

## **SUPPLY CHAIN ANALYTICS**

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### **Abstract**

Curiosity in supply chain management has increased since the 1980s when firms looked the benefits of collaborative relationships within and beyond their own organization. Firms are observing that they can no longer compete effectively in isolation of their suppliers or other entities in the supply chain. Now after almost 30 years of supply chain induction, industries have a lot of data available with them. Now it is time to process the data and predict the future applying analytics concept. The research paper focuses on Supply chain Analytics literature and use. This paper encourage industries to use digital platform to meet today's need.

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## 1. Introduction

The application of statistics, mathematics, predictive modeling and machine-learning methods to discover right patterns and learning in the process of supply chain is known as Supply chain analytics. To improve forecast and efficiency and be responsive to customer needs are the important goals of supply chain analytics.

## 2. Role of Analytics in Supply Chain

Supply chain translates the raw materials into finished product in the hand of ultimate customer. Dependence on traditional supply chain system in business is becoming difficult everyday with the rise of economic impacts, pricing pressures, high competition and usage of global operating systems and managing volatile expectations of consumers. These challenges create waste in the supply chain system. Here comes the role of analytics.

Along with improved business analytics and offering decision support for the critical, tactical and strategic supply chain activities, in current environment, many organizations are increasing their investments in Analytics with a large volume on supply chain function as it holds the maximum potential for competitive advantage and innovation.

Below are the major solutions provided by the analytics to the challenges faced by the supply chain managers:

- o **To improve Supply chain visibility, move to Smarter Logistics:** Globalization has resulted in large group of suppliers, manufacturing units and distribution locations. Though the growth opportunities in business are on the rise, the customer expectations for global accredited products is growing faster that has resulted in a complex network of regional supply chains which has to be monitored closely.

To monitor real-time critical events and KPI's through multiple touch points, the application of advanced analytics-driven 'control metrics' is must. The management should start investing in supply chain visibility to make decisions to amplify supply chain responsiveness, optimize cost and fulfill customer expectations.

o **Managing volatile demand:** Demand volatility has increased significantly and permanently with globalization making demand and inventory management a big challenge. To anticipate demand more accurately, monitor supply and replenishment policies and plan inventory flow of goods and services, the advanced analytics is used effectively by many organizations. Companies will be able to run a simulation on best-fit solutions. With the assistance of advanced analytics, they can program contextual exception handling alerts and use multi-criteria inventory ranking.

o **Reducing cost fluctuations:** Supply chain costs' a large part in company's costs impacting key financial metrics like working capital, cost of goods sold and cash flow. The supply chain executives face a challenge in handling these costs. Key areas where costs can be controlled with analytics-driven intelligence include: materials, logistics, sourcing etc

The refined analytics programs create real-time supplier performance data that supply chain managers can use to improve their supply chain strategy. This empowers them by providing analysis from initial screening to ongoing risk management and ensuring that supplier risk is assessed through a blend of financial analysis and capability constraints.

Hence, Supply chain Analytics, plays a key role in improving the performance of supply chain by enhancing supply chain visibility, managing volatility, and reducing cost fluctuations.

### **3. Traditional Supply Chain Risks**

Risk is a painful reality in today's manufacturing world. Any uncertainty in a process or the environment results in risk. In the Supply Chain, risks may occur while supplying a product or service to a customer in terms of timely delivery, cost and impact on image. Tactical initiatives like supplier rationalization programs and sourcing from low-cost-country increase the manufacturers' exposure to risk in supply chain disorder.

Many stakeholders get affected by the supply chain risk. The players in the supply chain are the logistics, producers, retailers, financiers' external groups and the customers.

There are 2 main types of risk to include in supply chain:

- External risks - that are outside of our control
- Internal risks - that are within control.

