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Determinants of Last Mile Delivery at PT Pos Indonesia Jakarta Oceania Main Branch through Distribution

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Abstract: This study aims to analyze the determinants of Last Mile Delivery at PT Pos Indonesia Jakarta Oceania Main Branch through the mediating role of Distribution. This quantitative study employed the Structural Equation Modeling–Partial Least Squares (SEM-PLS) approach using SmartPLS 4. The study population consisted of 171 employees, while 121 respondents were selected as the research sample using the Slovin formula. The findings indicate that Distribution has a positive and significant effect on Last Mile Delivery ($\beta = 0.359$; $t = 5.483$; $p < 0.001$). Line Haul Transportation significantly influences Distribution ($\beta = 0.328$; $t = 4.807$; $p < 0.001$) and Last Mile Delivery ($\beta = 0.252$; $t = 3.069$; $p = 0.002$). Likewise, Mail Processing Centre has a positive and significant effect on Distribution ($\beta = 0.444$; $t = 7.350$; $p < 0.001$) and Last Mile Delivery ($\beta = 0.249$; $t = 3.868$; $p < 0.001$). Pickup Service also significantly affects Distribution ($\beta = 0.155$; $t = 2.135$; $p = 0.033$) and Last Mile Delivery ($\beta = 0.141$; $t = 2.040$; $p = 0.042$). Furthermore, Distribution significantly mediates the effects of Line Haul Transportation ($\beta = 0.118$; $t = 3.698$; $p < 0.001$), Mail Processing Centre ($\beta = 0.160$; $t = 4.361$; $p < 0.001$), and Pickup Service ($\beta = 0.172$; $t = 4.861$; $p < 0.001$) on Last Mile Delivery. The adjusted R^2 values of 0.394 for Distribution and 0.620 for Last Mile Delivery indicate that the proposed structural model possesses satisfactory explanatory power. These findings demonstrate that improving operational performance in Mail Processing Centre, Line Haul Transportation, and Pickup Service enhances Distribution effectiveness, which subsequently strengthens Last Mile Delivery performance within courier logistics services.

Keywords: Distribution, Last Mile Delivery, Line Haul Transportation, Mail Processing Centre, Pickup Service, SEM-PLS.

Indonesian Abstract: Penelitian ini bertujuan untuk menganalisis faktor-faktor yang menentukan *Last Mile Delivery* pada PT Pos Indonesia Kantor Cabang Utama Jakarta Oceania melalui peran mediasi Distribusi. Penelitian kuantitatif ini menggunakan pendekatan *Structural Equation Modeling–Partial Least Squares* (SEM-PLS) dengan bantuan SmartPLS 4. Populasi penelitian terdiri atas 171 karyawan, sedangkan 121 responden dipilih sebagai sampel penelitian menggunakan rumus Slovin. Hasil penelitian menunjukkan bahwa Distribusi berpengaruh positif dan signifikan terhadap *Last Mile Delivery* ($\beta = 0,359$; $t = 5,483$; $p < 0,001$). *Line Haul Transportation* berpengaruh signifikan terhadap Distribusi ($\beta = 0,328$; $t = 4,807$; $p < 0,001$) dan *Last Mile Delivery* ($\beta = 0,252$; $t = 3,069$; $p = 0,002$). Demikian pula,

Mail Processing Centre berpengaruh positif dan signifikan terhadap Distribusi ($\beta = 0,444$; $t = 7,350$; $p < 0,001$) dan *Last Mile Delivery* ($\beta = 0,249$; $t = 3,868$; $p < 0,001$). *Pickup Service* juga berpengaruh signifikan terhadap Distribusi ($\beta = 0,155$; $t = 2,135$; $p = 0,033$) dan *Last Mile Delivery* ($\beta = 0,141$; $t = 2,040$; $p = 0,042$). Selanjutnya, Distribusi secara signifikan memediasi pengaruh *Line Haul Transportation* ($\beta = 0,118$; $t = 3,698$; $p < 0,001$), *Mail Processing Centre* ($\beta = 0,160$; $t = 4,361$; $p < 0,001$), dan *Pickup Service* ($\beta = 0,172$; $t = 4,861$; $p < 0,001$) terhadap *Last Mile Delivery*. Nilai *adjusted R*² sebesar 0,394 untuk Distribusi dan 0,620 untuk *Last Mile Delivery* menunjukkan bahwa model struktural yang diajukan memiliki kemampuan eksplanasi yang memadai. Temuan ini menunjukkan bahwa peningkatan kinerja operasional pada *Mail Processing Centre*, *Line Haul Transportation*, dan *Pickup Service* dapat meningkatkan efektivitas Distribusi, yang selanjutnya memperkuat kinerja *Last Mile Delivery* dalam layanan logistik kurir.

Keywords: Distribusi, Pengiriman Mil Akhir, Transportasi Jalur Utama, Pusat Pemrosesan Surat, Layanan Penjemputan, SEM-PLS.

INTRODUCTION

PT Pos Indonesia Jakarta Oceania Main Branch is one of the operational units of PT Pos Indonesia that provides courier and logistics services in the West Jakarta area. Its logistics business processes encompass pickup service, Mail Processing Centre, line haul transportation, distribution, and last mile delivery. Despite operating an extensive distribution network, the company continues to face various operational challenges that adversely affect its logistics service performance. Company records indicate that courier logistics service revenue in 2025 reached only IDR 17.84 billion, representing 40.09% of the annual target of IDR 44.50 billion. Compared with 2024, revenue declined by IDR 8.31 billion, equivalent to a decrease of 31.77%. These conditions suggest that the effectiveness of the company's logistics operational processes still requires substantial improvement.

These operational issues are further reflected in the company's performance indicators, which have not yet achieved the established corporate standards. During 2025, Last Mile Delivery performance reached only 88.20%, Distribution 87.75%, Line Haul Transportation 88.16%, Mail Processing Centre 88.14%, and Pickup Service 89.35%. All of these performance indicators remained below PT Pos Indonesia's minimum target of 95%. The relatively low performance across these logistics activities indicates the existence of operational bottlenecks within the distribution process, potentially resulting in delivery delays, increased customer complaints, and declining overall logistics service quality.

