

THE INVENTORY BALANCING ACT

Gideon Hillman addresses the issue of balancing inventory with working capital and customer service targets.

Inventory is a critical element to most businesses, but different functions within a business have different perceptions of how much inventory there should be. Sales tend to want large volumes of inventory to guarantee service; finance want the inventory minimized to reduce working capital, and operations want sufficient raw material to keep equipment operating efficiently. In addition, all inventories need to be of the right quality, positioned in the right place, at the right time and in the right quantity. The difficult task of inventory management is to balance and satisfy all of these needs. Identifying the 'levers' that allow a business to reduce inventory, but still meet customer service targets and working capital constraints is the key — but how is it done?

All too often, inventory is treated by 'rules of thumb' that do not provide sufficient justification for inventory levels, do not ensure working capital is minimized and don't have a clear correlation between inventory level and customer service. Many businesses talk about supply in terms of 'days' or 'weeks,' but what does that really mean in a supply chain where demand quantities, supply quantities and supply lead times all vary day to day or week to week? Inventory ties up working capital, costs money to store, costs money to handle and can become damaged or obsolete. With the exception of work in progress, in an ideal world there would be no inventory in a business. Material would

flow through the supply chain with no stops or bottlenecks, and the inbound supply rates would be synchronous with the outbound supply rates. A perfect world, but not the one many businesses operate within.

The reality is that for most companies to remain in business, they need to protect their supply. If they can't supply when the customer wants, in the quantity they require, then the customer will go elsewhere. Consequently, to protect supply, you need to hold inventory at points in the supply chain where the inbound and outbound product flows do not match; these are often referred to as 'decoupling points.' There are few businesses that have the luxury of customers requesting finished goods at exactly the same rate as the raw materials are supplied and processed. The area where most companies fall down is deciding how much inventory to hold. All too often, inventory levels are driven through the suboptimization of other processes (such as optimal production batch quantities) or driven by rules of thumb (4 weeks' supply for all products, for example). These techniques do not stand up to scrutiny as they are neither scientific, nor factual, and are often based on perception or intangible experience. In many companies, this leads to overinflated inventory holding, 'squirrel' stocks and conflicting ideas between sales, finance, operations and supply chain regarding how much inventory is truly required. The result is usually lots of stock,

but it's just the wrong type and in the wrong quantity. Consequently, you continue to get customer service failures, the stock you do have doesn't get used and can ultimately become obsolete.

Cycle and Safety

There are two types of inventory that protect supply — cycle stock and safety stock. Of course, there are other types of inventory, such as goods in transit, work in progress, obsolete etc., but these are all a consequence of an activity and not specifically held to protect supply. Cycle stock is the level of inventory held to ensure that the mean average customer demand can be met during the replenishment lead time. Safety stock is in addition to the cycle stock, but the safety stock level is designed to cover the potential for customer demand peaking above average and is based on a calculation that assesses the probability of the customer ordering more than usual. By making these calculations, a business can successfully bridge the inventory level with the customer service requirements. However, it is not just the supply that has to be protected, but also the cash constraints of the business. It is of no value to calculate inventory levels that perfectly meet the demands of the customer, if the business does not have the working capital available to invest in that inventory.

This is where the business needs to bridge the best possible service with the constraints

of working capital availability and consider how to meet customer requirements, but minimize the amount of working capital tied up in inventory at any one time. To give an example of the relationship between working capital and inventory, consider a business that sells £10 million worth of a product (at cost) each year. The total revenue received from sales of that product is £16 million. If the business buys all £10 million worth of the product at the start of the year, by the end of the year it would have made a £5 million gross profit on a single investment of £10 million working capital. However, if the business buys 50% (£5 million) of the product at the start of the year, sells it and then buys the next 50% with the sales revenue, then the profit will remain the same, but only £5 million of working capital is required.

Balancing this relationship between working capital and inventory can be a difficult task, which is often further complicated by standard measurements that businesses use. The finance department often dictates the maximum levels of inventory that can be held in 'stock-turns.' This is an accounting term that provides no indication to the type and location of physical inventory required. Balancing inventory levels with working capital constraints and

customer service targets is a science, not an art, and requires hard facts and data. There are no magic methods of protecting supply; if you have decoupling points in your supply chain, but insufficient capital to invest in inventory, then you will fail to service your customer. The business needs to calculate accurately what service it can afford. To do this, you need to ascertain the cost of the inventory calculated. This will include the purchase price of the inventory (or manufacturing cost), plus the inventory holding costs (warehousing, equipment, IT, staff, deterioration, insurance, etc.). With this complete, the business now has the tools to clearly present the balance between inventory levels, customer service and costs. With simple sensitivity analysis, all stakeholders can be shown how, if customer service want X% service, then it will cost £Y in working capital. Or, conversely, if finance want £Y working capital, then customer service will have to be X%.

By undertaking this approach, a business will have facts on which to make decisions, not 'rules of thumb.' They will have successfully balanced inventory levels with working capital constraints and customer service targets. They will have achieved the inventory balancing act. A good working example of this is the recent inventory tools implemented by Goodrich, a leading global supplier of systems and services to the aerospace and defence industry. They supply a wide portfolio of products — from actuation systems and landing gear to sensors, safety and engine control systems. The Goodrich division focusing on engine control and electrical power systems (Goodrich ECEPS) is a world leading supplier and aftermarket service provider, through both its in-house facilities and its joint venture with Rolls-Royce plc. Goodrich ECEPS offers 200 product families supplying nearly all sizes and types of aircraft — from corporate jets to the largest commercial jets, and helicopters to military platforms. Applications can range from supplying 90,000 lb thrust turbofans to the smallest turbofan and auxiliary power units (APUs).

In January 2012, Goodrich ECEPS engaged the specialist inventory team at Gideon Hillman Consulting to undertake a complete review of their inventory planning approach, specifically within their UK spares distribution and maintenance

facility. "Although we were already achieving excellent service levels, and had clear inventory targets to maintain that service, I wanted to better understand and analyse the link between the service level and the inventory cost," commented Tony Upton, Global Spares Director, Goodrich ECEPS Services. "The Gideon Hillman Consulting team offered us a clear methodology to optimize our inventories, but also to demonstrate the exact relationship between inventory costs and service. They gave me confidence that with their support we would be able to continue our focus on delivering excellent service, but also minimize the working capital costs associated with inventory." The objective of the project for the consulting team was to work with Goodrich and provide the logic, calculations and models to clearly justify and minimise the inventory, but also ensure sufficient inventory was in place to meet the required service levels. In addition, the consulting team were tasked with helping Goodrich understand the approach adopted, so the internal team could repeat the process periodically, reflecting changes in the Goodrich demand profile.

The consulting team worked alongside the Goodrich planners to develop a revised inventory policy, with clear rules for ABC classification, minimum inventory levels and reorder quantities. This inventory policy was then translated into a dynamic MS Excel model that automated all required calculations, making it quick and easy to recalculate inventory levels periodically. The model not only assisted Goodrich by automating the required calculations, but also allowed the team to test the sensitivity of changes in service levels and supplier lead times, against the cost of the inventory. "I'm delighted with the approach and models that the Gideon Hillman Consulting team delivered," added Tony Upton. "Not only do we now have the process, rationale and models to periodically optimize our inventories, but I can also use the models as a key management tool. I am now able to demonstrate and manipulate the links between inventory levels, service targets and, ultimately, operating cash flow."

About the author

Gideon Hillman is Managing Director and Chairman of Gideon Hillman Consulting Ltd.
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