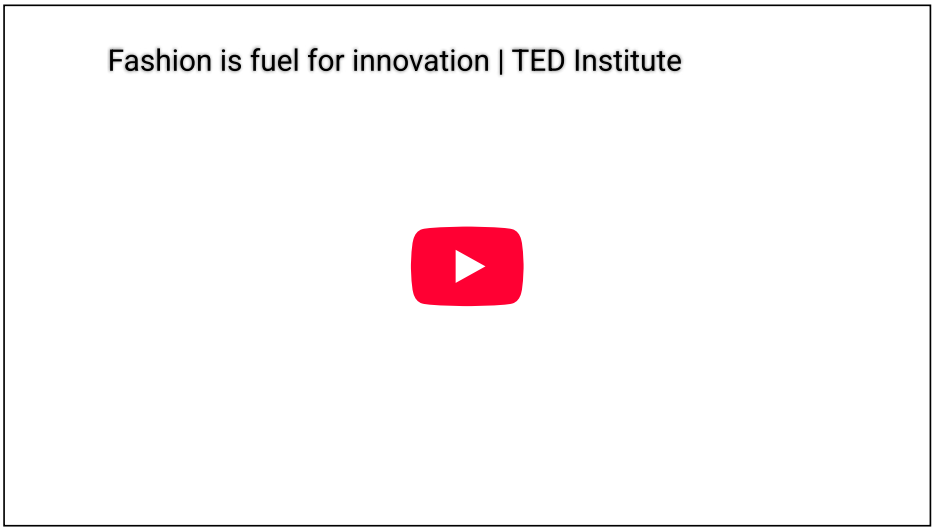
The big picture

The dynamic relationship between social change, innovation, fashion and technology is captured in **Video 1**. The close relationship we have with our clothes is in part due to extensive research and development (R&D) in the fashion industry.



Video 1. The fashion industry as an innovator.

Research and development (R&D) is the process of bringing new products to market. In fast-moving innovative industries such as consumer electronics or fashion, companies continually update their products to create and keep up with trends. This requires high levels of spending.

Overview (/study/app/business-hl/sid-351-cid-762729/o

Fashion houses employ creative designers to come up with new collections, while consumer electronics companies spend millions in technological research to try to stay ahead of their competitors. The goal of this spending is the release of new products with unique selling points that consumers will value.

Section 4.5.1 (/study/app/business-hl/sid-351-cid-762729/book/product-life-cycle-id-39005/) introduced the concept of the product life cycle, which attempts to map out the phases a product will pass through from its launch to its eventual withdrawal from the market. This section will focus in greater detail on the first step of the product life cycle: research and development.

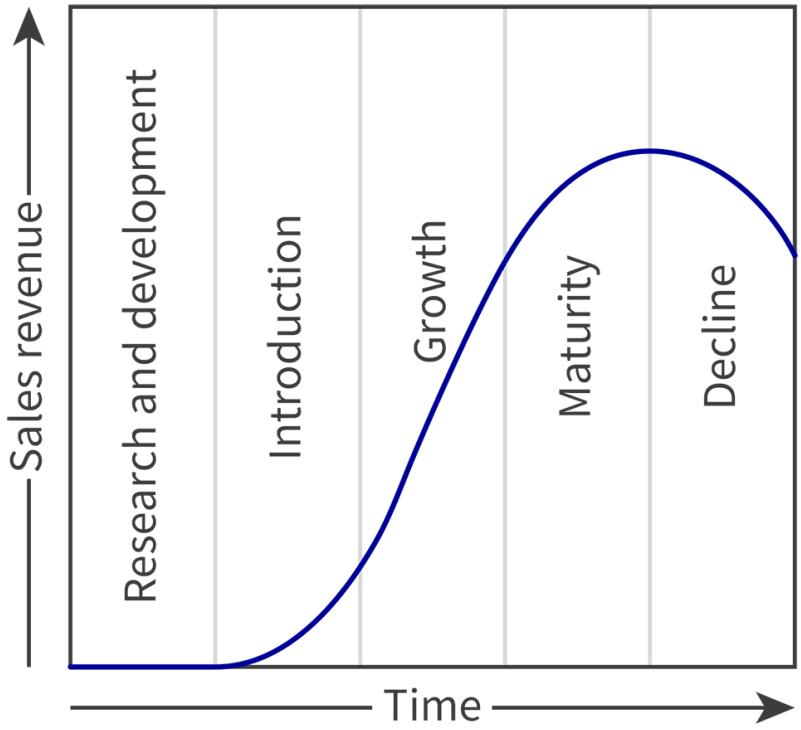


Figure 1. Research and development is a key element of the product life cycle.

More information for figure 1

The image is a flowchart illustrating the phases of a product life cycle with emphasis on the research and development phase. The diagram is structured from left to right, starting with a small initial phase that expands into several larger stages. The stages are labeled sequentially, depicting the progression from research and development to subsequent phases of the product life cycle. The flowchart uses arrows to indicate the direction of the process, highlighting the importance of research and development as a foundational step in the cycle. The design suggests a buildup from the initial stage to more complex phases, emphasizing a progression that is integral to the product's journey from inception to market.

[Generated by AI]

Student view

Overview (/study/app/business-hl/sid-351-cid-762729/o

Not all research and development will be successful. Research can lead to ineffective formulas or new designs that may be rejected by the consumer. Successful companies are aware of these risks and are willing to accept some failures from their research and development teams.

Pharmaceutical companies can make billions by developing new and useful drugs. Moderna, one of the pharmaceutical companies responsible for developing a COVID-19 vaccine, reported making 18 billion USD in revenue and 13 billion USD in profit in 2021. And Pfizer reported generating 31 billion USD in revenue from the production of its vaccine developed in collaboration with Biontech. These profits may seem excessive, but the pharmaceutical industry would argue that such profits are justified by the enormous risks these businesses take in developing new drugs. Before a new drug is launched, it must pass many test phases. These include computer modelling, testing and, finally, human trials. This process can take over 12 years to complete and costs billions of dollars in additional R&D funding.

