

INVENTORY MANAGEMENT AT THE NATIONAL CARTON INDUSTRY COMPANY (NCI)

Prepared by:

Hafez Sadder Abdelrahman Sawafta Mohamad Abdelbaset Hasan Abbas Supervised by:

Dr.Yahya Saleh

OUTLINE

- Introduction
- Problem Statement
- Methodology
- Demand Forecasting
- Inventory Control
- Warehouse Layout
- Conclusion
- Recommendations



INTRODUCTION

Overview

- Inventory refers to the array of finished goods or goods used in production held by a company.
- Inventory management is crucial to the survival of any company.
- An effective inventory management will reduce cost, speed up fulfillment, and prevent fraud.
- Moreover, it can be used to assess current assets, balance accounts, and provide financial reporting.



INTRODUCTION

The National Carton Industry Company (NCI)

- The National Carton Industry Company (NCI) was established in 1989 as a private shareholding company through the initiative of Palestinian businessmen.
- In 1993, NCI became a public shareholding company which helped it raise its capital and enabled the company to expand its business and improve the efficiency of its processes.
- The company's main headquarter is in the eastern industrial zone in Nablus.
- Despite the many economic challenges and obstacles caused by the political situation in Palestine, the company still operates with high efficiency and strives to achieve its vision: "To be the pioneers of carton industry in Palestine".

INTRODUCTION

- The company produces three main products: closed carton boxes, open carton boxes and furniture corrugation.
- The raw material used in the manufacturing of these products is paper rolls.
- There are four types of paper rolls used in NCI: Fluting, Test, White and Kraft paper rolls.



PROBLEM STATEMENT

- Problem statement gives guidelines about the project, and provides essential information about the scope of the project.
- NCI company lacked an effective inventory planning system which prevented them from proper anticipation of their customer's demand and resulted in a high inventory cost.
- Also, NCI company encountered several problems in their warehouses such as problems with the flow of material in and out of the warehouses, mixing the raw material with finished products which lead to unnecessary delays.



OBJECTIVES

- Developing a forecasting system for the raw materials (paper rolls) used in the manufacturing of open and closed carton boxes.
- Developing inventory control policies that minimizes the total inventory related costs in NCI.
- Establish an adequate safety stock level that protects the company against uncertainty in the demand and define a clear re-ordering point.
- Design an optimal layout for the raw materials warehouse that utilizes available space and smoothen the flow of materials in and out of the warehouse.

METHODOLOGY

- Data Collection:
- Most of the data was conducted from direct meeting with NCI staff.
- Several meetings were made with the different departments in the factory, like the Procurement Department, Quality Department, Sales Department, etc.



METHODOLOGY

- Data Analysis:
- A heavy study of over 30 relative references (books, papers and case studies) was conducted in order to know the required tools and methods needed to achieve this project.
- Several computer applications were used to analyze data, which include: Excel, Minitab and Visio.



DEMAND FORECASTING

Normality Test

- A normality test was conducted to the three types of products using Minitab.
- The results for the P-value were the following:
- P-value for closed carton boxes: 0.05
- P-value for open carton boxes: 0.154
- P-value for furniture rolls: 0.985
- Since the P-value for the three types of products was equal to or more than 0.05, it was concluded that the data is normally distributed.







DEMAND FORECASTING

- Then, data was analysed through Minitab using four forecasting methods:
- I. Moving Average method (with n = 3).
- 2. Single Exponential Smoothing method (with $\alpha = 0.1$)
- 3. Single Exponential Smoothing method (with $\alpha = 0.2$)
- 4. Linear Trend model.



DEMAND FORECASTING

- And we selected the forecasting method that had the lowest:
- Mean Absolute Percent Error (MAPE)
- Mean Absolute Deviation (MAD)
- Based on the results, the Moving Average method (with n=3) was selected.
- Using the Moving Average method, demand for year 2019 was forecasted for the finished products.
- By multiplying with the waste factor (1.06), the forecast converted to be in terms of raw materials (paper rolls).

- Economic Order Quantity (EoQ)
- In order to calculate EoQ, the following data was obtained from the factory:
- Holding cost per ton per year (H=\$240)
- Ordering Cost per ton (S=\$50)
- Annual Demand per ton.
- The following formula was used:

$$EOQ = \sqrt{\frac{2DS}{H}}$$



• EoQ of the four types of rolls:

Paper Roll Type	EoQ in Tons
Fluting	32
Test	24
White	18
Kraft	12

- Safety Stock and Reorder Point
- In order to calculate SS and R, the following information was founded:
- Standard deviation of the demand using Excel.
- Z that matches with a Customer Service Level (CSL) of 95%.
- Lead times.
- Average monthly demand.
- The following formulas were used:

Safety stock = $Z \sigma_{d\sqrt{L}}$ R = $\overline{d} \overline{L}$ + Safety stock



• Safety Stock and Reorder Points are presented in the following table

Paper Roll Type	Safety Stock in Tons	Reorder Point in Tons
Fluting	69	270
Test	39	151
White	21	81
Kraft	10	38

- Total Inventory Cost
- At first, the total cost of the current inventory policy was calculated.
- Then, the total cost of the optimal inventory policy was calculated.
- The total cost of the optimal policy was subtracted from the total cost of the current policy to calculate the amount of annual savings that will result from implementing the optimal policy.
- In order to calculate the total cost, the following formula was used:

$$C = \frac{Q}{2}(H) + \frac{D}{Q}(S) + (H)(Saftey \ stock)$$

After using the previous formula, the following results were obtained



\$ 144,800.9

Total Cost of the Current Policy (\$ / Year)

\$ 53, 638

Total Cost of the Optimal Policy (\$ / Year)

\$91,163 Total Amount of Annual Savings









WAREHOUSE LAYOUT

Current Layout



WAREHOUSE LAYOUT

Improved Layout



CONCLUSION

- Implementing the right inventory management system can result in a decent amount of savings per year, in this case, a total of \$91,163 per year could be saved yearly.
- The currently implemented inventory management system of issuing an order of each kind of raw materials every 3 months is far from ideal
- The current layout is time consuming and costly because of the long distance that the forklift go through to reach the production line.



RECOMMENDATIONS

- Using an inventory tracking system (e.g. Barcode scanning) which will help NCI identify and track their products and raw materials accurately.
- Periodic maintenance of the warehouses. Which will reduce losses due to issues as water leaking from the roof of the warehouses, nails and rocks found on the floor of the warehouse.
- An inventory management software can help the factory in controlling and optimizing the inventory.
- Changing the layout of their warehouse as well as their inventory control system.

000	

THANK YOU!

