WHITE PAPER

Enabling agility through digital manufacturing in the post-pandemic era

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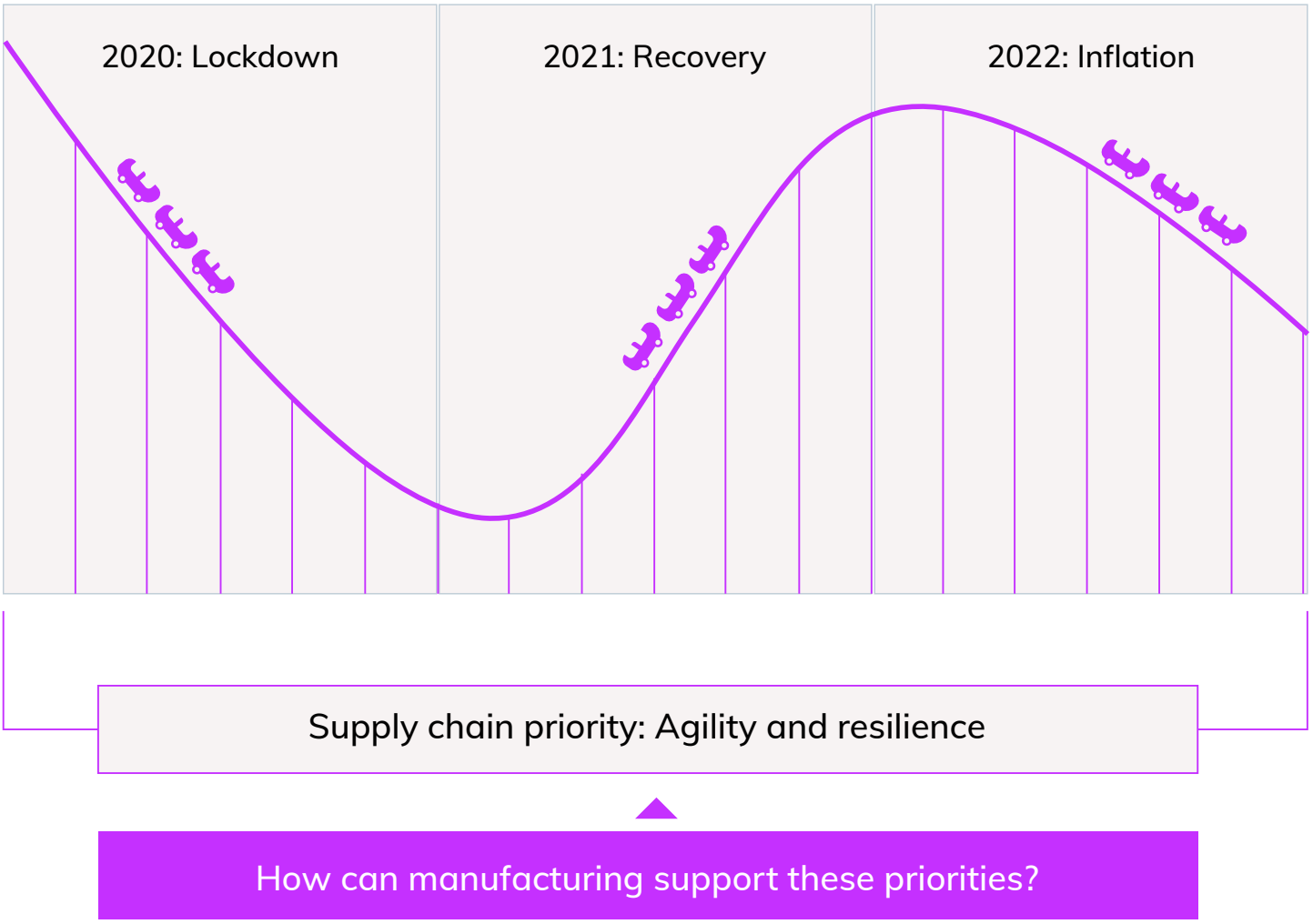
Executive summary:

For most industries, manufacturing has been singularly focused on maximizing efficiency. Efficiency ensures a plant makes the product at the lowest cost. To support this goal, a traditional supply-chain strategy protects the plant from external shocks and variability. However, in the post-pandemic environment, it became untenable to protect plants from the onslaught of supply disruptions and changing demand patterns. Instead, manufacturers are prioritizing responsiveness. To address the two conflicting goals of efficiency and responsiveness, this white paper describes the emerging mindset – and the requisite capabilities – necessary for agility and resilience.