How many companies can afford to spend this much on possible product failures? Do you think banks are likely to be willing to lend businesses money to invest in research and development when there is no guarantee of success? How can businesses improve their chances of bringing a successful new product to market?

Some critics argue that these pharmaceutical companies are profiteering from the COVID-19 pandemic. They suggest the prices these companies are charging for the much-needed vaccines are high and that the vaccines are mostly being sold to rich countries. Ethical questions could be raised in relation to the practices of the pharmaceutical companies. Yet the vaccines they develop are vitally important.

This subtopic will investigate the process of innovation and how and why businesses undertake product research.

Concept

Change and creativity

Innovation and creativity have the capacity to change the product or processes a business uses. For example, creative innovation may lead to the development of new products for new markets. Creativity and innovation are also necessary both internally in the business, and to respond to changes in the external environment.

Student view

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Learning objectives from the IBDP Business Management guide with assessment objective level:

- **Discuss** the importance of research and development for a business (AO3)
- **Analyse** the importance of developing goods and services that address customers' unmet needs (AO2)
- **Comment** on the importance of intellectual property protection; copyrights, patents, trademarks (AO2)
- **Explain** incremental and disruptive innovation (AO2)

The importance of research and development

The importance of research and development (HL)

Research and development (R&D) is a crucial part of many industries. Research and development is necessary to provide knowledge and understanding of consumer needs and to improve products, processes and efficiency. It helps businesses to develop new products or improve processes to gain a competitive advantage.

Theory of Knowledge

Beauty companies, pharmaceutical companies and biomedical science companies need to carry out extensive testing before products can reach human trials. Whilst part of that testing can be completed using computerised models, some of these companies still rely on animal testing. Companies may also wish to alter genes or manipulate DNA in order to find solutions.

- How might the methods used in R&D be limited by ethical considerations?

Student view

Overview (/study/app/business-hl/sid-351-cid-762729/o

Benefits of research and development for business

Companies spend on R&D for a number of reasons, some of which can be linked to the product life cycle, as mentioned in Section 5.8.0 (/study/app/business-hl/sid-351-cid-762729/book/the-big-picture-id-39044/). They can also be linked to the Ansoff matrix, which you learned about in Section 1.5.7 (/study/app/business-hl/sid-351-cid-762729/book/tool-ansoff-matrix-id-36539/) and is shown again here in **Figure 1**. Of particular importance in relation to the Ansoff matrix is product development and diversification.

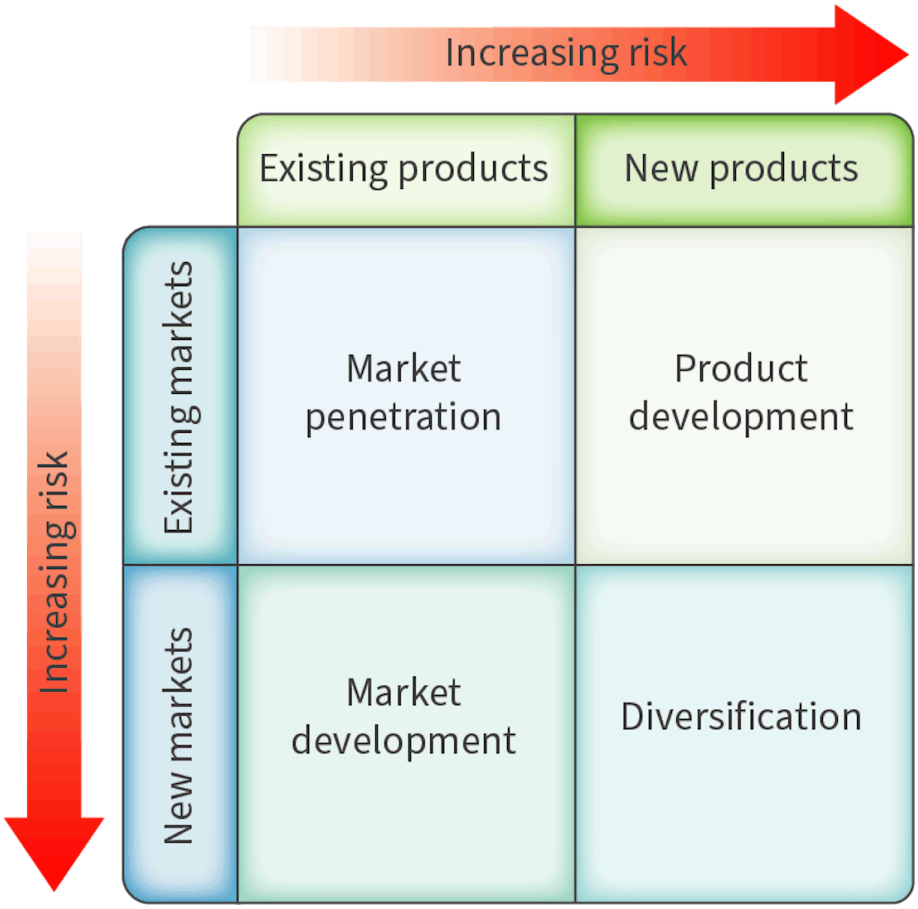

Figure 1. R&D can be linked to the Ansoff matrix through product development and diversification.

More information for figure 1

The image shows an Ansoff matrix diagram, which is a strategic planning tool used to link product development and diversification to risk management. The matrix is composed of a square divided into four quadrants. The X-axis represents product strategy and is labeled 'Existing products' and 'New products'. The Y-axis represents market strategy and is labeled 'Existing markets' and 'New markets'.

The top-left quadrant is labeled 'Market penetration,' indicating strategies applied with existing products in existing markets. The top-right quadrant is labeled 'Product development,' reflecting the introduction of new products in existing markets. The bottom-left quadrant is labeled 'Market development,' involving marketing existing products in new markets. Finally, the bottom-right quadrant is labeled 'Diversification,' indicating the strategy of introducing new products into new markets.

