The Fresh Connection (Round 1-3)

Content

1 Purchasing

1.1 Agreements

1.1.1 Trade unit

A trade unit is the unit you use when placing orders with the supplier. Should the trade unit be a pallet, you will then always order a multiple of pallets, and if it is a FTL, you will always be supplied in a multiple of full truck loads. The relevant trade unit depends on the type of component supplied by the supplier. Packaging is delivered in large rolls on pallets, so you can only order it by the pallet or FTL. The other packaging material can be ordered by the pallet layer, pallet or FTL. Pulp and additives are liquids and can be supplied in drums (250-liter content), IBCs (1,000-liter content) or tank (FTL) (30,000-liter-content). Suppliers prefer large trade units, as it saves on handling and administration costs. Increasing the trade unit size will thus decrease the contract index, but it will also increase the average stock as well as peak capacity load for the raw materials warehouse. Note that the trade unit is a minimum bound for the order size and that setting a minimum lot size smaller than the trade unit will not have an effect.

1.1.2 Agreed delivery reliability

The agreed percentage of the number of units that will be delivered on, or before, the promised time. Whether the supplier will fulfill this agreed percentage depends on his free capacity and certification.

1.1.3 Delivery window

The delivery window is the margin within which the promised time of delivery falls. Should the delivery window be four hours, the supplier is then obliged to deliver within a very precise period, if the delivery window is one day the supplier can make a delivery one working day earlier or later, while if the delivery window provides for one week, the supplier may deliver a week earlier or a week later than agreed to. Suppliers naturally prefer a large delivery window. However, large delivery windows will require more safety stock to provide the same availability of components.

1.1.4 Quality

Quality is a characteristic of a component. Quality can either be good, average or poor. Good quality components are obviously more expensive than poor quality components.

The quality of packaging material affects the number of breakdowns at the bottling lines. The better the quality, the lesser breakdowns occur (also depending of the chosen bottling line). The quality of the fruit pulp affects the taste of the juices The Fresh Connection makes. Directly after production the taste is tested by an official taste inspector. This officer decides if the juice lives up to the aroma, color and taste standards of The Fresh Connection. In case they do not, the finished product is put aside to be scrapped immediately. Luckily in most of

these occurrences production can be stopped, so not too many components go to waste. This type of problem can be partly prevented by implementing incoming inspection. If many breakdowns or quality rejections occur, resources are wasted, overtime increases and uncertainty is introduced.

1.1.5 Payment term (weeks)

The term of payment is the period within which the supplier must be paid. Suppliers want the payment terms to be as short as possible and will offer a better contract index. From a financial perspective however, it is desirable to pay the bills as late as possible and gain interest in the meantime.

1.1.6 Negotiate

The Purchasing Manager can negotiate the terms of delivery with the suppliers. Negotiations can be held regarding trade units ordered, delivery windows, terms of payment and review periods, amongst other things. If you impose high requirements on a supplier, then the latter will have a high contract index. This means that the purchase price will be high. By imposing lower requirements on a supplier, you will be able to insist on a lower purchase price. Besides negotiable terms some things are fixed for each supplier. First of all, the location of a supplier is important, choosing a distant supplier leads to higher transportation costs and CO^2 emissions. Secondly it is important whether a supplier is certified or not. If a supplier is certified his affairs are probably in order and there is a better chance that he lives up to his promises. Furthermore, if the free capacity of a supplier is comparatively small he might not be able to fulfill all placed orders. Finally, if a supplier has a high lead time more safety stock is required to deal with spikes in demand, especially if the frozen window is short as well. Note that there can be multiple open orders simultaneously with one supplier thus the lead time does not impose any constraint on the minimum order size.

1.1.7 Calculate

After selecting the terms for the new contract the resulting contract index can be calculated before a binding deal is made. The contract index reflects the terms of delivery you impose upon the supplier. If your requirements are high the result will be a high contract index, and as the requirements decrease, so does the contract index. For example, a contract index of 1.5 will mean that you will pay a premium of 5% over and above the basic price of the component. A contract index of 0.95 will, on the other hand, lead to a discount of 5% off the basic price.

1.1.8 Deal

Once the terms have been negotiated and the resulting contract index is satisfactory the contract can be signed. Note that the mode of transportation can only be selected after the contract has been made. By default, items are delivered by truck but from some locations it is possible to use a boat. This will not impact the contract index but will decrease the transportation cost at the expense of a longer lead time.