The post-pandemic state of the supply chain has been a roller-coaster of changing operating conditions

The manufacturing industry has faced numerous disruptions within the past three years, all of which pose a threat to operating conditions. Pandemic-triggered lockdowns tested the plant's resilience. A stimulus-induced economy fueled rapid growth and recovery.

Supply chain and labor disruptions continue to this day. Now, faced with economic slowdowns, inflation, and regional conflicts and unrest, manufacturers are under pressure to curb inflationary costs, increase efficiency, and become more agile than ever before.



In today's dynamic market, businesses must be able to change gears and adapt

The past three years have been an endurance test for manufacturers. Teams are constantly fighting new fires and reworking supply chain strategies to adapt to a volatile, post-pandemic market.

> According to a recent Gartner survey, 68%[1] of supply chain leaders are "constantly responding to high-impact risk events for which they weren't prepared."

Amid these changes, one thing became clear:

Just like drivers use a gearbox to adapt to different road conditions, businesses need different gears to understand, plan, and execute during dynamic – and disruptive – business conditions.

AVEVA's internal research found that companies "changed gears" using the following eight levers in their business and supply chain strategy:

Inventory	Just-in-time? Or just-in-case?
Capacity	Full utilization? Or build surge capacity?
Time	Adjust / extend order & supply lead times?
Segmentation	Treat customers & suppliers equally? / Or prioritize?
Price	Pass through cost increases to customers? Or absorb?
Relationships	Update partner / worker policies & review work culture?
Information	Review "points of failure" & understand systems gaps?
Cash	Review & reprioritize capital investments?

[1]Source: 2020 Gartner Supply Chain Signature Series Risk Survey

While the business has many gears in its gearbox, the manufacturing plant is usually stuck in just one: Efficiency.

Every manufacturing plant is working to maximize efficiency. After all, it's what enables companies to make the product at the lowest cost. Efficiency is especially important for companies that compete in low-margin segments.

To maintain these margins, the supply chain strategy often revolves around insulating the plant from external volatility. In theory, protecting the process within the plant using a combination of inventory buffers, lead times, and supplier policies allows the plant to reduce internal variability which, in turn, allows the plant to focus on the single goal of increasing efficiency.

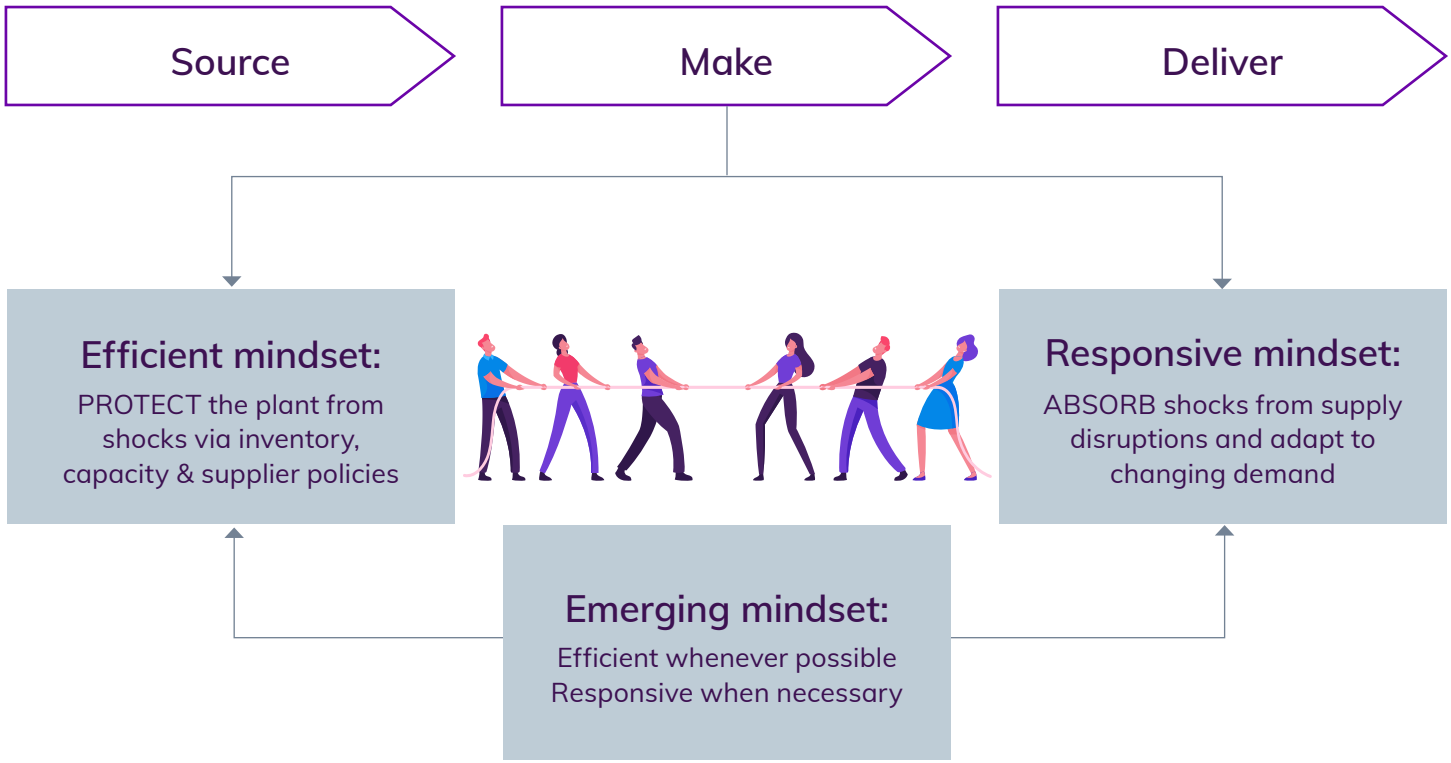
But there's one major problem: Insulating the plant from volatility also insulates it from corporate. Anyone outside of the plant views it as a black box. This lack of visibility makes it difficult to engage the plant in modernizing the supply chain strategy to achieve greater agility and resilience.

