DESIGN OF STOCK TAKING POLICY TO REDUCE THE TOTAL COST OF STOCK TAKING USING CYCLE COUNTING METHOD IN WEST JAVA DISTRIBUTION CENTER OF PT. XYZ

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Abstract

   PT. XYZ is a 3rd Party Logistic who provide services to the client including Warehousing, Transportation & Distribution, Cross Docking In-plant Value Added Service and Logistics. They have a Distribution Center (DC) in Cibiru, Bandung to handle FMCG product. In maintaining the accuracy of its products, PT. XYZ has an average inventory accuracy for 6 months by 92.71% with the implementation of stock take activity conducted every month to 6 SKU's calculation. The total of stock take cost is Rp 62.022.000,00, with performing 2 days freeze activity. PT. XYZ needs to redesign the stock take policy and procedure in order to minimize the total cost of stock take activity and improve inventory record accuracy (IRA) higher than 92%. The calculation of ABC cycle counting method is done to determine the number of SKUs are counted in each stock take activity based on the value of each product. Results of calculation ABC cycle counting method is used to determine the schedule of stock take activity. Then the analysis of business process with business process improvement using streamlining tools in order to get an improvement of shorter cycle time. The use of cycle counting method chosen to focus more on calculations based on products that have demand and value. The implementation of the proposed stock take policy can reduce labor time by minimizing the stock take activities up to 19%, and have a load calculation of SKUs quantity reduced by 98.36%. Provide cost reduction of stock take activities as much as 17.30%, by reducing a cost of Rp 10.764.000,00 and The company should not do the freeze activity anymore. Business processes of stock take activities that have increased efficiency of 0.14 and a decreased time in each SKU stock take time of 634.46 seconds to 441.53 seconds.

Keywords: 3 PL, Inventory Record Accuracy, Cycle Counting Method, Stock Take Policy, Business Process Improvement, Stock Take Cost

1. Introduction

   PT. XYZ is a 3rd Party Logistic who provide services to the client including Warehousing, Transportation & Distribution, Cross Docking In-plant Value Added Service and Logistics. They have a Distribution Center (DC) in West Java, called West Java Distribution Center, in Cibiru – Bandung to handle one of their customer's, which is PT. OPQ. The product that they handle is FMCG product. There are two variants of the product, which are Pouch Variant and Bottle Variant. Pouch Variant has two SKU and Bottle Variant has 4 SKU.
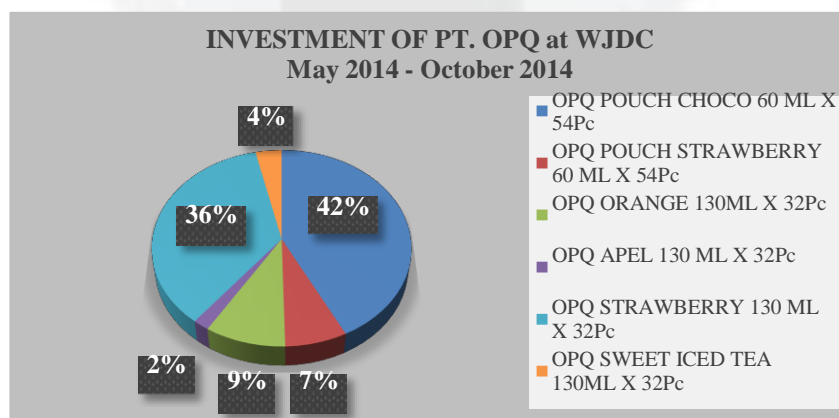

Figure 1. Investment of PT. OPQ at WJDC

   It is shown the investment of every units of the product on the Figure 1, the highest investment in the DC is OPQ Pouch Choco. PT. XYZ do a periodic physical inventory every month, or commonly known as stock take, to

do checks on the accuracy of inventory record. PT. XYZ implement the stock take activity by do a freeze activity for 2 days calculate all of the SKU's in the warehouse. After doing a stock take process, it can be obtained information on the inventory record accuracy of the initial nominal amount in the system, compared to the nominal stock of physical assets after activities take.

