Relevant information for decision making

Lecture 9

Schedule

Sessions	Topic	Reference
13 and 14	Cost-volume-profit analysis	Chapter 8
15 and 16	Cost planning	Chapter 9
17 and 18	Relevant information for decision making	Chapter 10
19 and 20	Control systems and performance measurement	Chapter 19
21 and 24	Budgets	Chapter 14, 15, 16
Second partial exam / General exam		

Learning objectives

- After this lecture, you should be able to:
  - Describe a five-step sequence in the decision process.
  - Differentiate relevant costs from irrelevant costs and revenues.
  - Distinguish between quantitative factors and qualitative factors in decisions.
  - Identify two potential problems in relevant-cost analysis.
  - Describe the opportunity cost concept; explain why it is used in decision making.
  - Describe the key concept in choosing which among multiple products to produce when there are capacity constraints.
  - Explain why the book value of equipment is irrelevant in equipment-replacement decisions.

Information and the decision process

Information and the decision process

Concept:

- Managers often adopt a **personalised approach** for **deciding among different courses of action**.
- The approach may be **highly stylised, informal and subjective**.
- It will usually also draw on **formally structured information**.
- A **decision model** is here taken to signify a **formal method for making a choice**, frequently involving **quantitative and qualitative analyses**.
- Accountants aim to **supply managers** with **relevant data** to **guide** their **decisions**.
- This information is **usually structured** and **acts** as an **input to decision making** which will rely also on **other information forms.**

Information and the decision process

Example Home Appliances:

- Home Appliances, a manufacturer of vacuum cleaners faces the question **“Should it rearrange a manufacturing assembly line to reduce manufacturing labour costs?”**
- For simplicity, assume that the only alternatives are **“do not rearrange”** and **“rearrange”.**
- The **rearrangement** will **eliminate all manual handling of materials**.
- The **current manufacturing line** uses **20 workers** (15 workers operate machines, 5 workers handle materials).
- **Each worker** puts in **2,000 hours annually**.
- The **rearrangement** is **predicted to cost €90,000**.
- The **predicted production output** of **25,000 units** for the next year will be **unaffected by the decision**.

Information and the decision process

Example Home Appliances:

- Also **unaffected** by the **decision** are the **predicted selling price** per unit of €250, **direct-materials costs per unit** of €50, **other manufacturing overhead** of € 750,000, and marketing costs of €2,000,000.
- The **cost driver** is **units of production**.

Information and the decision process

Example Home Appliances:

- To make the decision, **management** may **hypothetically proceed** in a **sequence of steps**.
- The **first step** is to **gather more information** about manufacturing labour costs.
  - The **historical manufacturing labour rate** of **€14 per hour** is the starting point for predicting total manufacturing labour costs under both alternatives.
  - The **manufacturing labour rate** is **expected to increase** to **€16 per hour** following a recently negotiated increase in employee benefits.
- The **second step** is to **predict future costs** under the two alternatives.
  - **Predicted manufacturing labour costs** under the "**do not rearrange"** alternative are 20 workers x 2,000 hours x €16 per hour = **€640,000**.
  - **Predicted manufacturing labour costs** under the "**rearrange"** alternative are 15 workers x 2,000 hours x €16 per hour = **€480,000**.
  - **Predicted costs of rearrangement** are **€90,000**.

Information and the decision process

Example Home Appliances:

- As the **third step**, Home Appliances' management compares the **predicted savings from eliminating materials handling labour costs** (5 workers x 2,000 hours x €16 per hour = €160,000) to the **costs of rearrangement** (€90,000).
- It also takes into account **other qualitative considerations** such as the **effect** that **reducing the number of workers** will have on **employee morale**.
- After **weighing** the **costs and benefits**, **management chooses** the **"rearrange" alternative.**
- Management next implements the decision in the **fourth step** by **rearranging the manufacturing assembly line**.

Information and the decision process

Example Home Appliances:

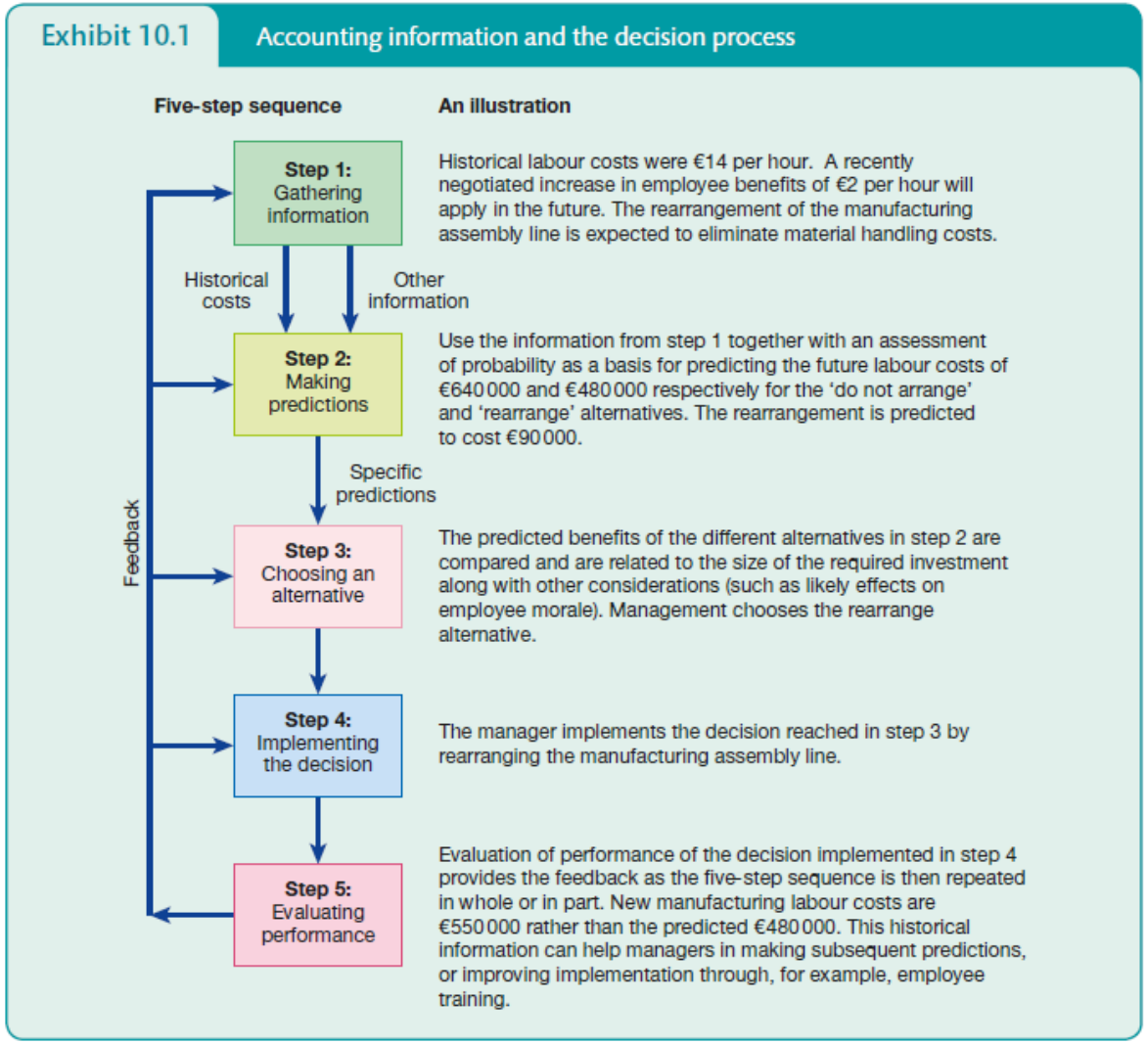
- As the **fifth step**, **management gathers information** about the **actual results** of the plant rearrangement to **evaluate performance** and to **provide feedback**.
- **Actual results** show that the **new manufacturing labour costs** are **€550,000** (due to, say, lower than expected manufacturing labour productivity) rather than the **predicted €480,000**.
- This **feedback** may lead to **better implementation** through, for example, a change in supervisory behaviour, employee training or personnel so that the **€480,000 target is achieved in subsequent periods**.
- However, the **feedback may convince** the decision maker that the **prediction method**, rather than the implementation, **was faulty**.
- Perhaps the **prediction method** for similar decisions in the future **should be modified** to **allow** for **worker training or learning time**.

Information and the decision process

Example Home Appliances:

- **Exhibit 10.1** summarises the **five-step decision process** that we just described: **gathering information, making predictions, choosing an alternative, implementing the decision, and evaluating actual performance to provide feedback**.
- The **feedback**, in turn, might **affect future predictions**, the **prediction method itself**, the **decision model** or the **implementation**.

Information and the decision process



The concept of relevance

Relevant costs and relevant revenues

Concept:

- The **most important decision-making concepts** in this lecture are **relevant costs** and **relevant revenues**.
- **Relevant costs** are those **expected future costs** that **differ** among **alternative courses** of **action**.
- **Relevant revenues** are those **expected future revenues** that **differ** among **alternative courses of action**.
- It is important to **recognise** that **relevant costs** and **relevant revenues** must:
  - **Occur in the future:** every decision deals with a manager selecting a course of action based on its expected future results.
  - **Differ among the alternative courses of action:** future costs and revenues that do not differ will not matter and, therefore, will have no bearing on the decision being made.

