



“A STUDY ON INVENTORY MANAGEMENT IN A STEEL INDUSTRY”

PARAS KUMAR¹ & DR.K. SASIREKHA²

¹ MBA Student, School of Management Studies, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

²Assistant Professor, School of Management Studies, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India

ABSTRACT :

Efficient inventory management plays a crucial role in the success of businesses across various industries. By optimizing inventory levels and implementing effective strategies, organizations can achieve significant cost reductions, enhance customer satisfaction, and boost overall profitability. This project delves into the intricacies of inventory management, examining various techniques and approaches to optimize inventory levels and streamline inventory processes.

The project commences with a comprehensive overview of inventory management, highlighting its significance and its impact on business operations. It then explores the fundamental principles of inventory management, encompassing demand forecasting, safety stock determination, and economic order quantity (EOQ) calculations. Additionally, it introduces various inventory management techniques, including just-in-time (JIT) inventory management and lean manufacturing principles.

To gain a practical understanding of inventory management principles, the project presents a detailed case study of a company that has successfully implemented effective inventory management strategies. The case study analyses the company's inventory management practices, highlighting the techniques and approaches employed to achieve significant improvements in inventory turnover ratios, cost reductions, and customer service levels.

The project concludes by summarizing the key takeaways from the analysis, emphasizing the importance of inventory management in optimizing business operations and achieving sustainable growth. It reiterates the need for a strategic approach to inventory management, tailored to the specific needs and challenges of each organization.

Keywords: Inventory management, inventory control, demand forecasting, safety stock, economic order quantity (EOQ), just-in-time (JIT), lean manufacturing, case study.

INTRODUCTION OF THE STUDY :

Inventory management involves a set of decisions that aim at matching existing demand with the supply of products and materials over space and time in order to achieve specified cost and services level objectives, observing product, operation, and demand characteristics. Inventories constitute the most significant part of current assets of a majority of companies in India. On an average, inventories are approximately 30% of the current assets in the companies. Stock constitutes one of the vital things of current resources, which licenses smooth operation of creation and deal procedure of a firm. Stock administration is that part of current resources administration, which is worried about keeping up ideal interest in stock and applying a successful control framework in order to limit the aggregate stock cost.

Especially for manufacturing companies, like **ARS STEELS & ALLOY INTERNATIONAL PVT.LTD.** it acts as a significant amount of current assets. As inventory plays a critical role to an organization, inaccuracies in an inventory will cause the organization to have chain problems, including loss or poor productivity, manufacture of excessive outcomes, reduction of customer loyalty, accumulation of overpricing inventory, etc. There is a trend showing that the manufacturing industry has been in rapid growth since the year 2016, and the trend is believed to continue for a few more years. The growth in advanced technology and innovation is also one of the potential factors that lead to the increased productivity in the industry. Inventory is defined as a list of goods and materials which are available in stock for business.

NEED FOR THE STUDY:

- This study helps to find the facts and opinion of Inventory Management.
- This study aims mainly in finding out Inventory control procedures.
- This study helps in overstocking or understocking of materials.
- This study helps to avoid unnecessary purchases and reduce waste,
- promoting sustainability and cost savings.

OBJECTIVES OF THE STUDY:

- To analyze the control techniques applied in Inventory Management.
- To analyze the inventory management of the company.
- To classify various materials based on ABC analysis.
- To find the Inventory turnover ratio to analyze the performance.

SCOPE OF STUDY:

- This study investigates and evaluate different inventory control models such as ABC Analysis and Inventory Ratio.
- This studies the methods and algorithms used for demand forecasting in inventory management.
- This studies risk factor associated with inventory management such as obsolescence, stockouts, etc.,
- These studies analyze the unique challenges and best practices in inventory management.

LIMITATIONS OF THE STUDY:

- The inventory details of company are collected for 5 years only
- The information taken from the company was limited
- In this study only limited ratios are used.

REVIEW OF LITERATURE

Munyaka Baraka, Jean-Claude & Yadavalli, Sarma (2023).

Inventory is a central management function. It is a cornerstone of supply chain management and logistics in the material management system. Depending on the organisational objectives, inventories in warehouses may be needed to fulfil customer or humanitarian demands. Controlling inventory is critical to operational success and organisational performance.

