

EGT2
ENGINEERING TRIPOS PART IIA – CRIBS

4 May 2023 2 to 3.40

Module 3E11

ENVIRONMENTAL SUSTAINABILITY AND BUSINESS

*Answer not more than **two** questions.*

All questions carry the same number of marks.

*The **approximate** percentage of marks allocated to each part of a question is indicated in the right margin.*

*Write your **candidate number** not your name on the cover sheet.*

STATIONERY REQUIREMENTS

Single-sided script paper

SPECIAL REQUIREMENTS TO BE SUPPLIED FOR THIS EXAM

None

10 minutes reading time is allowed for this paper at the start of the exam.

You may not start to read the questions printed on the subsequent pages of this question paper until instructed to do so.

You may not remove any stationery from the Examination Room.

- 1. The founder of a growing start-up with a competitive business idea of a green tech solution asks you to systematically evaluate which business model and strategies based on the Doughnut Model would be promising. The founder asks you to cover the following:**

Note to students: We covered the Doughnut Model in Session 1 (planetary boundaries) and mostly Session 2 of the course. We looked at the model in general and applied it to deep business design.

- (a) Outline the purpose and key elements of the Doughnut Model, in general, and for businesses specifically.**

The Doughnut Model is an economic framework, based on ecological economics, developed by Kate Raworth to provide a visual representation of sustainable development goals (SDGs) and guide decision-making towards a safe and just space for humanity. Its main purpose is to visualise the absolute ecological limits as well as the social base of functioning societies.

The model seeks to balance the social and ecological dimensions of the economy to achieve a sustainable and equitable future for all. It comprises two concentric rings - an inner ring representing social foundations, and an outer ring representing ecological boundaries. The social foundation ring outlines the minimum requirements for human well-being, such as access to food, water, health care, education, and political voice, while the ecological boundary ring defines the planetary boundaries beyond which ecological degradation is unsustainable.

Businesses can use the Doughnut Model to align their operations and strategies with sustainable development goals. To do this, they can focus on the following key elements of the Doughnut Model:

- **Meeting social needs:** Businesses can ensure that their products and services meet basic human needs such as access to food, water, health care, education, and decent work. They can also promote social equity by addressing inequalities and promoting diversity and inclusion in their workforce and supply chains.
- **Respecting ecological boundaries:** Businesses can minimize their impact on the environment by reducing their carbon footprint, conserving natural resources, and promoting sustainable production and consumption practices. They can also adopt circular economy models to reduce waste and pollution.
- **Innovating for the future:** Businesses can invest in research and development to develop sustainable technologies and business models that align with the Doughnut Model's principles. They can also collaborate with other stakeholders, including governments, NGOs, and communities, to drive systemic change towards a sustainable future. Frugal innovations are one example.

(b) Explain what “deep business design” means. What are the “five layers of business design”?

Deep Business Design (DBD) is an approach to designing and operating a business guided by a holistic and systemic understanding of the organization's purpose, values, stakeholders, and impact on society and the environment. The goal of deep business design is to create a sustainable and resilient business that generates value for all stakeholders and contributes positively to society. One approach (that was also used in class) was to use DBD to design business models aligned with the purpose of the Doughnut Economy.

The five layers are purpose, governance, strategy, operations, and impact. In detail, this means:

- **Purpose:** The purpose layer defines the organization's reason for existence, beyond making a profit. It articulates the organization's vision, mission, and values, and guides its strategic decision-making.
- **Governance:** The governance layer establishes the rules and processes that govern the organization's operations and ensures accountability to stakeholders.
- **Strategy:** The strategy layer outlines the organization's goals and objectives, and how it plans to achieve them. It includes market analysis, competitive positioning, product/service development, and resource allocation.
- **Operations:** The operations layer deals with the day-to-day activities of the organization, including production, logistics, marketing, sales, and customer service. It ensures that the organization's products and services are delivered efficiently and effectively, minimizing their environmental impact and maximizing social benefits.
- **Impact:** The impact layer assesses the organization's impact on society and the environment, and identifies opportunities to enhance its positive impact and mitigate negative effects. It includes social and environmental impact assessment, stakeholder engagement, and sustainability (ESG) reporting.

(c) Building on part (b): What are the options the business might look to develop if it wants to create a sustainable business and adhere to the model of a Doughnut Economy? You may use real-world examples you are familiar with.

Here are five options with examples:

1. **Redefine the purpose of the business:** The business can redefine its purpose to go beyond profit-making and explicitly incorporate social and environmental goals. For example, it can adopt a mission statement that emphasizes sustainability and social responsibility.
2. **Adopt sustainable practices:** The business can adopt sustainable practices in its operations, such as using renewable energy sources, reducing waste, and minimizing carbon emissions. It can also adopt circular economy principles, such as recycling and repurposing materials, and designing products for reuse and repair.
3. **Engage stakeholders:** The business can engage its stakeholders, including employees, customers, suppliers, and communities, in its sustainability efforts. It can seek feedback on its sustainability performance, involve stakeholders in decision-making, and collaborate with them to address shared sustainability challenges. For example, it can involve customers in the co-design of sustainable products and services.

