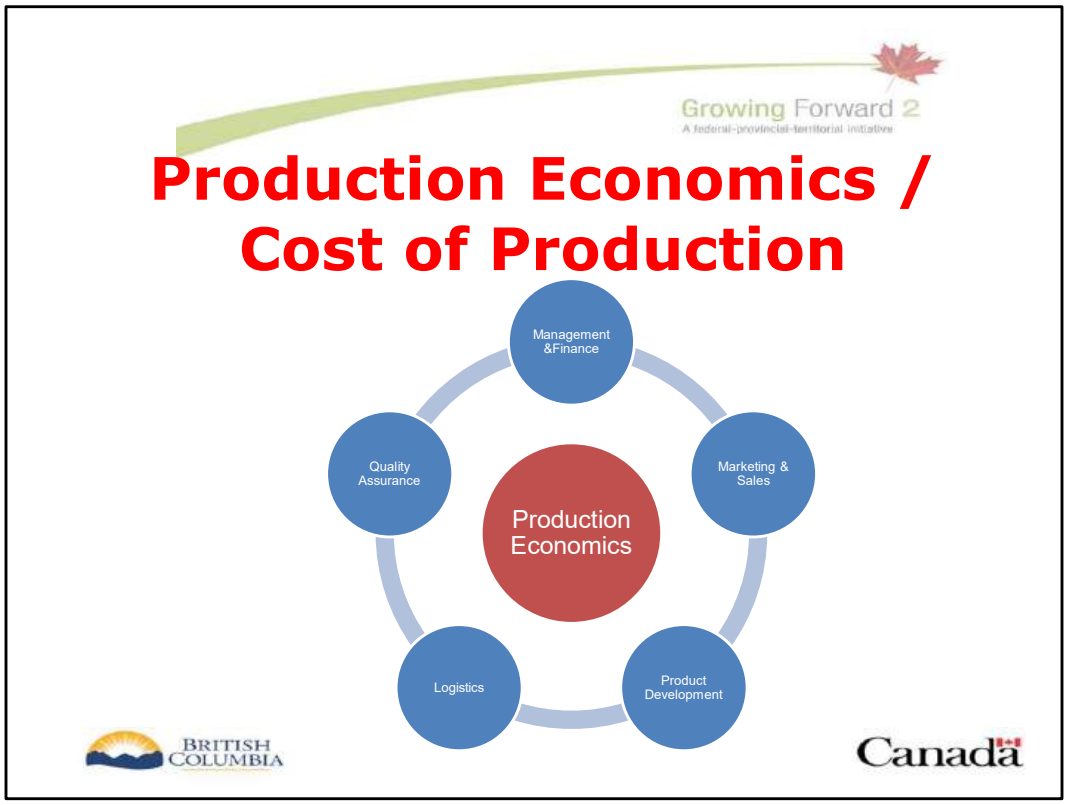


Production Economics involves the specific tasks of determining the Costs of Production and the analysis to identify what to charge for the product and the options available to make the product in the most economical manner.
Today we are confining our discussion to the food industry.

Is there anyone here who is a Cost Accountant or who has one on staff? Most small businesses rely on contract Accounting services thus it is beneficial and imperative to known how to account for all costs for producing a product.

To ascertain and allocate the costs appropriately information and projections are required from all other departments. As with all information the more accurate or realistic the information presented, the more realistic the costs.

It relies on information from Marketing – what products will be required, how much or each product will be required by the Consumer and how frequently?

From Product Development the formulations are provided to determine what ingredients and packaging are required as well as what processes

are required to produce the product.

Quality Assurance provides the details as to how rigid the standards are to satisfy the customer’s expectation and to ensure the product is safely produced. This may influence the equipment required, the skill level of employees, and speed of the production line.

Logistics provides the cost of the materials and packaging through Purchasing and the cost of transport (Freight In and Freight Out) through Shipping Departments.

Finance & Management assists in the evaluation of the suitability and feasibility of producing products and what other options exist.

SESSION OUTLINE

- Costs of Production
- Economics of Production
- Options for Production
- Contract Manufacturing
- Collaboration

COSTS OF PRODUCTION

Variable or Direct Costs (Cost of Goods Sold)

- Raw Materials
- Packaging Materials
- Labour
- Freight In
- Miscellaneous *

Overhead, Fixed, or Indirect Costs

- Facility expenses
- Annual certification costs
- Production Administration/Management Labour

In a typical food business the costs of production include the Variable Costs (Costs of Goods Sold) or the cost to make one selling unit (i.e. case of Haskap Berry Syrup) and the Overhead Costs, those costs that are incurred regardless if any production is created.

