A Study on the Effectiveness of Demand Forecasting in Arunnachala Impex Pvt Ltd

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ABSTRACT

This study investigates the demand forecasting techniques used by Arunnachala Impex Private Limited, Chennai, and evaluates their effectiveness in improving inventory management, production planning, and supply chain efficiency. Demand forecasting plays a vital role in predicting future demand based on historical data, market trends, and external factors, enabling better resource allocation and timely product availability. The research uses both primary data—collected through structured questionnaires and employee interactions—and secondary data from company records and industry literature. A sample of 120 respondents from departments such as supply chain, inventory, and operations was chosen through convenience sampling. Percentage analysis and chi-square tests were used for data analysis. The study finds that forecasting helps reduce inventory costs and improves efficiency, but is challenged by issues like inaccurate data and market fluctuations. The research recommends integrating AI-driven predictive models and real-time data systems to enhance forecasting accuracy and support strategic decision-making.

Keywords: Demand forecasting, inventory management, supply chain efficiency, predictive analytics, AI, operational planning, data accuracy.

INTRODUCTION

Demand is one of the most challenging and unpredictable aspects of supply chain management. Sudden changes or surprises in customer demand can disrupt operations across the entire supply chain—from procurement and production to inventory management, order fulfillment, and workforce planning. Every aspect of supply chain operations hinges on the accurate estimation of demand levels and timing.

Forecasting is a key process used to reduce uncertainty and bring structure to supply chain activities. It enables organizations to make informed decisions about scheduling, capacity planning, purchasing, staffing, and production. Inaccurate forecasts can result in costly consequences such as excess inventory, stockouts, poor customer service, and wasted resources.

In today's competitive and dynamic market environment, effective demand management is critical. It requires balancing supply and demand in order to avoid both overstock and shortages. Technologies that track real-time sales data, including point-of-sale information, play an important role in improving forecast accuracy and driving replenishment decisions.

Forecasting extends beyond operations—it influences strategic decisions across departments such as marketing, finance, and human resources. For example, forecasts guide promotional planning, budget allocation, hiring, and long-term investments. Products with stable, predictable demand—like milk— are easier to forecast, while seasonal or highly

variable items, such as chocolate, present greater challenges.

In short, accurate demand forecasting is essential to achieving operational efficiency, financial stability, and customer satisfaction. A well-managed forecasting system helps organizations navigate uncertainty, reduce risks, and create a responsive, resilient supply chain.

OBJECTIVES OF THE STUDY

The study is designed with the following specific objectives:

Primary Objective

A study on the effectiveness of demand forecasting in arunnachala impex pvt ltd

Secondary Objective

- To analyze the current demand forecasting methods and tools employed by the company
- To identify the challenges and limitations faced by the company in implementing effective forecasting strategies
- To examine the impact of forecasting accuracy on inventory management, order fulfillment, and customer satisfaction.

COMPANY PROFILE

Arunnachala Impex Private Limited, founded in 2003 by M. Selvaraj, is a leading exporter and wholesaler based in Tamil Nadu, India. The company specializes in the export of both agricultural and non-agricultural products, with a product portfolio that includes high-quality spices, pulses, textiles, and electronics. Over the years, Arunnachala Impex has established itself as a reliable supplier to international markets, particularly in Sri Lanka, Bangladesh, and Singapore. Headquartered in Chennai, the company operates with a strong commitment to quality, ensuring that all its products meet strict international standards.

Arunnachala Impex has built a solid reputation for delivering hygienic and high-quality products, positioning itself as a key player in the global export market. The company's success is driven by its efficient operations, well- coordinated supply chain, and robust customer service practices. The company also actively participates in government tenders, which has allowed it to expand its market reach and cater to a broader range of clients. Its ability

to handle large-scale orders while maintaining flexibility in meeting specific client demands has made it a preferred partner for businesses across borders.

Arunnachala Impex operates through several key departments, including Sales & Marketing, Operations & Logistics, Finance, Human Resources, and Customer Service. These departments work closely together to ensure seamless operations, from product procurement and inventory management to final delivery and customer satisfaction. The Operations and Systems departments, in particular, play a crucial role in managing the supply chain and leveraging technology to optimize business processes.

With a vision to further expand its trade portfolio and enhance its global footprint, Arunnachala Impex remains committed to innovation, sustainability, and customer satisfaction. The company's continuous focus on improving its operational efficiencies and adapting to market changes has positioned it for long-term success in the competitive export industry.

