

Sales And Demand Forecasting Using Time Series Analysis Evidence From A Textile Manufacturing Enterprise In Karur, Tamil Nadu

Poorani S¹, Dr.Suganya², Dr.R. Florence Bharathi³

^{1,2,3}Dept of Business Administration

^{1,2,3}vivekananda institute of information and management studies], Tamil Nadu, India

Abstract- *Accurate sales and demand forecasting is a strategic imperative for textile manufacturing enterprises operating in volatile, seasonally driven markets. This study applies time series analysis to historical sales and demand data (2022–2025) of Ascent Textiles, a home textile manufacturer based in Karur, Tamil Nadu, to evaluate performance patterns and generate forward-looking projections for 2026. The analysis examines trend, seasonality, cyclical movement, and irregular variation across product categories and geographic markets. Findings reveal a sustained upward sales trajectory — from ₹9.8 million in 2022 to ₹16.7 million in 2025 — with peak demand concentrated in the final quarter of the year. Domestic markets account for approximately 61.78% of total revenue, while export markets, led by the USA and UK, contribute the remaining 38.22%. Tablecloths and cushion covers emerge as the highest-revenue product segments. Power BI-based forecasting confirms continued growth through 2026, tempered by evidence of periodic overproduction. The study demonstrates the practical value of data-driven forecasting in improving production planning, inventory management, and strategic decision-making in textile SMEs.*

Keywords: Time Series Analysis, Sales Forecasting, Demand Forecasting, Textile Industry, Power BI, Business Analytics, Karur, SME

I. INTRODUCTION

1.1 Background

The textile industry occupies a pivotal position in India's industrial and export economy. Tamil Nadu, and specifically the city of Karur, has established itself as a leading centre for home textile production, supplying cotton-based products to domestic and international markets alike. Within this competitive environment, the ability to anticipate customer demand and align production accordingly has become a critical managerial competency.

Sales and demand forecasting enables organizations to move from reactive operational adjustments to proactive strategic planning. Without rigorous forecasting, textile firms risk overproduction — leading to elevated inventory costs — or underproduction, resulting in lost sales and diminished customer confidence. Time series analysis provides a structured, data-driven methodology for identifying patterns in historical sales data, including long-term trends, seasonal variations, cyclical movements, and irregular fluctuations.

This study focuses on Ascent Textiles, a micro enterprise established in 2001–2002 and located in Karur, Tamil Nadu. Operating in the home textile segment with products including terry towels, kitchen linen, tablecloths, and cushion covers, the company serves both domestic wholesalers and international exporters across the USA, UK, UAE, and Australia. The study applies time series methodology to sales data spanning 2022 to 2025 to derive forecasting insights for the 2026 period.

II. LITERATURE REVIEW

Time series forecasting has an extensive theoretical foundation in both statistical methodology and business application. Box and Jenkins (1976) established the ARIMA framework as a cornerstone of time series modelling, enabling systematic decomposition of data into autoregressive and moving-average components. Montgomery, Jennings, and Kulahci (2015) extended this foundation with applied approaches suitable for manufacturing and operations contexts.

Holt (2004) and Brown (1959) contributed exponential smoothing models capable of capturing trend and seasonal components, which are particularly relevant in consumer goods and textile industries where seasonal demand peaks are pronounced. Hyndman and Athanasopoulos (2018) offer a comprehensive modern treatment of forecasting principles and practice, emphasizing model selection based on data characteristics rather than one-size-fits-all application.

In the textile domain, demand is shaped by intersecting forces: festival calendars, fashion cycles, export contract cycles, and macroeconomic conditions (Heizer, Render & Munson, 2017). Kotler and Keller (2016) argue that understanding demand dynamics is foundational to effective marketing and production strategy. Chatfield (2000) emphasizes the role of visualization in interpreting time series output — a consideration directly reflected in this study's use of Power BI dashboards for forecasting.

Research in Indian textile SMEs specifically highlights the gap between available data and its analytical utilization (Panneerselvam, 2012; Gupta, 2014). This study responds to that gap by demonstrating an accessible, tool-based application of time series forecasting in a real manufacturing context.