According to Christopher (2022), logistics management is an integrated system encompassing procurement, pickup service, Mail Processing Centre, line haul transportation, distribution, and last mile delivery.

Previous studies have reported inconsistent findings regarding the relationship between Mail Processing Centre and Distribution. Alfianto et al. (2024), Lusel et al. (2024), and Martikasari and Yulianto (2024) found that Mail Processing Centre has a positive and significant effect on Distribution. In contrast, Fan (2024), Feng (2024), and Wu et al. (2025) concluded that the relationship is statistically insignificant. These inconsistent findings indicate the existence of a research gap, highlighting the need to re-examine the influence of Mail Processing Centre on Distribution within the operational context of PT Pos Indonesia Jakarta Oceania Main Branch.

Previous research investigating the influence of Line Haul Transportation on Distribution has produced inconsistent results. Li et al. (2024) and Zhao and Jiang (2026) reported a positive and significant relationship, whereas Ritzinger et al. (2024) and Durán-Micco et al. (2025) found no significant effect. These contradictory findings suggest that

additional empirical evidence is required to clarify the relationship between Line Haul Transportation and Distribution, particularly in the Indonesian courier logistics industry.

The relationship between Pickup Service and Distribution also remains inconclusive. Giménez-Palacios et al. (2022) and Wang and Huang (2021) demonstrated that Pickup Service positively and significantly affects Distribution. Conversely, Meng et al. (2022) reported that Pickup Service does not significantly influence Distribution performance. This inconsistency represents another research gap that warrants further empirical investigation within PT Pos Indonesia Jakarta Oceania Main Branch.

Previous studies examining the influence of Distribution on Last Mile Delivery have likewise generated inconsistent findings. Kumar and Chidambara (2024), Ferreira and Esperança (2025), and Faisal and Khalid (2024) concluded that Distribution has a positive and significant impact on Last Mile Delivery. However, Ray and Paul (2023) reported that the relationship is statistically insignificant. These conflicting findings suggest that the relationship between Distribution and Last Mile Delivery requires further investigation.

Research on the effect of Mail Processing Centre on Last Mile Delivery has also yielded inconsistent conclusions. Shelly (2022) and Nisa et al. (2025) found a positive and significant relationship, whereas Lamas-Fernandez et al. (2023) and Ray and Paul (2023) concluded that Mail Processing Centre does not significantly influence Last Mile Delivery. Therefore, additional empirical evidence is needed to validate this relationship within the operational environment of PT Pos Indonesia.

The relationship between Line Haul Transportation and Last Mile Delivery has also been widely debated. Zhu et al. (2023), Mandal and Archetti (2023), and Fried et al. (2024) demonstrated a positive and significant influence of Line Haul Transportation on Last Mile Delivery. In contrast, Boysen et al. (2023) and Kumar and Chidambara (2024) reported that the relationship is not statistically significant. These inconsistent findings justify the need for further empirical verification within Indonesian courier service companies.

Likewise, previous studies investigating the influence of Pickup Service on Last Mile Delivery have reported conflicting findings. Lai et al. (2021) and Ogunnowo and Sule (2021) found that Pickup Service positively and significantly affects Last Mile Delivery. Conversely, Kumar and Prashar (2024) and Ma et al. (2021) concluded that the relationship is insignificant. These inconsistent empirical findings indicate that the relationship between Pickup Service and Last Mile Delivery remains inconclusive and requires further investigation.

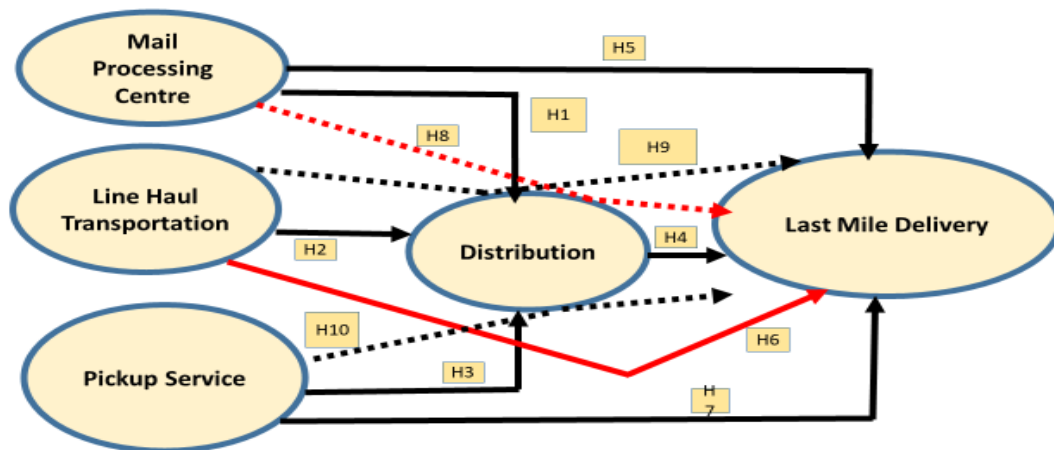
Previous studies investigating the mediating role of Distribution in the relationship between Mail Processing Centre and Last Mile Delivery remain limited and have produced inconsistent findings. Sułkowski et al. (2022) demonstrated that Distribution significantly mediates the relationship between Mail Processing Centre and Last Mile Delivery. In contrast, Ray and Paul (2023) reported that Distribution does not function as a mediating variable. These conflicting findings indicate a research gap regarding the indirect effect of Mail Processing Centre on Last Mile Delivery through Distribution.

Similarly, empirical evidence concerning the mediating role of Distribution in the relationship between Line Haul Transportation and Last Mile Delivery remains inconclusive. Zhu et al. (2023), Mandal and Archetti (2023), and Liu and Hassini (2024) reported significant mediation effects, whereas Lyons and McDonald (2023) concluded that Distribution does not mediate this relationship. These inconsistent findings highlight the need for further investigation to clarify the underlying mechanism linking Line Haul Transportation to Last Mile Delivery.

