Excess and Obsolete Inventory: Everybody's Responsible! [1]

Executive Summary

The Supply Chain Resource Cooperative held its first ever *"Executive Roundtable on Excess and Obsolete Inventory"* on the NC State campus on October 25, 2017. The event was attended by 25 executives from a variety of different industries and backgrounds. Inventory Management Partners, LLC sponsored the event, and helped to bring together the format and content for the discussion. The objective of this session was to openly discuss some of the challenges that exist in managing this over-looked asset, and begin to shine a light on approaches that can be more effective in dealing with the issue. After much discussion, the executive roundtable identified a number of characteristics associated with a properly developed E&O strategy:

Assign Accountability. Executives need to *deal with inventory issues as they arise!* Organizations need to be proactive about how to avoid making the decision, and when it does occur, immediately seek to address the issue. Can it be used somewhere else, or can we assume we won't use it and absorb that cost into the business and recognize it?

Design products with the end of the supply chain in mind. Ensure that engineers are more aware of how design parts left over at the end of the product life cycle will consume working capital, and train them on these costs. For example, Huawei had a component engineering team reporting into procurement, and they were responsible for dictating components that went into every line of business to ensure maximum flexibility for usage of parts. They forced component engineers to pull designs from existing baskets of parts, which addresses many of the problems with complexity and avoiding unique parts.

Management awareness of E&O impacts. Is there a senior management team committed to driving down Excess and Obsolete inventory levels? E&O should be viewed as pure cash. For example, more and more companies are establishing incentives for sales people who now earn part of their bonus based on how accurately they forecast to the SKU level, not to the planning level (which aggregates many parts, and which is relatively stable and easy to forecast).

Planning and Sales communication. There needs to be important communication channels between planning and sales managers. The discussion could include a dialogue that includes a discussion such as, "how real is your forecast? (I won't expose you)". Sales people tend to load their forecasts by as much as 10%, which drives the MRP orders. There needs to be a one to one relationship between sales and demand planning to ensure complete transparency and real-time communication.

Change sales incentives. It also helps if sales team bonuses are tied to inventory and tied to budget on S&OP's. Metrics on sales forecasts not only on final shipping, but on configuration and BOM accuracy is an important element. Customer-named accounts and configurations can help to improve sales accuracy, and to drive

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accountability for how the inventory was generated to a specific customer order and sales person can drive accountability six months down the road. Sales people will change their behaviors under these conditions.

Develop an E&O narrative. There needs to be a story constructed around how inventory is generated, and accountability for the inventory, to drive out the buffer planning behavior that occurs. There needs to be reviews of min-max cycles, minimum liability planning on configured products, and intelligence narrowing of the product portfolio as a result. Product design standards and ownership is key.

Plan for E&O to be an outcome of mergers and acquisitions. Several executives noted that mergers of two companies, with different cultures and philosophies about product design, customer service, and the resulting inventory strategy that emerges, can often create a huge amount of E&O. The cycle of business that drives these mergers causes a huge amount of instability in the network, and creates costs that often far outweigh the potential "savings" generated by forecasted cost savings. This creates a mismatch in systems and philosophies that take years to overcome and stabilize. Once they are finally overcome, the next merger comes along and it starts over again.

Focus on forecasting performance for mix, not final product. Forecasting performance analysis should be used to understand the strategy around what products/components will be consistently inaccurate. At one company, leaders challenged managers to understand people are ordering parts, and performing a deep analysis on what parts were driven into the supply chain through poor planning activities, which can help to prevent such problems from recurring. A pilot project was done to look at service parts through tier 2 components, what was being purchased, the MOQ's, and having suppliers share what they were seeing vs. what was being ordered. Opening discussions with partners on lead times, inventory levels, and forecast accuracy can start to open up the discussion.

Measure life cycle inventory cost. A planning process in the design stage can also help to build in the cost of inventory early on. A best practice at one company is to establish during the design phase the life cycle cost for components, and define the total life cycle cost of having ANYTHING in inventory over the life of the product. At least setting a planned number makes sense and can enable a category strategy around that target to be established.

