The ultimate guide to reducing excess and obsolete inventory – 10 steps to supply chain heaven

Along with shortages, excess and obsolete (E&O) inventory is a good indicator of how well your supply chain is performing. Some waste is inevitable in most supply chains, since demand is unpredictable and shelf life is not infinite, but organisations can do a lot to minimise E&O, with both financial and environmental benefits.

Here we present a guide to the 10 steps organisations can take to reduce E&O, organised into 3 levels of increasing sophistication. As far as E&O is concerned, prevention is better than cure, but dealing with existing E&O should not be neglected, and is included here.

Here are the 10 steps in summary:

1. *Develop good basic inventory hygiene and visibility*
2. *Be sensitive to product lifecycles*
3. *Examine root causes and address them*
4. *Eliminate naïve desire for "100%" service level and apply better segmentation*
5. *Stop buying/making to a poor forecast*
6. *Shorten stock cycles*
7. *Reduce complexity*
8. *Reduce your need for safety stock*
9. *Use a richer blend of inventory management approaches to optimize by item*
10. *Leverage S&OP to drive inventory optimization*

Level 1: The basics

Step 1 *Develop good basic inventory hygiene and visibility*

There are a number of things which contribute to basic inventory "hygiene". They are not necessarily pre-requisites to the more advanced steps below, but they are simpler to implement and will add significant accuracy and clarity to further steps.

First, ensure good booking processes. Inventory needs booking in and out accurately, and in a timely manner. Failure to do this can both distort demand and supply signals further down the line and give planners an inaccurate sense of how much inventory is held in the first place. It can also lead to inventory getting lost. Automated warehouses, barcodes and RFID can help minimise this type of error, although not eliminate it entirely. A good lagging indicator of booking issues is when systems show negative stock balances!

Then make sure accurate stock counts take place. However good you believe your booking processes to be, it is important to verify the actual figures regularly. Depending on the scale and complexity of your facilities, cycle stock counting might be a useful enhancement to, or substitute for, an annual stock check. Physical counts, even if randomly carried out, will show up both missing inventory and forgotten inventory.

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And finally, in terms of hygiene, a sturdy broom is essential. There may be a natural aversion to loss, but holding on to obsolete stock in the hope that it eventually finds a buyer or another use is unwise. Accounting rules and financial considerations will determine what needs to be devalued when, but even fully devalued stock takes up space, effort and management time. Anecdotes of something generating value well after it should have been used are legion, but it is overwhelmingly better to clear such stock out. The first consideration should be the use of discounts to promote sales, followed by options to rework or recycle, before finally scrapping.

All of the hygiene factors above should help improve the quality of inventory data at your disposal. Beyond this, especially where you are coordinating inventories across multiple facilities, visibility is also critical. You need to know how much you have, where and when. “Blind spots” or inadequate coordination can lead to shortages or excesses when considering the network as a whole.

While good booking processes should deliver accurate data in ERP systems, those systems can be laborious and inflexible when it comes to visualising the data in user-friendly ways. Various ERP add-ons, as well as third party software solutions, exist to enhance inventory visibility. Increasingly, these visibility tools allow organisations to see inventories in their wider network, such as at suppliers or customers.

Step 2 *Be sensitive to product lifecycles*

A common cause of E&O inventory relates to product lifecycles. Where historical data exists, supply chain teams can relatively easily ignore the more optimistic forecasts of their sales organisations, but with new product introductions a very optimistic forecast can often be king, leading to overstocks in the introductory phase. In extreme cases the initial supply can be larger than the all-time demand.

Similarly, as products reach the end of their lifecycle, E&O is in danger of being generated, precisely at the worst point in the cycle. This could be caused by a failure to recognize declining demand, a failure to communicate that sales focus is switching to new products, or simply a failure to plan for the switch.

While operational silos and the natural tension between sales and supply chain teams can seem one of the most intractable problems to solve – and we return to Sales and Operations Planning (S&OP) in step 10 below – sensitivity to product lifecycles and basic communication is sufficient to avoid the worst E&O effects in this area.