1.1.9 Terminate

Once the services of a supplier are no longer needed the contract can be terminated. It is possible to remove all suppliers for one component but make sure that the VP sales adjusts the category management accordingly. (an attention box will appear when this is not the case)

1.2 Supplier market

1.2.1 Search

The current supplier may not always be the best choice for you. The supplier market can be searched for suppliers of each component. Additional filters are available, but if multiple preferences are selected there may not be a supplier that meets all criteria.

1.2.2 Negotiate

Negotiations with new suppliers are identical to negotiations with existing suppliers. When it is possible to use a dual supply source you can either negotiate with a new supplier to replace the existing principle supplier, or you can negotiate to add a supplier as a dual source. Only one dual source can be selected for each component type. Before selecting a dual source, remember that for each selected supplier an amount of €5,000 is charged per annum for supplier management. If a dual source is selected, then replenishment orders are issued to this dual source if The Fresh Connection threatens to run out of stock. In this event the size of the replenishment order is equal to one week of expected demand. By selecting the correct dual source, it is possible to reduce supply chain risks.

1.3 Report

1.3.1 Supplier

This report shows the achieved purchasing information per supplier including measures of price, quality and volume.

1.3.2 Component

This report shows the achieved purchasing information per component including measures of price, quality and volume.

1.3.3 Finance

This report provides an overview of revenues, costs and investments from this round and the previous rounds.

1.3.4 Analysis

All reported data can be exported to Excel for further analysis. After choosing a point of view it is possible to view one or more measures. If there are multiple interesting points of view, it is convenient to export all data to Excel.

2 Operations

2.1 Inbound

2.1.1 Number of pallet locations

The delivered packaging is stored in the raw materials warehouse, while fruit pulp and additives delivered in drums or IBCs (Intermediate Bulk Containers) are stored in the same warehouse. The costs related to the raw materials warehouse are €200 per pallet location (the area required to store one pallet) per annum. You can decide whether to increase or decrease the number of pallet locations in the raw materials warehouse in each round.

Increasing or decreasing the pallet locations involves no additional expenditure. You will always pay the fixed rate for each pallet location every year. If there is insufficient space for storing the pallets, the remainder is then temporarily stored in an overflow warehouse. The rate for this overflow warehouse is €3 per pallet location per working day.

The required amount of pallet locations is dependent on the supply of goods and the safety stock levels. If component safety stock levels are high and lot sizes are large the number of required locations will be high. However, if components arrive in tanks there is no need to reserve pallet locations for them in the raw materials warehouse as they will be stored in the tank yard.

2.1.2 Number of permanent employees (FTE)

The labor force of the raw materials warehouse is primarily engaged in taking in the delivered pallets and making their contents available in good time for production. The intake of deliveries costs 1 hour per order line and 6 minutes per pallet, while making a pallet available for production costs 6 minutes and making a tank available for production costs 12 minutes' time. In addition, the employees lose approximately 4 hours per day in keeping the warehouse and tank yard running. When there are insufficient pallet locations in the raw materials warehouse, the manpower is also used to move the pallets to and from the overflow warehouse, costing them an average of 6 minutes per pallet. They are also responsible for filling the IBCs (Intermediate Bulk Containers) if there is insufficient capacity in the tank yard, costing them a further 1 hour per IBC. Should more manpower be required than is available on any given day, The Fresh Connection will then hire in flexible labor, using a completely automated system. This flexible labor must be given introduction training and its productivity per hour is subsequently a little lower than that of the permanent staff. An employee costs €40,000 per annum, while an hour of flexible labor is rated against a tariff of €42. When the need for flexible manpower is high, this can cause a loss of service level to the production area although the inventory is available.

2.1.3 Raw materials inspection

A raw materials inspection can be introduced to check the quality of the supplied materials

upon arrival in the inbound warehouse or tank yard. The materials will be inspected by means of random sampling and, should the quality be substandard, it will be immediately rejected. This inspection will result in a decrease of breakdowns at the bottling lines, as the defective packaging material is rejected before it gets there. It also decreases rejects of finished products, since the fruit pulp is inspected before it is processed.

However, the introduction of a raw materials inspection will also involve costs, being 2 hours per order line. Note that these inspections are done by a part time employee with the same hourly wage as permanent employees that cost €40,000 per annum.

2.1.4 Intake time (working days)

The intake time is the number of days the employees in the raw materials warehouse require to take in the incoming pallets. This intake time only applies to the delivery of pallets, as the contents of tankers are immediately pumped into the tanks upon arrival. Increasing the intake time will lower the peak labor requirements in the raw materials warehouse, which means that the need for flexible labor will likewise decrease. However, it will then naturally take longer before the raw materials are available for production thus the effective purchasing lead time is increased.

