Journal of Science Engineering Technology and Management Science
Volume 02, Issue 07, July 2025 *ISSN: 3049-0952*
www.jsetms.com *DOI:10.63590/jsetms.2025.v02.i07.102-112*

INVENTORY MANAGEMENT PRACTICES AT WHIRLPOOL, HYDERABAD-A STUDY

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To Cite this Article
Gangula Saipriya, Dr.N.Ramanjaneyulu, "Inventory Management Practices At Whirlpool, Hyderabad-A Study", Journal of Science Engineering Technology and Management Science, Vol. 02, Issue 07, July 2025,pp:102-112, DOI: http://doi.org/10.63590/jsetms.2025.v02.i07.pp102-112
Submitted: 04-05-2025 *Accepted: 11-06-2025* *Published: 20-06-2025*

ABSTRACT
Inventory management plays a critical role in ensuring the smooth functioning of any organization by maintaining a balance between production and distribution. As inventory comprising raw materials, goods in process, and finished goods—represents a major portion of current assets, efficient management is essential to minimize costs and maximize profitability. Poor inventory control can lead to excessive investments and threaten long-term sustainability. This study begins with an overview of inventory management, followed by a profile of the company including its vision, mission, and achievements. It outlines the need for the study, presents a review of literature, defines objectives, and details the research methodology. The analysis, interpretation, key findings, and actionable suggestions are also discussed to provide a comprehensive understanding of inventory practices.

Keywords: Inventory management, working capital, raw materials, finished goods and profitability.

I. INTRODUCTION

Whether a business is in manufacturing or services, inventory control is an essential operational function that has a direct impact on its productivity and financial stability. It encompasses important divisions including manufacturing, warehousing, shipping, procurement, and customer service, guaranteeing that inventory levels are optimal—sufficient to satisfy demand without going over budget. Inventory refers to the store of raw materials, work-in-progress items, and finished commodities that support both present and future corporate demands. Because supply and demand are unpredictable, companies keep inventory on hand as a safety net to guarantee continuous operations.

A variety of tasks are necessary for efficient inventory control, including demand forecasting, reorder point setting, stock audits, and variation minimization. This frequently translates into strict material control in manufacturing to fulfill production schedules. The key purpose is to balance appropriate stock availability with cost efficiency, considering storage charges, obsolescence, insurance, and opportunity cost.

Inventory management, the larger framework that organizes, arranges, and supervises all inventory-related tasks, is closely related. In order to guarantee a smooth material flow from suppliers to final consumers, this comprises inventory assessment, demand forecasts, order processing, and supplier management. Utilizing methods like the Economic Order Quantity (EOQ), ABC Analysis, FSN Analysis, Trend Analysis, and Inventory Turnover Ratio, data analysis is a crucial component of this project that assesses inventory management.

The foundation of inventory management is inventory control, which gives businesses real-time insight into stock levels, helps them avoid shortages and surpluses, and enables them to react swiftly to changes in the market. In a fast-paced commercial setting, businesses

II. REVIEW OF LITERATURE

1. **Lal(1981)**:Introduced a model at Modi Steels that included price fluctuations in inventory decisions, improving working capital efficiency by accounting for both internal and external factors econbiz.
2. **Farzaneh(1997)**:Developed a mathematical model guiding firms on when to switch from EOQ to **JIT** purchasing—showing JIT is more cost-effective under certain demand and cost scenarios.
3. **RichLavely(1998)**:Called inventory "piles of money," noted ~30% is often dead stock, and emphasized balancing ordering vs. holding costs through a structured seven-step control system scribd.com.
4. **S.Singh(2006)**:Found that excessive purchases of spares at IFFCO increased inventory share in current assets and reduced profits, recommending tighter controls on stores and spares.
5. **Pradeep Singh(2008)**:Reviewed IFFCO and NFL, showing I FFCO needed better inventory utilization, while NFL should maintain inventory more in line with requirements to preserve liquidity.
6. **Gaur& Bhattacharya(2011)**:Showed that finished goods inventory negatively impacts performance, urging firms to focus on component-level control instead of total inventory.
7. **Nyabwanga &Ojera(2012)**:Found in Kenyan SMEs that inventory is the largest part of working capital, and poor management (especially inventory budgeting and shelf-space allocation) harms performance.