Shrinkage is a loss that is common in every 3PL warehouse. Based on aggregate data that do take stock since May to October 2014, PT. XYZ is declining with the percentage that can be seen in Figure 2 below.
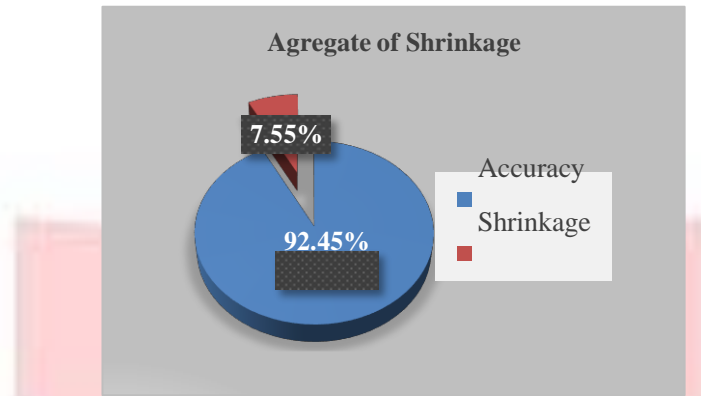

Figure 2. Percentage of Shrinkage

PT. XYZ shrank by 7.55% and the accuracy only 92.45%. The highest contribution of the shrinkage is 3.13% from OPQ Pouch Chocolate. Based on the results of the examination conducted by PT. XYZ, can be in the identification of the main factors that cause shrinkage in West Java Distribution Center (JWDC) is OPQ Pouch Chocolate products. Based on the data that has been shown above, it is necessary to take stock of making a planning policy to improve inventory record accuracy and minimizes the occurrence of shrinkage experienced by PT. OPQ. It is intended that the PT. XYZ faster in identifying the occurrence of shrinkage, so it can be traced more about the causes of shrinkage.
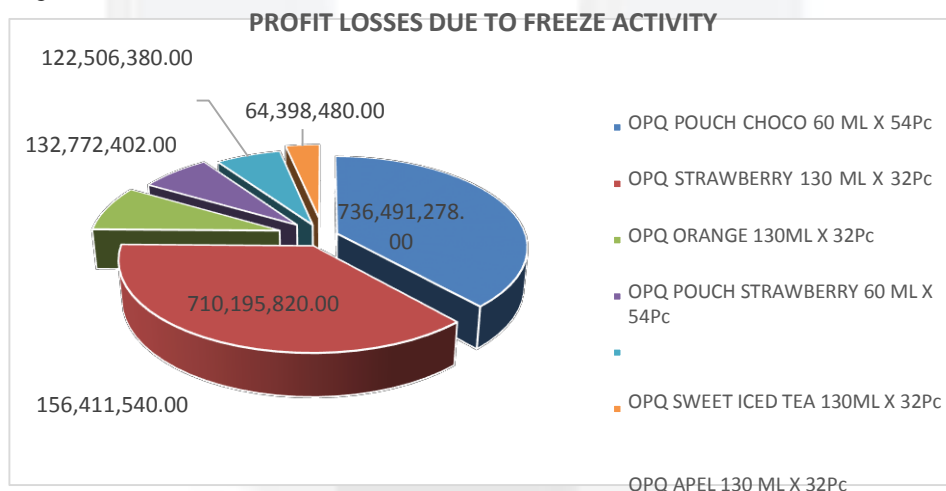

Figure 3. Profit Losses Due to Freeze Activity

Based on the Figure 3 shown above, the total profit losses due to the freeze activity every month is Rp 1,922,775,900.00. It is because when the company do the stock take activity, they have to freeze their inbound-outbound activity to count all of the product in their warehouse for 2 days. If that value added to the cost of stock take activity itself, amounted to Rp 62,226,000.00, so the total cost of a stock take activity is 1,985,001,900.00. With a level of accuracy that is only 92.45 % and the total cost of stock-take-activity is 1,985,001,900.00, need to be improved to reduce the total cost of stock take activity. Therefore, required a stock take policy proposal, which aims to take stock split time period. So that in case of shrinkage, the cause can be determined more quickly and traced the cause. Then, if the shrinkage has been minimized, hence significantly the percentage of inventory record accuracy will increase.

Cycle counting is the effort to counting the number of physical supplies in the warehouse and compare it with a record, and now having seen the transaction which was walking, done the act of correction. Cycle Counting method is a method that very dominant and become the best ways to keep inventory accuracy of a record remained

high Therefore, required a stock take policy proposal, which aims to take stock split time period. So that in case of shrinkage, the cause can be determined more quickly and traced the cause. Then, if the shrinkage has been minimized, hence significantly the percentage of inventory record accuracy will increase. In addition to increase the inventory record accuracy, PT. XYZ could do a process improvement on their stock take business process. So that a new stock take business processes can be generated by a stock take policy that has been determined previously [1].

