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Inventory Management Strategy Using The ABC Analysis Method

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ABSTRACT

Inventory control is crucial for the operational process in after-sale company. Determining the quantity of materials is used to ensure production runs is suitable to the planned schedule. This study aims to determine inventory according to a more strategic due to material classification. The classification based on the highest annual usage rate to reduce storage costs and material limitation. This company's problem is the storage cost expenditure due to the existence of materials that can no longer be used (deadstock) amounting to IDR13,223,620, and this costs will continue to increase if the materials cannot be used. Therefore, this study used the ABC analysis method, supported by determining the amount of safety stock and the Re-Order Point. This method utilizes the Pareto priciple (80/20). The results are 73% of all spare parts costs are concentrated in category A (IDR70,403,380), classification in category B is IDR18,485,856 equivalent to 19% and the total cost in category C is IDR8,544,500 equivalent to 8.8%. This study contributes to the company's development of inventory control strategies includes the provision of safety stock and approriate quantity to determine the timing of reorders for needed items, taking into account lead times when placing orders.

Keywords : ABC analysis, Safety Stock, Re-Order Point, Inventory Management

INTRODUCTION

Inventory is governance of a company's raw material supply for production operations and to fulfill customer orders (Gimenez-rossini et al. 2021). Furthermore, inventory is an investment and also can lead to waste, therefore, the company determinates the amount of inventory more accurately (Kırmızı, et al. 2024). Accurate control can be achieved through adequate supply, balancing supply and demand, as inventory (Gimenez-rossini et al. 2021).

Inventory management, as the science of managing inventory that used optimally by companies. This inventory management is used to design and establish a management system, so that order levels are precisely aligned with customer demand. Thus ensuring accurate cost usage based on inventory (Nuraeni and Santoso, 2024, Tinangon, et al. 2023, Siregar, et al. 2023). Furthermore, inventory manajgemen is structured into a systematic process, namely tracking inventory level, orders and sales by analyszing demand forecasts to maintain a balance of available stock (Kırmızı, et al. 2024). The inventory management system is directly derived from the availability of real-time data that companies utilize for demand estimation processes.

Innventory control was developed to address inventory management issues because the companies have a wide variety of materials and spare parts. Inventory is needed to cover sales demand and fluctuating production volumes (Umry & Singgih, 2019). The appropriateness of inventory requirements is based on the number of products being processed. Inventory management of materials

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and spare parts also aims to ensure operational continuity and cost effectiveness (Kırmızı, et al. 2024). Inventory management are reviewed continuosly and periodically, reflecting the desired service and rapid procurement response.

The ABC analysis method is a classification technique characterized by determining the relevant class for each inventory item. The results obtained from this method are optimized stock inventory classification (Kırmızı, et al. 2024). The classification menthod in ABC analysis is very important for manufacturing logistics by determining the type of materials, cost and also percetage of the number of the goods stored, regulary and planned (Handayani, et al. 2025). ABC analysis classification is multi-criteria and used based on the Pareto diagram that according to annual demand (Umry and Singgih, 2019, Handayani, et al. 2025). In addition, it can also be based on financial criteria, the value contribution used and the value-in-use criteria, so that the material rotates quickly (Gimenez-rossini et al. 2021, Ikasari and Mulyana, 2022, Nesti, et al. 2023, Sulfajrin and Lantara, 2023). This method is to create a policy in determining inventory based on the level of criteria. The criteria used on ABC analysis need to consider purchase and production lead times, costs and criticality of use, particularly the management of large inventories.

This study aims to find the optimal inventory management strategy to minimize costs and determine the ideal safety stock level for an automotive company that provide vehicle sales and after sales services. The problems that occurred in this company were due to a lack of control over raw material inventory, which resulted in an imbalance between inventory levels and actual demand. This imbalance is caused by several factors: excessive ordering compared to demand, resulting in excess stock, shortages due to late deliveries and sudden demand, resulting in production delays and dead stock due to over procurement and changes in part specificaitons, also potentioally making the part unsaleable. This situation causing in storage costs due to unused goods (as shown in Table 1).

