ANALYTICS CUT LABOR PAINS IN BIRTHING NEW HIGH-TECH PRODUCTS
Analytics cut labor pains in birthing new high-tech products is all about managing product life cycles by enhancing sales and operational planning process which helps all companies in gaining market share early on competition.
Table of Contents

High-tech Uses Analytics in New PLM Strategy 4
Birthing a New High-tech Product 5
S&OP Focus with NPI & EOL Transition 5
Responsive Sub-processes in the New Proactive Model 6
Analytical Mindset to Measure Process Maturity 7
Conclusion 8
Collaborating all supply chain partners to facilitate timely product innovation, would minimize total costs, gain quick market share and competitive advantage. This white paper discusses a new analytical model with pre-launch preparations, tactical planning, and product life cycle management that could be applied as standard work in any industry wanting to target inventory problems from a combination of obsolete products with no demand and residual finished goods with leftover components. Benefits realized by implementing this enhanced S&OP process integrated with Product Lifecycle Management (PLM) and EOL transition planning would translate into increased inventory turns, improved on-time delivery performance, manufacturing asset efficiency, cycle time reduction, decreased inventory risks, lower shipping costs, and better cash flow management.

The AIM Practice - Advanced Analytics, brings domain expertise in capturing historical data, market trends, and sizing the business risks while balancing material requirement and inventory exposure liability. Yet managing expectations with new product launches utilizing traditional S&OP is a no-win game because of varying lead times at suppliers, complex engineering involving product lines, and high volatility in demand from the hi-tech industry and its customers. Under these circumstances, the relative contribution of analytics becomes compelling in creating a competent dashboard which minimizes the ad-hoc nature and inconsistency of the overall planning process.

Analytical Model for rationalizing Excess & Obsolescence per Forecast

<table>
<thead>
<tr>
<th>Customer Assembly Type Component Description</th>
<th>Qty On Hand</th>
<th>Ex ST</th>
<th>Total Demand Qty</th>
<th>LTB Demand Qty</th>
<th>Inventory Covers Total LTB Demand Qty</th>
<th>Total Qty On Hand After Consumption</th>
<th>Liability</th>
<th>On Hand Assume Dock</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC, inc Assy OVRLY, OMSCS</td>
<td>105</td>
<td>$6.78</td>
<td>320</td>
<td>200</td>
<td>No</td>
<td>(22) $</td>
<td>-</td>
<td>178</td>
</tr>
<tr>
<td>ABC, inc SubAssy ATCA-Single Blade</td>
<td>154</td>
<td>$57.89</td>
<td>320</td>
<td>200</td>
<td>No</td>
<td>(44) $</td>
<td>-</td>
<td>156</td>
</tr>
<tr>
<td>ABC, inc SubAssy IC-LS</td>
<td>175</td>
<td>$26.92</td>
<td>320</td>
<td>200</td>
<td>No</td>
<td>(18) $</td>
<td>-</td>
<td>182</td>
</tr>
<tr>
<td>ABC, inc SubAssy ZD PLUG, 40 PAIR</td>
<td>639</td>
<td>$78.96</td>
<td>640</td>
<td>400</td>
<td>Yes</td>
<td>239 $</td>
<td>9,455.18</td>
<td>639</td>
</tr>
<tr>
<td>ABC, inc SubAssy SRAM, Kx16</td>
<td>3,557</td>
<td>$4.82</td>
<td>320</td>
<td>200</td>
<td>Yes</td>
<td>3,357 $</td>
<td>16,357.29</td>
<td>3557</td>
</tr>
<tr>
<td>ABC, inc SubAssy SOP, TP-PWP</td>
<td>6,920</td>
<td>$4.53</td>
<td>320</td>
<td>200</td>
<td>Yes</td>
<td>6,720 $</td>
<td>30,802.12</td>
<td>6920</td>
</tr>
<tr>
<td>ABC, inc SubAssy CHIP 3.9A</td>
<td>1,487</td>
<td>$1.63</td>
<td>320</td>
<td>200</td>
<td>Yes</td>
<td>1,287 $</td>
<td>1,346.24</td>
<td>1487</td>
</tr>
<tr>
<td>ABC, inc Assy GASKET</td>
<td>659</td>
<td>$5.38</td>
<td>320</td>
<td>200</td>
<td>Yes</td>
<td>459 $</td>
<td>2,296.98</td>
<td>659</td>
</tr>
<tr>
<td>ABC, inc Assy FRONT PANEL, ASSY</td>
<td>365</td>
<td>$54.68</td>
<td>320</td>
<td>200</td>
<td>Yes</td>
<td>147 $</td>
<td>8,342.28</td>
<td>347</td>
</tr>
<tr>
<td>ABC, inc Assy BRACKET, HDD</td>
<td>370</td>
<td>$21.78</td>
<td>320</td>
<td>200</td>
<td>Yes</td>
<td>174 $</td>
<td>3,609.10</td>
<td>374</td>
</tr>
<tr>
<td>ABC, inc Assy PANEL, AIR BAFFLE</td>
<td>465</td>
<td>$30.47</td>
<td>320</td>
<td>200</td>
<td>Yes</td>
<td>246 $</td>
<td>7,261.19</td>
<td>447</td>
</tr>
<tr>
<td>ABC, inc SubAssy CONN, SAS X4</td>
<td>2,064</td>
<td>$14.23</td>
<td>320</td>
<td>200</td>
<td>Yes</td>
<td>1,740 $</td>
<td>27,667.53</td>
<td>1941</td>
</tr>
<tr>
<td>ABC, inc Assy HEATSINK</td>
<td>2,419</td>
<td>$10.24</td>
<td>320</td>
<td>200</td>
<td>Yes</td>
<td>2,267 $</td>
<td>25,493.12</td>
<td>268</td>
</tr>
<tr>
<td></td>
<td>4,480</td>
<td>2,800</td>
<td>16,552</td>
<td>122,693.33</td>
<td>19355</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analytical Model for rationalizing Excess & Obsolescence per Forecast

The high tech industry was witnessing shortened product life cycles and technology cycles, though decision-makers in the supply chain were still unwilling to meet the level of collaboration desired in an ideal customer-supplier relationship. It became extremely difficult to forecast new product introductions (NPI) from both, siloed business stakeholders and no previous history existing of similar or like products. At the same time slow moving inventory in the pipeline got stranded (refer tabulated column values – quantity on hand after consumption and liability) as the old product’s demand, nearing end of life (EOL), had eroded. To succeed would require reassessment of supply chain variables such as batch sizes, economic order quantities (EOQs), minimum order quantities (MOQs), lead times, and the like, to couple with an enhanced Sales & Operational Planning (S&OP) Process in responding to the rapidly adapting needs of the market place and changing tastes and preferences of the customers.
Traditional S&OP is a supply chain planning model that has been around for over 50 years. A lot has changed since then – sensing/shaping/responding of demand signals, managing suppliers, exploding customer preferences, and of course shortened product & technology lifecycles. With everything fast becoming outdated, especially in the high-technology manufacturing industry, supply chain experts are turning to predictive modeling techniques - smarter analytics comes of age to tackle supply chain challenges!

Analytics tools track processes across the supply chain, identify gaps, report alerts, forecast future demand, chart trends, buying patterns and bring together visibility, predictability, and sustainability for customers, manufacturers and suppliers. Empowered with internalized data (information) that had so far been relegated to silos, companies are better equipped with analytics to translate historical lag data into leading indicators with actionable insights, rapidly adapting to needs of customers, facilitating timely product innovation, drastically cutting costs, and gaining market share much faster from competition by moving fast in closing demand-supply gaps.

In this white paper, Ferose A. Lambay (Industry Principal – SCM Advanced Analytics) outlined a new integrated business process that utilizes an analytics framework as an industry best practice measure for superior product lifecycle management (PLM), enhanced S&OP, and leaner inventory ownership.

### High-tech Uses Analytics in New PLM Strategy

Riddled with problems of volatile customer demands and stark variants in longevities of a slew of products through entire assembly lines, the high-tech manufacturing industry’s latest cost-cutter is its new strategy of using analytics to align product launches with end-of-life products.

Cutting costs in the supply chain and margin boosts from inventory reduction drives the bottom line with every new technological break-thru. Reducing variability in active products is still a linear process. It becomes arduous to forecast new product launches with no prior history or ramp-down of EOL especially when the pipeline is clogged with build inventory & components also nearing the decline with the older product. This translates into bigger inventory exposure risks for all supply chain partners wanting to align the imbalanced demand and supply plans.

Huge gaps arise between the volatile demand and the target plan for fulfillment requiring unbiased future forecasts. Leading to improve the overall supply chain planning and sales performance, business managers rely on sooner amplifying the warning signs and quickly responding to close the issues however innocuous they may seem. Predictive and reporting analytics tools trigger warning alerts to managerial functions, translating into a domino effect that mitigates these planning risks and propels the intelligence upstream & downstream in the supply chain, in detailed ways very much like Sherlock Holmes examining evidences at the scene of crime.

Larry Lapide of Massachusetts Institute of Technology (MIT) has outlined a maturity model to determine the extent of adoption of ideal S&OP practices in organizations (see Figure 1: A Four-stage S&OP Process Maturity Model). Most organizational processes operate in one of these stages, with Stage 4 considered the ideal stage (centers of excellence). Industry experts use analytics at every stage of this S&OP process maturity model which is widely used to diagnose an organization’s process maturity and thereby competitive standing in the market place.

---

**FIGURE 1: A FOUR STAGE S&OP PROCESS MATURITY MODEL**

<table>
<thead>
<tr>
<th>STAGE 1</th>
<th>STAGE 2</th>
<th>STAGE 3</th>
<th>STAGE 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MARGINAL PROCESS</strong></td>
<td><strong>RUDIMENTARY PROCESS</strong></td>
<td><strong>CLASSIC PROCESS</strong></td>
<td><strong>IDEAL PROCESS</strong></td>
</tr>
<tr>
<td>Informal meetings</td>
<td>Formal meetings</td>
<td>Formal meetings</td>
<td>Event driven meetings</td>
</tr>
<tr>
<td><em>Sporadic scheduling</em></td>
<td><em>Routine schedule</em></td>
<td><em>100% attendance and participation</em></td>
<td><em>Scheduled when someone wants to consider a change or when a supply-demand imbalance is detected</em></td>
</tr>
<tr>
<td>Disjointed processes</td>
<td>Interfaced processes</td>
<td>Integrated processes</td>
<td>Extended processes</td>
</tr>
<tr>
<td><em>Separate, disjoint demand plans</em></td>
<td><em>Demand plans reconciled</em></td>
<td><em>Demand and supply plans jointly aligned</em></td>
<td><em>Demand and supply plans aligned internally and externally</em></td>
</tr>
<tr>
<td><em>Supply plans not aligned to demand plans</em></td>
<td><em>Supply plans aligned to demand plans</em></td>
<td><em>External collaboration with limited number of suppliers and customers</em></td>
<td><em>External collaboration with most suppliers and customers</em></td>
</tr>
<tr>
<td>Minimal technology-enablement</td>
<td>Standalone applications interfaced</td>
<td>Applications integrated</td>
<td>Full set of integrated technologies</td>
</tr>
<tr>
<td><em>Multitude of spreadsheets</em></td>
<td><em>Standalone demand planning system</em></td>
<td><em>Demand planning packages and supply planning apps, integrated</em></td>
<td><em>An advanced S&amp;OP workbench</em></td>
</tr>
<tr>
<td></td>
<td><em>Standalone multi-facility APS system</em></td>
<td><em>External information manually brought into the process</em></td>
<td><em>External-facing collaborative software integrated to internal demand-supply planning systems</em></td>
</tr>
</tbody>
</table>
Birthing a New High-tech Product

NPI in high-tech manufacturing is a non-linear process with parallel research and technological innovation consuming the entire supply chain from engineering, marketing, sales, customers, suppliers, manufacturing, storage, distribution channel, transportation, to after-market logistics.

The key reason for new product launch failures is not just being late to market but absence of innovative supply chain planning processes to ensure new products reached customers in a timely manner. Better tools & metrics are needed for focused accountability and responsibility so that supply chain partners can foresee potential issues and take corrective measures to cancel/reschedule promised product deliveries and make more risk ready organizations.

By coupling the EOP product transitioning to NPI, the problem becomes only more daunting. Customers always demanded a wider variety of stable products & services while supply chain partners continued to face pressures and competition in areas of agility, flexibility, and inventory velocity at reduced costs.

EOL transitioning is not an easy task with products & components in a constant state of flux. It affects the whole gamut from server platforms, operating systems (OS), software, assembly components, commodity sourcing to compliance associated with various quality standards (ISO 9001, TL 9000, NEBS, etc.). Besides, the high-technology industry frequently witnesses technology swings such as chip size / capacity, flash memory, innovations like video streaming in mobile devices, and so forth.

Huge expenses affect cash flow outlays and working capital from last time buys / builds (LTB), excess and obsolescence (E&O), platform migrations and discontinuation liabilities. They tend to increase supply chain costs and reduce revenues if not planned properly during the pre-launch timeline.

S&OP Focus with NPI & EOL Transition

It is always a better idea to introduce collaboration with a “single number forecast” or “game plan” subscribed by all supply chain partners irrespective of their position, upstream or downstream in the supply chain (see Figure 2: Reactionary to responsive demand planning).

The participation of internal stakeholders and external partners during various stages of new product launches does not end once a new product is launched in the market. Participation must continue throughout the life cycle.

![Figure 2: Reactionary to Responsive Demand Planning](image)

This enhanced S&OP with NPI & EOL co-mingled with analytics generates greater visibility and predictability to companies needing insight and confidence to operate with even leaner inventory improving turns, sales performances, and decreasing forecast errors seen specifically during early introductions of new products and decline of older products.
Responsive Sub-processes in the New Proactive Model

By integrating NPI and EOL transitioning with the S&OP process, companies are better equipped to understand and align their risk categories with drivers improving resource allocation, reducing excess inventory, raising customer service levels and moving away from reactionary demand forecasting to a proactive responsive model which anticipates customer needs from the marketplace and offers unprecedented views into the supply chain.

The new proactive model (see Figure 3: NPI Planning Process with EOL Product Transition) further establishes sub-processes such as portfolio management (aka SKU rationalization, product or customer segmentation) and Pareto analysis (ABC classification) with critical components flagging their rates of change, lead times, roadmap timings, life cycle stage, smoothly transitioning at EOL without impacting new replacements or the working capital. Once the product is identified for potential discontinuation, the proactive model tunes downward supply planning assumptions such as fill rates, lot sizes, EOQ, MOQ to reduce all sorts of inventory from raw material to on-hand finished goods and packaging inventory this mitigating any inventory exposure risks during the final ramp-down stage.

More notably, the proactive model removes latency and variability by shaping the demand side and minimizing the cumulative lead time elements associated with each link in the supply chain, driving one set of plans for both new product launches and those reaching end of their life. The forecasting planning cycle time gets drastically reduced from months to days which boosts the inventory turnover ratio.

**FIGURE 3: NPI PLANNING PROCESS WITH EOL PRODUCT TRANSITION**
Analytical Mindset to Measure Process Maturity

Domain expertise already exists in data mining sales history, market trends, and even sizing risks encountered during demand / supply imbalances and inventory liabilities. The S&OP process integrated with NPI and EOL transition is still evolutionary across many industries due to low adoption rates and difficulties in jump starting change management. However, one can minimize the ad-hoc nature of this industry and planning inconsistencies by using analytics tools such as predictive models, balance scorecards, and shared performance metrics that capture insights into executing a 'single number plan'.

The proactive model dictates a collaborative platform (similar to CPFR) with the essential elements of early supplier involvement during the engineering design phase translating conceptual product designs into material evaluation plans thus preventing a great deal of inventory and capacity risks experienced during product launches and EOL when sales volumes have dropped as low as to be considered for EOL either through customer migration or by adoption of newer technology.

Among 72% of the companies surveyed in the industry (Pearson Survey, November 2009, see Figure 4: S & OP Maturity Model Curve) were in different stages of the SOP maturity curve. Most companies had begun to measure business critical metrics like forecast accuracy that impacted cost of goods sold (COGS), inventory costs, sales revenue and customer service levels.

Cost savings were realized during the NPI and EOL Transition when functioning properly within this new proactive S&OP process. The final stage of center of excellence (COE) will be reached only when companies had deployed this enhanced SOP model that completely packages analytical solutions supported with extraction, transformation & loading (ETL) tools, ad-hoc reporting, and S&OP workbenches. The data can be gathered from transactional enterprise resource planning (ERP) and advanced supply chain planning engines at the back - end which optimizes the supply chain plan to be executed.

Remarkable results are achieved with new metrics getting measured, and reported in competitive benchmarking of those companies adopting this new enhanced S&OP model with NPI & EOL. Any residual silos existing between internal departments and external stakeholders were completely eliminated as companies strived to better understand and remove impact of volatility on future demand.

Some of the business benefits that came with the new enhanced S&OP model were as follows:
- Improved delivery schedules
- Increase in market share with speedier time-to-market
- Collaboration throughout entire supply chain
- Manufacturing asset efficiency
- Planning cycle time reduction
- Decreased supply chain risks
- Lower shipping costs
- Drastic wastage reduction
- Improved customer relations
- Maximized revenues

Percentage of Companies that do not have a formal risk managing process would certainly benefit very rapidly in implementing the new integrated S&OP process described in this whitepaper allowing their businesses to focus on managing exceptions instead of routine fire-fighting. The way forward is to emphasize that this is a win-win proposition for all businesses and IT solution providers alike.
Conclusion

Integrated business processes that use analytics, proactive inventory models, and forecast value add (FVA) metrics form the essential elements of an enhanced S&OP framework. By using analytics and re-engineering traditional S&OP process, old products can be easily transitioned into new product introductions limiting inherent supply chain risks.

Traditional analytical tools lack the much-needed scalability, in-depth analytics, and collaborative responsiveness to manage an active S&OP process. The new analytics-inclusive S&OP Process Maturity Model can be used as a diagnostic tool that allows course corrections in financial budgeting, exposing misaligned goals between supply chain partners while satisfying customer demand at the lowest total delivered cost.

Companies wanting to implement this new responsive model or those having strategic plans to re-engineer their current S&OP will enjoy greater profits and market share than those firms with no exit strategy to deal with barriers in forecasting effort and outdated planning methods.

“You cannot improve what you cannot measure… An analytics based solution puts S&OP with PLM as a fast track best practice that can resolve disconnects in the planning processes while dramatically reducing finished goods inventory, sustaining service levels, and lowering the overall supply chain costs.”

The Drivers to S&OP success with Analytics, Aberdeen Research and SCMR, January 2010
Chad Mellen, President of Cross Accessory Division at A.T. Cross
Bob Allen & Len Prokopets, Principals with Archstone Consulting

Bibliography


Acknowledgements

The author is grateful to peers from NEI, Tektronix, and Jabil Electronics who helped in concept development as well as assisting in the hi-tech industry research.

Preparation extends beyond identifying supply chain risks at any S&OP meeting. The business stakeholders do not come well prepared to the pre-SOP meeting as their counterparts in Marketing, Engineering or Product Management. Using detailed analytics to identify products for discontinuation on an ongoing basis enables the company to effectively manage obsolete and excess inventory in the build pipeline.
About the Author:

Ferose A. Lambay CPIM, CSCP, CPF - a seasoned supply chain leader implementing best practices and end-to-end strategic and tactical supply chain solutions, analyzing emerging trends in technology, and inventory optimization. Ferose brings 20 years of experience in industry, advisory, management consulting, and information technology enabling for efficient supply chain performance. Before joining Wipro under AIM, his past responsibilities included global supply chain planning, demand forecasting, and master scheduling at a mid-sized platform server contract manufacturer with JIT kanban replenishment. His work in complex domains focuses on risk management, inventory management, constraint based planning, strategic sourcing, statistical forecasting, pricing elasticity models, ATP/CTP heuristics, SCOR metrics, and advanced analytical dashboards. He has facilitated executive S&OP, lean flow kaizen events, and materials management to bring about significant cash flow improvements through reductions in planning cycle times, excess and obsolete inventory. He helped maximize returns on IT investments by architecting advanced supply chain solutions in Manugistics, i2 Rhythm suite, Demand Tec, Adexa, and Logility integrated with ERP systems (Oracle, SAP, Great Plains, BPCS, and JDE). His career spanned Fortune companies like Tata Iron & Steels, i2 Technologies, EDS A.T. Kearney, Sterling Commerce, Rockwell Collins, and RadioShack Corporation. He holds a M.S. with major in Operations Research and Industrial Engineering from the University of Florida and MBA with major in Finance and Operations Management from the University of Texas at Dallas. He is certified in APICS & IBF. Ferose has spoken at industry events and shared his research by publishing white papers and articles in journals.

About Wipro

Wipro Technologies, the global IT business of Wipro Limited (NYSE:WIT) is a leading Information Technology, Consulting and Outsourcing company, that delivers solutions to enable its clients do business better. Wipro Technologies delivers winning business outcomes through its deep industry experience and a 360 degree view of “Business through Technology” - helping clients create successful and adaptive businesses. A company recognized globally for its comprehensive portfolio of services, a practitioner’s approach to delivering innovation and an organization wide commitment to sustainability. Wipro Technologies has over 130,000 employees and clients across 54 countries.