4. Assess and mitigate environmental and social impacts: The business can assess its environmental and social impacts, including its carbon footprint, water use, waste generation, and social equity. It can identify opportunities to reduce negative impacts and enhance positive impacts, such as investing in renewable energy or implementing fair labour practices.
5. Align business strategy with the Doughnut Model: The business can align its strategy with the principles of the Doughnut Model, focusing on meeting the social foundations and respecting the ecological boundaries outlined in the model. This can include developing products and services that meet basic human needs, adopting sustainable production and consumption practices, and collaborating with stakeholders to drive systemic change. One example is frugal innovations for the developing world.

2. The Circular Economy (CE) is one of the most promising approaches to “Net Zero Policies”.

Note to students: We covered the Circular Economy in Session 3 of the course. We looked at the model in general and applied it to business cases. Prof Stahel was a guest speaker and illustrated the approach with many examples. We also briefly covered circular approaches within the Porsche Sustainability Strategy presented by the company representative.

(a) Define, explain, and illustrate what is meant by Circular Economy

A circular economy (CE) is an economic model that aims to minimize waste and maximize the efficient use of resources. It offers a more sustainable and resilient economic model that can help address environmental and social challenges while creating economic value. One of its early promoters (and Guest Speakers in class) is Walter Stahel, a Swiss engineer and the “father” of the concept of the CE.

CE is based on the principles of designing without waste and pollution, keeping products and materials in use, and regenerating natural systems. The goal of a circular economy is to create a closed-loop system where resources are continuously cycled and waste is eliminated.

To illustrate what a circular economy is, we can use the example of a smartphone. In a traditional linear economy, the smartphone would be produced, used by the consumer, and discarded at the end of its life. This results in a significant amount of waste and the loss of valuable materials and resources. In a CE, the smartphone would be designed for longevity and reparability and made from recycled or sustainably sourced materials. At the end of its life, the smartphone would be collected, disassembled, and its components would be reused or recycled to create new products. This reduces waste and conserves resources.

CE can be (and is) applied to various industries and sectors, from manufacturing and agriculture/food to energy and transportation. It involves adopting a closed-loop system approach to resource management, where waste is minimized, materials are reused or recycled, and natural systems are regenerated. The benefits of a CE are: Reduced waste and pollution, resource conservation, new business opportunities and new jobs in the “re-industries”, reduced GHG emissions and overall, a low-waste and low-emission economy and society.

(b) Define the concept of “ecological engineering” and discuss using one example

Ecological engineering is the application of ecological principles and knowledge to design, construct, and manage ecosystems for human purposes. It aims to integrate human needs and values with ecological systems and processes to create sustainable solutions for environmental problems. Ecological engineering involves the use of natural or nature-based solutions to achieve environmental goals, such as habitat restoration, water quality improvement, and climate change adaptation.

Ecological engineering can be applied to urban and rural planning. One example often given is the use of constructed wetlands for wastewater treatment. Constructed wetlands are engineered systems that use natural processes to treat wastewater and improve water quality. They are designed to mimic the ecological functions of natural wetlands by creating an environment that supports the growth of plants and microorganisms that break down pollutants. (More examples and their pros and cons, promises and pitfalls, are provided in the “optional reading” assignments).

(c) Name two examples of companies setting ambitious circular strategies. Explain their circular approach. What are the main barriers, and what are the main opportunities for them when developing a CE approach?

Note to students: Not one specific answer is expected, students can pick any example they are aware of. In class, we mentioned a few (Patagonia), mainly in Prof Stahel's talk. Students could use the example of Porsche AG as follows:

Porsche, the German luxury car manufacturer, has set an ambitious circular economy approach to reduce waste and promote sustainability. They have implemented several circular strategies, such as design for circularity, material innovation, circular supply chain, and circular business models. By adopting these circular approaches, Porsche is not only reducing the environmental impact of their products and services but also creating new business opportunities and value for customers. In detail and following the company presentation:

- **Design for circularity:** Porsche designs their products with circularity in mind, using materials that are recyclable or renewable, and designing for disassembly and repair. For example, Porsche has developed a concept car called the "Porsche 911 RSR," which features lightweight materials that can be recycled, such as natural fibers, flax, and hemp. The car's components are also designed to be easily disassembled and recycled.
- **Material innovation:** Porsche is exploring innovative materials to reduce waste and promote sustainability. For example, Porsche is using recycled fishing nets to produce carpeting for their vehicles, reducing waste and ocean pollution. They are also exploring the use of 3D printing technology to create parts from recycled plastic and bio-based materials.
- **Circular supply chain:** Porsche is working with suppliers to promote sustainable practices, such as reducing waste and carbon emissions. They are also exploring ways to increase the use of renewable energy in their supply chain, such as sourcing materials from sustainable forests and using green energy to power their factories.
- **Circular business models:** Porsche is exploring circular business models, such as a car-sharing program that allows customers to share their vehicles with others. This not only promotes sustainability by reducing the number of cars on the road but also creates new business opportunities and value for customers.