Research examining Distribution as a mediating variable in the relationship between Pickup Service and Last Mile Delivery remains relatively limited, particularly in the context of courier service companies in Indonesia. Galiullina et al. (2024) and Masorgo et al. (2024) found that Distribution significantly mediates this relationship, whereas empirical evidence reporting the opposite conclusion is still scarce. This condition represents an important research gap that

motivates the present study to re-examine the mediating role of Distribution between Pickup Service and Last Mile Delivery.

The novelty of this study lies in the development of a comprehensive empirical model that integrates Mail Processing Centre, Line Haul Transportation, and Pickup Service as exogenous variables, Distribution as the mediating variable, and Last Mile Delivery as the endogenous variable within a single structural framework. The research model was developed based on previous studies and is presented in Figure 1.



Source: Previous Studies (2026)

Figure 1. Research Model

The hypotheses proposed in this study were formulated based on previous empirical studies and are presented as follows:

H1: Mail Processing Centre has a positive and significant effect on Distribution in the courier logistics services of PT Pos Indonesia Jakarta Oceania Main Branch.

H2: Line Haul Transportation has a positive and significant effect on Distribution in the courier logistics services of PT Pos Indonesia Jakarta Oceania Main Branch.

H3: Pickup Service has a positive and significant effect on Distribution in the courier logistics services of PT Pos Indonesia Jakarta Oceania Main Branch.

H4: Distribution has a positive and significant effect on Last Mile Delivery in the courier logistics services of PT Pos Indonesia Jakarta Oceania Main Branch.

H5: Mail Processing Centre has a positive and significant effect on Last Mile Delivery in the courier logistics services of PT Pos Indonesia Jakarta Oceania Main Branch.

H6: Line Haul Transportation has a positive and significant effect on Last Mile Delivery in the courier logistics services of PT Pos Indonesia Jakarta Oceania Main Branch.

H7: Pickup Service has a positive and significant effect on Last Mile Delivery in the courier logistics services of PT Pos Indonesia Jakarta Oceania Main Branch.

H8: Distribution positively and significantly mediates the relationship between Mail Processing Centre and Last Mile Delivery in the courier logistics services of PT Pos Indonesia Jakarta Oceania Main Branch.

H9: Distribution positively and significantly mediates the relationship between Line Haul Transportation and Last Mile Delivery in the courier logistics services of PT Pos Indonesia Jakarta Oceania Main Branch.

H10: Distribution positively and significantly mediates the relationship between Pickup Service and Last Mile Delivery in the courier logistics services of PT Pos Indonesia Jakarta Oceania Main Branch.

METHODS

Research Design

This study uses a quantitative approach with an explanatory research design to analyze the causal relationships among Mail Processing Centre, Line Haul Transportation, Pickup Service, Distribution, and Last Mile Delivery in courier logistics services at PT Pos Indonesia Main Branch Office Jakarta Oceania. The explanatory research design was selected because this study aims to examine the direct and indirect effects among variables through hypothesis testing. The research was conducted at PT Pos Indonesia Main Branch Office Jakarta Oceania during the period of February–June 2026.

Population and Sample

The population in this study consisted of 173 employees involved in logistics operational activities at PT Pos Indonesia Main Branch Office Jakarta Oceania. The respondents included Executive General Manager, Deputy Executive General Manager, Managers, Assistant Managers, Functional Employees, Account Managers, Staff, Counter Officers, Supervisors, Drivers, and Branch Managers of Sub-Branch Offices. The sample size was determined using the Slovin formula with a 5% margin of error, resulting in a total sample of 121 respondents. The sampling technique used in this study was stratified random sampling to ensure that each employee group had a proportional opportunity to become a research respondent. This technique was selected because the population consists of employees with different positions and responsibilities within logistics operations.

Data Collection and Research Instrument

Data collection was conducted using questionnaires as the primary data source. Secondary data were obtained through observation, interviews, and documentation studies related to logistics operational activities at PT Pos Indonesia Main Branch Office Jakarta Oceania. The research instrument was developed based on Supply Chain Management (SCM) theory, Supply Chain Operations Reference (SCOR) framework, and previous empirical studies related to logistics performance and Last Mile Delivery. All research indicators were measured using a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

Research Variables and Measurement

This study consists of three independent variables, one mediating variable, and one dependent variable. Mail Processing Centre (X_1), Line Haul Transportation (X_2), and Pickup Service (X_3) were positioned as independent variables. Distribution (Y) was used as a mediating variable, while Last Mile Delivery (Z) was used as the dependent variable.

Data Analysis Method

Data analysis was performed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with the assistance of SmartPLS 4 software. SEM-PLS was selected because this method is suitable for analyzing complex structural models involving direct relationships and mediating effects among latent variables.

The analysis was conducted in two stages, namely evaluation of the measurement model (outer model) and evaluation of the structural model (inner model).

The outer model evaluation was conducted to assess instrument validity and reliability. Convergent validity was evaluated using outer loading values and Average Variance Extracted (AVE). Discriminant validity was examined using the Fornell–Larcker Criterion and Heterotrait–Monotrait Ratio (HTMT). Reliability testing was performed using Cronbach's Alpha and Composite Reliability values.

The inner model evaluation was conducted by analyzing path coefficients, coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and hypothesis testing using the bootstrapping procedure. The significance level was determined based on a P-Values value below 0.05 and a T-Statistics value greater than 1.96 with a 95% confidence level.

The mediation analysis was conducted to examine the role of Distribution in mediating the relationship between Mail Processing Centre, Line Haul Transportation, and Pickup Service toward Last Mile Delivery. The indirect effect was evaluated based on the path coefficient, T-Statistics, and P-Values obtained from the bootstrapping results.