Two categories of Costs:
Variable or Direct Costs - These costs include the raw materials, packaging materials, labour, freight in and miscellaneous

Overhead or Fixed or Indirect Costs - These include facility expenses, annual certification costs, production administration and management labour.

COSTS OF PRODUCTION

Variable Costs (Cost of Goods Sold)

- Raw Materials
- Packaging Materials
- Labour
- Freight In
- Miscellaneous *

Let's take a closer look at what types of costs are associated with each line item. This decision is made with Finance to ensure all of the costs are accounted for and are easily recognized.

Raw Materials and Packaging are fairly self explanatory –they include the raw materials and packaging that are purchased and the amount used (based on the formulation) within each batch that is then divided by the yield in finished cases.

Where it becomes interesting is where there may be a conversion or preparation of the raw material, such as peeling, cutting, and sorting, where the mass of the original product changes before it is used in the actual production.

These loss factors affect the amount of raw materials or packaging to purchase as well as influences the cost and output.

The labour component is derived based on the factors and steps within the process. How many people do you need for each *unit operation* of the process flow? Are the steps continuous? Are there stages of the process that have to be conducted ahead of the main process? Do the activities require different skills? Are the different skills paid at different rates? Do you include the costs of employee payroll costs, vacation,

benefits? Do you use a cross the board percentage? Do you include a portion for "downtime" or "change over time" when changing products? Many of these decisions will be made with Finance for consistency of accounting.

Freight In is sometimes separated out and other times included in the individual item costs. The latter is difficult unless you are always receiving the materials the same manner each time. This also does not provide you with information that may allow you to assess the cost of transportation and how it affects the overall costs.

Miscellaneous costs can be separated out if and when the item becomes of significance or you want to know that specific information. This could include Certification that are only incurred when producing a specific product. Example would be BC Kosher – if your facility is certified kosher then the cost would go under Overhead costs as it needs to be spread over the entire year production, however if only specific products are to be certified kosher then the cost becomes a direct cost as it is incurred only when the production is taking place.

Which leads us to the next slide…..

COSTS OF PRODUCTION

Overhead or Indirect Costs

- Facility expenses
- Repairs and Maintenance
- Production Supplies
- Annual certification costs
- Production Administration/Management Labour

Overhead or Indirect Costs

The allocation of these costs is defined in concert with the Financial or Accounting department.

If you already have historical records of your overhead costs, sales, and production you can use these numbers to estimate a value per finished product case (fixed cost) that can be assigned assuming that the numbers associated with each area will not change very much from the past.

If you do not have historical records then you can use the information that you do have, such as rent expense, and obtain estimates of other costs through other non-competing food companies, suppliers, accountants, etc. Some of the expenses you can estimate based on your budget, such as for Production Admin and Management Labour.

The assumptions that you use for these costs should be recorded on the worksheet so you can refer back to them over time to see if any material change in those assumptions.

Let’s take a look at an example.

COSTS OF PRODUCTION

Fixed Cost Calculation

The total cost per year to operate Production

Rent and taxes = $25000
Operating Utilities = $8000
Disposal Fees = $ 2000
Pest Control & Contractors = $6000
Production Supplies = $9000

TOTAL **$50,000 per year**

Calculation and allocation of Fixed or Overhead Production Costs – Example

Rent and taxes = $25000
Operating Utilities = $8000
Disposal Fees = $ 2000
Pest Control & Contractors = $6000
Production Supplies = $9000

Total $50,000 per year

Now we want to determine how to allocate or spread these costs over all of the products?

Costs of Production

- **Fixed Cost Allocation - TOTAL $50,000 per year**
- **Option 1** – Divide over the number of cases expect to sell or make – 5000 cases = $10/case
- **Option 2** – Divide over the weight (kg) of product expect to sell or make – 50,000 kg = $1/ kg
- **Other options**: weighted averages based on the COGS that may reflect the value of the product or different product lines taking into account the specific costs of those products.

Allocation of Fixed or Overhead Production Costs – Example $50,000 total costs

Now we want to determine how to allocate or spread these costs over all of the products?

There are a number of ways to accomplish this task: Best to work with Accounting, again so there is consistency from year to year.

Option 1: If you expect to make 5000 cases of product per year then the allocation would be $10 per case.
Advantage is that it is easy to calculate – Disadvantage is that if the cases are not all the same size, or same value, or same cost then this could provide an unfair allocation – inhibiting sales of some products while under valuing others.

