

UoG / UESTC Joint School of Engineering

Engineering Project Management & Finance

Engineering Economics: Make or
Buy decisions

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- “Make-or-Buy decisions compare the cost of producing a component (or service) internally against the cost of purchasing the component (or service) from an external supplier”

Some common reasons for make-buy decisions at this level follow:-

- Delivery failure or poor service by existing source
- To allow the organisation to focus on its core business
- To access skills and technologies
- To provide [demand] flexibility
- Market or internal pressure to reduce costs

Simple Lease-or-Buy Example

- You can lease a piece of equipment you need for a project for \$150/day. To purchase the item, the investment cost is \$1,000, and the daily cost would be another \$50/day.
- How long will it take for the lease cost to be the same as the purchase cost?
- If you need the item for 12 days, should you lease it or purchase it?

Simple Lease-or-Buy Solution

- Set up an equation so the “make” is equal to the “buy”
- In this example, use the following equation. Let **d** be the number of days to use the item.

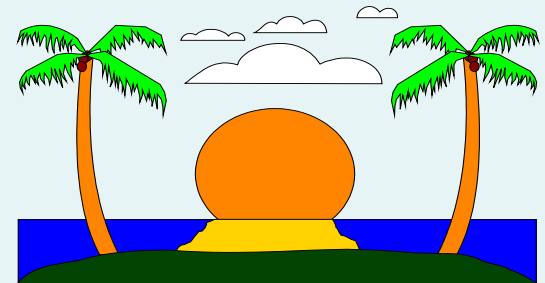
$$\$150d = \$1,000 + \$50d$$

- Solve for **d** as follows:
 - Subtract $\$50d$ from the right side of the equation to get
$$\$100d = \$1,000$$
 - Divide both sides of the equation by $\$100$
$$d = 10 \text{ days}$$

Lease-or-Buy Solution... or is it?

- The lease cost is the same as the purchase cost at 10 days
- If you need the item for 12 days, it would be more economical to purchase it
- But... does this analysis tell the whole story?
 - When might it not be applicable?

- Will you drive or fly to Florida for spring break?
- You have gathered the following information to help you with the decision.
 - Motel cost is \$80 per night.
 - Meal cost is \$20 per day.
 - Your car insurance is \$100 per month.
 - Kennel cost for your dog is \$5 per day.
 - Round-trip cost of gasoline for your car is \$200.
 - Round-trip airfare and rental car for a week is \$500.
- Driving requires two days, with an overnight stay, cutting your time in Florida by two days.



The Concept of Relevant Cost Information

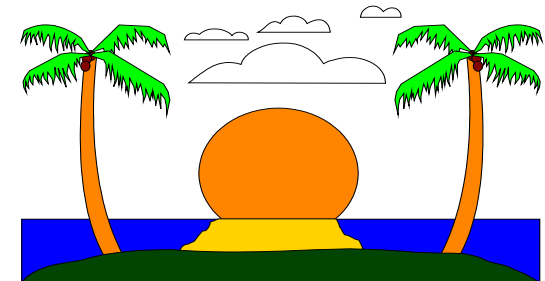
Florida Spring Break Drive/Fly Analysis

Cost	Drive	Fly
Motel	\$ 640	\$ 640
Eating out costs	160	160
Kennel cost	40	40
Car insurance	100	100
Gasoline	200	-
Airfare/rental car	-	500

8 days @ \$80

8 days @ \$20

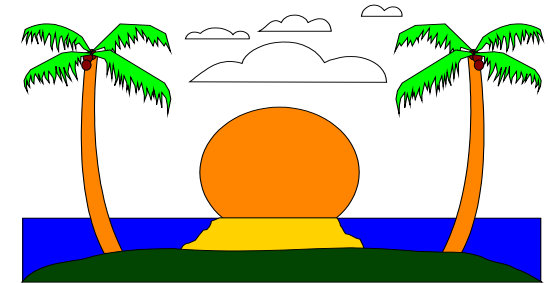
8 days @ \$5



The Concept of Relevant Cost Information

Florida Spring Break Drive/Fly Analysis

Cost	Drive	Fly
Motel	\$ 640	\$ 640
Eating out costs	160	160
Kennel cost	40	40
Car insurance	100	100
Gasoline	200	-
Airfare/rental car	-	500



Costs do not differ,
so they are not
relevant to decision.

