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Stock Optimization To Face The Level of Personal Protective Equipment Replacement in The General Affairs Division Using The Wecare System at PT Astra Daihatsu Motor

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Abstract: The current issue faced by PT Astra Daihatsu Motor is the high rate of Personal Protective Equipment (PPE) replacement, which is caused by various contributing factors. This study aims to examine and analyze the effects of workload, number of workers, procurement forecasting, and the "WeCare" one-system service on the optimization of PPE procurement stock at PT Astra Daihatsu Motor, as well as to generate procurement forecasting calculations for PPE for the year 2025. This research employs a mixed-methods approach, combining qualitative and quantitative methods. Observations were conducted to examine existing phenomena related to PPE replacement. Furthermore, the research population consists of employees from the three divisions with the largest workforce located at the Karawang Assembly Plant of PT Astra Daihatsu Motor. A total of 591 respondents were selected as the research sample from a population of 2,499 employees. The results of the study indicate an R-square value of 46.1%, which means that workload, number of workers, procurement forecasting, and the "WeCare" one-system service collectively contribute 46.1% to the optimization of PPE procurement stock, while the remaining 53.9% is influenced by other factors. Procurement forecasting related to PPE replacement was also carried out using the Holt–Winters method to optimize PPE procurement for the year 2025. Based on the findings of this study, it is expected that management can conduct evaluations of PPE procurement, particularly to improve the optimization of PPE procurement stock.

Keywords: Workloads, Procurement Forecasting, Workforce Size, Inventory Optimization, WeCare System

INTRODUCTION

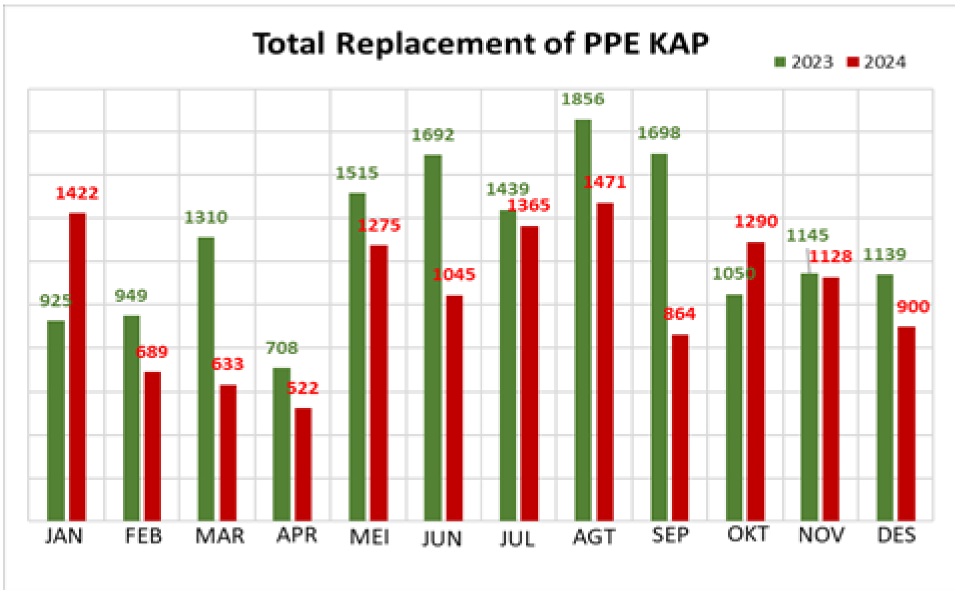
The automotive industry is one of the important sectors that contributes greatly to economic growth throughout the world, including in Indonesia.(Yang et al., 2024)This sector plays a significant role in contributing to gross domestic product (GDP), exports, and foreign exchange, ensuring high operational efficiency, supported by the performance of its constituent elements.(Solichin et al., 2025). Currently, many manufacturing companies prioritize investment in infrastructure, technology, and supply chain operators, which also includes skilled human resources as an important component.(Ringan et al., 2025)On the other hand, automotive manufacturing is a key industry driving the international supply chain and generating significant economic added value. The automotive industry involves various supporting sectors such as component suppliers, logistics services, vehicle maintenance, and sales and marketing activities. The automotive manufacturing process also consists of a series of complex and interconnected stages, from product planning and raw material procurement to assembly and quality testing before a vehicle is launched to the market.(Nayan, 2025)

