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Department of Land, Environment Agriculture and
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in Food and Health

True Cost and True Price Applied to Food:
An Empirical Study with Swiss Residents

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Abbreviations and acronyms

AMR	Antimicrobial Resistance
BMI	Body Mass Index
CO ₂	Carbon Dioxide
DALY	Disability-Adjusted Life Years
NHS	National Health System
TCAF	True Cost Accounting for Food
TCC	True Cost Campaigns
WHO	World Health Organization
WTP	Willingness To Pay

Summary

The current food system is becoming unstable increasingly which is contributing to major sustainability issues. Since the hidden costs associated with food production and consumption are not accounted for, the current economic value of food can be misleading. These hidden costs, known as externalities, encourage detrimental behaviours and create barriers to developing sustainable food systems. This thesis revolves around the comprehensive overview of the major externalities pertaining to food system in health, environmental and social sectors, along with the consumer studies regarding the true pricing implementation based on their reception also with the outline with the common perception of consumer about sustainable purchasing. To support a transition to a sustainable food system, the true cost accounting for food (TCAF) can be used. This methodology can be applied to assess and measure true costs associated with the food system. However, this approach requires cooperation from governments, businesses, and consumers. As consumers play a crucial role, but many are unaware of these hidden costs, leading to unsustainable buying habits. To make TCAF effective, we need to understand how consumers perceive it and how it influences their choices. This understanding can help promote smarter, more sustainable food purchasing decisions.

In this context, this study aims to evaluate how consumers in Switzerland perceive the true cost accounting and true price approaches. An online survey was conducted in Switzerland in June 2024. Linear regression was used to analyse the sample of 224 participants and to examine the predictors affecting their attitude towards TCAF. The results indicate that belief in TCAF methodology strongly influenced the positive attitudes towards TCAF. Belief in remediation of the externalities through true price and perceived green values related to true price, besides the sense of environmental protection also appeared as positive influencers of this attitude. Moreover, the regression revealed that participants with more positive attitudes towards TCAF give less importance to the affordability of food when compared to the externalities. The results can contribute by adding to the limited available literature on TCAF and true price. Stakeholders, policymakers and the food industry can use this information to support the shift of the current food system to a more sustainable one.

1. Introduction

The global food system is one of the major contributors to several issues, including biodiversity loss, inadequate living conditions for animals, climate change, and the loss of benefits derive from natural ecosystem throughout the food supply chain. To support a transition to a sustainable food system, establishing a methodology for measuring, assessing, and understanding the costs of the food system to human health, environment and society is necessary. Food systems can have positive and/or negative externalities that can affect the ecology, health, livelihoods, and community (Kennedy et al. 2023). The costs of these negative externalities are not internalised in the market price, which informally referred as “True cost” (True Price 2019). In this context, the True cost accounting for food (TCAF) is a methodology that can pinpoint the important "hidden costs" or detrimental externalities that have an impact on society, the environment, and health arising from food system (Kennedy et al. 2023).

For the utilization of True cost accounting (TCA) as a tool, assessing of target audience is significant, for farmers it can be employed for correcting the farming practices. Conversely, for market-based awareness regarding the product, it requires wider scope of TCA implementation (Sandhu et al. 2021). TCA for consumers can be used as a comprehensive tool to understand the impacts and damages of the food products (Sandhu et. al 2021). Currently, hidden costs are not incentivized by companies neither they are pressured to do so, which renders consumers unaware and not avoiding unsustainable products (De Groot Ruiz 2021). If true costs were implemented, market forces such as innovation, competition, and entrepreneurship would work to reduce external costs (De Groot Ruiz 2021).

To make the impact of true cost clearer the example of food costs in the United States were estimated to have reached \$1.1 trillion in 2019, including costs associated with production, processing, retailing, and wholesale. However, a study conducted by Rockefeller Foundation 2021 revealed that this amount does not account for the wider environmental impact, or medical costs associated with diet-related diseases. According to the authors, when considering healthcare, pollution,

loss of biodiversity, and global warming, the true cost of the American food system rises to a minimum of \$3.2 trillion per year (Rockefeller Foundation 2021).

The internalization of all externalities requires the framework that is TCA and then the food economics needs to be reformed to internalize them into price structure, can be termed as true pricing (Hendriks et al. 2021). True prices can be the solution for true costs, it is the sum of internalised (market price) and externalised (true costs) of the product's production or services (True Price 2019) True price bridges the gap of market price and external or hidden costs, renders as true price gap (De Groot Ruiz 2021), True price gap are the costs which needs to be repaired in order to restore the damage. For instance, CO₂ emissions require the rebalance of taking CO₂ out of the atmosphere, and child labours need compensation of educational, medical or psychological needs (De Groot Ruiz 2021). These gaps are articulated in same monetized unit to enable them to be compared with other externalities and conventional costs (True Price 2019).

When the food system is transformed into a more sustainable one, and the damage that has been done is paid for and restored, it may result in increased food costs (Hendriks et al. 2021), causing the implementation of true pricing challenging because consumers could be reluctant to pay higher prices, which would increase the cost of living (De Groot Ruiz 2021). However, this does not invalidate the concept of true pricing because preventing damages is more cost-effective than fixing them (De Groot Ruiz 2021), and the benefits to human health and the environment would far outweigh the costs (Hendriks et al. 2021).