Also, car insurance
is not relevant to
the decision as it
is a past cost.

Florida Spring Break Drive/Fly Analysis

Cost	Drive	Fly
Motel	\$ 640	\$ 640
Eating out costs	160	160
Kennel cost	40	40
Car insurance	100	100
Gasoline	200	-
Airfare/rental car	-	500

Are the extra two days in Florida worth the \$300 extra cost to fly?

Transportation costs **differ** between the two alternatives, so they are **relevant** to your decision

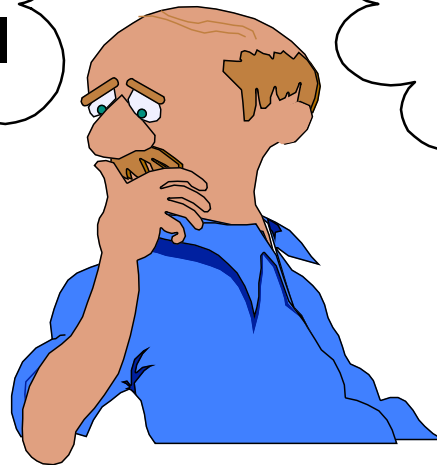


Make or Buy Decisions

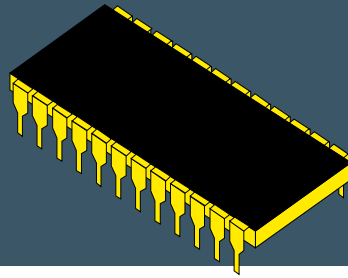
I suppose I should compare the outside purchase price with the additional costs to manufacture the part.

Should I continue to make the part, or should I buy it?

What will I do with my idle facilities if I buy the part?



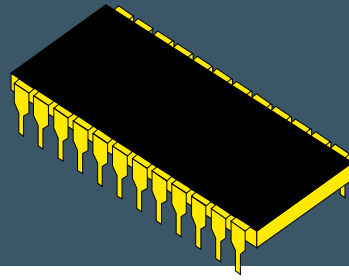
- **Incremental** costs also are important in the decision to make a product or buy it from a supplier.
- The cost to produce an item must include:-
 - (1) direct materials
 - (2) direct labor
 - (3) **incremental overhead**
- We should **not** use the allocated overhead rate to determine product cost.



Make or Buy Decisions

Exitel makes computer chips used in one of its products. Unit costs, based on production of 20,000 chips per year, are:

		Annual Cost(\$)	Per Unit Cost(\$)
Direct Material		180,000	9.00
Direct Labour		100,000	5.00
Variable Overhead		20,000	1.00
Fixed Overhead		260,000	13.00
	Total	<u>\$ 560,000</u>	<u>\$ 28.00</u>

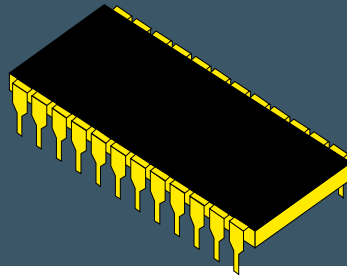


Make or Buy Decisions

An outside supplier has offered to provide the 20,000 chips at a cost of \$25 per chip. Fixed overhead costs will not be avoided if the chips are purchased. Exitel has no alternative use for the facilities.

Should Exitel accept the offer of \$25?





Make or Buy Decisions

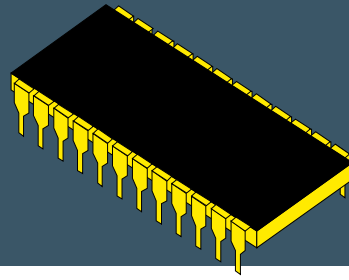
Let's look at the per unit **relevant costs** of not making (i.e. costs **avoided** if bought from outside supplier)

	<u>Unit Cost</u>
Direct Material	\$ 9.00
Direct Labor	5.00
Variable Overhead	1.00
Total Variable Costs saved	<u>\$ 15.00</u>
Remaining fixed Overhead(not saved)	\$13.00

No, Exitel should **not** pay \$25 per unit to an outside supplier. This would save \$15 variable costs but would not reduce the Fixed Overhead cost (\$13).