The high level of production generated by PT. Astra Daihatsu Motor, requires the entire production process to run smoothly and free from obstacles, especially the potential for line stoppages. One way to avoid line stoppages is to ensure that all supporting production components are well-stocked. The availability of raw materials and required production components is one of the important factors to ensure the smooth production process. This process can be carried out if there is a proper and good inventory system implemented by the company, so the company will not experience problems that can disrupt the production process. Therefore, an optimal inventory system must be implemented for raw materials, equipment and machinery, and all supporting production components to meet the needs of the company.

One way to ensure the availability of materials and production components is to optimize various aspects, including supply chain management. In any production process, strengthening inventory planning and control and increasing production capacity is crucial.(Novriyandi & Nurkertamanda, 2021). Inventory planning and control to optimize stock is useful so that supply chain management can be implemented properly. It needs to be implemented not only in the main components in production, but in various elements that support employees in carrying out the existing production process.

A smooth production process is not solely the responsibility of the Production division, but also of numerous other supporting functions, one of which is the General Affairs division. This division manages day-to-day activities to help improve the company's performance.(Liustanto, 2024)The General Affairs Division acts as the work ecosystem manager, ensuring that all supporting production elements run efficiently. The General Affairs Division's primary duties include building and infrastructure maintenance and housekeeping, security systems, asset inventory and management, facility services, licensing, and public relations.(Hikmariada et al., 2022)The General Affairs Division also provides non-production support services such as providing Personal Protective Equipment (PPE), ensuring power supply to all production machines or industrial robots, and various other support materials. PPE not only reflects the company's identity but is also a crucial element in ensuring Occupational Health and Safety (OHS) standards. One of the influencing factors in the work environment is the use of PPE in the work area.(Kurniawan et al., 2025).

PPE is used to protect individuals from various potential hazards with the aim of eliminating or reducing the risk of work accidents, both fatal and non-fatal.(Aksüt & Eren, 2024). In production areas, especially in the labor-intensive and high-risk automotive industry, PPE is also designed to meet technical standards, such as the selection of heat-resistant materials, ergonomic designs, and high visibility. The provision of PPE is a crucial component in the production process because it must ensure that the clothing worn by employees during the production process remains comfortable and safe in accordance with existing standards. The following data shows the number of requests for PPE exchanges during 2023-2024 for the Karawang Assy Plant area:



Picture0. Graph of PPE Replacement Demand Needs by Employees Throughout 2023-2024 at the Karawang Assy Plant of PT. Astra Daihatsu Motor

Based on the data on PPE exchanges during 2023-2024, we can see that the highest number of PPE exchange requests occurred in August. In total, the General Affairs division distributed 15,426 exchange items to employees in 2023, and 12,604 exchange items in 2024. These exchange requests are outside the regular annual uniform distribution schedule. The following is the percentage of monthly uniform exchanges compared to the total number of exchanges during 2023 and 2024 for the Karawang Assy Plant area:

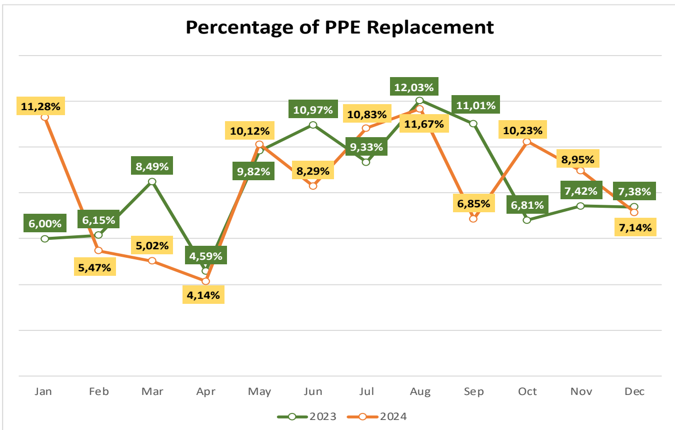


Figure 2. Graph of the Percentage per Month of Total PPE Exchanges in 2023 and 2024 at the Karawang Assy Plant of PT. Astra Daihatsu Motor

