

Current practices, drivers and barriers to advance a circular economy: Insights from the Massachusetts craft beer sector

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This presentation will discuss the U.S. craft beer industry business model innovations and collaborations to advance sustainable waste management and a circular economy (CE). Presenters will share insights from a U.S.-based research project that examined the current practices, drivers, and barriers for advancing waste reduction, with focus on brewers spent grain (BSG). Many corporations fail to incorporate CE principles into their business strategy due to budgetary restrictions, logistical hurdles and a lack of regulatory mandates. Small businesses on the other hand, are often best positioned to experiment with sustainability strategies as they do not face the shareholder pressures to deliver quarterly profits and often prioritize their commitment to support their local community and the environment (Purwandani & Michaud, 2021; Westman et. al. 2018; Luederitz et. al. 2020).

Craft beer has experienced rapid growth in the U.S. and globally in recent years. In Massachusetts alone, the number of craft breweries increased from 34 in 2007 to over 240 in 2022 (Mass Brew, 2023). The industry is very sustainability-committed, with many small entrepreneurial players committed to local sourcing, reducing energy, water and chemical use, preventing waste, and promoting social justice and community wellbeing (Ness, 2018; Rosburg & Grebitus, 2020). These companies are typically privately held, employee-owned or certified as B-Corp (benefit corporations) and their mission often includes supporting their local community, the environment and regenerative agriculture. At the same time, beer manufacturing is a water- and energy-intensive process, which generates a significant amount of waste (both liquid and solid). BSG is the largest source of waste and represents about 85% of the total by-products by weight in the brewing industry (Zeko-Pivac et. al. 2022). It is estimated that every 6-pack of beer uses about one pound of grain; approximately 20 million pounds of BSG are generated in the U.S. each year (Regrained, 2020). Discarded BSG can pollute water, soil, and air (in case of waste incineration) and thus negatively impact human health and the environment. It also represents a significant cost for brewers. In states such as Massachusetts, where disposal of organic waste is banned (MassDEP, 2023), breweries typically have three main options to manage spent grain: a) send it for composting where they typically pay by weight; b) send it to local farms for animal feed (a zero cost or revenue generating option where farmers remove BSG from the property and may even pay for it), and c) provide it to startups which are upcycling it into products such as flour, dog biscuits, and energy bars for human consumption (Veleva & Foley, 2018; Ness, 2018; Jakowski et. al. 2020). Examples of startups upcycling BSG include: Rise Products Inc¹ (making spent grain flour, brownies and upcycled granola), Brewers Food² (making pretzels, flatbreads, chips and cookies), OURgrain (flour and baking mixes), Brew Biscuits (upcycling BSG into dog biscuits)³, and Tender Food (vegetable protein meat analog using BSG).⁴

Many stakeholders have been working with the craft brewery industry in the U.S. to support a sustainability transition, including state and federal policy makers, the national Brewers Association, state brewers' guilds, universities, and other partners along the value chain. While research and academic studies about the craft beer industry have been growing, there is still a gap in understanding the current practices, drivers and barriers faced by small craft breweries in adopting sustainability initiatives and preventing waste generation (Bahl et. al. 2021; Sozen et. al. 2021; Rahman et. al. 2023). Yet, understanding these is critically important for devising effective policies and actions to transition the entire industry towards a circular economy.

¹ <https://www.riseproducts.co/shop/barley-flour>

² <https://www.brewersfoods.com/>

³ <https://brewbiscuits.com/#home>

⁴ <https://tenderfood.com>

This presentation will examine the following questions: How are sustainable waste management partnerships developed? What conditions (company, product, supply chain, market/societal) have led to their success? What are the main challenges facing craft beer entrepreneurs in adopting circular business models, and where do they see the greatest opportunities? What are the environmental and social impacts of different waste reduction strategies and how do companies prioritize these? The presentation is based on a research project funded by the U.S. Environmental Protection Agency which involved a survey, site visits and assessments of 30 craft breweries in Massachusetts, USA. Data collection was conducted between October 2022 and May 2023 and included: a) a survey of craft breweries, b) site visits and assessments, and c) publicly available data from breweries' websites and social media.

The research revealed that Massachusetts craft breweries have been most successful in addressing sustainability issues in the areas of spent grain management (95% assessing their performance as 'good' or 'excellent'), recycling (77%), and composting (65%). The most challenging sustainability areas for them include wastewater reduction (12% assessing their performance as 'excellent' or 'good') and reducing the use of hazardous chemicals in cleaning and sanitizing (24%). The study found that despite the lack of federal regulation in the U.S. to advance CE business models, a growing number of small, mission-driven companies are taking advantage of shifting business conditions (including customer demand, state initiatives, stakeholder pressures, and cost benefits of CE principles) by offering waste repurposing and upcycling. There is a need to increase the industry knowledge and networking opportunities regarding CE which can create more potential income while reducing the environmental impacts. Market research indicates consumers will pay more for sustainable beer (Carley & Yahng, 2018) and prefer brands that follow sustainability practices. Based on empirical research the authors will discuss the emerging drivers, business models and innovative collaborations, challenges faced by companies interested in supporting waste repurposing and the circular economy, and the opportunities they see in the future.

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