Student view

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The diagram also includes arrows showing 'Increasing risk' pointing upwards along the Y-axis and to the right along the X-axis, illustrating how risk increases with the entry into new markets and with the development of new products.

[Generated by AI]

Product development and diversification

Research and development allows businesses to develop new products for their existing markets (product development) or for new markets (diversification). With a new product, businesses can cultivate a unique selling point (USP) that helps to increase sales revenues. Businesses can also improve their brand image by being at the forefront of new product development. For new products, a business may be able to secure a patent and monopoly production rights, resulting in large profits over a period of time. Product development and diversification require that the business carry out extensive research and development on their product, and market research on their existing or new markets.

Basilisk (https://basiliskconcrete.com/en/how-does-it-work/), for example, is a company that has used new technology to create concrete with 'self-healing' properties. Over time, concrete can crack and become weaker. Replacing concrete structures that have cracked uses valuable resources and emits large amounts of CO_2. The new technology now enables concrete to repair itself, extending the life of concrete structures over time and improving sustainability. This is a new product that may be sold in existing or new markets for the business.

Exam tip

When considering the concept of research and development you should never assume that research and development spending is a guaranteed way to innovate and be successful. 'Might', 'may' and 'could' are all important words you should use when writing about research and development. You should think about the short-term and long-term implications of large R&D spending and question the impact it 'might' have on profitability.

Section Student... (0/0) Feedback Print (/study/app/business-hl/sid-351-cid-762729/book/the-big-picture-id-39044/print/) Assign

Lower production costs

Process innovation leads to improvements in the manufacturing process. Combining the ideas of lean production (Subtopic 5.3 (/study/app/business-hl/sid-351-cid-762729/book/the-big-picture-id-39339/)) and research and development, businesses can gain important cost leadership over competitors. For example, R&D in wind turbine technologies has led to

Student view

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increases in power output at lower costs, which has increased the profits for businesses providing wind energy. **Table 1** outlines some benefits and limitations of research and development for businesses.

Table 1. Benefits and limitations of research and development for businesses.

Benefits of R&D	Limitations of R&D
Lower costs. Research and development in relation to manufacturing processes and materials can lower costs of production for businesses, increasing profits.	**Risk.** Businesses can spend large sums of money on salaries and capital costs related to research and development that does not always result in products or services that consumers want. As a result, the money may be wasted.
Product development and patents. New products can result in increased sales revenues through unique selling points (USPs); patents can secure monopoly production and large revenues for a period of time.	**Lower short-term profits.** Research and development is costly so, in the short term until a product is on the market, profits may be reduced.
Diversification. New products in new markets can help diversify revenue streams, making the business more resilient over time.	**Corporate espionage.** Competitors may steal another business's innovations, unless they are protected by cyber security (Subtopic 5.9 (/study/app/business-hl/sid-351-cid-762729/book/the-big-picture-id-39043/)) and patents.
Brand image. Businesses that innovate well develop a strong reputation in the market that can increase sales and profits through customer loyalty and price leadership.	**Retaining talent.** Innovative businesses rely on creative employees to develop new ideas and those employees may be tempted to leave for higher pay and benefits at competitors.

An evaluation

After reading this section, you may be convinced that every company should invest heavily in R&D. However, you must always consider both sides of an argument. R&D has high failure rates. For every idea that makes it to market, 20 previous ideas may not have been successful. Even products that are launched may not be successful and may need to be supported with costly marketing campaigns. In short, R&D is expensive and it is unwise to recommend it to businesses facing immediate short-term cash flow problems.

Student view

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3 section questions

Question 1

What is a potential benefit of research and development?

1 All of these options ✓

2 Improved brand image

3 Lower production costs

4 Increased resilience

Explanation

Research and development should hopefully lead to new and innovative products and processes. This should drive sales growth and improve brand image and resilience through diversification, while leading to lower average costs of production.

Question 2

What is a potential disadvantage of investing in research and development?

1 Lower short-term profits ✓

2 Lower production costs

3 Lower long-term profits

4 Increased competition

Explanation

Profits = sales revenue — costs

Investment in research and development will increase costs, which will reduce profits in the short term. If the research is successful, profits should grow in the long term.

Student view

Question 3

Overview (/study/ap hl/sid-351-cid-762729/o

The development of a new method of production discovered through research and development is called:

1	Process innovation	✓
2	Product innovation	
3	Price innovation	
4	Planning innovation	

Explanation

Process innovation refers to the development of new ideas that can be implemented to improve how a company operates. For example, the discovery of a new type of machinery may lead to better and more efficient use of resources, which speeds up the production process.

Product innovation leads to new products, price innovation leads to new ways of pricing products, and planning innovation leads to new ways of planning operations.

5. Operations management / 5.8 Research and development (HL)

The importance of meeting needs

Addressing customers' unmet needs (HL)

Early in this course, you learned that businesses have a key role in meeting human needs within the boundaries of the planet and solving real problems. This was represented in the following question, a variation of the one being asked in cities around the world as they apply the Doughnut Economics model to improve development.

> How can our business support thriving people, in a thriving place, while respecting the wellbeing of people worldwide and the health of the whole planet?

The question assumes that businesses can and should support human and environmental thriving at both the local and global scale. To meet human needs and solve problems, businesses need to know what those needs and problems are. They can find out about needs and problems through their own market research and the research of scientists. Creative entrepreneurs and their businesses can then combine human, physical and financial resources

Student view

Overview (/study/app/hl/sid-351-cid-762729/o

to improve society and the environment through core business activities and business designs. You may recall the concept of generative (regenerative) businesses, which was explored in Section 1.5.6 (/study/app/business-hl/sid-351-cid-762729/book/generativeregenerative-business-id-36546/) and in the video by Kate Raworth in Section 1.3.5 (/study/app/business-hl/sid-351-cid-762729/book/strategies-and-tactics-id-36521/).