The data above shows that the average monthly absorption percentage in 2023 and 2024 was the same, at 8.33%. Furthermore, data on the reasons for PPE exchange requests are categorized into several categories, including the following:

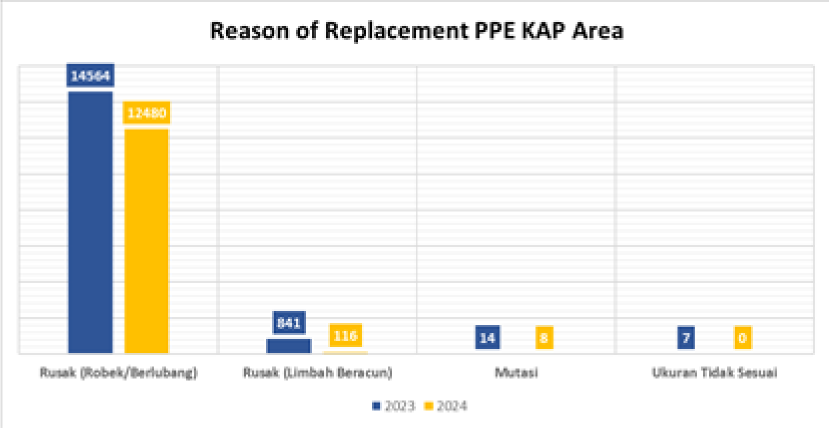


Figure 3. Graph of Categories of Reasons for Requests for Replacement of PPE Needs by Employees throughout 2024 at PT. Astra Daihatsu Motor

Although PPE procurement is part of the General Affairs division's function, this business process involves coordination across other functions such as Purchasing, HRD, and of course Finance or Accounting. In its implementation, this procurement process often faces various challenges, ranging from the mismatch of existing PPE stock with urgent employee needs, the sudden surge in requests for PPE exchanges, to the inefficiency of the budget allocated for PPE. As the complexity of operational activities and the number of workers in the automotive industry increases, PPE procurement management requires a more structured system and continuous evaluation. By implementing inventory management that includes procurement activities and physical asset management to ensure smooth operations within the dynamics of an organization's business, cost optimization can be achieved. Furthermore, the implementation of inventory management can also increase a company's competitiveness, while still considering the limitations arising from fluctuations in demand and procurement lead times.(Barrera-sánchez & Garcia-cáceres, 2025).

Improvements were made through research into the implementation of the PPE procurement process and historical data analysis, which can help mitigate issues in the procurement and exchange of PPE. Through the use of intelligent algorithms and sophisticated data analysis, the current logistics planning system is able to forecast needs and ensure timely material availability.(Suryanto et al., 2024). As in this study, with the WeCare one system service technology, it can easily analyze existing transaction data from the existing PPE procurement service process. Furthermore, to support the optimization of the PPE procurement process, stock management for PPE availability must also be a matter of concern, so in this study we will find out whether the optimization of PPE stock at PT. Astra Daihatsu Motor, especially at the Karawang Assy Plant, is truly influenced by workload, number of workers, procurement forecasting, and the WeCare one system service.

Through this research, it is expected to prove that workload factors, number of workers, procurement forecasting, and one WeCare service system play a role in influencing the high level of PPE replacement at Karawang Assy Plant PT. Astra Daihatsu Motor. This is done to answer the current research gap, because there has not been found a definite factor in influencing the level of PPE replacement which then plays a role in stock optimization in previous studies, so that with this research it is expected to produce a novelty in the field of PPE stock optimization science.

To determine the influence of these four factors on PPE stock optimization, SEM-PLS (Structural Equation Modeling Partial Least Squares) analysis was used. Through this procedure (method), multivariate analysis can be carried out to evaluate how endogenous and exogenous latent variables interact with each other through measurement models and structural models. This method was chosen because it is able to process latent variables, does not require normally distributed data. Furthermore, forecasting the trend of PPE exchange requests was also carried out to determine the procurement plan for PPE exchanges at the Karawang Assy Plant in order to optimize existing stocks.