Level 2: Good practice

Step 3 *Examine root causes and address them*

With the basics (steps 1 and 2) hopefully in place, the first step towards good practice in E&O reduction is creating a culture of continuous improvement relative to inventories. As with any business process, sustainable improvement comes from measuring outcomes, digging into root causes, addressing them and then measuring the improvement.

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The key challenge with inventory is often quantifying the impact of different root causes, since inventory sits right at the heart of your supply chain and is influenced by many things simultaneously. In the absence of good data there is a danger of particular root causes being singled out and blinding the organisation to other contributory factors. This can be as much on the basis of individual perception as fact.

As you move through the more advanced steps below, you should along the way develop more sophisticated analytics to better understand the relative importance of different inventory levers. However, it is rarely a good idea to wait for perfect data before starting improvement efforts. A lot of your instincts as to what root causes are driving E&O will be correct. The important thing at this stage is to identify and take actions, and to measure the results.

A critical success factor here is the implementation of short interval controls and KPI's to focus attention on E&O and inventory levels more generally. You can't improve what you don't control and you can't control what you don't measure.

Step 4 *Eliminate naïve desire for "100%" service level and apply better segmentation*

Even before getting into the realms of inventory science (see below), you can reduce E&O by doing two simple things. The first is to make some conscious and differentiated decisions about the service levels to provide your customers – both internal and external. Consider if a lower service level would be more profitable. The second is to segment your inventory items in ways that allow you to prioritise what is most important and deprioritise the rest.

You may use different metrics to measure service level, such as OTIF, fill rate, out of stock time, back order quantities, waiting time, and so on. Whatever measure you use, in the face of uncertain demand and supply you can never entirely guarantee availability. The role of inventory is not to prevent all shortages but to keep shortages to an acceptable – in most cases the most profitable – minimum. This is an important principle to grasp. Depending on your market, you may be delivering an unnecessarily high service level.

Start by baselining your current service level performance (using whatever service level metric is already in use and familiar to you) and on that basis set some service level targets depending on how important something is for your business. There may be some items where you do need to have very high availability on demand, but this is not necessarily the case for everything. Moving to a more segmented model where you have different service levels for different items, rather than the same for all, will help reduce E&O.

In the absence of other criticality criteria (for instance medication that is essential to the preservation of life), use profitability or simply revenue to segment your products. An ABC analysis would be a good starting place. List your items by total value (value * annual volume) and then segment the top 80% (A), the next 15% (B) and the bottom 5% (C). An improvement would be to group by finished goods product, since a low value raw material might be essential to a very high value finished product.

ABC analysis is very widely used. Less so is XYZ analysis, where variability is a second segmentation dimension. XYZ analysis is more complex than ABC analysis to do, since it involves statistics, but it should be a bigger driver of inventory levels, since variability is precisely what inventory is buffering against. At this stage do not worry too much about the mathematics of XYZ but find a segmentation

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that works for you, is clear to all in your organisation, and separates your most variable demand products from your least variable.

Various other segmentations exist, such as VED (Vital, Essential, Desirable), or FSN (Fast, Slow, Non-moving), to name just two. All such segmentations can be useful methods to focus the prioritisation of management attention, depending on your individual circumstances.

At this stage don't worry too much about the exact segmentation rules. Ensure that items you know to be the most critical to your organisation are in the top priority category.

Then set some target service levels, bearing in mind the nature of your business. If you stock items where it is critical to have very high availability on demand, for instance foodstuffs or critical medical supplies, then a target service level of 99% or higher might be appropriate. Whereas if your customers are used to waiting a few days or weeks then you can make do with a lower service level.

It is important to baseline your service levels and track their development. Inventory reduction programmes frequently meet resistance and then it is important to show that service levels have not suffered unless a conscious decision was made to lower them.

The most important principle here is differentiation – that not all products need the same levels of inventory. If you struggle to equate service level with required inventory levels then try to differentiate on the basis of cover, i.e. how many days' or weeks' average demand you aim to hold in inventory, although note that cover is far from optimal as a concept and will be addressed further in step 9 below.