RESULTS AND DISCUSSION

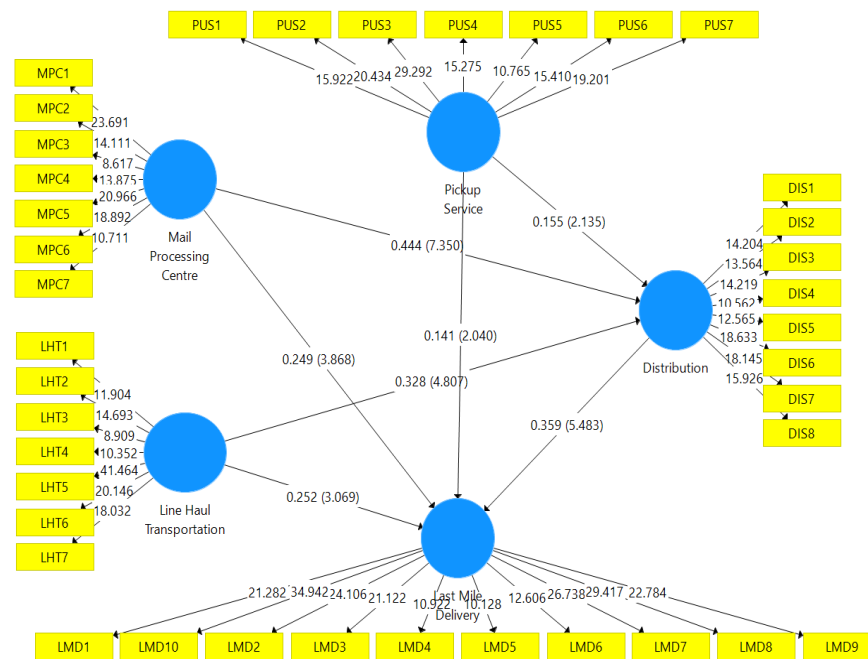
Results

This study aims to analyze the effects of Mail Processing Centre, Line Haul Transportation, and Pickup Service on Last Mile Delivery through Distribution as an intervening variable at PT Pos Indonesia Jakarta Oceania Main Branch Office. The analysis employed the Structural Equation Modeling–Partial Least Squares (SEM-PLS) method using SmartPLS 4 based on data collected from 121 respondents. The analytical procedure began with the evaluation of the measurement model (outer model), followed by the evaluation of the structural model (inner model). These procedures were conducted to ensure that the research instrument satisfied the validity and reliability requirements before testing the relationships among the variables.

The measurement model evaluation indicates that all indicators adequately represent their respective latent constructs. All outer loading values exceeded the recommended threshold of 0.70 as suggested by Hair et al. (2022), indicating that all indicators are valid and none required elimination. Furthermore, the Average Variance Extracted (AVE) values of all constructs were above 0.50, namely Distribution (0.536), Last Mile Delivery (0.683), Line Haul Transportation (0.627), Mail Processing Centre (0.590), and Pickup Service (0.618). These findings demonstrate that each construct explains more than 50% of the variance of its indicators, thereby satisfying the convergent validity requirement.

Discriminant validity was evaluated using the Fornell–Larcker criterion, which showed that the square root of the AVE for each construct exceeded its correlations with other constructs. These findings were further confirmed by the Heterotrait–Monotrait Ratio (HTMT), where all HTMT values were below the recommended threshold of 0.90. Consequently, each construct in the research model possesses sufficient empirical distinctiveness, indicating no overlap among the variables. These results confirm that the measurement model satisfies the discriminant validity requirement and that each construct measures a unique conceptual domain.

In addition to validity, all constructs demonstrated excellent reliability. Cronbach's Alpha values ranged from 0.879 to 0.948, while Composite Reliability values ranged from 0.902 to 0.955. These values substantially exceed the minimum recommended threshold of 0.70, indicating a high level of internal consistency among the indicators measuring each construct. Therefore, the research instrument is considered highly reliable and suitable for structural model evaluation. The complete research model is presented in **Figure 2**.



Source: Questionnaire Data (2026)

Figure 2. Research Model Results

After the measurement model satisfied all validity and reliability criteria, the analysis proceeded to the structural model evaluation using the data presented in Figure 2. The results of the path coefficient analysis and hypothesis testing are summarized as follows.

The results indicate that all direct relationships among the variables are positive and statistically significant. Mail Processing Centre positively affects Distribution with a path coefficient of 0.444, Line Haul Transportation with a coefficient of 0.328, and Pickup Service with a coefficient of 0.155. Furthermore, Distribution positively influences Last Mile Delivery with a coefficient of 0.359. In addition, Mail Processing Centre, Line Haul Transportation, and Pickup Service also exert direct positive effects on Last Mile Delivery with coefficients of 0.249, 0.252, and 0.141, respectively. All relationships exhibit T-statistics greater than 1.96 and p-values below 0.05, indicating that all direct hypotheses are supported.

The study also confirms the mediating role of Distribution in the relationships between the three exogenous variables and Last Mile Delivery. The indirect effect of Mail Processing Centre on Last Mile Delivery through Distribution has a coefficient of 0.160 with a T-statistic of 4.361. The indirect effect of Line Haul Transportation is 0.118 with a T-statistic of 3.698, while Pickup Service has an indirect effect of 0.172 with a T-statistic of 4.861. All mediation effects have p-values of 0.000, indicating that Distribution significantly mediates the relationships between the independent variables and Last Mile Delivery.

Table 1. Path Coefficient and Hypothesis Testing Results

Relationship	Original Sample (O)	T Statistics	P Values
Distribution → Last Mile Delivery	0.359	5.483	0.000
Line Haul Transportation → Distribution	0.328	4.807	0.000
Line Haul Transportation → Last Mile Delivery	0.252	3.069	0.002
Mail Processing Centre → Distribution	0.444	7.350	0.000
Mail Processing Centre → Last Mile Delivery	0.249	3.868	0.000
Pickup Service → Distribution	0.155	2.135	0.033
Pickup Service → Last Mile Delivery	0.141	2.040	0.042
Line Haul Transportation → Distribution → Last Mile Delivery	0.118	3.698	0.000
Mail Processing Centre → Distribution → Last Mile Delivery	0.160	4.361	0.000

Relationship	Original Sample (O)	T Statistics	P Values
Pickup Service → Distribution → Last Mile Delivery	0.172	4.861	0.000

Source: Questionnaire Data (2026)

The explanatory power of the structural model is considered substantial. The adjusted R^2 value of 0.660 indicates that 66.0% of the variance in Distribution is explained by Mail Processing Centre, Line Haul Transportation, and Pickup Service. Meanwhile, the adjusted R^2 value of 0.764 indicates that 76.4% of the variance in Last Mile Delivery is jointly explained by Mail Processing Centre, Line Haul Transportation, Pickup Service, and Distribution. These findings demonstrate that the proposed model possesses strong explanatory capability in describing the relationships among the research variables.