REVIEW OF LITERATURE:

S. Ramachandran, Mayur S Nakhava, and Kumar Pratik (2021), "Logistics in India: Challenges and Scope". The objectives of the study to required to compete through excellence in managing their logistics. Convenient sampling was used in this study it is a non-probabilistic sampling method. The size of the sample selected for the study is 300 respondents. The study findings that provide a perspective on these issues, outline some of the key challenges with the help of secondary information, and describe some interesting initiatives that some are required to compete through excellence in managing their logistics.

Lan Wang (2019), "Study on the Business Mode Innovation of Firms in Logistics Industry: A Case Study". The main objectives of the study to analyzing macro-environment and regional environment of logistics industry development. The sample size is 50 questionnaires using convenience sampling method. The data collected was analyzed through Percentages,frequencies and chi - square tests. The study conclude that the elements of the business model innovation though case analysis. By analyzing macro- environment and regional environment of logistics industry development, this article elaborates how logistics firms make innovation to create new business model.

Mohammad Safiqul Islam and Mr. Gu Qing Liang (2019), "Supply Chain Management on Apparel Order Process: A Case Study In Bangladesh Garment Industry". Bangladesh Garment Industry improvement is desired in reducing the Supply time required to produce and fulfill the orders placed by foreign companies. Supply time refers to the time required for supplying ordered garment products after the export order has received. Using modern fast and effective machinery can reduce time taken to deliver the order.

Kwame Owusu Kwateng and John Frimpong Manso (2014), "Outbound Logistics Management in Manufacturing Companies in Ghana". The objectives of the study can be used by management of GGBL to perform routine assessment and evaluation. Convenience sampling method has been used the sample size is 300 respondents. The researcher has used Ratio analysis. The study concluded that, the performance measurement construct obtained from the study can be used by management of GGBL to perform routine assessment and evaluation of outbound logistics activities to improve supply chain performance of the organization.

A.P.Bahale and Dr.S.S.Deshmukh (2014), "Improving Material Handling Efficiency in a Ginning Machine Manufacturing Company". The main objectives of the study to material handling has become a new, complex, and rapidly evolving science. 100 samples and Statistical tools used in this Study are percentage analysis, Chi- Square test and one way ANOVAs. The study analyses the material handling cannot be avoided in logistics, but can certainly be reduced to minimum levels. Material handling system design has a direct influence on the logistics cost.

RESEARCH DESIGN

This study follows a **descriptive research design** to analyze the demand forecasting techniques and their effectiveness in **Arunnachala Impex Private Limited, Chennai**. A **quantitative approach** was adopted, using structured data collection methods to assess the accuracy of forecasting techniques and identify areas for improvement. Primary data was collected through a **survey questionnaire** administered to employees across various departments, including **Logistics, Production, and Supply Chain Management**. The study employed a **random sampling technique** to ensure diverse perspectives on demand forecasting challenges and effectiveness.

The sample size included a **representative number of employees**, covering individuals with different levels of experience and expertise in demand forecasting. The collected data was analyzed using **statistical methods, percentage analysis, and graphical representations** to interpret trends and employee opinions. The key objectives of this research were to evaluate the **current demand forecasting techniques**, identify **challenges and limitations**, assess the

effectiveness of forecasting in optimizing inventory and production planning, and propose **recommendations for improvement**. This structured approach ensures a **comprehensive understanding** of demand forecasting within the organization and provides valuable insights for enhancing forecasting accuracy and supply chain efficiency.

SAMPLE SIZE

The sample size for this study was **120 employees**, selected from various departments including **demand forecasting, supply chain management, production, and logistics** at **Arunnachala Impex Private Limited, Chennai**. A **random sampling technique** was used to ensure a diverse representation of employees with different levels of experience and expertise in demand forecasting.

This sample size provides **statistically significant** insights into the effectiveness of the company's **demand forecasting techniques**, allowing for a comprehensive analysis of **key challenges, areas for improvement, and potential recommendations** to enhance forecasting accuracy and overall supply chain efficiency.

METHOD OF DATA COLLECTION

The data for this study was collected using **both primary and secondary data sources** to ensure a comprehensive analysis of **demand forecasting techniques** at **Arunnachala Impex Private Limited, Chennai**.

Primary Data:

The primary data was gathered through a **structured questionnaire** distributed to **120 employees** across various departments, including **Logistics, Production, and Supply Chain Management**. The questionnaire consisted of **multiple-choice questions and rating scales** to assess employees' awareness, challenges, and opinions on the effectiveness of demand forecasting techniques.