Option 2: If you expect to produce 50,000 kg of product then the allocation would be $1.00 per kg.
Advantage is that it is easy to calculate – Disadvantage is that if one product is more expensive to produce that another product this difference will create an unfair allocation.

The above allocations work well when you have one or two product lines

and the COGS are fairly even.

Other options that are used include using weighted averages, using various percentages based on the COGS, or some other portion of the facility costs to produce a specific product;

If you have two production lines, one very intense and high energy costs and consume about 75% of the space then you may allocate a substantial proportion of the costs to the products produced in that are thereby more accurately reflecting the actual costs of operation and production.

COSTS OF PRODUCTION

Comparison of allocation methods
2 different products, 2 pack sizes –
50:50 number of cases produced
50% of $50,000 = $10/case

Product #1: 12 bottles/case; 0.5 kg/bottle; 6 kg/case
$0.833/bottle or $1.66/kg

Product #2: 8 bottles/case; 1.25 kg/bottle; 10 kg/case
$1.25/bottle or $1.00/kg

IS THIS FAIR?

Allocation of Fixed or Overhead Production Costs – Example $50,000 total costs

We now have 2 different products in two different pack sizes - different numbers of bottles per case - and the density or weight of the products also differ.

From the previous slide the number of cases totaled 5000 thus since the sales are split 50:50 then the allocation per case is $10.

Product #1 with 12 bottles per case; each bottle containing 0.5 kg of product totaling 6 kg per case. The allocation per bottle is $0.833 or $1.66 per kg

Product #2 with 8 bottles per case; each bottle containing 1.25 kg of product totaling 10 kg per case. The allocation per bottle is $1.25 or $1.00 per kg

Just based on this information we do not know if this is a fair allocation. We do not know the ingredient costs for each product, the amount of processing area or energy consumption or how

much investment was required to create the product.

IS THIS FAIR?

ECONOMICS OF PRODUCTION

Can we produce and sell the product profitably?

Yes? No?

Is that the end of the discussion?

We have discussed the costs of production but what about the economics of production?

Economics is defined as the analysis of the production, distribution, and consumption of goods and services.

Generally the question that arises when evaluating launching a new product or keeping an existing one is, Can we produce and sell the product profitably?

Yes? or No? Is the answer this simple?

Is that the end of the discussion?

Of course not!

ECONOMICS OF PRODUCTION

Is Profit the only driver?

What is profit?

Price – cost = Profit?

Is Profit the only driver?

It is definitely one and a significant one! BUT not necessarily the only one to make all decisions - as what is profit? A simple mathematical equation?

The difference between the Price and Cost = Profit?

ECONOMICS OF PRODUCTION

Product Profit **or** Profit Contribution

- **Product** – every product stands on its own
- **Profit Contribution** – look at overall profitability and requires more analysis

To justify a new product or an existing product some companies insist that every product makes a profit **or** contributes to the profitability of the business. There is a distinction between these two thoughts.

The varying thought processes may affect whether the company continues in business or actually expands?

Product Profitability looks at each product in the current status of the company expense profile and if the Sell price is not greater than the Current Costs then the decision will be to eliminate or not sell that product, or to raise the price, unless COGS can be reduced.

Profit Contribution looks at not only the COGS portion but also how the additional production will affect the overhead (fixed) expenses thereby how it will affect the profitability of all products in the company.

Let's go back to our examples from the Costs of Production model.

COSTS OF PRODUCTION

Fixed Cost - TOTAL $50,000 per year

Now produce 5500 cases/year from 5000 cases/year

Fixed cost per case from $10 to $9.09

What to do with any extra $1.00?

In this example we had a fixed cost expense of $50,000 per year and now we can produce 5500 cases of product.

The fixed cost per case is reduced to $9.09; an extra $1/case or 10% or the fixed costs as profit. This now affects **all** of the products produced in the company.

What to do with that extra $1.00 per case?

Profit – bottom line
Keep profit margins but can reduce costs in some product lines?
Keep profit margins but increase promotions?
Invest in more efficient equipment? Ultimately reduce COGS of some products thereby allowing greater flexibility of pricing and profitability.

COSTS OF PRODUCTION

What can you do with any extra $1/case?

- Profit – bottom line
- Keep profit margin but reduce cost in some product line becoming more competitive (↑sales)
- Keep profit margins but increase promotions (↑sales)
- Invest in more efficient equipment – ↓COGS of some or all products; ↓both the variable and fixed costs of the product thereby ↓price, ↑ sales & profitability

What to do with that extra $1.00 per case?

