

Supply Chain Issues In The High-Technology Semiconductor Industry

Results of the supply chain survey conducted by Oracle & Global Semiconductor Alliance (GSA)

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Semiconductors, Software and Electronics devices have become ubiquitous across the globe serving many needs in diverse business and consumer markets. Despite this industry growth, delivering new products that meet customer requirements, increasing revenue growth and profitability, and efficiently managing a global operation are proving to be increasingly challenging.

KEY TRENDS WITHIN THE SEMICONDUCTOR / HIGH-TECHNOLOGY INDUSTRY:

Consider the following key trends in the semiconductor / High-tech industry;

GLOBALIZATION

Company value chains are globally fragmented with key operations dispersed in places as diverse as Silicon Valley (design), Taiwan (foundry), Bangalore (software), and Malaysia (Assembly & Test). Globalization has also introduced a change in the customer mix and diverse product requirements, driven by emerging economies such as China and India. This diversification and fragmentation has resulted in more complex processes, systems, and organizational structures. In order to be successful improved visibility, integration and synchronization of global operations in order to utilize scarce resource effectively is critical.

CONSUMER MARKET DOMINANCE

Consumer market segment now accounts for almost 70¹ percent of semiconductor output impacting every company along the high-tech value chain. The consumer segment is very competitive and extremely price-sensitive and success in this segment depends upon being able to manage fickle consumer tastes, fashion trends, promotions, seasonality, and availability of complementary services and content. Due to the dynamic nature of these markets, forecasting demand is more difficult than ever. Matching supply and demand in each market and product segment, while balancing costs with customer service objectives, is an extremely complex activity. Sales and operations planning may now include teams of geographically and organizationally dispersed process owners who need to analyze a significant amount of information and collaboratively make decisions on supply-chain plans.

INCREASING PACE OF INNOVATION

Rapid product commoditization enabled by transition to digital technology (use of ASSP's²) and use of modular designs has resulted in shrinking product lifecycles (from 24 months to as low as 9 months³). Companies must meet stringent time-to-market requirements, have processes that enhance agility in making changes, allow flexibility to configure or localize products while meeting country-specific regulatory requirements. Having "single source of truth" for diverse product and supply chain data in order to make accurate, up-to-date information available in a timely manner to the right decision makers is essential for achieving excellence in supply-chain management.

INCREASING PRODUCT COMPLEXITY

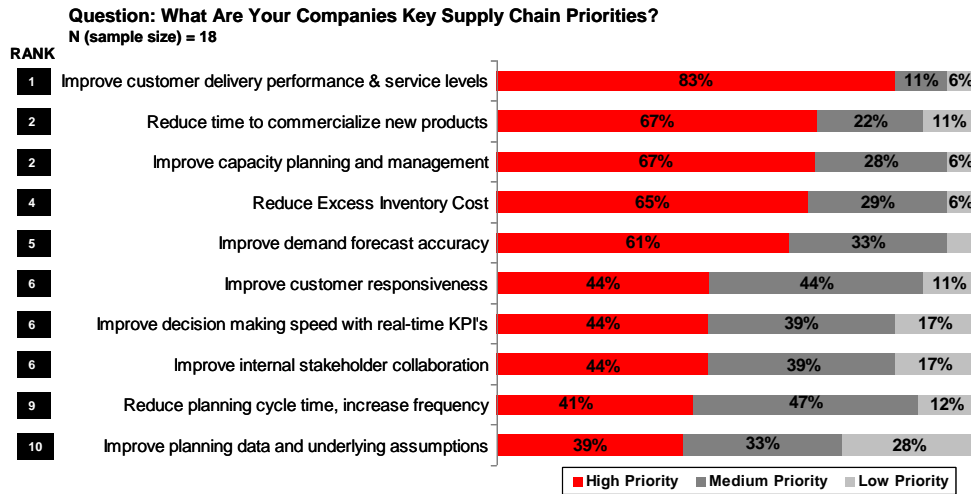
In order to drive differentiation, products are becoming increasingly sophisticated integrating software, embedded systems, digital content, and specialized components and services. Companies must collaborate with numerous ecosystem partners to achieve this integration. Information availability, accuracy and visibility across the extended enterprise are critical to effective collaboration in both planning activities (such as demand and supply planning) and execution activities (such as customer order fulfillment and inventory replenishment).

