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# The Effect of The Implementation of Single Truck Identification Data (STID) and Occupational Health and Safety on The Smooth Flow of Goods and its Implications on Logistics Efficiency at Tanjung Priok Port

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**Abstract:** This study aims to analyze the impact of Single Truck Identification Data (STID) and Occupational Health and Safety (OHS) on the smooth flow of goods and its implications on logistics efficiency at Tanjung Priok Port. The main issue faced at the port is the irregularity in the distribution of goods due to delays in vehicle verification and suboptimal safety conditions, which reduces logistics efficiency and affects the operational performance of the port. This study adopts a quantitative approach with a cross-sectional design, involving 380 respondents, including truck drivers, terminal operators, and port management, selected through purposive sampling. Data collection was carried out via questionnaires and analyzed using SmartPLS to test the direct and indirect effects among the variables. The results indicate that STID significantly affects the smooth flow of goods (t-statistic = 3.483) and logistics efficiency (t-statistic = 2.730), while OHS significantly affects the smooth flow of goods (t-statistic = 4.192) and logistics efficiency (t-statistic = 5.125). Additionally, both variables also have an indirect impact on logistics efficiency through the smooth flow of goods. In conclusion, the implementation of STID and OHS can improve logistics efficiency. It is recommended to strengthen the implementation of STID and the OHS program at the port. Future research could explore this further using a qualitative approach and longitudinal analysis.

**Keywords:** STID Implementation, Occupational Health and Safety, Smooth Flow of Goods, Logistics Efficiency

## INTRODUCTION

Tanjung Priok Port is one of the vital infrastructures that supports the Indonesian economy, functioning as the main gateway for export-import trade and distribution of goods between islands.

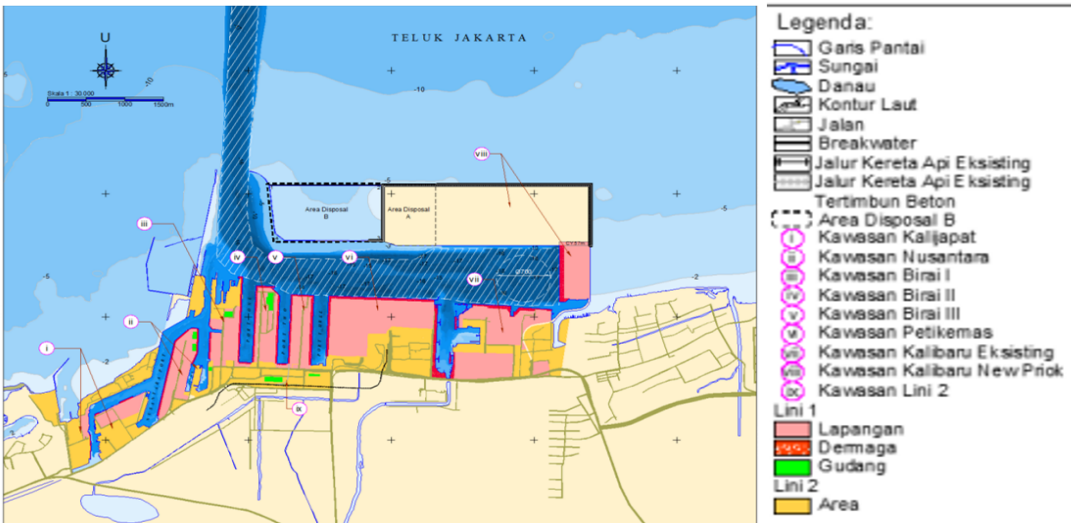


Figure 1. Layout of Tanjung Priok Port

As the largest and busiest port in Indonesia, Tanjung Priok has a land area of 604 ha and a port size of 424 ha. Based on data from the Decree of the Minister of Transportation Number KP 432 of 2017 and KP 217 of 2022, this port handles around 70% of the total flow of goods in Indonesia, with container throughput reaching 7,780,472 TEUs in 2024. This figure shows a 7% increase compared to the previous year, which reached 7,292,589 TEUs. This significant increase reflects the importance of Tanjung Priok Port in supporting Indonesia's economic activities. However, although throughput performance continues to increase, there are still challenges in several aspects, especially related to time management and management of the increasing truck queues.