The question is always: “What difference will a particular action make?”

Relevant costs and relevant revenues

Exhibit 10.2 Determining relevant revenues and relevant costs for Home Appliances

	All data		Relevant data	
	Alternative 1: Do not rearrange	Alternative 2: Rearrange	Alternative 1: Do not rearrange	Alternative 2: Rearrange
Revenues*	€6 250 000	€6 250 000	–	–
	–	–		
Costs				
Direct materials†	1 250 000	1 250 000	–	–
Manufacturing labour	640 000‡	480 000§	€640 000‡	€480 000§
Manufacturing overhead	750 000	750 000	–	–
Marketing	2 000 000	2 000 000	–	–
Rearrangement costs	–	90 000	–	90 000
Total costs	4 640 000	4 570 000	640 000	570 000
Operating profit	€1 610 000	€1 680 000	€(640 000)	€(570 000)
	€70 000 difference		€70 000 difference	

* 25 000 × €250 = €6 250 000.
† 25 000 × €50 = €1 250 000.
‡ 20 × 2000 × €16 = €640 000.
§ 15 × 2000 × €16 = €480 000.

Relevant costs and relevant revenues

Example Home Appliances:

- In **Exhibit 10.2**, the €640,000 and €480,000 **manufacturing labour costs** are **relevant costs** because they are **expected future costs** that **differ** between the **two alternatives**.
- The **past manufacturing labour rate** of €14 per hour and **total past manufacturing labour costs** of €560,000 (i.e., 12,000 hours x 20 workers x €14 per hour) are **not relevant**, even though they may play a role in preparing the €640,000 and €480,000 labour cost predictions.
- Although they may be a **useful basis** for making informed judgements for **predicting expected future costs**, **historical costs** in themselves are **irrelevant** to a **decision** because they deal strictly with the past, **not the future**.

Relevant costs and relevant revenues

Example Home Appliances:

- **Exhibit 10.2** presents the **quantitative data** underlying the choice between the **“do not rearrange”** and the **“rearrange”** alternatives.
  - The **first two columns** present **all data**.
  - The **last two columns** present **only relevant costs** or **revenues**.
- The **revenues**, **direct materials**, **manufacturing overhead** and **marketing items** can be **ignored** because although they are expected future costs, they **do not differ** between the **alternatives** and are thus **irrelevant**.
- The data in Exhibit 10.2 indicate that **rearranging** the production line will **increase** next year’s **predicted operating profit** by **€70,000**.

Relevant costs and relevant revenues

Example Home Appliances:

- Note that we **reach** the **same conclusion** whether we **use all data or include only the relevant data** in the analysis.
- By **confining** the **analysis** to **only** the **relevant data**, managers can **clear away** related but **irrelevant data** that might **confuse** them.
- The **difference** in **total cost between two alternatives** is a **differential cost**.
- The **differential cost** between alternatives 1 and 2 in **Exhibit 10.2** is **€70,000**.

Qualitative factors can be relevant

Qualitative factors can be relevant

Concept:

- We **divide** the **consequences of alternatives** into **two broad categories**:
  - **Quantitative**.
  - **Qualitative**.
- **Quantitative factors** are outcomes that are **measured** in **numerical terms**.
- **Some quantitative factors** are **financial**, that is, they can be **easily expressed** in **financial terms**.
  - Examples include the costs of direct materials, direct manufacturing labour and marketing.
- **Other quantitative factors** are **non-financia**l, that is, they can be **measured numerically**, but they are **not expressed** in **financial terms**.
  - Examples include the page download time for an Internet company and the percentage of on-time flight arrivals for an airline company.

Qualitative factors can be relevant

Concept:

- **Qualitative factors** are outcomes that **cannot be measured** in **numerical terms**.
  - Employee morale is an example.
- **Cost analysis** generally **emphasises quantitative factors** that can be **expressed** in **financial terms**.
- But just because **qualitative factors** and **non-financial quantitative factors cannot be easily measured** in **financial terms** does **not make** them **unimportant**.

Qualitative factors can be relevant

Concept:

- **Managers** must **at times** give **more weight** to **qualitative** or **non-financial quantitative factors**.
  - For example, **Home Appliances** may find that it can purchase a part from an **outside supplier** at a **price** that is **lower** than what it **costs to manufacture the part in-house**.
  - Home Appliances may **still choose to make the part in-house** because it feels that the **supplier** is **unlikely to meet** the **demanding delivery schedule** - a **quantitative non-financial factor** - and because **purchasing** the part from **outside** may **adversely affect employee moral**e - a **qualitative factor**.
- **Trading off non-financial** and **financial considerations**, however, is **seldom easy**.

