Vehicle Retail Forecasting Demand and Inventory Management Case Study at Shanghai General Motors

Weiwei Zhong, Shanghai General Motor Company, Shanghai, P.R.China

ABSTRACT

Just like any investment in business, Vehicle forecast and inventory management needs to serve the purpose of maximizing profit. For manufacturers, it is crucial to manage Supply Chain Operations as efficiently and profitably as possible. As we all know, Demand-Driven forecasting allows companies to sense demand signals through the synchronization of internal/external data. As the result, the accurate demand forecast will help the motorcar manufacture to support the inventory plan. However, in many cases inventory has turned into a major cash flow constraint thus making it necessary to optimize inventory using analytical and statistical methods in an integrated approach.

SAS® Supply Chain Solution (SCS) provides vehicle manufacturers the ability to calculate the accurate Demand-Driven forecasting and optimal inventory replenishment policies, thus enabling them to keep the market share and maintain customer service levels while minimizing average total costs such as ordering, inventory holding and backorder penalty costs.

INTRODUCTION

The motorcar manufacture SGM identifies the same problem.   Further analysis reveals that inventory levels are high and turns are below most major competitors. In addition a technology change and a proliferation of models amplify the issue.

The corporate goal is a reduction of inventory across the order fulfillment process in excess of 30% with no negative impact on service levels. Customer feedback reveals that a key to customer satisfaction is on time delivery and any deviation from promised dates has a negative impact on customer satisfaction.

PROJECT BACKGROUND

1.   Vehicle Market for SGM.

China's automobile industry has experienced a sharp increase in revenue from 2009 - 2010.   The market still maintains an annual growth rate of about 10% since 2011.   Car buyers are able to select from an increasing number of competing brands and more and more vehicle models offered.SGM has been consistently ranked above the industry average by about 2 – 3% market share.

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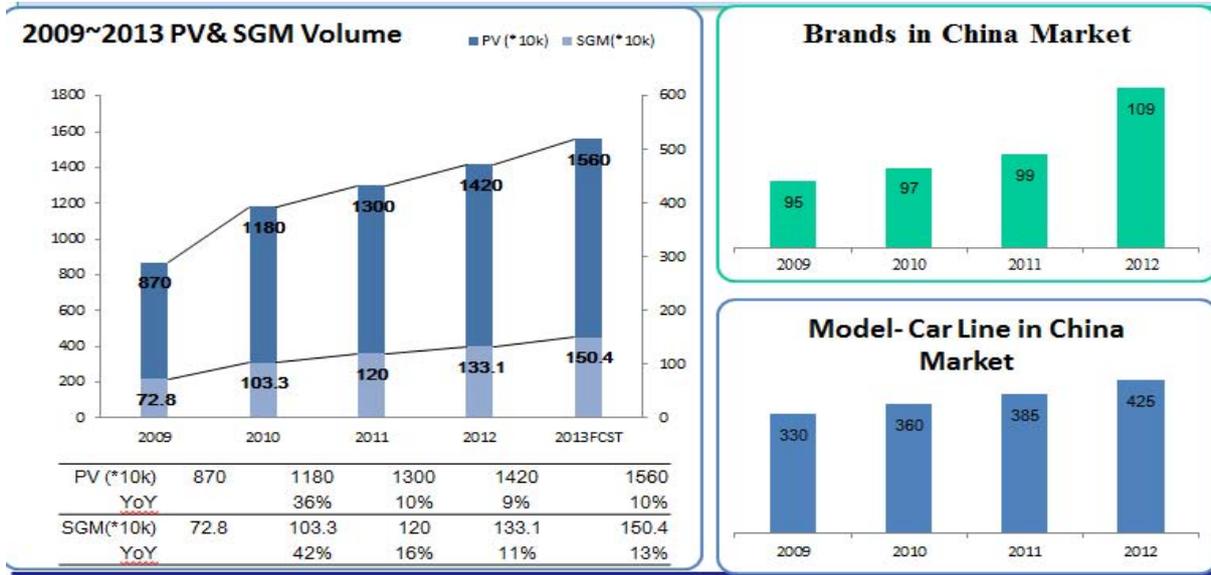

