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Design of Supporting Material Warehouse Management System at PT XYZ

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Abstract. This study has been done to create a system and standard to control the warehouse and also make it easier to find tools. The warehouse is full and finding tools is difficult because there is no regulation to control how the warehouse works. This research uses direct observation in the field, and interviews with the department related to supporting tool warehouses. The results of the observations is the organization of a new management system in the form of Standard Operating Procedure (SOP), rules, and a new layout for tools. Based on the existing SOP, stock cards and material, a parent table is made for controlling tools in the warehouse. Controlling is carried out with aim that the warehouse works according to its SOP and eliminates current problems.

Keywords: Warehouse Management System, Standard Operating Procedure, Layout.

1. Introduction

PT XYZ is a company engaged in the field of offset printing services, ranging from products of etiquette and labels, to a wide range of packaging made of duplex carton boxes. The assortment of products manufactured, requires PT XYZ to have good warehouse handling. The warehouse is an important part of the production process, because the warehouse stores the production material. Warehouse management is necessary for the flow of the supply chain to run without errors. The layout also plays an important role and has many strategic conequences for the company. The layout affects the company in terms of capacity, material flow, flexibility, cost, quality work environment, and so forth.

This company is developing a warehouse for supporting materials that are needed when the production process is running. The old material warehouse will be modified into a supporting material warehouse, developed with the aims of simplifying and expediting the production process. The supporting material warehouse contains materials (tools) which are required when operating machinery, as well as a color reference related to production. These materials have a lifespan (life cycle) and should be available when production begins. A supporting material warehouse is also needed to manage and organize the required material for production, unlike the old warehouse system that was just for the placing of material after use without properly controlling the material in it. A supporting material warehouse is expected to have a system that can facilitate the entry and exit of materials and would make finding items easy. For that, the layout of the placement of goods in the supporting material warehouse needs to be properly organised. Correctly labeling physical materials in the warehouse is also necessary, in order to easily find items.

2. Research Method

2.1 Warehouse Management System

The warehouse is seen as a permanent special facility that is designed to achieve the target level of service at the lowest total cost [1]. The Warehousing management system aims to control the warehousing activities and the expectations of this control is a reduction of inventory costs, increase in the effectiveness and efficiency of retrieval and entry of goods into the warehouse, as well as the ease and accuracy of obtaining inventory information in the warehouse.

2.2 Fixed Location System

The fixed location system is the system of placing goods in predetermined location. These goods cannot be mixed with items of different types than those that have been determined [2]. Goods are stored neatly and in a way that makes them easy to find. This method is typically used by small warehouses that only store a few items.

2.3 Floating Location System

The floating location system is a system that means the placement of goods in the warehouse can change [2]. The absence of a pre-determination of the goods placement means that use of available space becomes more efficient. Goods in the warehouse can be placed anywhere, the most important factor is updating the location of goods on the system.

Irawan [3] in his research analysing the discrepancies in companies offering warehouse management services, indicated that problems occured because the SOP was not executed properly. Leopatria and Palit [4] stated that the design of the calculations and memo adjustments were carried out to solve existing problems in the warehouse.

The method used for this research was direct interviews and observation in the field. The object of the observation was the current condition of the material warehouse, since the warehouse needed to be improved and a new system designed. The first step in observation was measuring the capacity and dimensions of the warehouse. The warehouse needed two rooms for a storage facility and office. The next step was sorting the material, with larger items placed in the warehouse and smaller items in the office. The interviews were carried out directly with everyone related to the current supporting material warehouse. More information was collected from interviews with the warehouse staff, the supply chain manager, and the Production Planning and Inventory Control (PPIC) division. Interviews with the warehouse staff were to obtain information about the true condition of the

current warehouse, as well as to understand their job description and the running of the current system in the warehouse. The warehouse staff were under the control of the PPIC division in this company. The information obtained from the supply chain manager was the goals of the new system in the supporting material warehouse. While the information from the PPIC division concerned the documentation flow process for ordering material and saving the material until the handover of the supporting material to production.

3. Result and Discussion

Drafting a plan for the supporting material warehouse management system was made to manage the old/current material warehouse. Drawing up the job descriptions of staff, the SOP, work instructions, regulations, and layout placement of materials was the design of the supporting material warehouse management system.

The company has a wide range of products and therefore requires a wide range of supporting material that is different for each product.

