IDENTIFYING KEY OPERATIONAL FACTORS INFLUENCING DISTRIBUTION ERRORS IN A POSTAL CONSOLIDATION WAREHOUSE: CASE STUDY OF KC CIANJUR

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Abstract. *Operational processes in consolidation warehouses are a crucial element, as they directly affect delivery delays, misrouting, and shipment losses. This study aims to identify the operational factors that influence distribution errors in the consolidation warehouse of PT Pos Indonesia, with a case study at the Cianjur Main Post Office (KC Cianjur). The research employs a quantitative approach using a survey method involving 58 respondents who are directly engaged in warehouse operations. The independent variables analyzed include warehouse condition and management, work behavior, and company standard operating procedures (SOP), while the dependent variable is distribution error. Data analysis was conducted using validity testing, reliability testing, correlation analysis, and simple linear regression. The results indicate that all independent variables have a positive and significant effect on distribution errors. Work behavior emerges as the most dominant factor, with an R value of 0.841 and an R^2 of 0.699 ($p < 0.05$), followed by warehouse condition and management ($R = 0.621$; $R^2 = 0.584$) and SOP ($R = 0.391$; $R^2 = 0.195$). These findings emphasize that improvements in human resource work behavior should be the top priority in efforts to reduce distribution errors. The results of this study can serve as an initial foundation for future research and the implementation of the Six Sigma approach using the DMAIC method to identify root causes more comprehensively and to design sustainable improvements in distribution processes.*

Keywords: *Consolidation Warehouse; Distribution Errors; Linear Regression*

1. INTRODUCTION

PT Pos Indonesia is one of the companies that plays a strategic role in the national logistics distribution system. In addition to providing postal services and commercial logistics services, PT Pos Indonesia has also been assigned by the government as part of efforts to strengthen the national logistics system in order to reduce Indonesia's relatively high logistics costs. In this context, the existence of a network of post offices distributed across various regions constitutes an essential element in ensuring the smooth flow of goods and documents at both national and regional levels.

One of the crucial components in the distribution system of PT Pos Indonesia is the middle-mile process, particularly those taking place in consolidation warehouses at branch offices. Consolidation warehouses serve as processing points for shipments after the collection stage, before they are further distributed to the final destination or the next hub. At this stage, parcels and documents from various origins are consolidated, sorted, and prepared for delivery according to the type of service and destination area. Errors occurring in the consolidation warehouse process have the potential to create a cascading impact, leading to delivery delays, incorrect routing, and even shipment losses.

The operation of consolidation warehouses requires a high level of accuracy and strict procedural compliance, as each stage of the process—from receiving and unloading (unbagging), sorting, to repackaging (bagging)—must be carried out in accordance with established standard operating procedures (SOP). Discrepancies between system data and the physical condition of shipments, negligence in scanning processes, or errors in determining

sorting destinations can have serious implications for distribution accuracy and the reliability of postal services. Therefore, operational factors such as warehouse condition and management, compliance with SOP, and the work behavior of personnel are critical elements in maintaining the quality of the distribution process.

The Cianjur Post Office, as one of the service units of PT Pos Indonesia, is responsible for managing the distribution of goods and documents within its service area, including deliveries to other branch offices and regional hubs. However, in its operational practices, several issues related to the consolidation warehouse process are still observed. These problems include delays in vehicle arrivals that affect subsequent distribution processes, sorting errors that cause shipments to be routed to incorrect destinations, and missed scanning cases that result in shipment data not being properly recorded in the track-and- trace system. Such conditions not only reduce operational efficiency but also increase the risk of misrouting and shipment loss.

Data from the Customer Complaint Handling (CCH) records of the Cianjur Post Office, as presented in Table 1, indicate a total of 140 customer complaints related to distribution services. These complaints are predominantly classified under the over service level agreement (over SLA) category, which includes delivery delays, shipments not yet received, failed deliveries, and misrouting. In addition, there were 28 cases of misrouting and 1 case of shipment loss, as shown in Table 2. Although the number of misrouting and loss cases is relatively small compared to the total shipment volume, their occurrence indicates that the management of the consolidation warehouse process still faces challenges in maintaining distribution accuracy.