Figure1. China and SGM Car Volume Comparing

2. **Characteristic of Vehicle Forecast:**

The demand forecast is the most important input for the inventory management. Every time the Marketing and Distribution Department are considering the sales number for next term and what will the future demand level be? Which factor will affect the vehicle demand such as GPD growth ratio, oil price? The car is distributed into different province and 4S store. How many cars will be sold in different department next week? There is clear evidence that demand forecast accuracy leads directly to higher earnings per share (EPS), return on assets and profit margins.
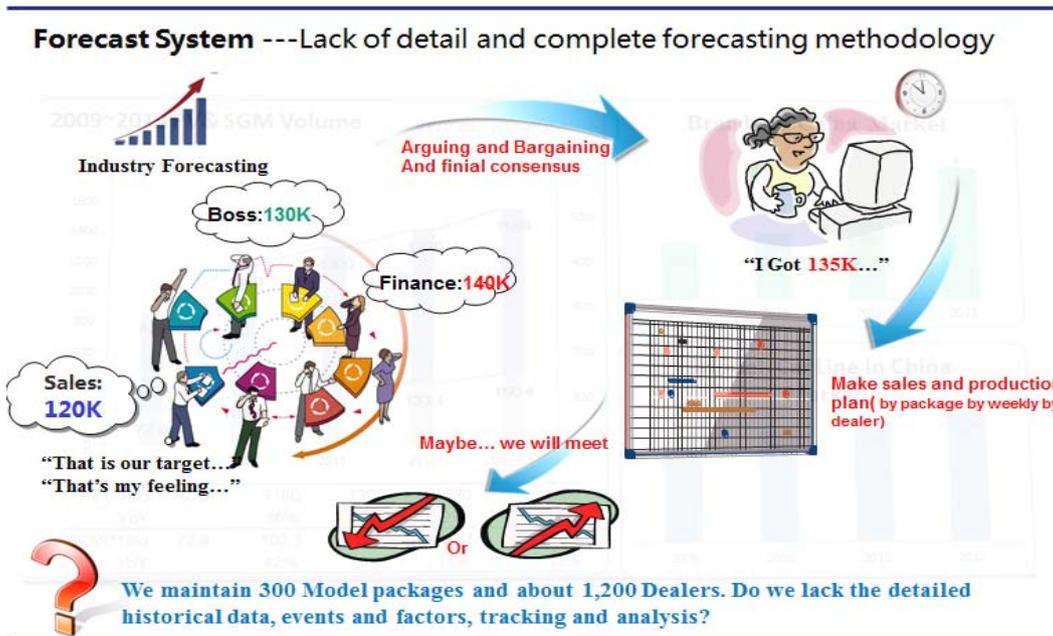

Figure2. Original Forecast System Challenge

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3. **Characteristic of Vehicle Inventory Optimization**

One of the biggest challenges in optimizing inventory is the fact that it is merely an output of many inter-organizational processes.   All too often organizations attempt to lower inventory using non-analytical approaches which lower service levels.
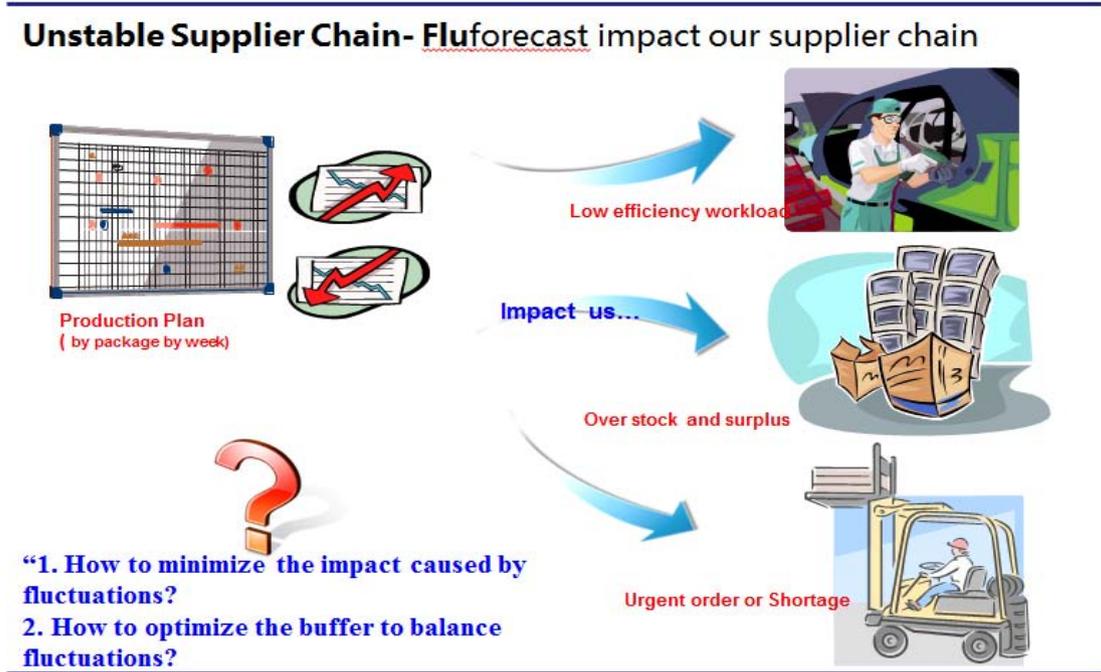

