Module 5: Green product development and service design

Green product concept

According to the Sustainable Development Goal 12: Responsible Consumption and Production, urgent action is needed to ensure that current material needs do not lead to the over-extraction of resources or to the degradation of environmental resources. Consumption and production should also include policies that improve resource efficiency, reduce waste and mainstream sustainability practices across all sectors of the economy.

The terms "green" or "sustainable" refer to products, services and practices and a product and service system that allows economic development while conserving for future generations. The **product and service system** is a system of products, services, supporting networks and infrastructure designed to be competitive, to satisfy customer needs, and have a lower environmental impact than traditional business models. To design and develop truly green and sustainable products and services, you need green policy, green partners and green processes.
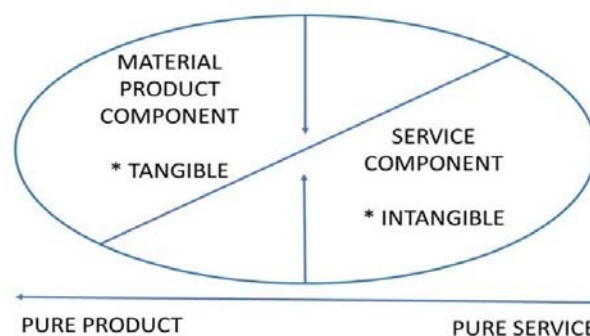

Figure1. Product and service system: mix of both products and services

Servicizing is a transaction through which value is provided by a combination of products and services, in which the satisfaction of customer needs is achieved either by selling the function of the product rather than the product itself, or by increasing the service component of a product offer.

The term **green servicizing** (green product and service system) incorporates the aim of reducing environmental impacts by reducing the amount of resources and energy required during production, delivery and consumption, and by reducing the number of products which end up being discarded after use.

While on the topic of defining a green product, you must realize that almost no product will ever be 100% "green," since product development has always some impact on the surrounding environment. Many products offer a green component that is at its best incremental, offering performance or some other characteristic that is only slightly better

than the conventional product. The truly green product characteristics fall into six categories, and many products comprise multiple categories. However, a product that falls into three categories is not necessarily any greener than a product that falls into only one category: 1) green process, 2) improved sustainability, 3) recycled contents, 4) recyclable, 5) low toxicity, 6) biodegradable.

Table1. Green and sustainable product characteristics

Category	Description
Green Process	The product is manufactured with consideration for exposure to chemicals by employees, source of materials, energy-efficient production methods, use of recycled materials in packaging, reclaiming manufacturing waste, and prudent use of energy.
Improved sustainability	The product is renewable and makes good use of available resources. Sustainable design considers environmental and human health and well-being, in addition to the traditional criteria of function, cost and aesthetics.
Recycled contents	The product is fabricated with post-consumer materials or post-industrial by-products.
Recyclable	The product can be re-used or reprocessed and refabricated after use.
Low toxicity	The product is less toxic than comparable products used for the same purpose.
Biodegradable	The product returns to the earth naturally under exposure to the elements.

Core principles, phases and tools of green product and service design

Design thinking is a process, geared towards gaining a common understanding, which can be described as a discipline that uses the designer's sensibility and methods to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity.

Service design thinking is a holistic, customer-centric approach using design principles, tools, processes and an empathetic understanding of customer needs to design products and services. The five core principles, which should form the foundations of service design thinking are: 1) user-centered, 2) co-creative, 3) sequencing, 4) evidencing and 5) holistic.

Service design is the design of systems that encompass service users, service providers, products, processes and logistics. The methods, tools and activities of design thinking help making products and services more useful, usable, efficient and desirable.
The product and service design process has five stages: discovery, interpretation, ideation, experimentation and evolution.

DISCOVERY	INTERPRETATION	IDEATION	EXPERIMENTATION	EVOLUTION
What are my challenges, how do I approach them?	I have a lot of information – how do I interpret it?	I see an opportunity – what do I create?	I have an idea, how do I realise it?	I tried to design something – how do I evolve it?

Figure 2. The five phases of design process (IDEO2012)

Service design tools are the collection of tools and tutorials that help dealing with complex design challenges. Service design tools are, for example: user journey mapping, user diaries, user personas, brainstorming, service blueprinting, prototyping, scenarios, etc.

Green design is intended to develop more environmental-friendly products, services and processes. Green design (also called eco-design, sustainable design) is the philosophy of designing physical objects, the built environment and services, to comply with the principles of sustainability (environmental, economic, social and technological).

One of the practical tools that helps you design and create products and services to a specific user is the **persona**. The persona is a representation of your most common target audience and helps you standardize the needs and get solutions faster. It is based on real data, gathered in a previous research, such as a user interview. You can think of it as a folder with similar users like you, who have their own name, photo and a brief description:

Photo	NAME … <u>Background</u> Age … Occupation … Education …
<u>Description</u> **Looking for green and sustainable products and services** Using information sources: … Social media preferences: … Influencers: … How we help: …	

Figure 3. Example of green product and service user persona

The most important piece of advice you should remember when creating personas is never to "box in" your user. They are multi-faceted, emotional human beings, who believe that you are worthy of their time. Treat them as sacred.