Gaps in the market

An unmet need is a particular issue, desire, function or problem that has not been addressed by society. It could be that a solution has not been found. Or it could be that a solution is not yet affordable. There are many categories of unmet needs and unsolved problems. The UN Sustainable Development Goals (**Figure 1**) capture 17 categories of needs and problems that individuals, businesses and governments around the world are trying to address. The Doughnut Economics model (**Figure 2**) also frames human needs and planetary boundaries.

Figure 1. UN Sustainable Development Goals (SDGs).

Credit: yukipon, Getty Images

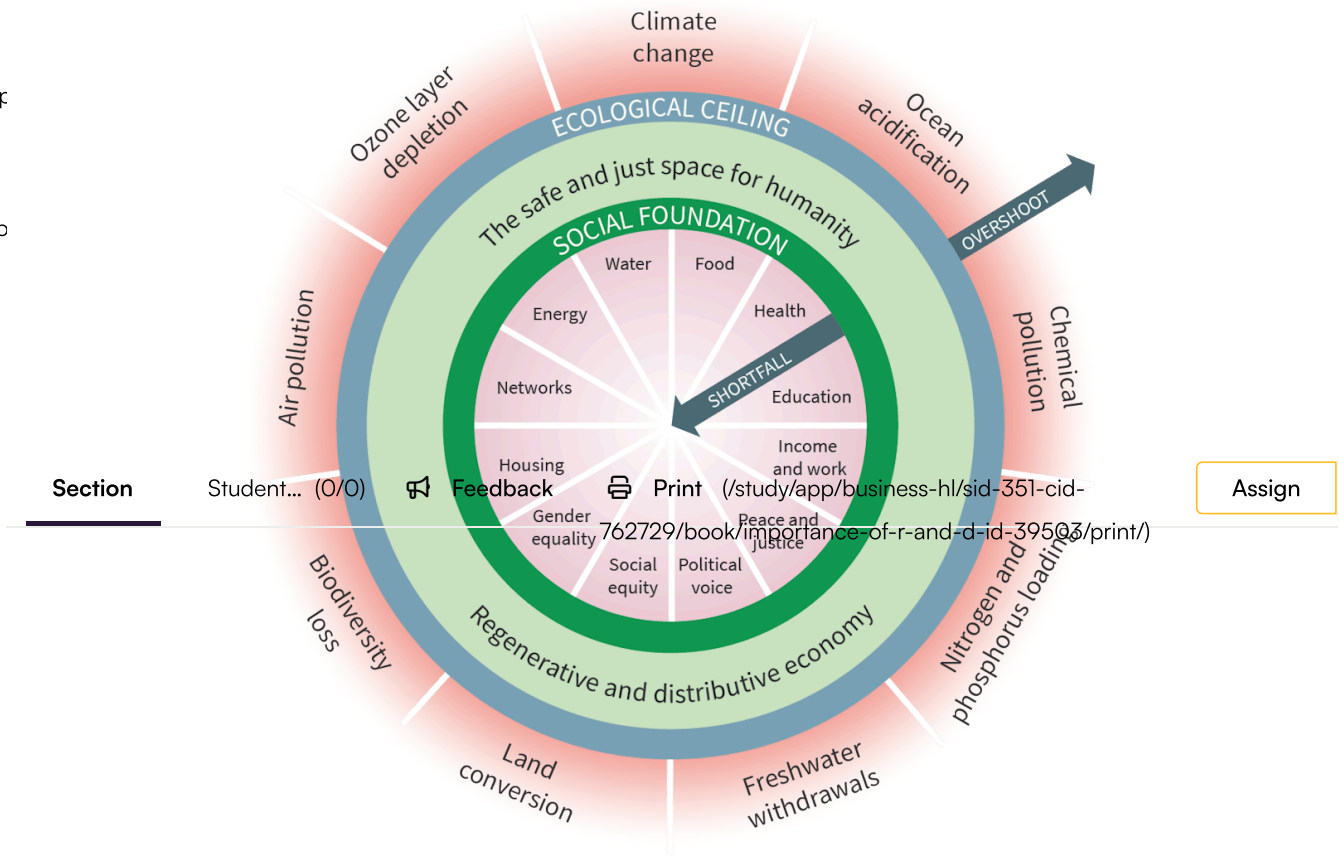
More information for figure 1

The image displays the 17 UN Sustainable Development Goals (SDGs) in a grid format. Each goal is represented by a unique icon and a different color. From left to right, they are as follows: 1. No Poverty, showing people icons; 2. Zero Hunger, illustrated by a bowl with utensils; 3. Good Health and Well-Being, indicated by a heartbeat line and a heart; 4. Quality Education, depicted by an open book; 5. Gender Equality, symbolized by a female and male gender sign; 6. Clean Water and Sanitation, shown with a water drop inside a glass; 7. Affordable and Clean Energy, depicted by a sun and power plug; 8. Decent Work and Economic Growth, represented by a graph; 9. Industry, Innovation, and Infrastructure, illustrated with cubes; 10. Reduced Inequality, depicted by an equal sign; 11. Sustainable Cities and Communities, represented by buildings; 12. Responsible Consumption and Production, illustrated by a loop arrow; 13. Climate Action, shown with a globe; 14. Life Below Water, depicted with fish and waves; 15. Life On Land, illustrated by a tree; 16. Peace, Justice, and Strong Institutions, indicated by a dove with an olive branch; 17. Partnerships for the Goals, shown with a linked icon. On the right side, the text "SDGs Sustainable Development Goals" is prominently displayed next to a colorful ring labeled "SDGs."

[Generated by AI]

Student view

Overview (/study/ap hl/sid-351-cid-762729/o



Section Student... (0/0) Feedback Print (/study/app/business-hl/sid-351-cid-762729/book/importance-of-r-and-d-id-39503/print/) Assign

Figure 2. The Doughnut Economics model. (Click to enlarge image.)