Figure3. Original Forecast System Challenge

It is very important to manage so much different package location. If the plant pushes every package in dealer result in high inventory cost and bad package management. However SGM is lack of the method to manage the package planning. It is the high issue for inventory optimization.
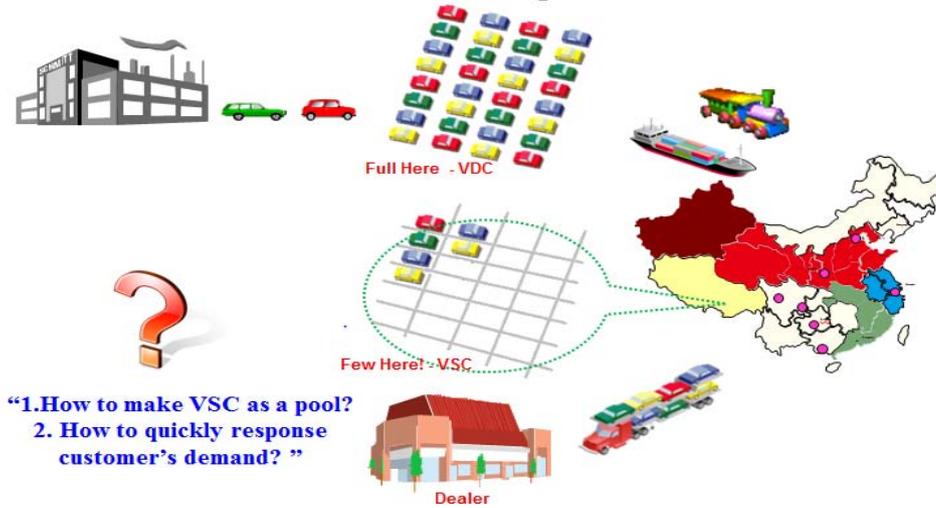

Figure4. Lack of the method to manage the package planning

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APPLICATION

STEP1.Using the SAS Demand Forecast Server to predict

SAS Demand Forecast will support the customer for different hierarchy series forecast and different model for the different series. Hierarchy for the vehicle forecast is series ->Province->Dealer. And we will summary the predict result from series to Brand. So it is critical to predict sales number in different series. And reconcile the prediction result from top to bottom down.

Figure5.   Vehicle Forecast Hierarchy

From the prediction process we will find the pattern using SAS Demand Forecast owing to the high performance forecast server and the rich model list. The forecast server can consider the external factor and different event including the user defined promotion.
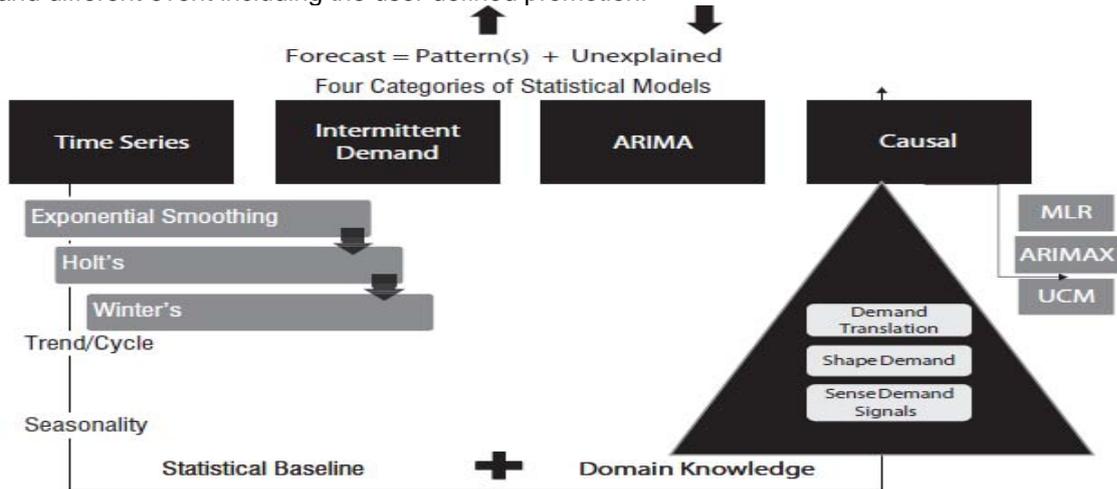
Figure6. SAS Demand Forecast Follow the Standard Prediction Process

We can predict different series with the help from SAS Demand Forecast and get the more accurate

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prediction result from SAS Server.

