White Paper

Raw Material Price Fluctuations

Leveraging data analytics to sustain profit
Every day the world we live in is getting smaller and smaller. Countries are more connected than ever before. Globalization is not just a phenomenon, but it is the new norm and here to stay. While globalization has its own positive effect on human lives and businesses, it also creates new challenges. An unexpected event of natural calamities, financial crisis, global recession and even political instability often leads to catastrophic impact on businesses located even thousands of miles away. As a result, companies face increase in raw material prices, increase in labor cost or increase in overhead cost or other costs.

When prices of raw materials used for making industrial products (such as steel, copper and aluminum) and consumer packaged goods (such as corn, wheat and milk) go up, many companies lack the strategy and plan to quickly respond and address the issue. Therefore companies struggle to meet profitability and growth target. To sustain profit margin and meet shareholders' expectations, organizations need to plan ahead and have the necessary strategy and resources so that they can take appropriate action when they face the situation.

**Missed Opportunity**

In today’s day in time, it is hard to imagine an organization that doesn’t leverage an ERP or CRM system to run its business on daily basis.

We find most of the businesses use some sort of ERP system that may include SAP or Oracle or JDE or other ERPs or other home grown systems to process business transactions. However, as businesses accumulate transaction data over time, they overlook the value of integrating transaction data with external market data and use advanced analytics to draw valuable insights. As a result they miss the opportunity to draw many valuable insights and struggle to respond quickly. Therefore, they miss the opportunity to turn volatility in raw material prices into an advantage and stay ahead of the competition.

**Leverage analytics to create competitive advantage**

In the area of supply chain and procurement, manufacturing companies can leverage advanced analytics to analyze the impact of raw material price fluctuations, simulate different strategies and execute the strategy that provides the best possible outcome. However any organization looking to applying advanced analytics to mitigate raw materials price volatility must try to think systematically and deploy right analytics strategy that leverages power of predictive and artificial to draw valuable insights. To do this, companies mainly need to follow a three step processes:

1. **Forecast raw Material price**
2. **Identify Product or Customer Segment most impacted**
3. **Simulate and Evaluate options**
Now let’s look at each step closely and see how companies can strategize and leverage analytics at each step.

1) **Forecasting raw material price**
Most of the companies in manufacturing and consumer product group use multiple raw materials and semi-finished products to produce finished product. In some cases these raw materials are commodities itself (example in food or restaurant industry, raw materials are commodities such as wheat, cheese, pork etc ) and other cases semi-finished products are produced from other commodities(example in automotive industry, automobile companies buy gear box or car body parts from OEMs as semi-finished product but OEMs manufacture these parts using commodity raw materials such as steel, nickel or polyethylene) . Therefore in both the cases, the final cost of the raw materials is significantly driven by the cost of the commodities.

Most of the commonly used commodities are publicly traded and hence historical prices are readily available. In other cases, companies can acquire commodity historical price data from third party data providers. As these datasets come from multiple sources, companies get data in bits and pieces and also in multiple formats. Therefore they should have a well thought data integration strategy and well-designed data model to harmonize and integrate different data sets together so that data could be analyzed further.

To expedite data collection, harmonization and integration process, companies can leverage predefined data models developed by various players in the market. For an example Commolytic has developed cloud based data model which is designed to take commodities and feedstocks price feeds from multiple sources and harmonize and store in an integrated data model. Companies interested in leveraging the solution can deploy the solution within few weeks. Same solution could also be packaged and deployed as an on premise solution.
### How can we forecast raw material prices?

- Collect commodity pricing data at regular interval
- Identify the commodities that have high correlation
- Leverage predictive models to forecast raw material prices

Once data collected, harmonized and integrated into either on premise or cloud data model, organization can deploy various analytical models to forecast prices. However for accurate forecast, building right forecasting model is always a challenge. It requires special skills and experience to achieve the right level of accuracy to forecast prices. To expedite deployment, companies can deploy prebuilt forecasting models that leverage some of the advanced analytical algorithms such as multivariate regression, time series and neural network. These pre built models which could be customized if necessary expedite the development process, allowing companies to receive the ROI quicker and stay ahead in the process.