3. The concept of Environment, Social and Governance (ESG) has been on the rise for the last decade or so, even though there has more recently been a substantial backlash.

Note to students: We covered ESG mainly in Session 4 but also in Session 5. You were also asked to listen to several ESG podcasts.

- (a) **What are the main reasons ESG entered board room thinking and company strategies? Explain the backlash against the concept of ESG. Do you think the backlash is justified or not?**

ESG (Environmental, Social, and Governance) factors have become increasingly important in boardroom thinking and company strategies for several reasons:

- **Investor pressure:** Investors are increasingly interested in companies with strong ESG performance. They believe companies with good ESG performance are better equipped to manage risk, create long-term value, and contribute to sustainable development.
- **Consumer demand:** Consumers are becoming more aware of the social and environmental impact of their purchases. They are increasingly seeking out products and services that are produced sustainably and ethically.
- **Regulatory pressure:** Governments and regulatory bodies are increasingly implementing policies that require companies to report on their ESG performance. For example, the European Union has recently introduced regulations that require companies to disclose their environmental and social impact.
- **Attracting and retaining scarce talent in the workforce:** Gen Z is more interested in working with a purpose and for a “good” company that also lives its values internally and externally.

In the past 1-2 years, however, there has been some backlash against the concept of ESG. Critics argue that ESG is a vague and subjective concept that lacks clear definitions and standards. They also argue that ESG performance may not always lead to better financial performance and that companies should prioritize shareholder value over social and environmental concerns.

Whether the backlash against ESG is justified or not is a matter of debate. While it is true that ESG is a complex and multifaceted concept, it is also true that companies that prioritize ESG performance are likely to be better equipped to manage risk, create long-term value, and contribute to sustainable development. Moreover, the increasing demand for sustainable and ethical products and services, along with regulatory pressure, means that companies cannot ignore ESG considerations without risking reputational damage and regulatory sanctions. Therefore, it is important for companies to take ESG considerations seriously and to integrate them into their strategies and decision-making processes. However, it is also important to ensure that ESG performance is measured and reported in a transparent and standardized manner to avoid greenwashing, whitewashing, and confusion.

- (b) **Imagine you are the CSO (Corporate Sustainability Officer) of a mid-sized tech firm in the energy industry, responsible for developing an effective and credible ESG strategy. What are the key opportunities, and what are the main pitfalls you should consider?**

As a Corporate Sustainability Officer (CSO) of a mid-sized tech firm in the energy industry, developing an effective and credible ESG strategy is critical to the success of the company. Here are some key opportunities and main pitfalls to consider:

Key Opportunities:

- **Market Advantage:** Developing a strong ESG strategy can give the company a market advantage. Investors, customers, and other stakeholders are increasingly interested in companies that have a strong ESG track record.
- **Cost Savings:** Implementing sustainable practices can lead to cost savings, such as reduced energy consumption and waste reduction.
- **Innovation:** Developing a strong ESG strategy can spur innovation and lead to the development of new products and services.
- **Employee Engagement:** Implementing sustainable practices can help to engage and motivate employees, who are increasingly interested in working for companies that prioritize ESG.

And here are some potential pitfalls to be aware of:

- **Lack of Commitment:** Developing a strong ESG strategy requires a long-term commitment from the company's leadership. If the company's leadership is not committed to ESG, it will be difficult to implement sustainable practices and gain the benefits of a strong ESG track record.
- **Greenwashing and whitewashing:** Companies must be careful not to engage in greenwashing, which is the practice of making false or exaggerated claims about ESG performance. This can lead to reputational damage and loss of trust from investors, customers, and other stakeholders.
- **Complexity:** Developing an effective ESG strategy can be complex and requires expertise in a range of areas, such as sustainability reporting, stakeholder engagement, and supply chain management.
- **Regulatory Risk:** The regulatory environment around ESG is constantly changing, and companies must keep up with the latest regulations and reporting requirements to avoid regulatory risk.

To develop an effective and credible ESG strategy, it is important to consider all of the above. The key is to ensure that the company's leadership is committed to ESG, that the values are disseminated and “lived” within the organization, to avoid greenwashing, to manage the complexity of ESG implementation, and to stay on top of the latest regulatory requirements.