What is agility?

Being efficient whenever possible and responsive when necessary.

An agility-focused approach seeks to synchronize the plant with the supply chain strategy whenever it "changes gears" so it can quickly adapt to changing conditions. In other words, the plant becomes more flexible to make changes as conditions warrant. When the plant is agile, it becomes a shock absorber for external volatility.

Agility finds the tension between efficiency and responsiveness, allowing the plant to shift to each side, as necessary.



What are the digital manufacturing capabilities plants need to enable agility?

AVEVA offers the broadest suite of digital manufacturing tools in the market, providing the plant and production network with a range of options to support the supply chain strategy. The following success stories capture how clients have deployed these capabilities to improve agility within their manufacturing operations.

Waste reduction	Connected worker	Responsiveness
Minimize the value leaks	Empower workers to solve problems	Adapt to market conditions
Kellogg's	Leclerc	Graphics packaging

Sustainability	Scalability	Customer-centricity
Ensure eco-efficiency in production	Deploy standards across sites	Protect the brand promise
Henkel	Danone	F&N Dairies

Connected worker: Empowering workers to become problem-solvers

People are the foundation of successful digital transformation, and companies must empower the workforce to identify and enable new solutions to overcome new challenges.

At the center of agile operations is the connected worker. Connected workers have access to the right information at the right time and are empowered to take the right actions to achieve overarching business and operational goals.

Leclerc: Accelerating training and time to value

Leclerc group was losing employees due to retirement, making it difficult to retain best practices for the company's three factories. As a leader in the food industry for more than 110 years, the company began exploring digital tools to easily safeguard and share employee knowledge. The company deployed Teamwork to both standardize its training content and prevent unplanned downtime.

By providing the necessary support and functionality, Teamwork helped significantly improve Leclerc's organizational learning and the activity within its facilities.

Responsiveness: Rapidly adapting to changing supply chain conditions

Supply chain conditions change by the minute. Raw materials shortages, logistics issues, or demand spikes can have a massive impact on the manufacturing plant. While these may be hurdles for some plants, the ability to rapidly adapt to changing supply chain conditions turns those hurdles into opportunities. Quick changeovers allow brands to capitalize on market conditions and run at maximum capacity.

Graphic Packaging International: Increasing changeover visibility to meet capacity goals

Graphic Packaging International's scheduling relied on tribal knowledge, but the lack of forward-thinking capacity utilization made it difficult to commit capacity to customers. The company implemented advanced planning and scheduling to increase changeover visibility, reduce scheduling errors, and make data-driven decisions. Now, scheduling decisions are automated and based on company KPIs – not intuition – which enabled the company to meet capacity goals, reduce unit costs by 6% due to increased OEE, and save $16 million annually.

Customer-centricity: Protecting the brand promise

Customers want more from the brands they purchase. Quality, traceability, transparency, and sustainability are just a few of their requirements – and consumers are willing to put their money where their values lie. Sustainability and transparency touch every part of the production line. Visibility beyond the plant floor also enables manufacturers to track and trace source materials, increasing consumer transparency and brand loyalty.

But there's one catch: Adapting to changing market conditions and consumer preferences costs money. However, manufacturers can charge more if they fulfill their brand promise and win consumer trust.