3.1 Material in Warehouse

There are generally seven types of supporting material needed for the production process. These are: punching knives, dieline, approval folder, sample print, cliche emboss/hotstamps, plates, and polymer boxes. The approval folder, sample print, and dieline will be in large folders, while the polymer will be stored in its boxes. The types and dimensions of materials that are stored in the support material warehouse can be seen in Table 1. The materials in the warehouse each have a lifespan (life cycle) and must be controlled in order to prevent the warehouse becoming full.

3.2 Material Warehouse Initial Condition

Initially, the material warehouse was divided into two – the knife warehouse holding the punching knives and dieline warehouse storing the dieline, approval folders, and sample print. Other material was placed on the production floor.

Table 1. Type and Dimension of Materials

Material Type	Length (cm)	Width (cm)	Height (cm)
Plates	113	0.2	93
Punching Knives	115	3	83
Emboss/Hotstamps	15	0.5	7
Polymer Boxes	113	5	83
Large Folders	116	2	88

In the knives warehouse there was one staff member to help with storage and taking out the punching knives; the dieline warehouse was also managed by one staff member who stored and took out the dieline, sample print, and approval folders. In the warehouse there was no system for recording the material flow. The information obtained about the management of goods in the warehouse system was:

- Goods reception
  Acceptance of newly purchased/created materials, and materials returned to the warehouse after being used in production.
- Storage of goods
  Newly purchased/created material will be stored until required for production. Materials that have been used. The warehouse staff also stored finished items.
- Expenditure
  When it is asked for, warehouse staff will take the material and deliver it to the production team that will use it.

3.2.1 Problems in the Material Warehouse

From observation, interviews, and other information obtained, there are problems in the current material warehouse. The warehouse is full of knives and the search for the correct knife is difficult. The problems that exist in the material warehouse need to be analyzed until the root cause of the problem is discovered. The Fishbone diagram could be used to find the root cause of the problem and to think through how to resolve the problem critically. This should be done to eliminate the initial problems. The Fishbone diagrams of the problems in the material warehouse are shown in Figure 1 and Figure 2.

Figure 1 illustrates the root causes of the problem that the warehouse is full. Most of these root causes are due to the absence of rules to regulate the material warehouse. In terms of the human factor, the material warehouse staff do not function as controllers of the material, but more focus on the preparation of material for production. A lot of material for old products lies unused but is not removed from the warehouse, making more piles. None of the staff in the warehouse or PPIC have taken the initiative to change this in order to improve the material warehouse.

Figure 2 explains the root cause of the human factor which makes the search for material difficult in the material warehouse. The staff do not inform each other about the placement and flow of material during their shift. And the labels are not clear since names are often shortened by warehouse staff. There is also a 'method' factor at the root of the problem, and that is the absence of clear rules on how the material should be arranged on the shelves. There is no order or rule for recording the material coming in and out, in order to determine the stock. The ineffectiveness of inspection also makes searching for material more difficult.

3.2.2 Recommendation

Suggestions will be made with the aim of creating a better material warehouse. The proposal will be given based on the needs of warehouse material, in order to function as a regulator and controller of materials.

3.2.3 Job Description Draft

The supporting material warehouse must be handled by people who focus only on the setting and preparation of supporting material for production, as well as raw materials warehouse staff who only focus on providing raw materials. Supporting material warehouse staff should have a clear job description in order to function properly in the operation of the warehouse. The job description draft for supporting material warehouse staff can be seen in Table 2.

