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Implementation of Inventory Management System (IMS) case study on XYZ online store business unit

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Abstract XYZ baby and child shop is a new player in the business of selling toys and baby gears. Consumers target for XYZ toy shop is segmentation of middle and upper financial ability buyers. XYZ toy store sells imported toys and baby products with high quality products, using international grade production materials and ISO production certificates: 9002. With this conceptual, establishment XYZ business line is as a provider (seller) toys and baby equipment premium brand; then the scope of the product sold must meet all expectations of market demands. Meet the expectations of market demand is not easy; because by fulfilling all expectations, then the impact is the high stock of goods that must be available. The high stock of goods will directly impact on the needs of a large storage area of goods and reduce money.
Based on the previous description, the formulation of the problem in this research is: "What inventory management strategy can be applied to improve the productivity of Lean Manufacturing business unit of XYZ online store?"

1. Introduction

XYZ baby and child shop is a new player in the business of selling toys and baby gear. Product toy shop XYZ is a product-product with segmentation of consumer buyers with the ability of middle and upper finance. XYZ toy store sells imported toys and baby products with high quality products, using international grade production materials and ISO production certificates: 9002.

The low level of brand image values encourages management to take action. The real action is to focus on the market penetration of the existence of XYZ toy store. The XYZ toy store has to be brave to grab the potential market of child toy buyers and baby supplies that are already familiar with the brand image of a competitor's business. To emphasize the existence of XYZ store then it can start with a focus on multiply the product variants sold. The number of product variants that are sold will certainly foster interest to consumers and prospective customers to buy from the XYZ store.

With this conceptual establishment XYZ business line is as a provider (seller) toys and baby equipment premium brand; then the scope of the product sold must meet all expectations of market demand. Meet the expectations of market demand is not easy; because by fulfilling all expectations, then the impact is the high stock of goods that must be available. The high stock of goods that must be available of course directly impact on the needs of a large storage area of goods.

Figure 1. Warehouse Condition

2. Theoretical Background

According to Barry Render's Operations Management book Jay Heizer. Inventory is one of the most expensive assets in many companies, reflecting as much as 40% of the total capital invested. Operations managers around the world have long realized that good inventory management is very important. On the one hand, a company can reduce costs by lowering inventory levels at hand. On the other hand, consumers will feel dissatisfied when a product out of stock. Therefore, companies must achieve a balance between inventory investment and customer service levels.

All organizations have several types of inventory planning and control systems. A bank has a method of controlling its cash reserves. Hospitals have methods used to control blood supplies and drugs. Actually every organization feels an interest in inventory planning and control.

Based on the previous description, the formulation of the problem / state of the art in this research is: "What inventory management strategy can be applied to improve productivity of Lean Manufacturing business unit of XYZ online store?"

3. Research Method

Research will be conducted research depicted in the flow chart depicted in Figure 2 as follows:

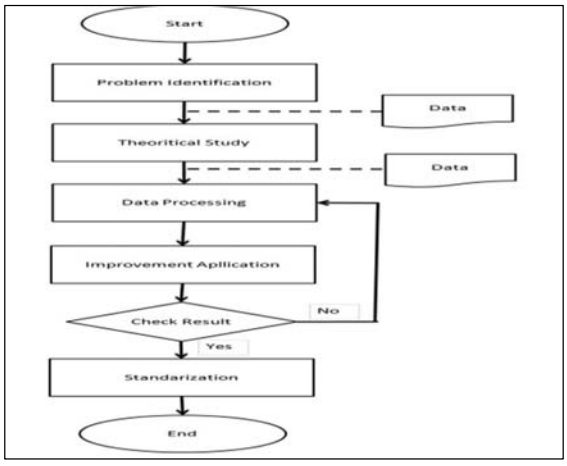

Figure 2. Research Method

4. Result and Discussion

From table 1 can be analyzed that the inventory value always experiences an increasing trend from month to month. The significant increase is in June - July where quantity increase is in 90 units of goods. The quantity of this quantity must of course be a moving asset (liquid asset) which is an

embedded capital that can be done immediately when sales are made. Increased inventory with low / long selling capabilities is highly undesirable.

