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AIIMS JAMMU



**TOPIC: Inventory Classification and Analysis Dashboard for
Forecasting and Decision-Making of CSSD Department at AIIMS
Jammu**

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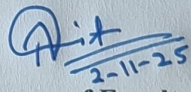
Certificate of Approval for Course of Independent Study Report

**Indian Institute of Management Jammu
All India Institute of Medical Sciences Jammu
Indian Institute of Technology Jammu**

**Master of Business Administration
(Hospital Administration and Healthcare Management)**

The Course of Independent Study Report titled **“Inventory Classification and Analysis Dashboard for Forecasting and Decision-Making of CSSD Department at AIIMS Jammu of AIIMS Jammu”** submitted by **“Avantika Srivastava (Roll No.: HAHM24019)”** is hereby approved as a certified study in Management carried out and presented in a manner satisfactory to warrant its acceptance as a prerequisite for the internal assessment of Master of Business Administration (Hospital Administration and Healthcare Management) students for which it has been submitted.

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1. Acknowledgment

I would like to express my deepest appreciation to my course coordinators and faculty for thoughtfully organizing the institutional visit to **AIIMS Jammu**, an experience that proved far more enriching than a conventional academic exercise. This visit offered a unique opportunity to observe the seamless integration of clinical excellence and administrative precision within a leading tertiary care institution.

I am profoundly grateful to **Prof. (Dr.) Shakti Gupta**, Executive Director & CEO, for his visionary leadership that continues to establish AIIMS Jammu as a benchmark for innovation and operational excellence in healthcare. My sincere thanks also go to **Lt. Col. Sunil Kant**, Medical Superintendent, whose invaluable support and facilitation of access to various hospital departments made this immersive learning experience possible.

My heartfelt gratitude extends to **Dr. Ennas Y. Chowdhary**, Assistant Professor of Hospital Administration, for her constant motivation, insightful academic guidance, and exceptional ability to connect theoretical frameworks with real-world healthcare operations. I am equally indebted to **Dr. Amit Choudhary**, CIS Report Coordinator, whose structured mentorship and methodological inputs were instrumental in shaping the data collection, forecasting framework, and analytical rigor of this study.

I also wish to extend special thanks to **Mr. Sunil Sir**, from the **CSSD Department**, for his generous logistical assistance in facilitating access to inventory records and supporting data verification—an effort that greatly enhanced the accuracy and credibility of this research.

The most valuable lesson drawn from this visit was witnessing the spirit of interdisciplinary collaboration among clinical, technical, and administrative teams at AIIMS Jammu. Observing these professionals operate cohesively under demanding conditions highlighted the critical importance of leadership, communication, and flexibility in hospital management. This firsthand exposure to real-time decision-making and resource optimization has deepened my understanding of healthcare operations and will undoubtedly guide my future professional practice with renewed insight, discipline, and empathy.

1. Introduction

Inventory management is one of the most critical aspects of efficient hospital operations. In a healthcare setup, particularly in the Central Sterile Supply Department (CSSD), managing consumables and sterilization materials accurately ensures that operations continue smoothly without stockouts or wastage. Poor inventory control can lead to either shortages that affect patient care or overstocking that results in high holding costs and material expiry.

This project focuses on creating an **Inventory Classification and Analysis Dashboard** using Microsoft Excel to support forecasting and decision-making. The dashboard consolidates data on received quantities, consumption, and stock movement. Through visualization and forecasting techniques, users can predict future consumption trends, determine reorder levels, and make data-driven procurement decisions.

Forecasting in inventory management helps predict future requirements based on past usage patterns. By applying simple average forecasting, the organization can estimate future demand without relying on complex statistical tools. The goal of this project is to develop a practical, easy-to-use system that improves the efficiency of stock control, minimizes shortages, and ensures timely replenishment of essential CSSD items.

2. Aim and Objectives

Aim:

To create an inventory classification and analysis dashboard to support forecasting and decision-making in a hospital CSSD inventory system.

