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## OVERVIEW OF SUPPLY CHAIN ANALYTICS AND OPERATIONS RESEARCH

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**Abstract:** Supply chain analytics helps business professionals to make data-driven decisions at both strategic and operation levels. The main purpose of supply chain analytics is to enhance operational efficiency and effectiveness of the industries. Supply chain analytics includes network design, inventory optimization and transportation optimization. Supply chain management is the management of flows between and among supply chain stages to maximize total profitability. Linear programming is a technique used to solve supply chain analytics problems. Linear programming is about solving conditional optimization problems. Supply chain is a great place to use analytics tools to look for a competitive advantage, because of its complexity and also because of prominent role supply chain place in a company's cost structure and profitability. Data science and data analytics are at the core of every modern globalized industry. Working in today's technology-centric workforce not only requires superior leadership skills, but the ability to translate data problems into the bigger picture for the organization. Many organizations generate solutions to their problems using analytics and innovation in many companies is driven by analytics. Data science is the most important component of analytics, it consists of statistical and Operations research techniques, machine learning and deep learning algorithms. Prescriptive Analytics is the highest level of analytics capability which is used for choosing optimal actions once an organization gains insights through descriptive and predictive analytics. In many cases, prescriptive analytics is solved as a separate optimization problem. Prescriptive analytics assists users in finding the optimal solution to problem or in making the right choice/decision among several alternatives.

O.R. is a scientific method of providing executive departments with a quantitative basis for decision regarding the operations under their control. Operations Research techniques form the core of prescriptive analytics. Inventory management is one of the problems that is most frequently addressed using prescriptive analytics. Samsung implemented a set of methodologies under the title-short life and low inventory in manufacturing (SLIM) to manage all the manu- facturing and supply chain problems. Supply Chain Analytics is helping to improve operational efficiency and effectiveness by enabling data-driven decisions at strategic, operational and tactical levels. Linear programming is one of the important techniques of Programming techniques (or O.R.) in Quantitative Techniques often used these days in business and industry. Linear programming technique is used in finding a solution for optimizing a given objective such as profit maximization or cost minimization under certain constrain.

**Keywords:** Supply Chain Analytics, Inventory Management, (O.R.) Operations Research Techniques, Linear Programming, Prescriptive Analytics and Supply Chain Management

**INTRODUCTION:** The name Linear programming is because of the fact that the model in such cases consists of linear equations indicating linear relationship between the different variables of the system. Linear programming technique solves product-mix and distribution problems of business and industry. It is a technique used to allocate scarce resources in an optimum manner in problems of scheduling, product-mix and so on. Key factors under this technique include an objective function, choice among several alternatives, limits or constraints (stated in symbols) assumed to be linear and the variables. OR (Operations Research) can be considered as being the application of scientific method by inter-disciplinary teams to solve problems involving the control of organized (man-machine systems) so as to provide solutions which best serve the purposes of the organization as a whole. In OR, problems are broken down into basic components and then solved in defined steps by mathematical analysis. For example, food, weapons, etc. in the most effective way possible to different military operations. OR aims to reduce muddy business problems into well-defined mathematical constructs, while also defining expected behaviour and goals (well rooted in computer science and analytics). **Supply chain analytics** helps business professionals to make data-driven decisions at both strategic and operation levels. The main purpose of supply chain analytics is to enhance operational efficiency and effectiveness of the industries. Supply chain is a great place to use analytics tools to look for a competitive advantage, because of its complexity and also because of prominent role supply chain place in a company's cost structure and profitability. Its essence is about transforming all the gathered historical data and incoming flow of current supply chain data insights for making better planning decisions. Data analytics is the art and science of teasing meaningful information and patterns out of large quantities of data. Supply Chain Analytics aims to improve operational efficiency and effectiveness by enabling data-driven decisions at strategic, operational and tactical levels. It encompasses virtually the complete value chain: sourcing, manufacturing, distribution and logistics. Lack of synchronization between planning and execution.



