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ORIGINAL ARTICLE

"Fika in the Anthropocene": leveraging food systems transformations through food cultures

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Abstract

The role of food cultures in food systems transformations is gaining prominence in scholarly discourse. However, several food cultures rely on products with substantial environmental and socio-economic impacts and risks, raising questions about their potential role in transformation processes toward more sustainable food systems. One such example constitutes the Swedish *Fika*, the daily practice of having coffee and pastries in company as an important social care institution. Based on ingredients like coffee, cocoa, and palm oil, it relies on products associated with high environmental and socio-economic impacts and risks. This paper draws on resilience theory and uses pathways as a conceptual approach to explore how Fika as an illustrative food cultures can be adapted to societal targets and anthropogenic challenges in order to preserve its deeper social value in the long term. We first outline the interlinked environmental and socio-economic impacts and threats associated with *Fika* ingredients. We then develop two distinct exemplary pathways, "less but better" and "innovated" *Fika*, to illustrate potential strategies that could mitigate adverse impacts while enhancing its resilience to anthropogenic challenges. Finally, we discuss the potential of these pathways to leverage wider dietary transitions by permeating throughout the food system. We propose that viewing individual food products within their cultural context (*the food cultural lens*) provides the opportunity for a paradigm shift, using food cultures as strategic entry points and levers for wider food system transformation. Further multi- and transdisciplinary research is required to evaluate the effectiveness of these pathways as well as the broader potential of food cultures to leverage food system change.

Keywords Food cultures · Fika · Food system transformation · Leverage points

Introduction

Food systems in the Anthropocene era are currently unsustainable for both people and the planet (Afshin et al. 2019; Crippa et al. 2021). Consequently, a *Great Transformation* (Willett et al. 2019) has been suggested to achieve healthy, sustainable and equitable diets from sustainable food systems (Biesbroek et al. 2023). The cumulative literature on food systems transformations argues that a change toward more sustainable and healthy diets is imperative to achieve international targets, such as the United Nation's Sustainable Development Goals (e.g., Chaudhary et al. 2018).

However, the current discourse on food systems transformations has been criticized for lacking a deeper focus on cultural explicit needs and the appreciation of cultural values (Tulloch et al. 2023). Scholars increasingly advocate for more context-specific solutions for transforming food systems, based on local cultures and views (Webb et al. 2020). They argue that pathways and solutions should be appropriately designed and adapted to address the real-world challenges and cultural needs of a specific context, particularly to address the *how* in transformation processes (Biesbroek et al. 2023). This necessitates understanding, respecting, and leveraging food cultures for the successful design of transformative pathways toward sustainable and just food systems (iPES Food 2021; The EAT–Lancet 2.0

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Commissioners and Contributing Authors 2023; The Food Culture Alliance 2023).

While no universally accepted definition exists to describe what constitutes culturally acceptable food consumption (House et al. 2023) or a food culture (Mingay et al. 2021), it has been referred to as the process of extending food products' nutritional value into identity, in the way it is cultivated, prepared and consumed by a society (Tellström 2011). In this sense, food cultures serve as a key driver of cultural identity, provide a sense of well-being and play a pivotal role in local to national to global development policies (UNESCO 2019). To be classified as healthy and sustainable, diets have to be culturally acceptable according to the working definition by the United Nations (FAO and WHO 2019).

However, some food cultures drive demand for unhealthy and unsustainable foods (The Food Culture Alliance 2023), and are vulnerable to current and future environmental changes. They depend on products with substantial anthropogenic impacts and risks, such as climate-change induced production declines. This raises the question of how these food cultures can be integrated into transformation processes toward more sustainable food systems.

In this paper, we aim to explore how such food cultures can be adapted to societal targets and anthropogenic challenges in order to preserve their deeper social value in the long term. We draw on resilience thinking (Folke 2006; Haider and Cleaver 2023) which suggests that systems facing disturbances need to undergo adaptations to maintain their overall identity (Cumming and Collier 2005; Rotarangi and Stephenson 2014), and develop two exemplary pathways to explore potential trajectories for the food culture to adapt.

As an illustrative example of food cultures, we utilize the Swedish tradition of *Fika* that constitutes a socio-cultural phenomenon and important social care institution, traditionally consisting of a cup of coffee accompanied by a sweet pastry. This case study is chosen for three main reasons: (i) The food items that constitute *Fika* are linked to multiple adverse social and environmental impacts in producing countries, particularly the high coffee consumption contributes substantially to the environmental impact of the Swedish diet (Moberg et al. 2020); (ii) the cumulating literature on sustainable dietary transformation predominantly focuses on main dishes and rarely on intermediate meals (Yngve et al. 2023) albeit they can constitute a high percentage of the caloric intake and environmental impact of diets (Bunge et al. 2024); (iii) a range of alternatives and strategies for more sustainable and climate change-resilient *Fika* product consumption are available or emerging and could mitigate the environmental and social impacts of current consumption patterns.

This paper is structured as follows: we begin by introducing *Fika* as a case study for food cultures and describe the methodology employed. We then outline the multiple interlinked environmental and socio-economic impacts and threats associated with the production and consumption of the food products constituting *Fika*. Next, we outline two exemplary pathways and associated strategies for transitioning to a *Fika* culture with reduced adverse impacts from the products consumed which we title*:* "*less but better*" *and* "*innovated*" *Fika.* Finally, we discuss how using food cultures as an entry point could leverage wider change in the food system and how the insights developed in this paper can be translated to the role of food cultures in transformation processes generally.

The Swedish Fika as a case study for food cultures

Fika is an inherent part of the Swedish (food) culture that comes in different shapes and forms. The traditional *Fika* consists of a cup of strong black filter coffee paired with a sweet pastry, such as the cinnamon bun or seasonal pastry specialities (Visit Sweden 2023). While often associated with enjoying a cinnamon bun and a cup of coffee, *Fika* is "*so much more than that*"—as referred to in a multitude of attempts to define it (Almroth 2020). Functioning both as a noun and a verb, *Fika* is the combination of coffee with sweet pastries (*the Fikabröd*), as well as a social gathering (Visit Sweden 2023). It represents a ritual and socio-cultural phenomenon with the essence of taking a break while spending time with other people (Caprioli et al. 2021), embodying a Swedish form of social engagement, an emotional language of inclusivity, and a social care institution (Almroth 2020). *Fika* constitutes a daily experience for most Swedish residents, from everyday life to professional settings, reflecting flat hierarchies and inclusive workplace cultures (Yngve et al. 2023). It is an integral part of the working day in Sweden, with residents spending an average of 1.5 h per week, or almost 70 h annually, having *Fika* at their workplace (Fairtrade Sweden 2024).