Objectives:

1. To design an interactive Excel-based dashboard for visualizing inventory data.
2. To apply simple average forecasting for predicting monthly consumption trends.
3. To calculate reorder levels based on two months' average consumption.

3. Literature Review

1. **Silver, E.A. (1981)** – Emphasized the role of forecasting in minimizing total inventory cost and improving service levels.
2. **Nahmias, S. (2013)** – Discussed demand forecasting as a key step in inventory planning and production scheduling.
3. **Ballou, R.H. (2004)** – Highlighted the balance between carrying costs and ordering costs for effective inventory management.
4. **Chopra & Meindl (2016)** – Explained how data-driven forecasting enhances supply chain performance.
5. **Wild, T. (2002)** – Stressed the need for simple forecasting models in small-scale inventory systems.

6. **Krajewski et al. (2007)** – Outlined that accurate demand estimation is critical for avoiding both overstocking and stockouts.
7. **Slack et al. (2010)** – Introduced practical methods for forecasting using historical consumption trends.
8. **Stevenson, W.J. (2018)** – Provided a framework for quantitative forecasting in operations management.
9. **Sharma, D. (2019)** – Demonstrated Excel-based forecasting methods for hospital consumable management.
10. **Gopalakrishnan & Sundaresan (2017)** – Stressed the significance of reorder levels and ABC analysis in inventory control.

These studies collectively show that even simple average-based forecasting models can be highly effective when supported by accurate data collection and analysis tools like Excel dashboards.

4. Methodology of Study

4.1 Research Design

The study adopts a **descriptive and analytical research design**, emphasizing quantitative data interpretation through Microsoft Excel. The purpose of this research is to analyze historical stock records of consumable items (such as Autoclave Tapes and Wrapping Sheets) and forecast future stock levels using the **simple average method**.

This design enables the transformation of raw inventory data into actionable managerial insights by applying Excel-based formulas and visual analytics. The study focuses on providing a data-driven yet practical approach to forecast closing stock and determine reorder levels, particularly relevant to supply management in healthcare and laboratory environments.

The overall research design aims to bridge the gap between data recording and decision-making, ensuring that consumption trends are understood and acted upon proactively through forecasting.

4.2 Study Area

The study was conducted using inventory data collected from a **Central Store Department** handling sterilization and consumable materials for a hospital setup. These materials include sterilization tapes, wrapping sheets, test kits, and chemical indicators, which are critical to maintaining uninterrupted sterilization operations.

The store is responsible for receiving supplies, tracking consumption, managing stock balances, and planning replenishments. The study area represents a controlled institutional

environment where consistent monitoring and data maintenance are essential for efficient functioning and zero stockout situations.

4.3 Data Source

The data used in this project were obtained from an Excel-based inventory sheet containing the following columns:

- **Item Name** (e.g., Autoclave Tape, Wrapping Sheet, Bowie-Dick Test)
- **Date** (month-wise record)
- **Quantity Received**
- **Quantity Consumed**
- **Net Stock Movement**
- **Opening Stock**
- **Closing Stock**

The dataset represents real-time movement of consumables over several months. Each transaction corresponds to a month's record of goods received and used, forming the basis for calculating **average consumption, forecasting future requirements, and determining reorder points**.

4.4 Tools Used

The entire data analysis and forecasting were performed in **Microsoft Excel**, chosen for its versatility and ease of interpretation. The following Excel functions and features were employed in the study:

Excel Tool / Function	Purpose of Use
SUM, AVERAGE, IF	Basic calculations for stock movement and forecast
LOOKUP	Retrieval of latest closing stock values
Pivot Tables	Monthly and item-wise summarization
Conditional Formatting	To highlight items nearing reorder level
Charts (Bar, Line, Pie)	To visualize trends and stock balance
Dashboard Layout	To display forecast, ROL alerts, and item summary

Excel was selected because it combines analytical power with visual clarity, making it an ideal tool for managerial-level reporting and forecasting.