By segmenting your products, by setting explicitly different target service levels and different target inventory levels by segment, however approximately, you are starting to familiarise your organisation with some of the most important principles in inventory optimization and already delivering benefits relative to a simplistic "one size fits all" approach.

Step 5 *Stop buying/making to a poor forecast*

We frequently hear the complaint that poor forecasts are to blame for E&O inventory. Most of the time this is at least partly true, but not necessarily in the expected way. It is frequently the *use* of the poor forecast, not the poorness of the forecast, that is the biggest problem.

If you have a forecast demand for 100 units of a product and you produce 100 units, but then only have demand for 10, it is easy to blame the forecast. If you have a forecast demand of 100 units every month and produce 100 units every month, but only ever have demand for 10 units per month, the blame should be with you for using the forecast.

Of course, in most real-life situations it is less clear cut. Forecasts are not usually so consistently wrong, nor demand so uniform. In reality, there is a lot of "noise" to deal with – demand goes up and down, forecasts are frequently revised. It is not necessarily so obvious that forecasts should be ignored. But what do we mean by forecasts should be ignored? Surely some forecast is required for any inventory planning exercise.

A useful starting point is to consider actual demand for each product. There is incontrovertible evidence of what has already been sold. If you compare this with your forecast, you can calculate if the forecast is adding value or destroying value relative to just using actual sales as the forecast. While superior methods to measure forecast value add exist, here is a relatively quick method to

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check if your forecast is better or worse than using actuals as a forecast: consider whether the mean absolute deviation (MAD) of your forecasts vs your actuals is greater or less than the MAD of your actuals. To take a simple example:

Forecast demand for 10 periods: 10, 10, 10, 10, 10, 10, 10, 10, 10, 10

Actual demand for those periods: 7, 8, 8, 11, 6, 5, 7, 13, 6, 6

The MAD of the forecast vs actuals is (3 + 2 + 2 + 1 + 4 + 5 + 3 + 3 + 4 + 4) / 10 = 3.1

The MAD of the actuals (deviations from mean of 7.1) is (0.1 + 0.9 + 0.9 + 3.9 + 1.1 + 2.1 + 0.1 + 5.9 + 1.1 + 1.1) / 10 = 1.72

In this example, you would be better using your actuals as a forecast than the forecast. Or at least you probably would! A key thing to understand about *any* forecast is that it is going to be wrong.

When doing this exercise, it is important to look at the forecast at the time of planning. For instance, if orders or production plans are confirmed 10 days in advance, the forecast on that day (i.e. actuals minus 10) is the one to compare with the actuals. Because forecasts are frequently revised, it is all too easy to lose track of what the forecast was at the critical planning horizon.

Before we go into more advanced approaches below, the important thing to retain here is that it is very valuable to understand where your forecast is destroying value and to decouple the forecast from the plan in those cases.

There is also a behavioural aspect to this step. We have worked with numerous organisations where the sales team were responsible for creating and maintaining forecasts in the system and where planning teams planned to those forecasts even though they knew them to be consistently wrong. There can be a culture of “we know the forecast is wrong, but if it is right and we haven’t got the stock then it’s *our* fault, whereas the forecast being wrong *isn’t* our fault”. This silo mentality needs breaking down.

It is also important to understand that forecasting is not the only game in town when it comes to reducing E&O. A lot of demand is inherently unforecastable and setting up inventory practices to mitigate this uncertainty is a more reliable approach than trying to second guess it.

Level 3: Leading practice

Step 6 *Shorten stock cycles*

Large production batch and purchase lot sizes drive high cycle inventory. The more inventory you have, the more likely it is to be excessive and at risk of becoming obsolete. By making or purchasing fewer items at a time, more frequently, E&O can be reduced. The challenge of achieving this can be approached from two directions.

Firstly, by minimizing set up and reorder costs. Techniques like single minute exchange of die (SMED) drive down the cost of production setups. Procurement efficiencies, such as the use of automated purchasing tools, make it less costly to reorder.