2.2 Mixing

No changes can be made here!

2.3 Bottling

2.3.1 Number of shifts

Each bottling line is manned by a fixed number of operators. These operators ensure that the components are supplied and that the finished product is processed. They also sort out breakdowns and change over the lines. The operators work in shifts. One shift can work 40 hours a week, two shifts 80 hours, three shifts 120 hours, four shifts 144 hours while five shifts can work 168 hours in a week. Each operator costs €40,000 per annum.

If the required capacity is higher than available, we will use overtime. These production hours are more expensive. If the required capacity in a week is higher than 168 hours, then automatically the load above 168 hours is being outsourced to a reliable partner. This partner bottles the juice at a similar line as The Fresh Connection does. Due to the transport of components and the finished product, the personnel costs of outsourcing are twice as high as the costs of overtime. Both overtime and outsourcing has an impact on the reliability of production (production reliability).

2.3.2 SMED action

A bottling line will have to be changed over between two production runs. This time is used

to ready the components, clean the bottling line and, if necessary, reset the set-up of the bottling line. Between two production runs using packs that are the same size, only a formula changeover will be necessary. While between two production runs of packs of a different size – for instance from 1-liter packs to 1.5-liter packs – a size changeover is necessary. Size changeovers take more time than formula changeovers. You can also reduce the change over time by implementing a SMED corrective action (Single Minute Exchange of Die). Doing this will cost €20,000 per annum, but will result in the changeover times being reduced by about 30 %.

2.3.3 Increase speed

The speed of the line indicates the number of liters that can be produced per hour. The speed can be increased through the action "Optimizing the bottling line speed". Although this action costs €30,000 per annum, the bottling line can then produce 10 % more liters per hour.

2.3.4 Preventive maintenance

The weekly down-time can be limited by undertaking preventive maintenance. A little preventive maintenance costs 1 hour a week per bottling line, but will reduce the number of breakdowns per line by 30 %. A greater deal of preventive maintenance will cost more time – 3 hours a week per bottling line – but will reduce the number of breakdowns by 50 %. The number of breakdowns can be furthermore reduced by introducing an incoming goods test, which means that substandard quality packaging material can be rejected before it reaches the bottling lines.

2.3.5 Solve breakdowns training

One way of reducing the duration of the breakdowns is the "Solving Breakdowns" training course. The operators will, after completing this course, be able to solve simple breakdowns themselves, which means they are less dependent on the very busy Technical Services staff. The result is that the average duration of a breakdown decreases by 40 %. The costs of this training course amount to €400 per employee and will be provided to all permanent staff.

2.4 Outbound

2.4.1 Number of pallet locations

The finished goods warehouse is used to store finished product that is ready for delivery. The costs for the finished goods warehouse are €200 for each pallet location per year. You can decide whether to increase or decrease the pallet locations in the finished goods warehouse in each round. Increasing or decreasing the pallet locations does not involve additional expenditure, and you will always pay the fixed rate for each pallet location every year. If there is insufficient space in the finished products warehouse, the rest of the pallets will then be temporarily stored in an overflow warehouse. The rate for this overflow warehouse is €3 per pallet location per working day.

2.4.2 Number of permanent employees (FTE)

The employees in the finished goods warehouse must store the pallets arriving from production. They also pick the customers' order lines and ready them for end-distribution. Storing the pallets coming from production costs 6 minutes in time for every pallet. The picking costs 10 minutes per order line, 6 minutes per pallet or pallet layer and 3 minutes per outer box. Should there be insufficient pallet locations available in the finished goods warehouse, the staff will then move the pallets to an overflow warehouse. Moving one pallet from or to the overflow warehouse costs 6 minutes. Processing a pallet of obsoletes for destruction takes the same time.

In addition, the staff spends 4 hours per working day cleaning and tidying up the finished goods warehouse.

An employee costs €40,000 per annum, while an hour of flexible labor costs €42s. When the need for flexible manpower is high and time windows to deliver short, this can cause a loss of service level although the inventory is available.

2.5 Report

2.5.1 Warehousing

This report shows the utilization of the inbound warehouse, the tank yard and the finished goods warehouse. Both the utilization of space and the utilization of labor are reported. If there is much overflow the capacity is probably too small, however if the utilization is low it may indicate that capacity is too large.

2.5.2 Mixing and bottling

This report shows the utilization of the mixing machine and the availability of the bottling machine. If there are many unutilized hours the production can be increased with the current bottling capacity, however if there is much overtime the mixing performance will decrease and the production plan adherence will go down.

2.5.3 Finance

This report provides an overview of revenues, costs and investments from this round and the previous rounds.