Based on the effect size (f^2) analysis, Mail Processing Centre provides the largest contribution to Distribution with an f^2 value of 0.310, representing a medium effect size. Likewise, Distribution contributes the largest effect to Last Mile Delivery with an f^2 value of 0.188, which also falls within the medium effect category. The remaining relationships, including those involving Line Haul Transportation, Mail Processing Centre, and Pickup Service, exhibit small effect sizes. These findings indicate that although all variables positively contribute to Last Mile Delivery, Distribution serves as the primary mechanism linking operational activities to delivery performance.

The predictive relevance evaluation also indicates satisfactory model performance. The Q^2 value for Distribution is 0.326, suggesting strong predictive relevance, while the Q^2 value for Last Mile Delivery is 0.503, indicating very strong predictive capability. Since both Q^2 values are greater than zero, the model satisfies the predictive relevance criterion recommended by Hair et al. (2022).

DISCUSSION

The first hypothesis testing shows that Mail Processing Centre has a positive and significant effect on Distribution, with a path coefficient value of 0.444, a T-Statistics value of 7.350, and a P-Values value of 0.000. Therefore, the first hypothesis is accepted. These findings indicate that better management of receiving, sorting, consolidation, and dispatch processes within the Mail Processing Centre will improve the effectiveness of Distribution at PT Pos Indonesia Main Branch Office Jakarta Oceania. The results imply that the company needs to continuously improve the accuracy of sorting processes, processing capacity, and operational coordination within the Mail Processing Centre. This finding is consistent with previous studies conducted by Alfianto et al. (2024), Lusel et al. (2024), and Martikasari and Yulianto (2024), which stated that Mail Processing Centre has a positive and significant effect on Distribution.

The second hypothesis testing demonstrates that Line Haul Transportation has a positive and significant effect on Distribution, with a path coefficient of 0.328, a T-Statistics value of 4.807, and a P-Values value of 0.000. Therefore, the second hypothesis is accepted. This finding indicates that improving the reliability of transportation between logistics nodes can enhance the effectiveness of Distribution processes at PT Pos Indonesia Main Branch Office Jakarta Oceania. The results suggest that the company should strengthen fleet reliability, transportation scheduling accuracy, route optimization, and vehicle monitoring systems. This finding supports previous research by Li et al. (2024) and Zhao and Jiang (2026), which confirmed that Line Haul Transportation positively and significantly influences Distribution.

The third hypothesis testing indicates that Pickup Service has a positive and significant effect on Distribution, with a path coefficient value of 0.155, a T-Statistics value of 2.135, and a P-Values value of 0.033. Therefore, the third hypothesis is accepted. The findings indicate that improving Pickup Service quality can facilitate the flow of shipments into the company's logistics network and subsequently improve Distribution performance. This result shows that punctual pickup schedules, faster customer responses, and effective operational coordination

are important factors in supporting Distribution effectiveness. This finding is in accordance with previous studies conducted by Giménez-Palacios et al. (2022) and Wang and Huang (2021), which found that Pickup Service has a positive and significant effect on Distribution.

The fourth hypothesis testing shows that Distribution has a positive and significant effect on Last Mile Delivery, with a path coefficient value of 0.359, a T-Statistics value of 5.483, and a P-Values value of 0.000. Therefore, the fourth hypothesis is accepted. The findings demonstrate that more effective Distribution processes will improve the quality of Last Mile Delivery services provided to customers. This result indicates that distribution accuracy, shipment synchronization, and real-time delivery monitoring are important factors in improving final delivery performance. The findings are consistent with research conducted by Kumar and Chidambara (2024), Ferreira and Esperança (2025), and Faisal and Khalid (2024), which stated that Distribution positively and significantly affects Last Mile Delivery.

The fifth hypothesis testing reveals that Mail Processing Centre has a positive and significant effect on Last Mile Delivery, with a path coefficient value of 0.249, a T-Statistics value of 3.868, and a P-Values value of 0.000. Therefore, the fifth hypothesis is accepted. This finding indicates that improvements in shipment processing, sorting accuracy, and consolidation activities at the Mail Processing Centre can directly improve Last Mile Delivery performance. The results emphasize that an effective Mail Processing Centre plays an important role in ensuring shipments are delivered accurately and on time to customers. This finding supports previous studies by Shelly (2022) and Nisa et al. (2025), which concluded that Mail Processing Centre has a positive and significant effect on Last Mile Delivery.

The sixth hypothesis testing shows that Line Haul Transportation has a positive and significant effect on Last Mile Delivery, with a path coefficient value of 0.252, a T-Statistics value of 3.069, and a P-Values value of 0.002. Therefore, the sixth hypothesis is accepted. These findings indicate that better performance of transportation activities between logistics nodes can improve the quality of Last Mile Delivery services at PT Pos Indonesia Main Branch Office Jakarta Oceania. Reliable transportation schedules, fleet availability, route efficiency, and timely shipment transfers are important factors in ensuring that deliveries reach customers according to the expected service standards. This finding is consistent with previous studies conducted by Zhu et al. (2023), Mandal and Archetti (2023), and Fried et al. (2024), which found that Line Haul Transportation has a positive and significant effect on Last Mile Delivery.

