Case Study

Leaner Routines Create Supply Chain Excellence

Holistic approach to transformation results in high-performing, lean supply chain at Keysight Technologies.

Goals

- Develop lean competencies for all employees across all sites
- Achieve breakthrough results in the areas of cost-savings, lead time reduction and customer satisfaction
- Sustain a lean culture

Approach

- Evaluate entire organization to identify optimization opportunities
- Create detailed value stream maps to analyze and problem solve organizational complexities using lean tools
- Implement SCOR to create a common language among employees

Results

- Customer response time improved by 50%
- $10 million worth of deals secured
- 22% reduction in logistics spend over revenue
- 50% lead time reduction in the logistics function
- 30% productivity improvement
- 42% warehouse space reduction

ASCM ASSOCIATION FOR SUPPLY CHAIN MANAGEMENT

In 2014, electronic measurement company Keysight Technologies spun off from Agilent Technologies. As a newly independent, publicly listed company, Keysight aimed to be cost competitive while making a profit and returning value to shareholders. Unfortunately, the spinoff created redundancies, duplications, and inefficiencies in its supply chain, which hindered its progress toward these goals.

"It was imperative that we transform Keysight's supply chain to be more responsive, flexible, and efficient," says Shidah Ahmad, vice president and general manager of Keysight's global supply chain and order fulfillment organization. "For that, we adopted a holistic approach to develop a comprehensive lean transformation strategy."

This was a major initiative for Keysight, particularly given the nature of its deep and complex supply chain. Keysight designs, develops, and manufactures solutions for the wireless communications, aerospace and defense, and semiconductor markets. Its portfolio of test and measurement solutions is one of the broadest in the industry with more than 6,000 offerings ranging from basic to high-performance instrumentation, fully integrated test systems, and software solutions. The firm's supply chain is composed of hundreds of thousands of parts and numerous suppliers and contract manufacturers. In all, Keysight ships about 70,000 units to customers in more than 100 countries around the world every single month.

"Implementing a holistic supply chain transformation was a big challenge," says Cherrie Teh, supply chain director and lean champion. "The transformation involved many different internal and external stakeholders with differing priorities and goals and diverse backgrounds and experiences. …Getting everyone aligned was a huge task."

In the end, though, it was well worth the effort, as Keysight earned the 2016 APICS Corporate Award of Excellence in Innovation as a result of its lean transformation. In particular, the judges were impressed by the three key pillars of the plan:

1. Develop competency: Ensure all employees across all sites are well equipped with the necessary lean competencies.
2. Deliver value: Use lean methodologies to achieve breakthrough results in the areas of cost savings, lead-time reduction, and customer satisfaction.
3. Sustain a lean culture: To derive longterm value from the lean initiative, foster ongoing improvements through a shift in mind-set and the adoption of lean throughout the organization.

The strategy began with concentrated efforts to scan the entire operation in order to identify optimization opportunities. Multiple gemba walks were performed with cross-functional teams and across all management levels and supply chain nodes. According to the APICS Dictionary, 15th edition, a gemba walk involves managers observing work being carried out so they may understand it better, coach, guide, and follow up on corrective actions. Next, detailed, current-state value stream maps were drawn to obtain clearer insights into the complexities at Keysight. Challenges were analyzed through a structured problem-solving methodology involving lean tools.

The APICS Supply Chain Operations Reference (SCOR) model also was used extensively during the initiative in order to get employees up to speed with the correct tools, techniques, and processes. Ultimately, this went a long way in creating a high-performing workforce that could contribute real value.

"Our supply chain's performance, process, practices, and people were analyzed and prioritized for each of the SCOR processes," explains Michael Tan, supply chain operations and engineering senior director. "To date, more than 200 global projects have been completed using the SCOR model to great success, and they resulted in major transformations."