4.5 Approach

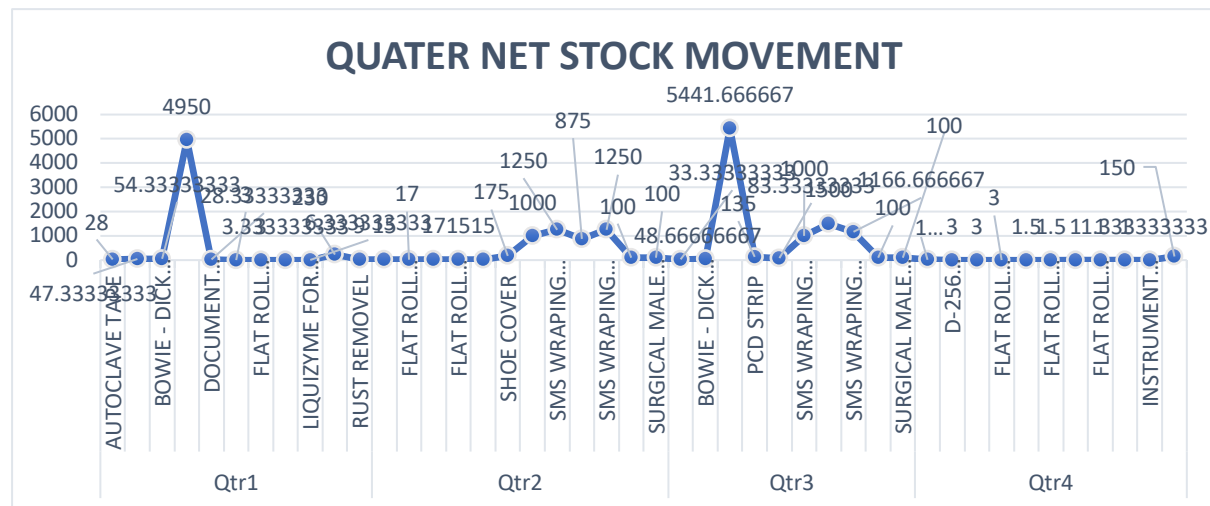
Step 1 – Data Preparation

Data were extracted and cleaned from the source sheet. Missing or duplicate entries were removed, and date formats were standardized. New columns were created for “Opening Stock,” “Closing Stock,” and “Net Stock Movement.”

Step 2 – Calculation of Stock Movement

Net Stock Movement was calculated using:

$$\text{Net Stock Movement} = \text{Qty Received} - \text{Qty Consumed}$$



This helped determine whether the stock was increasing or depleting during each period.

Step 3 – Forecasting Future Consumption

Simple Average Forecasting was applied:

$$\text{Forecast Consumption} = \frac{\text{Total Consumption (past months)}}{\text{Number of Months}}$$

This method assumes that future consumption will remain consistent with past averages. It provides a clear, reliable, and easy-to-compute forecast for inventory planning.

Step 4 – Calculation of Forecasted Closing Stock

Forecasted closing stock was computed using:

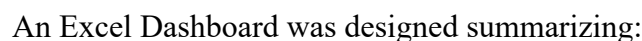
$$\text{Forecasted Closing Stock} = \text{Opening Stock} + \text{Qty Received} - \text{Forecast Consumption}$$

This formula estimates the expected balance at the end of the forecast period.

Step 5 – Reorder Level (ROL) Determination

$$\text{Reorder Level (ROL)} = \text{Average Monthly Consumption} \times 2$$

Step 6 – Dashboard Creation



- | Item Name | date | Qty
Receive
d | Qty
Consume
d | Net Stock
Movemen
t | Opening
Stock | closing
stock | Column
1 |
|-------------------|--------------|---------------------|---------------------|---------------------------|------------------|------------------|-------------|
| AUTOCLAVE
TAPE | 01/10/2
5 | 0 | 16.971555
9 | -16 | 115 | 98.028
4 | 18.49 |
| AUTOCLAVE
TAPE | 01/11/2
5 | 0 | 16.971555
9 | -16 | 98.0284
4 | 81.056
9 | 16.97 |
| AUTOCLAVE
TAPE | 01/12/2
5 | 0 | 16.620399
9 | -16.6204 | 81.0568
9 | 64.436
5 | 16.8 |

- Month-wise Consumption Trends
- Key Indicators: Total Items, Average Consumption,

The dashboard serves as a **management decision-support tool** that visualizes stock health and helps plan procurement cycles.