The seventh hypothesis testing indicates that Pickup Service has a positive and significant effect on Last Mile Delivery, with a path coefficient value of 0.141, a T-Statistics value of 2.040, and a P-Values value of 0.042. Therefore, the seventh hypothesis is accepted. The findings indicate that improving Pickup Service quality contributes to improving the effectiveness of Last Mile Delivery at PT Pos Indonesia Main Branch Office Jakarta Oceania. Timely pickup activities, quick service responses, and effective communication with customers can accelerate the movement of shipments within the logistics process and support successful final delivery. This result confirms that first-mile logistics activities have an important role in determining the overall quality of logistics services. This finding supports previous research conducted by Lai et al. (2021) and Ogunnowo and Sule (2021), which stated that Pickup Service positively and significantly affects Last Mile Delivery.

The eighth hypothesis testing proves that Distribution positively and significantly mediates the effect of Mail Processing Centre on Last Mile Delivery, with an indirect path coefficient value of 0.160, a T-Statistics value of 4.361, and a P-Values value of 0.000. Therefore, the eighth hypothesis is accepted. These findings indicate that improvements in Mail Processing Centre activities will provide a greater impact on Last Mile Delivery when supported by effective Distribution processes. The results demonstrate that the process of receiving, sorting, consolidating, and preparing shipments at the Mail Processing Centre must be integrated with an effective distribution system to ensure timely delivery to customers. Therefore, Distribution acts as an important mechanism that strengthens the relationship

between Mail Processing Centre and Last Mile Delivery. This finding is consistent with Sułkowski et al. (2022), who stated that Distribution plays a mediating role in the relationship between Mail Processing Centre and Last Mile Delivery.

The ninth hypothesis testing demonstrates that Distribution positively and significantly mediates the effect of Line Haul Transportation on Last Mile Delivery, with an indirect path coefficient value of 0.118, a T-Statistics value of 3.698, and a P-Values value of 0.000. Therefore, the ninth hypothesis is accepted. These findings indicate that effective Line Haul Transportation will generate greater improvements in Last Mile Delivery when followed by an effective Distribution process. Reliable transportation between logistics centers must be supported by accurate distribution planning, shipment coordination, and operational synchronization to ensure successful final delivery. The results confirm that Distribution serves as an important connecting mechanism between transportation activities and customer delivery performance. This finding supports previous studies conducted by Zhu et al. (2023), Mandal and Archetti (2023), and Liu and Hassini (2024), which found that Distribution mediates the relationship between Line Haul Transportation and Last Mile Delivery.

The tenth hypothesis testing shows that Distribution positively and significantly mediates the effect of Pickup Service on Last Mile Delivery, with an indirect path coefficient value of 0.172, a T-Statistics value of 4.861, and a P-Values value of 0.000. Therefore, the tenth hypothesis is accepted. These findings indicate that the contribution of Pickup Service to Last Mile Delivery performance becomes stronger when supported by an effective and integrated Distribution process. An accurate pickup schedule, responsive customer service, and efficient shipment collection process will improve Distribution effectiveness, which ultimately enhances the success of final delivery activities. The findings emphasize that first-mile and distribution activities must be managed as an integrated logistics system to improve customer delivery performance. This result is consistent with previous studies by Galiullina et al. (2024) and Masorgo et al. (2024), which stated that Distribution mediates the relationship between Pickup Service and Last Mile Delivery.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

1. Mail Processing Centre has a positive and significant effect on Distribution at PT Pos Indonesia Main Branch Office Jakarta Oceania. This relationship is indicated by a path coefficient of 0.444, a T-statistic of 7.350, and a P-value of 0.000, leading to the acceptance of the first hypothesis. This finding demonstrates that improvements in Mail Processing Centre management are associated with higher Distribution effectiveness within the organization.
2. Line Haul Transportation has a positive and significant effect on Distribution at PT Pos Indonesia Main Branch Office Jakarta Oceania. This relationship is indicated by a path coefficient of 0.328, a T-statistic of 4.807, and a P-value of 0.000, leading to the acceptance of the second hypothesis. This finding demonstrates that enhancing the quality of inter-node transportation consistently strengthens the overall effectiveness of the Distribution process.
3. Pickup Service has a positive and significant effect on Distribution at PT Pos Indonesia Main Branch Office Jakarta Oceania. This relationship is indicated by a path coefficient of 0.155, a T-statistic of 2.135, and a P-value of 0.033, leading to the acceptance of the third hypothesis. This finding demonstrates that improvements in pickup service quality support the smooth functioning of the Distribution process, although its relative contribution is smaller compared to the other variables in the model.
4. Distribution has a positive and significant effect on Last Mile Delivery at PT Pos Indonesia Main Branch Office Jakarta Oceania. This relationship is indicated by a path coefficient of 0.359, a T-statistic of 5.483, and a P-value of 0.000, leading to the acceptance of the

- fourth hypothesis. This finding demonstrates that a more effective Distribution process consistently yields superior Last Mile Delivery quality for end customers.
5. Mail Processing Centre has a positive and significant effect on Last Mile Delivery at PT Pos Indonesia Main Branch Office Jakarta Oceania. This relationship is indicated by a path coefficient of 0.249, a T-statistic of 3.868, and a P-value of 0.000, leading to the acceptance of the fifth hypothesis. This finding demonstrates that improvements in shipment processing quality positively enhance the quality of final-stage delivery services provided to customers.
 6. Line Haul Transportation has a positive and significant effect on Last Mile Delivery at PT Pos Indonesia Main Branch Office Jakarta Oceania. This relationship is indicated by a path coefficient of 0.252, a T-statistic of 3.069, and a P-value of 0.002, leading to the acceptance of the sixth hypothesis. This finding demonstrates that reliable inter-hub transportation is instrumental in improving the on-time performance of Last Mile Delivery services.
 7. Pickup Service has a positive and significant effect on Last Mile Delivery at PT Pos Indonesia Main Branch Office Jakarta Oceania. This relationship is indicated by a path coefficient of 0.141, a T-statistic of 2.040, and a P-value of 0.042, leading to the acceptance of the seventh hypothesis. This finding demonstrates that improvements in pickup service quality contribute to enhanced final-stage delivery performance for end customers.
 8. Distribution positively and significantly mediates the effect of Mail Processing Centre on Last Mile Delivery at PT Pos Indonesia Main Branch Office Jakarta Oceania. This relationship is indicated by an indirect path coefficient of 0.160, a T-statistic of 4.361, and a P-value of 0.000, leading to the acceptance of the eighth hypothesis. This finding demonstrates that improvements in Mail Processing Centre quality generate a greater cumulative impact on Last Mile Delivery performance when mediated through Distribution effectiveness.
 9. Distribution positively and significantly mediates the effect of Line Haul Transportation on Last Mile Delivery at PT Pos Indonesia Main Branch Office Jakarta Oceania. This relationship is indicated by an indirect path coefficient of 0.118, a T-statistic of 3.698, and a P-value of 0.000, leading to the acceptance of the ninth hypothesis. This finding demonstrates that the positive influence of Line Haul Transportation on Last Mile Delivery is amplified through the intermediary role of an effective Distribution process.
 10. Distribution positively and significantly mediates the effect of Pickup Service on Last Mile Delivery at PT Pos Indonesia Main Branch Office Jakarta Oceania. This relationship is indicated by an indirect path coefficient of 0.172, a T-statistic of 4.861, and a P-value of 0.000, leading to the acceptance of the tenth hypothesis. This finding demonstrates that the contribution of Pickup Service to Last Mile Delivery performance is substantially amplified when supported by an effective and well-integrated Distribution process.