Evaluate decision impacts related to E&O. There also needs to be some work around the cost of decisions and their impact on inventory. What is the cost of an engineering change and the resulting E&O cost? What is the cost of a new product and end of life inventory write-offs? Development cost of product should include tooling, supplier qualification, warehousing, and write-offs at end of life. Focusing on these costs can start the conversation going on cost of complexity.

Introduction

The Supply Chain Resource Cooperative held its first ever *"Executive Roundtable on Excess and Obsolete Inventory"* on the NC State campus on October 25, 2017. The event was attended by 25 executives from a variety of different industries and backgrounds. The objective of this session was to openly discuss some of the challenges that exist in managing this over-looked asset, and begin to shine a light on approaches that can be more effective in dealing with the issue. This white paper explores some of the issues that arose in the discussion. *Inventory Management Partners* sponsored the event, and helped to bring together the format and content for the discussion.

Outsourced Manufacturing and Unique Components in the Electronics Sector

A good amount of the electronics sector involves outsourcing to third party "contract manufacturers" such as Flex, Jabil, and others. The CM's are tier 1 order fulfillment providers, with tier 2'd doing some joint development (Original Design Manufacturer, or "ODM"[2]) and tier 3 and 4 component suppliers. For example, one company has this structure, do not own the inventory, but do have the liability for paying back the CM's for inventory that becomes aged. Organizations have been successful in beginning to cut out excess and obsolete inventory, but executives note that there are still struggles that exist.

The first is that some electronic manufacturers have to customize customer orders, yet are in a build to plan and configure to order environment, characterized by long lead times to get component parts up to tier 1, with highly customized orders. The lead times on many components, hard drives, and parts are long, and the portfolio of products is often very specified and unique. E&O can be significantly reduced by driving towards industry standard components, and reducing the number of unique parts. Another executive mentioned that their company reduced their product line which at one time had 700 sources of power supplies, down to 24 off-the-shelf parts which significantly reduced the E&O. Nevertheless, product support for 20-30 years old products requires holding an excessive amount of inventory. This is made even more complicated as companies are bought, sold, merged, and acquired, which results in further challenges in supply chain coordination.

The second challenge is due to the transition between product lines. As product life cycles are often two years or less, the transitions lead to having to support multiple technologies, often for decades. "We find ourselves struggling to ramp up the new products while supporting multiple older ones at the same time!" This causes challenges for sales forecasting, min/max replenishment levels, and managing excess inventory (or shortages) on many of the features of these products. Executives also joke that in addition to "last time buys" (the purchase of products that are going out of production due to age), there are also "latest time buys", which involve multiple purchases of products as the life cycles keep getting extended and the forecasts change.

[2] An *original design manufacturer* (ODM) is a company that designs and manufactures a product, as specified, that is eventually rebranded by another firm for sale. Such companies allow the firm that owns or licenses the brand to produce products (either as a supplement or solely) without having to engage in the organization or running of a factory.

A third challenge in the electronics sector is the planning and order fulfillment process. This is especially difficult in the PC market with extremely short product life cycles, long lead times for components, and the supply market challenges with capacity of components. A lot of the E&O occurs at the end of a product life cycle due to left over inventory. This requires a partnering approach with the sales team, to become more conservative on forecasts towards the end of the product life cycle. The use of channel partners as a vehicle to lean out inventories is a possibility, but this is not possible in the server market. This executive emphasized that to address E&O requires behavioral changes, beginning with identifying the cause of inventory, developing a pareto around the root causes, driving accountability, and following up with metrics. In some cases, it has been suggested that the sales organization should own E&O to drive the right behaviors!

Another factor in the electronics sector is the difference in supply chain philosophies and cultures that may clash during a merger/acquisition. In one instance discussion, the first company (Company A) viewed inventory as a core part of the business, which is a function of a build to order market with a highly customized product. The second company (Company B) has a history of having suppliers carry inventory, and a major challenge is rationalizing the different views on what the acceptable inventory carrying cost is for each sector. Company A is often creating markets, including products with components for a market that don't yet exist. Suppliers are sitting on inventory for customers that is unique, and this requires a good deal of trust and communication. This is being done in advance of not knowing what ultimate demand will be, and sometimes not having a good forecast. You put yourself in a position the big challenge here is sales relationships and accountability. Company A has traditionally had a close, relationship-based approach with suppliers, due to its low volume, high mix, high margin, custom components business, which is largely dependent on a reference design every 18 months. Company B is largely reliant on data exchange and interaction, with consumers as customers, data-based metrics, high efficiency, control points and decisions made on data in alignment with an Intel-based cadence. The different regional cultures (Northeast and Southwest) of the managers make this even more challenging. Both companies have different ERP systems (SAP APO vs. multiple planning systems), and there is an ongoing conversation on how to get the best of both worlds.

