

## **Part A: Circular Business Model Analysis:**

In this first part of the assignment, you will be using an example built from work by the real-life case company Caterpillar, and analyze how a company's business model may be shaped to enable greater circularity. For this, you will learn to apply the Circular Business Model Planning Tool introduced in Week 2. In the assignment you will focus on a few of the business model elements and start working with a version of the tool that is partially pre-filled. If you would like to see a full case mapped, you can go back to Lecture 3: "Business model Innovation" in which the tool is applied on the case of Fairphone.

As a first task, you will explore Caterpillar's business model and fill in parts of the Circular Business Model Planning Tool. After studying the case description, you "fill in" the three blank spots in columns C and D of the tool (see the template attached). N.B. By "filling in" the cells we do not mean editing or writing in the template, but providing a description for each of the three blank cells, in a text box below.

As second task, you get to pick two examples of business model elements filled in the tool that you think help the company realize circularity. For each of them, briefly explain how you think they help realizing circularity.

By using this planning tool, you can gain an insight into how business value is created along a product's life cycle, plan and analyze how circularity may be integrated into a business model, and recognize interdependencies of business model elements across various life cycle steps.

### **Task 1 - Solution:**

C2(value proposition): "Incentivized return of cores" - Offering some kind of an incentive, for example deposit in exchange for the return of the core parts of their machines. Creates value for Caterpillar and prepares them for additional sale.

C5(key activities): "Organized core reintegration" - This includes the organization and management of return process, and reintegrates them into the value chain. Crucial for maintaining the circular flow of materials, which involves the collection of used machines, disassembly of the machines and their cores, and preparation for reman.

D2(value proposition): "Affordable remanufactured machines" - Includes "like-new machine" warranty, but at a price well below the price of a new one. Makes it more attractive to a wider customer segment.

### **Task 2 - Solution:**

B5 First sale( with prolonged use) (key activities) : "Material acquisition, manufacturing" - Helps ensuring the durability of the materials used, the efficiency of manufacturing processes, as well as a longer life of the product. This signifies the importance of how the materials are acquired etc.

D2(value proposition): "Affordable remanufactured machines" - Important for keeping the circularity by closing the loop. It encourages the reuse of materials. By offering remanufactured machines at a lower price, helps customers to choose these over new ones. Generates less demand for new materials and ensures that the used materials are reintegrated into the value chain.

## **Part B - Critical Assessment of a Circular Business Model**

Once we have gained a more detailed understanding of a company's circular business model (Part A), it is also important to think critically about the effect of the business model. There might be drawbacks, trade-offs, or other ways in which the positive effects of circularity could be undermined.

In Part B (corresponding to Week 3) you should reflect on which assessment methods could be used to measure a business model's environmental performance and on whether Caterpillar's circular business model is likely to bring about environmental benefits. This consists of two tasks:

- 1) Your first task is to identify an assessment method introduced in Week 3 that could be used to measure environmental performance and to briefly explain what it can measure.
- 2) Your second task is to identify two ways the environmental benefits from Caterpillar's remanufacturing activities might be undermined. The skill-builder lecture at the end of Week 3 will help you to think critically about environmental impacts and discusses some examples.

### **Task 1 - Solution:**

An example would be the LCA (Life Cycle Assessment). We can evaluate and measure all stages of the product life cycle for example the raw material extraction, production, use and disposal/recycling. This method can be used to measure the impact of extracting the raw materials used in Caterpillar's products. The environmental footprint of manufacturing products. Including energy use, emissions and waste generation. The environmental benefits of the take-back program. The different implications of using these products for example fuel consumption and/or emissions. The effectiveness and drawbacks of the take-back program, remanufacturing.

### **Task 2 - Solution:**

1. Energy consumption in remanufacturing process: The disassembly, cleaning, inspection etc. can be energy-intensive. If we were to use non-renewable used as a source of energy, it could lead to greenhouse gas emissions. This could generate an offset in the environmental benefits gained from using less raw materials.
2. Emissions from transportation: Collection and redistribution of used products can increase emissions from transportation. This basically means that the vehicles used in transportation would generate more emissions, which also could offset the environmental benefits of manufacturing.

## **Part C - Upscaling Circular Business Models**

In Part C (corresponding to Week 4) of the assignment you will be focusing on both the business context and innovation with two tasks:

**1) The first task is to consider how entrepreneurial business ideas are affected by external factors, broadening your analysis to the context that the case company is operating in. Are there any changes in the legal framework that could make it easier for Caterpillar to operate in a circular manner? You should identify two examples of public policies that, if implemented, can promote circularity in your case company.**

**2) As the transition towards a circular economy ultimately depends on developing new ideas, your second task is to come up with your own ideas. Your second task is to provide two examples of what Caterpillar could change in its business model to become even more circular.**

**For this, we encourage you to use the analysis of Caterpillar's business model that you did in Part A of the assignment. For instance, think whether there is an additional circular strategy that the company could implement. It will be useful for you to have a look at the non-filled parts (the first and last columns (A and E)) in the analysis of your business model and how these could be capitalised on. Or think about whether some of the business model elements that you already analysed may be altered to facilitate circularity. For instance, could there be a more compelling value proposition or a new key partnership that makes reaching out to consumers or accessing used products much easier?**

### **Task 1 - Solution:**

1. Extended Producer Responsibility (ERP): These policies can be used to make sure that Caterpillar takes responsibility for the entire life cycle of their products. For example take-back, recycling and disposal of product waste. So what this would mean is that this could promote circularity through the incentivization of Caterpillar to design products that are easier to repair, upgrade, reuse, recycle.
2. Eco-design Directive: This focuses on improving the environmental performance of the products as well as include requirements for durability, repairability, upgradeability etc. If applied to Caterpillar, this would lead to the design of products that would use less energy, would last longer and easier to repair and upgrade. This would lead to a further promotion of circular economy through the decrease in demand for new raw materials and reduce of waste.

### **Task 2 - Solution:**

1. Product-as-a-Service (A column): Caterpillar could transition from selling products to leasing them. This could ensure that the products are returned to Caterpillar at the end of their use. The value proposition could be the provision of a service rather than the product. This could reduce upfront costs for the costumers and could enable Caterpillar to design products that are durable, maintainable and recyclable product.

2. Partnerships for material sourcing (Column E): Caterpillar could form partnerships with suppliers who are more committed to sustainability and circular practices. This could promote the sourcing of sustainable and recycled materials. The value proposition here would be the reduced environmental footprint, which could appeal to those customers who are environmentally conscious.