Sweden ranks among the highest per capita coffee-consuming countries globally, with an average annual consumption of 7.8 kg of roasted ground coffee per person (Swedish Board of Agriculture 2022). This equates to around three large cups of coffee per day, making it the second most consumed beverage after water (Scander et al. 2018).

The average annual consumption per capita of the accompanying *Fika* pastries amounts to 15.3 kg (Swedish Board of Agriculture 2022). Other data reflect *Fika* traditions, such as the variety of pastry days celebrated in Sweden. For instance, on the national Cinnamon Bun Day in the year 2023, an estimated 9.5 million cinnamon buns were sold (GfK and Bakers Confectioners 2023), nearly equalling Sweden's population size of 10.5 million (SCB 2024).

Other pastries often served for *Fika* are sticky chocolate cake, chocolate balls, or princess cake, as well as the more seasonal pastries such as shrovetide bun, saffron buns, ginger bread and strawberry cake (Almroth 2020) (Fig. 1 provides an overview of *Fika* and its main food ingredients).

Beyond cultural significance, *Fika* serves as a destination branding and public diplomacy tool and has been largely commercialized (Caprioli et al. 2021). As such, *Fika* provides an economic resource through generating employment (SCB 2017) and serving as a tourist attraction (Caprioli et al. 2021; Visit Sweden 2023).

Material and methods

Data collection on environmental and socio-economic impacts and threats

To mitigate the impacts associated with a food culture and to adapt it to anthropogenic challenges, it is essential to understand the range of impacts and threats associated with the production of its ingredients.

As a first step, we therefore conducted a non-systematic literature review of scientific and gray literature to examine the direct and indirect environmental, climate change-induced, and socio-economic challenges posed by the production of coffee and the ingredients of the accompanying Fika pastries. We prioritized sourcing data from Swedish literature to reflect impact factors relevant particularly for the Swedish context.

More specifically, we sourced the environmental impacts of Swedish consumption of coffee, cocoa, and dairy from two key reports that were commissioned by WWF Sweden to provide a science-based consumer guide targeting Swedish consumers (Eneroth et al. 2022; Karlsson Potter et al. 2020). These reports provide detailed analyses of key environmental indicators, including greenhouse gas emissions, land use, biodiversity impact and water use, focusing on countries with the largest import to Sweden. Climate change-related threats to the production of coffee were derived from reports produced by the Nordic Council of Ministers and the Stockholm Environment Institute, which examined transboundary climate risks to the Nordics based on trade data analysis, stakeholder interviews and scientific literature (Berninger et al. 2022).

Socio-economic impacts were derived from a combination of peer-reviewed articles and gray literature in both English and Swedish, published between 2015 and 2024. Using an inductive approach, we extracted environmental and socio-economic impact factors mentioned in the literature and collected them into a spreadsheet (S1). These impact factors are used to inform the figures throughout the manuscript.

Designing pathways for "Fika in the Anthropocene"

In a second step, we designed two exemplary and divergent pathways in order to explore different trajectories toward a *Fika* culture with reduced social and environmental impacts and increased resilience to anthropogenic challenges, which we title "Fika in the Anthropocene".

The concept of pathways is gaining prominence across sustainability-related fields in response to rapidly intensifying socio-environmental problems (see for example: Future Earth 2023; STEPS Centre 2024). Pathways offer strategic frameworks for guiding the transition toward more sustainable and resilient futures, offering structured approaches to addressing complex environmental, social, and economic challenges (Chan et al. 2020). As such, they describe potential and different trajectories to achieve consistent targets (Haasnoot et al. 2024). They often represent competing and overlapping visions of how certain targets could be achieved, and emphasize the importance of exploring trade-offs associated within these (Hof et al. 2020; Leach et al. 2010).

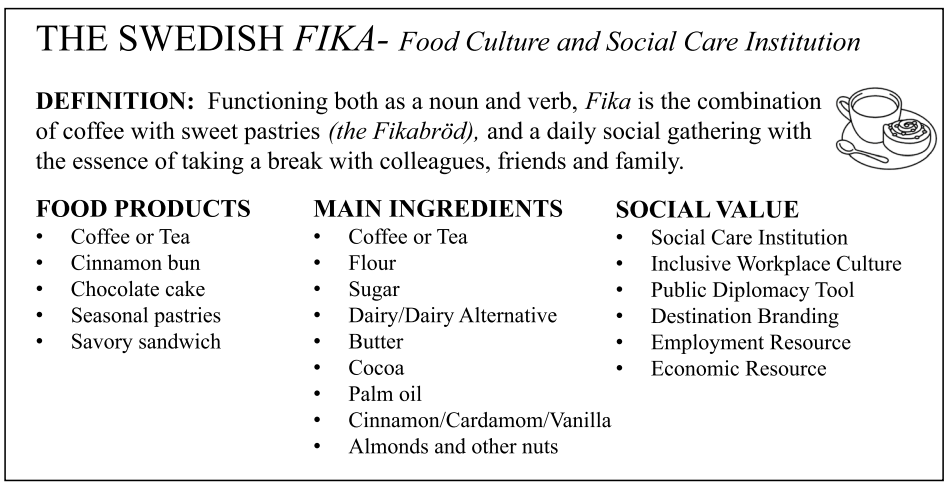

Fig. 1 Overview of the Swedish Fika as a food culture

To reflect different visions for the scenario of "Fika in the Anthropocene", we designed two distinct pathways: "less but better" and "innovated" *Fika*. These pathways were inspired by a set of qualitative scenarios from the large national-scale Mistra Food Futures program in Sweden (Mistra Food Futures 2024), which outlines plausible trajectories for the Swedish food system to meet sustainability and health targets (Gordon et al. 2022). For the illustrative purpose of this paper, we selected two of the most contrasting scenarios from the report and translated them to the *Fika* culture (*Food as Industry* and *Food as Food Tech*). The *Food as Industry* scenario envisions a food system with continued large-scale industrial practices, but with substantially improved efficiencies and consumption patterns, which informed the pathway "less but better" *Fika*. In contrast, the *Food as Food Tech* scenario envisions a food system with high tech innovations (such as cellular agriculture), which we translated to the pathway of "innovated" *Fika.*

