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Implementation of Lean Thinking to Minimize Waste in Warehouse of PT. Dunia Express Transindo

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Abstract. PT. Dunia Express Transindo is one of the company who provide warehousing activities. The problem that occurs in this company are defect, waiting time, and transportation time. The purpose of this research is to know what are the activities in the warehouse and identified any kind of waste. This research is using qualitative methodology. The data of the research object were obtained from the results of direct observations and interviews. Fishbone diagram is used in this research as a measurement method. Result shows that researchers has found some waste in goods loading activity into distribution truck, and transportation time on the movement of goods from rack into shipping area. With that result, researchers proposed a recommendation for improvement that can be applied in warehouse activity of PT. Dunia Express Transindo like using a good condition pallet to avoid unnecessary damage and applying 5S tools.

Keywords: lean thinking, supply chain management, warehouse, waste

1. Introduction

Warehousing is a building for storing goods whether it's a raw material or finished goods in certain quantity and time period then distributed to the intended location on request. The obstacle faced in warehouse management is the accuracy of goods movement and calculating the time period of stored items. The control of goods movement activity and document is needed to improve the efficiency of warehouse activity so that the quantity.

Warehouse have an important role in keeping the quality of product until it reach to the customer. The important role of warehouse in supply chain is based on a challenge that company faced to keep the warehouse performance like improving productivity and accuracy of warehouse activity, reducing cost and stock in warehouse, also improving customer service (Richards, 2011).

A good warehouse management is important for supply chain. Efficient and effective warehouse activity can give an optimum cost to serving and improving customer service level.

PT. Dunia Express Transindo (Dunex Logistics Solution) is a company who provide "Total Logistics" service based in Sunter, North Jakarta, Indonesia. This company provide all logistics service from raw material import, distribution to the manufacture, storing goods in warehouse, and distributing finished goods to end customer, whether it's export or import.

PT. Dunia Express Transindo always controlling and record for every incoming goods and out. Considering a lot of goods that need to be control so a right method is needed to find a good storing location, besides that for knowing is the storing goods location is full or empty in warehouse.

The waste that exist in the warehouse are defects on customer goods, waiting time when the goods have to wait to be carried and moved, and transportation time when moving goods from warehouse into distribution area or customer trucks. Defect waste happens because a damaged pallet, but they still use it. Waiting time happens because the goods have to wait the forklift operators to finish the other activity. Transportation time happens when loading the goods into customer truck.

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The purpose of this research is to know what are the activities in warehouse and identified any kind of waste that exist when doing any activities.

2. Methods

Waste can be minimized with applying lean thinking. Several methods can be used to identified and reduce waste that occurs in warehousing activities like fishbone diagram and 5S (Seiri, Seiton, Seiso, Seiketsu, Shitsuke). Here are the explanation of the methods that will be use in this research:

2.1 Fishbone Diagram

Fishbone diagram picturing a line and symbol that shows connection between results and cause of problem that will take an improvement action. A result that happened will be found what is the cause of problem, the cause of problem can be from working methods, tools and ingredients, measurement, man, environment and etc. (Munro, 2002). Based on the main cause we will find the main cause with more specific and detail.

2.2 5S

5S is an acronym from Japanese vocabulary that connected to maintaining a good workplace. The core of this concept are organizing, ordering, cleaning, and standardizing which is the main rule to manage an effective and efficient workplace. Here are the explanation of 5S (Osada, 2002) :

1. *Seiri* is an organizing or sorting which are what we need and don't, making decision and applying stratification management to remove somethings that we don't need.
2. *Seiton* is tidiness which means how fast can you done to put things and retrieve it back when we need it. Seiton focusing on functional management and eliminate searching activity.
3. Seiso is clean, cleaning is one of checking and creating a perfect workplace. Including how clean the machine is, work tools, work environment and many things in workplace.
4. *Seiketsu* is maintaining, tidiness and cleanliness with continuity including ourself and work place cleanliness. Doing 5S that applied with continuity to keep a good environment in work place.
5. *Shitsuke* means discipline, having an ability to do a job appropriate with procedure so that can create a work environment with habit and more discipline.

3. Discussions and Result

Warehouse in PT. Dunia Express Transindo is a place to keep finished goods to fulfill customer needs. Inside the warehouse there are 14 rack that used to place finished goods with 1 ton capacity per level. The rack that is owned by PT. Dunia Express Transindo has the lowest height of 5 meters and the highest is 10 meters. The goods that is stored in this warehouse are electronic goods and automotive spare parts. Besides a rack to place the goods there also a work desk for repacking.

In warehousing process, Dunex is already using a barcode system that is standardized and with a selected policy. With the barcode system, all warehousing activity already connected with the warehouse admin, the contents are when the goods will arrive, the classification of product, how much, and which rack they put for the goods.

3.1 Receiving Process

The goods in receiving process are finished goods like electronics and automotive spare parts. In this process, if the goods are bulky will take much more time to be prepared with pallet, compared with a well organized goods with combination packaging is faster.