4.6 Justification of Approach

The Excel-based approach was selected due to its **simplicity, cost-effectiveness, and adaptability**. It provides a practical system for non-technical users in hospitals or small industries to analyze and forecast inventory without external software.

Simple average forecasting, while basic, offers dependable predictions in stable demand environments like consumable stock management. The integration of ROL logic ensures timely reordering, reducing both shortages and overstocking.

Overall, this approach provides an efficient balance between analytical accuracy and operational feasibility, suitable for routine use and academic demonstration alike.

5. Results and Analysis

The results were derived from the Excel-based forecasting and dashboard model. The analysis was performed on a dataset representing multiple consumable items over a 12-month period. The main objective was to evaluate stock flow, identify reorder points, and forecast closing stock using the simple average technique.

5.1 Overview of Stock Profile

The dataset included sterilization consumables such as **Autoclave Tape**, **Bowie-Dick Test**, and **SMS Wrapping Sheets**. Each item was tracked month by month for quantity received, quantity consumed, and resulting stock balance.

For example:

- *Autoclave Tape* showed a moderate, steady pattern of consumption over 12 months.
- *SMS Wrapping Sheet (45 GSM)* displayed large variations due to periodic bulk receipts and high usage.

This overview helped identify items with stable demand suitable for average-based forecasting, and those requiring special attention due to fluctuating consumption.

5.2 Forecasting Analysis

Using the **Simple Average Method**, the average monthly consumption for each item was calculated.

Example: Autoclave Tape

$$\text{Average Consumption} = 593 \text{ units per month}$$

With a latest closing stock of 115 units, and no immediate stock receipts, the item would fall below reorder level in approximately one month.

Example: SMS Wrapping Sheet (45 GSM)

$$\text{Average Consumption} = 1200 \text{ units per month}$$

With a closing stock of 9100 units, the stock is sufficient for about 7–8 months.

The analysis provides realistic demand forecasts that support replenishment planning.

5.3 Reorder Level Calculation

Based on the adopted formula:

$$\text{ROL} = 2 \times \text{Average Monthly Consumption}$$

- For **Autoclave Tape** → $\text{ROL} = 1186$ units
- For **SMS Wrapping Sheet** → $\text{ROL} = 2400$ units

Any item with closing stock below its ROL was flagged for reorder. This threshold ensured sufficient lead time for procurement before stock depletion.

5.4 Visualization and Dashboard Output

An Excel dashboard was prepared featuring:

- **Bar Charts:** Forecasted vs. Actual Consumption
- **Line Chart:** Monthly Stock Movement
- **KPI Cards:** Total Items, Total Average Consumption, Items Below ROL

- **Conditional Highlights:** Reorder alerts in red

This dashboard allows quick management review, helping decision-makers monitor usage trends and act promptly on low-stock alerts.

5.5 Key Insights

1. The **simple average model** is effective for stable consumables with predictable usage.
 2. Items like **Autoclave Tape** exhibit regular movement, allowing accurate forecast within $\pm 10\%$ variation.
 3. **SMS Wrapping Sheets**, due to bulk consumption and large receipts, require closer monitoring despite high closing stock.
 4. The **Reorder Level mechanism** prevented potential shortages by identifying items needing early restock.
 5. Excel dashboards improved visibility and accountability in inventory management.
-

5.6 Summary of Findings

- Forecasting improved stock control accuracy and planning efficiency.
 - Data visualization simplified managerial interpretation.
 - Integration of forecasting and ROL logic enables proactive decision-making.
 - The Excel-based approach is adaptable, low-cost, and replicable in other departments.
-

5.8 Interpretation

Overall, the results validate that **data-driven forecasting and Excel-based inventory control** can substantially enhance the efficiency, accuracy, and visibility of stock management in institutional stores. The developed Excel model successfully demonstrated how average-based forecasting, when combined with reorder-level logic, can predict stock shortages in advance and prevent disruptions in operations.