The "less but better" pathway employs established low-tech strategies, such as promoting the choice of more sustainable and ethically produced *Fika* products. In contrast, the "innovated" pathway focuses on emerging, tech-driven solutions to substitute conventional *Fika* products with food innovations. To design both pathways, we conducted an explorative investigation by iteratively screening the literature to identify relevant potential strategies for the respective pathways. We selected strategies that aim to mitigate at least one impact or threat associated with the Fika ingredients that we identified in the previous step.

For the "less but better" pathway, we adapted established low-tech strategies outlined in a scientific report on coffee and cocoa targeting Swedish consumers (Eneroth et al 2022). For the "innovated" pathway, we conducted targeted literature searches using terms such as "coffee innovations", "lab-grown palm oil", "cocoa food tech", and "cellular coffee" to identify emerging alternatives to conventional *Fika* ingredients.

These two exemplary pathways offer complementary analytical lenses and approaches for transformation which have been described to be necessary to understand and bring *real-world changes* (Scoones et al. 2020). While presented separately, the two outlined pathways are not mutually exclusive, and could be combined to support a *Fika* culture based on products with reduced adverse impacts. Both pathways should therefore be viewed as illustrative rather than comprehensive, as the primary aim of outlining these pathways is to display that diverse strategies do exist that could provide opportunities to mitigate the adverse environmental and socio-economic impacts of current consumption patterns and adapt them to anthropogenic risks. As such, it is important to note that the objective of this paper is not to evaluate the strengths and weaknesses of the different pathways and strategies but to explore how an explicit focus on food cultures can be viewed as an entry point for food systems transformation.

Findings

The environmental and socio-economic challenges of Fika ingredients

The traditional *Fika* consists of a cup of coffee (sometimes tea) and a sweet pastry (Fig. 1). The main ingredients of the pastries are flour, sugar and dairy in the form of butter, cream or milk. Additional common ingredients are cocoa, almonds, spices such as cinnamon, cardamom and vanilla (Almroth 2020). Industrially produced *Fika* pastries frequently contain palm oil (Naturskyddsföreningen 2021). The production of several of these ingredients is associated with substantial negative environmental and socio-economic impacts such as deforestation and child labor, and threatened by climate change hazards (Ango et al. 2022; Bozzola et al. 2021; Eneroth et al. 2022; Meijaard et al. 2020; van Vliet et al. 2021). These impacts are often interlinked and mutually reinforcing, creating feedback loops between adverse environmental and socio-economic impacts (see examples for coffee in Fig. 2, and S1). Here, we illustrate the impacts and risks associated with three key high-impact and high-risk ingredients: coffee, cocoa, and palm oil.

The expansion of coffee, cocoa and oil palm plantations to meet increasing global demand involves monocultures and drives land use change, deforestation**,** and agricultural intensification, with severe consequences for local ecosystems and biodiversity (Eneroth et al. 2022; Meijaard et al. 2020). They are all classified as *biodiversity-impact hotspot products* in the Nordic diet, due to their production driving deforestation in tropical regions (Ahlgren et al. 2022). The production of coffee and cocoa is further associated with high pesticide use (Cederberg et al. 2019). Given that the average Swedish diet exceeds the global per capita biodiversity boundary six-fold (Moberg et al. 2020), the Nordic Nutrition Recommendations (NNR) advise limiting the consumption of these products (Blomhoff et al. 2023).

The entire coffee supply chain, from cultivation to consumption, carries a substantial climate footprint (Vieira and Lequieu 2021). In the Swedish context, the climate footprint of coffee predominantly originates from the cultivation of green beans in producing countries (57%), while the environmental impact of a cup of coffee is influenced by the type and quantity of milk or plant-based drink chosen (Eneroth et al. 2022). Coffee consumption alone contributes 14–18% to the overall environmental impact of the Swedish diet on consumptive water use, pesticide use, and extinction rate (Hallström et al. 2022).