Managing Spare Parts in the Utilities Sector

An executive from the utilities sector discussed the challenges of managing parts inventories for power generation and distribution, during an era of mergers that takes place. When companies merge, there is often a difference in systems, cultures, and views on how inventory should be managed. Nuclear energy facilities have very different views on inventory than gas generation, and extra inventory is often viewed as a necessity in the former case. In addition, state utility commissions are very restrictive, making it difficult to move parts between sites in different states, further restrict the standardization and deployment of parts. He notes that inventory has grown 10% annually since 2011, which is effectively doubling inventory over five years. Growth of excess inventory is often a function of material planning for specific capital projects that are cancelled or delayed, as well as contingency materials kept at Nuclear Plants that are often "stranded assets", unique material at fossil fuel plants, the move towards new technologies such as solar, wind renewables, and combined cycle plants. A big challenge in this industry is to develop a demand planning tool to better manage inventories of parts, and link budget and material forecasts based on the amount of planned spending. There is also a lack of an end of life strategy, and a lack of understanding on how to drive inventory reduction.

Capital Projects E&O

Another important source of excess occurs in large capital projects. Because materials are often not viewed as an expense but as part of a capital project budget, it is often not clear who owns the "write-off" process. Engineers are often incented on bringing in projects in on time, and because crew stoppage is expensive and additional materials comparatively less, the result is significant excess inventory. Often project teams are forced to work with reseller markets to identify sources to write-off such inventories. In many cases this can be avoided by standardizing equipment to use across multiple projects. In the oil and gas sector, it is often possible to run the decision by an investment recovery group to determine if there is anything that can be substituted. If a reel or cable is worth a lot of money, perhaps there is a way to put it on someone else's books.

Inventory in the Pharmaceutical Sector

Companies in the pharmaceutical sector are trying to drive a standardized process and establishing ownership for inventory within the supply chain. One company noted that with the deployment of an end to end ERP system, there is greater visibility to inventory in the system, but people are unsure what to do with it. In particular, manufactured finished goods going into end markets has been a focus, to expand the scope of logistics services to get into supplier manufacturing components of the supply chain. Lead times and expiration of product has been of particular concern, but up until recently there hasn't been the right governance and controls to manage the flow of materials to the market. A challenge has been also to ensure the right lead times information is put into the system, and the right KPI's to help define where the focus should be for cost savings. Currently, each of the four stages of the supply chain (manufacturing, in-market materials, transportation, and last mile through port and quality control clearance in market. The amount of effort to pull data on transportation projects versus actual lead times has proven to be exceptionally hard to get. This results in manufacturing planning to work on the wrong orders at the wrong times, and results in excess and obsolete inventory.

Inventory at the American Red Cross

The ARC has many inventory challenges, as it supports both the US and US Territories. Every country has their own Red Cross, and the company in the US is going through a profound set of changes to become more responsive. Its biggest inventories are in its national warehouses, which are bloated with inventory. The organization has a new supply chain leader, Tom Nash, who in addition to the blood business, has responsibility over enterprise, warehousing, and fleet operations. The three biggest pools of inventory are on the disaster side, where products are accumulated based on contingencies to prepare for disasters. Everything collected is ultimately given away, and there is a tendency to want to hoard inventory, so a decision was made to value it at zero. By de-valuing the inventory, people were no longer being charged with the inventory as an asset on their books, which encouraged them to buy things from national inventories. Because every disaster is local, there was a tendency at each of the 5 warehouses holding disaster supplies to stockpile inventory, decreasing visibility to it. Instead of using their local stock, they would hoard it for a rainy day, and bring in more inventory from the national DC's. This led to excess inventory, such as flashlights that were no longer functioning and blankets so old they were falling apart. Another problem would be that people would get fussy over what products they received, with no one wanting to be given the older products. Blood inventories are the second category, which has a short shelf life, and challenges with supply as ARC can't control who their donors are.