F&N Dairies: Achieving quality through traceability

F&N Dairies produces 3 million cans of milk per day. Quality is critical to maintaining consumer trust, but tracing parameter deviations was a manual process for operators. The existing paper-based system was error-prone and prevented operators from quickly performing root cause analysis.

Using a mix of a data historian, batch management tools, and an MES solution, F&N Dairies achieved digital tracking and traceability. These digital tools enabled the dairy to reach its production goal of 2,500 cans per minute, reduced quality traceability report time from four hours to one minute, and helped the plant achieve 100% first-time quality, which is a lean metric indicating that parts are manufactured correctly the first time without inspection, rework, or replacement.

Waste reduction: Minimizing the value leaks within production operations

Inflation is spiking and costs are increasing, forcing many consumers to change their purchasing habits. Now, manufacturers are faced with two choices: They can pass the costs on to consumers and risk losing market share, or they can find new ways to become more efficient and minimize costs.

Efficient operations require real-time and historical insights into assets and processes. With access to the right data, teams can monitor planned versus actual production as well as identify and minimize waste, or "value leaks," to quickly manage costs before they spiral out of control. A comprehensive view of end-to-end operations and asset health enables teams to identify bottlenecks and discover new ways to optimize asset performance and production processes.

Kellogg's: Increasing efficiency through digital adoption

Kellogg's holistic approach to digital transformation focuses on the end-user. The company's program blends engineering, IT, and operational organizations to turn data into information that its teams can use to make improvements and increase efficiency. Kellogg's uses a data infrastructure with a contextualization layer to capture and structure data from its plants and give its users access to the information they need to make decisions.

Kellogg's data infrastructure enables operations data to be used in other applications built at the MII layer, such as quality checks or packing line analytics. Operators can easily use these applications to understand how a production line is performing, including which products are being produced, changeover speed, losses, and supply levels. The data infrastructure automatically pulls in short-stop reason codes from PLCs, showing operators the alarm and fault code. With easy access to efficiency, uptime, downtime, and critical loss data, users can identify common themes to make global improvements. Just one initiative saved the company 3 million dollars per year in energy usage.

Sustainability: Ensuring eco-efficiency across operations

Companies are under pressure from both consumers and legislators to improve sustainability and reduce emissions. In manufacturing, sustainability is about eco-efficiency. Quickly getting to the heart of production issues prevents unnecessary waste, while healthy, high-functioning assets use less energy and help companies meet net-zero goals.

A pioneer in sustainability, Henkel wanted to improve supply chain resource efficiency on the production side by 5-6% annually, reduce energy consumption, and become three times more efficient by 2030. To get there, the company needed to improve how it collected, used, and communicated consumption and emissions data across its supply chain. Henkel deployed a manufacturing execution system to act as a single source of truth, which helped the company reduce energy consumption by up to 16% and save €37 million in energy costs. Henkel also improved OEE by 15% in just two years, reduced filling line waste, and improved label quality to 100%.

Scalability: Deploying standards across sites

Consumers want a personalized experience from brands across industries, right down to the types of products they purchase. The demand for personalized products is upending traditional product mixes. Delivering on these new market demands requires manufacturers to keep a pulse on what consumers want and meet those needs with unique production runs and increased scalability.

Producing personalized products requires new business models that prioritize a connected workforce that can quickly pivot when needed. By standardizing around core processes, manufacturers can create a foundation for personalized product success. From there, they can equip their teams to scale into unique product lines.

Danone: Specialized nutrition through digital manufacturing

Danone's "One Planet. One Health." initiative, focuses on driving healthier, more sustainable food and beverage consumption. Part of the company's vision focuses on creating a customer-centric business model, which requires flexible, efficient operations. To build the right manufacturing foundation yet ensure flexibility to scale and grow, Danone deployed a core MES model to its specialized nutrition plants. The model-driven template allowed Danone to create a menu of 20 configurable functionalities and interfaces that could be used by all plants. This flexible standardization enables Danone to preserve traceability, measure production performance, and report accurate factory usage.

To learn more about AVEVA solutions for Digital Manufacturing, visit aveva.com

About the author

Sree Hameed is currently the Senior Industry Marketing Manager covering the Manufacturing sector (which includes Food and Beverage, Consumer Goods, Life Sciences and Discrete Manufacturing) at AVEVA. In his 25-year career, he has helped companies adopt a variety of transformational technologies in the areas of production automation, manufacturing operations, supply chain management, product lifecycle management, and operational risk management. Sree also serves as an advisor to the Center for Intelligent Supply Networks at the University of Texas at Dallas.