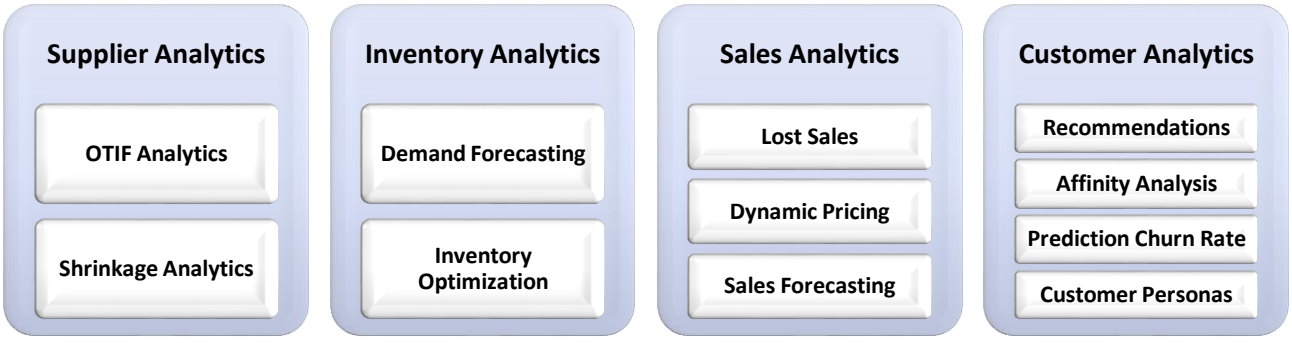
Improving Performance KPIs in the Automotive Aftermarket Industry using Big Data Analytics

1. Introduction

The Automotive Aftermarket Parts industry is a secondary industry serving the repairs and maintenance of vehicles. The market is generally split into two groups – OEM network and independent aftermarket (IAM). IAM ecosystem constitutes of generic manufacturers who produce aftermarket parts, independent wholesalers/distributors, online distributors & retailers and workshops & DIYers.

The retailers and workshops use a **B2B E-commerce platform** for placing orders for parts & supplies and wholesalers/distributors deliver them in the stipulated timelines. The B2B E-commerce platform generates exponential data such as customer data, product information, pricing data, and order details. All this data that may exist as separate siloes but have the potential to provide significant insights if considered together. Aftermarket wholesalers/distributors can make better business decisions for superior *customer delight*, driving *revenue growth* and *improving profits* by implementing new technology initiatives such as **Big Data Analytics** tools (like **Google Tensor Flow** and **Apache Spark**) to capture and draw hidden patterns and unknown relations.

This paper discusses methods to bring more predictability and to streamline the operations using Big Data Analytics and Machine learning (ML) techniques in different functions of Aftermarket business. Following analytics are discussed.



2. Supplier Analytics

2.1. OTIF Analytics

B2B E-commerce platforms can be integrated with firms' ERP systems bringing focus onto suppliers' data. Certain key KPIs like **OTIF** determine the performance of suppliers.

On time (OT) and **In Full (IF)** are KPIs used to ascertain the performance of suppliers. OTIF is ratio of the number of cases that were supplied exactly as ordered to the number of cases ordered.

A low OTIF usually indicates that sales are being lost and customer satisfaction is low. Improving OTIF will result in

- increasing the operating profit due to improved quality, better inventory control, better customer orders taking
- increasing of sales due to improved product availability for sales

It is therefore important to measure this KPI and ensure that it is being improved.

2.2. Shrinkage Analytics

Some of the reasons for **Shrinkage** are that when all expected or actual inventory doesn't get sold due to problems like breakage during shipment or incorrect packaging of goods supplied. The company can use predictive analytics to get insights on which supplies are likely to arrive at wholesaler/distributor in an unusable condition. Then, if patterns emerge, the company could bring up concerns to its suppliers for appropriate actions.