III. RESEARCH METHODOLOGY

3.1 Study Design and Data Collection

This study adopts a descriptive and analytical research design. Primary data were collected from Ascent Textiles through structured interaction with management and review of internal sales records. Secondary data were sourced from industry reports published by the Ministry of Textiles (Government of India), IBEF, and FICCI, as well as academic references. The study period spans four years, from 2022 to 2025, encompassing monthly, quarterly, and annual sales observations across product categories and geographic markets.

3.2 Analytical Tools and Techniques

The primary analytical instrument is time series analysis, applied to identify the four classical components of sales data: trend, seasonal variation, cyclical movement, and irregular fluctuation. Trend analysis establishes the directional movement of sales over the study period. Seasonal analysis identifies recurring intra-year patterns associated with festival cycles, export order calendars, and market demand peaks. Cyclical and irregular components are noted where identifiable in the data.

Data visualization and forecasting were executed using Microsoft Power BI, which employs built-in time series forecasting algorithms to project values beyond the observed period. Additional descriptive statistical analysis was applied to product-wise and geography-wise sales distributions. Year-on-year growth rates were computed to quantify sales trajectory.

3.3 Scope and Limitations

The study is confined to a single enterprise and therefore findings are not directly generalizable across the sector. Forecast accuracy is inherently contingent on the quality and completeness of historical records. External macroeconomic shocks, supply chain disruptions, and geopolitical events affecting export demand fall outside the predictive scope of the model employed.

IV. RESULTS AND ANALYSIS

4.1 Yearly Sales Performance (2022–2025)

The company's annual sales demonstrate consistent, uninterrupted growth over the four-year study period, as presented in Table 1.

Year	Sales (₹)	YoY Growth (%)
2022	9,800,000	—
2023	12,100,000	+23.47%
2024	14,500,000	+19.83%
2025	16,700,000	+15.17%

Table 1: Annual Sales Performance of Ascent Textiles (2022–2025)

Total cumulative sales over the four-year period reached approximately ₹53.1 million. Although the year-on-year growth rate shows a gradual deceleration — from 23.47% in 2023 to 15.17% in 2025 — the trajectory remains firmly positive, reflecting stable market expansion and effective customer retention.

4.2 Yearly Demand Analysis

Demand figures follow a comparable upward trend, rising from ₹8.5 million in 2022 to ₹15.8 million in 2025 (Table 2). The sustained alignment between demand and sales growth reflects effective inventory management in most periods, though the consistent presence of sales values above demand values suggests periodic inventory drawdown or order fulfilment from pre-built stock.

Year	Demand (₹)
2022	8,500,000
2023	10,200,000
2024	12,500,000
2025	15,800,000

Table 2: Annual Demand Analysis (2022–2025)

4.3 Monthly Sales Trend Analysis

Monthly disaggregation of sales data reveals clear seasonality. Sales commenced at ₹4,000,000 in January and progressed with moderate fluctuation through mid-year. A pronounced acceleration occurs from September onward, culminating in peak monthly sales of ₹13,800,000 in December. October and November also recorded elevated values of ₹11,200,000 and ₹12,500,000 respectively. This Q4 concentration is consistent with the textile industry's exposure to festival season demand, end-of-year export fulfilment, and heightened retail purchasing activity.

The overall monthly trend line confirms a positive trajectory, indicating that the company's growth is not confined to any single period but is broadly distributed across the year, with seasonal amplification in the final quarter.

4.4 Geographic Sales Distribution

Domestic sales account for approximately 61.78% of total revenue, with Chennai (₹12,500,000), Mumbai (₹10,800,000), and Delhi (₹9,700,000) representing the three largest individual markets (Table 3). International sales, constituting 38.22% of revenue, are led by the USA (₹7,200,000) and UK (₹5,800,000), with the UAE and Australia contributing ₹4,700,000 and ₹3,900,000 respectively (Table 4).