**Table 1.** Ship traffic at Tanjung Priok Port from 2020 to 2024

| No | Year | Ship Visit | | Total |
|---|---|---|---|---|
| | | Domestic | Overseas | |
| 1 | 2020 | 8,536 | 3.340 | 11,876 |
| 2 | 2021 | 9.018 | 3.439 | 12,457 |
| 3 | 2022 | 9,645 | 3,971 | 13,616 |
| 4 | 2023 | 9,683 | 3.996 | 13,679 |
| 5 | 2024 | 10,052 | 3.962 | 14,014 |

Source: inaportnet.dephub.go.id, 2025, (processed data)

The increase in the number of ship visits at Tanjung Priok Port is directly related to the volume of logistics trucks entering and leaving to distribute goods coming through the port. The increasing number of domestic ships indicates an increase in the volume of goods that must be moved to various regions in Indonesia, which in turn increases the need for logistics truck services. In this regard, according to the Decree of the Director General of Sea Transportation No. KP.803/DJPL/2021 concerning the Implementation of Single Truck Identification Data at Tanjung Priok Port, in order to support the smooth flow of goods through the arrangement of the national logistics ecosystem, improvements are needed to the identification system and data for trucks transporting goods from and to Tanjung Priok Port with the Implementation of Single Truck Identification Data at all terminals. Single Truck Identification Data is a single identity card for each truck, which is recorded centrally under the supervision of the Port Authority, controlled by the Port Business Entity and Terminal Operator which can be read electronically and integrated, to carry out Gate In and Gate Out

transactions in the Tanjung Priok Port area. The STID card is valid for 2 (two) years and can be extended by re-registration (to ensure there are no changes to the data).

**Table 2.**Vehicles Entering Tanjung Priok Port

| Year | Number of Vehicles |
|---|---|
| 2021 | 118,779 |
| 2022 | 956,400 |
| 2023 | 1,889,681 |
| 2024 | 850,335 |

*Source: inaportnet.dephub.go.id, 2025, (processed data)*

In line with this, the port also experienced a surge in incoming vehicles, recorded at 1,889,681 vehicles in 2023. This number decreased to 850,335 vehicles in 2024, but still showed a high level of traffic. This increase certainly has implications for the management of an adequate transportation system, which requires more efforts to improve logistics efficiency.

To support the smooth flow of goods and vehicles at Tanjung Priok Port, the Single Truck Identification Data (STID) system is implemented, which is a digital identity card for every truck operating at the port. STID aims to optimize vehicle management in an integrated manner, thus facilitating the process of entering and exiting vehicles (Gate In and Gate Out) from the port. This system allows for more efficient vehicle tracking, reduces congestion and speeds up the logistics process.

**Penggolongan Usia Kendaraan Truck Di Pelabuhan Tanjung Priok**

| No | Usia Kendaraan | Jumlah |
|---|---|---|
| 1 | Dibawah 10 Tahun | 15.746 |
| 2 | Antara 10 s.d 20 Tahun | 27.482 |
| 3 | Lebih dari 20 Tahun | 4.776 |
| Total | | 48.004 |

Keterangan
Jumlah approval Kartu STID adalah jumlah pengajuan kartu (Kartu perpanjangan, kartu rusak, dan kartu hilang), sementara jumlah total kendaraan adalah jumlah kendaran yang beroperasi di Tanjung Priok

**Figure 2.** Vehicle Age Classification

The implementation of STID has been successfully implemented in around 510 trucking companies active in ports, although the number of registered companies has reached 976, with more than 48,000 trucks using this system throughout Indonesia.

Although STID brings many benefits in terms of efficiency, there are challenges in its implementation, especially related to the renewal of the Notification of Conducting Business Activities (PMKU) by trucking companies. There are still many companies that have not updated their PMKU, which causes uncertainty in vehicle management and reduces system integration that should be more optimal. The existence of STID, which is designed to simplify the logistics process and reduce administrative errors, can be hampered if companies do not comply with this regulation, which ultimately affects the smooth operation of the port as a whole.

In addition, one of the major challenges in vehicle management at Tanjung Priok Port is the imbalance between the volume of incoming vehicles and the available terminal capacity. The increasing surge in vehicles requires adjustments to port infrastructure, such as truck parking capacity, queue management, and more efficient distribution of goods. The

implementation of STID can help monitor and control vehicle flow more effectively, but without adequate increase in terminal capacity, this challenge will remain an obstacle to improving logistics efficiency.