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In this process, the warehouse admin give a confirmation first that there will be a goods arrive for unloading. In this process tools is needed for material handling like manual pallet jack, powered pallet jack, forklift, and pallet.

After that, checking the document related on the goods that already been received before unloading. Unloading process can be done when the documents are already complete, but if the document still incomplete then they can't do unloading process.

If checker found a goods with bad condition like defect or the quantity of goods isn't same on the received documents, so they have to make a report that will be sent to customer. The purpose is so customer know there are defect goods or the quantity is different as it said on the documents.

But if the goods is match with the documents, the unloading process can be done. After they unload the goods, they will be placed in staging area first to do a physical process and creating a barcode for each goods to know the code of goods, goods specification, the owner of goods, which rack the goods is placed, and how many. Staging area is a place where they organize the goods that already unloaded that will proceed to place the goods in rack.

Table 1. Receiving activity

No.	Activity	Time	Definition
1	Unloading	20 minutes	Non-value adding but necessary
2	Lead time	2 minutes	Non value adding
3	Goods Checking in Staging Area	7 minutes	Non value adding but necessary
4	Lead time	10 minutes	Non value adding
5	Placing the goods to rack	20 minutes	Value adding
6	Lead time	1 minute	Non value adding
7	Data collection of goods	10 minutes	Value adding

In table 1 is the receiving activity. Goods that received is finished goods. At unloading process needs 20 minutes. The receiving process in bulk need a longer time, compared with the goods that already using a combination packaging. At this process the transportation time is too long which is 20 minutes. Because the layout of the warehouse that is not well organized so there is not enough movement to transferring the goods into staging area. The next process is physical checking in staging area. In this process, there usually found goods with bad condition (ex: leak) or the amount of goods is not match with the document, so they have to make a report to declare there are a damaged goods or the amount of goods is not match with the document so the process to place the goods to rack is delayed for 10 minutes. Next when they arrange the goods into rack there are also a longer transportation time, because the goods placed in over the forklift line so the forklift can bump the goods which will cause damage to the goods itself.

After we already found what cause of the waste that happened in some activity from receiving process, we create a table to show how much time loss per activity as we show below:

Table 2. Time Loss Per Activity (Receiving Process)

No.	Activity	Time Loss	Cause
1	Unloading	8 minutes	Not enough movement for forklift operator
2	Goods Checking in Staging Area	10 minutes	Found defect, warehouse staff have to make a

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			report about it
3	Placing goods to the rack	10 minutes	Not enought movement for forklift operator

3.2 Shipping Process

Shipping process can be done if the customer is requested to ship the goods. If there are a request from customer the goods will be prepared for loading process into customer distribution truck or Dunex fleet itself.

Table 3. Shipping Process

No.	Activity	Time	Definition
1	Request Pickup by Warehouse Admin	5 minutes	Value adding
2	Lead time	1 day	Non value adding
3	Arranging goods to shipping area	20 minutes	Value adding
4	Lead time	1 minute	Non value adding
5	Physical Checking of goods	10 minutes	Non value adding but necessary
6	Lead time	10 minutes	Non value adding
7	Loading process	20 minutes	Value adding

In table 2 is the shipping process. If customer want to request a shipping process, they have to confirm it 1 day before the loading process can be done to warehouse admin. Next picker will be preparing the goods that will be load into the trucks, then the goods have to arrange first with pallet, so they can easily move the goods into trucks. After that checker do a physical checking again, in this process usually found a damaged goods. It happens because there are a pallets with bad condition, but they still using it. The goods that will be shipped have to be in a good condition. So the picker have to repack the goods that cause a delay for loading process and the distribution trucks have to wait until repacking is done. When the loading process into distribution trucks we found a forklift operator that plays handphone while the loading process, it causes the transportation time too long.

After we already found what cause of the waste that happened in some activity from receiving process, we create a table to show how much time loss per activity as we show below:

Table 4. Time Loss Per Activity (Shipping Process)

No.	Activity	Time Loss	Cause
1	Physical checking of goods	10 minutes	Found defect, because damaged pallet
2	Loading process	10 minutes	Unprofessional workers, doing unnecessary movement while working

3.3 Fishbone Diagram

The waste that we found in warehousing process there are defect and transportation time. Both of the waste is analyzed the root of problems with fishbone diagram as it shown on figure 9 and 10.