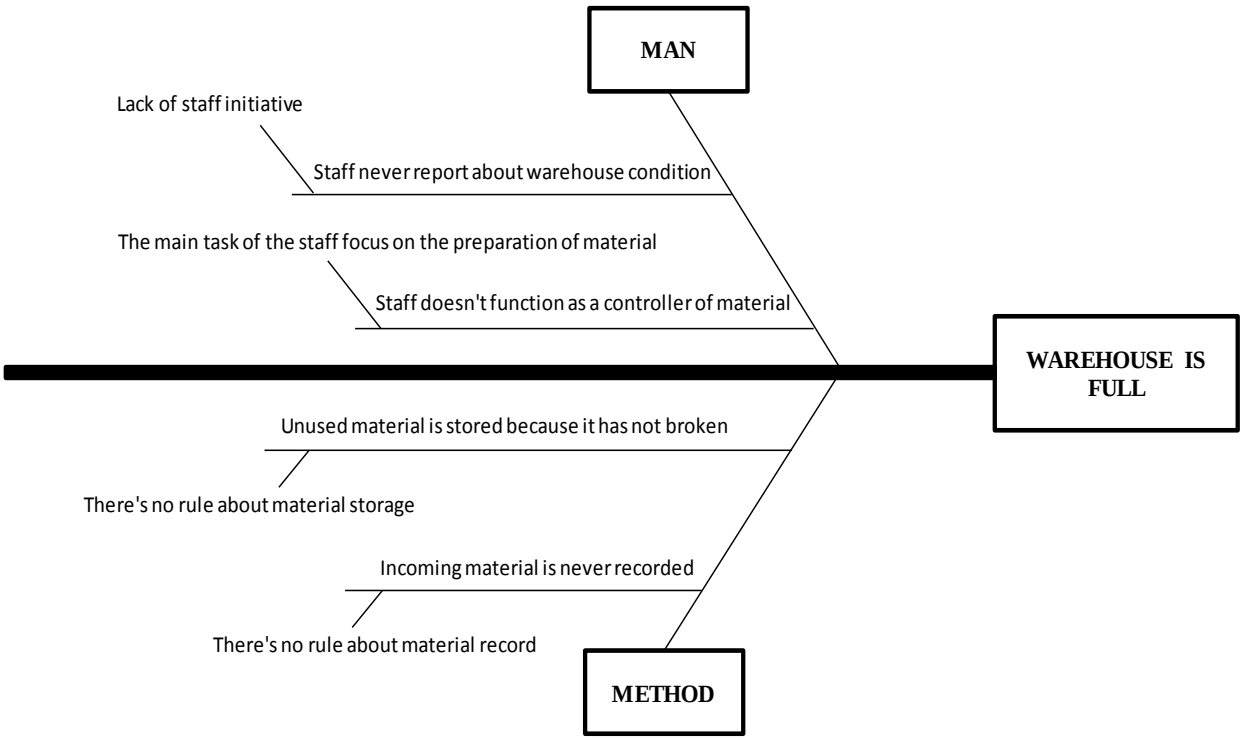

Figure 1. Fishbone Diagram – Warehouse is Full

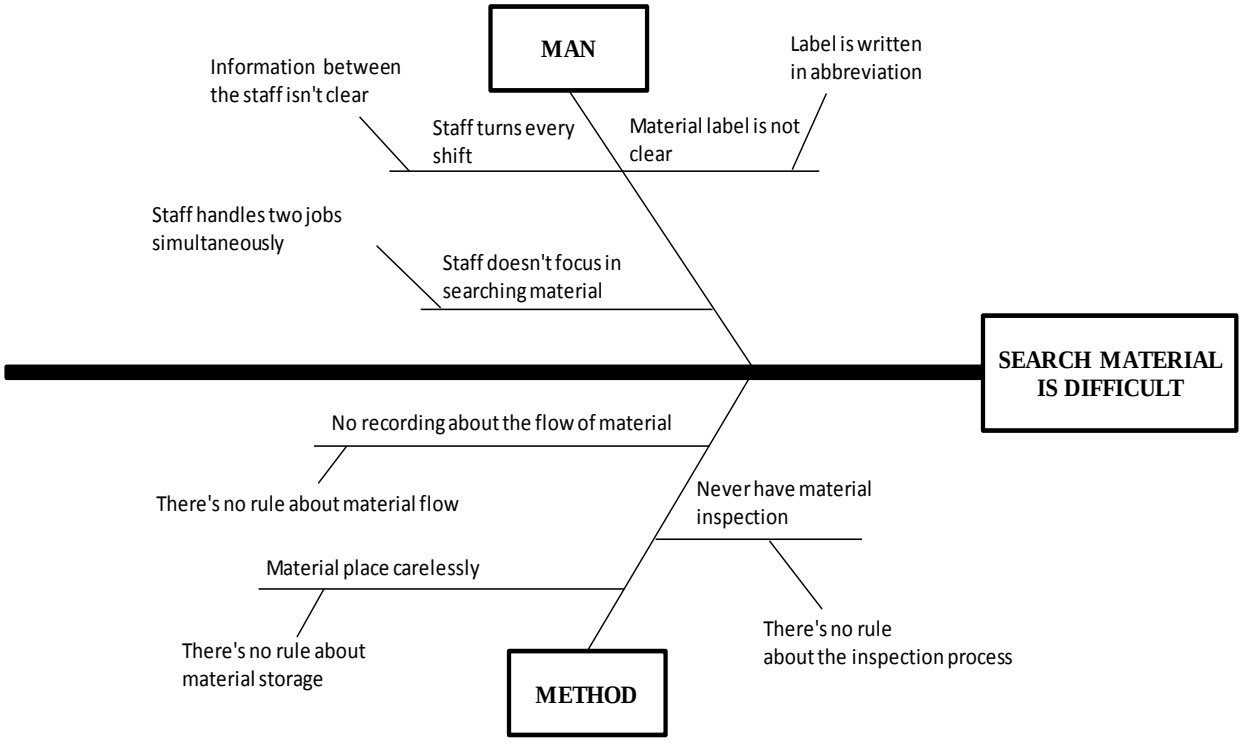

Figure 2. Fishbone Diagram – Search Material is Difficult

Table 2. Staff Job Description

POSITION	:	SUPPORTING MATERIAL WAREHOUSE STAFF
DEPARTMENT	:	PPIC
DIVISION	:	SUPPLY CHAIN
LOCATION	:	SEPANJANG

A. FUNCTION

Manage and control the availability of all required supporting material in the production process (offset-Finishing 1) to ensure a well-running production process.

B. MAIN RESPONSIBILITY

1. Regulate and control the supporting material needed for the production process.
2. Collect data on the stock material.
3. Examine the condition of all materials to determine whether they are applicable.
4. Make query letters for demolition and repair materials.
5. Confirm with the marketing department products material that has been unused for 1 year.
6. Conduct an investigation if there is a surge in demand for supporting materials and report the results to the Inventory Planner.

C. AUTHORITY & RIGHTS

1. Make a decision whether or not to accept materials based on the completeness.
2. Ask for procurement tool that support Inventory Planning and Control.
3. Charge the borrower for repayment of tools.
4. Request information regarding tool constraint fulfillment from the purchasing department.
5. Receive training from HRD as required by the PPIC process.

D. REPORT

1. Usage of tools (3 months)
2. Arrival schedule of tools (3 months)
3. Stock report of tool (3 months)
4. Deadstock report of tools (3 months)

3.2.4 Standard Operating Procedure Supporting Material Warehouse Draft

There are two SOPs made for the supporting material warehouse, namely the SOP for the reception, storage and use of materials, and the SOP for material destruction. In the SOP for reception, storage, and use of materials, the first thing to do is to ensure that the supporting material warehouse staff see the master production schedule in order to determine the sequence of production. After checking the schedule, the staff should check whether the material is available in the warehouse for supporting materials, or not. If the material is not available, or there is insufficient capacity, the warehouse staff must procure material by following the Work