Secondary Data:

Additional insights were obtained from **company reports, industry articles, research papers, and demand forecasting case studies** to support the primary data findings. These sources helped in understanding industry best practices and benchmarking the company's forecasting techniques.

PERIOD OF STUDY

The study on Demand Forecasting Techniques and Their Effectiveness in Arunnachala Impex Private Limited, Chennai was conducted over a period of 3 months, from Jan 2025 to March 2025.

AREA OF STUDY

This study was conducted at **Arunnachala Impex Private Limited, Chennai**, focusing on the company's **demand forecasting techniques and their effectiveness**. The research specifically examined the **forecasting methods used, their accuracy, challenges faced, and areas for improvement** in managing demand fluctuations.

The study covered key departments involved in demand forecasting, including **Logistics, Production, and Supply Chain Management**, to analyze how forecasting impacts **inventory control, production planning, and overall business efficiency**. By focusing on this organization, the study provides **practical insights into improving demand**

forecasting processes within similar industries.

STATISTICAL TOOL

In this study on **Demand Forecasting Techniques and Their Effectiveness in Arunnachala Impex Private Limited, Chennai**, the following **statistical tools** were applied for data analysis:

- Data from the questionnaires were collected and entered into Excel.
- Analysis was performed using SPSS software version 26.

❖ **PERCENTAGE ANALYSIS**

Percentage refers to a special kind of ratio in making comparison between two or more data and to describe relationships. Percentage can also be used to compare the relative terms in the distribution of two or more sources of data.

$$\text{Percentage of Respondents} = \frac{\text{Number of Respondents}}{\text{Total Respondents}} \times 100$$

❖ **CHI SQUARE TEST**

The chi square test is an important test among the several tests of significance developed by satisfaction. Chi-square, symbolically written ^{2}is a statistical measure used in the contexts of sampling analysis for comparing a variance to a theoretical variance. It can also be used to make comparison between theoretical population and actual data when categories as used. By comparing a calculated value with the table value of ^{2} for degrees of freedom at given level of significance. We may either accept or reject the null hypothesis .If the calculated value of ^{2} is less than the value, the null hypothesis is accepted ,but if the calculate value is equal or greater than table, value the hypothesis is rejected.

The formula applied for Chi-square

$$\chi^2 = \sum_i \frac{(i-i)}{i} \qquad \text{———}$$

Oi = Observed Frequency Ei = Expected frequency

HYPOTHESIS OF THE STUDY

The study on **Demand Forecasting Techniques and Their Effectiveness in Arunnachala Impex Private Limited, Chennai** is based on the following hypotheses:

Null Hypothesis (H_0):

There is **no significant relationship** between the effectiveness of demand forecasting techniques and factors such as employee experience, forecasting methods used, and supply chain efficiency.

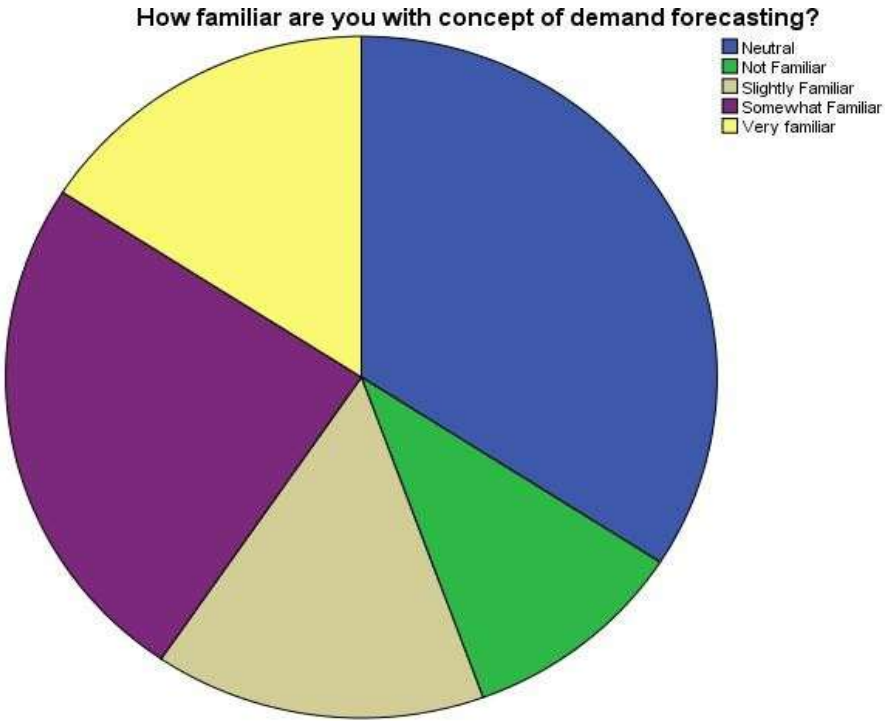
Alternative Hypothesis (H_1):

There is a **significant relationship** between the effectiveness of demand forecasting techniques and factors such as employee experience, forecasting methods used, and supply chain efficiency.