Table 1. Warehouse Stock for each brand Jan – Aug 2017

	Month							
Brand	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Babyelle	24	35	33	33	28	47	36	18
Barbie	4	4	4	4	3	2	1	1
Ching ching	26	31	37	32	34	39	45	43
Crayola	1	0	6	6	4	8	6	4
Grow n Up	1	34	47	42	88	63	38	7
Haenim	15	3	6	0	0	0	0	20
JOIE	15	24	19	20	17	38	51	44
Labeille	69	92	137	115	112	67	117	105
Learning R	10	5	15	14	11	11	8	8
Lerado	0	4	3	6	3	1	2	1
Little tikes	121	159	132	163	186	196	160	130
Melissa&Dough	0	0	0	12	9	8	76	65
Pliko	48	66	57	43	36	54	62	58
The First Year	6	6	6	6	6	6	3	3
Tommie Tippee	92	115	105	103	102	128	162	154
Vtech	98	97	91	95	89	131	122	94
Grand Total	530	675	698	694	728	799	889	755

From table 2 we can see that the demand for goods from January to August. In August Little takes brand position on ranks 1 or 2 from total sales. This data is required for EOQ calculations.

Table 2. Goods sold Jan – Aug 2017

	Month							
Brand	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Babyelle	7	2	0	5	1	15	18	7
Ching ching	13	18	11	22	27	28	60	26
Crayola	1	0	0	2	2	2	2	1
Grow n Up	30	44	35	38	49	34	53	40
Haenim	12	3	6	0	0	0	34	8
JOIE	3	5	2	3	6	23	33	11
Labeille	42	62	66	71	73	50	99	67
Learning R	5	2	1	3	0	3	0	2
Lerado	27	1	0	9	2	0	9	7
Little tikes	10	27	32	58	65	76	93	52
Pliko	13	9	14	7	6	9	3	9
Tommie Tippee	13	10	2	4	10	20	8	10
Vtech	0	6	17	15	24	9	28	14
Barbie	0	0	0	1	1	1	0	1
Melissa&Dough	0	0	0	3	1	4	11	3
The First Year	0	0	0	0	0	3	0	1
Grand Total	176	189	186	241	267	277	451	259

4.1 Calculation of Booking Fees

A = Calculation of Booking Cost Per Order Year 2017 Brand Little Tikes

1. Phone Fee

Reservations are assumed for 10 minutes.
Phone charges = number of minutes per message x phone rates per minute
= 10 x Rp 600 = Rp 6.000 / order

2. Internet Charges
In addition to via phone booking via email is also done, ordering via email is assumed as much as 5000 KB.
Internet cost = number of KB once message x internet rate per KB
= 5000 x Rp 0.1 = Rp 500 / order

3. Loading and unloading costs
The loading and unloading costs of little tikes brands
Cost of loading and unloading per hour per employee = Rp 15.000 / Jam / Employee.
The loading and unloading duration is 1 hour per shipment and 3 staff of warehouse are done.
= Rp 15.000 x 1 x 3 = Rp 45.000 / booking

4. Shipping costs
Shipping fee is not available due to order until warehouse

5. The cost of correspondence
Reservations are assumed to require 2 sheets of paper
The cost of correspondence = the amount of paper once the message x the A4 sheet of paper tariff
= 2 x Rp 625 = Rp 1.250

6. Administration Fee
Administrative costs = office stationery costs (ATK)
Total number of ordering frequencies in one year = 100 orders from all brands
ATK cost = Rp 9.600.000
Warehouse staff administration fee = Rp 9,600,000 per year: 100 = Rp 96,000

7. Warehouse Manager Salary Cost
Warehouse Manager Salary Costs who place a product order are calculated one time salary x 10% x13 times salary / total order frequency
= Rp 25.000.000 x 10% x 13
= Rp32.500.000 / 100 = Rp 325,000

Table 3. Total Ordering Cost

Ordering Cost	**1 time ordering cost (Rp)**
1. Phone Cost	Rp 6.000
2. Internet Cost	Rp 500
3. Load-Unload Cost	Rp 45.000
4. Mailing Cost	Rp 1.250
5. Administration Cost	Rp 96.000
6. Warehouse Manager Fee	Rp 325.000
Total Ordering Cost	**Rp 473.750**

4.2 Calculation of storage costs
h = Storage Cost / Unit / Time Unit

1. Payroll Supervisor
Salary Supervisor and Warehouse Implementer = {(1 warehouse staff x salary / month) + warehouse head salary} x 13 times salary in one year

Payroll and Warehouse Implementer = {(1 x Rp 2.300.000) + 4,000,000} x 13
= Rp 81.900.000 per year

