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## **PRESENTATION OF A SCIENTIFIC PAPER**

**ANALYSIS OF AN INVENTORY MANAGEMENT MODEL IN A  
MANUFACTURING PROCESS BASED ON MATERIAL  
REQUIREMENTS PLANNING (MRP)**

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# ***ABSTRACT***

Optimal inventory management is crucial for the efficient operation of businesses, as it accounts for over 50% of the total invested capital. Inadequate inventory management can lead to high costs and large profits. Modern inventory management models focus on quantity and time, rather than costs, aiming for smaller and more frequent purchases within the economical quantity of purchase and national transport. The material requirement planning (MRP) model is one such model, focusing on quantity and time rather than costs. This approach is essential for businesses to make informed decisions regarding inventory decisions and maintain a competitive edge in the market.

***Keywords*** – *inventory management, operation, time, costs, material requirement planning (MRP) model*

# INTRODUCTION

- ❑ Inventory management is crucial for companies to maintain a balance between high and low levels to reduce costs and meet customer needs.
- ❑ Excessive inventory can lead to high costs, while too little can cause problems and negative effects on production, trade, and distribution. In retail trade, inventory losses make up 1% of sales, while in many establishments, they amount to over 3%.
- ❑ Inventories can make up to 50% of a company's total invested capital and 70% of the cost of goods sold.

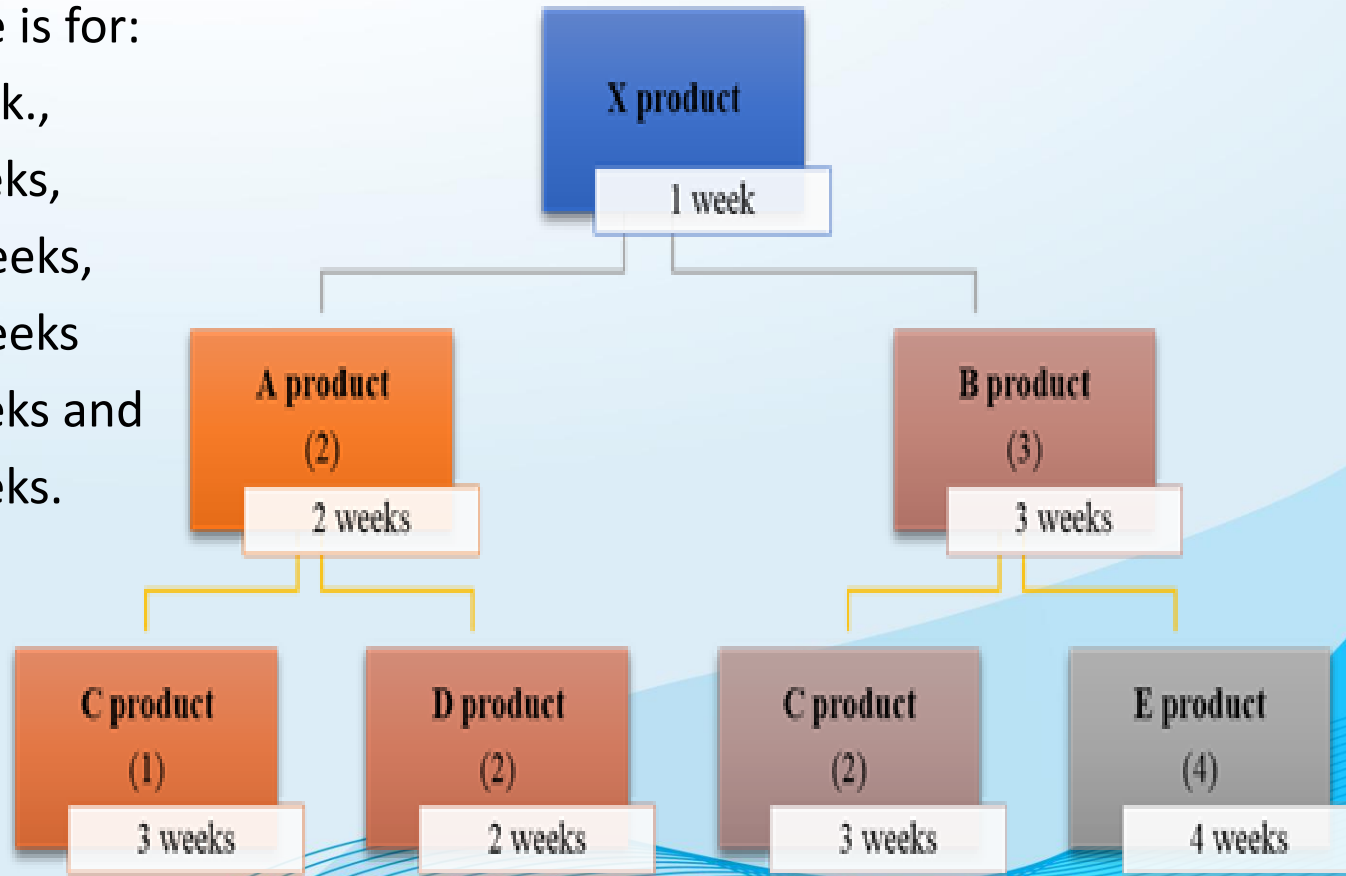
# Material requirement planning (MRP)