Credit: Kate Raworth (http://www.kateraworth.com/doughnut/) and Christian Guthier. CC-BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0/)

More information for figure 2

This is a diagram of the Doughnut Economics model. The image features concentric circles representing different aspects of sustainability and welfare. The outer ring is labeled 'Ecological Ceiling' and includes elements such as climate change, ocean acidification, chemical pollution, nitrogen and phosphorus loading, freshwater withdrawals, land conversion, biodiversity loss, air pollution, and ozone layer depletion. These are depicted as overshoot zones where ecological stress occurs.

Inside the outer ring is a green band labeled 'The safe and just space for humanity,' symbolizing a balance between planetary boundaries and human needs.

The innermost circle is labeled 'Social Foundation' and lists components such as energy, water, food, health, education, income and work, peace and justice, political voice, social equity, gender equality, housing, and networks. These represent societal needs that should be met to avoid 'shortfalls.'

An arrow labeled 'Overshoot' points from the edge of the ecological ceiling, while another labeled 'Shortfall' points inward from the social foundation, illustrating the need for balance.

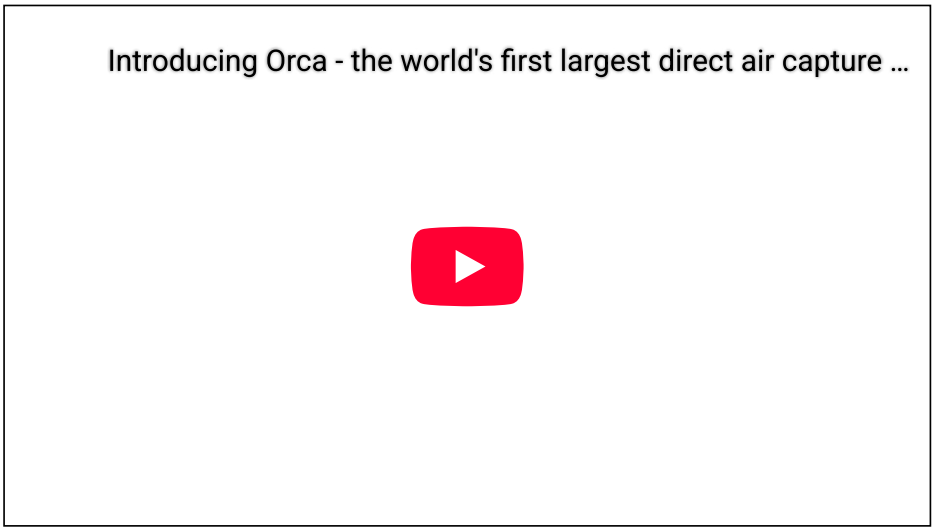
[Generated by AI]

Student view

Overview (/study/ap hl/sid-351-cid-762729/o

An unmet need that can be addressed by a business is known as a gap in the market. If a business can find and fill this gap, it may be able to earn a profit by selling a product or service for the unmet need to customers.

An example of a company working to fill a gap in the market is Climeworks (https://climeworks.com). Many climate scientists believe that achieving climate goals requires not only reducing CO_2 emissions, but also actively removing CO_2 from the atmosphere. Trees certainly serve this purpose! But there has been a gap in the market for technologies that could capture CO_2 at scale. Climeworks has researched and developed a carbon capture technology that can contribute to climate goals. Individuals and businesses pay Climeworks to offset their CO_2 emissions. **Video 1** explains how the technology developed by Climeworks functions.



Video 1. Climeworks is filling a gap in the market for carbon capture technologies.

Another example of a business that has spotted a gap in the market and filled it with its products is d.light (https://www.dlight.com/). Globally, more than 2 billion people do not have access to reliable electricity. d.light makes solar powered energy products that provide light and other energy needs to their customers. The company has served more than 100 million – mainly low-income – customers around the world with their products, which meet an essential human need and reduce reliance on polluting and dangerous kerosene lamps.

Student view

Overview (/study/ap hl/sid-351-cid-762729/o

Figure 3. Low cost, reliable electricity is a human need that is being met by innovative businesses such as d.light.

Credit: Westend61, Getty Images

In Section 4.1.3 (/study/app/business-hl/sid-351-cid-762729/book/market-share-and-growth-id-37438/), you learned about the difference between market orientation and product orientation. Both Climeworks and d.light are businesses that are market oriented. They have developed products in response to known human needs and global problems and are focused on their defined markets.

However, you may also remember that some companies are product oriented. These businesses are focused on product development often without a defined market to serve. Though some product-oriented businesses produce frivolous products that waste resources, there are other businesses whose risks and innovations have a huge positive impact on human wellbeing. For example, as you learned in the case study in Section 4.1.3 (/study/app/business-hl/sid-351-cid-762729/book/market-share-and-growth-id-37438/), pharmaceutical companies developed mRNA technologies for years before their use was really understood. These technologies have been critical to COVID-19 vaccine development for a number of companies, including Moderna and Biontech.

Concept

Creativity, sustainability and ethics

As mentioned in Section 4.1.3 (/study/app/business-hl/sid-351-cid-762729/book/market-share-and-growth-id-37438/), product orientation is often about imagining things that people do not yet know they need. This requires enormous creativity from businesses, who do not necessarily have the feedback from customers to guide their direction. Truly creative innovators have the ability to disrupt markets and help solve the world's biggest problems.

Student view

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However, it is important to remember that businesses have a responsibility to meet real human needs, not needs that are manufactured for the purposes of earning profits. There are significant sustainability and ethics concerns when businesses use the planet's limited resources to develop products that people do not really need. Even worse is when businesses use sophisticated marketing strategies to convince people that they do need them.

Activity

Learner profile: Inquirer
Approaches to learning: Research skills (information literacy)

Identify two businesses in your city or region that are meeting a genuine human need or solving a real problem.

- Connect each business to one of the Sustainable Development Goals or to an element of the Doughnut Economics model.
- What risks and rewards do you think the two businesses face by meeting human needs in their communities?

3 section questions

Question 1

An unmet need that has yet to be filled is known as a 1 gap ✓ in the 2 market ✓ .

Accepted answers and explanation

#1 gap

#2 market

General explanation

A gap in the market is a void that has yet to be filled by a company. It is a particular set of features, characteristics and functions that a product or service may offer, but which has yet to be fulfilled by a business.