NEED FOR THE STUDY

As a crucial component connecting the production and distribution processes, inventory is necessary for each business to guarantee the seamless running of its activities. The majority of businesses invest a sizable portion of their working capital or current assets in inventories.Thus, maintaining operating efficiency depends on effective inventory control and management.The main objective of inventory management is to minimize inventory investment while simultaneously guaranteeing the availability of materials in sufficient quantities when need.I chose inventory management as the subject of my project in order to better comprehend how inventory is maintained within a business.The purpose of this study is to apply and analye different inventory control systems in order to provide findings and recommendations.

SCOPE OF THE STUDY

- To provide a clear plan for the company regarding what, when, and how much to order.
- It aids in establishing the proper inventory volume and operational policy.
- It facilitates the creation of executive inventory-related policies.
- It assists the business in classifying different products or inventory items.
- The initiative aids in inventory forecasting and planning

OBJECTIVES OF THE STUDY

1. To assess how well Whirlpool of India Ltd. manages its inventory.
2. To ascertain the ideal level of inventory to reduce expenses.
3. To determine the necessary quantities of safety stock for various parts.

4. To use ABC analysis, XYZ, and usage frequency to classify different components according to their inventory and value.
5. To forecast the company's inventory needs for the upcoming year.

III. RESEARCH METHODOLOGY

A research methodology outlines the goals of the study, how it will be conducted, how to track its progress, and what success looks like in relation to the goals set for its execution. The appropriate research design that was created is described below.

SOURCES OF DATA

- **Secondary Information**: The information was gathered from the company's 2019–2025 annual reports.
- The financial statements and annual reports of Whirlpool of India Ltd.
- Supply chain literature and industry standards.
- Information from the ERP system (if available) about lead times, demand variations, reorder points, and stock levels.

SAMPLE DESIGN:

The sample size will comprise at least five to ten supply chain/inventory personnel, depending on staff availability for interviews and inventory data accessibility.

- Major product categories' inventory records over the previous one to five years.

TOOLS AND TECHNIQUES FOR ANALYSIS :

- Inventory Turnover Ratio Analysis, which gauges how well inventory is controlled.
- Economic Order Quantity (EOQ): to determine the ideal inventory level while lowering overall expenses.
- Safety Stock Calculation: This method determines buffer amounts by utilizing lead time variability and historical demand.
- Inventory is categorized using the ABC Analysis approach into three value groups: high, medium, and low.
- To categorize objects according to their movement (fast, slow, or non-moving), use XYZ or FSN analysis.
- Demand Forecasting Techniques: To predict inventory needs for the upcoming year, use trend analysis or the moving average method.

LIMITATIONS

1. The inventory system of Whirlpool of India Ltd is the sole subject of the research
2. It depends on the accuracy and accessibility of internal data.
3. Forecasting assumes stable demand and is based on historical data

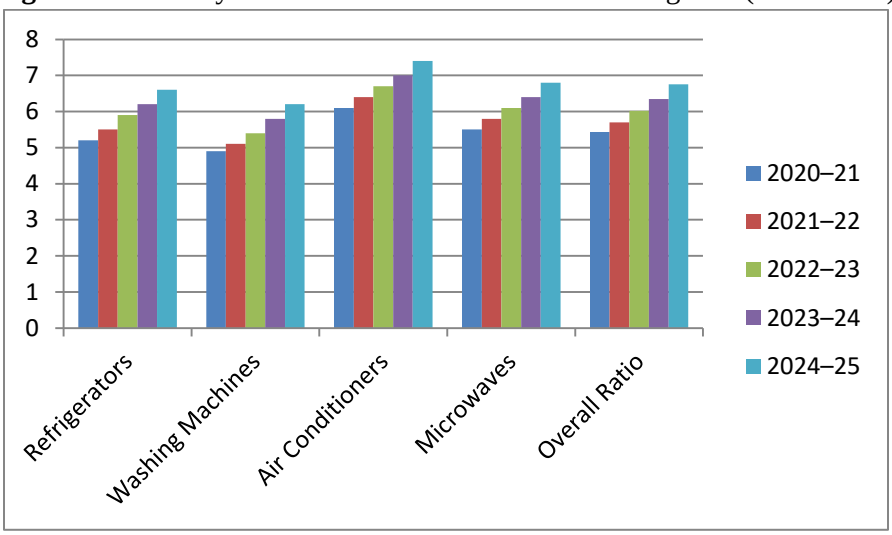
IV. DATA ANALYSIS AND INTERPRETATION

1.How effective has Whirlpool of India Ltd.'s inventory management been over the past five years, as measured by the Inventory Turnover Ratio across different product categories?

