15.963 Management Accounting and Control
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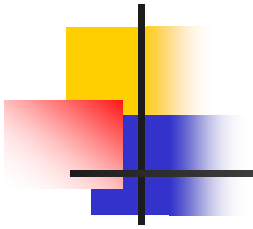
Incentive Distortions under Absorption Costing

- Absorption costing refers to any costing system in which all manufacturing costs are assigned to (or “absorbed” by) products, e.g.,
  - job costing,
  - process costing, etc.
- When such a method is to value inventory for financial reporting purposes, it creates an incentive to overproduce.
- This incentive to overproduce is another problem with absorption costing.

Incentive Distortions under Absorption Costing



- Oakville Auto Parts has annual sales of 100k mufflers.
  - price per unit is $100,
  - unit variable costs, all direct, are $30, and
  - fixed costs are $5m, and all of this is overhead.
- Assume beginning inventory is zero, and that WIP at year-end is zero.
- Allow production volume to vary, and consider what happens to
  - the value of ending FG inventory, and
  - cost of goods sold and reported income.
    - First consider what happens under actual costing, to avoid dealing with over-/under-applied overhead.

Incentive Distortions under Absorption Costing

Production	100000	110000	120000	130000	140000
Sales	**100000**	**100000**	**100000**	**100000**	**100000**
Ending Finished Goods Inventory (Units)	0	10000	20000	30000	40000
Unit Variable Costs	30	30	30	30	30
Fixed Overhead	5000000	5000000	5000000	5000000	5000000
Overhead Allocation Rate	50	45.45	41.67	38.46	35.71
Fixed Overhead in Ending FG Inventory	0	454545.5	833333.33	1153846	1428571
Variable Costs in Ending FG Inventory	0	300000	600000	900000	1200000
Ending Finished Goods Inventory ($)	0	754545	1433333	2053846	2628571
Variable Costs in Cost of Goods Sold	3000000	3000000	3000000	3000000	3000000
Fixed Costs in Cost of Goods Sold	5000000	4545455	4166666.7	3846154	3571429
Total Cost of Goods Sold	8000000	7545455	7166666.7	6846154	6571429

Incentive Distortions under Absorption Costing

- Overproduction allows managers to 'hide' fixed costs in inventory, and therefore to overstate income.
- The same effect occurs even under normal costing.
- Overproduction is more tempting for:
  - firms trying to avoid reporting a loss;
  - managers trying to circumvent compensation and financial contract conditions;
  - firms trying to avoid adverse trade credit squeezes; and
  - firm with low institutional ownership.

Incentive Distortions under Absorption Costing

- How do we counteract the incentive to overproduce?
  - Charge inventory holding costs against profits when evaluating managers.
  - Remove production decision rights from plant managers.
  - Variable costing.

Joint Products

- Joint products result from disassembly processes, in which a single input is disassembled to produce multiple outputs.
- Examples include: cocoa butter, cocoa powder and tanning cream, all from cocoa beans; cream and liquid skim from milk; gasoline, benzene, kerosene and naphtha, all from crude oil.
- Joint costs are incurred in processing the common input.

Joint Products

- The point at which all joint costs have been incurred is called the split-off point. This is also the juncture at which the joint products are separately identifiable.
- If several products emerge at the split-off point, the ones with the highest relative sales value are called joint products, while those (if any) with the lowest relative sales values are called by-products.
- For example, if logs are processed into different grades of lumber and wood chips, the former are joint products and the latter is a by-product.

Joint Products

- How should you allocate the joint costs (pre-split-off costs) to the different products?
- The allocation could be based on physical measures such as relative weight or volume.
- The allocation could also be based on market measures such as relative sales value or Net Realizable Value (NRV).
- Consider an example: 110k gallons of raw milk are purchased, to be processed into 25k gallons of cream and 75k gallons of liquid skim.

Joint Products

- $200k is spent on purchasing and processing the raw milk to the split-off point. This is the joint cost to be allocated to the two joint products, cream and liquid skim.
- Cream sells for $5 / gallon, while liquid skim sells for $4 / gallon.
- $60k is required to process the cream further before it can be sold; $160k is required for further processing of liquid skim.

Joint Products

- Is liquid skim profitable?

Cost allocation based on volume:

	Cream	Liquid Skim
Volume	25000	75000
Volume %	25%	75%
Joint Cost Allocated	50000	150000

Product Line Profitability: allocation based on Volume

Sales	125000	300000
Costs beyond Split-off	60000	160000
Joint Costs	50000	150000
Profit	15000	-10000

Joint Products

Cost allocation based on Sales

	Cream	Liquid Skim
Sales	125000	300000
Sales %	29%	71%
Joint Cost Allocated	58824	141176

Product Line Profitability: allocation based on Sales

Sales	125000	300000
Costs beyond Split-off	60000	160000
Joint Costs	58824	141176
Profit	6176	-1176

Joint Products

- It is not, regardless of whether we use relative volume or relative sales to allocate joint costs. Should we stop selling this product?
- An alternative is use NRV. This is the final selling price of the product minus all its direct costs beyond the split-off point.

Cost allocation based on NRV

	Cream	Liquid Skim
Sales	125000	300000
Costs beyond Split-off	60000	160000
NRV	65000	140000
NRV %	32%	68%
Joint cost allocated	63415	136585

Product Line Profitability: allocation based on NRV

Sales	125000	300000
Costs beyond Split-off	60000	160000
Joint costs	63415	136585
Profit	1585	3415

Joint Products

- Allocating joint costs based on NRV reveals that liquid skim is profitable.
- What if a joint product (e.g., liquid skim here) is unprofitable even using the NRV-based allocation method?
- If all NRV's are positive, and the sum of the NRV's exceeds joint costs, this will not happen.
- The allocation rate is (NRV_1 / $\sum$NRV) x JC, where NRV_1 is the NRV for product 1, and JC is the joint cost.
- If JC < $\sum$NRV then $JC_1 < NRV_1$, where JC_1 is the joint cost allocated to product 1.

Joint Products

So, which allocation method should we use in deciding whether to keep or drop a joint product?

- None. Allocating joint costs is irrelevant for this decision.
  - Joint costs are sunk at the split-off point, and therefore irrelevant in this decision.
- A joint product should be processed beyond the split-off point as long as its NRV exceeds the opportunity cost of the product if it is not processed.
  - For example, liquid skim has an NRV of $140k. If it could be sold without further processing at the split-off point for >$140k, then do not process further.
  - As long as a joint product has a positive NRV, it helps to recover some of the joint costs.

Joint Products

- Which cost allocation method should we use to decide whether to even begin to process the joint input (raw milk in our example)? This would be a long run decision.
- If the sum of the NRV's of all joint products sufficiently exceeds the joint cost, the input should be processed (in our example, raw milk should be processed into cream and liquid skim).
- Again, cost allocation is irrelevant in this case.
  - i.e., the joint cost is relevant, but its allocation to different products is irrelevant in deciding whether to process the joint input.

Cost Allocation

- Takeaways:
  - Cost allocation is generally useful for long run decisions, such as deciding whether to add or drop a product line, because fixed costs become avoidable in the long run.
  - In the joint product case, joint costs are unavoidable, and therefore, their allocation is irrelevant in both the short run and the long run processing decision.
  - However, joint cost allocation may still be relevant for calculating inventory values, for filing insurance claims, etc.