The implementation of Single Truck Identification Data (STID) at Tanjung Priok Port involves a number of registered companies to manage and operate trucks entering and leaving the port. Based on existing data, there are 976 companies registered at this port, but only around 510 companies are active in using PMKU. This shows that almost 50% of registered companies have not renewed or extended the validity period of their PMKU. Irregularities in updating PMKU have the potential to disrupt the management of vehicle and truck data operating at the port, which in turn can affect the efficiency and smoothness of logistics

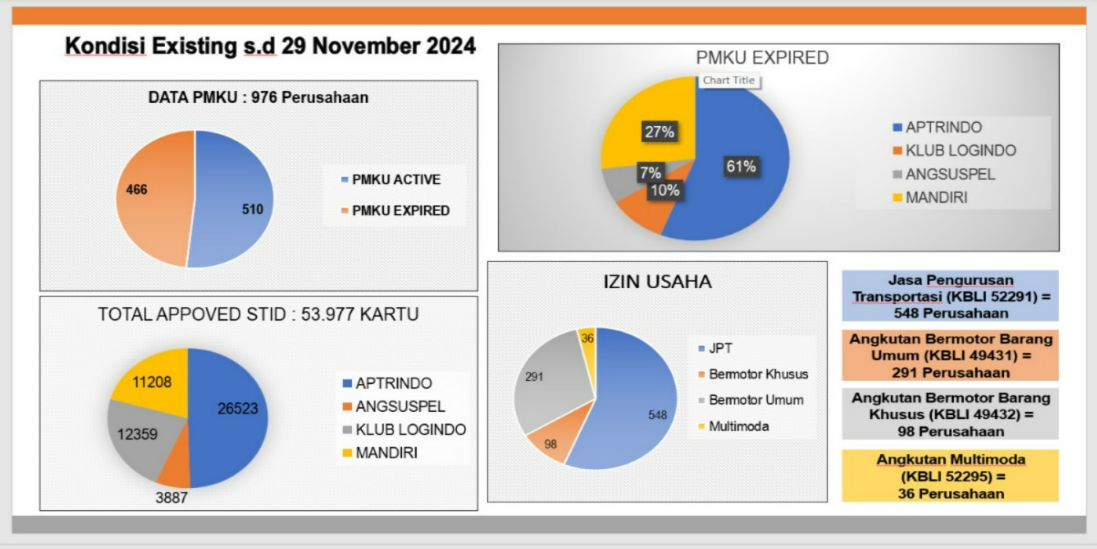


**Figure 3.** Existing Conditions

The impact of the increasing number of vehicles is also closely related to occupational safety and health (K3) issues at the port. In this context, the implementation of safety driving training for truck drivers is very important. Data shows that around 7,000 drivers registered at Tanjung Priok Port have taken the training, which aims to reduce the potential for accidents in the busy port area. However, even though this training has been implemented, the low awareness of the implementation of K3 among drivers and trucking companies is still a major obstacle. More consistent implementation of K3 needs to be pursued so that the level of work safety can be better maintained, considering the potential risk of accidents that can hinder the smooth distribution of goods.

**Table 3.**Truck Accident Incident at Port

| Month | Accident | Types of Truck Accident Incidents at Container Terminals |
|---|---|---|
| Jan-24 | 2 | Trailer Truck Accident, Collision with Gate |
| Feb-24 | 2 | Traffic Accident, Heavy Equipment Hits Panel |
| Mar-24 | 2 | Oil Spill, Single Traffic Accident |
| Apr-24 | 2 | Damage to Panel, Load Dropped |
| May-24 | 0 | No Accidents |
| Jun-24 | 3 | Collision at Gate, Load Falls |
| Jul-24 | 3 | Traffic Accidents, Heavy Equipment Damage |
| Aug-24 | 6 | Collision with Barrier, Load Falls |
| Sep-24 | 3 | Traffic Accident, Oil Spill |
| Oct-24 | 4 | Load Drop, Accident at Gate |

| Month | Accident | Types of Truck Accident Incidents at Container Terminals |
|---|---|---|
| Nov-24 | 5 | Collision at Gate, Motorcyclist Falls |
| Dec-24 | 2 | Falling Load, Deviation from Course |

*Source: PT. Pelabuhan Indonesia (Persero), 2025, (processed data)*

Truck accident incidents recorded during 2024 indicate damage or accidents to vehicles operating at the port, with the most incidents occurring in August, involving collisions with barriers and falling cargo. These accidents can have a direct impact on the operational efficiency of the port, as they disrupt the loading and unloading process and require more time to handle. Therefore, optimal implementation of K3 must be a top priority in maintaining the safety of workers and truck drivers, as well as reducing disruption to the flow of goods in and out of the port.