The hypothesis was tested using **Percentage Analysis and the Chi-Square Test** to determine whether demand forecasting accuracy is influenced by organizational and external factors.

FAMILIARITY WITH DEMAND FORECASTING

CLASSIFICATION	NUMBER OF RESPONDENTS	PERCENTAGE
Neutral	43	34.1
Not Familiar	13	10.3
Slightly Familiar	19	15.1
Somewhat Familiar	31	24.6
Very familiar	20	15.9



FAMILIARITY WITH DEMAND FORECASTING INTERPRETATION: -

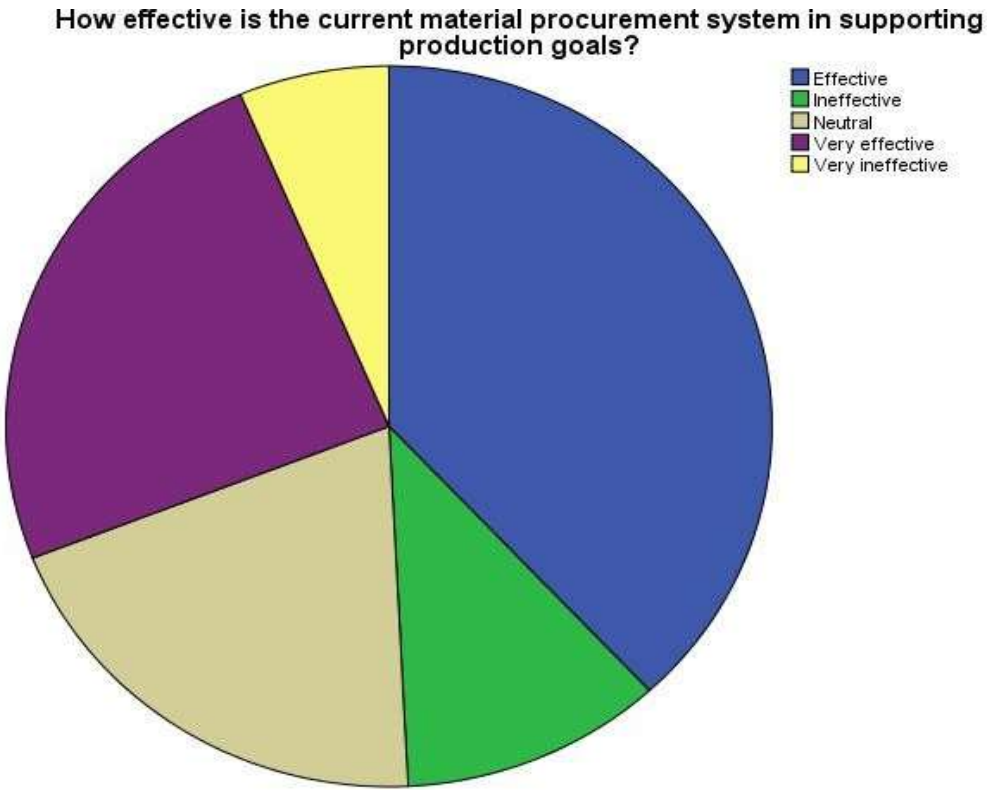
34.1% are neutral, 10.3% are not familiar, while 40.5% are somewhat or very familiar.

INFERENCE: -

There is a knowledge gap in demand forecasting, which may require training programs to enhance forecasting efficiency.

EFFECTIVENESS OF THE MATERIAL PROCUREMENT SYSTEM

CLASSIFICATION	NUMBER OF RESPONDENTS	PERCENTAGE
Effective	48	38.1
Ineffective	14	11.1
Neutral	25	19.8
Very effective	31	24.6
Very ineffective	8	6.3



EFFECTIVENESS OF THE MATERIAL PROCUREMENT SYSTEM

INTERPRETATION: -

38.1% find it effective, 24.6% very effective, while 11.1% find it ineffective.