STEP2.Vehicle Result from Demand Forecast Server.

In order to support SGM customer vehicle forecast system, SAS build the   vehicle forecast system using batch code and Project user-customer interface from EG Add-in. The system can handle the Data Management and customer demand such as event management. The system can predict the vehicle volume next 18 month for different hierarchy. We will trace dairy sales performance for different series everyday and check the current monthly prediction result.
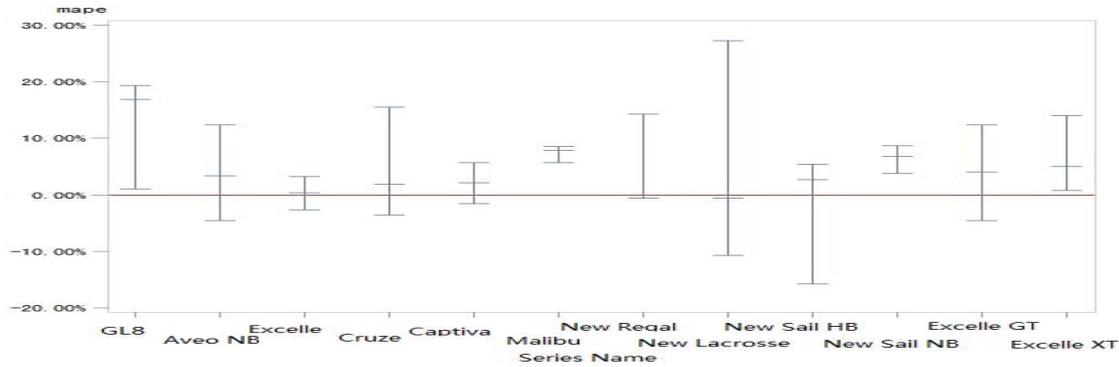

Figure7.   M1-M3 Monthly Forecast MAPE for Different Vehicle series.

  Customer interface demand forecast process will help customer to manage the system. The system is located in the EG Add-in interface.

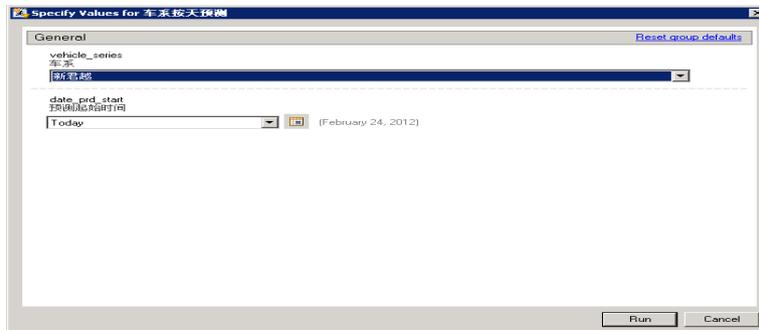Figure8. Customer Interface demand forecast system

Figure9. Dairy Sales Tracing

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STEP3.Using the SAS Inventory Optimization Method

In order to offer system solutions for weekly operational decision, the stock management model and order parameters have been defined and solved. Service level ,safety stock level, normal delivery ability, emergency delivery ability, the most optimized delivery cycle time, the probability of different delivery situation and management cost (including the cost of replenishment, holding and backordering)   are all introduced in the total cost model of automotive supply logistics.

Ultimately, this powerful solution provides essential decision support by helping manufacturers answer the three fundamental questions of inventory management:

- How to plan different package location in VSC or Dealer?
- Which items have crossed inventory thresholds and should be reordered?
- How much should be ordered?

