# UPCYCLED TREAT: RETHINKING CONSUMPTION AND RECOGNIZING THE POSITIVE IMPACT OF UPCYCLED FOOD PRODUCTS

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RESEARCH ARTICLE

## Abstract

*This study addresses the global challenge of food waste by investigating consumer awareness and the impact of upcycled food products. We aim to develop sustainable solutions by transforming nearly wasted supermarket fruits and vegetables into value-added products through fermentation. The project utilizes a fermentation process to enhance the nutritional value and extend the shelf life of the products. Methods include forming partnerships with local supermarkets, securing a fermentation facility, and complying with safety regulations. We promote consumer consciousness through social media and provide a unique app to track the carbon footprint of each product. Results indicate that fermentation is an efficient, low-cost method to preserve food while maintaining its organoleptic properties. The upcycled products appeal to health-conscious consumers, contributing to sustainability by reducing food waste and encouraging environmentally friendly consumption habits. This approach was started in Cluj-Napoca, Romania, and has the potential to be expanded to other regions, fostering broader adoption of upcycled food products. The findings displayed the viability of using nearly wasted food for upcycling, presenting a scalable model for sustainable food production.*

**Keywords:** Upcycling, upcycled food, food waste, fermentation, sustainability, carbon footprint

## INTRODUCTION

Food waste has received attention in the past years. Globally, about 1.3 billion tonnes of food worth USD 1 trillion (FAO, 2015) are wasted annually, representing a significant problem that demands immediate attention (FAO, 2011). Food wastage occurs at all stages in the food supply chain namely in the production, storage, processing, distribution, retail, food service, and consumption (FAO 2013). In Europe, 40% of waste is produced at the production, handling/storage, and processing stages while the other 60% is at the distribution, retail, and consumption stage (Lipinski et al., 2013). This is associated with the carbon footprint, which is an index to determine the total amount of greenhouse gases produced by human activities that add to the atmosphere (Pandey and Agrawal, 2010). These greenhouse gases cause a rapid rise in global temperature, which leads to global warming and climate change. To minimize the problem of food waste and its effects on the environment, food upcycling is one of the effective ways. According to the Upcycled Food Association, food upcycling is the process of transforming food into new products or ingredients of better quality that would otherwise end in the food

destination. These upcycled foods are value-added foods that are produced or processed in a way that increases theireconomic value. By taking part in the solution ofreducing waste, can ensure food security for therapidly increasing population to provide the necessary calories and nutrients for over seven billion people. Upcycled Treat is a business idea based in Cluj-Napoca, Romania, where it aims toaddress the issue of food waste through the use of innovative solutions for the nearly-wasted foods in supermarkets, particularly fruits and vegetables. The approach involves the use of fermentation techniques to upcycle fruits and vegetables, allowing them to be preserved longer while enhancing their nutritional value. This business idea can substantially help to reduce food waste, as it is not only easy to implement but also resource-efficient, as fermentation is a straightforward process and nearly wasted food products can be sourced at lower costs. On the other hand, it is well-known that consumers often prefer visually appealing fruits and vegetables. However, when ugly and nearly-discarded fruits and vegetables are upcycled and transformed into ready-to-consume finished products, their appearance becomes less critical, yet they

remain attractive and edible to consumers. Moreover, consumers are more likely to engage in sustainability initiatives and efforts to reduce food waste when they are empowered with sufficient knowledge and information aboutfood upcycling and carbon footprints. Therefore, the objective of this research is to conduct a business analysis using methodologies such as SWOT analysis and Porter's Five Forces. Thisanalysis aims to identify effective strategies for launching the upcycled treat business while simultaneously empowering consumers through the implementation of a QR code system in the products. This system will enable consumers to track and understand the carbon footprint associated with the food products they consume.

## MATERIAL AND METHODS

The strategic planning of the business, which involved scouting/profiling of retail shops and supermarkets, establishing partnerships, procuring raw materials and processing equipment, processing products, and marketing and promotion, was conducted in Cluj-Napoca, Romania. The framework of this research was created to generate a business opportunity for upcycled foods from nearly wasted fruits and vegetables and transform them into value-added products through fermentation. Additionally, the incorporation of a QR code system was introduced in the packaging to track the carbon footprint of the products and to raise awareness among the consumers on their role in contributing to sustainability and environment preservation. This idea was conceptualized to leverage the market growth of upcycled foods, particularly in Europe. SWOT Analysis and Porter's 5 Forces were used for analyzing and visualizing the implications of the upcycled products in the market.