In addition, by using cycle counting can impact the calculation of the stock take more effective so that it can adjust the number of items that will be calculated so that it can provide savings in the calculation [2]. In addition to increase the inventory record accuracy, PT. XYZ could do a process improvement on their stock take business process. So that a new stock take business processes can be generated by a stock take policy that has been determined previously.

The similar problem with this type of research has been done before by Miranti Putri Yuniar who use cycle counting method to minimizing the cost of stocktake at a distribution center. The other researcher that has been done with the similar type of problem is Dhea Fadhila that also use cycle counting method and business process improvement. Using the same method, researchers are trying to minimize the total cost of stock take activity and redesign the business process of stock take activity in a Distribution Center of 3 PL providers in Bandung city.

2.   Design of Stock Taking Policy to Reduce the Total Cost of Stock Taking
2.1 Conceptual Model

Conceptual model is a concept of thought that can help researchers formulate a problem-solving framework and assist in formulating solutions or proposals of the issues discussed. In general, the steps of the research is to minimize the total cost of stock take activity and redesign the business process of stock take activity in West Java Distribution Center of PT. XYZ is as follows:
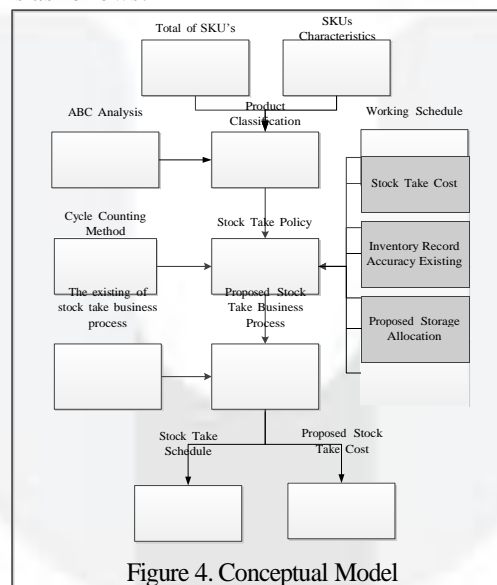

Figure 4. Conceptual Model

2.2 Product Classification

ABC analysis is used to classify items based on values owned by each of these items in a given period. In principle ABC analysis to classify an item based on the level of investment that is absorbed in the provision of supplies every type of item[2] . ABC analysis is a method of classification of items based on the level of the value of items, ranging from items with the highest value to items with the lowest value, then the item is classified into class A, B and C[3].

These are the steps in ABC calculation [2]:
1.   Calculate the total demand by means of accumulating demand for each type of product in one month (Di)

$$D_i = d_1 + d_2 + d_n \qquad (1)$$

2. Count the number of values for each product type (Mi) by multiplying the total demand of each product (Di) at a unit price of products (Pi)

$$M_i = D_i \times P_i \qquad (2)$$

3. Calculate the total amount of value to all types of products

$$V = \sum M_i \qquad (3)$$

4. Calculate the percentage value for each type of product (Vi)

$$V_i = \frac{M_i}{V} \times 100\% \qquad (4)$$

5. Calculate the percentage of each type of product (Ii), where N is number of products

$$I_i = \frac{1}{N} \times 100\% \qquad (5)$$

6. Sort percentage value, the percentage value ranging from the largest to the smallest percentage value
7. Calculate the percentage of the cumulative value of each product type based on the order of a percentage value
8. Determining the categories of products based on the cumulative percentages of each type of product, where category A is $\leq 20\%$, category B $\leq 30\%$, and category C $\leq 50\%$.

2.3 Cycle Counting

Cycle counting is a technique of counting inventory by dividing the inventory segments. Cycle counting is a method to solve the problems of supply and minimize the occurrence of [4]. *Cycle counting method has several advantages such as:*

1. Can identify the occurrence of a fault quickly.
2. Can increase the inventory record accuracy.
3. Activities cycle counting can be done during ongoing operations.
4. Does not require the number of employees that much to do activity cycle counting.
5. It is a systematic improvement in addressing the issue of inventory record accuracy.

In industry, cycle counting method is used to check and ensure the accuracy of the recording of inventory by recording activities regularly and continuously. Unlike the physical inventory counting methods entire inventory at the same time.