Table 1 Dead Stock Cost

No	Spare Parts Name	Inventory Qty (Unit)	Dead Cost (Rp)
1	D_CVT Fluid 1 Lt	23	2.990.000
2	Element Sub-ASSY Air Cleaner	22	2.179.980
3	Seal, Type Oil	13	7.237.750
4	Bush, Stabilizer	14	616.000
5	Filter, Air	11	890.890
Total Dead Cost			13.223.620

Source: Automotive Company, 2025

This company provides after-sales services, such as maintenance, repairs and material provision (in this case are spare parts). The availability of spare parts on schedule and in accordance with customer requests is very important for effective after-sales service operations. One of the risks associated with dead stock is increased storage and monitoring costs, that making spare parts susceptible to demage and quality degradation (Salwa et al., 2022). Dead stock is a term used for inventory that has not been traded for a long period of time (Dianto, 2023). As shown in Table 1, the company incurred a loss of IDR 13,223,620, and this costs will continue to increase if the materials cannot be used. Another consequence of the occumulation of poorly manage spare parts I that if hinders the optimal stock exchange process in the warehouse. This situation illustrates the need for inventory management and control for this company.

Due to those problems encountered at this company, this study developed a material inventory control strategy to ensure that spare part supply management aligns with needs. Hence, this study used the ABC analysis classification method and then supported by determining amount of available stock, so that spare parts purchases are focused on items with high turnover and strategic value. This first step uses and ABC analysis, identified based on financial criteria, the contribution of spare parts used and the used cycle (Gimenez-rossini et al. 2021, Ikasari and Mulyana, 2022, Nesti, et al. 2023, Sulfajrin and Lantara, 2023).

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The next step is to determine the safety stock and reorderpoint for each items.

METHOD

This study was conducted at a company engaged in automotive procurement and maintenance. Data was collected from inventory in 2025. The methods used were ABC analysis, Safety Stock (SS) and Re-Order Point (ROP). The ABC analysis method was used to analyze historical spare parts demand data using following steps: First, calculating the annual volume value based on the price per unit; second, each item was sorted from highest to lowest value; third, the total and percentage of annual volume; fourth, categorization into categories A, B, and C. Category A represents products with high demand, absorbing approximately 80% of total inventory costs, namely materials with high balue but in small quantities. Spare parts ini category B are considered to have sufficient demand approximetely 15% of inventory capital is covering approximetely 30% of various existing products. Meanwhile, catefory C requiring 5% of the total allocated capital and isl low-value (Ikasari et al, 2022, Nesti et al, 2023).

The next step to anticipate inventory is determining the SS and ROP. Safety stock is the availability of material, so as not to distrupt the production process. The SS formula is:

$$SS = Z \times \sigma \times \sqrt{LT} \quad \text{.....(1)}$$

Where:

Z = 1.65 (for a 95% service level)
σ = Standard deviation of daily demand
LT = Lead time in days

The Re-Order Point (ROP) is used to determine the appropirate time to reorder based on inventory levels, lead time and SS (Gimenez-rossini et al. 2021, Umry & Singgih, 2019).

ROP= (average daily demand x LT)+SS ....(2)

RESULT AND DISCUSSION

1. ABC Analysis

The calculation data in the Table 2, there were 19 types of spare parts can be classified in to three categories as below:

Table 2 Materials Classification

Materials Name	Cost/unit	Total Cost	Cost (%)	Cum. Cost(%)	Category
Go Value Plus 10w40 Sn 3,5 Liter	269,500	17,248,000	17.7%	17.7%	A
Pad Kit, Disc Brake L/Fitting	727,900	13,102,200	13.4%	31.1%	A
Alternator Assy, W/Regulator	1,688,240	10,129,440	10.4%	41.5%	A
D_ Cvt Fluid 1l	130,000	5,980,000	6.1%	47.7%	A
Retainer Sub-Assy, Spare Wheel	18,290	4,974,880	5.1%	52.8%	A
Filter Air_1	419,610	4,196,100	4.3	57.1%	A
Element Sub-Assy, Air Cleaner	204,900	4,098,000	4.2%	62%	A
Spring, Release Fork Antirattle	70,000	3,710,000	3.8%	65.8%	A
Support Sub-Assy, Fr Suspension	241,000	3,615,000	3,7%	69,5%	A
Cap Radiator	104,680	3,349,760	3.4%	73%	A
Switch Ay,Stop Lamp	53,990	3,239,400	3.3%	76.3%	B
Bolt, Hexagon	28,390	3,151,290	3.2%	79.5%	B
Belt, V-Ribbed	93,744	3,093,552	3.2%	82.7%	B
Bush Stabil Lateral	30,500	3,050,000	3.1%	85.8%	B
Boot,Control Shaft	43,748	2,974,864	3.1%	88.9%	B
Seal, Type T Oil	47,250	2,976,750	3.1%	91.9%	B
Clip, Release Bearing Hub	65,000	3,055,000	3.1%	95.1%	C
Hose, Radiator	110,000	2,970,000	3.0	98.1%	C
Sensor Oxigen	503,900	2,519,500	2.6%	100%	C

Source: Automotive Company, 2025

The steps for determining each category are as follows:

1. Determining the cost of each spare part. For example: spare part name Go Value Plus 10w40 Sn 3,5 Liter. Cost per unit IDR 269,500 x 64 unit = IDR 17,248,000
   So, the cost for 64 unit this type is IDR 17,248,000
2. Determining the percentage of total cost. For this type is 17.7% of total cost all types.
3. Next step is found cumulative cost to determine the type of each spare part in its category.