Instructions for the Provision of Material shown in Table 3. If the material is available, the supporting material warehouse staff should prepare the material to be used in production and wait for the production staff to take the materials. When the production staff are ready to take the materials, the warehouse staff must follow work instructions for the use and return of the materials shown in Table 4.

In the SOP of material destruction, warehouse staff must first record any material that has not been returned or used in one year. When they have finished making that list, they will submit it to the marketing department. This is done because the marketing department is more informed and aware of customer orders. From the submitted data of materials, only materials approved by the marketing department will be noted in a MOA (Minutes of Annihilation) and submitted to marketing, GM, and HR-GA for approval of extermination. If the data of material is not approved, the material will be retained and submitted again for extermination if it is not used within six months of the first filing.

Table 3. Work Instructions for the Provision of Material

NO.	ACTIVITY	PERSON IN CHARGE
1.	Warehouse staff receive/view the master schedule.	Warehouse staff
2.	Warehouse staff read material handling regulations.	Warehouse staff
3.	Warehouse staff check the material in the warehouse.	Warehouse staff
4.	If there is insufficient capacity / materials do not exist, the warehouse staff must inform the PPIC staff and make a PO for materials to R&D. **Note:** Warehouse staff will be informed directly by PPIC to make the PO request for new material if it is a new order/new repeat order.	Warehouse staff
5.	Warehouse staff request information about the estimated date of availability for the material from R&D.	Warehouse staff
6.	Warehouse staff receive material from R&D.	Warehouse staff
7.	Warehouse staff put the material on dropship in the supporting material warehouse office.	Warehouse staff
8.	Warehouse staff update the data in the material parent table.	Warehouse staff
9.	Warehouse staff prepare material for production when capacity is available on dropship. **Note:** Material on dropship should not be put on the shelf if it is being used for production shortly (± 2 days).	Warehouse staff