Isabella Goh is a supply chain analyst at Keysight. She attended a training about the SCOR model and discovered that the methodology helped her understand, design, and configure the business's end-to-end supply chain internally and with suppliers and customers. "SCOR lets us focus on and balance the multiple links in our supply chain," she says. "We are able to know which best represents our supply chain configuration from planning, execution, and sustaining. We also use the model to evaluate continuous improvement opportunities and for strategic planning."

Planning

The challenge of planning in a volatile and dynamic market environment is amplified at Keysight because of its broad portfolio of products and wide range of customers with different needs. Company leaders knew they needed to have a lean and highly flexible supply chain. To achieve this, they focused on fine-tuning supply chain models and enhancing visibility.

The dynamic supply chain initiative aimed to bring about optimum order fulfillment by customizing supply chain models for different demand clusters and balancing cost, lead time, risk, and customerexpectations. The Keysight team began by analyzing each product's assembly complexity and material supply risk and then compared them with customer order trends. It was found that 35 percent of Keysight products had mismatched demand-supply characteristics because of several factors, including a multi-layer bill of material structure, single-source unique parts with long lead times, and safety stock levels that did not align with current conditions. One of the many quick wins was realized by implementing optimized safety stock at the appropriate supply chain nodes in order to balance assurance of supply with inventory investment. In addition, the safety stock level was adjusted to match the risk level and supplier lead time.

The other critical element of the planning piece of the lean initiative was centered on real-time supply chain visibility and predictability. Keysight adopted the Kinaxis RapidResponse supply chain planning solution in order to store and integrate planning information from key partners and internal teams on a single platform. Structured analytical reports and action sheets also were designed and automated. This endto-end supply chain visibility enabled vertical assessment of planning capabilities in real time, and simulations helped the planning team make effective decisions. Ultimately, the response time to customers improved by 50 percent, and more than $10 million worth of deals were secured.

Procurement

Keysight's procurement strategy transformed from being focused on price negotiations to building partnerships for more efficient supply chain management. Some of the initiatives undertaken in this area included supplier rationalization and lead-time reduction.

Supplier rationalization enabled the optimization and prioritization of Keysight's partners. While focusing on improving the procurement process and cost efficiency, employees worked toward building strategic suppliers by segmenting them into categories—strategic partners and basic suppliers. Consequently, the company went from having more than 1,200 suppliers to just 100 strategic partners. This enabled Keysight to gain even greater economies of scale. Keysight professionals then collaborated with suppliers to achieve lead-time reductions through just-in-time (JIT) concepts including supplier-managed inventories and forecast-release agreements. Pareto Analysis, correlation analysis, Ishikawa diagrams, and other key lean tools were used for component and supplier profiling. This enabled the organization to work with greater flexibility and support more orders while reducing the cost of inventory. As a result, Keysight achieved a more than 30 percent lead-time improvement and saved approximately $10 million in inventory costs.

Manufacturing

To achieve world-class manufacturing at Keysight, a program was launched that encompasses cycle-time, inventory reduction, greater efficiency, and enhanced flexibility. Entire product lines were scanned in order to identify stock keeping units that had high inventories and were not meeting customer-requested lead times. These items then were examined based on revenue and cause codes, and constraints and bottlenecks were identified. Innovative solutions were implemented one by one to break the constraints. For example, the component-washing process at Keysight had been a cycle time issue because the activity was shared among many different productlines and could only be conducted in batches. However, contract manufacturers did not face such constraints, so component washing was moved to that site.

Heightened efficiency and flexibility were achieved by redesigning Keysight's workstations. The new workstations maximize vertical space, optimize assembly motion, and feature a modular concept that can be adapted to ebbs and flows in capacity for even greater flexibility. Further, the current setup of Keysight's automated test system was reconfigured to accommodate testing for different products without a physical changeover. With these added measures, the company realized a 30 percent leadtime reduction, a 30 percent productivity improvement, and about $5 million in reduced inventory.