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Based on the results of determining the categories in Table 2 and Table 3, this study found inventory management strategies for each category.

a. Category A. This company has a total cost for this category of IDR 70,403,380 or 73% of the total cost in 2025. Hence, 73% of all spare parts costs are concentrated in category A. This means that this category requires regular control and monitoring. There are 10 types of spare parts in this category, namely Go Value Plus 10w40 Sn 3,5 Liter (the highest level of control) to the most frequently used namely Radiator Cap. Therefore, in managing material inventory of category A, the company must store them properly and have control over the receipt and use of these materials due to needs, conduct routine checks and continous monitoring. In this category classification, tighter control is required, especially since each spare part has very accurate specifications. The problem that will occur if the product type undergoes development, so that the existing type of spare part is no longer needed.
b. Category B. The total cost in this classification is IDR 18,485,856 equivalent to 19%. There are six types of raw materials in class B, namely Switch Ay,Stop Lamp, Bolt, Hexagon, Belt, V-Ribbed, Bush Stabil Lateral, Boot,Control Shaft, Seal, Type T Oil. Those materials in this category require roper storage, with usage based on calculations of pas demand, continously check for changes in demand and monitoring customer change in demand that could lead to inventory storages. This category requires moderate control because the types of spare parts are not very specific.
c. Category C. The total cost in this classification is IDR 8,544,500 equivalent to 8.8% of the total cost. As shown in Table 2, there are 3 types of spare parts in this category, namely Clip, Release Bearing Hub, Hose, Radiator, Sensor Oxigen. Raw materials in class C require checking by comparing them to requirements. Control in this category is almost unnecesary due to affordable price, small quantities and less specific products. Even with loose controls, frequent use can result in waste.

Those results implies that, the company studied manage their inventories through item classification. All their materials are properly classified, so they can easy identification and furthermore company ensure selective control, with critical and valuable materials given maximum control over less critical materials.

Table 3 Materials Demand Per Year And Materials Cost

Materials Name	D per year	% D	Cost (%)	Cum. Cost(%)	Category
Go Value Plus 10w40 Sn 3,5 Liter	64	6.1%	17.7%	17.7%	A
Pad Kit, Disc Brake L/Fitting	18	1.7%	13.4%	31.1%	A
Alternator Assy, W/Regulator	6	0.6%	10.4%	41.5%	A
D_ Cvt Fluid 1l	46	4.4%	6.1%	47.7%	A
Retainer Sub-Assy, Spare Wheel	272	25.9%	5.1%	52.8%	A
Filter Air_1	10	1%	4.3	57.1%	A
Element Sub-Assy, Air Cleaner	20	1.9%	4.2%	62%	A
Spring, Release Fork Antirattle	53	5%	3.8%	65.8%	A
Support Sub-Assy, Fr Suspension	15	1.4%	3,7%	69,5%	A
Cap Radiator	32	3%	3.4%	73%	A
Switch Ay,Stop Lamp	60	5.7%	3.3%	76.3%	B
Bolt, Hexagon	111	10.6%	3.2%	79.5%	B
Belt, V-Ribbed	33	3.1%	3.2%	82.7%	B
Bush Stabil Lateral	100	9.5%	3.1%	85.8%	B
Boot,Control Shaft	68	6.5%	3.1%	88.9%	B
Seal, Type T Oil	63	6%	3.1%	91.9%	B
Clip, Release Bearing Hub	47	4.5%	3.1%	95.1%	C
Hose, Radiator	27	2.6%	3.0	98.1%	C
Sensor Oxigen	5	0.5%	2.6%	100%	C

Source: Automotive Company, 2025

2. Safety Stock and Re-Order Point

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In an inventory management system, calculating Safety Stock (SS) and Re-Order Point (ROP) is crucial for preventing stockouts that can disrupt operational processes. This study found result SS and ROP for each spare parts shown in Table 4. SS is used to anticipate uncertainty in demand and lead times. ROP indicates when a company should reorder to prevent stock shortages during the procurement process. For example the calculation of SS and ROP for Go Value Plus 10w40 Sn 3,5 Liter is as follows:

$SS = Z \times \sigma \times \sqrt{LT}$

SS = 1.65 x 0.28 x (√2)

SS = 0.65 ≈ 1 unit

ROP = (d x LT) + SS

ROP = (5.33 x 2) + 1

ROP = 10.66 + 1 = 11.66 ≈ 12 unit

Table 4 Safety Stock and Re-Order Point

Materials Name	Avg. Demand	*Lead Time* (day)	*Safety Stock (pcs)*	*ROP (pcs)*
Go Value Plus 10w40 Sn 3,5 Liter	5.33	2	1	11
Pad Kit, Disc Brake L/Fitting	1.5	2	1	3
Alternator Assy, W/Regulator	0.5	2	1	1
D_ Cvt Fluid 1l	3,83	2	1	8
Retainer Sub-Assy, Spare Wheel	22,67	2	6	51
Filter Air_1	0,83	2	1	2
Element Sub-Assy, Air Cleaner	1,67	2	1	4
Spring, Release Fork Antirattle	4,42	2	1	9
Support Sub-Assy, Fr Suspension	1,25	2	1	3
Cap Radiator	2,67	2	1	6
Switch Ay,Stop Lamp	4,42	2	1	9
Bolt, Hexagon	9,25	2	1	19
Belt, V-Ribbed	2,75	2	1	6
Bush Stabil Lateral	8,33	2	1	17
Boot,Control Shaft	5,67	2	1	12
Seal, Type T Oil	5,25	2	1	11
Clip, Release Bearing Hub	3.92	2	1	8
Hose, Radiator	2,25	2	1	5
Sensor Oxigen	5,25	2	1	11

Source: Automotive Company, 2025

Table 4 shows the results of the SS and ROP calculations based on the example above. As previously explained above, safety stock is necessary for companies to anticipate uncertantly demand. The results of the safety stock calculation in Table 4 indicate that the required spare part in the same, at one unit, except for Retainer Sub-Assy_spare wheell. This spare parts require 6 units of SS with the same lead time. Companies can minimize the risk to running out of stock during the lead time, if they have safety stock. The lead time required from the time the order is placed until the spare parts arrives at the company within two days. This is because each products has very precise specifications to its vehicle type.

While Re-Order Point provides a more measurable ordering time signal. Implementations of this concept is expected to improve ordering accuracy, avoid stockout, dead stock, and ultimately support overall warehouse operational efficiency. This ordering time is determined when the company needs to repurchase materials. This is necessary because the spare parts orders cannot always be shipped immendiately by suppliers, thus requiring sometime.

Tables 5 and 6, summarize the largerst and smallest ROP amounts for each category. These results are compared with percentage of customer demand and the percentage of cost expenditures for 19 types of spare parts at this company. In category A, the highest ROP values occur due to two factors: the quantity of products required by consumers and high product prices, which lead to high costs. This means the company needs to implement controls based on these two assessments, as excess procurement can result in decreased quality. Whereas, category B has similar spare parts prices, so this category is assessed based on the level of consumer demand. Spare part allocation in category B need to be moderately controlled due to unpredictable changes in consumer needs that frequently change along with vehicle product development. In contrast, category C is less of a concern because the demand and cost are both small. Based on the

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lowest ROP values, all categories explained that reordering was due to the cost of each product.

Table 5 The Largest Re-Order Point

Category	Spare Parts Name	ROP	% D	% Cost
A	Retainer Sub-Assy, Spare Wheel	51	25.9%	5.1%
A	Go Value Plus 10w40 Sn 3,5 Liter	11	6.1%	17.7%
B	Bolt, Hexagon	19	10.6%	3.2%
B	Bush Stabil Lateral	17	9.5%	3.1%
B	Boot,Control Shaft	12	6.5%	3.1%
C	Sensor Oxigen	11	0.5%	2.6%

Table 6 Lowest Re-Order Point

Category	Spare Parts Name	ROP	% D	% Cost
A	Alternator Assy, W/Regulator	1	0.6%	10.4%
A	Filter Air_1	2	1%	5%
B	Belt, V-Ribbed	6	3.1%	3.2%
C	Hose, Radiator	5	2.6%	3%

According to table 1 above, spare parts that cause of losses due to deadstock are in two category, namely category A and category B. Three types of spare parts are in category A, namely D_ Cvt Fluid 1l, Filter Air_1, Element Sub-Assy, Air Cleaner. The placement of these three types in this category is due to the level of cost expenditure. Hence, these types need to get strict control. The occurrence of deadstock in this category is due to product spesifications and product quality that are durable, so that there is a reduction in consumers' need for these spare parts. Whereas, deadstock ini category B include Bush Stabil Lateral-Seal and Type T Oil. These spare parts have a high customer demand and cost level lower than the theree products in category A. However, uncontrolled procurement of large quantities can result in product waste, ultimately rendering them unusable.