Limitations

This study is subject to several limitations that should be considered when interpreting its findings. First, the research was conducted exclusively at PT Pos Indonesia Main Branch Office Jakarta Oceania; consequently, the operational characteristics, organizational culture, and distribution systems inherent to this particular unit may not be representative of other main branch offices or courier logistics service providers. Therefore, the generalizability of the findings is constrained, and caution should be exercised when applying these results to different organizational contexts.

Recommendations

Practical Suggestions

PT Pos Indonesia Main Branch Office Jakarta Oceania is recommended to improve the quality of its Mail Processing Centre through the enhancement of sorting processes, the

adoption of automation technology, and the development of human resource competencies, so that overall operational effectiveness can be significantly elevated. The organization should also improve Pickup Service quality by ensuring pickup punctuality, accelerating service response times, and developing digitally integrated pickup solutions to enhance customer satisfaction. Furthermore, the company should optimize Line Haul Transportation performance through route rationalization, fleet reliability improvements, and the implementation of real-time monitoring systems to ensure more efficient inter-hub shipment movement. In addition, the Distribution process should be strengthened through better operational schedule synchronization, reduction of idle waiting times, and reinforced inter-unit coordination to accelerate and improve the accuracy of shipment flow. Finally, the company should enhance Last Mile Delivery quality by prioritizing on-time delivery, improving shipment handover accuracy, and integrating operational information systems across all logistics stages to continuously elevate customer satisfaction levels.

Theoretical Suggestions

This study provides empirical evidence that Mail Processing Centre, Line Haul Transportation, and Pickup Service are significant determinants of both Distribution and Last Mile Delivery performance within the courier logistics service context. Accordingly, the conceptual model developed in this study may serve as a viable framework for advancing theoretical development in logistics management, particularly with respect to the integration of operational processes within distribution chains. Future research is encouraged to enrich this theoretical model by examining more complex inter-variable relationships — including higher-order mediation and moderation effects — among logistics operational variables. Such theoretical extensions are expected to broaden academic understanding of distribution system effectiveness and last mile delivery optimization across the logistics industry.

Future Research Suggestions

Future studies are encouraged to expand the research scope by incorporating multiple main branch offices of PT Pos Indonesia or other logistics service providers, thereby enhancing the generalizability of the findings. In addition, subsequent research may introduce variables not examined in this study — such as Logistics Information System, Fleet Management, Warehouse Management, Digital Tracking System, Human Resource Competency, Customer Satisfaction, Service Quality, or Supply Chain Integration — as independent, mediating, or moderating variables, in order to produce a more comprehensive and robust understanding of the factors that determine logistics performance and last mile delivery quality.

REFERENCES

- Alfianto, R., Bisma, M. A., & Sulistiyaningsih, F. (2024). Analisis gagal antar surat dan paket PT Pos Indonesia (Persero) Cabang Sekejati Bandung menggunakan metode Fault Tree Analysis (FTA) dan Failure Mode and Effect Analysis (FMEA). *Economic Reviews Journal*, 3(3), 2479–2489. <https://doi.org/10.56709/mrj.v3i3.425>
- Boysen, N., Fedtke, S., & Schwerdfeger, S. (2023). Last-mile delivery concepts: A survey from an operational research perspective. *OR Spectrum*, 45(1), 1–58. <https://doi.org/10.1007/s00291-020-00607-8>
- Dobrodolac, M. (2025). Optimization of industrial process management in postal and logistics centers based on transit time quality standards. *Journal of Industrial Intelligence*, 3(1), 12–19. <https://doi.org/10.56578/jii030102>
- Durán-Micco, J., Alaei, S., & Macharis, C. (2025). Evaluating the impact of horizontal collaboration in logistics systems: A simulation-based study. *Transportmetrica B: Transport Dynamics*.
- Fan, S. (2024). Influencing factors and countermeasures on intelligent transformation and upgrading of logistics firms: A case study in China. *PLOS ONE*, 19(4), e0297663. <https://doi.org/10.1371/journal.pone.0297663>