Student view

Question 2

Overview (/study/ap hl/sid-351-cid-762729/o

Which of these is a benefit to a business that meets an unmet need?

1	First mover advantage	✓
2	More competition	
3	Less risk	
4	Less costly	

Explanation

First mover advantage can be explained as the ability to be better off compared to competition as a result of being the first to market in a new area/category or industry.

More competition is not a benefit for a business. Meeting unmet needs does not bring less risk; it in fact brings more risk because the business is taking on new products or markets. Meeting unmet needs does not result in lower costs.

Question 3

A business that focuses on the creation, design and development of a product, rather than on the needs of the customer, is known as a 1 product-orie... ✓ business.

Accepted answers and explanation

#1 product-oriented

General explanation

Product-oriented businesses focus on the quality of the product rather than the needs and wants of the customer. They focus more on their own capabilities rather than gathering market research and adapting to the needs and wants of the market.

5. Operations management / 5.8 Research and development (HL)

Intellectual property protection

Intellectual property (HL)

Student view

Overview (/study/app/business-hl/sid-351-cid-762729/o

Intellectual property (IP) refers to creations of the mind such as inventions, artistic works or brand names. Intellectual property is an intangible asset, which you learned about in Section 3.4.4 (/study/app/business-hl/sid-351-cid-762729/book/intangible-assets-id-39286/). The legal protections of these creations come in different forms including trademarks, patents and copyright. For example, a musician can copyright their music or trademark their name; a pharmaceutical company can patent a new medicine.

Businesses want to protect their intellectual property for a number of reasons:

- **Unique selling point (USP).** Original ideas or creations can be a unique selling point to distinguish a business from its competitors.
- **Market share.** The unique selling point could provide a business with control over an entire market. This will be true especially where a business has a patent, which you will learn about in this section.
- **Valuable assets.** Brands have value, and brand names are part of the valuation of many large companies. The brand value of Twitter, for example, is estimated to be worth more than 5 billion USD.
- **Protect investments in research and development.** Businesses often invest significant amounts of money to develop new ideas and innovations. IP ensures that they can stop others from copying them.

Types of intellectual property protection

Making connections

You learned about the different types of intellectual property in Section 3.4.4 (/study/app/business-hl/sid-351-cid-762729/book/intangible-assets-id-39286/) because IP has a value, which is recorded on a business's statement of financial position.

There are a number of types of intellectual property protection, as can be seen in **Figure 1**. You have already learned about these in Subtopic 3.4 (/study/app/business-hl/sid-351-cid-762729/book/the-big-picture-id-39045/), so this section just provides a quick overview of these again.

Student view

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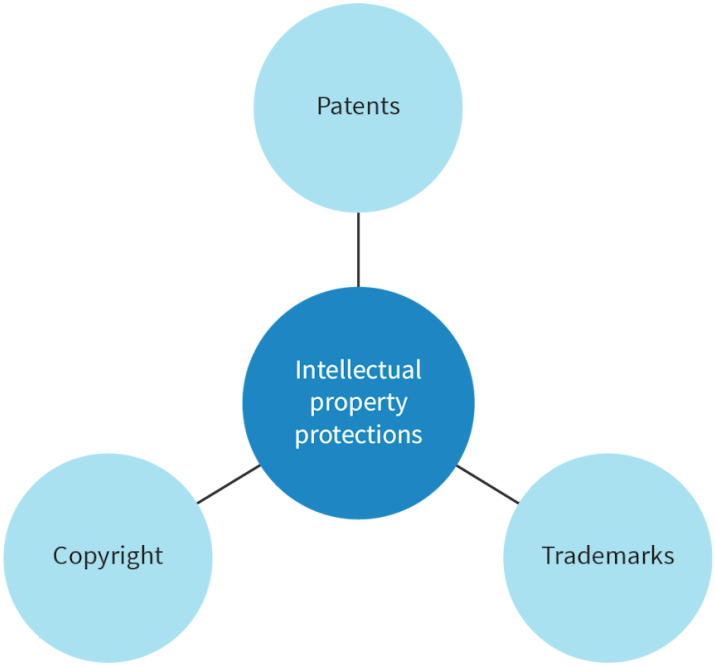

Figure 1. Different types of intellectual property protection.

More information for figure 1

The diagram displays a central circle labeled "Intellectual property protections," which connects through lines to three surrounding circles. Each surrounding circle represents a type of intellectual property protection: "Patents," "Copyright," and "Trademarks." The design visually organizes these categories, showing that they form part of the broader concept of intellectual property protections, with the central circle symbolizing the umbrella term and the outer circles representing specific protections.

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Patents

A patent is a licence or grant that gives an inventor the exclusive right to make, use or sell a product for a specific period of time. Patents protect innovation. If a business files for a patent and is approved by a government patent office, then it has ownership over that invention for a certain number of years. Only that company can produce the product for that time, giving it a monopoly. Samsung, for example, has over 200 000 patents worldwide.

In order to successfully apply for a patent, a business needs to have developed something that is:

- original (no one else can have developed the product in the past)
- viable (the product needs to have a use)

Student view

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Proving both of these points can be difficult and filing patents can be a complex process requiring legal support, which will also be costly for a business.

Patents help ensure that an innovative business can earn revenues to recover the large sums of money spent on research and development. Without patent protection, competitors may immediately copy the innovation and earn revenues without incurring any research and development costs. This may mean that the innovative business cannot survive.

Theory of Knowledge

As mentioned in Section 3.4.3 (/study/app/business-hl/sid-351-cid-762729/book/final-accounts-st-of-financial-position-id-39285/), one of the arguments for granting ownership rights over innovations and artistic content is that it provides an incentive for scientists, engineers, artists and others to develop new ideas. If these innovators know that they can obtain exclusive rights to produce and profit from their ideas for a period of time, they may be more willing to spend time and money to innovate.