Mason Frye (2023)

Effective inventory management policy is a recognizable critical driver for company success, but which techniques and tools are relevant today? This thesis explores the theory that a company's inventory management practices directly impact the firm's efficiency, responsiveness, and profitability.

Archana Bhattacharyya, Dr. A. Ibemcha Chanu, Dr. Subit Dutta (2022)

Different organizations follow different types of inventory management practices; Inventory management practice is the type of activities that an organization follow in is the process of ordering, issuing, storing and trading inventory products held by that organization.

Mrs. Toopalli Sirisha and Dr. Nalla Bala Kalyan (2022)

Business motives are to produce, sell & make profit. Inventories are playing vital role in every business whether industrial unit of trading organization. Thus this study acquires utmost importance, inventory can be broadly defined as the stock of Goods, commodities or other economic resources they are stored or reserved at any given for future production.

Khurshid Ali. ET. AL.,(2022)

The study has been undertaken to ascertain whether Inventory management influences the Operating Profits of the sample companies or not. In order to achieve this objective, there searchers have taken under study pharmaceutical industry which is represented by four major companies. A reference period of eight years from 2009-2010 to 2016-2017 has been taken into consideration.

Hemapriya, S (2021)

The success of any business depends on the customer's satisfaction since the customer is the best advertisement. A trader can achieve the goal by having sufficient inventory. Inventory represents any resource that is set aside for future use. Inventory is necessary because the demand and supply of goods usually are not perfectly matched at any given time or place and also it is very much essential for companies to manage the resource that are available to them. These resources include manpower, equipment and information. It is also essential to balance the advantage of having inventory of each resources and the cost of maintaining it and to determine an optimal level of inventory of each resource so that total inventory cost is minimum.

Fengfu Xu (2021)

Inventory management is an important basis for production management and cost control in manufacturing enterprises. The timely management method of inventory timely system is the scientific and efficient inventory management mode with remarkable advantages in inventory management. How to use The Internet of Things technology to assist the effective implementation of inventory timely management is the main problem discussed in this paper. IOT technology can assist enterprises to collect, analyze and process real-time data, thus providing advanced technology support for enterprises to carry out scientific and efficient inventory.

Muhammad Marsudi (2020)

Inventory control is significant to ensure smooth running of a company. Uncontrolled inventory would cause various type of problem to the company especially waste of costs, material and time. Good inventory would be able to certify the stock is always in a minimum level. The factor that should be taken in inventory control are policy demand that been practice and also system approach that been used. Thus, this study was to review the inventory management in manufacturing industry to identify the lack and also to improve efficiency in inventory management system in certain manufacturing industry field.

Muchaendepi, Wa. ET. AL., (2019)

The study assessed the inventory management (IM) strategies that are used by SME's in the manufacturing sector of Harare, Zimbabwe. The study comprised of the population from Gleview complex, Siya So Mbare, Kuwadzana, Gazaland and Magaba industrial sites. Respondents were selected from the each of the companies which the researchers selected purposively. The study used qualitative research design which was descriptive in nature.

Sharma, Nancy (2019)

This study is conducted to assess the impact of a well utilized technique in other industry named vendor managed inventory on supply chain process of Indian healthcare industry. We have identified five main objectives to analyse the overall importance and impact of vendor managed inventory on supply chain process of Indian healthcare industry. To compare traditional inventory management system to Vendor managed inventory (VMI) system. To select best vendor for successful implementation of vendor managed inventory (VMI). To evaluate quality of indicators and variables of supply chain process.

Parth Jwala (2019)

In today's world, manufacturing companies are keen to adopt lean methodologies to sustain an everchanging market. One way companies grow their business is by increasing customer satisfaction, customization and running the business in the optimal scenario. Inventories form a significant amount in applicable businesses, estimating around 30%, a number that has the potential to be decreased that would turn direct profits. The following two research questions were therefore answered.

RESEARCH METHODOLOGY

TYPE OF RESEARCH

The proposed study is of ANALYTICAL IN NATURE. Research design is needed because it facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible. A research design for a particular problem usually involves the consideration of the following factors.

DATA COLLECTION

SECONDARY DATA

This study is mainly based on Secondary data which have been collected from the ANNUAL REPORTS of the company and the STORES LEDGER.