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Secondly, by ensuring that inventory holding costs are properly factored in. All other things being equal, production teams like large batch sizes because it reduces the number of changeovers necessary and procurement teams like large lot sizes if it allows them to take advantage of supplier volume discounts. But the "savings" of these high volumes need to be offset against the holding cost of the inventory they generate and this is where mistakes can be made. The cost of capital, especially as expressed by public interest rates, is much lower than inventory holding costs.

The true holding cost of inventory is made up of not just your organisation's weighted average cost of capital (WACC) but also all of the operational costs involved in holding inventory, including not least the cost of obsolescence! By making your organisation aware of the true cost of holding inventory, in other words, you can help reduce E&O.

Where production and procurement are forced to use a higher holding cost, batch/lot sizes should decrease, assuming that they are using some form of total cost calculation to define their batch/lot sizes in the first place.

Step 7 *Reduce complexity*

Complexity is the enemy of inventory efficiency for a variety of reasons.

First is the impact on forecast accuracy. Forecasts are more accurate at an aggregate level than at granular levels. It is much easier to accurately forecast demand for a whole class of product than for each individual variant of that product. Simply by having a high number of alternatives, you are increasing your chances of having E&O inventory. Of course, you still need to convince your marketing department of the benefits of standardisation!

The second is the sheer proliferation of items. We frequently work with clients with many tens of thousands of different items in inventory. The very volume of items makes it harder to stay on top of optimum inventory levels for each.

Thirdly, a lack of standardisation makes items much less flexible. By having a high degree of standardisation at a sub-component level you allow yourself to re-purpose or even re-use items in a variety of situations.

And fourthly, the number of stocking points you have drives how much inventory you need. The square root law is an approximation which states that the amount of inventory required by a system is proportionate to the square root of the number of locations in which it is stored. So, for example, if you move from 1 warehouse to 4 warehouses, your inventory requirements will double. Since demand volatility at each individual warehouse will be higher than the aggregate demand overall, risks of E&O increase. Of course, there can be good, even necessary reasons to increase your number of stocking locations – retail premises being a prime example – but if you are adding a new warehouse just due to capacity constraints at your existing one, the E&O effect is one to bear in mind.

Inventory is of course only one consideration in network optimization and technology exists to help optimize network design, but as a basic rule of thumb the square root law is a useful heuristic to facilitate E&O reduction.

Complexity quickly asserts itself in large organisations, and simplification is often a long-term lever to reduce E&O but it is a very significant root cause and should not be ignored.

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Step 8 *Reduce your need for safety stock*

There are a number of important parameters which affect how much safety stock you need. Safety stock exists to ensure the ability to continue supply in the face of variability on both the demand and the supply side. Where demand is variable and lead times are long, you can feel squeezed in the middle. Both sides can be influenced to reduce E&O.

On the demand side, the most important step is trying to reduce variability. We have already (step 7) discussed the benefits of product standardisation to reduce demand variability, but price stability is also beneficial – discounts and other promotions introduce additional variability into the supply chain. Even when prices are being discounted to dispose of obsolete or close-to-obsolete stock (step 1) it should be remembered that this is liable to have a knock-on effect on other product lines.

On the supply side, there are benefits both to reducing the variability of lead times and to reducing the absolute lead times themselves. Reducing the variability of lead times sounds easier said than done, since, at least for raw materials, it usually comes down to external factors, but this is not to say that improvements cannot be made, especially within production.

A more straightforward lever may be reducing lead times. Within a factory, this comes down to reducing cycle times while maximising throughput. With third party suppliers, the key lever is finding more local sources of supply. Of course, there may be cost benefits to sourcing from further afield but this needs putting in the proper context of the holding cost of inventory (see step 6 above).