METHOD

This research uses a mixed approach, namely qualitative and quantitative. The qualitative approach is flexible and allows for in-depth data exploration through direct observation and documentation.(Sari et al., 2025)Observations were conducted to understand field conditions, the dynamics of subject habits, interactions between research subjects, and various phenomena related to the high rate of Personal Protective Equipment (PPE) exchange. Meanwhile, a quantitative approach was used to test hypotheses and analyze relationships between variables through numerical data and statistical techniques. The descriptive quantitative method was chosen because it aligns with the characteristics of the available PPE exchange transaction data, allowing it to describe the conditions of the research variables objectively and systematically.

The population in this study was all employees of Karawang Assy Plant PT Astra Daihatsu Motor, totaling 2,499 people (cut-off date December 1, 2024). The sampling technique used Probability Sampling with the Proportionate Stratified Sampling method, where the population is divided by division and each member has an equal chance of being selected. Determination of the sample size was carried out using the Slovin formula with a 5% error rate. Samples were taken from the three divisions with the largest number of employees, namely Production, Quality, and Plant Administration, with a total of 591 respondents who were divided proportionally according to the population size of each division.

Data processing was carried out in two stages: primary data and secondary data. Primary data obtained from the questionnaire were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS), which includes measurement models and structural models to comprehensively examine the relationships between variables. Meanwhile, secondary data, in the form of PPE replacement procurement transactions for 2023–2024, were analyzed using forecasting methods. Based on the dynamic monthly data pattern and the lack of trends or seasonal patterns, it was concluded that PPE replacement data at the Karawang Assy Plant fluctuates without any particular trend, therefore the forecasting method was adjusted to these characteristics.

RESULTS AND DISCUSION

In order to meet the convergent validity criteria, the valueloading factorThe obtained value must be above 0.7. Based on the data above, this study shows that the majority of indicators in each variable have a loading factor value greater than 0.70 so that it is said to be valid. In addition, there are 11 indicators that have a loading factor value of less than 0.70, namely in the Workload variable indicator as many as 2 indicators, namely BK3 and BK7. Then in the Number of Workers variable indicator there are 3 indicators that are less than 0.70, namely TK1, TK2, and TK6. In the Procurement Forecast variable indicator there are 2 indicators that are less than 0.70, namely FC2 and FC4. Furthermore, in the One System WeCare variable indicator there are 2 indicators that are less than 0.70, namely WC6 and WC7. And the last indicator in the Stock Optimization variable there are 2 indicators that are less than 0.70, namely OP3 and OP4.

Variable indicators with a loading factor value of less than 0.70 have a low level of validity, so they need to be removed from the model. Some of the remaining valid indicators are shown in the following table:

Table 1. *Loading Factor Values after Elimination for All Variables*

	Workload Variables	Number of Workers Variable	Procurement Forecast Variables	WeCare One System Variable	Stock Optimization Variables	Note:
BK1	0.884					**VALID**
BK2	0.882					**VALID**
BK4	0.893					**VALID**
BK5	0.874					**VALID**
BK6	0.887					**VALID**
BK8	0.870					**VALID**
TK3		0.957				**VALID**
TK4		0.866				**VALID**
TK4		0.898				**VALID**
TK7		0.833				**VALID**
TK8		0.877				**VALID**
FC1			0.880			**VALID**
FC3			0.893			**VALID**
FC5			0.893			**VALID**
FC6			0.887			**VALID**
FC7			0.888			**VALID**
FC8			0.896			**VALID**
WC1				0.886		**VALID**
WC2				0.877		**VALID**
WC3				0.887		**VALID**
WC4				0.891		**VALID**
WC5				0.892		**VALID**
OP1					0.870	**VALID**
OP2					0.865	**VALID**
OP5					0.863	**VALID**
OP6					0.867	**VALID**
OP7					0.870	**VALID**
OP8					0.875	**VALID**

The following are the loading factor results for all variables that have undergone the first elimination, as shown in the following image:

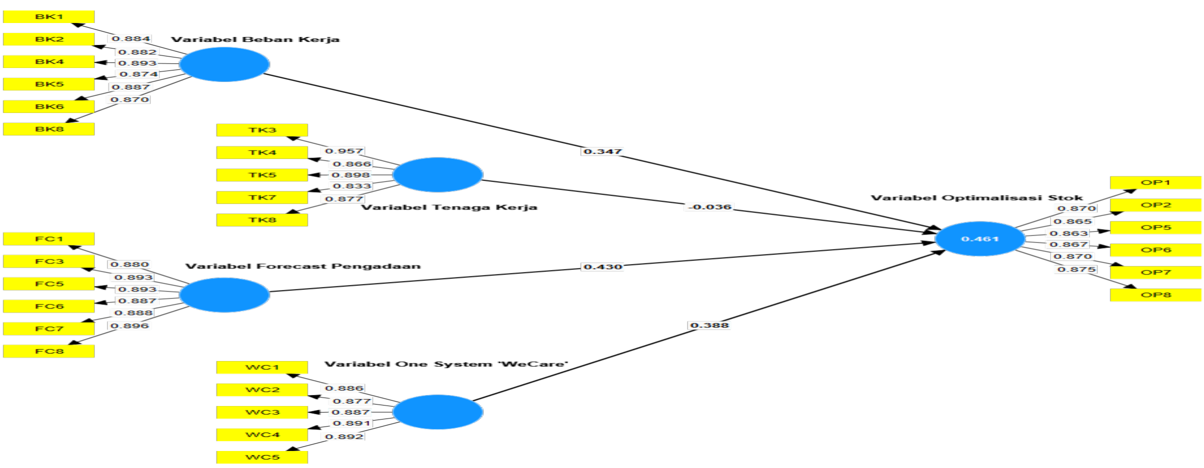


Figure 4. Latent model of research variables *AVE value*

Table 2. *AVE Values of Each Variable*

	Average Variance Extracted (AVE)	Note:
Workload Variables	0.778	**VALID**
Labor Variable	0.788	**VALID**
Procurement Forecast Variables	0.791	**VALID**
One System Variable 'WeCare'	0.786	**VALID**
Stock Optimization Variables	0.754	**VALID**

Based on the results of the convergent validity test using the AVE value, all variables have an AVE value above 0.50, so they are all declared valid. The Procurement Forecast variable has the highest AVE value of 0.791, which indicates that more than 79% of the indicator variance can be explained by this construct. Thus, all constructs have met the convergent validity criteria based on the AVE value, because each is able to explain more than 50% of the indicator variance.

Discriminant Validity Test

Cross Loading

The Cross Loading value of all variables has a correlation value between the indicators (instruments) and their constructs (variables).

*Latent Variable Correlation*and Fornell Larckker (□AVE)

Table 3 *Latent Values of Correlation and Fornell Larckker Variables (□AVE) Each Variable*

	Latent Variable Correlation					Fornell-Larcker (AVE)	Note:
	Workload Variables	Labor Variable	Procurement Forecast Variables	One System Variable 'WeCare'	Stock Optimization Variables		
Workload Variables	1,000	0.016	0.001	-0.001	**0.347**	0.882	**VALID**
Procurement Forecast Variables	0.001	0.024	1,000	0.011	**0.434**	0.889	**VALID**
One System Variable 'WeCare'	-0.001	-0.019	0.011	1,000	**0.393**	0.887	**VALID**
Stock Optimization Variables	0.347	-0.028	**0.434**	0.393	1,000	0.868	**VALID**
Labor Variable	0.016	1,000	**0.024**	-0.019	-0.028	0.887	**VALID**

The table above shows that each variable has a higher AVE (√AVE) square root value compared to all its correlations with other variables. Therefore, because √AVE is greater than all correlations between constructs, all these variables are declared to meet the requirements for discriminant validity.

The test results above demonstrate consistent results for Convergent Validity and Discriminant Validity, with all indicators declared valid. This indicates that the model used has a good fit and is able to effectively differentiate between different constructs.