INFERENCE: -

Procurement is largely effective, but inefficiencies still exist for some employees.

CHI – SQUARE STATISTICAL HYPOTHESIS:

Null Hypothesis (H_0): There is no significant relationship between employees' familiarity with demand forecasting and their perception of its effectiveness in their department.

Alternative Hypothesis (H_1): There is a significant relationship between employees' familiarity with demand forecasting and their perception of its effectiveness in their department.

HOW FAMILIAR ARE YOU WITH CONCEPT OF DEMAND FORECASTING?

*** DO YOU THINK THE CURRENT DEMAND FORECASTING TECHNIQUE MEETS PRODUCTION REQUIREMENTS?**

Cross tabulation							
How familiar are you with concept of demand forecasting?		Do you think the current demand forecasting technique meets production requirements?					Total
		Agree	Disagree	Neutral	Strongly agree	Strongly disagree	
Neutral	Count	7	10	18	4	4	43
	Expected Count	10.9	5.8	12.6	10.2	3.4	43.0
Not Familiar	Count	0	0	4	7	2	13
	Expected Count	3.3	1.8	3.8	3.1	1.0	13.0
Slightly Familiar	Count	4	2	6	5	2	19
	Expected Count	4.8	2.6	5.6	4.5	1.5	19.0
Somewhat Familiar	Count	15	3	5	6	2	31
	Expected Count	7.9	4.2	9.1	7.4	2.5	31.0
Very familiar	Count	6	2	4	8	0	20
	Expected Count	5.1	2.7	5.9	4.8	1.6	20.0
Total	Count	32	17	37	30	10	126
	Expected Count	32.0	17.0	37.0	30.0	10.0	126.0

CHI – SQUARE TEST

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	35.755[a]	16	.003
Likelihood Ratio	40.200	16	.001
N of Valid Cases	126		
a. 15 cells (60.0%) have expected count less than 5. The minimum expected count is 1.03.			

INFERENCE: -

The Chi-Square test result ($\chi^2 = 35.755$, $p = 0.003$) indicates a significant relationship between employees' familiarity with demand forecasting and their perception of whether the current demand forecasting technique meets production requirements. Since the p-value is less than 0.05, we reject the null hypothesis (H_0 : There is no significant relationship between familiarity with demand forecasting and perception of its effectiveness) and accept the alternative hypothesis (H_1: There is a significant relationship between familiarity with demand forecasting and perception of its effectiveness). This suggests that employees with different levels of familiarity have varying opinions on the effectiveness of demand forecasting techniques, highlighting the need for targeted training programs to enhance understanding and utilization of forecasting methods.

STATISTICAL HYPOTHESIS:

Null Hypothesis (H_0): There is no significant relationship between the perceived accuracy of demand forecasting and its impact on production efficiency.

Alternative Hypothesis (H_1): There is a significant relationship between the perceived accuracy of demand forecasting and its impact on production efficiency.

HOW OFTEN IS THE DEMAND FORECASTING TECHNIQUE REVIEWED OR UPDATED? * HOW EFFECTIVE IS THE CURRENT MATERIAL PROCUREMENT SYSTEM IN SUPPORTING PRODUCTION GOALS?

Cross tabulation							
How often is the demand forecasting technique reviewed or updated?		How effective is the current material procurement system in supporting production goals?					Total
		Effective	Ineffective	Neutral	Very effective	Very ineffective	
Annually	Count	12	9	8	9	2	40
	Expected Count	15.2	4.4	7.9	9.8	2.5	40.0
Half-yearly	Count	24	1	7	5	2	39
	Expected Count	14.9	4.3	7.7	9.6	2.5	39.0

Never	Count	4	0	0	3	1	8
	Expected Count	3.0	.9	1.6	2.0	.5	8.0
Quarterly	Count	5	1	6	10	1	23
	Expected Count	8.8	2.6	4.6	5.7	1.5	23.0
	Count	3	3	4	4	2	16
	Expected Count	6.1	1.8	3.2	3.9	1.0	16.0
	Count	48	14	25	31	8	126
	Expected Count	48.0	14.0	25.0	31.0	8.0	126.0

CHI – SQUARE TEST

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	29.960[a]	16	.018
Likelihood Ratio	31.901	16	.010
N of Valid Cases	126		
a. 16 cells (64.0%) have expected count less than 5. The minimum expected count is .51.			