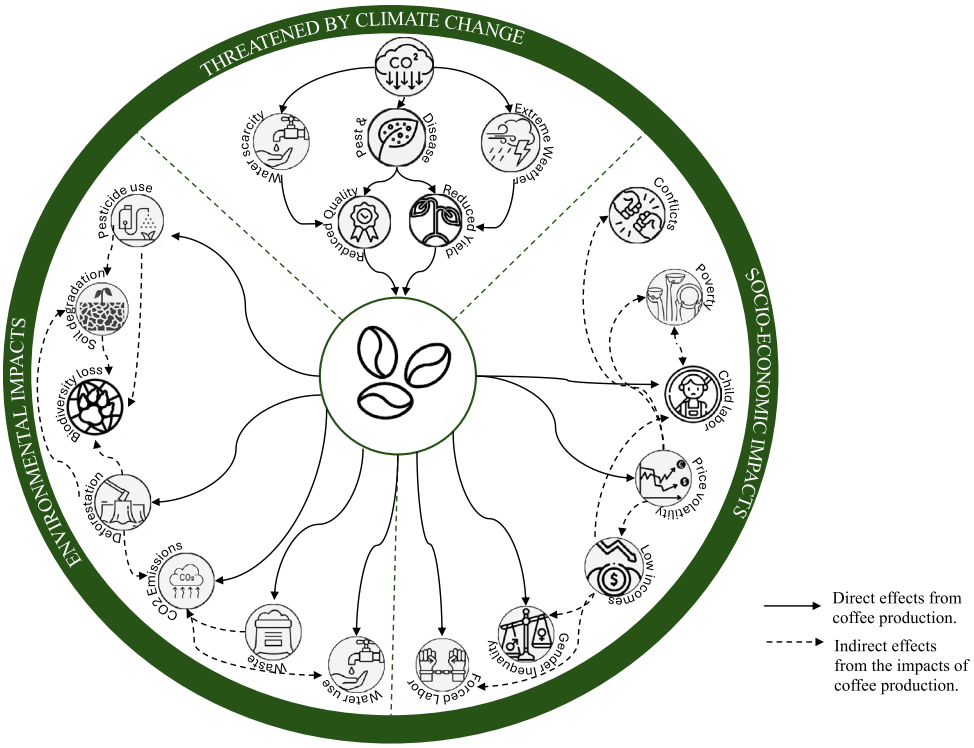

Fig. 2 The environmental and socio-economic impacts of coffee production and its challenge of being threatened by climate change. The figure illustrates the complex interactions of environmental processes, economic structures, and social relations of coffee production (Barreto Peixoto et al. 2023), and the climate-change induced impacts on productivity which is projected to decline, resulting in an inability to deliver on growing demand (Bunn et al. 2015). Detailed references are available in Supplementary Material S1. Credits: Icons are derived from the Noun Project under a Creative Commons License

Furthermore, coffee production and preparation generate substantial amounts of waste, estimated at 23 million tons per year of coffee, which further exacerbates environmental impacts (Durán-Aranguren et al. 2021).

Simultaneously, coffee and cocoa cultivation are largely threatened by climate change due to altered temperatures, weather patterns, and increased pest and disease outbreaks that decrease yields (Bozzola et al. 2021; Gateau-Rey et al. 2018; Vieira and Lequieu 2021). In addition, climate change negatively impacts the quality and taste of coffee (Ahmed et al. 2021) and cocoa (Niether et al. 2017). The suitability of growing coffee crops is projected to decrease by up to 50% (Bunn et al. 2015), causing a potential 45.2% decline in global Arabica and 23.5% Robusta coffee variety production (Adams et al. 2021), while its demand is forecasted to double by 2050 (International Coffee Organization 2023). In fact, coffee stands out as the crop most vulnerable to climate change in the Nordic food supply, anticipating a projected decline of yield ranging from 20 to 60% for key trading partners (Berninger et al. 2022).

The environmental impacts of producing these *Fika* ingredients are deeply intertwined with adverse socio-economic implications, creating feedback loops and often reinforce each other (Barreto Peixoto et al. 2023). For example, climate change-induced harvest losses, together with high price volatility are leading to substantial economic losses for farmers forcing many to leave the industry (International Coffee Organization 2023). Fluctuating harvests due to climate change leading to high price volatility are particularly evidenced by the cocoa sector where prices per ton doubled in the year 2024 (Glauber and Mamun 2024). Cocoa farming is associated with prevailing low incomes leading to many cocoa-farming households living below the poverty line (van Vliet et al. 2021), illegal child labor and modern slavery partly due to low and fluctuating prices (Odijie 2020). The expansion of palm oil plantations has often resulted in the displacement of indigenous communities and smallholder farmers, causing social conflicts and loss of livelihoods (Andrianto et al. 2019).

Prevailing low incomes and extreme poverty among coffee farmers, with an estimated 5.5 million coffee farmers live below the international poverty line of $3.20 a day (Ruben 2023), are strongly tied to the still prevalent child labour in coffee supply chains (Ango et al. 2022), detected in at least 17 countries (ILAB 2022). This has broad-reaching social and economic consequences, affecting children's physical and mental well-being, disrupting their education and prospects, and thus perpetuating poverty cycles in coffee-producing families and communities (Ango et al. 2022). Women in coffee production face specific challenges, including unequal compensation, limited access to resources and decision-making processes, and extensive involvement in labor-intensive activities, such as harvesting and processing (International Coffee Organization 2018).

Other regular ingredients of the accompanying *Fika* pastries also have substantial adverse environmental and socio-economic impacts. Dairy products, consumed in the

form of milk, butter and whipped cream in *Fika* pastries, generally have a higher environmental impact than their plant-based alternatives available at most Swedish retail (Bunge et al. 2024; Röös et al. 2016). The key ingredient sugar is generally over-consumed in Sweden (Amcoff et al. 2012), contributing to adverse effects for public health and the environment (Blomhoff et al. 2023).

In summary, many ingredients central to the *Fika* culture are associated with adverse environmental and socio-economic impacts. They are also vulnerable to climate change, projected to experience reductions in agricultural yields, and thereby threatening future capacity to supply existing demand for conventional *Fika* ingredients. This necessitates exploring pathways and underlying strategies to shift toward more sustainable and resilient ingredients for *Fika*, in order to preserve its social value as a food culture in the long term.

Pathways and strategies to transition toward a more sustainable and resilient *Fika* culture

Here, we outline two distinct exemplary, pathways and their underlying strategies for transitioning toward a more sustainable and resilient *Fika*: "*less but better*" and "*innovated*". In Fig. 3, we present their potential to mitigate current environmental and socio-economic impacts from prevailing consumption patterns in Sweden. The "less but better" pathway employs established low-tech strategies, such as promoting the choice of more sustainable and ethically produced *Fika* products. In contrast, the "innovated" pathway focuses on emerging, tech-driven solutions to substitute conventional *Fika* products with food innovations.

Pathway I: Less but better Fika

The terms *less* and *better* emphasize quality over quantity and are often used to promote more sustainable consumption patterns within environmental limits. The concept of "less but better" has primarily been used as a theory of change to guide the reduction of Western meat consumption (Resare Sahlin et al. 2020). Applied to the *Fika* culture, *less and better* would encourage reducing the consumption of *Fika* products that are associated with negative environmental and socio-economic impacts and replacing remaining amounts with more sustainable alternatives.

Less is a relative term depending on current amounts of consumption, with the goal to reduce current Swedish consumption patterns of the *Fika* ingredients associated with negative environmental and socio-economic impacts.