It should also be remembered that long lead times not only increase the safety stock you need, but also increase what we call pipeline stock: inventory that is not yet showing on your books but which is already in transit from your suppliers. Such inventory makes you less agile and less able to respond to changing demand signals. A similar phenomenon is caused by long production frozen periods. While frozen periods can be good for production efficiency, they reduce agility and will tend to drive higher E&O.

In summary, reducing lead times, delays, lags and variability throughout your supply chain will reduce your need for safety stock and so reduce E&O.

Step 9 *Use a richer blend of inventory management approaches to optimize by item*

While standardisation helps reduce E&O if applied to product design (see step 7), differentiation is what holds the key to unlocking substantial benefits when it comes to the management of inventories. No two items that you stock are the same. Segmentation (considered in step 4) is a useful improvement on “one size fits all”, but flat policies across segments, such as setting cover targets by segment, ignore differing variability at an item level. In terms of the individual parameters that will allow you to reduce E&O while maintaining service levels, both safety stock and cycle stock need to be defined at an individual item level.

To calculate optimum stock levels by item, scientific approaches exist. Fortunately, given the data challenge involved, tools exist to calculate these parameters for you. Unfortunately, all such tools by necessity work on a number of assumptions, which means that their recommended parameters do not work for many items. Thus, while the optimum parameters can be calculated for each and every

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item, it is currently somewhat difficult and laborious to do so with a reasonable degree of accuracy for all items.

Safety stock and cycle stock are essential concepts when it comes to replenishment models. Here, by replenishment models, we mean an approach where target safety stocks and order quantities are set, along with a re-order level. When stock on hand drops to a given level, more is ordered or made. In replenishment models, target safety stock can be calculated to handle expected variability in demand up to a defined service level. In general, replenishment is an underutilised resource, since many people find variability a difficult concept to factor in well.

The main alternative to replenishment is deterministic planning. This seems to be more widely used since it requires less understanding of statistics. In deterministic models, stock is bought or produced in direct response to a demand signal, whether confirmed orders or a forecast.

Deterministic planning works well when demand is known (such as through confirmed customer orders), or at least is known to be different to the past (such as for a promotion, or the phasing out of a product). In other words, to go back to the theme of step 5, if you are certain that your forecast is better than actuals for predicting future demand, then deterministic planning *should* be superior.

While this is a simplification, and care needs to be taken with terminology, deterministic planning is often championed by proponents of Material Requirements Planning (MRP) systems, where "MRP" is selected as the production planning method. The principle here is that requirements for all components can be established through the explosion of the Bill of Materials (BOM). While finished goods might be managed using a replenishment approach, since end-customer demand is unknown, raw materials, WIP and semi-finished goods are often managed through a deterministic MRP model that reflects the production plan (which itself reflects the sales forecast).

The problem here is that if customer demand is unknown and MRP is being used to plan deterministically, you are just passing your variability, and stock imbalances, up the supply chain. Alternative approaches like Demand Driven Material Requirements Planning (DDMRP), CONWIP or Kanban, seek to counter this by introducing decoupled replenishment points in the supply chain.

The debate for and against MRP is sometimes presented as a binary choice. In reality, there are situations in which MRP works very well, and situations in which it doesn't. This is where differentiation is essential. Enterprise Resource Planning (ERP) systems offer a choice of strategies, including not only MRP and replenishment as set out here, but multiple variants too.

The very number of options available, along with all of the essential parameters which go with them, can initially seem overwhelming, but restricting yourself to one or two means that an opportunity is being missed. Differentiating your approach can bring enormous benefits. We recommend an incremental approach. Do not go from 1 stock policy to 15 overnight. Do not trial a new stock policy with all of your items. Instead, identify classes of item suitable for a different approach and then test it with a restricted number of items before scaling up.

Similarly, where you are using a new tool or method to define target stock levels, do not implement them in full immediately, but work to them gradually. Let us say your new tool has suggested you can reduce your safety stock for an item by 50%. You may or may not understand exactly how it has made that calculation, and it may or may not be very precisely correct, depending on what assumptions the tool is making and how good they are.