Table 4. Work Instructions for Expenditure and Returning Material

NO.	ACTIVITY	PERSON IN CHARGE
1.	The Head of the Production Team requests materials for production from the supporting material warehouse staff. **Note:** If the requested tool is not available, warehouse staff are required to provide an estimated date of availability of the supporting tools.	Head of the Production Team
2.	The Head of the Production Team must show a PO of production as proof of material demanded.	Warehouse staff
3.	Warehouse staff should confirm the request by showing regulations for lending material to the production team head.	Warehouse staff
4.	After the Head of the Production Team has read the material governing lending regulations, the Head of the Production Team and warehouse staff together examine the already-prepared supporting materials.	Warehouse staff & Head of the Production Team
5.	Warehouse staff ask the Head of the Production Team to sign the stock card indicating agreement that the materials were appropriated and the lending regulations read.	Warehouse staff
6.	Warehouse staff hand over the material to the Head of the Production Team.	Warehouse staff
7.	Warehouse staff record the status of the material on the material parent table.	Warehouse staff
8.	When the production schedule of a product has been completed, the warehouse staff remind the Head of the Production Team to return the material.	Warehouse staff
9.	The Head of the Production Team returns the material to the warehouse.	Head of the Production Team
10.	Warehouse staff check the completeness of the material and ask the Head of the Production Team to sign the stock card as proof of the return of materials.	Warehouse staff
11.	Warehouse staff check the condition of the returned materials, determining whether it is still good or not.	Warehouse staff
12.	Warehouse staff inform of the destruction of material that is not usable, and place it in a predetermined location.	Warehouse staff
13.	Warehouse staff check the capacity of the remaining materials.	Warehouse staff
14.	Warehouse staff propose the cull of material if the remaining capacity is insufficient for production and separate this materials to a predetermined location.	Warehouse staff
15.	If material still has capacity, the material will be put back on the shelf and the material status updated.	Warehouse staff

3.2.5 Rules and Authority Supporting Material Warehouse Draft

Rules and authority must be applied to the implementation of the process in order for material storage to become more optimal and controlled. Rules and authority are applicable to the staff, the borrower (production), as well as material handling. The rules that apply to the staff and borrower can be seen in Table 5 and Table 6, respectively. The rules that apply to the material handling are shown in Table 7.

Table 5. Rules for Staff

RULES APPLYING TO SUPPORTING MATERIAL WAREHOUSE STAFF
1. The staff is obliged to show / read the existing regulations to the borrower.
2. Staff shall see PO of borrowers before allowing them to borrow any materials.
3. Staff shall request the borrower's signature on the stock card at the time of borrowing and returning.
4. Staff shall check the completeness of a given material (especially a large folder containing dieline, approval folders, sample print, and plates).
5. The staff reserve the right to refuse the return of incomplete materials.
6. Staff are required to make a letter for lost material that should be signed by the borrower of the material.
7. Staff shall check the completeness of the material that has been returned by borrowers.
8. Staff are required to maintain the safety and security of their workplace.
9. Accidents caused by staff being in violation of the rules / SOPs are the responsibility of the staff concerned.
10. Staff shall report any damage that occurred to the tools, fittings and materials.
11. This rule applies to the staff performing his or her duty as manager of the Warehouse Material Support, and does not conflict with the primary task of the staff.
12. Any violation of the rules will be penalized.

Table 6. Rules for Borrowers

RULES APPLYING TO BORROWERS
1. A current PO must be taken and shown as a condition for borrowing.
2. Materials borrowed will be determined by the staff and the borrower. The borrower will sign the stock card when borrowing material as a sign of agreement that the appropriate material has been lent.
3. The material must be returned completely as stated on the stock card. If it is not complete, the staff will not accept it.
4. The borrower must report the condition of material if there has been any damage.
5. The borrower must be responsible for the borrowed material.
6. The borrower can hand over responsibility for the borrowed material to others who will return the material.
7. The rules above should be read first by the borrower before borrowing material.
8. Signing a stock card also signifies that the rules have been read carefully.
9. Regulations can be printed and given to the borrower if needed.
10. Any error caused by negligence and violation of rules by the borrower becomes the responsibility of the borrower.

3.2.6 Design Layout

The layout of the supporting material warehouse will be divided into two, namely the material warehouse and the support material warehouse office. The material warehouse is a repository for the storage of punching knives, big folders, and polymer boxes. The supporting material warehouse office is for other materials that are not included in the warehouse and for office staff. The layout of the supporting material warehouse office can be seen in Figure 3 and the material warehouse in Figure 4. Material in the warehouse will be placed on shelves previously occupied by knives and will be divided into sections for different material. Used shelves will

stack 3 rows high and 22 columns side-by-side. The capacity of the racks and the division is shown in Table 8.