## RESULTS AND DISCUSSIONS

Creating value-added products using almost wasted foods is not a new practice. Converting them into foods or ingredients for foods are just some examples of how to maximize their use. Several available and easy techniques could be used to create innovative products that are both environmentally friendly and of high quality. One such technique is the fermentation process, which involves the use of microbial enzymes to convert sugar into acids, gas, or alcohol (Taviera et al., 2021). Nowadays, fermentation has been widely used to improve the shelf life of raw foods while maintaining their organoleptic characteristics and nutritional properties. Additionally, from an economic standpoint, the fermentation technique is considered an inexpensive process that requires minimal energy to preserve foods (Samtiya et al., 2021). To better understand the competitive advantages and disadvantages of the business idea of Upcycled Treat, a SWOT analysis was conducted to assess the factors affecting the business model.

### SWOT Analysis

*Strengths*

Innovative product development in upcycled fermented foods offers significant opportunities to experiment with various fermentation techniques, ingredients, and flavors. Also, it is easier to create unique products for consumers with diverse preferences and dietary needs. The fermentation technique can enhance the nutritional profile and shelf-life of food products, while also creating unique flavors and experiences for consumers (Savor et al., 2018). The techniques that can be used are lactic acid fermentation, ethanol fermentation, and acetic acid fermentation. Moreover, these techniques can create products using food by-products such as fruit peels vegetable scraps, and other novel ingredients to develop unique flavors that can attract modern culinary and mainstream markets. Aside from its innovative concept, it also supports sustainability and quality. Nowadays, consumers support brands that align with their values of environmental sustainability and health consciousness. With proper brand positioning, the company can attract a loyal customer base and differentiate themselves from others.

*Opportunities*

Cluj-Napoca has numerous academic and research institutions with expertise in food technology and business. Partnering and collaborating with these local institutions can enhance product innovation and visibility. Aside from that, Romania has rich traditional practices of fermented foods such as sauerkraut and pickles, which can be adapted and marketed using modern fermentation techniques. Upcycled Treat is advantageous since it provides a strong foundation for consumer acceptance and product differentiation. On the other hand,

fermented products have become popular in recent years due to their health advantages, unique flavors, and contribution to sustainability. Thus, making these foods more and more popular. According to a market research report conducted by Business Research Insights, the global market for fermented food products is expected to increase from USD 1425.3 million in 2022 to USD 2131.53 million by 2031 with a Compound Annual Growth Rate (CGAR) of 46% during the forecast. Through this, Upcycled Treat can leverage the trends and popularity of fermented products such as Kombucha and sauerkraut to attract more health-conscious demographics.

*Weaknesses*

Cluj Napoca is situated in a region with a diverse agricultural base, providing various potential raw materials for upcycled food production. However, the availability of these materials is influenced by seasonal variability. Since agricultural products used for fermentation are only sometimes available throughout the year, it affects the quantities of fermented products to be produced. For instance, the production of some fruits and vegetables peaks during certain months, resulting in varying quantities of waste and by-products available for upcycling throughout the year.

*Treats*

Consumer perception of upcycled foods plays a critical role in the success of the business. While there is a growing awareness and acceptance of sustainable practices among consumers, there are still some consumers who are skeptical about the safety, quality, and nutritional content of waste products (Aschemann-Witzel et al., 2015). Marketing efforts must focus on educating consumers about the health benefits and sustainability aspects of upcycled fermented foods to improve acceptance and drive demand (Parfitt et al., 2010).

One of the primary challenges in establishing an upcycled food business is navigating the complex and evolving landscape of food safety regulations. The European Union has strict food safety standards that must be met, which include regulations on the production, labeling, and sale of fermentedfoods. Compliance with these regulations is essential to ensure product safety and gain consumer trust (European Commission, 2020). Additionally, local regulations in Romania must be followed, which may require constant monitoring and adjustments to business practices to stay compliant (Romanian Ministry of Agriculture and Rural Development, 2019).

**Porter's Five Forces Analysis**

*Competitive Rivalry*

The market for upcycled products is valued at approximately $53.7 billion and is projected to increase to $97 billion by 2031 (Upcycled Food Association, 2021). This significant growth attracts a substantial number of competitors, intensifying competitive rivalry. Upcycled Treat must strategically position itself to differentiate from competitors. Key strategies include product differentiation, unique selling propositions, and innovative marketing approaches to maintain a competitive edge in this expanding market (Porter, 2008). This will give the company a better view of the market and its offerings.