2.5.4 Analysis

All reported data can be exported to Excel for further analysis. After choosing a point of view it is possible to view one or more measures. If there are multiple interesting points of view, it is convenient to export all data to Excel.

3 Sales

3.1 Agreements

3.1.1 Service level (%)

The service level is the most crucial of the agreements reached with the customer. The customer naturally expects a high service level and is prepared to offer a high contract index in return. However, this arrangement also entails a risk. Should the promised service level not be delivered, the customer will insist on a substantial discount on the contract index, which will be detrimental to the final sales price. Once again, the customer will offer a small bonus should the service level prove to be better than had been agreed upon. All in all, the issue of the service level agreement must be finely balanced with that of feasibility.

3.1.2 Shelf life (%)

All the customers insist on having a part of the total shelf life period of a finished product, which is the requested shelf life percentage. The customer wants the highest possible percentage of that shelf life, enabling him to keep the product in stock for a longer period and to offer the consumer greater shelf life. But the longer the customer can keep the finished product in stock, the shorter the time The Fresh Connection can do so. Therefore, the probability of the finished goods expiring increase in proportion to the percentage of the shelf life promised to the customer. It is important to realize that promised shelf life has a large impact on the entire operation as a high promised shelf life reduces the amount of time that finished goods can be kept in stock. Hence, the only way to attain a high shelf life and a high service level at the same time is by having very short production interval and a short frozen period.

3.1.3 Order deadline

The final time during the day at which the customer can place an order is the order deadline. The customer naturally wants the time to be as late as possible and to that extent offers a higher contract index. However, if the order deadline is set too late, the employees in the finished goods warehouse may not be able to get all the order lines out in time.

3.1.4 Trade unit

An order unit is the unit that the customer uses to place the order lines. If the order unit concerns the outer box, then the smallest quantity the customer can order is the entire contents of an outer box. On the other hand, should the order unit be the equivalent of a pallet, the customer will always order a whole pallet of finished product. Customers want the freedom of being able to order small quantities, but don't forget that this may require additional labor in the finished goods warehouse– it takes longer to pick a certain volume in outer boxes than it does to pick whole pallets.

3.1.5 Payment term (weeks)

The payment terms relate to the period in which the customer must have paid for the products received. The customer would naturally like to have generous payment terms. From a financial perspective however, it is desirable to receive the sales revenues as soon as possible and gain interest in the meantime.

3.1.6 Negotiate

The VP Sales can negotiate the terms of delivery with The Fresh Connection's customers. Negotiations can concern order units, service levels, shelf life, payment terms and many other things. A well-negotiated sale can result in a good contract index being agreed to.

This index demonstrates whether the customer is prepared to pay an additional sum over and above the basic sales price for the finished product, or whether he insists on a discount. A contract index of, for example, 0.95 means that the customer insists on a discount of 5%, while for a contract index of 1.05 the customer will offer a premium payment of 5%. This aside, the contract index is not all-determining when it comes to the final sales price. If the supply chain performance does not, in terms of service levels, fulfill the agreements made with the customer, then the customer will give you penalties. On the other hand, should the service level be far better, the customer will be prepared to offer a small bonus.

3.1.7 Calculate

After selecting the terms for the new contract the resulting contract index can be calculated before a deal is made. The contract index reflects the terms of delivery you promise supplier. If your standards are high the result will be a high contract index, and as the standards decrease, so does the contract index. For example, a contract index of 1.05 will mean that you will receive a premium of 5% over and above the basic price of the product. A contract index of 0.95 will, on the other hand, lead to a discount of 5% off the basic price.

3.1.8 Deal

Once the terms have been negotiated and the resulting contract index is satisfactory the contract can be signed.

3.2 Order management

3.2.1 Shortage rule

In the unfortunate event that The Fresh Connection runs out of stock and so cannot satisfy customer demand, the rule of shortage will determine how the situation is dealt with. If the proportional method is chosen, the shortage of finished product will then be equally divided over all the orders for the day. Each customer then receives a little less. If a 'first-come-first-served' principle is employed, the customer who placed an order first receives delivery first and the customer who placed the order second receives delivery second, etc. Finally, if the principle of customer priority is employed, the customers must be ranked in terms of priority.

The customer with the highest priority will receive delivery first, followed by the customer with second-highest priority, etc. This means that the lowest-priority customer will suffer the most from the shortage. Note that if the agreed service level is calculated on order lines, it is unwise to distribute the shortage equally. If there is no differentiation between customers it will be most efficient to maintain a first come first served policy, but if the customers or contracts are not identical a preferred customer order may be desirable.

