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The Complex Role of Single-Use Compostable Bioplastic Food Packaging and Foodservice Ware in a Circular Economy: Findings from a Social Innovation Lab

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Abstract

Incorporated into institutional and corporate sustainability programmes, compostable bioplastic food packaging and foodservice ware is gaining popularity as a replacement for plastics derived from petroleum. Compostable bioplastics, on the other hand, come with their own unique set of complex issues and constraints that affect sustainability throughout their lifecycle. In some cases, these issues and limitations may even prevent the adoption of sustainable waste management techniques and, consequently, the growth of a circular economy. This study examined, from a systems viewpoint, the opportunities and constraints of biodegradable bioplastic food packaging and foodservice ware in encouraging sustainable production and consumption. It did accomplished by using a methodological approach from the social innovation lab. The results of key informant interviews with 28 participants and three workshops on social innovation with 27 participants each on "viewing the system," "creating solutions," and "prototyping," and 22 participants on various stakeholder groups are used in this study.

Keywords: Recycled bioplastics; Cyclical economy; Handling of waste; Social change; Food packaging made of plastic

Introduction

Plastics are widely used in the food supply chain because they are a tough, lightweight, and adaptable material that makes moving and, in certain situations, preserving food easier. More than 8 million tonnes of plastic slip into the ocean each year, though, making plastic pollution a rising global issue. Since more than 90% of plastics are derived from fossil fuels, the amount of plastics produced globally is expected to quadruple over the next 20 years. At the current rate of growth, plastics are estimated to consume 15% of the global yearly carbon budget by 2050. 26 percent of all plastics manufactured are utilised for packaging, where they lose 95 percent of their material worth [1].

Bio-based biodegradable plastic packaging is one technical advancement that has surfaced as a viable remedy for decreasing the usage of fossil fuels for plastic food packaging and foodservice ware while minimising plastic pollution. Biodegradable refers to the property of breaking down into natural substances such as water, carbon dioxide, and compost. Bio based refers to the extent to which the plastic is formed entirely or in part from biomass. Only bio-based bioplastics are taken into account when discussing bioplastics in this research [2, 3]. Takeout containers, cups, cutlery, straws, wraps, bags, and boxes are examples of goods used for food storage, transportation, retailing, and serving that fall under the category of food packaging and foodservice ware. Please take note that there are no liner bags included for collecting food waste for composting.

Renewable biomass resources, including corn, sugarcane, and algae, are used in part or in full to create bio-based polymers. By being broken down by environmental microbes, biodegradable plastics can be transformed into organic materials like compost, carbon dioxide, and water. The existence of biodegradable and compostable plastics that are not bio-based and the fact that bio-based plastics are not always biodegradable or compostable should be noted. Confusion among consumers and incorrect disposal are made possible by the large variety of bioplastic products. Compostable bioplastics, which must be treated under specified conditions and are often found at industrial facilities, are the focus of our attention within the category of biodegradable plastics [4, 5, 6].

Circular economy and compostable bioplastic packaging

Many organisations are now taking into account these items in their goals for circularity and sustainability. Compostable bioplastic food packaging and foodservice ware are being promoted as one "sustainable" alternative to fossil fuel-based plastics in the food. Due to the possibility of using otherwise discarded resources, agricultural by products, or waste materials as the feedstock, compostable bioplastics are a significant intervention in the field of circular economy. Compostable bioplastics play a significant role in these proposals, which increasingly include the circular economy's tenets in order to solve plastic waste and fossil fuel consumption [7]. The New Plastics Economy report by the Ellen MacArthur Foundation.

A solution for material sustainability that has gained popularity in recent years is the circular economy concept. One of the definitions of the circular economy that is most frequently used is a system that is founded on design and the idea "that products and materials are circulated at their best value at all times". To put it another way, the circular economy aims to "transform supply chains into supply loops" and imitate nature's circular processes as opposed to the prevalent "take-make-waste" linear system of production and consumption. Resource depletion, waste production, and pollution are all problems that the circular economy seeks to address. So, solutions for a circular economy focus on both inputs [8, 9].

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Conclusion

Corn, sugarcane, and algae are just a few examples of renewable biomass sources that are partially or entirely used to make bio-based polymers. Biodegradable plastics can become organic materials like compost, carbon dioxide, and water by being broken down by environmental bacteria. It is important to be aware that bio-based plastics are not necessarily biodegradable or compostable as well as that there are biodegradable and compostable polymers that are not bio-based. 2018 European Bioplastics the wide range of bioplastic goods allows for customer confusion and improper disposal. Our research focuses on compostable bioplastics, which must be handled under specific circumstances and are frequently encountered at industrial facilities [10].

Potential Conflicts of Interest

No conflict or competing interests in the publication of this paper.

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