INFERENCE: -

The chi-square test examines the relationship between the frequency of demand forecasting technique updates and the effectiveness of the current material procurement system in supporting production goals. The Pearson Chi-Square value is 29.960 with 16 degrees of freedom, and the p-value is 0.018, which is less than the conventional significance level of 0.05. This indicates that we reject the null hypothesis (H_0), which states that there is no significant relationship between how often demand forecasting is updated and the perceived effectiveness of the procurement system. Instead, we accept the alternative hypothesis (H_1), suggesting that the frequency of updating demand forecasting techniques has a significant impact on the effectiveness of the material procurement system in achieving production goals. This implies that regular updates to forecasting techniques may enhance procurement efficiency, leading to better production outcomes.

ANOVA

STATISTICAL HYPOTHESIS:

Null Hypothesis (H_0): There is no significant difference in satisfaction with demand forecasting techniques across different experience levels.

Alternative Hypothesis (H_1): There is a significant difference in satisfaction with demand forecasting techniques across different experience levels.

ANOVA

How 2 are you with effectiveness of current demand forecasting techniques?					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.922	3	.641	.487	.692
Within Groups	160.618	122	1.317		
Total	162.540	125			

POST HOC TEST

How 2 are you with effectiveness of current demand forecasting techniques?		
Duncan[a,b]		
How many years have you been working with Arunnachala impex private limited?	N	Subset for alpha = 0.05
		1
2.0	42	2.452
4.0	14	2.500
1.0	43	2.628
3.0	27	2.778
Sig.		.362

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 25.718.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

INFERENCE: -

The ANOVA results, there is no statistically significant difference in the level of satisfaction with the effectiveness of current demand forecasting techniques among employees with different years of experience at Arunachala Impex Pvt Ltd, as the p-value (Sig.) is 0.692, which is greater than the 0.05 threshold. Therefore, we fail to reject the null hypothesis (H_0) and conclude that years of experience do not significantly impact employees' satisfaction with the forecasting techniques. The post hoc Duncan test further supports this, as all experience groups fall within the same homogeneous subset, indicating no meaningful group-wise differences.

FINDINGS:

- **34.1%** of employees are neutral about their familiarity with demand forecasting, while **10.3%** are unfamiliar with it. This indicates a **need for training programs**.
- **38.9%** of employees cite **market fluctuations** as the main challenge in demand forecasting, followed by **supply chain disruptions (22.2%)** and **inconsistent historical data (19.4%)**.

SUGGESTIONS:

- Reduce Dependency on Manual Forecasting – Shifting from traditional spreadsheets to automated forecasting software can reduce human errors and increase forecasting efficiency.
- Diversify Data Sources – Relying on multiple data points such as customer feedback, industry trends, and competitor strategies will improve the accuracy of demand predictions.
- Optimize Inventory Management – Demand forecasting should be integrated with inventory management systems to prevent overstocking or stock shortages.
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CONCLUSION :

The study on demand forecasting at Arunnachala Impex Private Limited, Chennai, highlights its importance in improving inventory control, reducing production delays, and enhancing supply chain efficiency. While the company uses moderately effective forecasting methods, there is considerable scope for improvement through the use of AI-driven models, real-time data, and
predictive analytics. Challenges such as market fluctuations, inconsistent data, and supply chain disruptions currently hinder forecast accuracy. Additionally, many employees are either unaware or uncertain about forecasting practices, indicating a need for training and capacity building. By adopting advanced forecasting tools, encouraging collaboration between departments, and regularly evaluating forecasting models, the company can improve its demand planning process. A technology-focused, data-driven approach will help reduce uncertainty, lower costs, and increase customer satisfaction.
Strengthening demand forecasting practices will ultimately support better decision-making and enhance the company's overall operational performance and competitiveness in the market.

REFERENCES :

- **K. Toke and R. C. Gupta (2010),** "Green Supply Chain Management, Critical Research and Practices". Proceedings of the 2010 International Conference on Industrial Engineering and Operations Management Dhaka, Bangladesh, Pp- 9 – 10.
- **Abimbola O Aniki, Charles Mbohwa (2014)**, "Improvement of Logistics and Supply Chain Management in the Cement Industry in Nigeria". Indian Journal of Research, Volume : 3 | Issue : 10 | Oct 2014, Pp.73-74.
- **Ashish Kumar Bhateja and Rajesh Babbar (2011),** "Study of Green Supply Chain Management in the Indian Manufacturing Industries: A Literature Review cum an Analytical Approach for the measurement of performance". IJCEM International Journal of Computational Engineering & Management, Vol. 13, Pp -84-99.