With an integrated STID system and more consistent safety training, it is expected that the logistics system at Tanjung Priok Port can run more smoothly. However, the implementation of STID also needs to be accompanied by optimal terminal capacity management, improved infrastructure quality, and more efficient data updates. This is important to ensure that every truck operating at the port has a clear identity, roadworthy vehicles, and well-trained drivers, which ultimately improves safety, efficiency, and smooth flow of goods.

The implementation of STID, although it brings various advantages, also contains challenges in vehicle data management and system integration that are not yet fully optimized. Therefore, it is important to improve coordination between various related parties, including trucking companies, terminal operators, and port authorities, to ensure that the STID system can run smoothly and effectively. Resolving issues such as PMKU updates and terminal capacity management will greatly support smooth logistics and more efficient delivery of goods.

The success of STID implementation is highly dependent on the understanding and compliance of trucking companies, which must always follow the rules and procedures set by the port authority. Without high compliance from companies, vehicle data management and logistics systems will be hampered, which in turn will slow down the smooth flow of goods at the port. Therefore, it is important for trucking companies to have a greater awareness of their role in supporting smooth logistics and safety at Tanjung Priok Port.

Although STID and K3 have a significant impact on logistics efficiency, the implementation of both systems must be carried out simultaneously to ensure that there are no obstacles in the operational process. With better integration and improved system management, Tanjung Priok Port can continue to be a major logistics hub in Indonesia, supporting the country's economy by increasing the efficiency of goods distribution, reducing congestion, and increasing safety and productivity in the port area.

## METHOD

The research method used in this study is a descriptive approach using a survey as a data collection method. According to Sugiyono (2024), descriptive research aims to examine the current situation related to the problem being studied using observation, interview, or questionnaire techniques. In this study, researchers collect data to evaluate theories or answer questions that have been formulated. This study focused on a population consisting of truck drivers, terminal operators, and port management, with a total of 7,055 individuals. Sample selection was carried out using purposive sampling and simple random sampling methods, where samples were taken randomly without considering strata in the population, with a sample size of 380 calculated using the Taro Yamane formula. The hypothesis proposed in this study tests the direct and indirect effects of the implementation of Single Truck

Identification Data (STID) and occupational health and safety (K3) on the smooth flow of goods and logistics efficiency at Tanjung Priok Port.

The collected data will be analyzed using the SmartPLS 3 program for fast and accurate processing. The first step in data processing is editing, which involves verifying errors and ambiguities in respondents' responses, as well as coding to classify responses into appropriate categories. After the data is arranged in a table format to facilitate analysis, the data analysis techniques used are path analysis and hypothesis testing, in order to evaluate the relationship between existing variables. Data tabulation is carried out to quantify and organize data in an easily understood table form, thus supporting more in-depth statistical analysis and hypothesis testing.

## RESULTS AND DISCUSSION

Demographic profile data of respondents who participated in this study, with a total of 380 respondents consisting of truck drivers, terminal operators, and port management. Based on gender, most respondents were male, as many as 273 people (71.8%). In terms of age, the majority of respondents were over 41 years old, with a total of 220 people (57.9%). In terms of last education, most respondents had a high school education, as many as 249 people (65.5%), followed by 25 people (6.6%) who had a Diploma, 49 people (12.9%) with a Bachelor's degree, and 57 people (15.0%) who had a Master's degree. This distribution provides an overview of the demographic characteristics that represent relevant research subjects for further analysis.

### Outer Model

Convergent validity testing shows that all reflective indicators in the research model have a loading factor value of more than 0.6, which indicates that these indicators are reliable in measuring the intended construct. This is in accordance with the provisions of Hair et al. (2019) that loading factor values above 0.6 are considered valid and reliable, which makes this research model valid in measuring the existing variables.