**External supply chain risks:** External risks can be driven by events which are outside the purview of business in the supply chain. External risks are majorly consists of 5 types:

- **Demand risks** - caused by volatile or differential customer demand or end-customer demand
- **Supply risks** - caused by any disruptions in the flow of raw material or element within the supply chain
- **Environmental risks** – caused by factors outside the supply chain; generally related to social, economic, governmental or climatic factors
- **Business risks** - caused majorly by operational and financial factors such as a supplier's financial instability or management inefficiency
- **Physical risks** - caused due to physical facilities provided by the supplier and regulatory compliance

**Internal supply chain risks:** Internal risks are better off than external ones as they can mitigated as they are under management's control. There are also consists of 5 main types:

- **Manufacturing risks** - caused by interruptions in internal processes or operations
- **Business risks** - caused by changes in key management, reporting hierarchy, personnel or business processes, such as the communication with suppliers and customers
- **Planning and control risks** - caused by inappropriate estimation and planning, which results to unproductive management
- **Mitigation and contingency risks** - caused by not putting alternative solutions in case something goes wrong
- **Cultural risks** - caused by hiding or delaying negative information which is business's cultural tendency. In the advent of unexpected events, such businesses are generally slow to react.

#### **4. Machine Learning and Digital Supply Chain**

RiskTraditional supply chain management has seen major shifts in the last 20 years with the change in its procurement functionalities as well.

Corporate focus, technology usage have shifted and somewhere along the way, supply chain functionalities went digital. Sustainability and transparency have become a concern, management systems are becoming complex and this has required top-to-bottom redesigning of many supply

chains, globally. The businesses which have survived these shifting tides, are the ones which have decided to embrace the disruptions of technology and innovation rather than demeaning its presence. Machine learning will soon impact this continuous paradigm shift.

Machine learning refers to a computer-based discipline in which algorithms can "learn" from the data. It processes the changes in systems that perform tasks linked with artificial intelligence. These tasks include diagnosis, identification, planning, prediction, etc. The potential for diverse and dynamic usage of machine learning is quite confounding.

Business must have a properly managed supply chain in order to succeed. It is quite difficult to make a reliable demand forecasting model for supply chains in today's arena of volatility and complexity. The root cause behind the disappointing result of most of the forecasting techniques is the usage of old models as these are not designed to learn constantly from data and make decisions. Machine Learning is the answer to this problem which can help supply chain to forecast efficiently and control it properly. It is a type of artificial intelligence (AI) that helps computers to learn without being explicitly programmed.

Below are the three main problem areas in supply chain wherein machine learning can help to resolve:

- o **Planning Team's Problems:** The planning team may spend too much time in manually adjusting and evaluating forecasts, and still not able to deliver them accurately or on time. Machine learning can help by taking more demand variables into account and weights each according to its significance, resulting in much more accurate and timely forecasts.
- o **Safety Stock Levels:** Machine learning can help companies with a diverse range of SKU profiles, including long-tail items, to set optimal, lower levels they can trust by taking more demand variables into account,. Companies need to keep its safety stock levels high with traditional planning methods. However, machine learning will help in setting an optimum security stock level by evaluating many more variables.
- o **Sales and Operations Planning:** Machine learning' can improve the quality of short- and mid-term forecast by picking up key trends from promotional and transactional data and

provides actionable insights about trends. This helps in making the S&OP process more efficient and effective to achieve the business objectives.

Machine learning can completely revamp the architecture of the supply chain management of the organization. The companies have already started using it, and have started realizing that their planning division is much improved.

### **5. Data Gathering and filtering**

Historic data of supply chain for any industry is available with them. These data are in trillion GB. We actually don't know what to do with these data.

Supply chain analytics provide the platform by which we convert unstructured data to structured data using data mining concepts and tools. Data filtering provide a positive sense to data which help while creating algorithm. After this process data will talk and we can predict the behavior of data.

### **6. Applying algorithm to find optimal solution**

Processed and filtered data is input for applying any algorithm to obtain optimal solution or to predict future. Many tools including Microsoft Azure is available in market which is having inbuilt algorithm where we can fed structured and filtered data as per requirement and optimal result can be seen. This artificial intelligence has changed the industry perspective of looking the things. Industries are able to take their decisions freely and they know where to invest.

### **7. Conclusion**

With the Introduction of supply chain analytics, Industries are moving from traditional to advanced and automated trend prediction methodology. Utilizing these trends, wastage and expenses during supply chain process can be minimized and optimize usefulness of available facilities can be prevailed.