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DIFFERENTIAL ANALYSIS

THE KEY TO DECISION MAKING

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OUTLINE OF THE LECTURE

1. Differential analysis
2. Avoidable cost
3. Sunk costs, future costs, opportunity costs
4. The make or buy decision
5. Contribution margin per unit of the constrained resource

DIFFERENTIAL ANALYSIS (1)

- managers must decide what products to sell, whether to make or buy component parts, what prices to charge, what channels of distribution to use, whether to accept special orders at special prices, and so forth
- making such decisions is often a difficult task that is complicated by numerous alternatives and massive amounts of data, only some of which may be relevant
- every decision involves choosing from among at least two alternatives
- in making a decision, the costs and benefits of one alternative must be compared to the costs and benefits of other alternatives

DIFFERENTIAL ANALYSIS (2)

- the key to making such comparisons is **differential analysis** - focusing on the costs and benefits that **differ** between the alternatives
- a difference in cost between any two alternatives is known as a **differential cost**
- a difference in revenue between any two alternatives is known as **differential revenue**

DIFFERENTIAL ANALYSIS (3)

- differential costs and revenues are relevant to decision making, whereas costs and revenue that do not differ between alternatives are irrelevant to decision making
- because differential costs and differential revenues are the only inputs that are relevant to decision making, they are also often referred to as **relevant costs** and **relevant benefits**

AVOIDABLE COST

- an **avoidable cost** is a cost that can be eliminated by choosing one alternative over another
- by choosing the alternative of going to the movie, the cost of renting the DVD can be avoided
- by choosing the alternative of renting the DVD, the cost of the movie ticket can be avoided
- therefore, the cost of the movie ticket and the cost of renting the DVD are both avoidable costs

SUNK COSTS

- two broad categories of costs are never relevant in decisions - sunk costs and future costs that do not differ between the alternatives
- **sunk cost** is a cost that has already been incurred and cannot be avoided regardless of what a manager decides to do
- For example, suppose a company purchased a five-year-old truck for \$12 000. The amount paid for the truck is a sunk cost because it has already been incurred and the transaction cannot be undone. The amount the company paid for the truck is irrelevant in making decisions such as whether to keep, sell, or replace the truck. Furthermore, any depreciation expense related to the truck is irrelevant in making decisions.

FUTURE COSTS

- **future costs** that do not differ between alternatives should also be ignored
- continuing with the example discussed earlier, suppose you plan to order a pizza after you go to the movie theater or you rent a DVD
- if you are going to buy the same pizza regardless of your choice of entertainment, the cost of the pizza is irrelevant to the choice of whether you go to the movie theater or rent a DVD
- notice, the cost of the pizza is not a sunk cost because it has not yet been incurred

OPPORTUNITY COSTS

- **opportunity costs** also need to be considered when making decisions
- an **opportunity cost** is the potential benefit that is given up when one alternative is selected over another
- for example, if you were considering giving up a high-paying summer job to travel overseas, the forgone wages would be an opportunity costs of traveling abroad

SUMMARY

- only those costs and benefits that differ between alternatives are relevant in a decision
- differential costs are also referred to as relevant costs or avoidable costs
- the key to successful decision making is to focus on relevant costs and benefits as well as opportunity costs while ignoring everything else - including sunk costs and future costs and benefits that do not differ between the alternatives

THE MAKE OR BUY DECISION

- when a company is involved in more than one activity in the entire value chain, it is **vertically integrated**
- An integrated company is less dependent on its suppliers and may be able to ensure a smoother flow of parts and materials for production than a nonintegrated company
- a decision to carry out one of the activities in the value chain internally, rather than to buy externally from a supplier, is called a make or buy decision
- make or buy decisions also involve decisions concerning whether to outsource development tasks, after-sales service, or other activities

SPECIAL ORDERS

- managers must often evaluate whether a special order should be accepted, and if the order is accepted, the price that should be charged
- a special order is a one-time order that is not considered part of the company's normal ongoing business

CONSTRAINT

- a constraint is anything that prevents you from getting more of what you want
- the constraint, or bottleneck, in the system is determined by the step that limits total output because it has the smallest capacity