Here are the steps to do perform the calculation method of cycle counting [5]:
1. Set number of frequencies for each classification ABC,
2. Multiply the number of each SKU in each class with a predetermined frequency,
3. Summing calculation of one year on class setaip to get the total calculation of one year.
4. Divide the total calculation of the year the number of working days in XYZ.

2.4 Inventory Record Accuracy

Inventory record is a document that contains the number and type of inventory owned by the company [6]. Inventory records can be shaped like a hardcopy of the book and in softcopy electronic documents or in a system. Inventory records aims to facilitate the company in knowing the amount of its inventory without having to physically perform calculations every wants to know the status of its inventory. The calculations to get the inventory record accuracy is as follows:

$$Overall\ SKU\ Accuracy = \frac{Total\ Number\ of\ Accurate\ SKU\ Record}{Number\ of\ SKU\ in\ the\ Sample} \times 100\% \ .... [6]$$

2.5 Business Process Improvement

Business Process Improvement (BPI) is a method used by an organization or company to make changes that can improve its business processes. BPI provides a system that will assist in the process of simplification (streamlining) of business processes, to provide assurance that the internal and external customers of the organization or company will get a much better output than ever before [7].

3. Discussion
3.1 Product Classification

ABC classification analysis is a technique of calculating the number of products by classifying products into three classes, namely class A, class B, and class C. The amount of calculation A-class product on more than the calculation of the product in class B, and the number of calculations in a class B product more compared to the calculation of the product in class C.

Table 1. Product Classification

SKU	ITEM	May	June	July	August	September	October	Demand	Price
1020006475	OPQ POUCH CHOCO 60 ML X 54Pc	244437	185084	203481	211492	263879	176625	1284998	Rp 47,657
1020006484	OPQ STRAWBERRY 130 ML X 32Pc	253886	214703	215268	153506	133620	109767	1080750	Rp 53,310
1020006482	OPQ ORANGE 130ML X 32Pc	83298	51832	57102	35180	27726	23503	278641	Rp 53,310
1020006479	OPQ POUCH STRAWBERRY 60 ML X 54Pc	27097	36809	23159	72074	32085	22630	213854	Rp 47,657
1020006485	OPQ SWEET ICED TEA 130ML X 32Pc	43711	24595	25204	14199	0	0	107709	Rp 53,310
1020006483	OPQ APEL 130 ML X 32Pc	0	0	0	10660	25685	19610	55955	Rp 53,310
	Total	652429	513023	524214	497111	482995	352135	3021907	308554

Value (Price x Demand)	HIT	Inventory Value (Value x HIT)	Average Demand	% Average Demand	% Inv. Value	Acc. Inventory Value	A B C			ABC
Rp 61,239,149,686	6	Rp 367,434,898,116	214166.3333	42.52275136	41.03967509	41.03967509	A	0.166666 667	0.166666 667	A
Rp 57,614,782,500	6	Rp 345,688,695,000	180125	35.76384052	38.61079009	79.65046518	B	0.166666 667	0.333333 333	B
Rp 14,854,351,710	6	Rp 89,126,110,260	46440.16667	9.220700703	9.954706604	89.60517178	B	0.166666 667	0.5	B
Rp 10,191,640,078	6	Rp 61,149,840,468	35642.33333	7.07678959	6.829970689	96.43514247	C	0.166666 667	0.666666 667	C
Rp 5,741,966,790	4	Rp 22,967,867,160	17951.5	3.564272494	2.565335548	99.00047802	C	0.166666 667	0.833333 333	C
Rp 2,982,961,050	3	Rp 8,948,883,150	9325.833333	1.851645335	0.99952198	100	C	0.166666 667	1	C
1.52625E+11		8.95316E+11	503651.1667	100	100	505.7309325		1	3.5	

Table 2. Amount of SKU

Class	Amount of SKU
A	1
B	2
C	3
Total	6

Based on the calculation, could be known where the product that classified as A class is 1 SKU, 2 SKUs for B class and 3 SKUs for C class. The calculation is calculated from 6 SKUs that are in the warehouse PT.XYZ in May until October 2013.

3.2 Cycle Counting

Cycle counting is a method of performing activities stock take by dividing the inventory segments. Then it is calculated with the quantity because the the low amount of SKU but the high amount of quantity. By using a formula that is multiplying the number of cycle counting SKUs with the frequency of calculations that take stock to be adapted to the classification of ABC the results of the total to be counted every year. The frequency calculation is based on the APICs standard, which for the A class is counted for 4 times, B class is counted for 2 times and C class is counted for 1 times [3].