One key strategy of less but better *Fika* is to reduce wasting prepared coffee (WWF 2022). Currently wasted prepared coffee and tea constitute the largest amount of

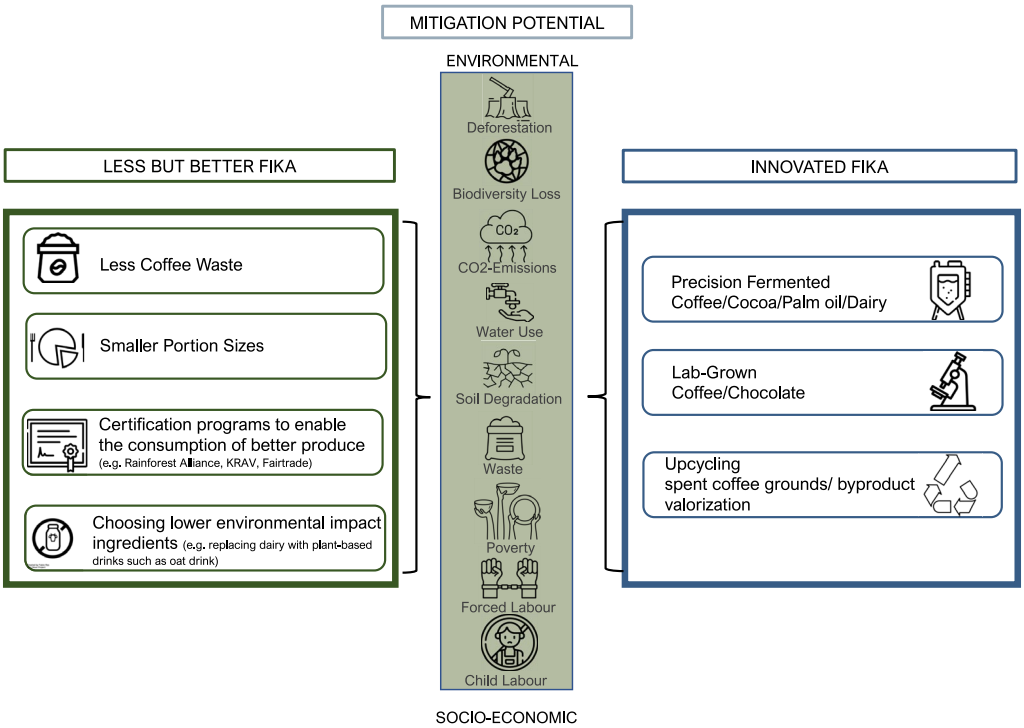

Fig. 3 Claimed mitigation potential of the strategies underlying the two exemplary pathways. Using the term "claimed", we refer to industry statements that have not necessarily been substantiated in the peer-reviewed literature. Credits: Icons are derived from the Noun Project under a Creative Commons License

waste thrown into the sink in Sweden, corresponding to 84,400 tons annually (Åkerblom et al. 2021). Another key strategy is to reduce the portion size of *Fika* products, such as the size of the coffee cup and pastry. Because *less* and *better* can interact (Resare Sahlin and Trewern 2022), achieving *less* could allow for *better Fika.* For instance, reducing the amount of wasted prepared coffee, and portion sizes, decreases the quantity of coffee that needs to be purchased and could increase purchasing power for *better* coffee.

Better here refers to a shift toward consumption of products that are produced with lower environmental and socio-economic impacts than those predominantly consumed. There are multiple strategies to improve consumption patterns. One major sustainability-oriented consumer guides in Sweden recommends increasing the consumption of organically or agroforestry grown coffee and cocoa that complies with EU legislation and avoiding or reducing the consumption of non-organic produce (Eneroth et al. 2022; WWF 2022). To mitigate the adverse impacts of climate change on coffee cultivation, the Nordic Council of Minsters emphasizes that Nordic countries need to support climate adaptation projects in producing areas to support the predominantly small-scale coffee farmers adapting to climate change (Berninger et al. 2022). Consumers can support this shift by choosing agroforestry-grown over monoculture-grown coffee (Eneroth et al. 2022), from companies that support climate-adaptation programs. This requires institutional changes, such as increased availability and appropriate information at retail, to facilitate informed choices.

Various types of voluntary sustainability standards exist that can guide conscious consumer choices toward purchasing *better Fika* products and create demand for more sustainable and ethically produced ingredients. Relevant certificates in Sweden include EU-organic, KRAV, Fairtrade, and Rainforest Alliance (Eneroth et al. 2022). KRAV ensures chemical pesticide-free production, compliance with EU organic production regulations, and social responsibility such as respecting human rights and prohibiting child labor. For coffee, cocoa, and palm oil in particular, KRAV-certified products cannot be cultivated on land with high conservation value ecosystems (KRAV 2024). Fairtrade encompasses environmental, social, and economic criteria, including a minimum price on coffee to protect coffee farmers against volatile prices, and claims to support the transition toward more sustainable production methods and education on the climate impact of farming (Fairtrade Foundation 2023). Currently, Fairtrade-labeled coffee constitutes 10% of the sold coffee in Sweden (Fairtrade Sweden 2024). Despite inconsistent research findings on the implications of voluntary sustainability standards on different sustainability outcomes, systematic reviews support that voluntary sustainability standards generally have a positive impact on habitat conservation (DeFries et al. 2017) and provide economic benefits to certified smallholder farmers (Meemken 2020).

Emerging to voluntary sustainability standards is the application of blockchain technologies to validate certification schemes. At Swedish retail, companies, such as Zoega by Nestlé and Löfberg Group, already experimented with blockchain technology in the coffee industry, enabling consumers to scan QR codes on coffee packages to access detailed information about the coffee's supply chain (Bager et al. 2022). However, there is limited evidence of blockchain's concrete sustainability benefits for the food sector (Bunge et al. 2022) and its advantages for the coffee supply chain remain uncertain (Bager et al. 2022).

Reducing the environmental impact from *Fika* consumption extends beyond choosing more sustainably produced coffee to other *Fika* ingredients with high environmental impacts. For instance, the greenhouse gas emissions from a cup of coffee depend on the type (and quantity) of milk or plant-based drink chosen (Nab and Maslin 2020). Research indicates that opting for oat drink has a substantially lower climate footprint compared to bovine milk in the Swedish context (Eneroth et al. 2022). The arguments would also be similar for *Fika* pastries containing dairy products. Replacing those with plant-based alternatives can reduce the environmental impact due to lower greenhouse gas emissions and reduced land use (Bunge et al. 2024).