Profit – bottom line

Keep profit margins but can reduce costs in some product line becoming more competitive (increase in sales)?

Keep profit margins but increase promotions (increase in sales)?

Invest in more efficient equipment? Ultimately reduce COGS of some or all products thereby reducing both the variable and fixed costs of the product leading to option of decreasing price (more competitive), increasing sales and profitability.

OPTIONS FOR PRODUCTION

- New unfamiliar Product?
- New unfamiliar Process?
- Limited Capacity?
- Limited Knowledge?
- Expanding existing production capacity; eliminate smaller lines?
- Investment Restrictions?

Sometimes to increase profitability and options for product expansion you also have to look outside your own walls.

This generally happens when a new product or process is being introduced or due to your own expansions plans, some smaller products may be eliminated.

Is the product novel? Or is it just unfamiliar to you?
Do you have the internal resources to create the product and processes?
Do you have restrictions on the physical space?
Do you have the knowledge? Time to acquire the knowledge?
Do you have the opportunity to specialize and increase your capacity on a profitable and expanding product line but don't want to stop selling other products?
Do you have investment/capital restrictions?
What is the risk?

What do you do? You may want to consider finding a contract manufacturer to produce either the new products or to produce your smaller and at times less profitable lines???

CONTRACT MANUFACTURING

- No current manufacturing –
  - Start up or new product or process
- Find one – know what you are looking for
  - Health Inspectors
  - Directories – food processor associations
- Do they have the know-how?
- Are they reputable – NDA and NC contracts

Contract Manufacturing

Most companies when they have excess capacity will entertain producing product for other companies, even competitors! There may be restrictions to ensure that your product and ingredients will not contaminate the manufacturer's materials and vice versa.

As we discussed in the last slide there are a number of reasons to look at contract manufacturing.

If you don't have your own manufacturing facility you may want to use someone else's investment until you decide if the product is successful in sales and/ or if you decide that you do not want to produce products, just focus on the sales or other functions.

Many current manufacturing companies will seek contract manufacturers when introducing a new product or process to test the product prior to making the investment.

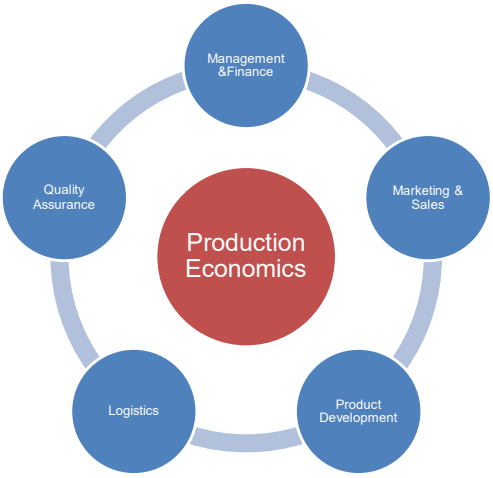
How do you find and screen Contract Manufacturers?
Health Inspectors
Food Processor Associations, Product specific associations

Know what you are looking for – the product, packaging, processing, labeling, Quality Assurance programs, Food Safety protocols, financially stable, reputable? Do they currently manufacture for other brands?

NDA – Non-Disclosure Agreements
NC – Non –Compete Agreements

To follow up with contract manufacturing and the associated selection, qualification, and evaluation decisions the next level will provide more details and examples.

COLLABORATION



As we've discussed the Economics of Production entails making decisions based on information that other departments will be supplying as well as that which resides in the manufacturing environments.

Collaboration and accuracy of information are critical for success. Business opportunities are always being presented and information is always changing thus appropriate responses requires constant review and monitoring of the data.

NEXT LEVEL

1. Define Lean Manufacturing Process
2. Define and Use Process Optimization
3. Determine Key Performance Indicators (KPIs)
4. Use procedures for Qualifying & Managing Contract Manufacturers

This level you have learned the basics of production economics and costs of production.

It is now time to use your data to define how these processes can be utilized and managed to identify existing losses and anticipated losses, build process optimization modules, and as your business complexity expands, how to qualify and manage contract manufacturers.

FEEDBACK, PLEASE

Please take a few minutes to assist us by providing feedback as to the content and delivery of this module.

We would appreciate if you would provide your name and contact details to follow up for more details as we want these modules to constantly be relevant to food business owners. We appreciate all input, positive and less than positive!