PERIOD OF STUDY

The period of study is for 3 years from 2021 to 2024

TOOLS USED FOR THE STUDY

The analytical tools used for the study are

- ABC analysis
- Inventory Ratio
- Trend Analysis

DATA ANALYSIS AND INTERPRETATION

ABC ANALYSIS.

ABC analysis divides an inventory into three categories—"A items" with very tight control and accurate records, "B items" with less tightly controlled and good records, and "C items" with the simplest controls possible and inimal records..

Classification of A, B and C items in the organisation of the year 2021-22

| ABC ANALYSIS for 01-APR-21 To 31-MAR-22 | | | | | |
|---|------------------------|---------------------------|--------------------|------------|--------------|
| Sl no. | Item Category Name | Item Group Name | TOTAL COST | PERCENTAGE | ABC ANALYSIS |
| 1 | ASSETS-ELECTRICAL | STORES AND CONSUMABLES | 92,48,347.12 | 11.76 | A |
| 2 | ASSETS-GENERAL | STORES AND CONSUMABLES | 2,14,89,445.18 | 27.33 | A |
| 3 | ASSETS-MECHANICAL | STORES AND CONSUMABLES | 12,71,519.49 | 1.62 | B |
| 4 | BATTERY | STORES AND CONSUMABLES | 3,540.00 | .00 | C |
| 5 | BEARING | STORES AND CONSUMABLES | 54,80,904.76 | 6.97 | B |
| 6 | COPPER MOULD | STORES AND CONSUMABLES | 11,48,060.05 | 1.46 | B |
| 7 | ELECTRICAL-CONSUMABLES | STORES AND CONSUMABLES | 6,29,812.57 | .80 | B |
| 8 | ELECTRICAL-SPARES | STORES AND CONSUMABLES | 83,33,741.57 | 10.60 | A |
| 9 | ELECTRICAL-TOOLS | STORES AND CONSUMABLES | 5,365.00 | .01 | C |
| 10 | GENERAL-CONSUMABLES | STORES AND CONSUMABLES | 43,90,374.57 | 5.58 | B |
| 11 | GENERAL-SPARES | STORES AND CONSUMABLES | 4,70,575.34 | .60 | B |
| 12 | GENERAL-TOOLS | STORES AND CONSUMABLES | 2,63,790.05 | .34 | C |
| 13 | MECHANICAL-CONSUMABLES | STORES AND CONSUMABLES | 65,66,490.84 | 8.35 | A |
| 14 | MECHANICAL-CONSUMABLES | TUNDISH BOARD | 2,08,717.27 | .27 | C |
| 15 | MECHANICAL-CONSUMABLES | SODIUM SILICATE | 36,300.00 | .05 | C |
| 16 | MECHANICAL-CONSUMABLES | SILICO MANGANESE & FE. MA | .00 | .00 | C |
| 17 | MECHANICAL-SPARES | STORES AND CONSUMABLES | 1,74,41,458.79 | 22.18 | A |
| 18 | MECHANICAL-TOOLS | STORES AND CONSUMABLES | 5,93,987.60 | .76 | B |
| 19 | RAMMING MASS | RAMMING MASS | 9,87,615.00 | 1.26 | B |
| 20 | REMIX 77 | STORES AND CONSUMABLES | 72,520.00 | .09 | C |
| SI TOTAL | | | 78642565.19 | | |

Interpretation: This tables shows the 80% of the items are from A category (Most valuable) in the organization, 15% of the items from B category (Moderate value) and 5% of the items are from the C category (least valued).