Pathway II: Innovated Fika

Another potential pathway to reduce the adverse impacts of *Fika* consumption while preserving current consumption patterns is through emerging food innovations. For consumers, this pathway would enable current consumption levels to be maintained, but replacing traditional *Fika* products with respective food innovations that are claimed to be more sustainable by the companies producing these products (Bunge et al. 2025).

While the literature on food innovations addressing animal-source products is growing (e.g., Bunge et al. 2022; Mazac et al. 2022), less attention has been given to innovations addressing plant-based products such as coffee, cocoa, and palm oil (Bunge et al. 2025). Below, we compiled existing and emerging food innovations aimed at tackling the social and environmental challenges associated with food products consumed for *Fika* (Table 1).

Many emerging food innovations utilize cellular agriculture, which can be categorized into two distinct approaches: precision fermentation (acellular) and cell cultivation (cellular) (ProVeg International 2020). For example, precision-fermented coffee involves fermenting sugars from plant-based

Table 1 Emerging food innovations addressing the negative environmental and social impacts of *Fika*

Innovation	Description
Upcycling spent coffee grounds	Valorising coffee by-products into ingredients for food products and beverages
Precision-fermented coffee and cocoa	Using microbial cultivation (fermentation technique) to convert ingredients such as oats and barley into cocoa-free chocolate with similar structure and sensory attributes as cocoa-based chocolate; and yeast to ferment sugars found in plant-based materials into coffee compounds
Lab-grown coffee and cocoa	Directly cultivating real coffee or cocoa cells in bioreactors by first selecting cells from coffee or cocoa beans and then growing them in bioreactors that mimic the conditions of the natural environment (i.e., rainforest) where coffee and cocoa thrive
Precision-fermented palm oil alternatives	Microbial production of palm oil alternatives from yeast and sugar
Precision-fermented dairy alternatives	Dairy powder brewed in a lab using precision fermentation

materials (e.g., oats) with yeast or bacteria to create a coffee-like product without traditional coffee plants, referred to as *beanless coffee* (Atomo Coffee 2024a, b). In contrary, cell-cultivated coffee sources cells from the coffee plant and uses advanced cellular agriculture techniques to cultivate their biomass in bioreactors, producing coffee-related compounds that mimic traditional coffee aroma and flavor (Aisala et al. 2023). Europe's first cell-grown coffee was produced in Finland (VTT 2021) though the concept of cultivating coffee cells in bioreactors was already proposed in 1974 in order to cope with increasing coffee leaf diseases and harvest loss (Townsley 1974).

Companies launching cell-grown or precision-fermented coffee claim numerous advantages, including reduced land, pesticides, and water usage, mitigated environmental impacts associated with conventional coffee farming, and mitigated climate change susceptibility, and avoiding human rights abuses (Atomo Coffee 2024a, b; California Cultured 2023; Minus Coffee 2024a, b). However, these benefits are only indicative due to the early stage of these technologies and have not been substantiated in the peer-reviewed literature, in line with generally low and contested scientific evidence on the environmental benefits of cellular agriculture (Tuomisto 2022). Importantly, cell-cultivated coffee is classified as a novel food and requires regulatory approval in the European Union before commercial application (Aisala et al. 2023).

Precision fermentation offers the advantage of utilizing local crops or industry by-products to produce compounds that mimic the sensorial profiles of coffee and other crops. For instance, the company *Atomo Coffee* applies precision fermentation to convert upcycled date pits from farmer's waste streams into coffee compounds (Atomo Coffee 2024a, b). Precision-fermented cocoa alternatives based on local oats and sunflower seeds have been launched at German retail and the product is suggested to have up to 90% less CO_2 emissions and 94% less water use compared to conventional chocolate (ChoViva 2024). Precision fermentation is further utilized to produce lab-grown fat alternatives such as cocoa butter as an alternative to palm oil (ChoViva 2024), and dairy powder to substitute conventional bovine milk products (e.g., Perfect Day 2024).

Moreover, precision fermentation can be combined with by-product utilization, transforming inedible by-products into edible products and thereby reducing waste. For instance, several companies created value out of coffee by-products using those as ingredients for beverages (e.g., kombucha, beer) or food products (e.g., coffee flour) (Kaffe Bueno 2018).

Discussion

We titled this paper "*Fika in the Anthropocene*" to communicate both the current impacts and threats associated with the *Fika* culture, and also the adaptive capacity required to preserve its deeper social value in the long term. The Anthropocene concept provides an analytical framework to examine anthropogenic impacts across various sectors and encourages discussions on reversing unsustainable practices and advancing sustainable transformations (Olsson et al. 2017). As such, "*Fika in the Anthropocene*" intents to reflect both the anthropogenic impacts and challenges of the food products constituting this food culture, as well as its adaptive capacity to transition toward more sustainable products and practices to preserve its cultural significance.

By outlining two exemplary pathways, "less but better" and "innovated" *Fika*, we demonstrated that potential strategies exist that could mitigate the adverse environmental and socio-economic impacts of current consumption patterns and adapt them to anthropogenic risks, while preserving the social value of the *Fika* culture. These strategies illustrate the potential to transition toward more sustainable products and practices, emphasizing the dynamic nature of food cultures and the possibility of adapting them to anthropogenic challenges.

Complementary pathways with trade-offs

While the two outlined pathways are presented separately, they are not mutually exclusive and could be combined to support a *Fika* culture based on products with reduced adverse impacts and increased resilience to anthropogenic risks. As they are intended to be exemplary, other viable pathways and strategies may exist, such as conventional coffee substitutes based on roasted chicory roots, barley, or lupin (Mostafa et al. 2021). These alternatives have been widely consumed in other countries, particularly when coffee was rationed during political upheavals (Rothfeld 2022), and are therefore not introduced here as emerging food innovations.

Designing pathways is a normative process and involves several challenges. The aim of this paper was not to present optimal pathways, but to stimulate thinking about different strategies for adapting the Swedish Fika, as a representative food culture, to societal targets and anthropogenic challenges in line with existing visions for the Swedish food system (Gordon et al. 2022). Hence, a comprehensive analysis of their positive and negative impacts was beyond the scope of this paper, but both pathways involve potential limitations and trade-offs, which are important to mention briefly.