Table 8 shows the division of the shelves and columns for the punching knives, large folders, and the polymer boxes. Punching knives will be placed on the bottom and middle rows (rows 1 & 2). This is because punching knives are the heaviest materials (± 20 kg). The height of each row on the shelf is 84 cm which is not large enough for the large folders whose height is 87 cm. The polymer boxes are only about 83 cm high and could be placed in any row.

Table 7. Materials Handling Rules

	RULES OF MATERIAL HANDLING
1.	New materials, finished disposable material, or material that is prepared for production must be put in the dropship location before being used.
2.	Materials in the dropship location must be recorded and transferred to the material warehouse up to 4 hours after being received.
3.	Labeling of material must be completed in accordance with the PO (Production Order).
4.	Removal of material should be done with caution, especially for heavy material. Staff should always pay attention to safety.
5.	Staff should use stepladders to remove the material stored at a height.
6.	Staff should arrange material according to the item code.
7.	A paper dieline will be prepared by the staff as supporting material. The paper dieline will be replaced at the next production run (staff must discard the old without requiring a MOA).
8.	Material that is still in-date, not broken and with production capacity should be stored in the material warehouse.
9.	The staff is strictly prohibited from saving material that is damaged, expired, or with too little production capacity, without good reason (marketing and R&D should confirm renewal or destruction).
10.	Head of the PPIC will inspect the supporting material warehouse every 3 months, which may be changed as needed, in order to that it remain controlled and running efficently.
11.	Any violation of the rules will be penalized.

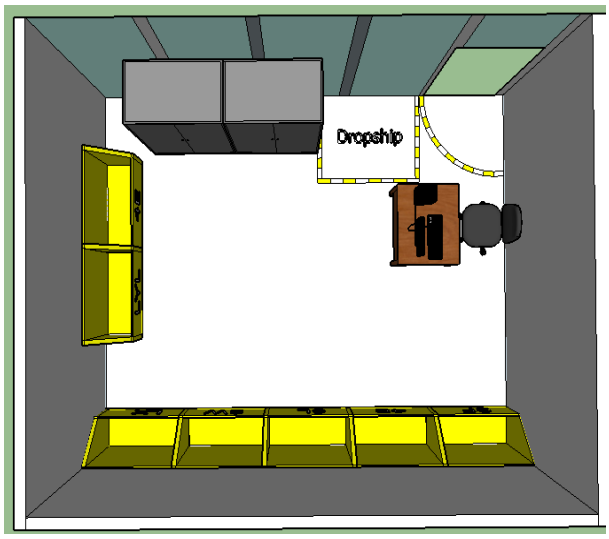

Figure 3. Supporting Material Warehouse Office (Top View)

3.2.7 Labeling and Arrangement of Materials

Labeling of the material will be by the product name and item code of each product. This is done in order to facilitate the search for material. Examples of labeling of the material:

- IN TONGJIE LUBANG - T037-0032
- IN JASMINE TEA - T037-0002
- GB NAGOYA - T039-0010

Arrangement of the materials will done using a combination of the location system method and the floating fixed location system method. This is because it gives more flexibility to determine what is suitable for the conditions and demands of the company. Shelved material will be stored alphabetically, ranging from A-V as in Table 8. Rows 1, 2, and 3 show the position on the bottom, middle and top, respectively. For instance, shelf "A" consists of rows A1, A2, and A3. A1 means the bottom row of shelf A, A2 is the middle row, and A3 is the top row. Arrangement of materials on the shelves is based on the item code in order to facilitate the search for material. The arrangement always starts from the shelf A1, then to A2, and continues to B1 (if the folder is large, then it starts from the shelves A3 to B3). After placing the material, supporting material warehouse staff will update the material parent table noting the material position in the appropriate column. The material parent table is shown in Table 9.

Although it is a combination of two methods, the system does have weaknesses. The weakness is that when new material arrives and there is no empty space in accordance with the item code, all the previously arranged material must be moved. To overcome this weakness, the new material will be placed first on the extra shelf (shelf U) until there is material checked out that creates enough vacant space to move the material, or until stock-taking (which is every three months). At stock-taking time, supporting material warehouse staff can rearrange the shelves, including matching the data in the material parent table.