The point is not that the tool is weak and should be discarded – it has suggested something that you had not thought of and it may well be right – the point is that if you drop safety stocks by 50% and

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that is too much, you will end up with shortages. This will damage the credibility of you, the tools, and any further optimization initiatives. It is much better in the example given to try reducing safety stocks by, say, 20% at first, watching what happens carefully, and then reducing them further. Don't go for the full 50% until you are confident.

This step 9, which embraces differentiation in inventory management approaches, has enormous potential. nVentic's extensive experience and diagnostic tools show that the application of this step 9 *alone* can typically deliver reductions in inventory levels of 20-50%, all but eliminating E&O, without sacrificing service levels. However, this approach also involves substantial complexities and numerous pitfalls. To be successful, we believe it is essential to develop capability in your supply chain teams so that you have a better understanding of the science rather than just trusting in "black box" solutions which you know from personal experience to have limitations. Here too, a phased approach with incremental improvements year over year is appropriate.

Scientific approaches to inventory optimization hold enormous potential, despite the complexities involved. Existing technology, whether driven by formulas, artificial intelligence or modelling, is currently unable to take account of all variables. The human mind still has a vital role to play. But advanced scientific methods and tools *can* help you to go a lot further in reducing E&O without service level suffering. Where you have a large number of items to manage then you will benefit greatly from using technology to optimize at an individual item level. The limitations of the technology do not mean you shouldn't use it, they just mean you should seek to understand those limitations and work with them.

Step 10 *Leverage S&OP to drive inventory optimization*

It may surprise you to find Sales and Operations Planning (S&OP) this far down the list. After all, S&OP is surely one of the most important planning processes at your disposal and you certainly wouldn't want to exhaust all of the scientific approaches to inventory optimization (step 9) before turning to S&OP. Indeed, as we said at the start, these 10 steps are not to be thought of as a strict sequence, where each step needs to be completed before progressing to the next.

The reason we have placed S&OP at the end is due to its strategic nature. Done well, S&OP is the way your organisation makes its most important supply chain decisions – how much should be bought, manufactured and stored in order to maximise your corporate goals. Various strategic decisions can and should flow from S&OP: Achieving the right balance between conflicting management incentives. Deciding what should be made to order and made to stock. How to find the best balance between demand and supply lead times. (Where customer promise times are short and supply/manufacturing lead times are long then E&O will thrive.)

S&OP is also a vital counterweight to silo behaviour. In simplistic terms, sales organisations like high inventories, since they never have to worry about stock outs. Having everything available on demand makes their vital revenue-generating role easier. Production and supply chain organisations, on the contrary, look to control costs and maximise efficiency. This natural and healthy tension comes for resolution to the S&OP process.

However good your S&OP process, you will still generate some E&O inventory. Inventory is itself a strategic lever. You choose how much you will hold to buffer yourselves against variability. It is only one possible buffer, the other main ones being time and capacity: you can deliberately retain spare

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capacity to be able to react to changes in demand, or you can use time – asking customers to wait in the event of demand spikes.

We have placed S&OP as the last step of our 10 for two interrelated reasons. In the absence of robust analytics, strategic transparency is limited. Decisions are made on the basis of incomplete information and organisational politics can become the guiding force. Only once you have full transparency of the relative costs and benefits of alternative approaches can you be confident of making the best decisions. And at the same time, it is of limited value to have the best inventory analytics in the world if you cannot bring the rest of the organisation with you. S&OP needs inventory analytics, just as inventory analytics needs S&OP.

Reducing E&O inventory may be seen as a desirable tactic, but at a certain level it needs to be weighed in the strategic balance, since fully eliminating E&O is likely to be impossible without service levels suffering, although we have never seen any organisation reach that level in practice. Rather, the application of a full range of inventory optimization approaches will allow you to reduce E&O even while you maintain or improve service levels and this win-win scenario is vital to sustainability. You know that you have truly achieved mastery of E&O when all stakeholders see inventory optimization as something which helps them, rather than something which endangers the objectives of sales to further the objectives of operations.