For instance, the *Innovated Fika* pathway is based on emerging, recently-introduced, food innovations such as lab-grown or precision-fermented coffee. While industry claims suggest that these innovations reduce negative environmental and social impacts compared to conventionally available products, such claims have not yet been substantiated in the scientific literature. This represents an important area for further study given the increasing interest and development of these products (Bunge et al. 2025).

Both pathways could alleviate environmental and socio-economic concerns associated with *Fika* ingredients, but there is uncertainty on how to successfully implement them and whether they can bring about the systemic and enabling changes required to adapt the food culture to anthropogenic challenges. Several of the outlined food innovations, such as cell-grown coffee, face regulatory hurdles (e.g., the European Union's Novel Food Regulation) and their deployment and potential can therefore be only speculative (Aisala et al. 2023). Another main critique and barrier to proliferating food innovations is their missing consumer acceptance, particularly because they are perceived as unnatural (Siegrist and Hartmann 2020). It is therefore important to investigate how the consumer acceptance of these food innovations can be enhanced and how they could compensate for declining production of conventional ingredients.

Food innovations often receive the criticism that their deployment might reinforce unsustainable and unjust pathways of food systems instead of contributing to desired transformations (e.g., Fairbairn et al. 2022). Particularly, cellular agriculture has been claimed to reinforce power asymmetries in food systems by strengthening corporate control, developing products targeting affluent consumers, and diverting attention from proven low-tech approaches to transforming food systems such as agroecology (Howard 2022). Prevalent criticism of evolving food innovations therefore concerns the livelihood of farmers currently producing the foods that are to be replaced (Saavoss 2019). However, the projected decline in coffee and cocoa production requires alternatives if rising demand amidst declining production is to be met. We suggest that alternatives, such as lab-grown or precision-fermented coffee, are therefore not necessarily intended to replace conventionally grown crops, but could compensate for production decline despite increasing consumption demand (Bunge et al. 2025).

It is therefore important to implement these pathways carefully by following just transition principles (Tribaldos and Kortetmäki 2022) to protect the livelihoods of smallholder farmers currently producing these its food products and to avoid exacerbating existing inequalities in the food system.

Preserving by adapting food cultures in the Anthropocene

Integrating food cultures and social values into food systems transformation processes is a key principle (iPES Food 2021). Food cultures serve as a social identity that reach beyond the food products consumed and their potential nourishment. The cultural relevance extends the nutritional value of individual food products into identity by attributing important social values, thereby enhancing their overall value for consumers (Tellström 2011). As such, while the food products consumed for *Fika* might not fulfill nutritional needs, they serve as tools for individuals to create an identity and foster relationships (Tellström 2011). The practice of social eating (commensality) is a crucial part of socialization (Yngve et al. 2023), promoting mental well-being, social bonding, and enhancing feelings of contentment and embeddedness within the community (Dunbar 2017). Food cultures play pivotal roles in shaping the cultural identity of individuals and communities worldwide, as evidenced by UNESCO's recognition of numerous food cultures as intangible cultural heritages (UNESCO 2019). They can also facilitate intercultural dialogue, social inclusion, and sustainable development more broadly (UNESCO 2019). For instance, Sweden's promotion of *Fika* as an emblematic part of its cultural identity demonstrates how food traditions can be harnessed to communicate positive values (Visit Sweden 2023).

However, as outlined throughout this paper, some food products constituting food cultures drive demand for

unhealthy and unsustainable foods, and are vulnerable to climate change hazards. We therefore suggest that in order to preserve the deeper social value of food cultures in the long term, it is important to address the adverse impacts of their underlying food products. Recognizing values as critical leverage points for sustainability transformations (Horcea-Milcu 2022), we propose that communicating the impacts and risks of individual food products through the lens of food cultures could leverage consumer acceptance of more sustainable products and practices (Fig. 4). We title this the "*food cultural lens*", which frames food products within the context of food cultures rather than as individual ingredients.

The food cultural lens as a potential leverage point for wider food system transformation

We suggest that this *food cultural lens* could enable the pathways to take place and adapt *Fika* to anthropogenic challenges and societal goals. The enhanced social value of individual food products through the cultural lens can support shifting norms and values, fostering transitions from less sustainable to more sustainable practices, such as reducing coffee waste, consuming smaller portion sizes, and purchasing products certified with voluntary sustainability standards. This gives rise to the hypothesis that analyzing the adaptations needed to preserve food cultures in the Anthropocene, rather than analyzing how to reduce the impacts of individually consumed food products, can serve as a strategic entry point to shift consumer behavior toward more healthy and sustainable diets in general.

Some initiatives have started leveraging food cultures as catalysts for food system change. For instance, the Food Culture Alliance which regards food cultures as society-wide solutions to change collective preferences and emphasizes the power of cultural influence to promote healthier dietary habits and sustainable food choices. The Alliance brings together practitioners and organizations, provides them with knowledge, tools, and resources to deploy strategies that can shift preferences and increase society's demand for nutritious and sustainable foods (The Food Culture Alliance 2023).

We therefore suggest that the proposed pathways could not only facilitate the transition to a *Fika* culture based on more sustainable and resilient products and practices, but thereby potentially leverage broader change across other parts of the food system (Fig. 4). The products consumed for *Fika* are not exclusively tied to, but consumed beyond the cultural context as part of other meals, such as the breakfast coffee. Raising awareness on the impact and threats of the products through the lens of a food culture could therefore enhance consumer acceptance and adoption of more sustainable practices and products in general. For instance, increased awareness of the adverse impacts and risks associated with the *Fika* products could lead to behavioral changes toward greater attention to certificates, reduced waste behavior, and a general acceptance of food innovations intended to compensate for the decreasing supply of the original commodity.