An illustration of relevance: choosing output levels

One-off special orders

Concept:

- Management sometimes faces the **decision of accepting or rejecting one-off special orders** when there is **idle production capacity** and where the **order has no long-run implications**.
- We **assume that all costs** can **be classified** as **either variable with respect** to a **single driver** (units of output) or **fixed**.
- The **following example illustrates** how focusing on **revenues, variable costs and contribution margins** can **provide key information** for **decisions** about the **choice of output level**.
- The example also indicates how **reliance on unit-cost numbers** calculated after allocating fixed costs can **mislead managers** about the **effect** that **increasing output** has on **operating profit**.

One-off special orders

Example Huber GmbH:

- **Huber GmbH manufactures** quality **bath towels** at its **highly automated** Heidelberg **plant**.
- The **plant** has a **production capacity of 48,000 towels each month**.
- **Current monthly production** is **30,000 towels**.
- **Retail department stores** account for **all existing sales**.
- **Expected results** for the August are shown in **Exhibit 10.3**.
- **Note** that these **amounts** are **predictions**.

One-off special orders

Example Huber GmbH:

- The **manufacturing costs per unit** of **€12** consist of
  - **direct materials €6** (**all variable**),
  - **direct manufacturing labour €2** (**€0.50** of which is **variable**),
  - **manufacturing overhead €4** (**€1** of which is **variable**).
- The **marketing costs per unit** are **€7** (**€5** of which is **variable**).
- Huber GmbH has **no R&D costs** or **product-design costs**.
- **Marketing costs** include **distribution costs** and **customer-service costs**.

One-off special orders

Example Huber GmbH:

- **Exhibit 10.3** presents data in an **absorption-costing format**: **fixed manufacturing costs are included** as **product costs**.
- The **manufacturing cost per unit is €12** (€7.50 of which is variable and €4.50 of which is fixed), which is above the €11 price offered by the hotel chain.
- **Using the €12 absorption cost** as a guide in decision making, a **manager might reject the offer**.

One-off special orders

Exhibit 10.3 Budgeted income statement for August, absorption-costing format for Huber GmbH

	Total	Per unit
Sales (30 000 towels × €20)	€600 000	€20
Cost of goods sold	360 000	12
Gross margin (gross profit)	240 000	8
Marketing costs	210 000	7
Operating profit	€30 000	€1

One-off special orders

Example Huber GmbH:

- A **luxury hotel chain offers** to **buy 5,000 towels per month** at **€11 a towel** for each of the **next three months**.
- **No subsequent sales** to this **customer** are **anticipated**.
- **No marketing costs** will be **necessary** for the **5,000-unit one-off special order**.
- The **acceptance** of this **special order** is **not expected** to **affect** the **selling price** or the **quantity of towels sold** to **regular customers**.

Question: Should Huber GmbH accept the hotel chain’s offer?

One-off special orders

Example Huber GmbH:

- **Exhibit 10.4** presents data in a **contribution income statement format**.
- The **relevant costs** are the **expected future costs** that **differ between the alternatives** - the **variable manufacturing costs** of **€37,500** (i.e., €7.50 per unit x 5,000 units).
- The **fixed manufacturing costs** and **all marketing costs** (including variable marketing costs) are **irrelevant** in this case; **they will not change** in total **whether or not** the special order is **accepted**.
- Therefore, the **only relevant items** here are **sales revenues** and **variable manufacturing costs**.

One-off special orders

Exhibit 10.4 Comparative income statements for August, contribution income statement format for Huber GmbH

	Without one-off special order, 30 000 units		With one-off special order, 35 000 units	Difference, 5000 units
	Per unit	Total	Total	Total
Sales	€20.00	€600 000	€655 000	€55 000‡
Variable costs				
Manufacturing	7.50*	225 000	262 500	37 500§
Marketing	5.00	150 000	150 000	– ‖
Total variable costs	12.50	375 000	412 500	37 500
Contribution margin	7.50	225 000	242 500	€17 500

(continued)

One-off special orders

Exhibit 10.4 continued

	Without one-off special order, 30 000 units		With one-off special order, 35 000 units	Difference, 5000 units
	Per unit	Total	Total	Total
Fixed costs				
Manufacturing	4.50†	135 000	135 000	–#
Marketing	2.00	60 000	60 000	–#
Total fixed costs	6.50	195 000	195 000	–
Operating profit	€1.00	€30 000	€47 500	€17 500

* Variable manufacturing costs = direct materials, €6 + direct manufacturing labour, €0.50 + manufacturing overhead, €1 = €7.50.
† Fixed manufacturing costs = direct manufacturing labour, €1.50 + manufacturing overhead, €3 = €4.50.
‡ 5000 × €11.00 = €55 000.
§ 5000 × €7.50 = €37 500.
‖ No variable marketing costs would be incurred for the 5000-unit one-off special order.
Fixed manufacturing costs and fixed marketing costs are also unaffected by the special order.

One-off special orders

Example Huber GmbH:

- Given the **€11 relevant revenue per unit** (the special order price) and the **€7.50 relevant costs per unit**, Huber would **gain an additional €17,500** (i.e., (€11.00 - €7.50) x 5,000) in **operating profit per month** by **accepting the special order**.
- In this example, **comparisons** based on either **total amounts** or **relevant amounts** (Exhibit 10.4) **avoid** the **misleading implication** of the **absorption cost per unit** (Exhibit 10.3).

One-off special orders

Example Huber GmbH:

- The **additional costs** of **€7.50 per unit** that Huber will incur if it **accepts the special order for 5,000 towels** are sometimes called **incremental costs**.
- **Incremental costs** are **additional costs** to **obtain** an **additional quantity,** over and **above existing or planned quantities**, of a cost object.
- **Huber** could **avoid** these **costs** if it did **not accept** the **special order**.
- Huber incurs **no incremental fixed manufacturing costs** if it **accepts** the **special order**; those **costs will not change** whether or not the special order is accepted.
- **Fixed manufacturing costs** do **not change** because the analysis in Exhibit 10.4 assumes that the **5,000-towel special order** will use **already acquired capacity** that will **otherwise remain idle** for each of the next three months.

One-off special orders

Example Huber GmbH:

- The **assumption** of **no long-run or strategic implications** is **crucial** in the analysis we present for the one-off special order decision.
- Suppose, for example, that **Huber** is **concerned** that the **retail department stores** (its regular customers) will **demand** a **lower price** if it **sells towels at €11 each** to the **luxury hotel chain**.
- In this case, the **analysis** of the **luxury hotel chain order** must be **modified** to **consider both the short-term benefits** from **accepting** the order and the **long-term consequences** on **Huber's business and profitability**.

Potential problems in relevant-cost analysis

Potential problems in relevant-cost analysis

Example Huber GmbH:

- It is **important** in relevant-cost analysis **not to assume** that **all variable costs are relevant**.
- In the **Huber GmbH** example, the **marketing costs of €5 per unit** are **variable** but **not relevant** because for the **special-order decision**, Huber incurs **no extra marketing costs**.
- Similarly, it is important **not to assume** that **all fixed costs** are **irrelevant**.
- Consider **fixed manufacturing costs**.
- In our example, we **assume** that the **extra production** of 5,000 towels per month **does not affect fixed manufacturing costs**.
- That is, we **assume** that the **relevant range** is at least **between 30,000 and 35,000 towels per month**.
- **In some cases,** however, the **extra 5,000 towels** might **increase fixed manufacturing costs.**

Potential problems in relevant-cost analysis

Example Huber GmbH:

- **Assume** that Huber would have to **run three shifts** of **16,000 towels per shift** to achieve **full capacity of 48,000 towels per month**.
- **Increasing** the **monthly production** from **30,000 to 35,000** would require a **partial third shift** because **two shifts** alone could **produce only 32,000 towels**.
- This **extra shift** would probably **increase fixed manufacturing costs**, **thereby** making any partial **additional fixed manufacturing costs relevant** for this **decision**.
- The best way to avoid these problems is to **require each item** included in the analysis both
  - (1) to be an **expected future revenue** or **cost**.
  - (2) to **differ among the alternatives**.

Potential problems in relevant-cost analysis

Example Huber GmbH:

- Note also that **unit-cost data mislead decision makers** in **two major ways**:
  - (a) when costs that are **irrelevant** to a **particular decision** are included in unit costs.
  - (b) when unit costs that are calculated at **different output levels** are used to **choose among alternatives**.
- Unitised fixed costs are often **erroneously interpreted** as if they **behave** like **unit variable costs**.
- Generally, **use total costs** rather than unit costs in **relevant-cost analysis**.

An illustration of relevance: choosing output levels

Outsourcing and idle facilities

Example Brumaire SA:

- **Decisions** about whether a producer of goods or services will **insource** or **outsource** are also called **make-or-buy decisions**.
- Often **qualitative factors dictate** management's **make-or-buy decision**.
- In the Brumaire SA example described here, **assume that financial factors predominate** in the **make-or-buy decision**.
- The question we address is: **What financial factors are relevant?**
- **Brumaire SA** manufactures **thermostats** for **home** and **industrial use**.
- **Thermostats** consist of **relays, switches and valves**.
- **Brumaire makes** its own **switches**.

Outsourcing and idle facilities

Example Brumaire SA:

- Columns 1 and 2 of **Exhibit 10.5** report the **current costs for its heavy-duty switch (HDS)** based on an analysis of its various manufacturing activities.
- Materials handling and set-up activities occur each time a batch of HDS is made.
- Brumaire produces the 10,000 units of HDS in 25 batches of 400 units each.
- The cost driver is the number of batches.
- Total materials handling and set-up consist of fixed costs of €5,000 plus variable costs of €500 per batch, amounting to €5,000 + 25 x €500 = €17,500.
- Brumaire only commences production after it receives a firm customer order.
- Brumaire's customers are pressuring the company to supply thermostats in smaller batch sizes.

Outsourcing and idle facilities

Example Brumaire SA:

- Brumaire anticipates that next year, the 10,000 units of HDS will be manufactured in 50 batches of 200 units each.
- Through continuous improvement, Brumaire expects to reduce variable costs per batch for materials handling and set-up costs to €300 per batch.
- No other changes in fixed costs or unit variable costs are anticipated.

Outsourcing and idle facilities

Exhibit 10.5 Financial data for HDS manufacturing at Brumaire SA

	Total current costs of producing 10 000 units (1)	Current cost per unit (2) = (1) ÷ 10 000	Expected total costs of producing 10 000 units next year (3)	Expected cost per unit (4) = (3) ÷ 10 000
Direct materials	€80 000	€8.00	€80 000	€8
Direct manufacturing labour	10 000	1.00	10 000	1
Variable manufacturing overhead costs for power and utilities	40 000	4.00	40 000	4
Mixed overhead costs of materials handling and set-ups	17 500	1.75	20 000	2
Fixed overhead costs of plant depreciation, insurance and administration	30 000	3.00	30 000	3
Total manufacturing costs	€177 500	€17.75	€180 000	€18

Outsourcing and idle facilities

Example Brumaire SA:

- Another manufacturer offers to sell Brumaire 10 000 units of HDS next year for €16 per unit on whatever delivery schedule Brumaire wants.
- **Should Brumaire make or buy the part?**
- Columns 3 and 4 of Exhibit 10.5 indicate the expected total costs and the expected per unit cost of producing 10,000 units of HDS next year.
- Direct materials, direct manufacturing labour, and variable manufacturing overhead costs that vary with units produced are not expected to change since Brumaire plans to continue to produce 10,000 units next year at the same variable costs per unit as this year.
- The costs of materials handling and set-ups are expected to increase even though there is no expected change in the total production quantity because these costs vary with the number of batches started, not the quantity of production.

Outsourcing and idle facilities

Example Brumaire SA:

- Expected total materials handling and set-up costs = €5,000 + 50 batches x the cost per batch of €300 = €5,000 + €15,000 = €20,000.
- Brumaire expects fixed overhead costs to remain the same. The expected manufacturing cost per unit equals €18.
- At this cost, it seems that the company should buy HDS from the outside supplier because making the part appears to be more costly than the €16 per unit to buy it.
- A make-or-buy decision, however, is rarely obvious.
- A key question for management is: What is the difference in relevant costs between the alternatives?

Outsourcing and idle facilities

Example Brumaire SA:

- For the moment, suppose the capacity now used to make HDS will become idle if HDS is purchased and that the €30,000 of fixed manufacturing overhead will continue to be incurred next year, regardless of the decision made.
- Assume that the €5,000 in fixed clerical salaries to support set-up, receiving and purchasing will not be incurred if the manufacture of HDS is completely shut down.
- Further suppose that the €30,000 in plant depreciation, insurance and administration costs represents fixed manufacturing overhead that will not vary regardless of the decision made.
- **Exhibit 10.6** presents the relevant cost calculations.

Outsourcing and idle facilities

Exhibit 10.6 Relevant (incremental) items for make-or-buy decision for HDS at Brumaire SA

	Total relevant costs		Per unit relevant costs	
Relevant items	**Make**	**Buy**	**Make**	**Buy**
Outside purchase of parts		€160 000		€16
Direct materials	€80 000		€8	
Direct manufacturing labour	10 000		1	
Variable manufacturing overhead and set-up overhead*	40 000		4	
Mixed materials handling	20 000		2	
Total relevant costs	€150 000	€160 000	€15	€16
Difference in favour of making HDS		€10 000		€1

* Alternatively, the €30 000 of depreciation, plant insurance and plant administration costs could be included under both alternatives. These are, however, irrelevant to the decision.

Outsourcing and idle facilities

Example Brumaire SA:

- Brumaire saves €10,000 by making HDS rather than buying it from the outside supplier. Alternatively stated, purchasing HDS costs €160,000 but saves only €150,000 in manufacturing costs.
- Making HDS is thus the preferred alternative.
- Exhibit 10.6 excludes the €30,000 of plant depreciation, insurance and administration costs under both the make and the buy alternatives because these costs are irrelevant; they do not differ between the two alternatives.

Outsourcing and idle facilities

Example Brumaire SA:

- Alternatively, the €30,000 could be included under both alternatives since the €30,000 will continue to be incurred whether HDS is bought or made.
- Exhibit 10.6 includes the €20,000 of materials handling and set-up costs under the make alternative but not under the buy alternative because buying HDS and not having to manufacture it saves both the variable costs per batch and the avoidable fixed costs.
- The €20,000 of costs differ between the alternatives and hence are relevant to the make-or-buy decision.

Outsourcing and idle facilities

Example Brumaire SA:

- For the moment, suppose the capacity now used to make HDS will become idle if HDS is purchased and that the €30,000 of fixed manufacturing overhead will continue to be incurred next year, regardless of the decision made.
- Assume that the €5,000 in fixed clerical salaries to support set-up, receiving and purchasing will not be incurred if the manufacture of HDS is completely shut down.
- Further suppose that the €30,000 in plant depreciation, insurance and administration costs represents fixed manufacturing overhead that will not vary regardless of the decision made.
- Exhibit 10.6 presents the relevant cost calculations.

Outsourcing and idle facilities

Example Brumaire SA:

- Brumaire saves €10,000 by making HDS rather than buying it from the outside supplier. Alternatively stated, purchasing HDS costs €160,000 but saves only €150,000 in manufacturing costs.
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- Alternatively, the €30,000 could be included under both alternatives since the €30 000 will continue to be incurred whether HDS is bought or made.

Outsourcing and idle facilities

Example Brumaire SA:

- Exhibit 10.6 includes the €20,000 of materials handling and set-up costs under the make alternative but not under the buy alternative because buying HDS and not having to manufacture it saves both the variable costs per batch and the avoidable fixed costs.
- The €20,000 of costs differ between the alternatives and hence are relevant to the make-or-buy decision.

Outsourcing and idle facilities

Example Brumaire SA:

- In Exhibit 10.6, the incremental cost of making HDS is the additional cost of €150,000.
- Likewise, the incremental cost of buying HDS from an outside supplier is the additional cost of €160,000.
- The differential cost between making and buying HDS is €10,000.
- Note that, in practice, incremental and differential costs are often used interchangeably.
- The figures in **Exhibit 10.6** are valid only if the released facilities remain idle.
- If the component part is bought from the outside supplier, the released facilities can potentially be used for other, more profitable purposes.
- More generally, then, the choice in our example is not fundamentally whether to make or buy, it is how best to use available facilities.

Outsourcing and idle facilities

Example Beijing Engineering:

- The **use** of **otherwise idle resources** can often **increase profitability**.
- For example, consider the **machine-repair plant** of **Beijing Engineering**, where the **decision** was whether to **drop** or **keep a product**.
- The plant kept **producing electric plaster-spraying machines** even though the **unit cost exceeded** the **selling price**.
- Based on cost calculations, **each sprayer cost 1230 yuan** to make but **sold for only 985 yuan**, resulting in a **loss of 245 yuan per sprayer**.
- Still, to **meet market demand**, the plant **continued to produce sprayers**.

Outsourcing and idle facilities

Example Beijing Engineering:

- **Workers and machines** would **otherwise be idle**, and the plant would still have to **pay 759 yuan even if no sprayers were made**.
- **In the short run**, the **production of sprayers**, even at a loss, actually **helps cut the company's operating loss**.
- With the **Beijing Engineering** illustration there is also the notion that **fixed costs can be high** and lead to losses but they **have to be incurred to enable scale**.
- Once **over** a **critical production point**, **unit costs go down** such that **total unit costs fall below selling prices** and **profits follow**.
- Depending on **future expectations**, **sustaining losses** for a time can be justified if it is thought that **profitability will follow**.

Opportunity costs, outsourcing and capacity constraints

Example Brumaire SA:

- **Reconsider** the **Brumaire SA example** where we assumed that the **capacity currently used to make HDS became idle** if the parts were purchased.
- Suppose instead that Brumaire has **alternative uses** for the **extra capacity**.
- The **best available alternative** is for Brumaire to **use the capacity** to **produce 5000 unit**s each year of a **regular switch** (RS) that **Ventôse SA wants**.

Opportunity costs, outsourcing and capacity constraints

Example Brumaire SA:

- Charlotte de Calonne, the accountant at Brumaire, **estimates the following future revenues and future costs if RS is manufactured and sold**:

Expected additional future revenues		€80,000
Expected additional future costs		
Direct materials	€30,000	
Direct manufacturing labour	€5,000	
Variable overhead (power, utilities)	€15,000	
Materials handling and set-up overheads	€5,000	
Total expected additional future costs		€55,000
Expected additional operating profit		€25,000

Opportunity costs, outsourcing and capacity constraints

Example Brumaire SA:

- Since Brumaire **cannot make both HDS and RS**, the **three alternatives available** to management are as follows:
  1. Make HDS and do not make RS for Ventôse.
  2. Buy HDS and do not make RS for Ventôse.
  3. Buy HDS and use excess capacity to make and sell RS to Ventôse.
- **Exhibit 10.7**, Panel A, summarises the **"total-alternatives"** approach - the **incremental expected future costs** and **expected future revenues** for **all alternatives**.
- **Buying HDS** and **using the excess capacity** to **make RS** and **sell it to Ventôse** is the **preferred alternative**.

Opportunity costs, outsourcing and capacity constraints

Example Brumaire SA:

- The **incremental costs** of **buying HDS** from an **outside supplier** are **more than the incremental costs** of **making HDS in-house** (€160,000 to buy versus €150,000 to make).
- But the **capacity freed up by buying HDS** from the outside supplier **enables Brumaire to gain €25,000 in operating profit** (expected additional future revenues of €80,000 minus expected additional future costs of €55,000) by making RS and selling to Ventôse.
- The **total relevant costs** of buying HDS (and making and selling RS) are €160,000 - €25,000 = **€135,000**.

Opportunity costs, outsourcing and capacity constraints

Exhibit 10.7 Total-alternatives approach and opportunity-costs approach to make-or-buy decisions for Brumaire

Panel A: Total-alternatives approach to make-or-buy decisions

	Choices for Brumaire		
Relevant items	**Make HDS and do not make RS**	**Buy HDS and do not make RS**	**Buy HDS and make RS**
Total incremental costs of making/buying HDS (from Exhibit 10.6)	€150 000	€160 000	€160 000
Excess of future revenues over future costs from RS	0	0	(25 000)
Total relevant costs	€150 000	€160 000	€135 000

Panel B: Opportunity-costs approach to make-or-buy decisions

	Choices for Brumaire	
Relevant items	**Make HDS**	**Buy HDS**
Total incremental costs of making/buying HDS (from Exhibit 10.6)	€150 000	€160 000
Opportunity cost: Profit contribution forgone because capacity cannot be used to make RS, the next-best alternative	25 000	0
Total relevant costs	€175 000	€160 000
Difference in favour of buying HDS	€15 000	

Opportunity costs, outsourcing and capacity constraints

Example Brumaire SA:

- Deciding to use a resource in a particular way **causes a manager to give up** the opportunity **to use the resource in alternative ways**.
- The **lost opportunity** is a **cost** that the **manager must take into account** when making a decision.
- **Opportunity cost** is the **contribution to income** that is **forgone (rejected)** by **not using a limited resource** in its **next-best alternative use**.
- **Exhibit 10.7**, Panel B, displays the **opportunity-costs approach** for **analysing the alternatives faced** by Brumaire.
- **Management focuses** on the **two alternatives before it**: whether to **make or buy HDS**.
- It **does not explicitly include RS** in the analysis.

Opportunity costs, outsourcing and capacity constraints

Example Brumaire SA:

- Focus first on the make HDS column and ask what are all the costs of choosing this alternative?
- Certainly, Brumaire incurs €150,000 of incremental costs to make HDS. But is this the entire cost? No, because by using limited manufacturing resources to make HDS, Brumaire gives up the opportunity to earn €25,000 from not using these resources to make RS.
- Therefore, the relevant costs of making HDS are the incremental costs of €150,000 plus the opportunity cost of €25,000.

Opportunity costs, outsourcing and capacity constraints

Example Brumaire SA:

- Next consider the buy alternative.
- The incremental costs are €160,000.
- The opportunity cost is zero because choosing this alternative does not require the use of a limited resource - Brumaire's manufacturing capacity is still available to make and sell RS. Panel B leads management to the same conclusion as Panel A does - buying HDS is the preferred alternative by an amount of €15,000.