

Alternatives to single-use plastics: Introduction

RSM UK Consulting LLP (RSM) in conjunction with Dr Samuel Short (University of Cambridge) and the University of Birmingham Library Services, were commissioned by the Food Standards Agency (FSA), to carry out a rapid evidence assessment to develop an understanding of the alternatives to single-use plastics in food packaging and production.

3.1 Background

The global food industry's reliance on single-use plastics is having large negative impacts on the environment (for example, Sheehan, 2017; Kershaw, 2018). Every year in the UK, 2.5 million metric tons of plastic waste is generated, equivalent to 98.7kg per capita (Statista, 2023). This waste ends up as a source of environmental pollution which damages natural ecosystems and creeps into our food chain through the ingestion of microplastics. While consumer preferences are gradually drifting towards alternatives which are perceived to be more sustainable, the health and safety risks and sustainability credentials of emerging solutions are yet to be fully explored. It is imperative that the FSA are fully equipped with current evidence on the risks and opportunities of alternatives in order to develop an appropriate strategy which considers all aspects in terms of benefits and costs to UK businesses, consumers and the natural world.

Policy context

There have been recent changes in the policy landscape for single-use plastics within the UK. In 2022, plans were announced for a ban on single-use plastic plates, trays, bowls, cutlery, balloon sticks, and certain types of polystyrene cups and food containers, to be effective from October 2023 (UK Government, 2023) and previous bills to restrict the use of single-use plastic drink stirrers, straws and cotton-buds (enforced in October 2020). This has followed the five pence single-use carrier bag charge (now 10 pence minimum), which led to a decrease in plastic bag sales of 95% from 2015 to 2021 (Defra Press Office, 2021). In Northern Ireland (NI), since 1st April 2022, the single-use carrier bag levy increased to 25 pence (NI Government, 2022). Since the levy was introduced in NI, more than £19 million has been raised and used to support local environmental projects (BBC News, 2020).

Furthermore, a Plastic Packaging Tax, first proposed in the UK Budget in 2018 but introduced in 2022, applies to the manufacturing or importation of plastic packaging which is not comprised of at least 30% recycled material (UK Government, 2022). The transition away from single-use plastics is mirrored in policy changes across the globe. A few significant changes include:

- The EU's Directive on Single-Use Plastics, which has caused legislative action in 23 countries since 2019, including single-use plastic bags, plastic taxes, reusable product targets and regulations (EUR-Lex, 2019).
- many countries, including India, Canada and Kenya have established outright bans on the manufacturing, distribution, sale and use of numerous single-use plastic items, with many

other countries such as the USA, China, Brazil, Mexico, Chile having similar policies on a regional basis (Behera, 2022).

- the Canadian government is providing support and funding for SMEs to develop sustainable alternatives to plastic packaging through its Canadian Plastics Innovation Challenge (Government of Canada, 2021). The EU has similar funding schemes through Horizon Europe Research and Innovation (European Commission, 2018).

3.2 Study aims

This research aims to establish a baseline understanding of the risk and opportunities associated with use of alternatives to plastics in the food system in terms of:

- sustainability (for example, environmental impact, recyclability, biodegradability)
- food safety (for example, protection from contamination).

This research also aims to identify the main alternatives to single-use plastics in terms of materials and their functions and to understand potential future developments in this area. The outcomes of this research have the potential to inform future policy and regulation decisions as well as guide the development of further research. The scope of the project has been centred on the following research questions:

1. What are the single-use plastic alternatives emerging in food production and packaging, and what risks and opportunities do the alternatives pose?
2. To what extent are the alternatives already in use?
3. What trajectory are the alternatives are likely to take, over the next ten years, in terms of innovation, adoption, spread, and becoming established in the industry and what are the associated enablers and barriers, including regulatory approaches and policy initiatives?
4. Are there any changes required to UK food regulation in the context of the alternatives, and if so, what are the potential changes at the legislative, governance, training and enforcement levels?

STEEPLE theme analysis has been used to analyse the available evidence and inform each research question. STEEPLE analysis involves consideration of the following elements:

- **Social**, for example, food safety for the general public and specific consumer groups (allergens, pathogens, toxicity, cross-contamination); food availability, nutrition, choice; food fraud/crime and traceability; consumer awareness, and attitudes towards alternatives
- **Technological**, for example, materials, functionality, durability
- **Economic**, for example, cost-effectiveness, market maturity, business model innovation (for example, circular business model, retail model), adoption and spread of innovation/solution (current and future)
- **Environmental**, for example, sustainability including carbon footprint, resource use, waste and pollution in production, transport, storage, disposal
- **Political**, for example, legislation, advocacy
- **Legal**, for example, regulatory and enforcement
- **Ethical**, for example, accountability, responsibility.