Reliability Test
Cronbach's Alpha Value

Table 4. *Cronbach Alpha Values andComposite ReliabilityEach Variable*

	Cronbach's alpha	**Composite Reliability (rho_c)**	**Note:**
Workload Variables	0.943	0.955	**Reliable**
Labor Variable	0.942	0.949	**Reliable**
Procurement Forecast Variables	0.947	0.958	**Reliable**
One System Variable 'WeCare'	0.932	0.948	**Reliable**
Stock Optimization Variables	0.935	0.948	**Reliable**

The test results show that the Cronbach's Alpha value for each variable is above 0.70. This indicates that the construct used has met the reliability assumption based on Cronbach's Alpha or is proven to be consistent in measuring the construct. The Composite Reliability value for each of the variables above exceeds 0.70, which indicates that the construct has a high level of consistency in measuring the intended variable.

Model Fit Testing

Table 5. SRMR and NFI values
(Source: SMARTPLS data processing results)

Parameter	**Standard Values**	**Parameter Values**	**Informatio n**
SRMR	Must be < 0.08	0.027	**Fit**
NFI	Must be > 0.90	0.948	**Fit**

Structural Model Testing (Inner Model)
R-Square (R2)

Table 6. *Values*R-square

	R-square	*R-square adjusted*
Stock Optimization Variables	0.461	0.457

The R-Square value obtained shows that the R-Square value for Stock Optimization is 46.1%. This means that the ability of exogenous variables, namely Workload, Number of Workers, Procurement Forecasting, and One System WeCare Services in explaining Stock Optimization is 46.1%. This means that the remaining 53.9% of the influence is explained by other variables outside those discussed in this study. The value of this percentage is the value of the exogenous variables against the endogenous variables.

F Square/Effect Size (F^2)

***Table** 7. F-Square Value*

	Stock Optimization Variables	Note:
Workload Variables	0.223	Moderate
Procurement Forecast Variables	0.343	Moderate
One System Variable 'WeCare'	0.279	Moderate
Labor Variable	0.002	Weak

Based on the results of the F-Square test, it shows that there are three exogenous variables that have a moderate influence on the endogenous variables and there is one exogenous variable that has a weak influence on the endogenous variable. Therefore, it can be concluded that most endogenous variables have a moderate influence on the exogenous variables in the structural order.

Q-Square

Table 8. *Values*Q-Square

	Q-Square
Stock Optimization Variables	0.448

Based on the Q-Square value obtained, the Stock Optimization value is 0.448, meaning that the Stock Optimization variable can be concluded to be able to predict the model well in the large/strong category.

Hypothesis Testing Results

Table 9. *P-value and T-statistic value*

	Original sample (O)	*T statistics*(|O/STDEV|)	P values
Workload Variable Stock Optimization Variable	0.347	11,294	0,000
Labor Variable Stock Optimization Variable	-0.036	0.794	0.213
Procurement Forecast Variable -> Stock Optimization Variable	0.430	14,235	0,000
One System 'WeCare' Variable -> Stock Optimization Variable	0.388	13,130	0,000

H1: The first hypothesis tests whether Workload has a positive and significant effect on Optimizing PPE Procurement Stock.

The test results show that the value of the t-statistic of the Work Variable on increasing Stock Optimization is 11,294 the p-value was 0.000. The t-statistic showed a positive and significant effect, thus confirming the first hypothesis. This demonstrates that workload significantly impacts the optimization of PPE procurement stock.

H2: The second hypothesis tests whether the number of workers has a positive and significant effect on the optimization of PPE procurement stock.

The test results show that the t-statistic value of the Number of Workers on increasing Stock Optimization is0.794then the results of the p-values are0.213. The results show that the t-statistic does not have a positive and significant effect, thus rejecting the second hypothesis. This proves that the number of workers does not significantly influence the optimization of PPE procurement stock.

However, even though the results of the hypothesis test cannot be proven, the variable Number of Workers can still be continued for this research as based on previous research.(Lengkey et al., 2020),(Saftari & Sinta, 2022),(Santoso et al., 2022) Based on these three previous studies using the SEM-PLS method, and some variables whose hypotheses could not be proven, the research using these variables could still be continued. This occurred because the Number of Workers variable was valid and reliable, but the hypothesis was not accepted. In research, a hypothesis can be rejected, and that is a result of the research, not an error.

H3: The third hypothesis tests whether the Procurement Forecast has a positive and significant effect on the Optimization of PPE Procurement Stock.