Classification of A, B and C items in the organisation of the year 2022-23

| ABC ANALYSIS for 01-APR-22 To 31-MAR-23 | | | | | |
|---|------------------------|---------------------------|--------------------|------------|--------------|
| Item Nature | Item Category Name | Item Group Name | TOTAL COST | PERCENTAGE | ABC ANALYSIS |
| 1 | ASSETS-ELECTRICAL | STORES AND CONSUMABLES | 2,66,07,661.37 | 18.12 | A |
| 2 | ASSETS-GENERAL | STORES AND CONSUMABLES | 5,58,11,129.16 | 38.00 | A |
| 3 | ASSETS-MECHANICAL | STORES AND CONSUMABLES | 64,19,061.69 | 4.37 | B |
| 4 | BATTERY | STORES AND CONSUMABLES | 2,230.00 | .00 | C |
| 5 | BEARING | STORES AND CONSUMABLES | 53,97,458.29 | 3.68 | B |
| 6 | COPPER MOULD | STORES AND CONSUMABLES | 13,66,510.05 | .93 | C |
| 7 | ELECTRICAL-CONSUMABLES | STORES AND CONSUMABLES | 47,21,913.42 | 3.22 | C |
| 8 | ELECTRICAL-SPARES | STORES AND CONSUMABLES | 1,05,42,127.44 | 7.18 | A |
| 9 | ELECTRICAL-TOOLS | STORES AND CONSUMABLES | 3,785.00 | .00 | C |
| 10 | GENERAL-CONSUMABLES | STORES AND CONSUMABLES | 49,55,614.33 | 3.37 | B |
| 11 | GENERAL-SPARES | STORES AND CONSUMABLES | 20,69,344.63 | 1.41 | C |
| 12 | GENERAL-TOOLS | STORES AND CONSUMABLES | 4,31,078.57 | .29 | C |
| 13 | MECHANICAL-CONSUMABLES | STORES AND CONSUMABLES | 70,27,121.80 | 4.78 | B |
| 14 | MECHANICAL-CONSUMABLES | TUNDISH BOARD | 3,48,856.92 | .24 | C |
| 15 | MECHANICAL-CONSUMABLES | SILICO MANGANESE & FE. MA | .00 | .00 | C |
| 16 | MECHANICAL-CONSUMABLES | SODIUM SILICATE | .00 | .00 | C |
| 17 | MECHANICAL-SPARES | STORES AND CONSUMABLES | 1,97,27,941.75 | 13.43 | A |
| 18 | MECHANICAL-TOOLS | STORES AND CONSUMABLES | 6,39,215.59 | .44 | C |
| 19 | RAMMING MASS | RAMMING MASS | 5,31,987.50 | .36 | C |
| 20 | REMIX 77 | STORES AND CONSUMABLES | 2,59,840.00 | .18 | C |
| SI - Total | | | 146862877.5 | | |

Interpretation: This tables shows the 76% of the items are from A category (Most valuable) in the organization, 16% of the items from B category (Moderate value) and 7% of the items are from the C category (least valued).

Classification of A, B and C items in the organisation of the year 2023-24

| ABC ANALYSIS for 01-APR-23 To 31-MAR-24 | | | | | |
|---|------------------------|---------------------------|--------------------|------------|--------------|
| Item Nature | Item Category Name | Item Group Name | TOTAL COST | PERCENTAGE | ABC ANALYSIS |
| 1 | ASSETS-ELECTRICAL | STORES AND CONSUMABLES | 2,67,91,068.48 | 10.63 | A |
| 2 | ASSETS-GENERAL | STORES AND CONSUMABLES | 13,00,58,595.71 | 51.61 | A |
| 3 | ASSETS-MECHANICAL | STORES AND CONSUMABLES | 2,70,74,467.25 | 10.74 | A |
| 4 | BATTERY | STORES AND CONSUMABLES | 300.00 | .00 | C |
| 5 | BEARING | STORES AND CONSUMABLES | 59,16,142.53 | 2.35 | B |
| 6 | COPPER MOULD | STORES AND CONSUMABLES | 12,20,010.05 | .48 | C |
| 7 | ELECTRICAL-CONSUMABLES | STORES AND CONSUMABLES | 47,53,864.37 | 1.89 | C |
| 8 | ELECTRICAL-SPARES | STORES AND CONSUMABLES | 1,14,30,873.51 | 4.54 | B |
| 9 | ELECTRICAL-TOOLS | STORES AND CONSUMABLES | 3,785.00 | .00 | C |
| 10 | GENERAL-CONSUMABLES | STORES AND CONSUMABLES | 44,06,056.06 | 1.75 | C |
| 11 | GENERAL-SPARES | STORES AND CONSUMABLES | 39,11,304.09 | 1.55 | C |
| 12 | GENERAL-TOOLS | STORES AND CONSUMABLES | 6,10,831.07 | .24 | C |
| 15 | MECHANICAL-CONSUMABLES | STORES AND CONSUMABLES | 89,66,198.08 | 3.56 | B |
| 13 | MECHANICAL-CONSUMABLES | SILICO MANGANESE & FE. MA | 19,67,846.40 | .78 | C |
| 16 | MECHANICAL-CONSUMABLES | TUNDISH BOARD | 2,21,304.64 | .09 | C |
| 14 | MECHANICAL-CONSUMABLES | SODIUM SILICATE | 35,765.00 | .01 | C |
| 17 | MECHANICAL-SPARES | STORES AND CONSUMABLES | 2,01,76,314.59 | 8.01 | B |
| 18 | MECHANICAL-TOOLS | STORES AND CONSUMABLES | 31,00,922.65 | 1.23 | C |
| 19 | RAMMING MASS | RAMMING MASS | 12,04,165.00 | .48 | C |
| 20 | REMIX 77 | STORES AND CONSUMABLES | 1,62,750.00 | .06 | C |
| SI - Total | | | 252012564.5 | | |