Furthermore, to test the discriminant validity, Average Variance Extracted (AVE) was used, which showed that all latent variables in the model had an AVE value of more than 0.5. Variables such as STID (0.650), Occupational Health Safety (0.673), Logistics Efficiency (0.643), and Smooth Flow of Goods (0.675) met good discriminant validity standards, confirming that the constructs in the model can be clearly distinguished.

Further testing was conducted using the Heterotrait-Monotrait Ratio (HTMT) test, with the results showing that the HTMT value between the tested variables was below the 0.85 limit. This indicates that there is no multicollinearity problem between constructs, so this model has good discriminant validity.

In addition, the Fornell-Larcker Criterion test also supports discriminant validity by showing that the AVE value is greater than the correlation value between latent variables. For example, the AVE value of Logistic Efficiency (0.802) is greater than the correlation between other variables, which ensures that each construct can distinguish itself from other constructs.

Finally, cross loading analysis shows that each indicator has the highest loading value on the corresponding construct, confirming that the indicators accurately measure the intended construct and supporting discriminant validity between variables in the model.

Reliability testing also showed good results, with all variables having Cronbach's Alpha and Composite Reliability values of more than 0.70, which is in accordance with the recommended minimum limit. Variables such as STID (X1) have Cronbach's Alpha values of 0.968 and Composite Reliability of 0.971, indicating very good reliability. Thus, all variables in this model are reliable in measuring the intended construct.

The explanation above is reflected in the PLS Algorithm data processing image to obtain the following outer model image.

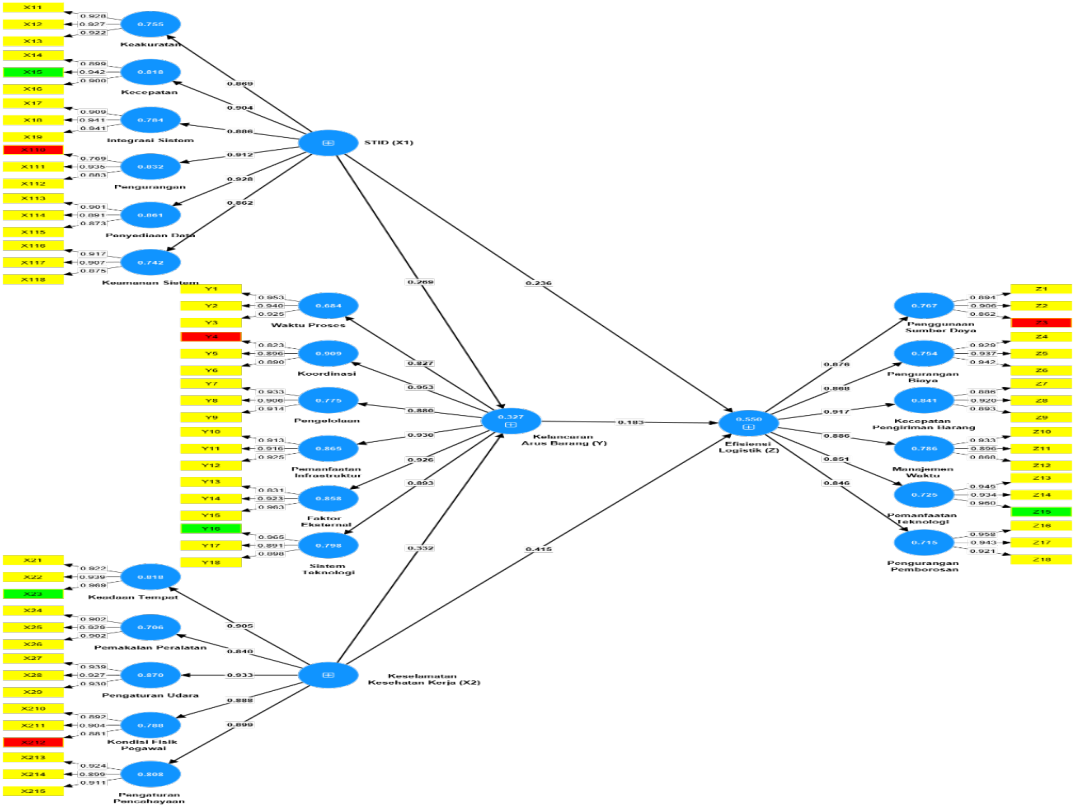


**Figure 4. Outer Model Measurement Model**

## Inner Model

Below are the results of the inner model image from the PLS-SEM bootstrapping results along with their descriptions.