The test results show that the t-statistic value of the Number of Procurement Forecasts on increasing Stock Optimization is 14,235 The p-value is 0.000. These results indicate a positive and significant t-statistic, thus confirming the acceptance of the third hypothesis. This demonstrates that the Procurement Forecast significantly impacts the optimization of PPE procurement stock.

H4: The fourth hypothesis tests whether the One System WeCare has a positive and significant effect on the Optimization of PPE Procurement Stock.

The test results show that the t-statistic value of the One System Service 'WeCare' on increasing Stock Optimization is13,130The p-value was 0.000. The t-statistic showed a positive and significant effect, thus accepting the fourth hypothesis. This proves that the 'WeCare' One Service System significantly impacts the optimization of PPE procurement stock.

H5: The fifth hypothesis tests whether Workload, Number of Workers, Procurement Forecast, One System WeCare have a positive and significant effect on Optimizing PPE Procurement Stock.

From the explanation above, it was found that H2 was not proven, so it can be said that H5 was also not partially proven.

Discussion

The SmartPLS analysis proves a true relationship between workload, procurement forecasting, and WeCare's one-stop service system, reinforced by the concrete implementation of stock optimization using PPE forecasting. Through the PPE forecasting, it is hoped that PPE stock optimization can be achieved more easily because the amount of subsequent purchases is determined based on the PPE forecasting results, thereby minimizing the chance of out-of-stock or overstock.

It has been proven that there is a relationship between workload and stock optimization. In other words, it is true that workload influences the optimization of Personal Protective Equipment (PPE) procurement stock at the Karawang Assy Plant. H1 is proven to be in accordance withThe theory presented by Muthya Achyana in his journal entitled "Factors Influencing the Workload of Room Attendants at the Grand Jatra Hotel Pekanbaru"(Achyana, 2022).

It has been proven that there is no relationship between the number of workers and stock optimization. In other words, it is not true that the number of workers affects the optimization of procurement stock.Personal Protective Equipment (PPE)at the Karawang Assy Plant. H2 was not proven in accordance with the theory presented by Novi Rosyana and Aris Soelistyo in their journal entitled "Analysis of Labor Absorption in Large and Medium Manufacturing Industries at the Regency/City Level in East Java Province (2017-2019)"(Rosyana & Soelistyo, 2020).

It is proven that there is a relationship between procurement forecastingPersonal Protective Equipment (PPE)with stock optimization. In other words, it is true that forecasting PPE procurement influences the optimization of PPE procurement stock at the Karawang Assy Plant. H3 is proven to be in accordance with the theory presented by Fuad Hasan, Sutrisno, and

Ninny Siregar in their journal entitled "Analysis of Lecture Equipment Needs Using Forecasting Methods Considering Safety Stock at University X" ((Hasan et al., 2022).

It has been proven that there is a relationship between the 'WeCare' one-service system and stock optimization. In other words, it is true that the 'WeCare' one-service system influences procurement stock optimization.Personal Protective Equipment (PPE)at Karawang Assy Plant. H4 is proven to be in accordance with the theory presented by Nur Sucahyo, RC. Esti Nursumaryanti, and Ilham Hanifah in their journal entitled "Design of a Web-Based Employee Uniform Exchange System at PT. Indomarco Prismatama Jakarta"(Sucahyo et al., 2024).

It was proven that there is a relationship between workload, procurement forecasting, and the 'WeCare' one-service system and stock optimization. In other words, it was found that workload, procurement forecasting, and the 'WeCare' one-service system influence procurement stock optimization.Personal Protective Equipment (PPE)at the Karawang Assy Plant. H5 is proven to be in accordance with the existing theory as mentioned above and represents a novelty in research.

CONCLUSION

Based on the research results, it can be concluded that the research model has an explanatory power of 46.1% on the Optimization of PPE Procurement Stock as indicated by the R-Square value, where partially Workload, Procurement Forecasting, and One System Service “WeCare” have a positive and significant effect, while the Number of Workers does not have a significant effect; however, simultaneously all independent variables still have a positive and significant effect on stock optimization, and the results of forecasting calculations based on historical data for 2023–2024 can be used as a basis for planning PPE procurement in the Pareto replace category for the period January–June 2025 at the Karawang Assy Plant.

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