3. Inventory Analytics

3.1. Demand Forecasting

The demand for parts replacement keeps fluctuating due to:

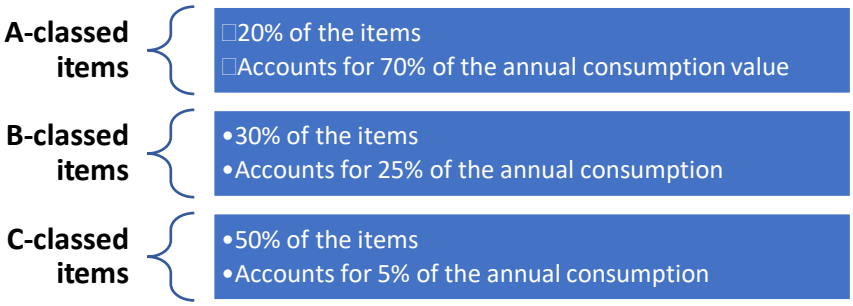
Trends in industry	Cyclic variations	Seasonal fluctuations
•With cars lasting for more time than ever, there is more demand for replacement of parts •Increase in traffic densities increases risk of accidents leading to increased demand for replacement of parts	Economic cycles will have impact on buying new vehicles, which in turn will result in varied demand for parts replacement	•Certain parts will show higher demand during certain seasons (like Wiper blades, A/C and heating systems)

Using the **historic order data**, predictive models are built through **Time Series analysis** and **probabilistic models**, to capture such demand fluctuations to large extent. For each part, such models can be generated and accordingly processes can be built to have requisite quantities ordered. This methodology will do away with traditional forecasting using **historical averages**. While older models were accurate to a season, newer models will be accurate to a fortnight or even a week, resulting in substantial cost savings.

3.2. Inventory Optimization

Shelf space in stores is a precious asset which needs to be used to maximize profitability but at the same time, satisfies customers' part requirements.

To determine "**par levels**" (the minimum quantity that must be on hand at all times), flag **obsolete items** and identify **critical parts,** the businesses must accurately classify inventory. **ABC analysis**, a particularly popular classification system, classifies inventory by the relative priority of each item against other items in the inventory.



But such classification is not as straightforward as it sounds. However, usage of ML algorithms for ABC Analysis shall improve accuracy levels to large extent.

4. Sales Analytics

Lost Sales

Whenever buyer sees parts as **unavailable** while ordering, it is considered as "**Lost Sales**"

"Lost Sale" will have a "Double whammy" effect – **loss of revenue** for seller and **customer dissatisfaction**

Once Lost Sales notification is received**, Automated action** should be initiated for ordering such parts with suppliers

Techniques described for Demand forecasting and inventory optimization will help reduce "Lost Sales"

Dynamic Pricing

There are various forms of dynamic pricing in E-commerce businesses – **Peak pricing, Surge pricing, Segmented pricing and pricing based on time of purchase**.

Dynamic pricing can also be used to reduce customer churn when the application identifies a customer as being likely to churn, the firm can offer reduced prices to retain the customers.

XGBoost models can be used in predicting Dynamic pricing

Sales Forecasting

Sales forecasts at SKU level can be arrived at, using the **demand forecasts data** obtained from steps mentioned in Section **3** and **dynamic pricing** in Section 4

5. Customer Analytics

Various Customer analytics like Recommendations, Affinity Analysis, Predictive Churn Rate and Customer Personas will help increase sales and improve the profitability for the firm.

Recommendations

- Products that customer is most likely to buy, based on his purchase history or on the product he is currently viewing.
- **Collaborative filtering** and **content-based recommendations** are models used

Affinity Analysis

- Also called as **Market Basket Analysis**, these analytics are useful to identify groups of products that are bought together in a cart.
- **Apriori algorithm** is used to derive these insights from transactional order database.

Predictive Churn Rate

- In B2B E-commerce, customer **churn** can occur at **SKU level**.
- **Logistic Regression model, Bayesian Inference model** and **Pareto/NBD model** can be applied.

Customer Personas

- **Grouping customers** with **similar buying patterns** using the previous purchased products.
- The firm can target customers with particular offer
- Non-supervised learning algorithms such as **k-means** are applied to derive these analytics.

6. Conclusion

In summary, the aftermarket distributors have access to a lot of data generated from their CRM, ERP, inventory management systems and E-commerce Ordering systems. Using latest technologies like Big Data Analytics and tools like Google Tensor Flow and Apache Spark to generate insights from Suppliers Data, Inventory Data, Sales Data and Customer Data, the firms can take actions to increase sales, improve profitability and customer delight.

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