Domestic Location	Sales Value (₹)
Chennai	12,500,000
Mumbai	10,800,000
Delhi	9,700,000
Bengaluru	8,900,000
Kolkata	7,600,000
Hyderabad	6,900,000

Table 3: Domestic Sales Distribution

International Market	Sales Value (₹)
USA	7,200,000
UK	5,800,000
UAE	4,700,000
Australia	3,900,000

Table 4: International Sales Distribution

4.5 Product-Wise Sales Analysis

Product category analysis reveals meaningful variation in revenue contribution (Table 5). Tablecloths are the highest-performing product at 197,400 units, followed by cushion covers (187,080 units) and towels (176,760 units). Curtains and bedsheets contribute comparatively lower volumes. The concentration of revenue in tablecloths and home furnishing categories reflects broader global demand trends for Indian cotton household textiles.

Product Category	Sales (Units)
Tablecloths	197,400
Cushion Covers	187,080
Towels	176,760
Curtains	166,440
Bedsheets	156,120

Table 5: Product-Wise Sales Distribution

V. TIME SERIES FORECASTING AND 2026 PROJECTIONS

The Power BI forecasting model, applied to historical sales data from 2022 to 2025, projects a continuation of the upward growth trend through 2026. The algorithm accounts for both the long-term trend component and seasonal variation patterns identified in the historical record.

Forecast results indicate expected sales growth in 2026, with Q4 anticipated to maintain its position as the peak demand period. The model also identifies months in the first half of the year as comparatively lower-demand periods, informing decisions on production scheduling and raw material procurement. Minor fluctuations around the trend line are expected and are attributable to irregular variation —

demand responses to promotional activity, export order timing, and market conditions.

Importantly, the analysis identifies evidence of periodic overproduction — instances where production volumes exceeded realized sales — indicating that the current planning process is not fully calibrated to the seasonal demand profile. The forecasting framework developed in this study provides a corrective mechanism: aligning production volumes with anticipated demand during both peak and trough periods.

VI. DISCUSSION

The findings of this study carry several practical and strategic implications for Ascent Textiles and, more broadly, for textile SMEs operating in comparable environments.

First, the concentration of domestic revenue in metropolitan markets — particularly Chennai, Mumbai, and Delhi — suggests a well-established distribution network in urban India, but also a relative under-penetration of tier-2 and tier-3 markets, which present growth opportunities. International sales, while already diversified across four major markets, are led by the USA and UK, indicating alignment with established Indian home textile export corridors. Strategic expansion into emerging markets could diversify export risk and unlock incremental revenue.

Second, the product mix data highlight tablecloths and cushion covers as the company's primary revenue drivers. Resource allocation — in terms of raw material procurement, production scheduling, and marketing investment — should be proportionate to this product hierarchy while actively addressing the demand gap for lower-performing categories such as bedsheets and curtains.

Third, the seasonal demand pattern, with Q4 peaks and a more subdued first half, has direct implications for workforce planning, inventory buildup, and supplier management. Proactive planning around this cycle would reduce overproduction episodes and improve working capital efficiency.

Finally, the successful application of Power BI in this study demonstrates that accessible business intelligence tools can deliver meaningful forecasting capability without requiring advanced statistical software — an important consideration for micro and small enterprises with constrained analytical resources.

VII. CONCLUSION

This study demonstrates that time series analysis, supported by accessible visualization and forecasting tools, can generate actionable business intelligence for textile SMEs. Ascent Textiles exhibited consistent sales growth between 2022 and 2025, with a compound trajectory confirmed by forecasting models to extend through 2026. The identification of seasonal concentration, geographic revenue distribution, and product-category performance provides a multi-dimensional foundation for strategic and operational planning.

The study affirms that data-driven forecasting is not exclusively the domain of large enterprises. For micro and small manufacturers in Karur and comparable textile clusters, systematic analysis of existing sales records — combined with accessible tools such as Power BI — can materially improve production planning accuracy, reduce inventory-related inefficiencies, and strengthen competitive positioning. Future research may extend this framework to incorporate ARIMA or machine learning-based models, enabling finer-grained forecasting across shorter time horizons.

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