Interpretation:

This tables shows the 73% of the items are from A category (Most valuable) in the organization, 18% of the items from B category (Moderate value) and 8% of the items are from the C category (least valued).

TREND ANALYSIS

Trend analysis is a technique used to examine and predict movements of an item based on current and historical data. You can use trend analysis to improve your business using trend data to inform your decision-making.

Trend formula = Current period / Base period *100

Table Showing Trend analysis of purchase for the period of 3 years

| YEAR | PURCHASE | TREND |
|---------|-------------|-------|
| 2021-22 | 384838031.4 | 384 |
| 2022-23 | 566854332.4 | 566 |
| 2023-24 | 423465161.7 | 423 |

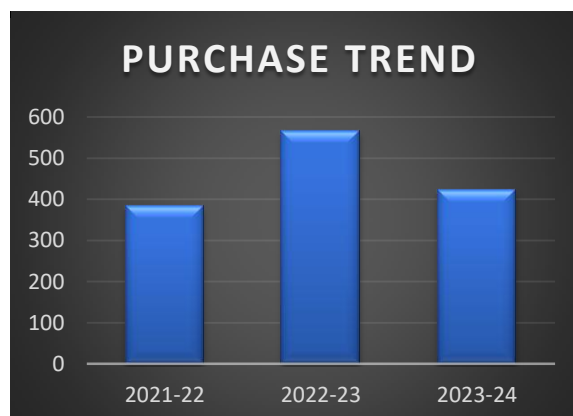
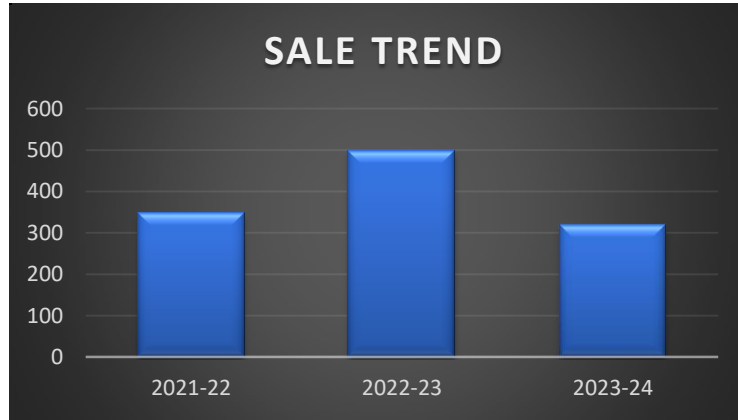


Fig Trend Analysis chart of purchase for the period of 3 years

Interpretation:

The trends of Purchases for the period of 3 years in given in the above chart. This chart shows that the Purchases increase during 2022-2023 then again decline in 2023-2024.

Table Showing Trend analysis of sales for the period of 3 years



| YEAR | SALES | TREND |
|---------|-------------|-------|
| 2021-22 | 348434743.7 | 348 |
| 2022-23 | 498634020.1 | 498 |
| 2023-24 | 318315474.7 | 318 |

Fig Trend Analysis chart of sales for the period of 3 years

Interpretation:

The trends of sales for the period of 3 years in given in the above chart. This chart shows that the sale increase during 2022-2023 then again decline in 2023-2024.