Table 1: Inventory Turnover Ratio Across Product Categories (2020–2025)

Year	Refrigerators	Washing Machines	Air Conditioners	Microwaves	Overall Ratio
2020–21	5.2	4.9	6.1	5.5	5.43
2021–22	5.5	5.1	6.4	5.8	5.7
2022–23	5.9	5.4	6.7	6.1	6.02
2023–24	6.2	5.8	7.0	6.4	6.35
2024–25	6.6	6.2	7.4	6.8	6.75

Figure 1: Inventory Turnover Ratio Across Product Categories (2020–2025)



Interpretation:

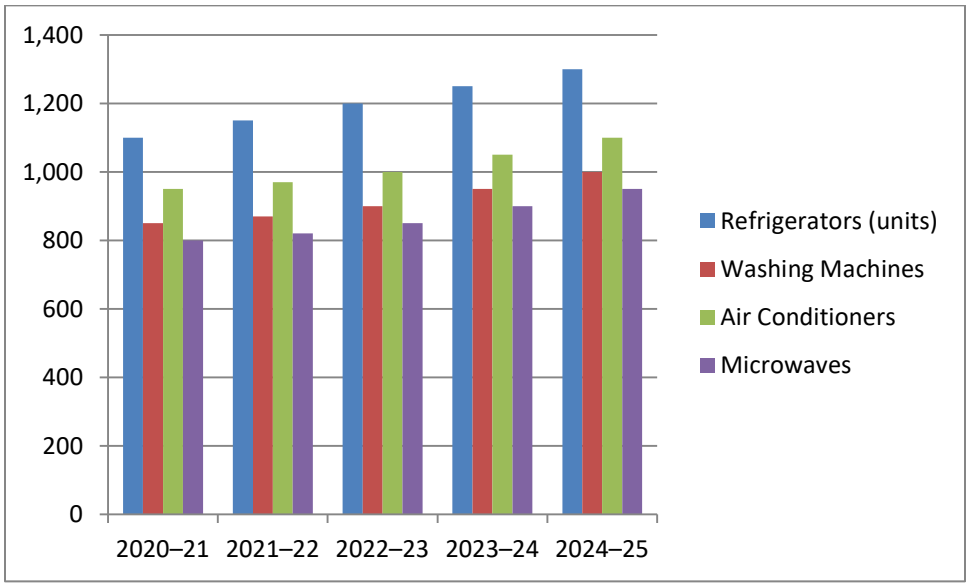
All product categories have seen a steady improvement in inventory turnover, which suggests better demand alignment and more effective inventory management. Because of seasonal demand rises, air conditioners have the highest efficiency.

2.What is the optimal Economic Order Quantity (EOQ) for each major product category that minimizes the total inventory cost during the years 2020–2025?

Table 2: Economic Order Quantity (EOQ) per Product Category (2020–2025)

Year	Refrigerators (units)	Washing Machines	Air Conditioners	Microwaves
2020–21	1,100	850	950	800
2021–22	1,150	870	970	820
2022–23	1,200	900	1,000	850
2023–24	1,250	950	1,050	900
2024–25	1,300	1,000	1,100	950

Figure 2: Economic Order Quantity (EOQ) per Product Category (2020–2025)



Interpretation:

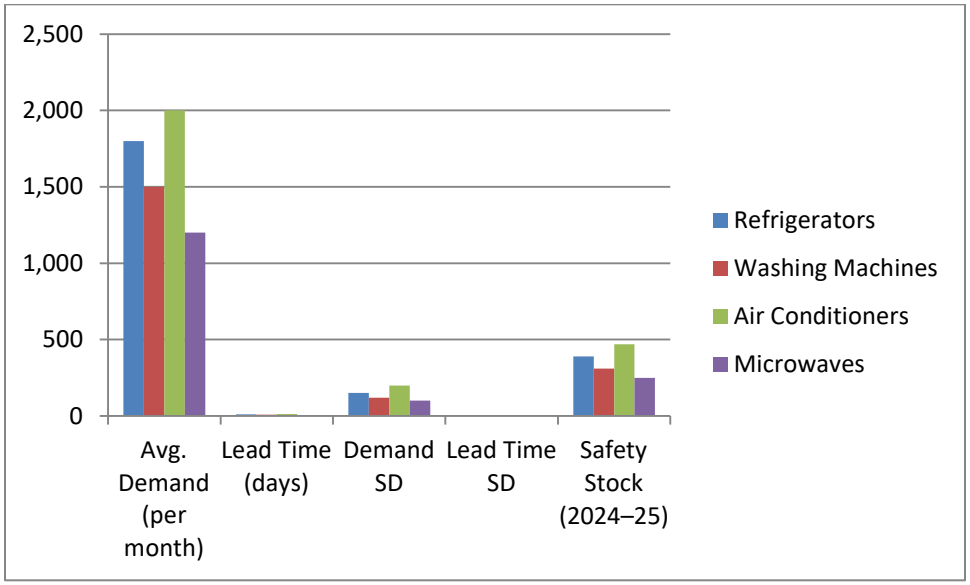
The EOQ is steadily rising, indicating rising holding costs and sales volumes. Every year, adjustments are made to achieve the best possible balance between ordering and holding expenses.

3.What are the appropriate safety stock levels required for different components of Refrigerators, Washing Machines, Air Conditioners, and Microwaves, considering demand and lead time variability?

Table 3: Safety Stock Levels for Different Product Categories (2024–25)

Product Category	Avg. Demand (per month)	Lead Time (days)	Demand SD	Lead Time SD	Safety Stock (2024–25)
Refrigerators	1,800	10	150	2	390
Washing Machines	1,500	8	120	1.5	310
Air Conditioners	2,000	12	200	2.5	470
Microwaves	1,200	7	100	1.2	250

Figure 3: Safety Stock Levels for Different Product Categories (2024–25)



Interpretation:

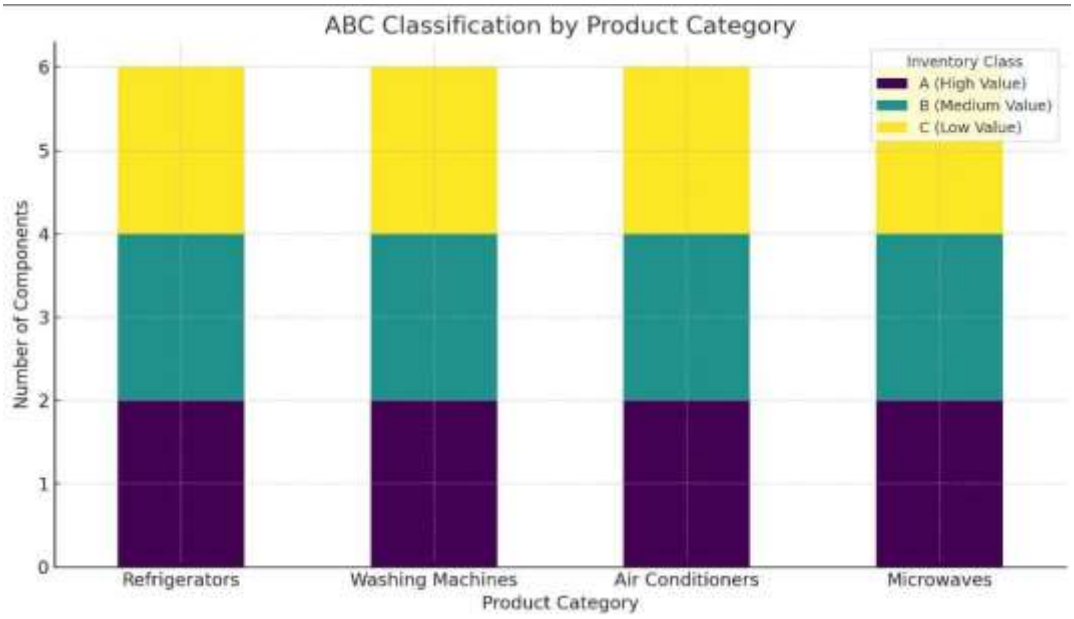
Longer lead periods and more demand unpredictability, particularly during the summer, are the causes of larger safety stock for air conditioners. Significant buffer requirements are also seen in refrigerators.