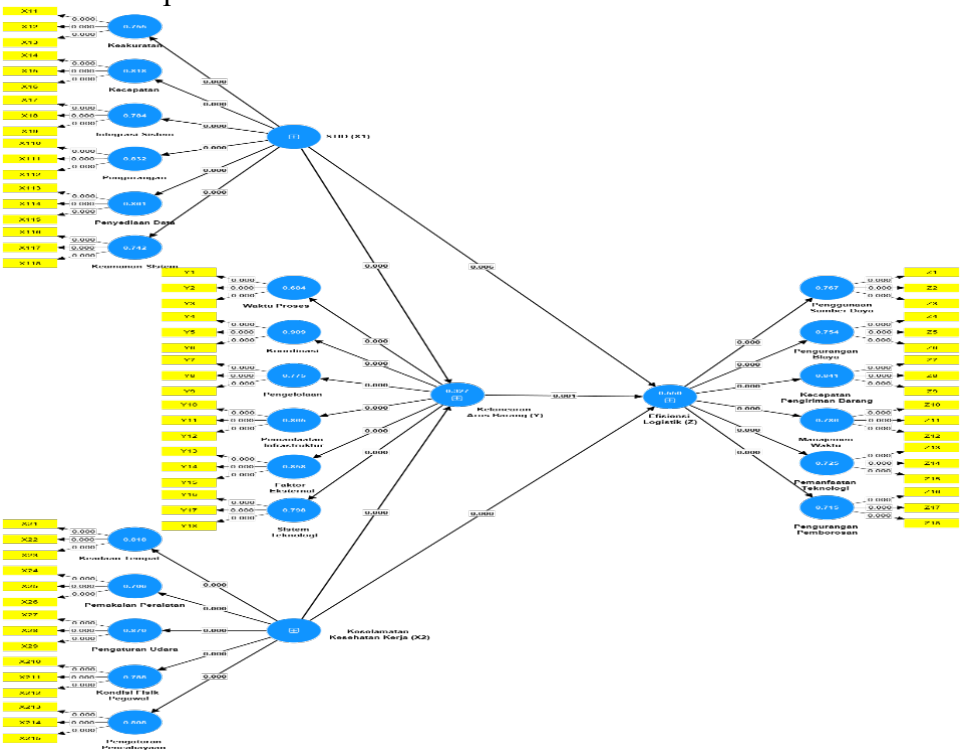

**Figure 5. Research Results Matrix**

The R-Square test is used to assess how much proportion of variability can be explained by exogenous constructs to endogenous constructs. The test results show that the Smooth Flow of Goods (Y) variable has an R2 value of 0.327, which indicates that the STID and Occupational Health and Safety variables can explain 32.7% of its variability. While for the Logistics Efficiency (Z) variable, the R2 value of 0.550 indicates that the STID, Occupational Health and Safety, and Smooth Flow of Goods variables can explain 55.0% of its variability.

The f-Square test is used to measure how much influence the independent variable has on the dependent variable. The test results show that the influence of STID and Occupational Health and Safety on the Smooth Flow of Goods and Logistics Efficiency is in the weak category ($f^2$ <0.15). However, the influence of Occupational Health and Safety on Logistics Efficiency has a medium effect size ($f^2$ = 0.124), indicating that this variable has a more significant influence compared to the others in the model.

The Q-Square test measures the predictive ability of the model against the dependent variable. The test results show that the Smooth Flow of Goods variable has a $Q^2$ value of 0.217, indicating a small predictive relevance. Meanwhile, the Logistics Efficiency variable has a $Q^2$ value of 0.347, indicating a moderate predictive relevance, which means that the model makes a fairly good contribution in explaining the variation in the dependent variable.