However, the effectiveness of the *food cultural lens* as a catalyst for food system change is not yet substantiated in the literature. Further research is needed to assess whether food cultures can serve as entry points to leverage wider food system transformation. In Table 2, we propose key research themes and questions to further investigate this potential. We particularly recommend behavioral studies to assess whether consumers are willing to alter their consumption behavior when informed about the anthropogenic impacts and challenges of the products constituting their food cultures, and the fact that adapting more sustainable consumption patterns

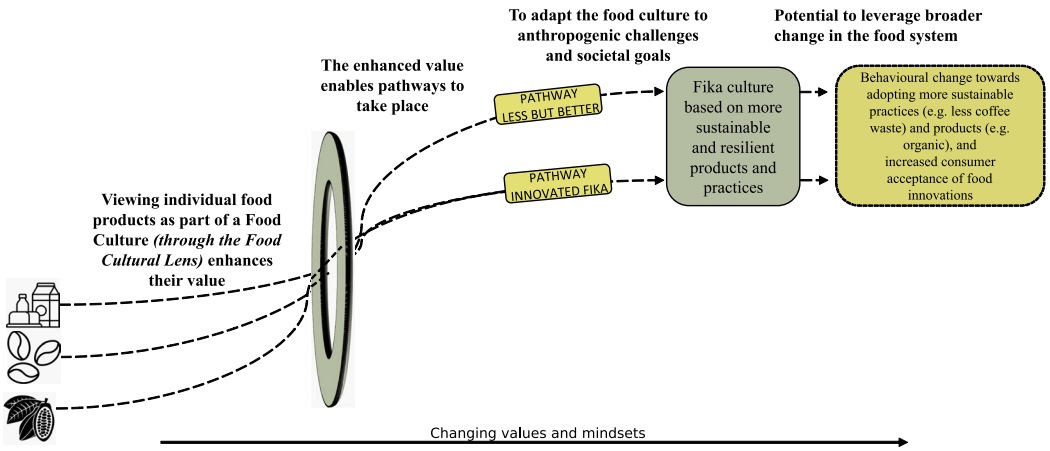

Fig. 4 Viewing food products through the cultural lens as a potential leverage point for food systems transformations. Credits: Icons are derived from the Noun Project under a Creative Commons License

Table 2 Toward a research agenda on food cultures as leverage points for food system transformation

Toward a research agenda on food cultures as leverage points for food system transformations	
Research themes	Potential research questions
Mitigating impacts of products in food cultures and adapting to Anthropogenic challenges	To what extent could the consumption of products classified as "better" mitigate the environmental and socio-economic impacts of current consumption patterns? How much "less" would be required to achieve the overall environmental and social targets? To what extent could food innovations alleviate pressures from the production of conventional food culture ingredients, and what role could these innovations play in coping with anthropogenic challenges?
Adapting dietary behavior by raising awareness through the food cultural lens	Is it possible to preserve the deeper social value of a food culture by adapting or replacing some of its conventional ingredients with more sustainable products? Does framing the adverse impacts and anthropogenic challenges through the food cultural lens influence consumer preferences and behavior differently than focusing on the individual food products themselves? Would raising awareness of the environmental and socio-economic impacts and threats of products through the lens of food cultures influence consumer acceptance and behavior change toward more sustainable products and practices? (e.g., purchasing certified coffee from companies that invest in climate-adaptation projects)?
Enabling the food cultural lens to leverage broader transformative change	Could framing individual food products through the lens of food cultures leverage broader change in dietary behavior? Would consumers be more receptive to food innovations generally if they were first introduced through food cultures? Would consumers purchase more sustainable products and pay greater attention to Voluntary Sustainability Standards in general if awareness on the impacts of products would be raised through food cultures?

could support preserving the social value of the food culture. Additionally, we suggest exploring the role of food innovations in compensating for the declining production of food cultures' ingredients and assessing whether introducing these innovations through food cultures enhances or reduces their consumer acceptance. Finally, further research is required to assess *how* these pathways can effectively be implemented.

Translating the insights to other food cultures

While this paper focused on *Fika* as one case study for food cultures, the insights developed are intended to be of relevance for food cultures and their role in food systems transformation more broadly. Coffee, for instance, is one of the most widely consumed beverages globally and constitutes various food cultures, such as the Turkish or Ethiopian coffee ceremonies or the Viennese coffee house culture.

The insights derived from *Fika* can also be extended to non-coffee-based food cultures with similar social values, and anthropogenic impacts and risks. One such example is the British pub culture as a central social care institution (Thurnell-Read 2024), linked to beer supply that is affected by climate change-induced declining hop yields (Mozny et al. 2023).

With this paper, we hope to inspire other food systems scholars to consider various food cultures in different geographic and cultural contexts and their potential as levers for transformation. We suggest to evaluate the environmental and socio-economic implications of the products constituting respective food cultures, exploring pathways and strategies to address or replace products with adverse impacts, and investigating the leverage potential for broader food systems transformation.

Conclusion

The purpose of this paper was to explore how food cultures can be adapted to societal targets and anthropogenic challenges in order to preserve their deeper social value in the long term. For illustrative purposes, we used the Swedish *Fika* as a case study, and examined the environmental and socio-economic impacts and threats associated with current *Fika* ingredients. We then outlined two exemplary pathways that could mitigate these impacts and adapt the *Fika* culture to threats, thereby potentially functioning as a leverage point for wider food systems change.

We develop the hypothesis that analyzing the adaptations needed to preserve food cultures in the Anthropocene, rather than analyzing how to reduce the impacts of individually-consumed food products, can serve as strategic entry points for dietary change. We suggest that viewing individual food products through the *food cultural lens* enhances their social value, and enables transition pathways to adapt the food culture to anthropogenic challenges and societal goals. This could not only lead to a more sustainable and resilient *Fika* culture but also leverage wider food system change, for instance by increasing consumer acceptance of food innovations intended to compensate for high- impact and risk products in general. With the insights developed in this paper, we propose a paradigm shift regarding the role of food cultures in food system transformation processes, suggesting that they could serve as strategic entry and leverage points instead of static parameters. We hope to inspire other scholars to conduct further multi- and transdisciplinary research to understand and harness the potential of food cultures as potential leverage points for wider food system transformation.

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Data availability There are no original data produced for the writing of this article.

Declarations

Conflict of interest The authors declare no conflict of interest.

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