are always available in the appropriate quantities, Perum BULOG Branch Office Madiun can increase delivery efficiency, reduce transportation costs, and improve partner satisfaction, making inventory management a top priority in their logistics strategy.

   Based on the analysis, Warehouse Location (X1), Transportation (X2), and Inventory (X3) have a positive and significant effect on logistics distribution

performance (Y) at Perum BULOG Madiun Branch Office. The findings show that these three factors can explain 87% of the variation in logistics distribution performance, with the rest being influenced by other factors. Effective management of warehouse location, transportation, and inventory is important to improve operational efficiency and customer satisfaction

CONCLUSION

Fundamental Finding: This study concludes that, in the context of Perum BULOG Madiun Branch, inventory management significantly influences logistics distribution performance, while warehouse location and transportation have no substantial individual effects. However, when analyzed simultaneously, all three variables contribute positively to logistics distribution performance, with a combined explanatory power of 87%. **Implication**: These findings highlight the critical role of effective inventory management in enhancing logistics performance for state-owned enterprises, particularly in the rice distribution sector. Optimizing inventory processes could help reduce delivery delays and improve supply chain efficiency. Additionally, integrating and aligning all three factors could further strengthen overall logistics performance. **Limitation**: The study is limited to a single branch of Perum BULOG and relies on a relatively small sample size of 30 employees, potentially reducing the generalizability of the results to other branches or contexts. **Further Research**: Future studies should expand the scope by including multiple branches or organizations to validate these findings across diverse contexts. Moreover, incorporating additional variables such as external market factors, supplier performance, and customer satisfaction could provide a more comprehensive analysis of logistics distribution performance.

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