Shipping

Within Keysight's logistics function, inbound freight spending had increased despite having fewer shipments. In addition, portions of the global warehouse footprint had become redundant, there was significant duplication, and resources were being allocated ineffectively. The logistics team went to work looking for ways to be more cost effective and customer focused.

First, a deep-dive analysis into shipping process patterns, behavior, and requirements made it possible to consolidate inbound shipments and reduce spending and inventory levels while fulfilling customer delivery requirements. Then, a worldwide warehouse footprint rationalization program was initiated. One of the outcomes was the relocation and consolidation of two warehouses in Germany into a single, new location closer to the manufacturing plant. Other noteworthy results include the following:

- Headcount was optimized through cross-training.
- Information transmission between the third-party logistics provider and Keysight was improved and automated by reconfiguring the Oracle system.
- Trucking timings were consolidated.
- Storage methods were improved based on movement frequency.
- A JIT system was implemented to eliminate the staging of inventory in the warehouse by synchronizing suppliers' deliveries with customers' demands.

Quality improvement programs based on the voice of the customer also were relentlessly pursued. In one key project, a packaging solution consisting of a four-piece, adjustable packing sleeve was implemented in order to consolidate all small packages. This prevented loss and damage and reduced the number of transactions required at the warehouse. The bottom-line results from the logistics transformation included a 22 percent reduction in logistics spend over revenue, a 50 percent lead-time reduction, a 42 percent warehouse space reduction, and a $3 million cut in aging inventory.

Design for supply chain

A critical objective at Keysight was to optimize production even before it begins. By applying a product life cycle management mentality from the conceptual design stage, a product can be developed from the ground up and become a truly supply-chain-efficient creation. A design standards user group was established to develop, manage, and communicate corporate design guidelines and material quality standards to the worldwide Keysight technical community. Group members used a two-pronged strategy: analyzing the voice of the customer and designing for manufacturability.

Each hardware design was tied to real customer needs, and many complicated projects were simplified to meet customer and cost requirements. For example, multiple screws and washers to secure a transformer were replaced with just one press-in stud. Standardization was another lean concept incorporated into design projects. Fewer types of parts ordered in larger quantities brought about reduced part and material overhead costs. Additionally, unless the use of unique parts added a specific value, industry-standard parts were recommended whenever possible. This increased sourcing flexibility and facilitated the cost-effective disposal of excess inventory when needed.

Winning results

Keysight's lean projects have created a much more efficient supply chain model in which cost, lead time, and inventory are fully optimized. The cost and time savings realized continue to increase exponentially, as lean is now truly part of the workforce's DNA. "Our supply chain transformation resulted in a more robust, responsive, flexible, and efficient supply chain, which is all reflected by lead-time reductions and improved quality and delivery levels,"

> " To date, more than 200 global projects have been completed using the SCOR model to great success."

Ahmad says. She also notes that savings have been reinvested into research and development activities as well as new technologies and capabilities that will contribute to future revenue growth and overall business success.

"We are pleased with our lean transformation so far, but it must not stop here," Teh adds. "There must be continuous improvement to keep raising the bar and deliver increasingly better results. There is a great opportunity to proliferate this lean transformation strategy to employees, shareholders, and customers and, with it, the lean way of life."

About ASCM

The Association for Supply Chain Management (ASCM) is the global leader in supply chain organizational transformation, innovation and leadership. As the largest non-profit association for supply chain, ASCM is an unbiased partner, connecting companies around the world to the newest thought leadership on all aspects of supply chain. ASCM is built on a foundation of APICS certification and training spanning 60 years. Now, ASCM is driving innovation in the industry with new products, services and partnerships that enable companies to further optimize their supply chains, secure their competitive advantage and positively impact their bottom lines. For more information, visit ascm.org.

Interested in aligning your organization with ASCM?
Contact us at **CorporateDevelopment@ascm.org**

ASSOCIATION FOR SUPPLY CHAIN MANAGEMENT