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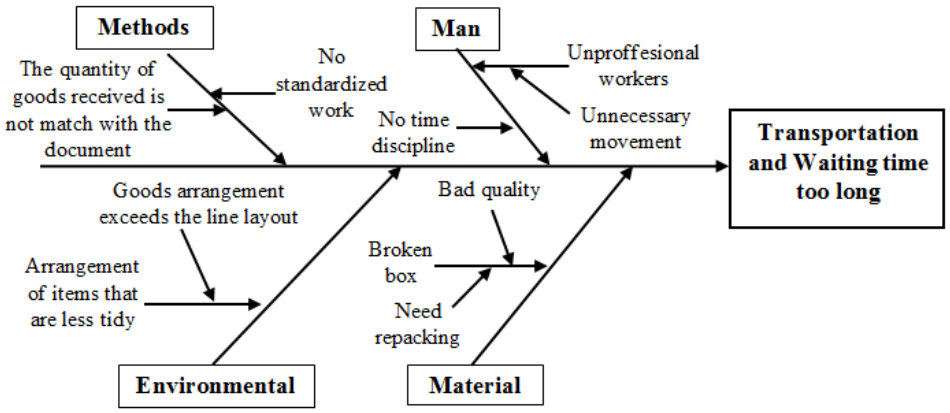

Figure 9. Fishbone diagram of transportation & waiting time

The cause of waste from transportation time and waiting time is making the time of each process is longer so it can effect to the flow of warehouse process. There is no standardized work and many controlling cause there is no time standard for doing each activity.

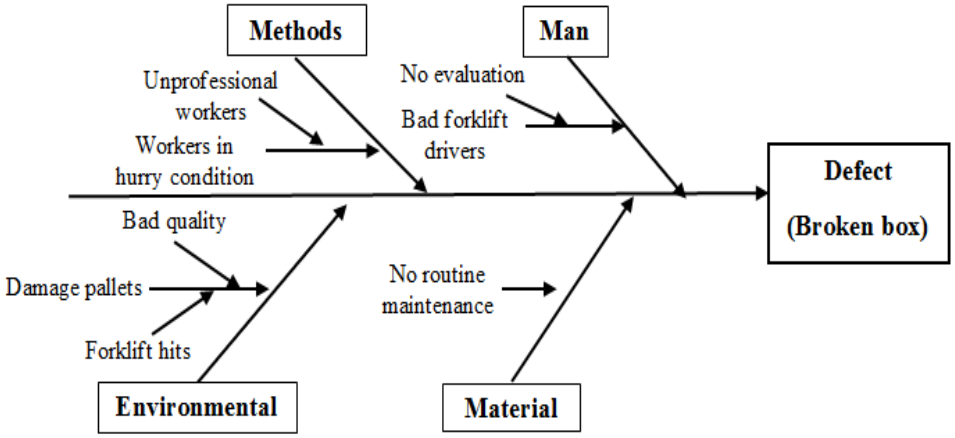

Figure 10. Fishbone diagram defect

The cause of defect waste is happens on shipping area where the goods are ready to be shipped. When they move the goods into distribution truck there always found a broken box so it's not matched with the criteria or not good to be sent and also delaying the loading process which cause the trucks that already arrived have to wait much longer because repacking process. Damaged box have to be replaced by repacking process in order to meet the criteria and good to be shipped.

3.4 Purposed Improvement

To reduce waste that occurs from longer transportation time and defects so there is an improvement by applying 5S (Seiri, Seiton, Seiso, Seiketsu, Shitsuke). First, Seiri is a step to remove the unusable. Empty boxes that still on the floor can cause the forklift operator is not having enough movement. Second, Seiton means placng all material or tools as it designated. Third, Seiso means clean. So they have to aware of cleanliness of the warehouse. Fourth, Seiketsu is a stage where the company have to set a standardized work. With standardized work

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is set in doing every process must be had a better result. Fifth, Shitsuke is how to do something right to make it as a good habit.

Table 3. Implementation of 5S Methods

	Defects	Transportasion Time & Waiting Time
Seiri	Using a pallet with good condition	Throwaway the box that already broke and unusable so it can make enough movement for forklift
Seiton	Placing the goods in pallet according to the standard	Placing the goods inside the layout
Seiso	Pallet placement does not exceed the specified layout line	The goods in staging area have to be placed into storing rack quickly
Seiketsu	Applying standardized work in each procedure	Applying standardized work in each procedure
Shitsuke	Always aware the cleanliness of the warehouse	Always aware the cleanliness of the warehouse

4. Conclusions

4.1 Conclusions

Based on data we processed and analyzed, we conclude that :

1. The results from fishbone diagram is found a waste there are defects, waiting time, and transportation time too long.
2. The cause from transportation time and waiting time make the time of the process is much longer so it can interfere the flow of warehouse process. No standardized work is set and controlling cause no time standard for each activity
3. The cause of defect waste is happened in storing area for goods ready to be sent. When they were loading the goods to distribution trucks usually found damaged box and delaying loading process that cause the trucks have to wait much longer for repacking. Damaged box have to be replaced by repack it's goods to fullfill the criteria and appropriate to be sent.

4.2 Suggestions

Based on the research conducted by the researchers, so we have some suggestions, which is :

1. Applying 5S in warehouse of PT. Dunia Express Transindo to reduce the waste that occurs.
2. Replacing pallet with good quality to avoid another damaged box.
3. Giving a visible layout to divide the goods and the forklift which still operates in warehouse to avoid accident or bump into the goods.
4. Pallet placement should be inside of the line layout.

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