O Negative is the most common blood with the highest demand, and it is manufactured by ARC with the hope that hospitals will take the product before it expires. There is also a challenge in terms of multiple trips to the hospital with blood every day, which drives transportation costs. Is there a way to share the product and combine couriers? Blood is also a declining market, as improved surgical techniques require less blood even for elective surgeries, and in some cases, are not using any blood in surgeries at all, which is driving a lot of waste. Hos to optimize the supply of blood and reduce the cost at the same time, for a declining market? This is problematic as there used to be a single group responsible for testing and distribution to the end customer, but now there is a group for inventory, one for collections, and one for sales, so no single group has true ownership of the inventory. And there are also disconnects with transportation and savings potentials, and to drive accountability of inventory expense to all parties on their P&L. How to drive inventory flow and reduce obsolescence is a discussion that is taking place right now. The product has only a 5-day life cycle.

E&O in Industrial Manufacturing

A common challenge in manufacturing is the complexity associated with customization of orders through the dealer network. For example, one manufacturer's products have over 100,000 components, and associates spend over 40% of their time on forecasting and inventory management. Lead times also vary from 2 to 3 weeks, and alignment of transportation delivery times with MRP schedules can drive fluctuations in available and inventory, and even a small component being late can drive delivery schedules off. Unfortunately, a lot of planning is done by Excel, and mistakes often occur. Three common themes include working with suppliers ("plan for every part") to manage the right planning parameters, improving flow paths, reducing lead times, and supplier management.

Another opportunity exists in better managing inventory for equipment maintenance. This is especially problematic for new equipment that has no history of spare parts. Understanding the carrying cost of spare parts inventory including financial and logistics costs can help raise awareness, but there is a need to better understand spare parts inventories in terms of turns, service levels, and service strategies. Maintenance engineers will always argue to hold a lot of spare parts to minimize delays. For expensive new equipment from European manufacturers, there may not be a lot of leverage, and lead times can be exceptionally long.

A third opportunity exists in inventory that is not owned by manufacturers, but which is owned by suppliers. This is the case for many of their product options, such as kits, attachments, etc. that customers order from dealers. The buying company provides forecasts to suppliers, and hold them accountable to provide 90% availability, as well as 98% service part reliability, and hold suppliers accountable for holding the inventory to fulfill these orders. A big challenge exists when forecasts are unreliable, and ensuring that processes for tracking orders is key. This arrangement looks good for the buyer's financials, but causes problems in managing supplier relationships. If processes are not aligned with suppliers, there are breakdowns in communication, and communication is often not happening fast enough. A manager noted that we need to get better alignment from engineering to support, to marketing, to supply management, and understand where the breakdowns in process flows and information flows are happening.

Emerging Themes

A common theme that emerged from the discussion was the excess and obsolete inventory is often a by-product of misaligned decisions. These can include product lifecycles, design standardization, promotional sales forecasting incentives, and multiple other factors.

A second common theme was that the true cost of E&O inventory is often misunderstood, and not truly measured. Elements of inventory cost should be documented, which might include labor (warehouse management), damage, carrying cost, liability insurance, contractual obligation costs, and others. This often doesn't lead to accountability for inventory by function, and whether it belongs to sales manufacturing, or purchasing/suppliers. The hidden costs of E&O inventory, and the right KPI's for measuring performance against world-class levels of aged inventory.

End of life cycles are another component of excess and obsolete. This can occur when a product is phased out, or when a capital project concludes, and there is left over inventory. Contractual commitments for holding inventory are often not well-defined, and the cost of these commitments are also not factored into the sales account management cycle.

Another common theme was the lack of communication that occurs, when functional groups don't communicate decisions, and even within functional groups, different locations may be buying the same materials but not sharing information. One division may have $10M of inventory, while another one is chasing down material of the same part! Every industry seems to have an E&O problem, and often the level of E&O is misunderstood and understated. An example was given of a $4B company that believed their E&O was $4M; after a study was done, it was found to be $44M! Most of their material was obsolete, and they had warehouses of material that was 10 years old that they didn't know was there.