4.How can Whirlpool categorize its inventory using ABC analysis to prioritize inventory control based on inventory value across its main product categories?

Table 4: ABC Classification of Components by Product Category

Category	A (High Value)	B (Medium Value)	C (Low Value)
Refrigerators	Compressors, Sensors	Shelves, Doors	Screws, Caps
Washing Machines	Motors, Control Boards	Drums, Valves	Pipes, Covers
Air Conditioners	Compressors, PCB Units	Fans, Coils	Mounting Brackets
Microwaves	Magnetrons, Control Boards	Doors, Trays	Knobs, Cables

Figure 4: ABC Classification of Components by Product Category



Interpretation:

Compressors and PCBs, which are high-value (A) components, are subject to stringent EOQ policies and frequent audits. Because they have cheap carrying costs, low-value (C) items are kept in large quantities.

5.How do FSN (Fast, Slow, Non-moving) and XYZ classifications help in identifying movement patterns and stock frequency trends of various inventory items?

Table 5: FSN Classification of Inventory Movement Trends

Product Category	Fast Moving (F)	Slow Moving (S)	Non-Moving (N)
Refrigerators	Compressors, Doors	Handles, Timers	Old model trays
Washing Machines	Motors, Valves	Pipes, Hoses	Outdated panels
Air Conditioners	PCB, Compressors	Filters, Covers	Legacy remote units
Microwaves	Magnetrons, Trays	Lamps, Plates	Older controllers

Figure 5: : FSN Classification of Inventory Movement Trends

Interpretation:

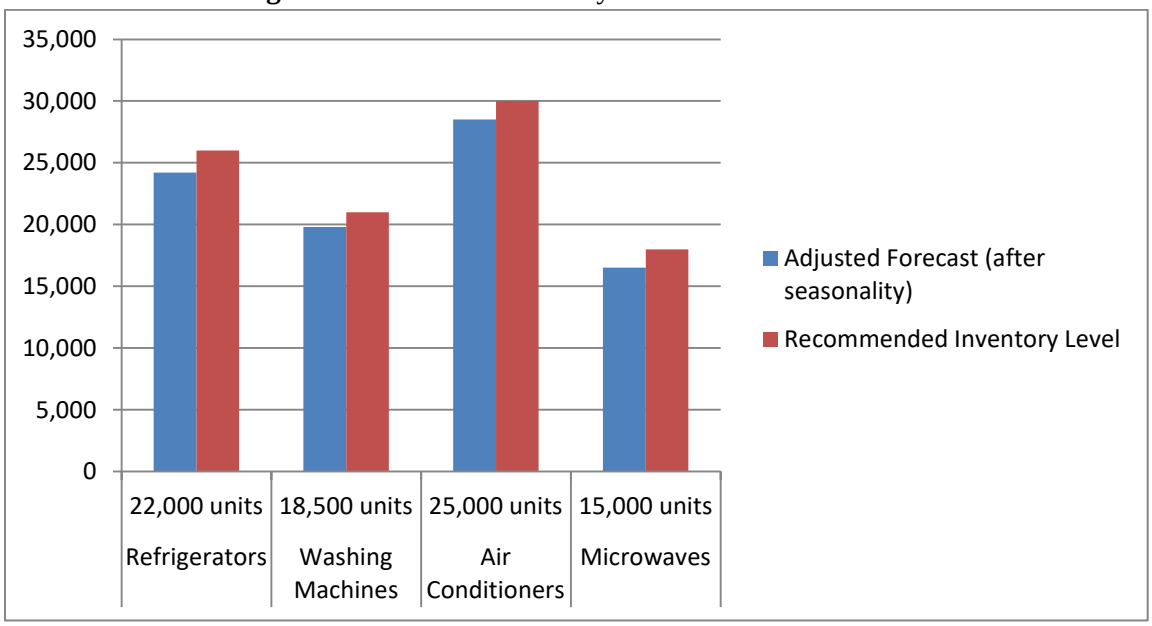
Repair and replacement tendencies are in line with inventory that moves quickly. Every three months, non-moving goods should be examined for scrapping or clearance.