However, a compelling argument against ownership of intellectual property is that it slows innovation by preventing innovators from building on the work of others. Many new ideas are not completely original but develop ideas that already exist. Intellectual property protections often block those kinds of innovations. For example, the knowledge pharmaceutical companies have with regard to vaccines would be extremely useful in saving many lives around the world. Yet, such information is not shared, but protected.

- Is innovation supported or hindered by ownership of knowledge?

Trademarks

A trademark is a symbol, word or phrase that is recognisable and associated with the business. Examples of trademarks include brand names or logos that can help customers identify a product from its competitors. You are probably aware of the trademarks of global companies such as the Apple logo or the distinctive font used by Coca-Cola.

Section Student... (0/0) Feedback Print (/study/app/business-hl/sid-351-cid-762729/book/importance-of-dev-goods-and-services-id-39504/print/) Assign

Trademarks are usually registered via a government authority. They are crucial for branding, marketing and adding value. Customers can quickly identify a business's product and trust its quality because of the trademark.

Student view

Overview (/study/ap hl/sid-351-cid-762729/o

Figure 2. The distinctive Coca-Cola trademark is instantly recognisable around the world.

Activity

Learner profile: Thinkers
Approaches to Learning: Thinking skills (transfer)

Write down the first five trademarks that come to mind, other than those already mentioned in this section.

- Compare the trademarks you have listed with those of your classmates. Are any of them similar?

- Discuss with your class the importance of a recognisable trademark for a business, using some common examples from the group.

Copyright

Copyright is available for creative artists, writers, musicians and contributors to any other creative medium. Copyright is given without application to any authority. For example, JK Rowling has copyright protection for her Harry Potter series of books. Copyright is granted for a significant number of years, even after the creator's death.

Student view

Overview (/study/app/business-hl/sid-351-cid-762729/o

Copyrights can generate royalties. Royalties are fees paid for the right to use copyrighted material. For example, musicians can be paid royalties if someone wants to use a song in a movie or advertisement.

Case study

DJI is a Chinese technology company that has built a reputation for producing a range of high-quality drones. As a result, DJI has been able to increase market growth and build market share. The company has been able to grow as a consequence of product development and innovation.

By December 2015, DJI had submitted more than 679 patent applications. Not all of these applications have been successful, but such patents help to protect against competition. The company has established markets in Asia, Europe, North America, South America and parts of Africa and counts Hollywood producers among its clients. The company strategy has always been built around research and development and continuous innovation, developing their own technologies in order to build and maintain market share.

Questions

1. Define patent. [2 marks]
2. Explain **one** benefit and **one** drawback for DJI of having a patent for its drones. [4 marks]

Question 1

A patent is a licence or grant that gives an inventor the exclusive right to make, use or sell a product for a specific period of time.

Define is an AO1 level command term, requiring the precise meaning of a term.

- One mark is given for a vague definition.
- Two marks are given for a complete definition.
- Definitions do not require application to the stimulus material.

Question 2

One benefit of a patent is that it can protect an innovation or idea from being stolen or adopted by a competitor. This is important because a business may have spent significant sums of money on research and development, and if an innovation is taken by a competitor, the business that developed the product may not be able to earn revenues to cover the costs. Patents are beneficial for DJI as they have probably spent heavily on research and development to add new features to their drones. By patenting their innovations, they can make it very difficult for other drone manufacturers to offer the same features. This gives DJI a competitive advantage by offering something unique, which may prove to be a USP.

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One drawback of a patent is the cost and complexity involved with the patent process. Patents are often filed in the host country. For example, DJI files many of its patents in China and or the US. The process involved could be very lengthy and time consuming for DJI. And a patent application not be approved, which may be an issue for DJI, limiting the speed at which they can bring a product to market and costing them additional money in legal fees.

Analyse is an AO2 level command term, meaning to break down in order to bring out the essential elements or structure. In this case, you are breaking down the benefits and drawbacks of patents.

- One benefit and one drawback need to be addressed. Other responses are possible and would be rewarded if appropriate.
- To achieve full marks, you must always include theory and application to the case study in your responses to the **analyse** command term.

3 section questions

Question 1

What is the name given to a licence or grant that gives an inventor the exclusive right to make, use or sell a product for a specific period of time?

Patent ✓

Accepted answers

Patent

Explanation

A patent is granted by authorities, recognising that the inventor or creator is the sole owner of the invention and giving them the sole right to produce and sell it for a period of time. Patents are often applied for in order to protect specific features or innovations, for example a particular scroll function on a smartphone.

Question 2

Which of the following refers to a protected symbol, word or phrase associated with a business?

1 Trademark ✓

2 Patent

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3 Trade secret

4 Copyright

Explanation

A trademark is a symbol, word or phrase that cannot be replicated by anyone else. It is distinctive to the brand.

A patent is the legal right to produce a product for a certain length of time. A trade secret is an insight into a product or manufacturing process that gives a business a competitive edge but is not necessarily legally protected. Copyright refers to the legal protection for works of creative artists, writers and musicians.

Question 3

The following are all protected by trademarks, **except**:

1 The rights to a local theatre production. ✓

2 The Starbucks logo

3 The Nike slogan ('Just do it')

4 Adidas's three stripes

Explanation

The rights to a local theatre production would fall under copyright, not a trademark.

5. Operations management / 5.8 Research and development (HL)

Incremental and disruptive innovation

Innovation (HL)

Creativity is the process of coming up with a new idea. Adaptive creativity refers to changing or improving something that already exists. Innovation refers to the concept of creating or developing new ideas and turning them into something commercially viable. Innovation goes one step further than creativity. Innovation can be categorised into four different areas, as shown in **Table 1.**

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Table 1. Four types of innovation.

Type of innovation	Description
Product innovation	Developing and improving existing products. For example, food manufacturers have been developing new products, flavours and tastes to cater for vegetarian and vegan markets.
Positioning innovation	When a product is marketed to a new target audience. For example, AirBnB was originally positioned for the conference market before moving into tourism and holiday accommodation.
Process innovation	Developing new methods of production or product delivery. The development of artificial intelligence has led to the development of sophisticated, automated robotics within factories, reducing the costs and increasing the efficiency of operations for the businesses that have adopted them.
Paradigm innovation	A change that fundamentally alters an entire industry. For example, Netflix revolutionised the home entertainment industry with its streaming service.

Innovation can either take the form of a steady process (incremental innovation) or it can be a radical change that completely disrupts a market (disruptive innovation).

Incremental innovation

Incremental innovation occurs through a series of small, minor adaptations or changes that happen steadily over a period of years. For example, the video game Subway Surfers, which has been downloaded over a billion times, is updated every 3 weeks with new locations. The core of the game does not change, and the changes are minimal but improve the game. Another example of incremental innovation is where food manufacturers regularly update products, making steady improvements to packaging, recipes and flavours.

Disruptive innovation

Disruptive innovation involves the creation of new industries or markets. The rise of digital ride hailing apps and food ordering apps, for example, have radically changed the way people order taxis or takeaway food. Bicycle sharing apps have also changed the way people get around; in many cities around the world, people can now rent bicycles in order to make their journeys, reducing the need for many to purchase their own bicycle.

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Figure 1. Bicycle sharing apps are an example of disruptive innovation.

Credit: Westend61, Getty Images

International Mindedness

Some innovations are so revolutionary they can impact businesses and people in every nation across the world and disrupt or change global actions in some way. The internet made it possible for people to connect across distances and buy products from businesses around the world. More recent innovations, such as 3D printing, have also had a global impact. 3D printing has made prosthetics (artificial body parts) cheaper globally, reducing costs and making it possible for amputees around the world to improve their quality of life.

Section Student... (0/0) Feedback Print (/study/app/business-hl/sid-351-cid-762729/book/intellectual-property-protection-id-39505/print/) Assign

3 section questions

Question 1

Which of the following is considered a type of innovation?

1 Incremental ✓

2 Constructive

3 Accelerated

4 Conceptual

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Explanation

Incremental innovation occurs steadily over time. This means that products are adapted in a subtle manner rather than through major changes.

Question 2

When Nike releases a new lightweight running shoe, what type of innovation is this?

1 Product innovation ✓

2 Process innovation

3 Paradigm innovation

4 Positioning innovation

Explanation

This is an example of product innovation. This is because Nike has developed a new product, a new type of shoe with new features, which is different from previous shoes on the market.

If the company had developed a new way to make this shoe, it would be process innovation. If it had adapted an existing shoe for a new market, this could be considered positioning innovation. And if the new shoe was so revolutionary that it completely changed the very concept of a running shoe, it would be considered paradigm innovation.

Question 3

Which type of innovation involves the creation of new industries or markets?

Disruptive innovation ✓

Accepted answers

Disruptive innovation

Also accepted

Disruptive

Explanation

Disruptive innovation involves the creation of radical new concepts or ideas, which can change the way in which businesses or even entire industries operate.

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5. Operations management / 5.8 Research and development (HL)

Terminology exercise

Check that you understand the terminology used in this subtopic by dragging the correct word into each space.

The term and development refers to the process of scientific discovery used by businesses to help create new products and processes. If successful, this can lead to the generation of new products, which is commonly referred to a product .

A business may seek to a new invention in order to stop others from profiting from it. Businesses may also seek to their logo design, to give themselves an authentic brand image that cannot be replicated.

However, research and development is not a guarantee of success; there is a that a company will fail to create successful new products or processes, even if it spends heavily. For this reason, many businesses focus on making small, subtle changes to their products rather than seeking to develop something completely different. This is known as innovation.

The creation of a new idea may help a business meet some form of unmet need. A business may, for example, identify a in the market. This may help the business to gain a competitive advantage by being the first to market. It may also allow them to charge higher if that product is in some way unique.

innovation | trademark | research | risk | prices | incremental | patent | gap

Check

Section Student (0/0) Feedback Print (/study/app/business-hl/sid-351-cid-762729/book/innovation-incremental-and-disruptive-id-39506/print/) Assign

Interactive 1. Key Concepts in Research and Development.

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5. Operations management / 5.8 Research and development (HL)

Checklist

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What you should know

By the end of this subtopic, you should be able to:

- define the following terms: (AO1)
  - research and development (R&D)
  - copyright
  - patent
  - trademark
  - incremental innovation
  - disruptive innovation
- discuss the importance of research and development for a business (AO3)
- analyse the importance of developing goods and services that address customers unmet needs (of which the customers may or may not be aware) (AO2)
- comment on the importance of intellectual property protection: copyrights, patents and trademarks (AO2)
- explain incremental and disruptive innovation (AO2)

Reflection

Section Student... (0/0) Feedback Print (/study/app/business-hl/sid-351-cid-762729/book/reflection-id-48341/print/) Assign

Teacher instructions

The goal of this section is to encourage students to pause at the end of the subtopic and to reflect on their learning. Students can use the questions provided below to guide their reflection. The questions encourage students to look at the bigger picture and to consider how the subtopic's contents might have impacted the way they view the subject.

The following table shows you how each prompt aligns to the DP *Business management guide*:

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Prompt #	Syllabus alignment
1	**Learner profile:** Open-minded
2	**Concept:** Ethics
3	**Concept:** Change

Students can submit their reflections to you by clicking on ‘Submit’. You will then see their answers in the ‘Insights’ part of the Kognity platform.

Reflection

In this subtopic you learned about research and development.

Take a moment to reflect on your learning so far. You can use the following questions to guide your reflection. If you click ‘Submit’, your answers will be shared with your teacher.

1. What prospects does artificial intelligence (AI) provide for improving the quality and speed of research?
2. How important is intellectual property protection for a business? Do you think there are products that should not be protected by intellectual property laws? Why or why not?
3. What are some examples of disruptive innovation that you have witnessed in your life? Why do you think they were successful?

⚠ Once you submit your response, you won't be able to edit it.

0/2000

Submit

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Rate subtopic 5.8 Research and development (HL)

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