Green product and service life cycle

Life cycle assessment is a business management concept for sustainable products with the aim of improving specific goods and services and enhancing the overall sustainability performance of the business and its value chains in general. It requires a holistic view and a full understanding of interdependency of businesses, in order to support relevant decisions and actions to improve sustainability of the performance, which takes into account the environmental and social benefits, and at the same time, offers a number of value creation opportunities for the business.

There are several ways to analyze the life cycle of the product and service. After having been launched, a product and service should enjoy a long and happy life. But each product and service has its own life cycle, which is not infinite. Not all products and services follow all stages of the life cycle. While some products and services are introduced and die quickly afterwards, others stay in the mature stage for a very long time.

Table 2. Product and service life cycle stages

	Stage	Characteristics
1.	Introduction Stage	Product launched into the market. Sales grow slowly. Informative advertising is done. The firm might not earn a profit at this stage. Price skimming may be used if the product is a new invention and has no competitors. Competitive pricing may be used if it already has a lot of competitors.
2.	Growth Stage	Sales grow rapidly. Persuasive advertising may be used. Prices may be reduced if faced by stiff competition. The firm starts earning profits.
3.	Maturity Stage	Sales increase slowly and reach the highest sales figures. Competition is at the maximum level as many new 'me too' products may be in the market. Promotional pricing might be a good option. Profits are at the highest level as the firm is also getting economies of scale. Repetitive advertising is done to remind the consumers.
4.	Saturation Stage	Sales are stagnant. Maximum competition but no new competitors and the market is already crowded with the same types of products. Promotional pricing or competitive pricing may be a good choice. Advertising efforts at its highest point.
5.	Decline Stage	Sales start to decline. Profits start to come down. Marketing research done to find out whether this decline is permanent or temporary. If the decline is permanent in nature then stop the production of the product, otherwise implement extension strategies. Advertising is reduced.
6.	Extension stage	Introduce new variations of the original product. Try to sell the product in different markets. Make small changes in the colour, design or packaging. Start a new advertising campaign.

Another way to analyze your product's life cycle is using a tool called green design. As a holistic approach, green design (eco-design) examines the whole life cycle of products and services, which can be divided into five different stages (table 3).

Table 3. Green product and service life cycle design

No	Stage	Questions to answer
1.	Use of raw materials	Which raw materials are used? Which upstream chains are required for these raw materials? How much energy is being consumed for these processes?
2.	Manufacture	What kind of operating materials are needed for the production process? How much energy is required and from which sources is it generated?
3.	Distribution	What kind of packaging materials are used and how recyclable are they? Which means of transport are used for the product's distribution?
4.	Product use	How energy-efficient is the product in its use phase? Is the product easy to maintain? How long is the product's lifetime?
5.	End of life	Is the product, or parts of it, reusable? Does the product contain materials which are problematic to dispose? Which basic materials are recyclable?

This module encourages you to adopt and integrate green and sustainable thinking and knowledge into your product and service design so that it responds to the Sustainable Development Goals (SDGs) and supports you to design and produce efficient and attractive green products and services. Refine your canvas.

Assignment

1. How green is your product?

Use the example (Table 1. Green and sustainable product characteristics) and try to find out, how many of these six categories you follow. Give some proofs.

2.Persona of your green product

Use the example (Figure 3. Sample of the persona) and create two personas of your green product and service.

3.Analyze the life cycle of your green product and service. Find out, what factors affect the environment negatively during the life cycle of your product.

Use the example (Table 3. Green product and service life cycle design) to analyze the life cycle of your green product and service. Using the figures, data of your business, prepare a table comparing the use of energy resources, mineral resources and renewable resources at different stages of your green product's and service's life cycle. Compare the numbers of the past years and periods.

Based on the results of the analysis, write what factors affect the environment negatively during the life cycle of your product (i.e. during raw material extraction, raw material production, transportation, use and end of life/disposal).

4.Develop a guidance plan for value-added and sustainable green product and service design and development

Use the table and develop your business a guidance plan / solution for a value-added and sustainable green product and service design and development.

Life cycle stage	Criteria	Guidance plan / Solutions
Materials	Efficient use of materials to minimize material inputs and waste. Use of "low impact" materials (recycled/recyclable/renewable). Green chemistry and product safety (no toxic components or processes). Use raw materials and ingredients, which help to reduce the product's environmental impacts or realize new environmental benefits. Reduced environmental footprint.	
Packaging	Optimization of packaging (packaging to product ratio). Use of "low impact" packaging materials, (e.g. recycled/recyclable/renewable), which also have a lower environmental footprint. Design packaging for recycling/ re-use. Packaging system protects the product from damage and extends life. Packaging includes information allowing the end-user to get the maximum value and benefit.	
Production	Production of redesigned product is technically feasible with low or no impact on cost. Redesign gives environmental benefits or cost saving.	
Transportation	Products are transported using the most economical forms of transport available with a low environmental impact. Use of "low impact" transit packaging (recycled/recyclable/renewable), which also has the lowest environmental footprint. Optimization of transit packaging without exposing the product to damage.	
Use	Reduce energy consumption of product when used. Design of product to reduce consumer waste. Designing for durability to extend the product's life.	
Waste	Design of product for re-use / recycling to promote circular economy. Design of product to be a part of a closed loop with supporting information.	

Finally, revise your business model!