Rows on the shelves to the left, which are closest to the door (shelf V), will be used for cast-off material (material that is damaged, already with insufficient capacity, or that should be destroyed). As shown in Table 8, all the top shelf rows (all row 3, except shelf U and V) are to be used for the placement of large folders. These will also be compiled and updated as for the punching knives. Rows 1 and 2 on shelves J, K, L, M, N, O will be used for polymer boxes which will also be compiled and updated like the punching knives.

3.2.8 Operational Warehouse Management System Draft

This draft was created to control the support material warehouse so that the same problem does not occur again. Using stock cards will highlight any material that is not in the warehouse. In addition, they will control the position of the material so that it is not placed carelessly on the production floor. Stock cards also provide data for checking physical stock during stock-taking. Stock card are created for each job and contain a list of the complete materials used to carry out production. A sample of a stock card can be seen in Table 10.

Not all products use supporting material. Materials which are used to make products will be checked in the status column.

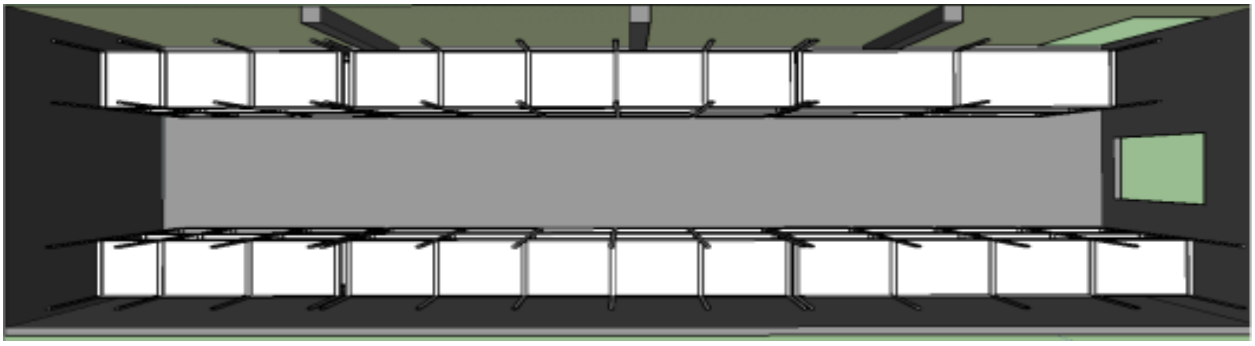

Figure 4. Material Warehouse (Top View)

Table 8. Shelf Capacity

RIGHT SHELF CAPACITY					LEFT SHELF CAPACITY				
SHELF	DIMENSION (cm)	ROW 1	2	3	SHELF	DIMENSION (cm)	ROW 1	2	3
A	110	36	36	55	M	66	13	13	33
B	113	37	37	56	N	99	19	19	49
C	112	37	37	56	O	99	19	19	49
D	110	36	36	55	P	99	33	33	49
E	99	33	33	49	Q	99	33	33	49
F	99	33	33	49	R	99	33	33	49
G	99	33	33	49	S	99	33	33	49
H	99	33	33	49	T	99	33	33	49
I	99	33	33	49	U	180	60	36	90
J	99	19	19	49	V (predetermined place)	180	60	36	90
K	99	19	19	49					
L	68	13	13	34					