STEP4: Inventory Optimization Result from SAS® Supply Chain Solution

Although counterintuitive, it in fact is possible to reduce inventory while improving service levels simultaneously using our proven inventory management methodology.SAS inventory management methodology attacks inventory from two directions:

- Optimizing inventory levels while viewing the existing order fulfillment process as a given constraint.
- Changing the fundamental order fulfillment process across the entire system

Most clients find this two-step approach of significant value. During the first step cash can be made available quickly and success is immediately generated.   Step two is used to generate breakthrough business results and provide a robust order fulfillment process that will be able to perform at lower inventory levels while providing extraordinary service levels.
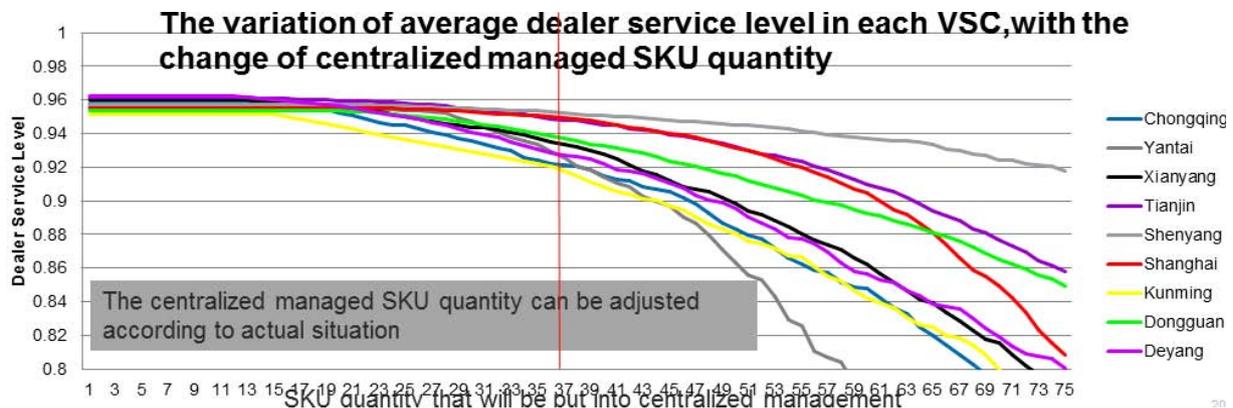

Figue10. Different package location Planning

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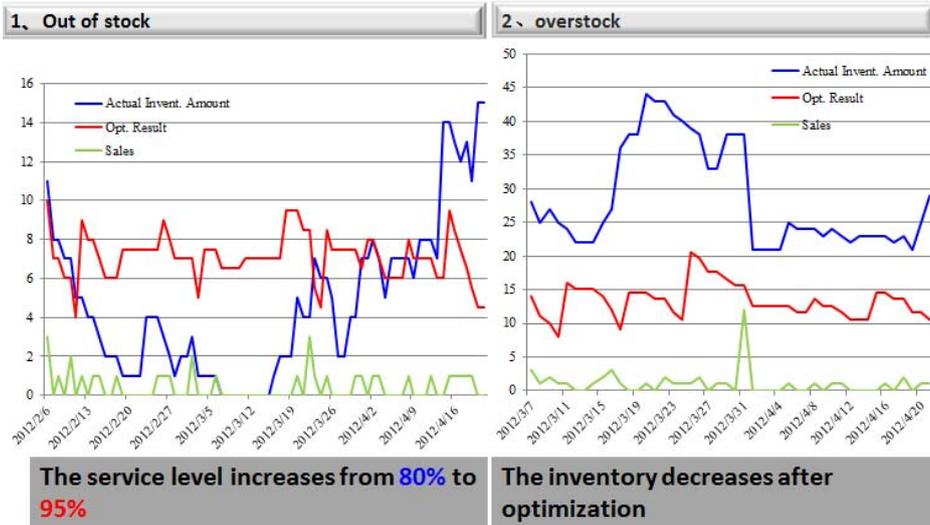

Figure11. Dealer Level Inventory Optimization

CONCLUSION

SAS® Supply Chain Solution can perform quickly with hundreds of thousands of items, which dramatically eases complicated processes such as large-scale vehicle prediction and inventory planning. These capabilities help our company SGM increase sales share and reduce inventory costs and achieve target customer service levels.

REFERENCES

ACKNOWLEDGMENTS <HEADING 1>

RECOMMENDED READING<HEADING 1>

CONTACT INFORMATION <HEADING 1>

Your comments and questions are valued and encouraged. Contact the author at:

Name: Christina Zhong
Enterprise: Shanghai General Motors Co. Ltd
Address: 1500 Shengjiang RD
City,StateZIP: 201206
Work Phone: 0086-021-28908604
Fax:
E-mail:weiwei_zhong@shanghaigm.com
Web: