13 Manufacturing and services

A Industry

Industry (uncountable) is the production of materials and goods. The related adjective is **industrial**. **An industry** (countable) is a particular type of business activity, not necessarily production.

B Manufacturing ... and services

Manufacturing ...

Here are some of the **manufacturing industries** that make up the **manufacturing sector**:

aerospace	planes and space vehicles
cars (BrE) automobiles (AmE)	cars
computer hardware	computers, printers, etc.
construction	buildings
defence (BrE) defense (AmE)	arms, weapons
food processing	canned, frozen foods, etc.
household goods	washing machines, refrigerators, etc.
pharmaceuticals	medicines
steel	a stronger, more useful metal than iron
textiles	cloth and clothes

... and services

Here are some of the **services** or **service industries** that make up the **service sector**:

catering	restaurants, bars, etc.
computer software	programs for computers
financial services	banking, insurance, etc.
healthcare	medical care
leisure	sport, theme parks, etc.
media	books, newspapers, film, television
property (BrE) real estate (AmE)	buying, selling and managing buildings
retail	shops
telecommunications	phone, Internet services
tourism	travel and holidays

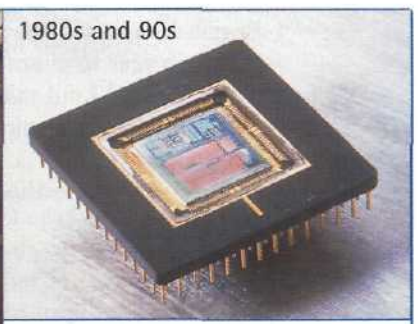
Note: You use all these words in front of 'industry' to talk about particular industries, but you usually drop the 's' from 'cars', 'automobiles', 'pharmaceuticals' and 'textiles': 'the automobile industry'.

C Countries and their industries

Here is how industry has developed in South Korea:

In 1950, South Korea was a poor country, with most people living and working on the land. The government decided to **industrialize**, and the new **emerging industries** were textiles, and **heavy industries** like steel and shipbuilding.

Then South Korea turned more and more to **light industries** like electronics, making electrical goods such as televisions cheaply. It also started producing cars.

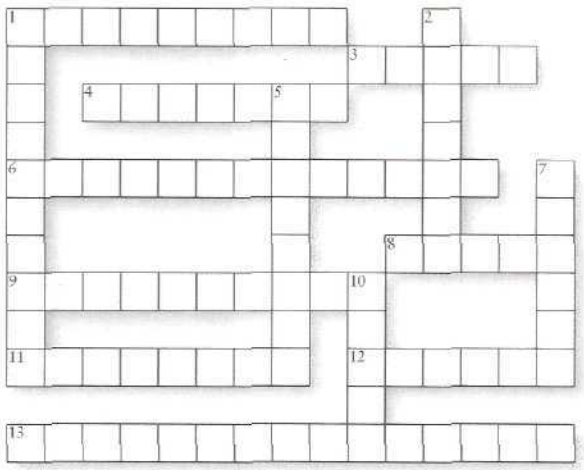


South Korea moved into specialized electronics in the 80s. This was the one of the **growth industries** of the 1990s: making specialized parts for computers and telecommunications equipment.

13.1 Companies in particular industries need to avoid particular problems. Match each problem to one of the industries in B opposite.

1 Buying a new building and being unable to find people to rent it.
2 Causing public anger by building mobile phone masts in beautiful countryside.
3 Making vehicles whose tyres burst at high speed.
4 Holidaymakers arriving to find that their hotel is not finished.
5 Lending to someone who cannot repay the loan.
6 Selling weapons to governments that people do not approve of.
7 Buying players who do not score goals.
8 Making drugs that poor countries cannot afford.
9 Rejecting a book that is then brought out by another publisher and sells 30 million copies.
10 Removing the wrong leg in an operation.

13.2 Use words from A, B and C opposite to complete the crossword.



Across

1 Plane and rocket industry. (9)
3 Metal industry. (5)
4 Any industry that doesn't sell goods. (7)
6 Making things. (13)
8 Television, music, the Internet. (5)
9 Related to industry or industries. (10)
11 Describing a new industry. (8)
12 Describing an industry that is getting bigger. (6)
13 Making drugs. (15)

Down

1 Making cars in the US: the ..... industry. (10)
2 Making arms (BrE). (7)
5 Serving food and drink, rather than making them. (8)
7 Keeping people well: ..... care. (6)
10 Making televisions rather than steel: ..... industry. (5)

Over to you

Is your organization, or one you would like to work for, in manufacturing or services or a combination of both?

Where are industries in your country based? Are companies in different industries grouped in different areas?

14 The development process

A Market research

The **original concept** is the basic idea for something.

In designing products and services, **market research** – finding out what people want – is of course very important. This may involve **questionnaires** or **surveys**, with questions about what people buy and why, perhaps with interviews in the street or by telephone.

There may be **consumer panels** and **focus groups**, where ordinary people meet to discuss product ideas informally.

Perhaps the researchers will make **sales forecasts**, estimates of how many products will be sold.

See Unit 21 for more on marketing.

B Development and launch

In software, developers often produce a final test version, the **beta version**, where users are asked to point out **bugs** (problems) before the software is finalized.

Car **designers** use **CADCAM** (**computer-assisted design / computer-assisted manufacturing**) to help develop and make products and test different **prototypes**.

Researchers in **laboratories** may take years to develop new drugs, **testing** or **trialling** them in **trials** to show not only that they are **effective**, but also that they are **safe**. Drugs need to be made on an **industrial scale** before they can be sold.

Rollout is the process of making a product available, perhaps in particular places, to test reaction.

Product launch is the moment when the product is officially made available for sale. This is the 'big moment'.

If a **design defect** or **design fault** is found in a product after it has been launched, the company may have to **recall** it, asking those who have bought it to return it, perhaps so that the defect can be corrected.

14.1 Three people are talking about their work in product development. Correct the mistakes in italics, using expressions from A and B opposite.

1

(a) *Market researches showed* there was a real need for this service, but before offering it, we had to test it in a (b) *beta copy* with small groups of users over several months to eliminate all the bugs. Even so, (c) *after lunch*, some users said they could get into other people's accounts!

2

The more you eat, the thinner you get, and (d) *the focal groups* said they liked the taste, but first we had to prove to the authorities that it was (e) *secure*. Another problem was making it on an (f) *industrial level*: at first we could only make it in small quantities in the laboratory, but making it in bigger quantities was impossible.

3

At our research centre in Toulouse in France, the (g) *designators* develop the prototypes. People think that my job is dangerous, but there is so much (h) *tasting* on computer first, that all the danger has been eliminated by the time we use the product. (i) *CADCAR* means that the process of design and manufacture is much quicker than before.

14.2 Complete this talk by a marketing specialist using words from A and B opposite.

A few years ago a famous car company launched a new car, based on a completely new (1) ..... . They'd done years of technical research and (2) ..... research with focus (3) ..... and (4) ..... panels and analysis of responses to questionnaires and (5) ..... . Then came the (6) ..... . Sales of the car were very good until a Swedish newspaper reported the results of its 'elk test'. They found that the car had a tendency to tip over if you turned quickly to avoid an elk. This was due to a (7) ..... fault in the car, so they had to (8) ..... all the cars they'd sold in order to correct it.

Over to you

What sort of market research does your company, or one you would like to work for, do? Have you ever taken part in market research as a consumer?

15 Innovation and invention

A Innovation and invention

Verb	Noun: concept (uncountable)	Noun: thing (countable)	Noun: person
design: to make plans or drawings for how something is to be made	design	a design	a designer
develop: to make a new idea successful, for example by making or improvinga product	development	a development	a developer
innovate: to think of new ideas, methods, products, etc.	innovation	an innovation	an innovator
invent: to design and make something for the first time	invention	an invention	an inventor
–	**technology**: the practical or industrial use of scientific discoveries	a technology	a technologist

countable = you can say *a/an*; uncountable = you can't say *a/an*

B Research and technology

Hi, I'm Ray and I'm head of **product development** at Lightning Technologies. Lightning makes semiconductors, the components at the heart of every computer. I'm in charge of **research and development** (R&D) at our **research centre** just outside Boston. Our **laboratories** are some of the most **innovative** in the computer industry, and we have made many new discoveries and **breakthroughs**.

I love **technology**, using scientific **knowledge** for practical purposes. The **technology** of semiconductors is fascinating. We are at the **cutting edge** or **leading edge** of semiconductor technology: none of our competitors has better products than us. Everything we do is **state-of-the-art**, using the most advanced techniques available.

Of course, the **hi-tech** products of today become the **low-tech** products of tomorrow. Products that are no longer up-to-date because they use old technology are **obsolete**. It's my job to make sure that Lightning's products never get into that situation.

BrE: research centre
AmE: research center

C Patents and intellectual property

Information or knowledge that belongs to an individual or company is **proprietary**. A product developed using such information may be protected in law by **patents** so that others cannot copy its design.

	Noun	Verb
BrE:	a licence	to license
AmE:	a license	to license

Other companies may pay to use the design **under licence** in their own products. These payments are **royalties**.

In publishing, if a text, picture, etc. is **copyright**, it cannot be used by others without permission. Payments to the author from the publisher are **royalties**.

The area of law relating to patents and copyright is **intellectual property**.

15.1 Choose the correct forms to complete these sentences containing words from A opposite.

1 White came up with (a design/design) that combined lightness and warmth.
2 There's an exhibition on architecture and (the design/design) at the Museum of Modern Art.
3 McGrew is vice president of (a development/development) and product planning.
4 The FDA has approved (a development/development) for treating tooth disease, a new laser machine.
5 Electric light was (an invention/invention) which enabled people to stay up later.
6 Sometimes (an invention/invention) is so obvious that it is hard to believe nobody thought of it before.
7 Channel Four has always encouraged experimentation and (an innovation/innovation) in its films.
8 He discovered (an innovation/innovation) that has enabled him to build guitars more efficiently.

15.2 Complete this presentation using words from B opposite. Put the words in brackets into their correct form.

Hi, I'm Raj (1) ..... I'm head (2) ..... product (3 develop) ..... at (4) ..... Indian Rice Research Centre. I'm in charge of research (5) ..... development (6) ..... our (7 researching) ..... centre in Delhi. Our (8 laboratory) ..... are (9) ..... of the most (10 innovation) ..... (11) ..... agriculture. We have recently (12) ..... some big (13 breakthrough) ..... in increasing rice production.

I love (14 technological) ....., using scientific knowledge (15) ..... improve people's lives. (16) ..... technology (17) ..... rice development (18) ..... a good example (19) ..... this.

We are at the (20) ..... edge of rice-growing techniques. Everything we do (21) ..... state-of-the-art, using the most advanced biological (22 know) ..... available.

15.3 Match the expressions (1–6) from C opposite with their meanings (a–f).

1 copyright infringement
2 intellectual property
3 patent application
4 proprietary information
5 royalty payment
6 licensing agreement

a a payment to the owner of a design, or to an author
b an arrangement between the owner of a design and someone else, allowing them to use the design for money
c when someone uses another's text, pictures, etc. without permission
d when an inventor asks the authorities to officially recognize an invention as his/her property
e designs, ideas, etc. that belong to someone
f the law relating to designs, ideas, etc. that belong to someone

Over to you

For you, which is the most important invention of the last 100 years? Which one do you wish had not been invented?

16 Making things

A Products

A **product** can be:

- something natural.
- something made to be sold.
- a service.

Produce refers to agricultural products such as crops or fruit.
For example, you can buy fresh produce at a farmers' market

Something that is made is **produced** or **manufactured**.

A country or company that produces something is a **producer** of it.

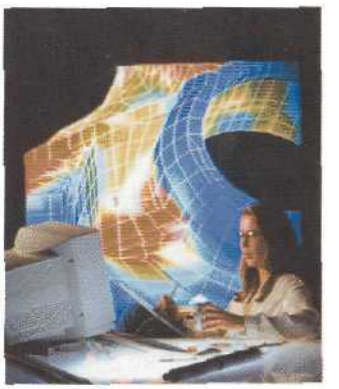
A company that manufactures something is a **maker** or **manufacturer** of **manufactured goods**.

B Mass production

'I'm Steve and I'm head of car production at a **manufacturing plant**. 'Plant' sounds more modern than **factory** or **works**. On the **assembly line** we **mass-produce** cars. The plant is highly **automated**: we use a lot of machinery. These machines are expensive to buy but very **cost-effective** – we don't have to pay them wages! We use **industrial robots**. These robots are part of the CADCAM system of computer-assisted design and manufacturing.'

BrE: **labour-intensive**
AmE: **labor-intensive**

'My name's Luke. I have a little **workshop** where I produce furniture ordered by individual customers. We don't use machinery: the furniture is **hand-made**. Producing furniture like this is a **craft industry**. It's very **labour-intensive**: it takes a lot of work to produce each piece. Many people dislike the furniture that big companies **churn out** in large numbers on their **production lines**, so we have a lot of customers.'



CADCAM system

Craft industry

C Capacity and output

Output is the number or type of things that a plant, company, industry or country produces. **Productivity** is a measure of how much is produced in relation to the number of employees. High output per employee = high productivity.

The maximum amount that a particular plant, company or industry can produce is its **capacity**. If it is producing this amount, it is **working at full capacity**. If it is producing more than what is needed, there is **overproduction** or:

- **excess capacity**
- **overcapacity**
- **spare capacity**
- **surplus capacity**

These expressions can also be used in service industries.

If far too many things are produced, there is a **glut** of these things. If not enough goods are being produced, there is a **shortage**.

16.1 Complete this table with words from A opposite.

Verb	Noun: person/organization	Noun: process	Noun: thing
make	maker	×	×
		manufacturing	
produce: non-food		production	
produce: food		production	

16.2 Rearrange these lines to make a text containing words from B and C opposite.

1 work. Of course, we still have a lot of assembly
2 plant producing TVs in Singapore. We have two production
3 My name's George Chen, and I'm director of a manufacturing
4 lines working 24 hours a day. We use CAD
5 line workers, so it's still quite labour-
6 intensive. But with the help of computer-
7 CAM, and robots do some assembly
8 assisted design and automation, productivity is increasing.

16.3 Match the headlines (1–7) to the extracts they relate to (a–g).

1 FOOD SHORTAGES HIT EASTERN AFRICA

2 AIRLINE REPORTS BIG PRODUCTIVITY RISE

3 TOO MUCH BUILDING LEADS TO GLUT OF OFFICE SPACE

4 LOCAL PLANT AT FULL CAPACITY

5 FALL IN STUDENT NUMBERS LEADS TO EDUCATION OVERCAPACITY

6 OIL OVERPRODUCTION LEADS TO PRICE FALL

7 NATIONAL OUTPUT AT ALL-TIME HIGH

a ... Overall production in the country rose by five per cent last year ...
b ... Rainfall has been below average in this part of Africa for the past five years. Not enough food has been grown ...
c ... Too much oil has been produced recently in relation to world demand ...
d ... There have never been so few people aged between 17 and 21 since 1950. The result: too many places at private colleges and universities ...
e ... The plant's capacity is 3,000 computers a week, and it's producing 3,000 ...
f ... Northern is running more flights with fewer pilots and staff. That was the message from Northern's CEO Frank Delaney to shareholders yesterday ...
g ... There has been too much building in the city centre, and now there is a lot of office space standing empty ...

Over to you

Are hand-made goods necessarily better than factory-made ones? What about cars, clothes, computers and shoes?

17 Materials and suppliers

A Inputs

Dryden makes vacuum cleaners. It takes **raw materials** like steel and plastic and makes some of the **components** or **parts** used in its products. Other components are made by other companies.

Materials and parts are just some of the inputs. The others are **labour** (workers and managers) and **capital** (money). **Knowledge** is also important because Dryden is a leader in vacuum technology.

Vacuum cleaners that are being made are **work-in-progress**. At any one time, Dryden has **goods** worth millions of dollars in its factories and warehouses: the products that have been made – its **finished goods** – and materials and components.

Quantities of raw materials, components, work-in-progress and finished goods in a particular place are **stocks**.

Work-in-progress

BrE: work-in-progress; AmE: work-in-process
BrE: stocks; AmE: inventories

Note: **Goods** is rarely used in the singular.

B Suppliers and outsourcing

Dryden receives materials and components from about 20 companies, its **suppliers** or **partners**.

The company is doing more **subcontracting**: using **outside suppliers** to provide components and services. In other words, it is **outsourcing** more, using outside suppliers for goods or services that were previously supplied **in-house**: within the company.

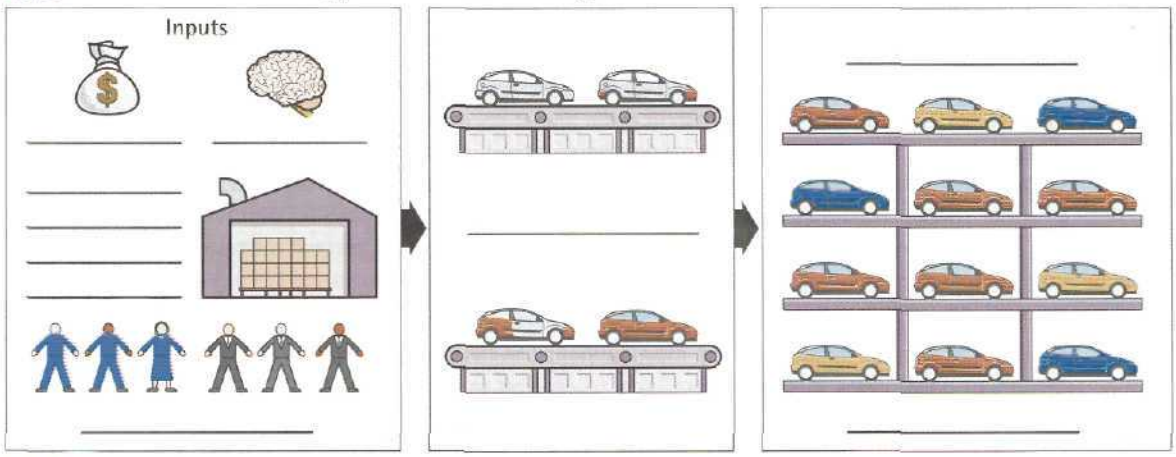
C Just-in-time

Of course, it costs money to keep components and goods **in stock**: stocks have to be **financed** (paid for), **stored** (perhaps in special buildings: **warehouses**) and **handled** (moved from one place to another). So Dryden is asking its suppliers to provide components **just-in-time**, as and when they are needed.

This is part of **lean production** or **lean manufacturing**, making things **efficiently**: doing things as quickly and cheaply as possible, without waste.

A warehouse

17.1 Use words from A opposite to label the diagram.



17.2 Match the sentence beginnings (1–4) with the correct endings (a–d).
The sentences all contain words from B opposite.

1	Computer manufacturer XL is cutting back on in-	a	contractors' maintenance work is worrying train operating companies.
2	The poor standard of some sub	b	suppliers are causing delays in production, the Azco group claims.
3	Retail giant Sharks Ltd have decided to out	c	house production work in a bid to reduce costs and increase efficiency.
4	Late deliveries from outside	d	source canteen and cleaning services, to focus better on its buying and selling activities.

17.3 Replace the words in speech bubbles with the correct forms of words from C opposite.

1 Let's get the materials in *only when we need them* to keep costs down.
2 It's difficult to find the right *special buildings* to put our finished goods in.
3 You'll have to decide well in advance how *to pay* for all this.
4 It's very important that we *keep* these components at the right temperature.
5 There must be a *quicker and cheaper* method than this!
6 They want to introduce a system of *making things efficiently.*

Over to you

What are the advantages and disadvantages of: outsourcing?
using outside suppliers?
asking for components 'just in time'?
lean production?

18 Business philosophies

A Total quality management

Tom Dryden, of Dryden Vacuum Cleaners, believes in **quality**: 'The **specifications** or **specs** of a product are exact instructions about its design, including its **dimensions** (size), how it is to be made, the materials to be used, etc. The objective of **quality control** is **conformity** to **specifications**, the idea that the product should be made exactly as it was intended, with **zero defects**: no faults at all. Things should be done **right first time** so we don't have to correct mistakes later in a process of **reworking**. We do **spot checks** every few minutes during production to ensure everything is going well.

We have a system of **total quality management** (TQM), including **quality circles**: groups of employees who meet regularly to suggest improvements.'

B Continuous improvement

Ray, at Lightning Technologies: 'We are always making small improvements or **enhancements**; this is **continuous improvement**. We refer to it by its Japanese name: **kaizen**.'

Silvia Chavez, Aerolíneas Latinas: 'We use continuous improvement in our service industry. We look carefully at the overall customer experience. In retailing, they use **mystery shoppers**, who pretend to be shoppers to check service in shops. We use "mystery travellers" to report on the standard of service before, during and after the flight.'

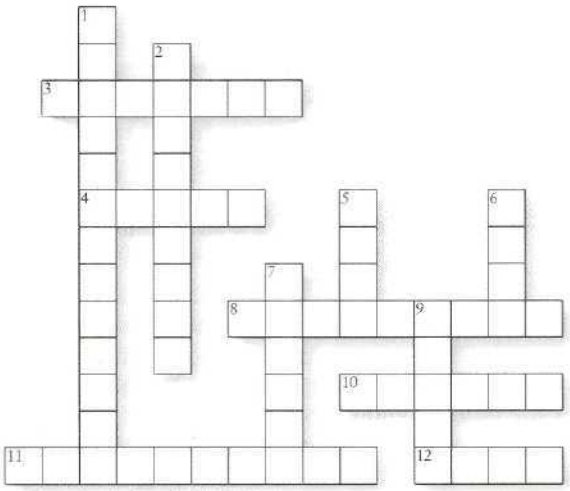
C Benchmarking

Jim, production manager at an electricity power station in the UK: 'We use a system called **benchmarking** to compare our **performance** to other power stations. We've recently been to the US to see how the best power stations operate – **best practice** – and try to copy it. We've managed to halve the number of workers, and increase productivity.'

D Business process re-engineering

Susanna, head of personal banking at an international bank: '**Business process re-engineering**, or **BPR**, applies in service industries as well as in manufacturing. We didn't want to change existing things in small ways. We completely redesigned all our processes in management, administration and customer service. We eliminated three levels of management and installed a completely new computer system. The gains in productivity have been very good.'

18.1 Complete the crossword, using words from A opposite.



Across

3 See 6 down.
4,5 down Right .... (5,4)
8 Could be length, height or width. (9)
11 Total quality ..... . (10)
12,10 Making sure things are alright. (4,6)

Down

1 What the designer decides. (13)
2 Doing it again when you shouldn't have to. (9)
5 See 4 across.
6,3 across No mistakes at all. (4,7)
7 A quality ..... meets to suggest improvements. (6)
9 Short form of 1 down in plural. (5)

18.2 Which expression from B, C or D opposite describes each of these situations? One of the expressions is used twice.

1 A police service reduces the number of forms to fill in when a crime is reported, first from fifteen to twelve, then to ten, then to seven, then to three.
2 A travel company closes all its high street shops, lays off middle managers and half of its sales assistants and retrains the others to sell on the phone. It also starts an Internet service.
3 A telephone company looks at other telephone companies to see which one issues bills with fewest mistakes to customers. It then copies this company's methods to reduce the mistakes in its own bills.
4 Most parcel delivery companies deliver 70 per cent of parcels by 10 am the next day, but one company has an advanced computer system that enables it to achieve an 80 per cent delivery rate.
5 An Internet banking service starts by allowing customers to see how much money they have in their accounts, and the latest transactions in the order they took place. Six months later customers can view the transactions in different orders. Three months later, they can make payments using the Internet service, which they couldn't do before.

Over to you

Do you try to continuously improve your own work? If so, in what ways?

In what ways does your company or the place where you study improve its efficiency? What should it be doing?