- ❑ The MRP system is rigid and simplistic, accounting for lead times and details that affect the master's production schedule.
- ❑ Data integrity requirements are crucial for the effective use of MRP systems, as they rely on accurate information about key inputs like demand, inventory, and production.
- ❑ Therefore, data integrity and data management are essential for the effective use of MRP systems.

# RESULTS

Attached is the product structure where product X is made of two units of product A and three units of product B, product A is made of one unit of product C and two units of product D. Product B is made from two units of product C and four units of product E.

- The production time is for:
- Product X - one week.,
- Product A - two weeks,
- Product B - three weeks,
- Product C - three weeks
- Product D - two weeks and
- Product E - four weeks.



# DISCUSSION

- Based on the developed product structure, we assume that from the master production plan, there is a need for 100 units of product X in the tenth week. Based on that, we develop a plan of total material requirements to produce 100 units of product X (table 1).

|           |                 | 1 | 2    | 3   | 4   | 5   | 6   | 7    | 8 | 9   | 10  | Production time |
|-----------|-----------------|---|------|-----|-----|-----|-----|------|---|-----|-----|-----------------|
| X product | Need Order time |   |      |     |     |     |     |      |   | 100 | 100 | 1 week          |
| A product | Need Order time |   |      |     |     |     |     | 200  |   | 200 |     | 2 weeks         |
| B product | Need Order time |   |      |     |     |     | 300 |      |   | 300 |     | 3 weeks         |
| C product | Need Order time |   |      | 600 | 200 |     | 600 | 200  |   |     |     | 3 weeks         |
| D product | Need Order time |   |      |     |     | 400 |     | 400  |   |     |     | 2 weeks         |
| E product | Need Order time |   | 1200 |     |     |     |     | 1200 |   |     |     | 4 weeks         |

# DISCUSSION

- Based on the data in Table 1, it is obvious that if the company wants to have 100 units of product X available in the tenth week, it must start its production in the ninth week.
- To begin production of product X in week nine, it needs to have 200 units of product A and 300 units of product B available. Production of these products takes 2 weeks for product A and three weeks for product B. Therefore, production of product A should begin in week seven, production of product B in week six, and so on.

|           |                 | 1    | 2 | 3   | 4   | 5   | 6    | 7   | 8 | 9   | 10  | Production time |
|-----------|-----------------|------|---|-----|-----|-----|------|-----|---|-----|-----|-----------------|
| X product | Need Order time |      |   |     |     |     |      |     |   | 100 | 100 | 1 week          |
| A product | Need Order time |      |   |     |     |     |      | 200 |   | 200 |     | 2 weeks         |
| B product | Need Order time |      |   |     |     |     | 300  |     |   | 300 |     | 3 weeks         |
| C product | Need Order time |      |   | 600 | 200 |     | 600  | 200 |   |     |     | 3 weeks         |
| D product | Need Order time |      |   |     |     | 400 |      | 400 |   |     |     | 2 weeks         |
| E product | Need Order time | 1200 |   |     |     |     | 1200 |     |   |     |     | 4 weeks         |

# CONCLUSION

- ❑ Inventory management is an important activity. Inventory planning helps determine which goods and/or services should be produced. Also, inventory planning helps determine whether the organization will produce the goods or services or whether they should be purchased from another organization. However, inventory planning also means that demand needs to be anticipated. Inadequate inventory management causes negative consequences, especially high costs and large losses in the profits of enterprises of all industrial branches.
- ❑ The material requirement planning (MRP) model belongs to the group of modern inventory management models in that they are focused on quantity and time, not on costs. The main benefits of applying MRP are:
  - 1) better response to customer requirements,
  - 2) better response to market changes,
  - 3) better use of existing facilities and human resources and
  - 4) reduction of inventory levels.
- ❑ The main drawback of the MRP model is that the emphasis is placed on materials, and the rest of the production resources, especially capacity, are neglected. By introducing the models into practice and their knowledge and application, it is possible to achieve greater productivity and profit in the work.