University
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New Information

If Exitel buys the chips from the outside supplier, the idle facilities could be leased to another company for \$250,000 per year.

Should Exitel buy the chips and lease the facilities?

Cost Analysis (annual)

Figures based on 20,000 chips per year		Make	Buy	Buy & Lease
Direct Material		180,000	0	0
Direct Labour		100,000	0	0
Variable Overhead		20,000	0	0
Fixed Overhead		260,000	260,000	260,000
External Price		0	500,000	500,000
Costs sub-total		\$ 560,000	\$760,000	\$760,000
Lease of Premises (Income)		0	0	(\$250,000)
Total		\$560,000	\$760,000	\$510,000

The opportunity cost of facilities changes the decision.

**The real question to answer is,
“What is the best use of Exitel’s facilities?”**

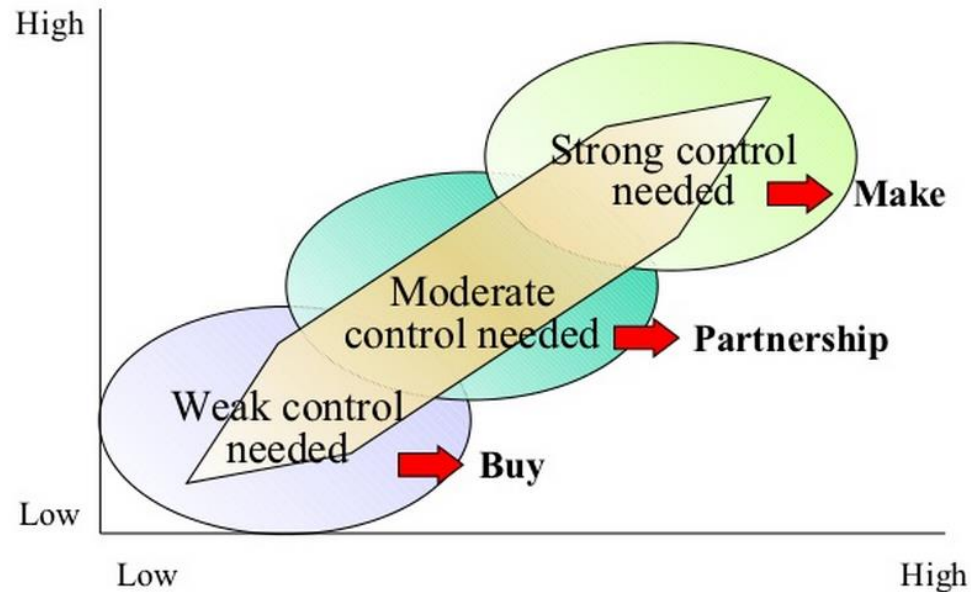


Some other things to consider...

Make or Buy

Advantages of Making

- Low costs
- Better quality
- Unique characteristics
- Better time management
- Control of proprietary information
- Etc...



Risks tied to Outsourcing

- Size, power of producer
- Technical capacity of buyer
- Number of transactions involved

- We have looked at a simple lease versus buy
 - Are financial considerations always the best for decisions?
 - How do you access 'hidden' costs /benefits of ownership?
- We have looked at relevant costs
 - Those costs which are pertinent to a decision
 - Considered 'intangible costs (benefit of staying 2 more days)
- We have looked at Make versus Buy analysis
 - A lower price offer is not always a good deal
 - Understanding Fixed and Variable costs are important
 - There may be short term financial benefit by leasing

As engineers, you will be required to consider these options on projects and /or facilities

- Read the following:
 - ★ – Make versus buy-A Decision Framework: Booz & Co (PWc)
 - ★ – Make Versus Buy: Dan Oliver
- Give special consideration to cases when Make versus Buy gives a financial benefit but not a business benefit

Skim

Read

Understand

Critique