3.3 Category management

No changes can be done here!

3.4 Forecasting

No changes can be done here!

3.5 Report

3.5.1 Customer

This report shows the achieved sales information per customer including measures of volume, service level and freshness.

3.5.2 Product

This report shows the achieved sales information per product including measures of volume, price, service level and obsoleteness.

3.5.3 Customer product

This report shows the achieved sales information per customer per product including measures of volume, price, service level and promotion impact.

3.5.4 Product customer

This report shows the achieved sales information per product per customer including measures of volume, price, service level, freshness and promotion impact.

3.5.5 Finance

This report provides an overview of revenues, costs and investments from this round and the previous rounds.

3.5.6 Analysis

All reported data can be exported to Excel for further analysis. After choosing a point of view it is possible to view one or more measures. If there are multiple interesting points of view, it is convenient to export all data to Excel.

4 Supply Chain Management

4.1 Component

4.1.1 Safety stock (weeks)

The safety stock is the stock you set aside to cover uncertainty with respect to production requirements and the supply reliability from the supplier. The higher the stock, the lower the risk of running out of stock and so, with a high safety stock, you guarantee reliability of supply to production. A high safety stock also leads to high stock expenses and higher capital demands. The safety stock is expressed in forecast weeks (demand forecast). During the frozen period of production, the production planning is fixed and thus so is the demand for components. During this period there will be little uncertainty with respect to demand. Note that if one component is missing it may affect the production of one or more finished products. Hence it is desirable to have a rather high component availability. Furthermore, components can be stored for a long time and will storing them not have any impact on the freshness of the finished product. Therefore, the safety stock level decision is simply a tradeoff between storage cost and CO2 usage versus reliability.

4.1.2 Lot size (weeks)

The lot size is the minimum quantity that can be ordered. The final quantity ordered will in general be a bit higher than the minimum because when ordering, the actual demand for the component (how low the stock is) is taken into account as well as the trade unit agreed to with the supplier. A higher order quantity will lead to more cost effective purchasing, but it will increase the required storage space in the raw materials warehouse as well.

4.2 Production

4.2.1 Frozen period of production (weeks)

Each week The Fresh Connection's planning division issues a new production plan. This production plan determines which finished product will be produced when. An important aspect for the production plan is the frozen period of production, which is the number of weeks for which the production plan is fixed and therefore may no longer be changed.

Should, for example, the frozen period of production be two weeks, the schedule for the following two weeks is then fixed. Outside of this two-week period, the production plan can be changed.

A long frozen period of production is great for The Fresh Connection's purchasers, because when the production plan is fixed, the component requirement is then known to an exact degree and the purchasers can ensure that the deliveries arrive at the right time and in the right quantity. Moreover, the fixed period drives production leveling over that period, such that capacity usage is more evenly distributed.

The disadvantage of a long frozen period of production is that it limits flexibility and

responsiveness, which impacts availability of the finished product. If the production plan has been fixed for a long period, one cannot quickly respond to unexpected peaks in demand and customer service will suffer. If the frozen period is longer than the promotional horizon it is impossible to anticipate promotions properly. On the other hand, if the frozen horizon is much shorter it is possible to anticipate promotions quite adequately. When the frozen horizon is slightly shorter than the promotion horizon it is partially possible to anticipate upcoming promotions as there is some flexibility but most batches have already been scheduled.

4.3 Product

4.3.1 Safety stock (weeks)

The safety stock is the stock you set aside to combat uncertainty with respect to uncertainty on the part of customer demand and the supply of finished product from production. A high safety stock will lead to a high service level for the customer. But it is not wise to set the safety stock too high, as the finished product produced by The Fresh Connection only has a limited shelf life. Overly high safety stock will also lead to high stock levels and obsoletes which brings forth costs, working capital and a high carbon footprint. The safety stock is expressed in forecast weeks (forecast of customer demand).

4.3.2 Production Interval (working days)

The production interval is the number of working days between two production runs for the same finished product. If the production interval is 1, then the finished product is, produced every working day, and if the production interval is 5, the finished product is produced once every week.

4.4 Report

4.4.1 Component

This report shows the inventory information per component including measures of demand, stock size, obsoleteness and availability.

4.4.2 Product

This report shows the inventory information per product including measures of stock size, obsoleteness, production quality and others.

4.4.3 Finance

This report provides an overview of revenues, costs and investments from this round and the previous rounds.

4.4.4 Analysis

All reported data can be exported to Excel for further analysis. After choosing a point of view it is possible to view one or more measures. If there are multiple interesting points of view, it is convenient to export all data to Excel.