Here are the results*Path Coefficients*direct influence:

**Table 4.** Direct Influence and Indirect Influence

| Hypothesis | Influence | Original sample (O) | T statistics (\|O/STDEV\|) | P values | Information |
|---|---|---|---|---|---|
| H1 | STID (X1) -> Smooth flow of goods (Y) | 0.269 | 3.483 | 0.000 | Significant |
| H2 | Occupational Health and Safety (X2) -> Smooth flow of goods (Y) | 0.332 | 4.192 | 0.000 | Significant |
| H3 | STID (X1) -> Logistics efficiency (Z) | 0.236 | 2,730 | 0.006 | Significant |
| H4 | Occupational Health and Safety (X2) -> Logistics efficiency (Z) | 0.415 | 5.125 | 0.000 | Significant |
| H5 | Smooth flow of goods (Y) -> Logistics efficiency (Z) | 0.183 | 3.392 | 0.001 | Significant |
| H6 | Occupational Health and Safety (X2) -> Smooth flow of goods (Y) -> Logistics efficiency (Z) | 0.061 | 2,562 | 0.010 | Significant |
| H7 | STID (X1) -> Smooth flow of goods (Y) -> Logistics efficiency (Z) | 0.049 | 2,469 | 0.014 | Significant |

*Source : Output Program Smart PLS (2025)*

The implementation of Single Truck Identification Data (STID) has a direct effect on the smooth flow of goods at Tanjung Priok Port, with a path coefficient of 0.269 and a T-statistic of 3.483 which is greater than the t-table value of 1.96, proving that STID increases the efficiency of goods distribution. This technology enables fast and accurate vehicle identification, reduces waiting time, and smooths the flow of goods, supporting the findings of Dwilestari et al. (2024) which states that STID accelerates logistics and operational efficiency.

Occupational Health and Safety (OHS) has also been proven to have a direct effect on the smooth flow of goods with a path coefficient of 0.332 and a T-statistic of 4.192. Workers who feel safe and healthy are more efficient at work, reduce operational disruptions, and

speed up loading and unloading of goods. This is in accordance with research by Amelya & Amelia (2021) which states that the implementation of OHS increases productivity and smooth logistics at the port.

The implementation of STID has a direct effect on logistics efficiency with a path coefficient of 0.236 and a T-statistic of 2.730. The implementation of STID which reduces vehicle waiting time and accelerates goods verification contributes to reducing operational costs, in line with the findings of Putra (2024) which shows that STID technology increases supply chain efficiency at the port.

K3 also has a direct effect on logistics efficiency, with a path coefficient of 0.415 and a T-statistic of 5.125, indicating that good implementation of K3 reduces the incidence of accidents and worker absenteeism, and increases operational efficiency at the port. This finding is supported by Schaal (2024), who stated that K3 contributes greatly to improving logistics performance.

The smooth flow of goods has a direct effect on logistics efficiency with a path coefficient of 0.183 and a T-statistic of 3.392. This finding shows that fast and unhindered distribution of goods reduces operational costs and increases logistics efficiency, supporting the view of Astuti et al. (2023) that good management of the flow of goods can accelerate the flow of goods.

The indirect effect of STID on logistics efficiency through smooth flow of goods shows a path coefficient of 0.061 and a T-statistic of 2.562. This finding confirms that STID accelerates the distribution of goods, reduces congestion, and in turn improves logistics efficiency, as found by Dwilestari et al. (2024) who stated that STID improves operational efficiency even though administrative challenges remain.

K3 also has an indirect effect on logistics efficiency through the smooth flow of goods, with a path coefficient of 0.049 and a T-statistic of 2.469. Good implementation of K3 reduces accidents and work disruptions, allows workers to focus more, which ultimately facilitates the distribution of goods and increases logistics efficiency. This finding is in line with the research of Rahman et al. (2023) which shows that good K3 management can support the smooth flow of goods and logistics efficiency at the port.

## CONCLUSION

The implementation of Single Truck Identification Data has a significant impact on the smooth flow of goods.The results of this study indicate that the Implementation of Single Truck Identification Data (STID) has a significant effect on the Smooth Flow of Goods, with a t-count of 3.483, which is greater than the t table (1.96), and a significance value smaller than 0.05. The speed and accuracy of vehicle data processing implemented through STID smoothens the flow of goods distribution, reduces vehicle waiting time, and avoids congestion in the port area. The highest loading factor for STID is X1.5 (0.942), which emphasizes the importance of vehicle data processing speed in accelerating the smooth flow of goods. Conversely, the lowest loading factor is X1.10 (0.769), which indicates a problem of data inconsistency on the printed STID stickers, which can slow down the operational process.