*Buyer power*

The buyer power in the upcycled products market is relatively high due to the broad consumer interest in sustainable products (Nielsen, 2018). The substantial number of buyers in the market can lead to increased price negotiations, potentially driving prices down. To mitigate this influence, Upcycled Treat must focus on maintaining high levels of customer satisfaction and loyalty. Strategies such as offering premium product quality, ensuring transparent sourcing, and providing excellent customer service are essential in fostering a loyal customer base less sensitive to price variations (Kotler & Keller, 2016). Consumers exhibit low price sensitivity towards upcycled products, as many are willing to pay a premium for products that contribute to environmental sustainability (Euromonitor International, 2020). Upcycled Treat's value proposition includes not only the quality of the product but also its positive environmental impact. This low price sensitivity can be leveraged to maintain robust profit margins while emphasizing the ecological benefits associated with the products (White et al., 2019). Additionally, Upcycled Treat has developed a mobile app that allows consumers to track the carbon footprints of their purchases. This app enables all involved actors to add information about the product each time it is transferred from one place or phase to

another, providing transparency and fostering a deeper connection between consumers and the environmental impact of their purchases. This innovative feature can enhance customer loyalty by promoting eco-conscious purchasing decisions.

*Threat of Substitution*

The threat of substitution for Upcycled Treat's products is high due to the availability of alternative products or solutions. The ability of buyers to substitute upcycled products with alternatives is relatively high, mainly due to the current low familiarity with upcycled foods. Grasso and Asioli (2020) reported that 85% of consumers were not familiar with upcycled foods. However, there is a potential for market growth, as consumers are willing to consider purchasing upcycled products to help the environment, reduce food waste, and explore new flavors. Upcycled Treat can address this by educating consumers on the benefits of upcycled foods, highlighting their unique tastes, and promoting their positive environmental impact (Grasso & Asioli, 2020). Upcycled Treat should concentrate on offering unique value propositions and differentiation to combat this threat. Emphasizing the superior quality, unique taste profiles, and clear environmental benefits of its products can help in building a loyal customer base. Additionally, continuous innovation and adaptation to consumer preferences can further reduce the threat of substitution, ensuring that Upcycled Treat remains a preferred choice among consumers (Porter, 2008).

*Threat of New Entrants*

The threat of new entrants into Upcycled Treat's market is also high. If new competitors can quickly enter the market, they may weaken Upcycled Treat's position. To counter this threat, Upcycled Treat should focuson building barriers to entry such as brand loyalty, unique product offerings, and strong partnerships (Barney, 1991). Utilizing specialistknowledge, such as the ability to transform nearly discarded products into value-added food items through fermentation, provides a significant advantage (Schanes et al., 2018). Collaborating with other upcycled food manufacturers or organizations throughout the food supply chain can help achieve economies of scale. From a future research perspective, it is important to ensure that economic measures are included alongside the environmental and social impacts of individualized upcycled food initiatives to ensure the industry's financial viability and growth (Rogers et al., 2019).

*Supplier Power*

The Supplier power in the upcycled food industry can vary depending on the availability of nearly discarded products and the relationships with suppliers. Since Upcycled Treat sources its raw materials primarily from surplus produce that would otherwise go to waste, supplier power may be lower compared to traditional food production. However, forming strong partnerships with suppliers,such as local supermarkets and farmers, can ensure a consistent supply of raw materials at favorable terms. By leveraging these relationships, Upcycled Treat can maintain a stable supply chain and reduce the risk of supplier power negatively impacting its operations (Gereffi et al., 2005).

By systematically addressing these five forces, Upcycled Treat can effectively navigate the competitive landscape, capitalize on consumer trends toward sustainability, and establish a strong, differentiated brand in the growing market for upcycled products.

## CONCLUSIONS

The study demonstrates that upcycling nearly wasted supermarket fruits and vegetables through fermentation is a viable and effective approach to reducing food waste. The fermentation process not only preserves the nutritional value and extends the shelf life of these products but also appeals to health-conscious consumers, contributing to sustainable consumption practices. The project's success in Cluj-Napoca highlights the potential for scaling this model to other regions, fostering broader adoption of upcycled food products. By leveraging partnerships with local supermarkets and utilizing a unique app to track carbon footprints, Upcycled Treat promotes environmental consciousness among consumers. The results underscore the economic and environmental benefits of upcycling, presenting a sustainable and scalable solution to global food waste challenges. Future research should explore the economic impacts and scalability of such initiatives to ensure long-term viability and industry growth.

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