2) Analytical model to identify the impact of price fluctuations -

Companies should be equipped with analytical models that allows them to quickly pinpoint net impact, identify the product line or customer segment or any other portion of the business that is most impacted. However many companies lack the relevant analytical model. They depend on the traditional process of assembling multiple excel sheets from various sources, scrambling to integrate and analyze data and draw insights. To make the situation worse, many times these excel sheets contain incomplete, inconsistent and erroneous data, resulting wrong output and decisions. This contributes missed opportunity to execute right strategy and react to volatility in market place in right way.

Companies with right strategy for analytics and experience do not wait for the situation to occur. Rather they formulate the strategy, deploy the right architecture and implement the right solution that allows them to combine sales transaction data with raw materials pricing data and provide clear visibility into the top raw materials and their impact on revenue and gross margin. If designed correctly, analytics solution

### After identifying the impact of raw material price increase what options do I have?

- Replacing one raw material with another raw material
- Purchasing raw materials in advance
- Passing the cost increase to customer
one or more mitigation strategies:

a) Replacing raw material with another raw material - To adopt this strategy, organization should have the right analytics strategy, analytics system and model in place that can recommend whether company should buy a particular raw material or replace one material with another. Proven analytical model that leverages bills of material and sales history process allows companies to switch to cheaper raw materials when prices increases or shift production to different geographic locations that have cost advantages. Once impact of the raw material price fluctuations is quantified, business leaders can decide to choose. Well defined analytical model could guide to the best possible actions. In a specialty chemicals company, Commolytic analytics was able to quickly analyze alternate bills of materials (BOM), forecast prices of the raw materials used in alternate BOMs and come up with recommendation to replace a particular raw material which is forecasted to cost more in coming months with another raw material which is forecasted to be fairly stable, saving millions of dollars to the company. Based on this recommendation, procurement and supply chain team was able to coordinate with R&D and implement the alternate BOMs.

b) Purchasing raw materials in advance: Companies can also purchases raw materials when prices are low and stockpile an inventory that they can leverage when prices goes up. But as with any high volumes of inventory, there is an opportunity cost for the capital investment on storing extra inventory. However, companies can leverage data and analytical model to find the optimal point, find cost benefit of buying and storing inventory vs paying high price and come up with right decision.

c) Passing the cost increase to customer: Sometimes when option of absorbing the cost internally doesn’t work, companies think of passing the cost to customer. But the key challenge is finding how much and to which customer. If companies lack the right analytical model then identifying amount of price increase and product and customer for whom price increase would most beneficial takes long times. During this time companies miss the opportunity and impact the bottom line. However good news is that there are analytics solutions in the market that companies that can leverage to expedite identifying the segment and coming up with optimal price increase. Commolytic analytics leverages prior sales history to forecast future sales. Using bills of material data and projected sales and forecasted increased price, analytics can recommend the optimal price increase for each segment or product and customer.

3) Simulating multiple corrective actions and evaluate options
For every decision there is cost and there is also benefit. When companies face raw material price increase, simulating different variables, factoring best case scenario, worst case scenario and most likely scenario and conducting a sensitivity analysis is highly recommended.

When raw material prices fluctuate, market goes through a volatile period. At that time standard costs mostly generates an inaccurate profitability analysis, marketing and pricing decisions, or future production planning. Therefore it is important to deploy analytical models to understand the relationships between raw material price fluctuations and its impact other business functions and find out how much margin, by product and customer, is dependent on specific raw materials. Based on this answer, business leaders could take appropriate decisions which may include price adjustments by product and by customer or prioritizing production to the most important customers and allocating raw material to products with higher margin.
Also, most forecasting models forecast the price increase with a confidence interval. Most advanced analytics models could be designed to take these confidence intervals into account and provide multiple possible scenarios. We can also combine the sales history and sales forecast and bills of material data to simulate net impact in different situation and come up with what if scenarios.

For companies that lack the right analytics strategy or system, it is essential that they define the right strategy, deploy the right solution and leverage solution to take right decision.
Commolytic helps global enterprises negotiate effectively with vendors, analyze market volatility and forecast raw material prices, run what-if scenario to simulate profit, operate more efficiently and effectively and gain competitive advantage and maintain profitability.

With innovative advanced analytics capability, unparalleled domain and industry expertise, strategic thinking and talented and passionate people, Commolytic delivers analytics and strategic solutions to enterprises of different size and scale.

With primary base at Chicago and offshore development center in India, Commolytic helps companies realize their strategic, operational and financial objectives.

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