There is also a root cause in the misalignment between consumption and forecasting. In the majority of instances, this is a root cause for much of the E&O problem that exists. E&O is often viewed as a **mistake**. And when it occurs, it is frequently not acknowledged, and the decision on what to do with it is postponed…eventually "the sins of the company fall on the supply chain", and the E&O becomes the ownership of the supply chain team.

Important issues to consider when evaluating how to deal with E&O:

- Do you have dedicated resources to manage E&O?
- Do you have a team who handles the issue across all lines of the business?
- Do you have a means to properly measure the cost of E&O?
- Do you formally designate ownership of inventory as a result of supply-forecast-demand errors?

An important point to note is that the forecast can never be "fixed" – forecasts will always be inaccurate, and this is unlikely to change due to the shifts that are constantly occurring in the demand of products, the flow of new products, the increased complexity and customization of products, and the end of life issues that arise.

Summary Recommendations

After much discussion, the executive roundtable identified a number of characteristics associated with a properly developed E&O strategy:

Assign Accountability. Executives need to *deal with inventory issues as they arise!* Organizations need to be proactive about how to avoid making the decision, and when it does occur, immediately seek to address the issue. Can it be used somewhere else, or can we assume we won't use it and absorb that cost into the business and recognize it?

Design products with the end of the supply chain in mind. Ensure that engineers are more aware of how design parts left over at the end of the product life cycle will consume working capital, and train them on these costs. For example, Huawei had a component engineering team reporting into procurement, and they were responsible for dictating components that went into every line of business to ensure maximum flexibility for usage of parts. They forced component engineers to pull designs from existing baskets of parts, which addresses many of the problems with complexity and avoiding unique parts.

Management awareness of E&O impacts. Is there a senior management team committed to driving down Excess and Obsolete inventory levels? E&O should be viewed as pure cash. For example, more and more companies are establishing incentives for sales people who now earn part of their bonus based on how accurately they forecast to the SKU level, not to the planning level (which aggregates many parts and which is relatively stable and easy to forecast).

Planning and Sales communication. There needs to be important communication channels between planning and sales managers. The discussion could include a dialogue that includes a discussion such as "how real is your forecast? (I won't expose you)". Sales people tend to load their forecasts by as much as 10%, which drives the MRP orders. There needs to be a one to one relationship between sales and demand planning to ensure complete transparency and real-time communication.

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potential "savings" generated by forecasted cost savings. This creates a mismatch in systems and philosophies that take years to overcome and stabilize. Once they are finally overcome, the next merger comes along and it starts over again.

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Measure life cycle inventory cost. A planning process in the design stage can also help to build in the cost of inventory early on. A best practice at one company is to establish during the design phase the life cycle cost for components, and define the total life cycle cost of having ANYTHING in inventory over the life of the product. At least setting a planned number makes sense and can enable a category strategy around that target to be established.

Evaluate decision impacts related to E&O. There also needs to be some work around the cost of decisions and their impact on inventory. What is the cost of an engineering change and the resulting E&O cost? What is the cost of a new product and end of life inventory write-offs? Development cost of product should include tooling, supplier qualification, warehousing, and write-offs at end of life. Focusing on these costs can start the conversation going on cost of complexity.

Actions Going Forward

It was clear that this discussion had only "scratched the surface" on the root causes of E&O. However, the majority of the discussion was focused on the root causes of E&O, and how it is created. An important topic going forward for the next workshop is to focus on "what we can do as an organization to deal with E&O once it is generated?"

The group discussed the possibility of establishing a total cost of ownership model for E&O, and having a team of NC State students work on this. There needs to be a benchmark study to identify the different costs of inventory, and identification of different methods of calculating it. The cost model needs to be supply chain led, but bought in by finance and embedded into the operations team, the sales team, and product design teams. This could also help to shape the discussion given that a third party (NC State) would be creating it. It could also help to drive discussions of OEM's with their contract manufacturers on what they are doing to eliminate E&O.

Another session could also be held that presents some of the benchmarking insights from an inventory cost model comparison. The focus should also be on how to manage E&O once it is created. These insights shared with the group and provide a basis for discussion of how best to work around these issues.

Please direct any suggestions, thoughts, or comments for moving forward to Rob Handfield rbhadfi@ncsu.edu.