

Setting up a circular and sustainable business model for sea urchin

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Introduction

In the last decade, circular economy (CE) has become one of the most discussed issues in the European and non-European political debate, as a result of continuous and increasingly evident phenomena related to climate change and the growing emissions of greenhouse gas (GHG). The traditional linear economy model based on extraction, processing, production and waste no longer seems to be functional in a world where natural resources are starting to run out.

According to the United Nations, the world population will reach 9 billion by 2050, causing several problems in terms of food security and in the increasing consumption of raw materials. Therefore, rulers are called upon to pay attention to alternative forms to reduce pollution and waste of these resources, thus inserting the topic of circular economy in the political agenda. Sustainable economic growth has several purposes: mitigate price volatility, improve food security in the poorest regions of the planet, limit waste of resources, reduce environmental impact and create new jobs. Indeed, precisely with regard to the last point, according to the Environmental Services Association (ESA), the circular economy in the United Kingdom has encouraged the hiring of about 50,000 new jobs and USD 12 billion in investments. In this context, in 2015 the European Commission (EC) introduced the First Action Plan in its agenda with the aim of helping Europe in a process of transition from the linear to the circular economy. The Action Plan provides for 54 measures that seek to close the life cycle of products: from production to consumption and waste management. A further step forward was taken by the EC last March 2020, with the adoption of the European Green Deal. This aims to achieve climate neutrality in Europe by 2050, restore biodiversity and incentivize a society that is balanced with a clean and cost-efficient circular economy. In addition, the Green Deal is committed to supporting the supply, the use of renewable energy sources, by-products and the reuse of waste and residues.

In many countries, without contribute from the legislator (e.g., subsidy, frameworks, taxes, etc.), an autonomous and convinced awareness on the part of citizens in adopting initiatives to contrast climate change is still missing. It is therefore necessary to rethink the world economic system in a new perspective, which makes eco-innovation and better food waste management its strengths.

Regarding to this latter aspect, FAO estimates that about 1.3 billion tonnes of food are lost or discarded every year, equal to one third of total edible food. Nowadays, with the increase in fish consumption, most wild fish stocks are classified as fully exploited, with several species facing extinction. Moreover, a remarkable share of waste is represented by the discarded fish, which includes many species and by-catches. Fishing waste is estimated to exceed 20 million tonnes each year, about 25% of the annual world harvest. Therefore, this is an increasingly emerging problem, even because fish industries are suspected of being responsible for significant risk to the environment. The fish waste occurs for several reasons: products that are caught but not sold because they have a low commercial value, damaged goods, inadequate management of the supply chain, improper storage of the product and finally waste deriving from domestic consumption. There are also species such as sea urchins, where waste is abundant due to the high content of inedible parts, such as shells, spines and viscera. Lacking management of fish waste and overfishing have several negative implications on ecosystems and the protection of marine species (e.g., damage to habitats, illegal fishing, endangered fish species). Therefore, from food waste, the reuse of discarded fish represents a valid tool to reduce the environmental impact of fishing and to promote new forms of sustainable business through more virtuous economy. In addition to better waste management and the reuse of waste to obtain biomaterials or energy sources, by implementing a circular economy approach it is also possible to maximize the value of food production and to reduce waste.

Therefore, this study aims to provide concrete examples of circular economy such as the creation of new products deriving from sea urchin waste and the sustainable transition in the sea urchin industry..

From Marine Waste to New Eco-Friendly Products: Development of the Biomedicine, Pharmaceuticals, Cosmetics and Blue Biotechnologies

According to the latest available FAO data, indeed, the capture production of sea urchins in 2018, for the species included in the database and in all forms of sale-live, fresh, chilled or frozen-was approximately 62,828 tonnes.

Skin lesions such as ulcers, wounds and burns are among the most frequent problems in human health care and therapies to treat these critical issues require very expensive economic interventions. To date, different types of skin lesions can be treated with techniques that are not free from serious limitations and dangers, such as immune rejection in allogeneic skin graft, the onset of infections or the presence of scars.

To face these problems, in recent years, many researchers have studied and tested marine collagen as a biomaterial. Marine collagen is also widely used in dentistry and generally utilized as a membrane in periodontal and implant therapy, but also in bone grafts. Moreover, thanks to the skin's reparative properties, marine collagen is also used by cosmetic companies for the creation of products containing bioactive ingredients and marine collagen extracts, capable of providing benefits, such as the inhibition of photo-aging of the skin. marine collagen used for cosmetic products is the fact that this element has a limited smell compared to collagens derived by other animals

Methods

Thanks to its characteristics, marine collagen is a valid support for production of biomedical devices, dermal implants, cosmetic and pharmaceutical products. To make their core business effective, companies should not consider only the financial perspectives but also the social and environmental aspects.

Therefore, this study aims at analysing these three frameworks using the Triple-Layered Business Model Canvas, which is a useful tool to support the creative exploration of sustainable and innovative business models (Schoormann et al., 2016).

The Business Model Canvas (BMC) (Osterwalder, 2004) is a valid economic-financial tool based on 3 key aspects. Firstly, it helps to explain how the different components and parts of a company can integrate to provide value to the customer. Furthermore, this scheme, made up of strategies and interconnections, serves to outline the links between the supply chain and the stakeholder networks [76]. Finally, the BMC explains how from these interconnections it is possible to generate value in the production of a good, thus implementing the company's profits (Joyce et al., 2016). It is divided into nine blocks: key partners, key activities, key resources, value proposition, customer relationships, customer segments, distribution channels, cost structure and revenue streams. These items can be grouped into four main areas activities: supply, customer infrastructure and finance.

Conclusion

The performed analysis provides some useful market opportunities derived by sea urchin waste. That of the sea urchin market certainly turns out to be interesting and full of potential to be seized. In addition, sea urchin waste can be reused for new innovations in the fields of biomedicine, pharmaceuticals and cosmetics.

The reuse of sea urchin waste is a clear example of how a circular economy model can be adopted for companies to be successful. Through this virtuous model, they can be projected towards a green economy based on a more eco-sustainable vision.

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