Occupational Health and Safety has a significant impact on the smooth flow of goods.This study shows that Occupational Health and Safety (OHS) has a significant effect on the Smooth Flow of Goods, with a t-count of 4.192, greater than the t table (1.96), and a significance value smaller than 0.05. Effective OHS implementation ensures that workers work in safe and healthy conditions, which reduces operational disruptions due to accidents or health problems. The highest loading factor for OHS is X2.3 (0.969), which highlights the importance of using personal protective equipment (PPE) in maintaining safety and smooth operations. Meanwhile, the lowest loading factor is X2.12 (0.881), which shows that despite routine health education, workers' awareness of the importance of occupational safety still needs to be improved.

The implementation of Single Truck Identification Data has a significant impact on Logistics Efficiency.The results of this study indicate that the Implementation of Single Truck Identification Data (STID) has a significant effect on Logistics Efficiency, with a t-count of 2.730, which is greater than the t table (1.96), and a significance value smaller than 0.05. The implementation of STID that is faster in verifying vehicles contributes to reducing operational time and costs, which improves overall logistics efficiency. The highest loading factor for STID in logistics efficiency is X1.5 (0.942), indicating that the speed of vehicle data processing is a key factor in improving efficiency. Conversely, the lowest loading factor is X1.10 (0.769), indicating a problem of information inconsistency on the STID sticker that slows down the efficiency process.

Occupational Health and Safety has a significant impact on Logistics Efficiency.This study found that Occupational Health and Safety (OHS) has a significant effect on Logistics Efficiency, with a t-count of 5.125, which is greater than the t table (1.96), and a significance value smaller than 0.05. Good OHS implementation ensures that workers work in safe conditions, which increases productivity and reduces disruptions that can slow down the distribution of goods. The highest loading factor for OHS in logistics efficiency is X2.3 (0.969), indicating that compliance with the use of PPE plays an important role in supporting logistics efficiency. Conversely, the lowest loading factor is X2.12 (0.881), indicating that despite health education, its impact on improving logistics efficiency is still limited.

The smooth flow of goods has a significant effect on logistics efficiency.The results of the study show that the Smooth Flow of Goods has a significant effect on Logistics Efficiency, with a t-count of 3.392, which is greater than the t table (1.96), and a significance value smaller than 0.05. The smooth distribution of goods through efficient vehicle queue management and loading and unloading processes reduces operational costs and accelerates the delivery of goods, which directly increases logistics efficiency. The highest loading factor for the Smooth Flow of Goods is Y15 (0.963), which indicates that collaboration between logistics teams plays a major role in facilitating the distribution of goods. However, the lowest loading factor is Y4 (0.823), which indicates that even though the time for verifying goods has been optimized, this process still affects the smooth distribution of goods.

The implementation of Single Truck Identification Data has a significant impact on Logistics Efficiency through the Smooth Flow of Goods.This study shows that the Implementation of Single Truck Identification Data (STID) has an indirect effect on Logistics Efficiency through the Smooth Flow of Goods, with a t-count of 2.562, which is greater than the t table (1.96), and a significance value smaller than 0.05. STID accelerates the vehicle identification process which in turn facilitates the distribution of goods, which has an impact on overall logistics efficiency. The highest loading factor for STID in logistics efficiency through the smooth flow of goods is X1.5 (0.942), which indicates that the speed of vehicle data processing accelerates the smoothness and efficiency of logistics. Conversely, the lowest loading factor is X1.10 (0.769), which indicates the presence of information inconsistencies that can reduce system efficiency.

Occupational Health and Safety has a significant impact on Logistics Efficiency through the Smooth Flow of Goods.The results of this study confirm that Occupational Health and Safety (OHS) has an indirect effect on Logistics Efficiency through the Smooth Flow of Goods, with a t-count of 2.469, which is greater than the t table (1.96) and a significance value smaller than 0.05. Good OHS implementation improves the smooth distribution of goods, which in turn accelerates logistics efficiency. When workers work in a safe environment, they can focus more and work more efficiently, which smooths the flow of goods. The highest loading factor for OHS in logistics efficiency through the smooth flow of goods is X2.3 (0.969), which indicates that compliance with the use of PPE is very important in maintaining safety and smooth distribution of goods. However, the lowest loading factor is X2.12 (0.881),

which indicates that even though there is routine health education, its effect on efficiency still needs to be improved.

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