Challenges and Capabilities

We all depend on manufacturers of consumer packaged goods (CPG)* to deliver – as we use the products they produce (such as packaged food and beverages, cosmetics, toiletries, over-the-counter drugs, and other household goods) in our daily lives.

Every day, CPG companies – including some of the world's biggest brands – manufacture these products on a massive scale and distribute them to their networks of retailers and customers around the globe.

To survive and thrive in this hyper-competitive, extremely volatile, high-volume, low-margin industry, CPG players need to be able to leverage their data to accurately forecast market demand and make decisions about which products to produce, when to produce them, how much inventory to keep in specific locations, and how to transport goods to consumers and retail outlets.

Indeed, in order to succeed, CPG companies must be able to excel in a number of key areas:

- **Demand forecasting:** Accurately predicting future demand, which may spike or dip dramatically depending on special events, seasons, or supply volatility.

- **Integrated planning:** Generating and executing production and distribution plans based on forecasted demand, capacity capabilities, and inventory levels.

- **Resource utilization:** Effectively deploying critical manufacturing resources (such as machines and workers) – in order to minimize operating costs while improving service levels.

- **Inventory management:** Effectively controlling inventory levels across the end-to-end network – to maximize on time, in full (OTIF) delivery performance and customer satisfaction while avoiding costly stock-outs or surpluses.

- **Supply chain agility:** Efficiently responding to sudden shifts in demand as well as supply chain bottlenecks and disruptions.

- **What-if analysis:** Evaluating various scenarios to identify risks and opportunities and enable strategic planning in various domains including product portfolio selection, supply chain network design, and long-term capacity needs.

*Also known as Fast-Moving Consumer Goods (FMCG).

In order to achieve excellence in all these areas, leading CPG companies utilize predictive analytics tools such as machine learning (to create demand forecasts) in combination with prescriptive analytics tools such as mathematical optimization (which – using machine learning-based forecasts and real-time supply chain data as input – generate optimal production, inventory, and distribution plans).

Armed with these data-driven forecasts and plans, CPG enterprises can make optimal strategic, tactical, and operational decisions – and ensure they are able to balance cost and service level tradeoffs across their supply chains and satisfy market demand in the most profitable way possible.

Although CPG leaders have been utilizing mathematical optimization for decades, they are – with the recent emergence of cutting-edge Industry 4.0 technologies (including IoT devices, drones, unmanned ground vehicles, and other forms of robotic process automation) and the greater availability of high-quality data – constantly discovering new opportunities to apply this prescriptive analytics technology across their end-to-end supply chain networks.

With mathematical optimization, CPG companies can generate plans and automate decisions – based on their demand forecasts and real-time supply chain data – that:

- Keep production, inventory, and distribution operations in alignment with market demand.

- Keep operating costs down and service levels high.

- Keep end-to-end supply chain operations running as efficiently as possible.

- Keep customers happy (by delivering products on time, in full) and shareholders happy (by delivering improved revenue growth and profitability).

We all depend on CPG companies to deliver (as we need their products in our daily lives), and – in order to deliver for us – CPG companies depend on mathematical optimization (as they need this powerful prescriptive analytics tool to make the best strategic, tactical, and operational decisions).

Opportunities for Optimization

Mathematical optimization empowers CPG companies to foster optimal, data- and demand-driven planning and decision making across their operations in numerous areas including:

Strategic

- Supply Chain Network Design
- Product Portfolio Optimization
- Workforce Planning
- Demand Planning
- Yield and Revenue Management

Tactical

- Supply Chain Configuration
- Production Planning
- Supplier Selection
- Sales & Operations Planning
- Inventory Positioning and Safety Stock Placement
- Capacity Planning
- Maintenance, Repair, and Overhaul (MRO) Planning

Operational

- Flow Shop Scheduling
- Machine and Equipment Planning
- Order Fulfillment Planning
- Workforce Scheduling and Rostering
- Logistics Planning
- Vehicle and Shipment Routing

Industry Solution Sheet: Consumer Packaged Goods (CPG)

Business Benefits

CPG enterprises utilizing mathematical optimization to manage their end-to-end supply chain planning, decision making, and operations are able to achieve significant business benefits including:

- Increased profit margins

- Improved resource utilization and operational efficiency

- Decreased operating costs

- Superior inventory control and fewer stock-outs

- Better supply chain visibility and agility

- Improved service levels, customer satisfaction, and revenue growth