Table 1. Customer Complaint Handling (CCH) Complaint Data at KC Cianjur

No	Sub-Branch Office	Number of Complaints
1	KCP CIDAUN 43287B1	23
2	KCP CAMPAKACIANJUR 43263	22
3	KCP CIBEBER 43262	4
4	KCP GEKBRONG 43287B1	12
5	KC CIANJUR 43200	27
6	KCP SINDANGBARANG 43272	3
7	KCP BOJONGPICUNG 43283	2
8	KCP SINDANGLAYA 43264	16
9	KCP SUKANEGARA 43264	6
10	KCP PAGELARANCIANJUR 43266	2
11	KCP MANDE 43292B1	4
12	KCP CIKALONG 46495B1	5
13	KCP CIRANJANG 43282	1
14	KCP TANGGEUNG 43267	8
15	KCP CILAKU 43285B2	3
16	KCP WARUNGKONDANG	1
17	KCP PASIRHAYAM 43285B1	1
Total		**140**

Source: KC Cianjur, 2025.

Table 2. Customer Complaint Handling Causes

No	CCH Causes	Number of Complaints
1	Over SLA	87
2	Lost Shipment	1
3	Incorrect Routing	28
4	Shipment Not Received (Marked as Delivered)	7
5	Delivery Failure	17
Total		**140**

Source: KC Cianjur, 2025.

Several previous studies have revealed that distribution errors and the effectiveness of warehouse management are influenced by multidimensional operational factors. Silen (2021) emphasized that the readiness and competence of human resources, particularly their understanding of standard operating procedures (SOP), have a significant impact on distribution accuracy. Similar findings were reported by Adawiyah (2022), who showed that non-compliance with SOP is one of the main drivers of increased distribution error risks. From an infrastructure perspective, Nofri (2023) found that physical warehouse conditions, storage capacity, and the availability of supporting facilities significantly affect distribution performance. Meanwhile, Sujatmiko (2020) highlighted the role of warehouse management systems and the utilization of technology in reducing the risk of misrouting and shipment loss.

Based on these studies, it can be concluded that distribution errors in consolidation warehouses are not caused by a single factor, but rather result from the interaction of various operational factors, including warehouse condition and management, compliance with SOP, and the work behavior of personnel. However, studies that specifically identify the most influential operational factors affecting distribution errors in the consolidation warehouses of PT Pos Indonesia—particularly at the branch office level characterized by high shipment volumes, wide destination variations, and strong dependence on sorting and scanning accuracy—remain relatively limited. Previous research has largely focused on manufacturing warehouse contexts (Firdaus et al., 2018; Rafli, 2022; Utami, 2024) and performance indicator analyses in construction warehouses (Kusrini et al., 2018).

Furthermore, prior studies tend to frame performance variables from a positive outcome perspective, such as improvements in warehouse performance (Buzu, 2021; Faber et al., 2018; Rahman et al., 2023; Runtuwene & Karuntu, 2024), while quantitative studies that position distribution errors as the dependent variable (a negative outcome) remain scarce. Therefore, this study aims to identify the operational factors influencing distribution errors in the consolidation warehouse of PT Pos Indonesia, using the Cianjur Main Post Office (KC Cianjur) as a case study. The findings are expected to provide an empirical basis for improving warehouse management quality and to support the development of further research focused on systematic operational process improvements.

2. LITERATURE REVIEW

2.1 Distribution Management

Distribution is a crucial component of the logistics system that aims to deliver products from producers to end consumers through the most efficient and effective channels (Bowersox et al., 2013). A well-designed distribution system must ensure that goods are delivered to the correct location, on time, in the appropriate quantity, and at minimal cost (Czinkota et al., 2021).

2.2 Warehouse Management

According to Stock and Lambert (2001), a warehouse is one of the components of a company's logistics system that functions as a storage location for goods—whether raw materials, components, work-in-process items, or finished goods—situated between points of origin and destination. In addition, warehouses play a role in providing management with information regarding the status, condition, and placement of stored goods.

Warehouse management, meanwhile, refers to the process of planning, organizing, and controlling all activities carried out within the warehouse, including receiving, storage, picking, and shipping of goods. Its primary function is not merely to provide storage space, but also to ensure the smooth flow of goods within the supply chain.

According to Rushton et al. (2022), warehouse management consists of several key elements, namely:

a. Warehouse Layout and Material Flow

   Warehouse layout and material flow relate to the arrangement of space, the placement

of work areas, and the movement of goods within the warehouse to ensure that storage and retrieval processes are carried out efficiently and safely, while minimizing time and travel distance.

b. Warehouse Facilities
   Warehouse facilities include operational supporting infrastructure such as buildings, storage racks, material handling equipment, and information technology systems used to support the smoothness and accuracy of warehousing activities.
c. Warehouse Operational Processes
   Warehouse operational processes encompass the entire sequence of activities, from receiving and storage to picking, packing, and the dispatch and distribution of goods in accordance with established procedures.