TOTAL CAPACITY	
POLYMER BOXES	204
PUNCHING KNIVES	952
LARGE FOLDERS	975

PUNCHING KNIVES
POLYMER BOXES
LARGE FOLDERS
EXTRA SHELF
CAST-OFF MATERIAL

Table 9. Material Parent Table

NO	ITEM CODE	JOB NAME	TYPE OF MATERIAL	CONTENT	LIFE CYCLE	LIMIT OF USE	REMAINING CAPACITY	CONDI-TION	LAST EXIT	LOCA-TION
1	G029-0142	IN TBB 15 BKS RD4RB1RL1	LARGE FOLDER	DIELINE, SAMPLE PRINT, APPROVAL FOLDER	20-07-17			GOOD	20-08-16	OUT
2	G029-0142	IN TBB 15 BKS RD4RB1RL1	PUNCHING KNIVES			250,000	100,000	GOOD	09-08-16	A2
3	G029-0142	IN TBB 15 BKS RD4RB1RL1	PLATE			70,000	10,000	GOOD	07-07-16	LYL
4	G029-0142	IN TBB 15 BKS RD4RB1RL1	POLYMER BOX					POOR	15-07-16	V2
5	G029-0200	IN TBB 30 ERECTOR RP1	BIG FOLDER	DIELINE, SAMPLE PRINT, APPROVAL FOLDER	13-03-17			GOOD	13-04-16	F3
6	G029-0200	IN TBB 30 ERECTOR RP1	PUNCHING KNIVES			250,000	100,000	GOOD	12-05-16	B2
7	G029-0200	IN TBB 30 ERECTOR RP1	PLATE			70,000	5,000	GOOD	13-06-16	6L
8	G029-0200	IN TBB 30 ERECTOR RP1	HOTSTAMP					POOR	20-08-16	EMB3
9	M027-1681	GB INDOMIE MKGS SQN ARAB	BIG FOLDER	DIELINE, SAMPLE PRINT, APPROVAL FOLDER	20-07-17			GOOD	20-08-16	G3
10	M027-1681	GB INDOMIE MKGS SQN ARAB	PUNCHING KNIVES			250,000	50,000	GOOD	09-08-16	C2
11	M027-1681	GB INDOMIE MKGS SQN ARAB	PLATE			70,000	5,000	GOOD	07-07-16	4E
12	M124-0001	IN CHOKI-CHOKI CHOCO CASHEW 20X11G	BIG FOLDER	DIELINE, SAMPLE PRINT, APPROVAL FOLDER	15-08-17			GOOD	15-07-16	F3
13	M124-0001	IN CHOKI-CHOKI CHOCO CASHEW 20X11G	PUNCHING KNIVES			1,000,000	100,000	GOOD	13-04-16	B2
14	M124-0001	IN CHOKI-CHOKI CHOCO CASHEW 20X11G	PLATE			70,000	100,000	GOOD	12-05-16	4E
15	M124-0001	IN CHOKI-CHOKI CHOCO CASHEW 20X11G	HOTSTAMP					GOOD	13-06-16	EMB3

Table 10. Stock Card

STOCK CARD								
JOB NAME	**:**	IN BAKMI MEWAH RASA 110 GR.N3						
ITEM CODE	**:**	M027-1700						
ITEM	**STATUS**	**OUT**	**IN**	**OUT**	**IN**	**OUT**	**IN**	**OUT**
Plate	V	13-06-16 Agus	15-06-16 Agus					
Large Folder	V	13-06-16 Agus	17-06-16 Edi					
- Approval Folder								
- Sample Print	V							
- Dieline	V							
Polymer Box/ Blanket								
Cliche Emboss	V	15-06-16 Edi	17-06-16 Edi					
Cliche Hotstamp								
Punching Knives	V	15-06-16 Edi	17-06-16 Edi					

There is only one dieline and it can be used for the process from offset production until finishing 1. Where a stock card contains a name under the date, it should be filled according to the signature of the borrower. For instance, Table 10 shows a large folder borrowed by Agus (head of the offset team) and returned by Edi (head of the finishing 1 team). The large folder was passed to finishing 1 and not returned to the supporting material warehouse. This is allowed by the rule that the last person to borrow something will return it. If the production division does not return the material until the PO (Production Order) is completed, the supporting material warehouse staff are require to collect these materials from production.

Finally, the contribution of this research is seeking to emphasize and demonstrate the importance of the warehouse management system. It should aim to control warehouse activities to ensure the work is effective and efficient. It will be effective if the inventory information in the warehouse is accurate, while the ease and speed of retrieving goods in the warehouse will make for efficiency.

This research also contributes to establishing a floating fixed location system. Regarding the choice of a suitable location system, it is possible to combine both fixed and floating location systems. It might be useful to sort based on the item code and the system allocation simultaneously.

4. Conclusion

Based on analysis and discussion, there are five recommendations that can be made to overcome the existing problems. The proposals are as follows:

- Design staff job descriptions to enable the staff to focus on their work and control the material warehouse.
- Create a draft SOP to control and assess staff performance.
- Draw up draft regulations for the supporting material warehouse, to enable it to run properly without obstruction from other parties.
- Design a system to label and prepare materials in order to solve the difficulty of locating material.
- Create an operational plan for the supporting material warehouse, in order to control the warehouse and avoid undesirable outcomes such as material loss and lack of accountability.

With the material parent table to control material and stock cards for warehouse operations, it is expected that problems at the material warehouse can be resolved and not recur. There are some generalized solutions that could be used as a model for similar research:

- The company's human resource department should make a clear job description for each function in order to control and evaluate its workforce.
- Regulations and SOPs should be made for any kind of activity or resource, in order to create a standard, so that if there is a change of staff, it is not necessary to reproduce basic training.
- Tracking is important anywhere. It involves the process of determining the current and past locations, as well as other information about a unique item or property.

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