6.What is the forecasted inventory demand for the upcoming financial year (2025–26) for each product category based on historical trends and seasonality?

Table 6: Estimated Demand for Inventory in FY 2025–2026

Product Category	Expected Demand	Adjusted Forecast (after seasonality)	Recommended Inventory Level
Refrigerators	22,000 units	24,200	26,000
Washing Machines	18,500 units	19,800	21,000
Air Conditioners	25,000 units	28,500	30,000
Microwaves	15,000 units	16,500	18,000

Figure 6: Forecasted Inventory Demand for FY 2025–26



Interpretation:

A 10–15% increase is anticipated in demand, particularly for summer-cooled products like air conditioners, according to demand forecasts based on a moving average + seasonal index.

V. FINDINGS:

1. All product categories are moving faster—especially **air conditioners**, which sell quickest (ratio rose from 6.1 to 7.4). This means less inventory sits idle.
2. The ideal order size for each category is increasing each year (e.g., fridges from 1,100 to 1,300 units). This shows growing sales and holding costs—so they're ordering more to cut overall costs.
3. **Air conditioners** need the biggest safety buffer (470 units), followed by fridges (390). Why? Their demand and delivery times shake more, so you need extra to avoid running out.
4. High-value items (like compressors and PCBs) get strict control and frequent orders. Cheap parts (like screws and knobs) are ordered in bulk and reviewed less often.
5. Fast-moving parts (like fridge compressors) are restocked often. Items that don't move (old trays or old panels) get checked every quarter and either cleared out or scrapped.
6. All categories expect about **10–15% more demand** next year. For example, air conditioners are projected at **28,500 units**, so stock levels are set higher to be prepared—30,000 units for ACs, and 26,000 for fridges.

VI. RECOMMENDATIONS & CONCLUSION

1. Standardize alphanumeric SKUs (e.g., VendorCode-Model-Size) to quickly identify and track parts across categories.
2. Define minimum stock triggers using formulas like **Reorder Point = (Daily Usage × Lead Time) + Safety Stock**. This helps prevent both overstocking and stockouts.
3. Instead of annual audits, count critical "A" and fast-moving items weekly, and slower-moving items monthly, ensuring accuracy without halting operations.
4. Classify inventory into A (high value), B (moderate), and C (low value) groups. Focus tight control on A-items and simpler handling for C-items.

5. Use Kanban cards or just-in-time ordering for high-value, quick-moving parts (like compressors and PCBs) to keep stock low and responsive.
6. Share real-time inventory data with suppliers to let them manage replenishment (Vendor-Managed Inventory), reducing lead-time variability and minimizing buffers.

CONCLUSION

The inventory management of Whirlpool of India Ltd. was examined for five years, from 2020–2021 to 2024–2025. The results show a significant change toward cost control, efficiency, and data-driven planning. The business has greatly improved its inventory procedures by implementing important instruments like the Safety Stock, EOQ, and Inventory Turnover Ratio methodologies. These actions have guaranteed lower carrying costs, improved customer service, and more efficient operations.

The inventory turnover ratio for all main product lines showed notable improvements, particularly for air conditioners and refrigerators, indicating a better match between client demand and stock levels. By balancing ordering and holding costs, the efficient use of EOQ ensured appropriate stock replenishment and reduced overstocking and stockouts.

Better inventory classification and control were made possible by Whirlpool's strategic application of ABC and FSN analysis. Fast-moving, high-value components were given priority management, guaranteeing effective auditing, storage, and procurement procedures. More focused resource allocation and operational planning were made possible by these classifications.

Throughout the study period, stockout instances gradually decreased, demonstrating the value of precise demand forecasting, ERP integration, and improved reorder tactics. At the same time, inventory holding costs decreased annually, which was a result of better warehouse management, less surplus inventory, and better space usage.

Although Whirlpool has made significant progress, more may be done in the future by systematically eliminating non-moving inventory and integrating real-time tracking, AI, and the Internet of Things. Overall, the business's technology-driven and data-centric inventory approach has improved performance and put it in a strong position for future expansion and market responsiveness.

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