

Silky Silk & Cottony Cotton Corp

Data Miners Anonymous –
Business Optimization Exercise

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Silky Silk & Cottony Cotton Corp (SSCCC)

Apparel exports—US\$28.8b (2010)

SSCCC

- 9% of import trade from China
- 12% of women apparel market in US
- Annual revenue: \$2.5b
- Diversified Retail base: High end fashion to Wal-Mart!
- Silk & Cotton Apparels

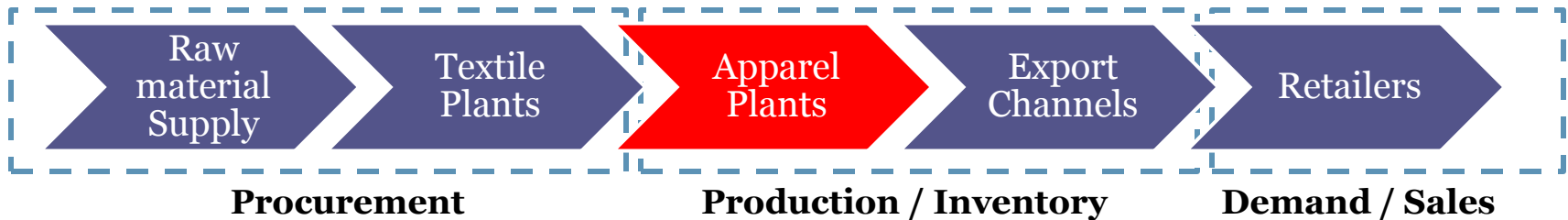
The Business Model

Client : Medium sized Apparel Export Manufacturer

Product: Womens apparel for all seasons

End Customers: Large retailers, high end fashion houses and brand owners.

Value Chain:



Supply:

- Textile and accessory manufacturers located in industrial clusters in close proximity.
- Suppliers absorb inventory costs only at material booking stage

Demand:

- Buyers primarily follow Lean Retail model.
- *Production time:*
 - Regular orders : 16 weeks
 - Adhoc orders: Starting from 4 weeks

Costs:

Direct Costs : Fabric procurement, labor and shipping

Supply Chain Costs:

Impacted by cycle time and demand forecasts

WIP Inventory and Finished Goods Inventory

Motivation & Mandate

Motivation: CCSSS wants to build a 5 year plan to optimize operating and capital expenditure post the drop in demand since 2008

Mandate:

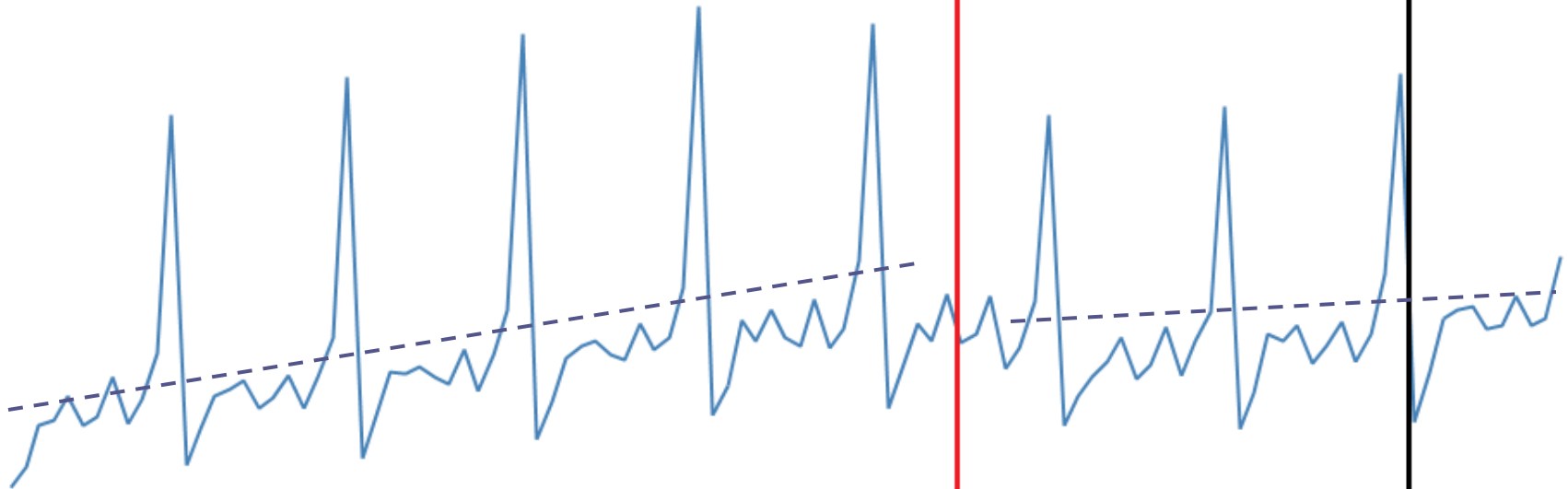
- Identify reason for demand drop in 2008
- Reduce operating expenditure. Forecast seasonality to optimize procurement, inventory and production schedules
- Rationale Capacity build-up and Capital expenditure. Forecast 5 year requirement by modeling trends in the data