ORACLE/GSA SUPPLY CHAIN SURVEY:

In order to understand the implications of these trends and the industry response to these market forces, Oracle, in conjunction with Global Semiconductor Alliance (GSA) conducted a survey of Supply Chain Executives of participating GSA member companies. The survey was designed to understand participating companies' supply chain priorities, their key process capability gaps and the strategic initiatives to address the gaps. The results of the survey, shown below are extremely illuminating and can be leveraged by others to audit their own supply chain capabilities.

SUPPLY CHAIN PRIORITIES

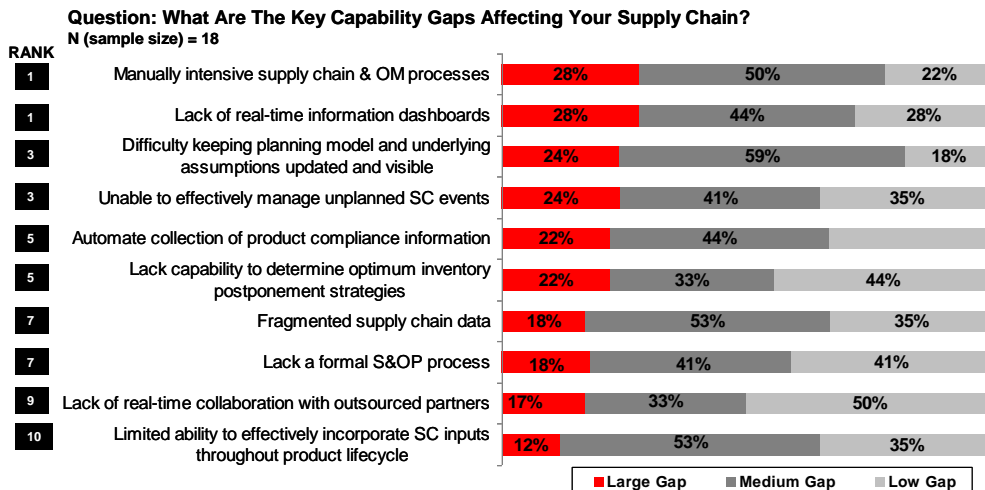
Given the dynamic nature of the market, it is not surprising to see that meeting customer on-time delivery performance and reducing the time to commercialize new products are the top two supply chain priorities highlighted by the Supply Chain Executives.



In order to profitably balance “variable” demand against “short-term fixed” capacity, effective production capacity planning and management also ranks high among the supply chain priorities of semiconductor companies. Given that it takes a while before you can add “expensive” additional production test capacity when demand picks up, or suffer low utilization in times of low demand, it is reasonable to expect that capacity planning would be a key priority. Ability to rationalize inventory throughout the supply chain (through improved inventory visibility across the extended enterprise and better die-bank & FGS inventory postponement strategies) and improving demand forecast accuracy round out the top five supply chain issues identified. Improving demand forecast accuracy (at a low enough level of product hierarchy) could reap big dividends along a variety of supply chain metrics (inventory cost, delivery performance, etc.). Key to improving demand forecast is having a system-driven cross-functional Sales and Operations Planning (S&OP) process that includes internal stakeholders from sales, marketing, NPI and finance as well as demand-supply collaboration capabilities with external partners (customers and channel partners).

SUPPLY CHAIN CAPABILITY GAPS

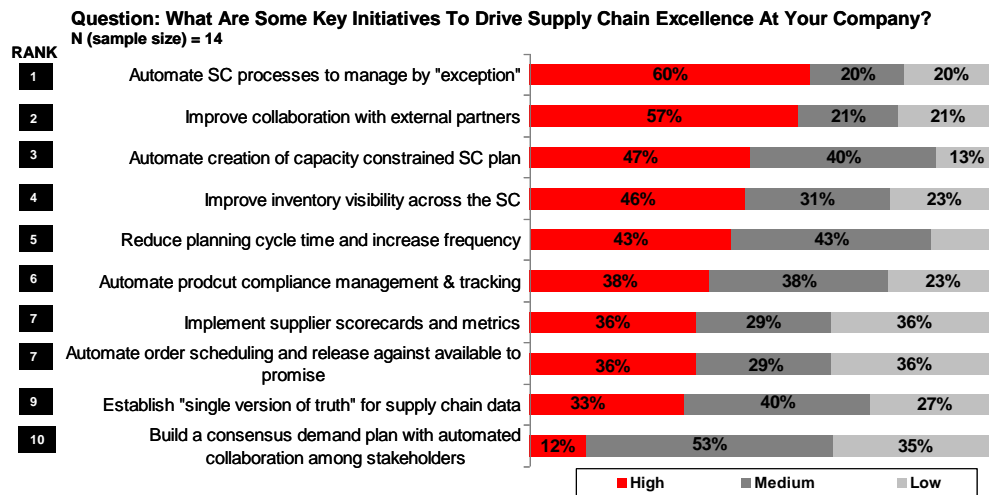
Remarkably, 78% of all participating companies highlighted the existence of manually intensive processes in supply chain planning (demand-supply planning, capacity planning) and execution (order scheduling, order allocation and fulfillment) as large or medium capability gaps to improving their supply chain performance.



Multiple manual or custom processes result in poor data quality and lack of trust in the planning data. Not surprisingly though, lack of process automation and standardization increases delivery and customer commitment lead times, reduces on-time delivery performance and limits customer responsiveness to forecast changes (demand upside request, product mix change, etc.). Equally important capability gap is easy and real-time access to supply chain KPI's that inhibits planners to make fact-based supply chain decisions thereby reducing supply chain agility. Another key gap identified by companies is the difficulty they have in keeping the supply chain planning data and underlying planning model and assumptions centralized and constantly updated as business conditions change. In companies with lower process maturity, this data is typically distributed among several different individuals and resides in multiple spreadsheets with limited visibility across functional silos or multiple organizations that may follow different planning protocols and frequencies leading to non-standardization. The net result is big swings in supply chain performance as the planning model and assumptions can quickly get out of synch with business realities. In mature organizations however, supply chain planning and execution processes are increasingly standardized and automated so the planners can spend bulk of their time on value-added tasks such as managing supply chain "exceptions", maintaining and updating the supply chain model and running "what-if" scenarios to optimize supply chain performance.

SUPPLY CHAIN INITIATIVES

Given the responses provided by Supply chain Executives regarding their companies' Supply Chain Priorities and Capability gaps, the list of key initiatives that are underway hardly comes as a surprise.



High among the list of initiatives is the desire to automate basic supply chain planning and execution processes. With increased process automation and standardization supply chain planners can focus their efforts on managing "exceptions" and maintaining and updating the planning models as opposed to spending their time doing "manual reconciliations". Since semiconductor companies rely on a plethora of outsourced manufacturing partners it is no surprise then that improving external supply chain collaboration is also a wide spread initiative (tracking WIP status through foundry, assembly and test process, operational yield/cost tracking, etc.). Having real-time visibility into manufacturing and back-end operations can help mitigate order delivery or supply disruption issues before they become large enough to affect quarterly financial targets. Companies are also working on capabilities that can automate the process of converting the unconstrained demand forecast and create a "capacity-constrained" supply chain plan across foundry, assembly and test vendors. Having this capability allows planners to systematically balance or allocate steady-state demand based on back-end capacity constraints, while focusing their efforts on in-quarter customer order (upside requests, product mix change, etc.). In order to improve inventory performance, reduce inventory cost and improve customer service levels, companies are working on efforts to increase inventory visibility across the extended supply chain including die banks, assembly/test facility, distribution center and Vendor Managed Inventory (VMI) hubs. Rounding out the top five initiatives, companies are also attempting to reduce demand-supply planning cycle times and improving planning frequency. Fast, frequent planning cycles reduce the negative impact of demand-supply mismatch.

Conclusion:

Based on the macro trends within the semiconductor industry and Oracle's work with multiple customers in the high technology sector it is evident that effective, ongoing collaboration among globally dispersed employees and ecosystem partners must become routine across all functions – from product development, supply chain management, marketing and sales to service management. In order to execute efficiently with speed, accurate business information must be provided in a secure, timely, and personalized way to key decision makers. Geographically far-flung operations must work in a synchronized manner so that companies can operate as a single, integrated global enterprise, capturing benefits from scale economies yet retaining agility to respond to local market requirements or changing business conditions.

Automation of key business processes and utilization of information and communications technology will be critical in assisting businesses to address these challenges. However, in order to address the trends and challenges highlighted above, companies must assess and prioritize business needs and identify specific "pain points" related to global business processes, employee productivity and global operations. Based on this assessment and understanding of specific pain points companies can develop a prioritized solution roadmap to achieve "new" business and technology capabilities. A good business case typically guides prioritization of new capabilities.

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