2.3 Human Resources and Work Behavior

Human resources (HR) constitute a crucial element in warehouse management, as nearly all warehouse operational activities involve workers' skills, discipline, and understanding of standardized workflows. According to Rushton et al. (2017), the quality of warehouse operations is largely determined by the ability of human resources to implement established standard procedures, thereby ensuring service consistency. As the primary element in warehouse operations, human resources play a role that is strongly influenced by individual competence and work behavior in carrying out prescribed work procedures (Rizal, 2017).

Work behavior refers to the manner in which individuals act and adjust their behavior in accordance with organizational rules and objectives. This concept encompasses how individuals interact with one another, collaborate within organizational structures to accomplish tasks, and engage with the external environment (Fatmawati, 2022). Understanding organizational work behavior is essential, as it enables organizations to comprehend, predict, and manage human resource behavior, thereby supporting effective operations and the achievement of organizational goals.

According to Bryson (2003), work behavior can be measured through several key indicators that reflect how individuals perform their roles within an organization. These indicators include:

1. *Cooperativeness / Social Skills*
   Cooperativeness reflects an individual's ability to build social relationships and work collaboratively with colleagues to achieve shared objectives.
2. *Work Quality*
   Work quality indicates the level of accuracy, neatness, and precision in the outcomes produced by an individual.
3. *Work Habits*
   Good work habits are reflected in discipline, consistency, and compliance with established work procedures within the organization.
4. *Personal Presentation / Self-Control*
   Individuals with strong self-control are able to maintain professionalism, uphold work ethics, and remain focused and composed when facing operational pressures or challenges.

2.4 Standard Operating Procedures (SOP)

Standard Operating Procedures (SOP) are a series of systematically and structurally arranged steps or work guidelines that serve as standardized methods for carrying out activities or resolving specific problems (Fatimah, 2015). According to Paturuan et al. (2025), SOP are official documents that define standardized methods or procedures for performing routine operational tasks within an organization. SOP are designed to create uniformity and consistency in work practices, ensuring that activities are carried out efficiently and in alignment with organizational goals and policies.

SOP play a critical role in regulating and directing employee work practices so that all organizational activities are conducted in a structured manner and aligned with the organization's vision and mission. In addition, SOP function to reduce operational risks, serve as benchmarks for performance evaluation, and ensure that operations are implemented systematically, on time, and in an accountable manner (Nur'aini, 2019).

According to Nur'aini (2019), the indicators of SOP implementation can be described as follows:

1. Efficiency
2. Efficiency refers to the accuracy and effectiveness of work execution, supported by interrelated factors that operate in an integrated manner to achieve predetermined goals and objectives.
3. Consistency
4. Consistency represents the level of regularity in work execution, which can be measured through stable and repeatable outcomes in accordance with established standards.
5. Error Minimization
6. The implementation of SOP aims to reduce the potential occurrence of errors in task execution or work activities.
7. Problem Resolution
8. SOP provide guidance for identifying and addressing various issues that may arise during the work process.
9. Operational Workflow or Process Mapping
10. SOP function as a clear guide in the form of work plans or sequences of operational activities, enabling all parties to act promptly and appropriately when performing their duties.

3. RESEARCH METHODS

This study employs a quantitative approach using a survey method. Data were collected through questionnaires distributed to 58 respondents who are directly involved in process and transportation activities at the consolidation warehouse of the Cianjur Main Post Office (KC Cianjur). The respondents consist of consolidation warehouse staff, Sub-Branch Office (KCP) warehouse personnel, and warehouse supervisors.

The sampling technique used in this study is purposive sampling, considering the limited number of respondents and their selection based on direct involvement in warehouse operational activities. In line with Obilor (2023), purposive sampling is a non- probability sampling technique in which researchers deliberately select subjects who meet the objectives of the study. The operational variables used in this study are as follows:

Tabel 3. Operational Variable

Variable	Variable Indicators
X1 Warehouse management and condition (Rushton et al., 2022)	Layout and warehouse flow
	Warehouse facility
	Warehouse process management
X2 Work behaviour (Bryson, 2003)	Cooperativeness
	Work Quality
	Work Habits
	Personal Presentation
X3 Standard Operating Procedurs (SOP) (Nur'aini, 2019)	Efficiency
	Consistency
	Error Minimization
	Problem Resolution
	Work Procedures and Process Mapping

Y **Distribution Errors (KC Cianjur, 2025)**	Over SLA
	Lost Shipment
	Incorrect Routing
	Shipment Not Received (Marked as Delivered)
	Delivery Failure

Source: Literature Review, 2025.