Apparel Demand - Data Visualization

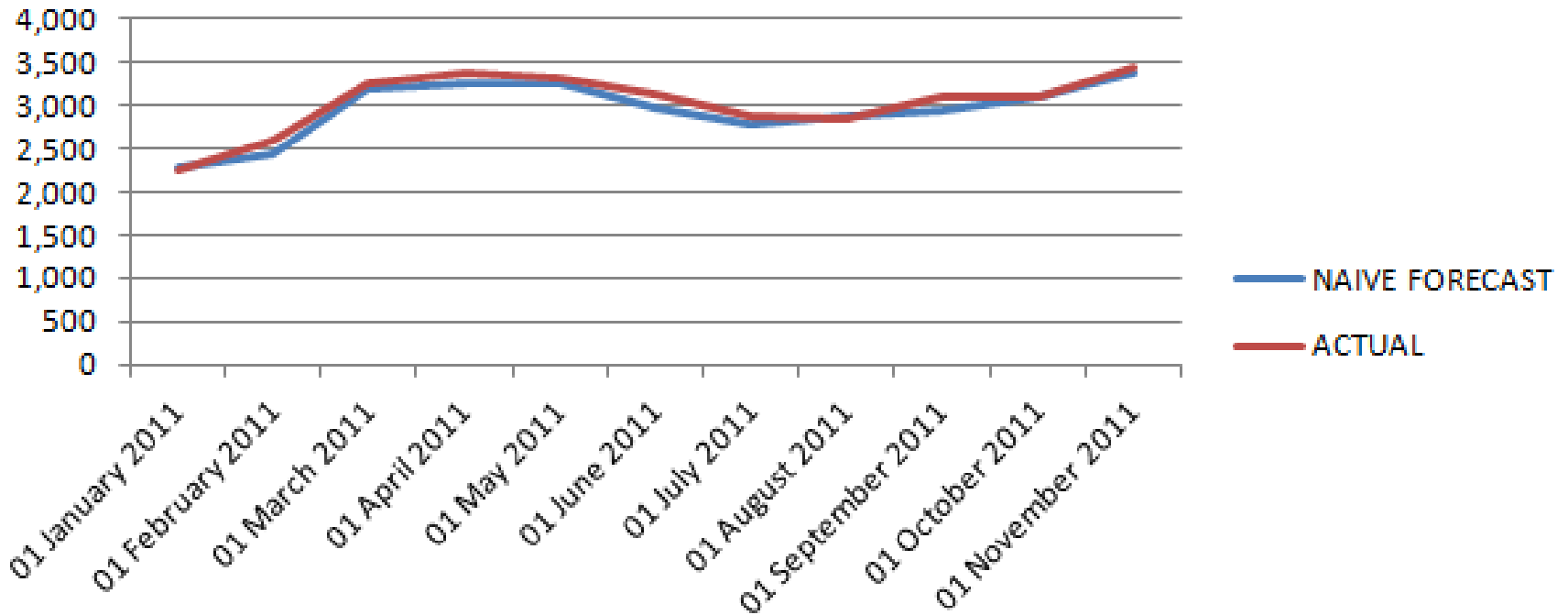
HISTORICAL DATA

TRAINING

VALIDATION



Forecasting Method: Naïve Forecast

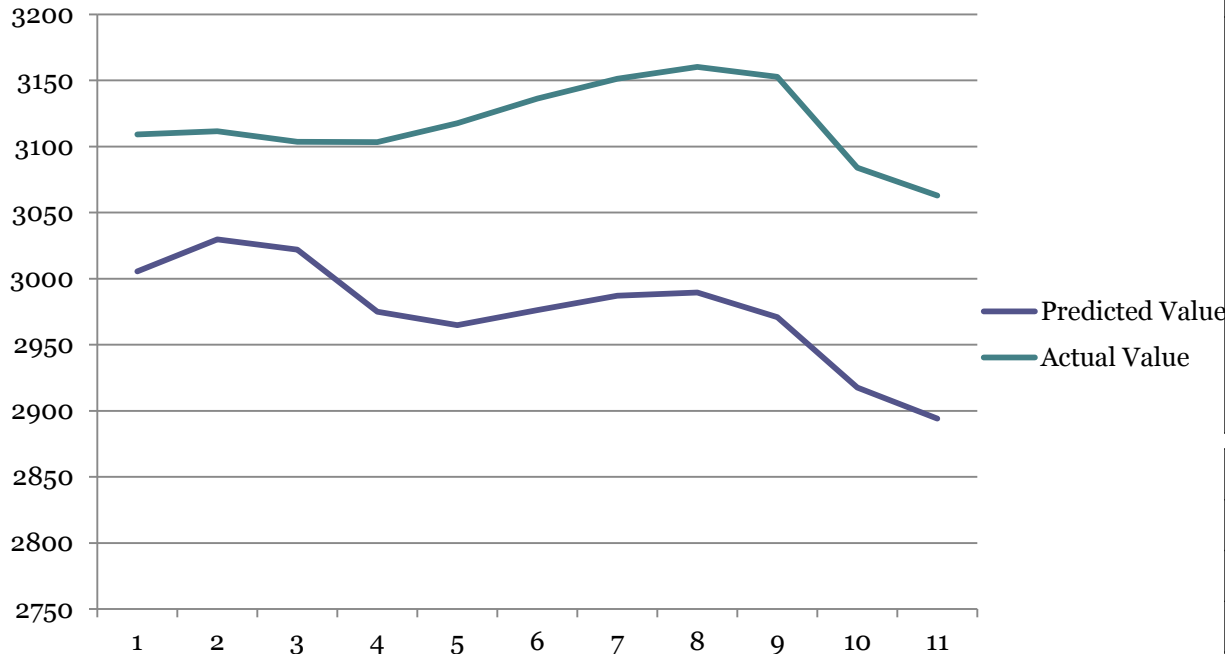


We can also look to get the naïve forecast today, for the next 3 to 5 years BUT this will certainly not capture the trend on the data. And hence the need for a model by which we can forecast the trend.

NAIVE FORECAST ACCURACY MEASURES	
Average Error	67.91
MAE	79.18
MSE	8,846.27
RMSE	94.05
MAPE	2.64%

** Numbers are in Millions of Dollars

Forecasting Method: MLR (De-Seasonalized Data)



Input Variables	Coefficient
Constant Term	3198.83667
Time period	-5.2252631
Month Index_2	29.4169121
Month Index_3	26.8172245
Month Index_4	-14.799147
Month Index_5	-19.749014
Month Index_6	-3.2821331
Month Index_7	12.9182272
Month Index_8	20.4768238
Month Index_9	7.24375343
Month Index_10	-40.922749
Month Index_11	-59.014053
Month Index_12	-24.638807

Month	Index
January	0.744875
February	0.783602
March	0.988239
April	1.035306
May	1.059817
June	0.96602
July	0.894713
August	0.954848
September	0.953861
October	1.011707
November	1.092886
December	1.514124