2. Electricity Fee
A. Lights
= Number of x wattage bulbs used (converted in kw) x number of flame clocks used daily) x electricity tariff
A. = {2 units x 20 watts (0.02 Kwh x loss RRD = 115%} x 9 Working hours x Rp 1352
= Rp 560 / day
B. = {6 units x 80 watts (0.08 Kwh) RRD loss = 115%} x 4 Working hours x Rp. 1352
= Rp 2.985 / day
The total cost of electricity for the lamp is
= Rp. 560 + Rp 2.985 = Rp 3.545 x 312 days = Rp 1.106.040 / year
B. AC
= {1 unit x 880 watts (0.88 Kwh) x loss RRD = 115%} x 9 hours work x Rp 1352
= Rp 12,314 x 312 days = Rp 3,841,968
C. Computers and Notebooks
Computer
= {1 computer unit x 100 watts (0.1 Kwh) x loss RRD = 115%} x 9 hours work x Rp 1352 = Rp 1.399 x 312 days = Rp 436. 488 / year
Notebook
= {1 unit Notebook x 50 watts (0.05Kw) x loss RRD = 115%} x 9 hours work x Rp 1352 = 700 x 312 = Rp 268,200 / year
Total cost of electricity for computers and notebooks in one year = Rp 436. 488 + Rp 268,200 = Rp 704,688 / year
Total cost of electricity is cost for lamp + charge for ac + charge for computer and notebook Rp 1,106,040 / year + Rp 3,841,968 / year + Rp 704,688 / year = Rp 5,652,696

3. Warehouse Depreciation Fee
By the straight-line method then calculate the depreciation cost of the warehouse is
= Acquisition Price: Economic Life (calculated per month, as depreciation expense is calculated per month)
= 100,000,000: (3 × 12) (number 3 = 3 years, 1 year there are 12 months So 3 x 12 = 36 months)
Acquisition cost: (3x12)
Rp 100,000,000: 36 months = Rp 2.777.777 (Depreciation value per month)
Calculate the accumulated depreciation from January 2017 to August 2017
= Depreciation per month x (number of months from January 2017 to August 2017)
= Rp 2.777.777 x 8 months = Rp 22,222,222

4. Shipping Costs Products
Assumption of car operating expenses per one day x number of cars x 26 days x 12 months
Rp 50.000 x 1 x 26 x 12 = Rp 15,600,000 / Year
Total Storage Cost
= Payroll salary + Electricity costs + Warehouse depreciation costs + Product shipping costs
= Rp 81.900.000 + Rp 5.652.696 + Rp 22.222.222 + Rp 15.600.000 = Rp 125,374,918
h = Storage cost per unit per year
H = Total storage cost per one year / Total inventory per one year

4.3 Determine the value of EOQ
EOQ method formula
EOQ = √ ((2.A.D) / h)
INFORMATION
A = COST OF BOOKING / ONE TIME MESSAGE

D = TOTAL DEMAND / ONE YEAR
h = STORAGE COST / UNIT / UNIT TIME
h = Storage cost per unit per year this cost is obtained from the formula
as follows:
h = (Total Storage Cost) / (Total Inventory)
h = (Rp 125.374.918) / 155
h = Rp 808,870

EOQ = √ ((2.A.D) / h)
EOQ = √ ((2. (Rp 473,750) (413)) / 808,870)
EOQ = √ (391,317,500 / 808,870)
EOQ = √483
EOQ = 21.99 ≈ 22 units
So the amount of little tikes brand stock that can be ordered based on economical order quantity method or Economic Order Quantity (EOQ) is 22 units per order.

4.4. Annual booking fee
These are costs incurred in connection with the ordering activities of raw materials / products.
Annual booking fee = (Request year x message cost per message) / (Number of times each message)
Booking cost per year = D / EOQ x A
Annual booking fee = 413/22 x 473,750
Annual booking fee = Rp 8.893.579

4.5. Cost of storage per year
Is the cost incurred in connection with the storage of raw materials purchased.
Storage cost per year = average inventory level x storage cost per unit per year
Storage cost per year = EOQ / 2 x h
Storage cost per year = 22/2 x 808,870
Storage cost per year = Rp 8,897,570

D. Total raw material inventory cost (Total Cost)
The optimal total raw material inventory is the summation of the total cost of the message and the total cost of storing raw materials.
C = goods price = Rp 1,000,000
TC = Total message cost + Total save cost + One year fee
TC = {(D / EOQ) x A + (EOQ / 2) x h + (CD)}
TC = Rp 8.893.579 + Rp 8.897.570 + (Rp 1.000.000 * 413)
TC = Rp 430.791.149

4.6 Safety Stock
Safety Stock = Zq
Where: Z = Standard deviation
q = squared error; where q is derived from the formula
√ ((€ (x-y) ²) / n)
Where:
x = Inventory
y = Usage
n = Number of months
Z = 5% ≈1.65
€ (x-y) ² = 90.384
n = 8 months
√ ((€ (x-y) ²) / n)
√ (90384/8)

√11.298
106 units per month
So the amount of safety stock needed to avoid running out of little tikes merchandise is 106 units per month.