The research framework is illustrated as follows:

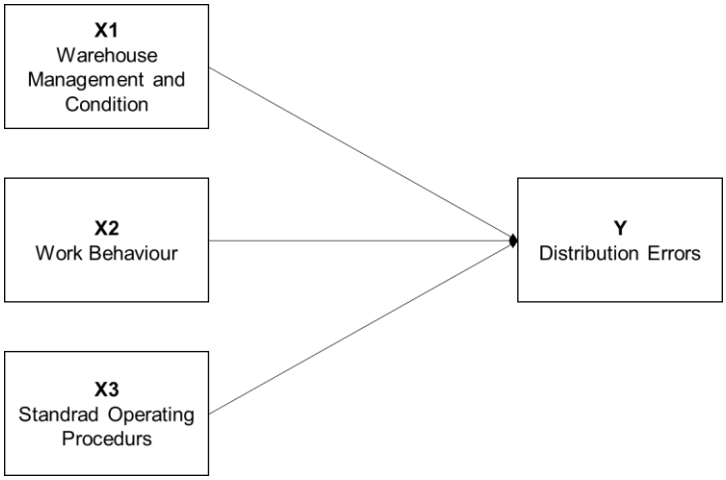

Figure 1. Research Framework. Source: Authors, 2025.

Based on the research framework above, the following research hypotheses are proposed:

1. H1: Warehouse condition and management have a significant effect on distribution errors.
2. H2: Work behavior has a significant effect on distribution errors.
3. H3: Standard operating procedures have a significant effect on distribution errors.

3.1 Data Analysis Technique

Validity Test

According to Sugiyono (2019), validity testing is used to determine the extent to which a research instrument is capable of measuring what it is intended to measure. If the calculated correlation coefficient (r_calculated) is greater than the critical value (r_table), the research instrument is considered valid. Conversely, if r_calculated is less than or equal to r_table, the instrument is deemed invalid.

Reability Test

Reliability testing is conducted to assess the consistency of respondents' answers to the research instrument. Reliability testing in this study is performed using Cronbach's Alpha (Sugiyono, 2019). An instrument is considered reliable if the Cronbach's Alpha value (α) is greater than 0.6. However, if the α value is less than or equal to 0.6, the instrument is considered unreliable. The formula for the reliability test is presented as follows:

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum \sigma^2}{\sigma_t^2}\right)$$

Where:
α = Reability

k = Number of research instrument
$\sum \sigma^2$ = Number of instrument varians
$_t\sigma^2$ = Number of varians

Correlation Analysis

Correlation analysis is used to determine the strength of the relationship between independent variables and the dependent variable (Sugiyono, 2019). The formula used in this analysis is as follows:

Description:

r = Pearson correlation coefisient X = Value of independent variable Y = Value of dependent variable $\dot{X}$ = Average value of variable X
$\dot{Y}$ = Average value of variable X

Berikut merupakan keterangan nilai korelasi (Barasa et al., 2021):

Table 4. Correlation Value

Value	Description
0,00 – 0,19	Very low correlation
0,20 – 0,39	Low correlation
0,40 – 0,59	Moderately strong correlation
0,60 – 0,79	Strong correlation
0,80 – 1,00	Very strong correlation

Source: Barasa et al., 2021

Linear Regression Analysis

Linear regression analysis is used to determine the effect of independent variables on the dependent variable (Sugiyono, 2019). This study employs linear regression analysis to identify the influence of independent variables on distribution errors. The t-test and F- test are not analyzed separately, as they are already incorporated within the regression model. In simple terms, the formula for simple linear regression is as follows:

$$Y = a + bX$$

Description :
Y = Dependent variable
X = Independent variable
a = Konstanta
b = Regression Coefficient

4. RESULTS AND DISCUSSION

4.1 Validity Test

Validity testing was conducted to determine the extent to which each questionnaire item in the research instrument accurately measures the intended variable. In this study, validity testing was performed using the r-table value, where each statement item is considered valid if the correlation value between the item score and the total score exceeds the r-table value at a specified significance level. With a total of 58 respondents, the r-table value is 0.254. The results of the validity test for each variable are presented as follows:

Table 5. X1 Validity Test

Validity Test of X1 (R table of 58 = 0,254)						
Instrument	X1.1	X1.2	X1.3	X1.4	X1.5	X1.6
Corelation	0,342	0,660	0,437	0,301	0,325	0,362
R Table	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**
Decision	Valid	Valid	Valid	Valid	Valid	Valid

Source: Authors Analysis, 2025

Tabel 6. X2 Validity Test

Validity Test of X2 (R table of 58 = 0,254)												
Instrument	X2.1	X2.2	X2.3	X2.4	X2.5	X2.6	X2.7	X2.8	X2.9	X2.10	X2.11	X2.12
Corelation	0,288	0,296	0,312	0,328	0,445	0,482	0,336	0,334	0,254	0,332	0,480	0,356
R Table	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**
Decision	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid

Source : Authors Analysis, 2025

Tabel 7. X3 Validity Test

Validity Test of X3 (R table of 58 = 0,254)										
Instrument	X2.1	X2.2	X2.3	X2.4	X2.5	X2.6	X2.7	X2.8	X2.9	X2.10
Corelation	0,324	0,275	0,508	0,316	0,329	0,460	0,435	0,266	0,370	0,334
R Table	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**
Decision	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid

Source : Authors Analysis, 2025

Tabel 8. Y Validity Test

Validity Test of Y (R table of 58 = 0,254)										
Instrument	X2.1	X2.2	X2.3	X2.4	X2.5	X2.6	X2.7	X2.8	X2.9	X2.10
Corelation	0,286	0,298	0,691	0,303	0,264	0,298	0,621	0,378	0,462	0,289
R Table	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**	**0,254**
Decision	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid

Source : Authors Analysis, 2025

Based on Tables 5 to 8 above, all research instruments used in this study have correlation values greater than the r-table value of 0.254. Therefore, the research instruments are considered valid and suitable for use in this study.

4.2 Reability Test

The reliability test is conducted to determine the extent to which the research instrument is able to produce consistent results when used repeatedly under the same conditions. A reliable instrument ensures that each item in the questionnaire has an adequate level of reliability in measuring the variables under investigation. In this study, reliability testing was performed using the Cronbach's Alpha coefficient, where a value greater than 0.60 indicates acceptable internal consistency. Thus, the reliability test confirms that the data obtained are appropriate for use in subsequent stages of analysis.

Table 9. Reability Test

Variable	Cronbach's Alpha Value	Description
X1	0,699429	Reliable
X2	0,716819	Reliable
X3	0,723794	Reliable
Y	0,716624	Reliable

Source : Authors Analysis, 2025.

Based on the results of the reliability testing presented in the table above, which were conducted using Microsoft Excel, the Cronbach's Alpha values obtained are greater than 0.60. This indicates that the research instruments exhibit a very good level of internal consistency. Therefore, each item or question in the questionnaire can be considered reliable in measuring the variables under study, and the data obtained are suitable for use in further analysis.

4.3 Correlation and Linear Regression Analysis

Correlation analysis and simple linear regression are used to examine the relationship and the effect of each independent variable (X1, X2, and X3) on the dependent variable (Y). Correlation analysis aims to measure the strength of the relationship between two variables, while simple linear regression is used to determine the direction and magnitude of the effect of the independent variables on the dependent variable, as well as to statistically test the significance of these effects.

Correlation between X1 (Warehouse Condition and Management) and Y (Distribution Errors)

The following are the results of the regression analysis conducted between X1 and Y.

Summary Output

Regression Statistics	
lultiple R	0,620769677
R Square	0,583662862
Adjusted R Square	0,567325724
Standard Error	16,59808623
Observations	58

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	196,6598974	196,6598974	8,064315651	0,035491294
Residual	56	233,9644355	24,17793635		
Total	57	430,6			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	43,069	4,532	1,503	0,280	-33,991	52,148	-33,991	52,148
X1	0,312	0,484	2,644	0,035	0,246	0,121	0,246	0,121

Sumber: Analisis Regresi pada Ms. Excel, 2025.

Based on the results of the simple linear regression analysis between variables X1 and Y, a Multiple R value of 0.621 was obtained, indicating a positive relationship with a strong level of correlation between X1 and Y. The R Square value of 0.584 indicates that 58.4% of the variation in variable Y can be explained by variable X1, while the remaining 41.6% is influenced by other factors outside the model.