CONTRIBUTION MARGIN PER UNIT OF THE CONSTRAINED RESOURCE (1)

- managers routinely face the problem of deciding how constrained resources are going to be used
- a manufacturer has a limited number of machine-hours and a limited number of direct labour-hours at its disposal
- because the company cannot fully satisfy demand, managers must decide which products or services should be cut back

CONTRIBUTION MARGIN PER UNIT OF THE CONSTRAINED RESOURCE (2)

- in other words, managers must decide which products or services make the best use of the constrained resource
 - fixed costs are usually unaffected by such choices, so the course of action that will maximize the company's total contribution margin should ordinarily be selected

CONTRIBUTION MARGIN PER UNIT OF THE CONSTRAINED RESOURCE (3)

- if some products must be cut back because of a constraint, the key to maximizing the total contribution margin may seem obvious - favor the products with the highest unit contribution
- unfortunately, that is not quite correct
- rather, the correct solution is to favor the products that provide the highest contribution margin per unit of the constrained resource

MANAGING CONSTRAINTS (1)

- effectively managing an organization's constraints is a key to increased profits
- when a constraint exists in the production process, managers can increase profits by producing the products with the highest contribution margin per unit of the constrained resource
- they can also increase profits by increasing the capacity of the bottleneck operation
- when a manager increases the capacity of the bottleneck, it is called **relaxing (or elevating) the constraint**

MANAGING CONSTRAINTS (2)

The capacity of a bottleneck can be effectively increased in a number of ways, including:

- working overtime on the bottleneck
- subcontracting some of the processing that would be done at the bottleneck
- investing in additional machines at the bottleneck
- shifting workers from processes that are not bottlenecks to the process that is the bottleneck

MANAGING CONSTRAINTS (3)

The capacity of a bottleneck can be effectively increased in a number of ways, including:

- focusing business process improvement efforts on the bottleneck
- reducing defective units - each defective unit that is processed through the bottleneck and subsequently scrapped takes the place of a good unit that could have been sold

JOINT PRODUCT COSTS AND THE CONTRIBUTION APPROACH (1)

- two or more products that are produced from a common input are known as **joint products**
- the **split-off point** is the point in the manufacturing process at which the joint products can be recognized as separate products
- the term **joint cost** is used to describe the costs incurred up to the split-off point

JOINT PRODUCT COSTS AND THE CONTRIBUTION APPROACH (2)

- **sell of process further decisions**
 - it is profitable to continue processing a joint product after the split-off point so long as the incremental revenue from such processing exceeds the incremental processing cost incurred after the split-off point
 - joint costs that have already been incurred up to the split-off point are always irrelevant in decisions concerning what to do from the split-off point forward

DIFFERENTIAL ANALYSIS

	Per Unit	8,000 Units
Direct materials	\$ 6	\$ 48,000
Direct labor	4	32,000
Variable overhead	1	8,000
Supervisor's salary	3	24,000
Depreciation of special equipment	2	16,000
Allocated general overhead	5	40,000
Total cost	<u>\$21</u>	<u>\$168,000</u>

DIFFERENTIAL ANALYSIS

	Total Relevant Costs — 8,000 units	
	Make	Buy
Direct materials (8,000 units × \$6 per unit)	\$ 48,000	
Direct labor (8,000 units × \$4 per unit)	32,000	
Variable overhead (8,000 units × \$1 per unit)	8,000	
Supervisor's salary	24,000	
Depreciation of special equipment (not relevant)		
Allocated general overhead (not relevant)		
Outside purchase price		<u>\$152,000</u>
Total cost	<u>\$112,000</u>	<u>\$152,000</u>
Difference in favor of continuing to make		<u>\$40,000</u>

DIFFERENTIAL ANALYSIS

	Make	Buy
Total annual cost (see Exhibit 12-5)	\$112,000	\$152,000
Opportunity cost—segment margin forgone on a potential new product line	<u>60,000</u>	<u> </u>
Total cost	<u>\$172,000</u>	<u>\$152,000</u>
Difference in favor of purchasing from the outside supplier		<u>\$20,000</u>

DIFFERENTIAL ANALYSIS

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