INVENTORY TURNOVER RATIO

This ratio is an efficiency ratio which shows the efficiency of the firm in producing and selling its products.

Inventory turnover ratio = Cost of goods sold / Average inventory

Table Inventory turnover ratio

| INVENTORY TURNOVER RATIO | | | |
|--------------------------|-----------------|-------------------|----------------|
| Year | COGS | Average Inventory | Turnover Ratio |
| 2021-2022 | 38,40,38,743.74 | 6,04,40,921.36 | 6.36 |
| 2022-2023 | 60,73,20,020.70 | 11,17,52,221.35 | 5.43 |
| 2023-2024 | 31,73,15,475.76 | 19,94,37,720.48 | 1.59 |



Fig Chart of Inventory turnover ratio.

Interpretation: The inventory turnover ratio for the year 2021-2022 is approximately 6.36. This means that, on average, the company sold and replaced its inventory about 6.36 times during the year. A higher turnover ratio generally indicates that a company is managing its inventory more efficiently, as it suggests that the company is selling its goods quickly and restocking efficiently. But from 2022-2023 its started decreasing continuously. The trends for the period of 3 years in given in the above chart. This chart shows that the inventory turnover ratio decline.

SUGGESTION:

- The company has to invest in the inventory management system to improve the control techniques in Inventory Management. It should use an inventory management solution to automate inventory operations and eliminate the risk of human errors. It can automatically track existing inventory levels, raise purchase invoices for new and repeat orders, categorize products into multiple batches, create real-time reports, and monitor stock movement.
- The firm has to perform regular inventory audits to analyse the impact of inventory management towards performance. Use the physical count, cycle count and spot check methods to ensure your inventory records are accurate and up to date. Maintaining accurate inventory in the organisation to ensure proper inventory optimization.
- Monitoring of demand closely to avoid stockouts is very essential. Check your monthly sales data to identify products that have shown a consistent increase in demand over the past couple of months. For each identified product, use demand forecasting models that analyse historical and seasonal sales data to predict demand in upcoming months. Based on expected future demand, increase or decrease procurement. As a rule of thumb, maintain more safety stock for products with higher expected demand.
- Using inventory techniques like ABC analysis will categorize your inventory into priority groups and can help you understand your ideal ordering quantities and frequencies. You can also determine which items are essential to your business but may cost more and move more slowly.
- Existing inventory management system of the organization is good but if the inventory management system is to be improved, they should adopt some new inventory management system. The organization should also try to adapt more inventory management techniques like Just in Time inventory system. This technique will save the time of the organization and will also reduce the inventory holding cost in the organization. As the organization is already following Lean manufacturing, now the organization can also try and implement different manufacturing techniques like TQM, Six Sigma etc.

CONCLUSION:

Inventory management has to do with keeping accurate records of goods that are ready for the sales. The Inventory management is significant for any manufacturing organization. It helps the organization in smooth running of its activities and in reducing the cost of managing the inventory. Inventory management is important for keeping costs down, while meeting regulation. Supply and demand as a delicate balance, and inventory management hopes to ensure that the balance is undisturbed.

From the above data it is clear that the company should improve in their inventory control techniques. It is better for the company to reduce the inventory level to a considerable degree reduction in excess inventories carries a favourable impact on the profitability of the company by way of unnecessary locking up of capital. The techniques used in the organisation will help to maintain the correct flow of inventory. ABC analysis, Inventory ratios, Trend analysis are been undertaken to manage the inventory effectively. The recommendations and suggestions given, if implemented will improve the positions of the inventories.

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2. "Inventory Control at Toyota" by Harvard Business School Case Study (Case No. 9- 607-069)
3. "Inventory Management at Dell" by Harvard Business School Case Study (Case No. 9-604-111)

Online Resources:

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2. "ABC Analysis: A Simplified Inventory Control Method" by Small Business Trends (<https://www.bluecart.com/blog/abc-inventory-analysis>).
3. "Inventory Ratio Analysis: Keeping Your Inventory in Check" by Institute for Supply Management (<https://www.ismworld.org/supply-management-news-andreports/news-publications/inside-supply-management-magazine/blog/2023/2023-11/the-monthly-metric-work-in-process-inventory/>).