Training Data scoring - Summary Report

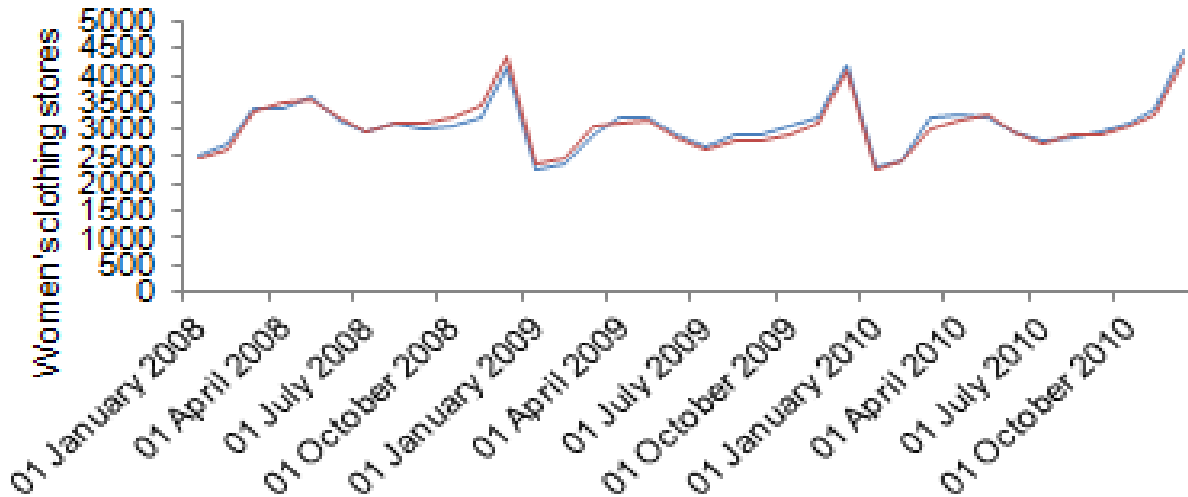
Total sum of squared errors	RMS Error	Average Error
150224.1377	64.59793119	0.000111287

Validation Data scoring - Summary Report

Total sum of squared errors	RMS Error	Average Error
234802.9189	146.101745	141.8123997

Forecasting Method: Holt Winter's

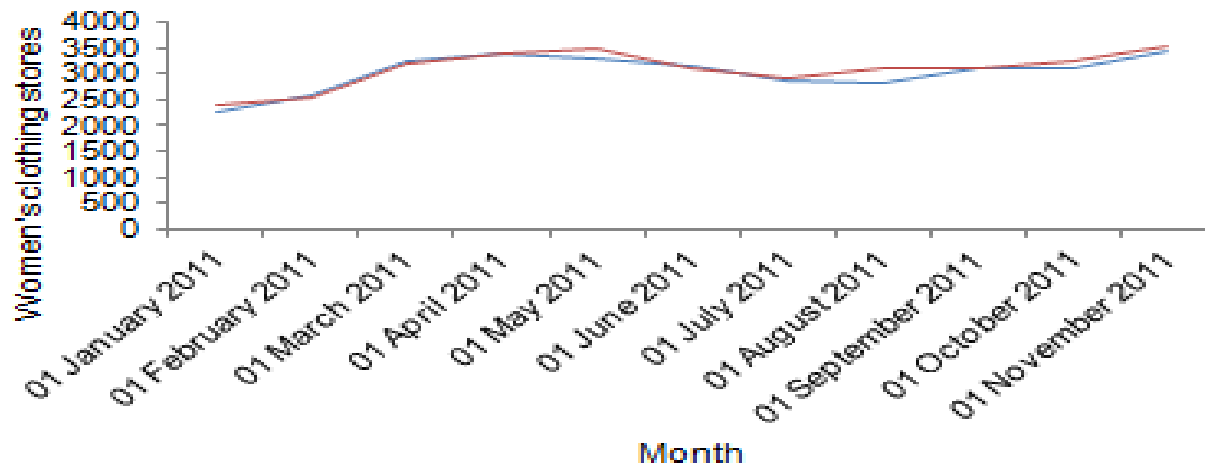
Time Plot of Actual Vs Forecast (Training Data)



Error Measures (Training)

MAPE	2.8428922
MAD	87.717358
MSE	10441.209

Time Plot of Actual Vs Forecast (Validation Data)



Error Measures (Validation)

MAPE	2.8219775
MAD	81.759845
MSE	12469.901

— Actual — Forecast

Recommendations

- *Holt Winter provides the best performance on the forecasts as demanded by the mandate*
- *While the Naïve forecast provides most accurate prediction in the short term, it is ill-suited to forecast demand 5 years later*
- *For a One-Step forecast however we would prefer to use the MLR equation, and seasonally adjust it using the seasonal indexes*
- *Seasonality indexes can be directly used to adjust the production schedule and procurement policy*
- *Average demand (keeping prices constant) for year 2016 will around US\$35billion. Current capacity of the plant is more than sufficient. Recommend the company set aside funds only for maintenance Capex and explore methods of sharing excess capacity with 3rd party vendors*