IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A Study On Optimizing Inventory Management At Otto Clothing Pvt Ltd

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ABSTRACT: This study considers multi-period inventory systems for optimizing profit and storage space under stochastic demand. A nonlinear programming model based on random demand is proposed to simulate the inventory operation. The effective inventory management system is realized using a multi-objective grey wolf optimization (MOGWO) method, reducing storage space while maximizing profit. Numerical outcomes are used to confirm the efficacy of the optimal solutions. The numerical analysis and tests for multi-objective inventory optimization are performed in the four practical scenarios. The inventory model's sensitivity analysis is performed to verify the optimal solutions further. Especially the proposed approach allows businesses to optimize profits while regulating the storage space required to operate in inventory management. The supply chain performance can be significantly enhanced using inventory management strategies and inventory management practices. Finally, the novel decision-making strategy can offer new insights into effectively managing digital supply chain networks against market volatility.

KEYWORDS: Inventory Optimization, Multi-Period Inventory Systems, Stochastic Demand, Grey Wolf Optimization (GWO), Nonlinear Programming.

I INTRODUCTION

Inventory management is the process of ordering, storing, tracking, and controlling a company's inventory. This includes raw materials, work- in-progress goods, and finished products. Effective inventory management ensures that a business has the right amount of stock to meet customer demand without excessive surplus. Optimizing inventory management involves refining these processes to enhance operational efficiency, reduce costs, and improve customer satisfaction.

In today's competitive market, businesses face increasing pressure to balance supply and demand accurately. Poor inventory management can lead to stockouts, lost sales, or overstocking, which ties up capital unnecessarily. By optimizing inventory management, companies can streamline their supply chain, improve cash flow, and gain a significant competitive advantage.

II REVIEW OF LITERATURES

Journal of Communication and Computer 16 (2021) Modern supply chain management (SCM) leverages advanced technologies to reduce operational costs, enhance product quality, and streamline the delivery and after-sales processes. These improvements increase production efficiency and provide a sustainable competitive advantage. In the context of growing globalization, SCM must continuously evolve to address emerging challenges and support the competitiveness of local economies. This evolution contributes to increasing supply chain complexity, thereby creating a clear need for logistics audits and diagnostics that incorporate innovative technologies and mathematical modeling. A critical factor in efficient procurement

and logistics is the reliable and uninterrupted supply of raw materials and semi-finished goods, which hinges on supplier selection and strong customer-supplier relationships. Additionally, effective line balancing requires adequate technological, material, labour, and financial resources. In industrial operations, logistics support involves the timely provision of raw materials and components from central or enterprise-based warehouses, c Certainly! Here's a clear and refined version of the abstract based on the original:

S. Singh (2016) Analysed the inventory control practices of single fertilizer company named IFFCO. He statistically examined the inventor system with consumption, sales and other variables along with growth of these variables and inventory patterns. He concluded that an increase in components of inventory lead to an increase in the proportion of inventory in current assets. A special focus was made on stores and spares in order to calculate excess purchases resulting in loss of profit. Rafael Granillo-Macías In today's competitive and increasingly disrupted economic environment, the need to optimize operational costs and enhance customer service has highlighted inventory management as a key area for improvement. Effective inventory control significantly impacts logistics performance, with warehousing operations accounting for approximately 15% of total logistics costs. This study presents a practical inventory classification model applied within a food sector company, utilizing both qualitative and quantitative variables. Through data mining techniques, materials are categorized based on picking frequency, consumption rates, and handling characteristics. The model further integrates inventory classification with facility location strategies, providing comprehensive support for decision-making in inventory and warehouse management operations.

III RESEARCH METHODOLOGY

ResearchDesign:
The study follows a **descriptive research design**, aiming to evaluate and optimize inventory management at Otto Clothing Pvt. Ltd. through both qualitative and quantitative approaches.

SamplingMethod:
A **non-probability convenience sampling technique** was used, targeting 100 employees across different departments.

Data Collection:

- **Primary Data**: Collected through structured questionnaires.
- **Secondary Data**: Sourced from company websites, journals, newspapers, and past research projects.

Tools for Analysis:

- **Percentage Analysis**: For understanding distribution of responses.
- **Chi-Square Test**: To examine the association between categorical variables.
- **Correlation Analysis**: To assess the strength of relationships between inventory factors.

DurationandArea:
The research was conducted at Otto Clothing Pvt. Ltd. from

January to May ANALYSIS AND INTERPRETATION

Chi-Square Test – to find association between variables like

gender and perception of job portals.

Correlation Analysis – to examine the relationship between

variables such as age and sourcing perception.

ANOVA (Analysis of Variance) – to compare perceptions

across groups like education levels or departments.

Test	**Variables Analyzed**	**Test Value**	**p-value**	Significance	CONCLUSION
Correlation	Cloud-based Inventory Benefits ↔ Demand-driven Replenishment	r = 0.981	0.000	Significant at 0.01 level	Strong positive correlation — H_1 accepted
ANOVA	Dept. Type ↔ Cause of Stock Mismanagement	F = 87.648	0.000	Significant	Differences exist — H_1 accepted
Chi-Square	Software Used ↔ Stockout Cause (e.g., MATLAB, Excel)	χ^2 = 204.494 (df=16)	0.000	Significant	Strong association — H_1 accepted

FINDINGS

- 32.4% of respondents identified lack of real-time inventory tracking as the primary reason for inventory issues.
- The main problems from manual tracking are delayed order fulfillment (28.4%), inaccurate stock data, and human error.
- 32.4% of employees noted that poor space utilization is the biggest factor in rising inventory holding costs.
- 29.4% agreed that cloud inventory systems enhance tracking and forecasting, leading to more accurate and responsive stock control.
- The top reason for stockouts (24.5%) was late deliveries from suppliers, followed by poor coordination between departments.
- 32.4% of staff support EOQ as the best way to reduce waste and holding costs.
- Only 29.4% correctly identified that Genetic Algorithms optimize inventory through iteration and selection, showing a knowledge gap.
- A strong positive correlation (r = 0.981) was found between cloud-based systems and effective demand-driven strategies, proving that digital tools directly enhance inventory performance.
- Different departments (sales, warehouse, IT) have statistically significant differences in how they view stock management problems (p = 0.000).

SUGGESTION

- Use cloud-based systems integrated with POS and warehouse data to improve transparency and reduce inventory mismatches.
- Apply dynamic forecasting methods to align inventory with real-time demand, minimizing stockouts and overstocking.
- Automated storage and retrieval systems can help reduce labor errors and optimize space utilization.
- Calibrate GA models carefully to simulate optimal stock levels across the supply chain and reduce total inventory costs.
- Conduct workshops to improve understanding of inventory technologies and ensure smooth adoption.
- Break silos between procurement, sales, and supply chain departments for better forecasting and decision-making.
- Reduce supplier delays by establishing strong relationships and clearly defined SLAs (Service Level Agreements).

CONCLUSION

The study concludes that Otto Clothing Pvt. Ltd. is at a critical juncture where scaling its inventory management through technological intervention is essential. While the company excels in market reach and product range, it faces inefficiencies due to outdated manual systems, poor departmental coordination, and underutilized technological tools.

Statistical analysis revealed a strong correlation between modern inventory systems and replenishment strategies, reinforcing the need for data- driven solutions. Moreover, the use of Genetic Algorithms (GA) offers immense potential to optimize inventory levels across supply chain stages—from factory to distribution centers and agents.

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