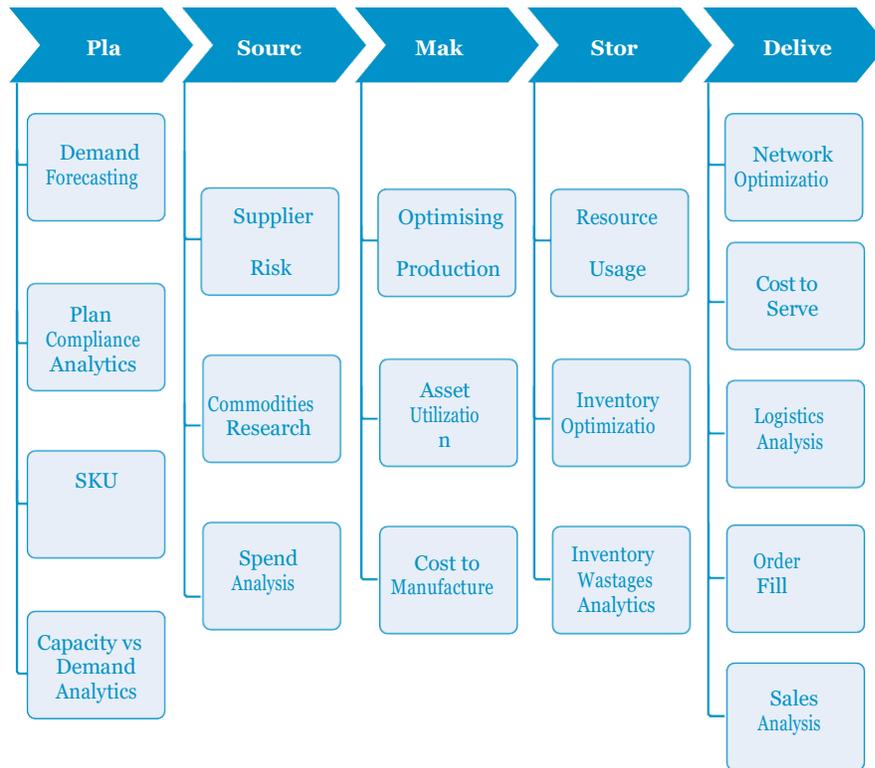
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Supply chain analytics refers to the process’s organizations use to gain insight and extract value from the large amounts of data associated with the procurement, processing and distribution of goods. Supply chain analytics is an essential element of supply chain management (SCM). Supply chain analytics brings together data from across different applications, infrastructure, third-party sources and emerging technologies such as IoT to improve decision-making across the strategic, tactical and operational processes that make up supply chain management. Supply chain analytics helps synchronize supply chain planning and execution by improving real-time visibility into these processes and their impact on customers and the bottom line. Increased visibility can also increase flexibility in the supply chain network by helping decision-makers to better evaluate tradeoffs between cost and customer service.

Our Capabilities in Supply Chain Analytics:



Supply chain analytics uses

**Sales and operations planning** uses supply chain analytics to match a manufacturer's supply with demand by generating plans that align daily operations with corporate strategy. Supply chain analytics is also used to do the following:

**improve risk management** by identifying known risks and predicting future risks based on patterns and trends throughout the supply chain;

**increase planning accuracy** by analyzing customer data to identify factors that increase or decrease demand;

**improve order management** by consolidating data sources to assess inventory levels, predict demand and identify fulfillment issues;

**streamline procurement** by organizing and analyzing spending across departments to improve contract negotiations and identify opportunities for discounts or alternative sources; and

**increase working capital** by improving models for determining the inventory levels required to ensure service goals with minimal capital investment



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Supply chains can appear simple compared to other parts of a business, even though they are not. If we keep an open mind, we can always do better by digging deeper into data as well as by thinking about a predictive instead of reactive view of the data. Certainly, supply chain analytics helps improve the process and efficiency of a supply chain. Supply chain analysis is the use of data in the design, planning and management of the supply chain. In particular in the fields of demand sensing, forecasting and performance measurement but also in the area of monitoring the supply chain ecosystem to detect drivers of potential disruptions to launch pre-emptive measures. Major role of a supply chain analytics is to control and improve inventory turnover ratio of a company.

You can define analytics on basically three levels, then apply it to supply chain management and optimization:

1. Descriptive What has happened
2. Predictive What could happen
3. Prescriptive What should happen

On the Descriptive level, we identify what has happened in the supply chain, where it occurred, how frequently it occurred, what caused it to occur and other relevant information.

For the Predictive level, we look at what could happen if certain changes were made or if certain situations changed. Here we consider alternatives, trends within our supply chain ecosystem and the marketplace.

Moving to the Prescriptive level, we establish what should happen in order to realize the best possible outcome of the operation. The best possible outcome may vary by customer, product, geography, market segment or another variable.

Supply chain analytics has turned out to be a necessity for organizations in order to efficiently penetrate into the market. Supply chain analytics stresses on releasing the cash by enhancing forecast accuracy, support network reconfiguration, minimizing material wastage, optimize service levels, reducing inventory etc.

**My research area objectives are:** The main objectives of Supply chain management are to reduce cost, improve the overall organization performance and customer satisfaction by improving product or service delivery to the consumer. Supply Chain Analytics aims to improve operational efficiency and effectiveness by enabling data-driven decisions at strategic, operational and tactical levels. It encompasses virtually the complete value chain: sourcing, manufacturing, distribution and logistics. Lack of synchronization between planning and execution. The ultimate goal of effective supply chain management is higher profits through improved customer satisfaction and a lower cost of doing business. Profits are healthier when costs are controlled and reduced where possible.

**Conclusion:** Analytics has an increasing impact on decision making and performance management within many organizations and it is sometimes viewed as a source of competitive advantage. The analytic movement is being driven by technically literate executives who make fact-based decisions, the availability of good data, a process orientation to running an enterprise, and improved software for data capture, processing, and analysis. Analytics has much in common with Operations Research.

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