Overproduction

Accurately calculating the raw material requirements to meet customer orders can be difficult – many high volume ingredients are sourced from outside the UK and have to be ordered well in advance of production. At the same time the complexity and unpredictability of the production process adds uncertainty. This case study focuses on how to prevent overproduction.
WRAP’s vision is a world without waste, where resources are used sustainably.

We work with businesses, individuals and communities to help them reap the benefits of reducing waste, developing sustainable products and using resources in an efficient way.

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The case for action

Overproduction is ‘to produce products in excess of customer demand’. It is particularly significant within the soft drinks sector, and estimates prepared for this review put overproduction at between 1% and 2% of total production, resulting in an estimated 80 million litres of product lost over the sector. One soft drinks company reported holding on average 70 pallets of products ‘just in case’ a further order for any of the products arrived within the month.

The key economic issues associated with overproduction include:

- increased material, labour and utility costs per unit of output sold;
- increased inventory holding costs since overproduced products are held on a ‘just in case’ basis;
- reduced machine utilisation efficiencies, i.e. machines / production lines are tied up producing products with no customer orders; and
- increased waste management costs.

The material costs associated with overproduction are traditionally built into budgets, but many of the other costs listed above are absorbed by the business and can be regarded as hidden costs.

There are two main ways of tackling overproduction:

- Closer collaboration with customers; and
- Working to reduce variance within the production process.

Further details are set out in this review.
Collaborative programmes

The sector is well placed to deepen collaborative programmes between retailers and manufacturers. These are desirable to address current and future pressures\(^1\) including:

- Greater promotional effort driven by the economic situation;
- Shorter lead times, resulting in products moving through the supply chain in a continuous way, with a minimum of intermediate stock; and
- Channel diversification particularly as consumers make more frequent use of convenience stores and home delivery.

All these pressures have the potential to increase volatility which in turn can lead to more safety stocks and increased over production.

The food and grocery industry revolves around relationships, networks and talking to the right people. Engaging with trading partners; communicating, sharing information and seeking active participation can significantly improve supply chain and business performance.

One approach known as collaborative planning, forecasting and replenishment (CPFR) has been proposed\(^2\). Put simply CPFR is about developing a single forecast which ties demand and supply planning into one process. CPFR typically has four phases: planning, forecasting, replenishment and review, each containing specific activities, each of which is owned by the manufacturer, the retailer, or managed jointly. Benefits include:

- A single shared forecast that combines information from all participants, increasing shared knowledge and forecast accuracy;
- Improved relationships that could open up further opportunities;
- More efficient forecast-to-order conversation and replenishment procedures that reduce out-of-stocks and delivery times, increasing

\(^1\) The Future Value Chain 2016
\(^2\) Global Commerce Initiative, VICS 2002
supply chain agility and the ability to respond to consumer demand; and

- Increased forecast accuracy can reduce buffer stocks and enable better capacity utilisation since production planning is based on more reliable data.

Other collaborative methods have been identified by this review. Three examples being practiced are:

- Vendor managed inventory (VMI). A case study between Sainsbury’s and Coca Cola that trialled (VMI) showed positive benefits for both;

  
  
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<th>Order generation</th>
<th>Order processing</th>
<th>Fulfilment</th>
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<td>• A more forensic understanding of how the forecast is generated, i.e. ‘what goes in to the forecast’</td>
<td>• Opportunity to ‘tweak’ orders before it is ‘pushed’ out to better reflect any supply or network constraints</td>
<td>• Better understanding of how the depot network works</td>
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<tr>
<td>• Opportunity to challenge forecast and make recommendations for improvement</td>
<td>• Increased visibility of demand to optimise capacity utilisation</td>
<td>• Greater visibility of forward loads offering opportunity to better manage haulier, depot and labour capacity</td>
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- Acceptance of part pallets. Allowing for the flexibility in order quantities required the supply chain to be able to accommodate part pallets. It was acknowledged that for some companies this could result in a reduction in transport efficiency and increased storage and material handling. However, these potential barriers were assessed at the development stage where it was established that the savings far outweighed the negative impacts; and

- Tolerance limits on customer orders. Instead of agreeing a fixed order quantity, the customer had placed a tolerance limit on the nominal order requirement to allow for a level of over- or under-production.
Reducing variance

As well as working to forecasts or inaccurate information on actual demand, over production can be caused by unreliable processes, large batch sizes and unbalanced cells/departments. These are generally within the control of individual production plants.

A comparison of the variance between actual and expected material usage undertaken for this review found that the best performing companies had a variance between actual and expected usage of 0.5% and up to 2.3% of total production. The best performing companies all placed significant focus on variance reporting and had systems in place to drive down yield losses within their production processes.

Many materials have a long purchase lead time and must be bought to forecast prior to receipt of a customer order. Prime examples of this are orange juice concentrate purchased from Brazil, neutral alcohol from the USA and bulk New World Wine for bottling in the UK.

For large drinks companies, moving from ‘average’ to ‘good’ or ‘best’ practice could result in annual savings of over £1 million in direct purchase costs alone. The improved predictability of the system will bring additional savings.

To realise these savings opportunities often requires no significant capital investment, but will need an investment in time. A recommended seven-step approach to reducing product variance is:

1. Determine the minimum material usage (per unit of product) from a zero loss perspective – i.e. the most efficient performance possible.
2. Determine expected material usage using historic performance data and use this to set the waste allowances / shrinkage rates incorporated within the Bill of Materials (BoMs) and works orders.
3. Using the data from 1 and 2 above and sales data, identify the materials accounting for the highest losses, using the calculation, expected yield losses (determined in step 2) minus minimum material usage (determined in step 1). A Pareto analysis can be
undertaken to place the materials in order of significance / savings opportunity. Figure 1 shows an example Pareto Chart showing that the top seven raw materials account for 65% of the waste allowance costs. Focus would be placed on these seven materials to enable the highest savings to be made.

Figure 1: An example of a Pareto Chart used to identify the most significant raw materials in terms of shrinkage or waste allowance.

4 Focusing on the significant materials, identified in step 3 above, find the key causative factors. Possible causative factors include:
   - residual product left in tanks;
   - overfill;
   - spillages;
   - quality rejects;
   - set up or changeover losses; and
   - lack of parity between purchase quantities and order requirements.

5 Develop and implement solutions to address the key causative factors.

6 Monitor performance and amend the waste allowance / shrinkage rates on BoMs accordingly.

7 Repeat the process to identify the next tranche of opportunities.
Conclusion

Reducing the variability within the production process can have a major impact on overproduction within the drinks sector. This can have a significant impact on costs, from the direct reduction in material usage to the more hidden costs, such as, labour, storage, material handling, waste management, inventory control, and the lost opportunity costs associated with running products with no customer orders.

Measuring losses and taking action in manufacturing processes to move to good practice, combined with working across the supply chain can achieve significant reductions in the level of waste being generated.
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