Table 3.a. Cycle Count Calculation

Class	Number Of SKU	Counting Frequency	Annual Count
A	1	4	4
B	2	2	4
C	3	1	3
Total Count per **6 months**			11

Table 3.b. Cycle Count Calculation

Class	SKU	Count of Frequency	Qty	Annual Count	Daily Count	Capacity / Pallet	Daily (/pallet)
A	MILKUAT POUCH CHOCO 60 ML X 54Pc	4	118986	475943	2645	160	17
B	MILKUAT STRAWBERRY 130 ML X 32Pc	2	59423	118847	661	135	5
	MILKUAT ORANGE 130ML X 32Pc	2	35626	71251	396	135	3
C	MILKUAT POUCH STRAWBERRY 60 ML X 54Pc	1	24969	24969	139	160	1
	MILKUAT SWEET ICED TEA 130ML X 32Pc	1	13426	13426	75	135	1
	MILKUAT APEL 130 ML X 32Pc	1	573	573	4	135	1
	Total		253002.3333	705008.3333	3920	860	28

Based on the above calculation, the total calculation in 6 month as much as 11 times. Here are the steps to do perform the calculation method of cycle counting [5]:

1. Calculations of cycle counting method begins with a set of frequency count for each classification ABC. Count of frequency that is set for the calculation of this study follow the standards defined by APICS, in order to get four times the calculation in 1 year for category A, 4 times a calculation in 1 year for category B, and 3 times in 1 year calculations for category C.
2. Multiplying the quantity of every SKUs by category ABC with the predetermined count of frequency, so we get the number of calculations in one year for each category.
   Example: 118986 (Quantity of OPQ Pouch Choco) x 4 (frequency of A Class) = 475943
   So the total of carton in class A is 475.943 carton that need to be counted for 1 year.
3. Obtained from the annual count divided by the number of working days in a year. PT.XYZ work schedules 6 days a week. Number of working days specified for this calculation has reduced the number of national holidays as much as 19 days, in order to get 300 days of work in one year. The number of working days and then divided by the total calculation as much as 1 year, so it is obtained the calculations take stock of activity during the first day is calculated as 2.645 carton for A class.
4. Final calculation is divide the daily count of quantity to the pallet capacity of every SKUs

So the total calculation of class A in one day are 17 Pallets, class B are 5 pallets for OPQ Strawberry and 3 pallets of OPQ orange, and class C are 1 Pallet for OPQ Pouch Straberry, 1 Pallert for OPQ Sweet Iced Tea and 1 Pallet for OPQ Apel.

3.3 Stock Take Schedule Design

The determination of the schedule stock take based on consumption rate in each category of the ABC. SKU consumption rate that has the greatest value would be calculated in advance compared to other SKU that have a value lower consumption rate. The determination of the schedule stock take this was based on the SKU that has a SKU movements faster than others with regard to value the ABC category. The determination of the schedule of stock take can make the stock take activities widened more focused because of a little quantity of SKUs and tracking of goods that could be the difference in focus is not burdened with another SKU that is not calculated on that day.

Table 4. Stock Take Schedule

No.	Day	Class	SKU	Consumption Rate	Qty Counted	Um	Location Start	Location End	Time Needed
1		A	OPQ POUCH CHOCO 60 ML X 54Pc	7726.161111	6	Pallet	PC-1-M3-1-2	PC-1-R3-1-2	
2					6	Pallet	PC-1-M4-1-2	PC-1-R4-1-2	1.79
3					5	Pallet	PC-1-N5-1-2	PC-1-R5-1-2	
4	1	B	OPQ STRAWBERRY 130 ML X 32Pc	6660.572222	5	Pallet	BT-1-S1-2-1	BT-1-W1-2-1	1.79
5			OPQ ORANGE 130ML X 32Pc	1466.216667	3	Pallet	BT-3-D1-2-4	BT-3-F1-2-4	1.79
6		C	OPQ POUCH STRAWBERRY 60 ML X 54Pc	1392.077778	1	Pallet	PC-2-L29-1-3	-	1.79
7			OPQ SWEET ICED TEA 130ML X 32Pc	956.9555556	1	Pallet	BT-3-F13-1-4	-	1.79
8			OPQ APEL 130 ML X 32Pc	603.6166667	1	Pallet	BT-3-F25-1-4	-	1.79

3.4 Workflow Design of The Stock Take Activity

Stock take activity with serpentine method takes an average of total time for about 634.46 minutes. In the stock-take activities proposed counting products based on a set schedule and go directly to the product which will be calculated by the time calculation for one SKU on average for 2.03 minutes.