Honourable mentions:

We are coming towards the end of our guide to reducing E&O inventory, and you may feel that some things have been missed from our ten steps. Two notable ones we chose to leave out are vendor managed inventory (VMI)/consignment stock and multi-echelon inventory optimization (MEIO). Let's briefly consider them here:

VMI is where you outsource the management of some of your inventory to your supplier. Consignment stock is where inventory in your warehouse belongs to your supplier until you use it. You might use a combination of VMI and consignment stock or just have one or the other. Consignment stock is a tempting quick win when you want to reduce inventory levels, since you are getting inventory off your books without it leaving your warehouse. VMI might seem a good option if you believe your supplier to be better at managing inventory than you are.

There can be benefits to both VMI and consignment, especially in terms of vertical supply chain visibility – your supplier will have granular visibility of your actual consumption of their products, rather than relying on your forecasts. However, we chose to leave both out of our guide. VMI and/or consignment might be good for you, especially at lower ends of your own inventory management maturity curve, but it is essentially outsourcing a problem rather than solving it, and it has downsides as well as benefits: A lot of work needs to go into the service level agreement if it is to work well, the relationship needs managing closely, it can be difficult to have good visibility of what your supplier is doing or if you're getting value for money. With consignment stock, you still have a number of the holding costs, such as storage and material handling, even if your cash is no longer tied up in the stock itself.

In short, while VMI/consignment stock doesn't preclude good inventory management, neither does it automatically deliver it. Use it judiciously and, if you use it, put effort into doing it well.

MEIO we left out for a different reason. In theory, MEIO will be better than single echelon inventory optimization, but in practice it is fraught with difficulties. Here we need to be very clear with

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terminology. It is always good to work out the best place in your supply chain to hold inventory. This can be done with network design and network optimization, using heuristics for inventory. It is also good to optimize all echelons in your supply chain. With single echelon optimization you decouple each site in your network from the others and treat demand signals between them as independent. So safety stock in your manufacturing facility might be calculated on the basis of the variability of the demand coming from your distribution centre. With MEIO you treat your whole network as one: you optimize what is held at each point on the basis of the whole.

This is good in principle, but there are currently a number of challenges with applying it in practice. Firstly, there is the computational challenge – effort is exponentially driven by permutations. Secondly there is an issue with fuzziness. MEIO is highly dependent on a number of parameters like waiting times, which are normally hard to quantify accurately. Finally, and perhaps most importantly, there are challenges with implementation. To realise the benefits of MEIO, you need a differentiated range of service levels. You might want a given location to deliver a service level of 50% for one item, 80% for another, 98% for a third. Where you have managers used to targeting, say, 95% for all items, on the understanding that 96% is even better, this is immensely complex.

In short, while MEIO has potential, especially for reducing E&O since you are lowering overall levels of inventory across the network, we wouldn't recommend anyone to try it unless they are already very advanced in all of the other approaches. Implementing MEIO successfully demands high degrees of competency in our steps 9 and 10 as a prerequisite. And even then, it is probably only worth the effort beyond heuristics for a relatively small number of items. For the vast majority of organisations, it will be better to focus on our 10 steps.

Conclusions:

So there you have it. The ultimate guide to reducing excess and obsolete inventory. Did we miss anything out? If we did, or if you have any questions on the content of this guide, contact us and let us know.

This guide has deliberately been technical in nature and is intended as a checklist of things to try when aiming to reduce E&O. It does not pretend to be comprehensive on all topics. Rather, we hope it might act as a jumping off point for new approaches. Organisations that have very low E&O invest in their people, systems and processes to deliver sustainable benefits. Getting whole organisations to perform strongly on this measure takes time, effort and commitment.

And yet, as we head into the 2020's, it is to be hoped that more organisations prioritise E&O reduction. E&O has a negative financial effect, but it is also bad for the environment. Every product that is surplus to requirements represents resources and energy wasted, from the extraction of raw materials, via multiple stages of processing, transportation, packaging and so on. Wherever you are in your E&O reduction journey, it is always worth striving for the next level.

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