CONCLUSION

The study concludes that inventory management strategies indentified can be identified by using the ABC analysis method. This method effectively organizes materials by emphasizing item categorization, selective control and selective allocation of resources. Classification based on ABC analysis contributes to inventory control management for this company, which is divided into three categories: based on costs incurred and the quantity of goods used according to consumer demand. This study contributes to the company's development of inventory control strategies. The proposed inventory control strategy includes the provision of safety stock and approriate quantity to determine the timing of reorders for needed items, taking into account lead times when placing orders.

Company maintain optimal stock levels to meet demand. To achieve optimal stock levels, the company must meet both the lowest and the highest stock requirements, while considering the company's financial aspects. This approach avoids high costs and unusable stock. The results of this study provide insight into the use of ABC analysis for automotive after-sale companies.

REFERENCE

Dianto, E. W. (2023). *Analisis Management Inventory Untuk Menghindari Death Stock Product Di Tb. Sinar Baru*. *4*(1).

Gimenez-rossini, E., Risso, A., & Beluco, A. (2021). *Implementation of Inventory Management in a Footwear Industry*. *14*(2), 360–375.

Handayani, D., Ibnurizq, M. I., Bahar, F. I., & Hanafi, R. (2025). *Inventory Control Analysis With Abc Classification, Safety Stock And Reorder Point In Spare Parts Distributor Company*. *10*(1).

Ikasari, A. christina, & Mulyana, A. (2022). Peranan Manajemen Logistik Dalam Proses Penerimaan (Inbound) Barang Pada PT. Sky Light Multitrada Tangerang. *Jurnal Sosial, Ekonomi Dan Humaniora*, *1*(1), 14–19. https://doi.org/10.56244/sosiera.v1i1.492

Jonatan Persada Siregar, Rektor Sianturi, & Debora Exaudi Sirait. (2023). Analisis Pengendalian Persediaan Barang

Menggunakan Metode EOQ. *Jurnal Ilmu Pendidikan Dan Sosial*, *2*(3). https://doi.org/10.58540/jipsi.v2i3.445

Kırmızı, S. D., Ceylan, Z., & Bulkan, S. (2024). *Enhancing Inventory Management through Safety-Stock Strategies-A Case Study*. 1–17.

Nesti, L., Elviana, R., & Ramadhani, J. (2023). *Rancang Bangun Sistem Manajemen Gudang Sparepart PLTU dengan Metode Class-Based Storage*. *9*(1), 219–231.

Nuraeni, N., & Santoso, B. (2024). Peranan Manajemen Persediaan Bahan Baku terhadap Penjadwalan Produksi PT XYZ. *Jurnal Bisnis Dan Manajemen (JURBISMAN)*, *2*(2), 1–15.

Salwa, S., Nurazizah, A., Kusumaningtyas, R. D., & Samesti, T. (2022). *Analysis of Inventory Problems Using the Fault Tree Analysis Method (Case Study : PT Kimpai Dyna Tube) Analisis Permasalahan Persediaan Barang Menggunakan Metode Fault Tree Analysis (Studi Kasus : PT Kimpai Dyna Tube)*. *15*(2), 310–316.

Sulfajrin, E., & Lantara, D. (2023). Analisis Pengendalian Persediaan Spare Part Dengan Menggunakan Metode Analisis Abc Pada Pt. Antam, Tbk. Ubpn. Sultra. *Jurnal Aplikasi Dan Pengembangan Sistem Industri*, *1*(1), 9–17.

Tinangon, C., Arrazi Hasan Jan, & Karuntu, M. M. (2023). Analisis Manajemen Persediaan Pakan Ternak Untuk Ayam Petelur Pada Cv. Mulia Jaya. *Jurnal EMBA : Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi*, *11*(02), 217–226. https://doi.org/10.35794/emba.v11i02.47968

Umry, T. F., & Singgih, M. L. (2019). *Inventory Management and Reorder Point (ROP) Strategy Using ABC Analysis Methods in Textile Manufacture*. *5*, 1–7.