3.5 Stock Take Cost Design

Stock take activity is a routine activity undertaken by PT XYZ monthly. Stock take activities conducted by PT XYZ aims to do the calculation of the number of products in the warehouse actually, then the calculation is compared with the number of products registered in the system. Based on the calculation cycle counting, SKU calculated in a stock take activities remain much as 6 SKUs every day but there is a change in the number of

pallets were calculated. Changes in the calculated number of SKU certainly will not need as much time as take stock of existing activities in addition to the operator that is used to calculate the 28 pallets were not as much as operator on stock take activities existing. Operator is used to calculate stock SKU based activities take enough improvement requires three people to count 6 SKUs every day. Changes in the number of workers to count the SKU will result in changes in the cost of activities. The existing cost is summarize all of the payment that PT. XYZ should pay, from normal salary until the stationary cost. For the improvement, the overtime cost, meal and transport cost in in overtime are removed because the cycle counting is conducted every day in a normal time.

Table 4. Stock Take Cost

	Stock Take Cost (Existing)			Improvement
No	Description	Total		Total
1	Normal Salary	2,592,000.00		432,000.00
2	Overtime Cost	6,624,000.00		-
3	Meal Cost	810,000.00		45,000.00
4	Transport Cost	810,000.00		45,000.00
5	MH Cost	50,940,000.00		50,940,000.00
6	Stationary Cost	450,000.00		450,000.00
	Total	62,226,000.00		51,462,000.00
	Difference			10,764,000.00
	% Minimize			17.30%

Based on the proposed cost, XYZ can minimize the total cost of stock take activity by 17.30% or Rp 10.764.000,00.

3.6 Business Process Improvement

Below shown the existing time data activity that has been calculated in can be known how the efficiency of time after the elimination of activities. Here below is the calculation the efficiency of a given business process proposals [4]:

Table 5. Business Process Improvement

Business Process	Activity Performer	Activity Analysis	Streamlining	Proposal
Making the CSBL Report (Counting Form Information)	Admin	**RVA** This activity is an important process because it will issue-ing the product that need to be count and the area allocation	Error Proofing	Area allocation is based on a stock take activity schedule that has been determined in Stock take Policy design phase, so that the checker would not be wrong location and one SKU when calculating the goods
Counting Phase 2	Checker	**BVA** Counting phase 2 activity, an activity that provides output directly to the PT. XYZ itself, because by doing the calculation of phase 2 can be made to match the calculation results with the previous	Duplication Elimination	This activity is an activity similar to Counting Phase 1. One counting of are considered due to the amount of product that is calculated each day is not much, so the error rate also decreases. Therefore it conducted the elimination of this activity.

The calculation of the cycle time efficiency is based on the improvement of stock take business process. From the calculation of cycle time efficiency above, there is an increase of 0.14 compared with the existing condition. Business process of stock take activity is not only increased efficiency but also decreased the activity time so that the counting time can be shorter for 30.41%. It shown below on the Table 6.

Table 6. Cycle Time Efficiency

Cycle Time Efficiency	RVA	BVA	NVA	CE
Stock Take Existing	10	6	0	0.625
Stock Take Proposal	10	3	0	0.769

	Existing	Proposal	Difference	Percentage
Total Time (sec)	634.460	441.527	192.933	30.41%
Total Time (Min)	10.574	7.359	3.216	30.41%

4. Conclusion

1. Based on the results of the research that has been done, then obtained some conclusions which is the answer to the problem formulation predetermined. The implementation of the proposed stock take policy can reduce the working time stock take activity decreased by 98 %, and have a load to counting the SKU reduced as well. A decrease in the calculated pallet, pallet from 1711 to 28 pallets, or by 98.36%. Provide cost reduction from the stock take activity as much as 17.30 % by reducing a cost of Rp 10.764.000,00 and decrease the total cost caused by stock take activity

for 97.41% or as much as Rp 1.933.539.900,00 because the company should not do the freeze activity anymore. The increase of efficiency in business process of stock take activity for 0.14 and stock take time reduction of 634.46 sec becomes 441.53 sec. And based on the design of storage allocation using lean warehousing that has been proposed by Mahardiani Beningrum on her research, the total time to do the stock take activity is 10.74 minutes a day, which 1.79 minutes for each bay.

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