4.7. Determining Order Frequency
Frequency = D / EOQ
Information
D = Total product demand from one-year consumer
Q = Quantity of one year order
Frequency = D / EOQ
Frequency = 413/22
Frequency = 18.7 ≈ 19 times / one year

4.8. Specifies the ROP value
Reorder or Reorder Point When reorder or reorder point (ROP) is the time when the company must place the order back material, so acceptance of materials ordered can be timely.
ROP formula
1. Without safety stock policy
Long production turnaround = 1 year effective corporate work / order frequency
= 312 days / year: 19
= 16.42 ≈ 16 days / every order
ROP = EOQ / (Old production turnaround) x lead time
ROP = 22/16 x 3
ROP = 4.125 ≈ 4 units
So re-ordering can be done at the time of the amount
supplies remaining 4 units
2. With safety stock policy
ROP = (EOQ / (Old production turnaround) x lead time) + Safety stock
ROP = (22/16 x 3) + 106 pcs
ROP = 110 units

4.9 Warehouse Layout Improvement
Layout arrangement is also not clearly indicated allocation placement of goods stock. The initial layout placement is based on the large items allocated in the front area and the small goods at the back of the Figure 3. The result is the placement of goods of different dimension different in one area (not tidy and inefficient).

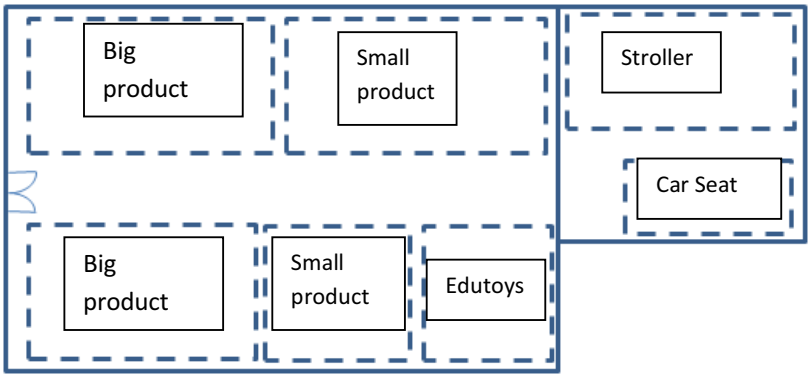

Figure 3. Warehouse Layout before improvement

Preparation of a new layout is clearly indicated allocation placement of goods stock. The layout placement is based on the type of goods. The result is the placement of items of the same or similar dimension in one area (placement is more neat and efficient). Figure 4 placement of goods with a new layout.

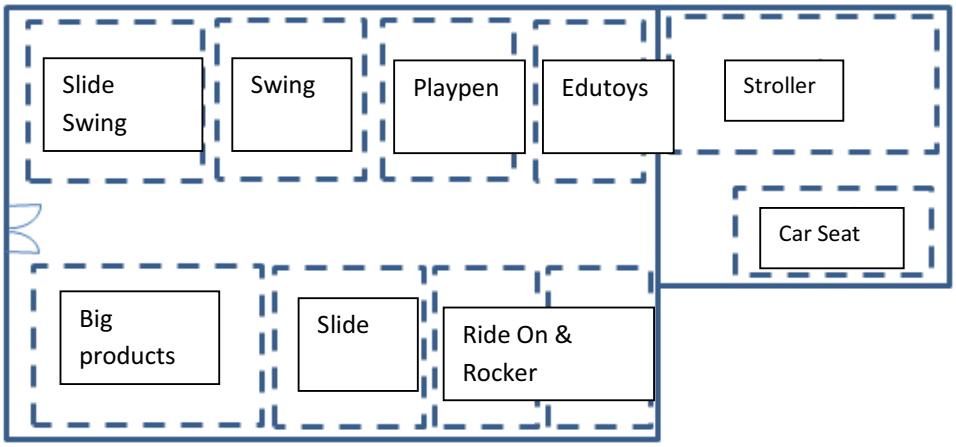

Figure 4. Warehouse Layout after improvement

Figure 5. Warehouse after improvement

5. Conclusion

The conclusions that can be drawn from this final project are:

1. From the calculation and data processing, it is found that the ROP for Little Tikes stock type is when the value of 110 units. And the order quantity is 19 times in one year.
2. Repairs Warehouse layout needs to be done and standardized and the allocation of placement in the warehouse in accordance with the type of stock items.
3. EOQ with a value of 22 units / order has answered the needs of the warehouse order, so anticipation of the warehouse can be better.

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