The significance test results show a Significance F value of 0.035 (< 0.05), indicating that the regression model of X1 on Y is statistically significant. In addition, the p-value of variable X1 is 0.035 (< 0.05), which also indicates that X1 has a statistically significant partial effect on Y. This analysis demonstrates that the first hypothesis (H1) is accepted, namely that warehouse condition and management have a significant effect on distribution errors.

Correlation between X2 (Work Behaviour) and Y (Distribution Errors)

The following are the results of the regression analysis conducted between X2 and Y.

Summary Output

Regression Statistics	
Multiple R	0,841007339
R Square	0,699481306
Adjusted R Square	0,671979252
Standard Error	9,746103753
Observations	58

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	155,2374070	155,2374070	11,9564071	0,011134313
Residual	56	238,6936275	34,20881478		
Total	57	393,9			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	12,691	13,067	1,266	0,219	-24,547	16,836	-24,547	16,836
X2	0,387	0,436	2,662	0,011	0,586	0,636	0,586	0,636

Sumber : Analisis Regresi pada Ms. Excel, 2025.

The analysis results show a Multiple R value of 0.841, indicating a very strong positive relationship between variables X2 and Y. The R Square value of 0.699 shows that 69.9% of the variation in Y can be explained by variable X2, while the remaining 30.1% is explained by other factors outside the model. This value is the highest among all independent variables, indicating that X2 has the greatest explanatory power for Y.

The Significance F value of 0.011 (< 0.05) indicates that the regression model is statistically significant. Furthermore, the p-value of X2 is 0.011 (< 0.05), confirming that X2 has a significant partial effect on Y. This analysis indicates that the second hypothesis (H2) is accepted, meaning that work behavior has a significant effect on distribution errors.

Correlation between X3 (Standard Operating Procedurs) and Y (Distribution Errors)

The following are the results of the regression analysis conducted between X3 and Y.

Summary Output

Regression Statistics	
Multiple R	0,391145327
R Square	0,194573489
Adjusted R Square	0,189146979
Standard Error	96,83856732
Observations	58

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	223,3851408	384,8514076	9,915655221	0,043317422
Residual	56	385,5458937	33,20617667		
Total	57	608,9			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	41,580	5,341	7,785	1,750	-13,880	52,280	-13,880	52,280
X3	0,680	30,591	0,186	0,043	0,313	137,303	0,313	137,303

Sumber : Analisis Regresi pada Ms. Excel, 2025.

Based on the analysis results, a Multiple R value of 0.391 was obtained, indicating a positive relationship with a low level of correlation between X3 and Y. Meanwhile, the R Square value of 0.195 indicates that 19.5% of the variation in Y can be explained by variable X3, while the remaining 80.5% is influenced by other factors outside the model. The significance test results show a Significance F value of 0.043 (< 0.05), indicating that the regression model is statistically significant. The p-value of X3 is also 0.043 (< 0.05), demonstrating that X3 has a significant partial effect on Y, although its influence is relatively smaller compared to X1 and X2.

Consistent with the regression analyses for X1 and X2, these results indicate that the final hypothesis (H3) is accepted, namely that company standard operating procedures have a significant effect on distribution errors.

CONCLUSION

Based on the results of the correlation and simple linear regression analyses, it can be concluded that all independent variables examined—namely X1, X2, and X3—have positive relationships and significant effects on the dependent variable (Y). This indicates that each of these operational factors contributes to the occurrence of distribution errors in the consolidation warehouse.

The analysis results show that variable X2 has the most dominant influence on Y, as indicated by the highest correlation coefficient and coefficient of determination (R Square) compared to the other variables. This finding suggests that the aspects represented by variable X2 constitute the primary factor that should receive priority attention in efforts to reduce distribution errors.

Meanwhile, variables X1 and X3 are also proven to have significant effects, although with relatively lower levels of contribution.

This study has certain limitations, as the analysis is restricted to correlation analysis and simple linear regression. Consequently, the findings are limited to identifying relationships and influences among variables and do not yet explore the root causes of distribution errors or propose in-depth and sustainable process improvements. Therefore, future research is recommended to adopt the Six Sigma approach using the DMAIC method, which enables systematic process analysis, identification of root causes, targeted improvement design, and continuous control of distribution process performance.

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