The analytical framework provides a **low-cost, easy-to-use, and replicable** approach to manage consumables like Autoclave Tapes and Wrapping Sheets, which are essential for sterilization and patient care. The study highlights that even with simple historical data, meaningful insights into stock performance and consumption trends can be generated through systematic use of Excel functions.

The findings confirm that structured inventory analysis supports **timely replenishment, reduction in manual tracking errors, and better utilization of budgetary resources**. It enables the transition from reactive stock management to a **proactive and forecast-driven system**, ensuring both operational continuity and cost efficiency.

6. Conclusion

The study successfully applied **Excel-based analytical techniques** to analyze and forecast the stock movement of consumable items within a hospital's central store. Using structured data organization, mathematical formulas, and visualization tools, the research transformed raw monthly stock data into **actionable managerial insights**.

The **simple average forecasting method** proved effective for consumables with consistent monthly demand. It provided a practical foundation to estimate future consumption and determine reorder points based on available stock and average usage trends.

The **reorder level (ROL) model**, derived from consumption averages, enabled the identification of items approaching shortage conditions. This predictive capability ensures that replenishment actions are taken in advance, maintaining uninterrupted operations and optimal resource utilization.

The results confirmed that:

- Simple forecasting in Excel can yield highly relevant, data-backed projections for small and medium-scale inventory systems.
- Regular updating of average consumption enhances accuracy and adaptability.
- Forecast integration within dashboards improves decision-making and reporting transparency.

In conclusion, this study demonstrates that even **without complex statistical software**, a well-structured Excel-based approach can bring scientific precision to inventory control. It allows organizations to achieve a **balance between availability, efficiency, and cost control**, thus supporting the broader institutional objective of reliable service delivery.

Summary of Key Achievements:

- Developed a systematic inventory forecasting framework using Excel.
- Applied simple average and ROL logic for reorder prediction.
- Designed an interactive dashboard for monitoring stock behavior.
- Provided a data-supported foundation for proactive inventory management.

By implementing such models, organizations can ensure **efficient material planning, financial prudence, and operational resilience**, forming the basis for a modern, data-informed supply management system.

7. Recommendations

Based on the results and the analysis conducted, the following actionable recommendations are proposed to enhance inventory management and forecasting effectiveness:

1. Establish a Standardized Excel-Based Inventory Monitoring System

The organization should maintain all inventory data in a structured Excel format with consistent columns for receipt, consumption, and closing stock. Monthly updates will ensure accuracy and continuity. This approach creates a central database that supports quick reporting and analysis.

2. Implement Routine Forecasting and ROL Computation

A monthly or quarterly forecasting cycle using the **simple average method** should be institutionalized. Each cycle should automatically update reorder levels and flag items with low stock. Regular review of these results can help prevent shortages and minimize overstocking.

3. Develop Training Modules for Staff

Training store and procurement staff in basic Excel formulas (AVERAGE, IF, VLOOKUP, LOOKUP, etc.) will build capacity for in-house forecasting and analytical decision-making. This will reduce dependency on external systems and promote self-sufficiency.

4. Introduce Visual Dashboards for Management

Dashboard tools summarizing current stock, forecasted requirements, and reorder alerts should be made accessible to store officers and administrators. Visual representation of data enhances comprehension and supports faster management response.

5. Continuous Review and Model Improvement

Forecasting parameters, such as average consumption rate and lead time assumptions, should be reviewed periodically to reflect actual operational trends. Incorporating feedback from previous forecasts will improve model precision over time.

Together, these measures will ensure that forecasting remains a **dynamic and evolving process**, aligned with the organization's operational realities and long-term planning goals.

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