- Feng, C. (2024). Design of logistics sorting algorithm based on deep learning and sampling evaluation. *International Journal of Computational Intelligence Systems*, 17, 82. <https://doi.org/10.1007/s44196-024-00449-0>
- Fried, T., Goodchild, A. V., Sanchez-Diaz, I., & Browne, M. (2024). The state of sustainable urban last-mile freight planning in the United States. *Journal of the American Planning Association*.
- Galiullina, A., Mutlu, N., Kinable, J., & Van Woensel, T. (2024). Demand steering in a last-mile delivery problem with home and pickup point delivery options. *Transportation Science*, 58(2), 454–473. <https://doi.org/10.1287/trsc.2023.0287>
- Ghozali, I. (2023). *Partial least square*. Badan Penerbit Universitas Diponegoro.
- Giménez-Palacios, I., Parreño, F., Álvarez-Valdés, R., Paquay, C., Oliveira, B. B., Carravilla, M. A., & Oliveira, J. F. (2022). First-mile logistics parcel pickup: Vehicle routing with packing constraints under disruption. *Transportation Research Part E: Logistics and Transportation Review*, 164, Article 102812. <https://doi.org/10.1016/j.tre.2022.102812>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). Sage Publications.
- Jakfar. (2024). Determinants of logistics distribution efficiency: A case study in Alor District, East Nusa Tenggara. *Logistica: Journal of Logistic and Transportation*, 2(3), 168–176. <https://doi.org/10.61978/logistica.v2i3.677>
- Kumar, D., & Prashar, A. (2024). Linking resource bundling and logistics capability with performance: Study on 3PL providers in India. *International Journal of Productivity and Performance Management*, 73(1), 270–302. <https://doi.org/10.1108/IJPPM-06-2022-0289>
- Kumar, I., & Chidambara. (2024). A systematic literature review and bibliometric analysis of last-mile e-commerce delivery in urban areas. *Urban, Planning and Transport Research*, 12(1), 2357577. <https://doi.org/10.1080/21650020.2024.2357577>
- Lai, P.-L., Jang, H., Fang, M., & Peng, K. (2021). Parcel locker service quality, customer satisfaction, and last-mile logistics performance. *Sustainability*, 13(23), Article 13268. <https://doi.org/10.3390/su132313268>
- Li, J., Wang, Y., & Liu, H. (2024). The optimization of split demand route planning under metro-truck collaborative distribution. *Urban Rail Transit*, 10(2). <https://doi.org/10.1007/s40864-024-00216-6>
- Lim, S., Kim, J., & Lee, H. (2022). Logistics service reliability in first-mile and last-mile delivery operations. *Journal of Transportation and Logistics Management*, 18(2), 85–101.
- Liu, S., & Hassini, E. (2024). Freight last mile delivery: A literature review. *Transportation Planning and Technology*, 47(3), 323–369. <https://doi.org/10.1080/03081060.2023.2268601>
- Ma, P., Yao, N., & Yang, X. (2021). Service quality evaluation of terminal express delivery based on an integrated SERVQUAL–AHP–TOPSIS approach. *Mathematical Problems in Engineering*, 2021, Article 8883370. <https://doi.org/10.1155/2021/8883370>
- Martikasari, A. M., & Yulianto, I. (2024). Proposed package distribution routes at PT. Pos Indonesia Mail Processing Center Bandung. *Sainteks: Jurnal Sain dan Teknik*, 6(2), 203–213. <https://doi.org/10.37577/sainteks.v6i02.656>
- Masorgo, N., et al. (2024). Last-mile delivery: A process view, framework, and research agenda. *Journal of Business Logistics*, 45(4). <https://doi.org/10.1111/jbl.12397>
- Meng, W., Meng, L., Han, G., Zhuang, X., Tong, L. C., & Wu, S. (2022). The value of preemptive pick-up services in dynamic vehicle routing for last-mile delivery: Space-time network-based formulation and solution algorithms. *Journal of Advanced Transportation*, 2022, Article 5052897. <https://doi.org/10.1155/2022/5052897>

- Mohammad, W. A. M., Diab, Y. N., Elomri, A., & Triki, C. (2023). Innovative solutions in last mile delivery: Concepts, practices, challenges, and future directions. *Supply Chain Forum: An International Journal*, 24(2), 151–169. <https://doi.org/10.1080/16258312.2023.2173488>
- Nisa, J., Kumar, A. K. P., & Nathan, R. J. (2025). Logistic service improvement parameters for postal service providers using analytical hierarchy process and quality function deployment. *Economies*, 13(5), 120. <https://doi.org/10.3390/economies13050120>
- Nuruly, S. (2023). Logistics: Analysis of procurement, distribution, warehousing, and transportation (mini review). *Indonesian Journal of Business Analytics*, 3(3), 865–874. <https://doi.org/10.55927/ijba.v3i3.4566>
- Ogunnowo, B. E., & Sule, S. S. (2021). Measurement of customer perceptions of logistics service quality. *Jurnal Teknik Industri*, 22(2), 115–126.
- Ray, P., & Paul, A. K. (2023). Last-mile delivery of electronic retailers: Systematic literature review and research directions. *Journal of Informatics Education and Research*, 3(2). <https://doi.org/10.52783/jier.v3i2.238>
- Ritzinger, U., Brandstätter, G., Krasel, L. F., & Prandtstetter, M. (2024). Collaborative logistics: Optimizing fixed-scheduled container trains. *European Transport Research Review*, 16, 71. <https://doi.org/10.1186/s12544-024-00688-4>
- Shelly, E. (2022). An overview of logistics. *Journal of Entrepreneurship and Organization Management*, 11(3). <https://doi.org/10.37421/jeom.2022.11.358>
- Sugiyono. (2023). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.
- Wang, X., & Huang, G. Q. (2021). When and how to share first-mile parcel collection service. *European Journal of Operational Research*, 288(1), 153–169. <https://doi.org/10.1016/j.ejor.2020.05.049>
- Wu, K., Lu, Z., & Bai, E. (2025). Optimization of cold chain logistics distribution path considering traffic condition and replenishment along the way. *PLOS ONE*, 20(1), e0305982. <https://doi.org/10.1371/journal.pone.0305982>
- Zhao, Y., & Jiang, H. (2026). Hub location and truck platoon routing optimization for courier line-haul networks with carbon benefits under undirected symmetry. *Symmetry*, 18(2), 369. <https://doi.org/10.3390/sym18020369>
- Zhu, X., Cai, L., Lai, P.-L., Wang, X., & Ma, F. (2023). Evolution, challenges, and opportunities of transportation methods in the last-mile delivery process. *Systems*, 11(10), 509. <https://doi.org/10.3390/systems11100509>