Recent research aiming to account for these costs and to promote a more sustainable food system has been conducted in several countries (United Kingdom: Fitzpatrick et al. 2019; Germany: Michalke et al. 2022; Netherlands: TruePrice 2023). However, the topic was not deeply explored in Switzerland. Implementing true price can benefit businesses to take sustainable decisions, authorities to establish policies, investors to reassess their portfolio to contribute to sustainability goals, and for consumer to make the right purchasing decisions (True Price 2019). Therefore, this project aims to communicate the TCAF methodology to the consumer and analyse their response based on different parameters like conveying of knowledge regarding externalities, price variation etc. which could support the

Swiss food system to implement TCAF into the food network to make it more sustainable.

1.1 Background

According to Aspenson (2020), the definitions and concept formation of true cost accounting are quite different across different studies, it often regarded as a tool, scientific approach, reform mechanism and economic model. In the present study, TCAF will be considered also as a communication tool (Barjolle et al. 2023; Michalke et al. 2022; Taufik et al. 2023) to enlighten the consumers about the externalities arising from the food system.

The true cost accounting for food (TCAF) assesses the wider effects of food systems, capturing both beneficial and detrimental effects on the environment, society, and economy. The idea is to make hidden costs (such as diseases related to dietary habits, erosion of land, environmental exposure to chemicals, contamination of water, etc) visible for internalisation into decision-making processes by exposing them (Baker et al. 2020). Economically accounting for all externalities, whether positive or negative, can enhance the health system, promote sustainable practices, and ensure equal competitiveness among all production systems (Fitzpatrick et al. 2019). To mitigate the gap between the market price and true cost, all the externalities are needed to be quantified, monetized and internalized through true pricing (Pieper et al. 2020). i.e. true costs are the monetary values of negative externalities arising from food system and, true price is referred as the accumulation and diminution of these costs in the consumer price (Hendricks et al. 2021). True price not only can be used as a communication instrument to reveal to consumers the external costs of the product and help them to choose sustainable products but also be used as an indicator to mitigate these costs (Taufik et al. 2023).

The current economic system often supports less sustainable businesses. In contrast, the most sustainable ones are not as profitable unless backed by premiums or subsidies, rendering food products with greater negative impacts more affordable (Fitzpatrick et al. 2019). Organic farming often internalizes external costs, which are reflected in prices. However, consumers end up paying more for these food products, along with taxes and other surcharges such as health

insurance and water charges. As these prices are not affordable for everyone, the potential for organic systems is limited (Fitzpatrick et al. 2019).

Globally, it is recognized that agricultural practices have both beneficial and harmful impacts on the environment, which are not adequately reflected in their cost (Fitzpatrick et al. 2019). Furthermore, intersecting issues such as global warming and food accessibility should be tackled to ensure the availability of affordable, wholesome, and secure food (BCCDC 2023). Apart from the agricultural impact on land use, ecosystems, and pollution, other interactions in the food system are often overlooked (Ericksen et al. 2009). A study by Rayner and Scarborough (2005) evaluated that 10% of Disability-adjusted life years (DALY) loss and around £6 billion in costs are borne by the National Health System (NHS) annually due to diet-related diseases, a figure larger than that for smoking, which can be overlooked by policymakers (Rayner and Scarborough 2005). The intensified growth in the global population has also exacerbated agricultural practices, resulting in higher environmental burdens (Fitzpatrick et al. 2019).

1.2 Problem statement

The current food system needs to be improved to a more sustainable one to allow the achievement of some specific United Nations Sustainable Development Goals (United Nations 2022). Some externalities arising from the food network include economic and ecological losses. Thus, there is a need to transform the food system to shift towards a more sustainable direction, so that future generations do not bear the load and present food insecurity issues get resolved (FAO 2018). Consumers are the important stakeholders along the food chain, who often remain unaware of the externalities, leading to unsustainable consumption patterns (Camargo et al. 2019). For the implementation of successful TCAF, it is vital to understand, how consumers would perceive this approach. Therefore, it is necessary to examine their knowledge, personal choices, and behaviour patterns regarding different forms of communication about TCAF, as it can influence consumer behaviour and perceptions, to promote more informed and sustainable purchasing decisions (Michalke et al. 2022). TCA leads to true pricing at product level which incorporates the externalities in product price (Baker et al. 2020), True price can help to reject the perverse incentives implying that beneficial products are costlier than harmful

ones, through true price the global economy could potentially be sustainable, by internalizing all costs (De Groot Ruiz 2021).

1.3 Objectives and research questions

The objective of this study is to evaluate how customers react to various forms of communication regarding the TCAF and to assess how environmental and health externalities based on food production impact consumer behaviour and attitudes. Furthermore, this study also aims to evaluate consumers' perceptions towards the true price of food. Based on the evaluation of the outcomes, suggestions can be proposed to support the implementation of this methodology in the Swiss Food System.

2. Theoretical background

This thesis explores the true cost accounting for food (TCAF) and highlights its critical importance in evaluating the overall effects of food production and consumption. It navigates the externalities associated with food systems, from social injustices, and health deterioration to environmental degradation. This work seeks to support the incorporation of TCAF frameworks into decision-making procedures by evaluating consumer behaviour towards this approach.

2.1 True Cost Accounting for Food (TCAF)

The cost of food often excludes social, environmental, and health impacts (Barjolle et al. 2023). Since the hidden costs associated with food production and consumption are not accounted for, the current economic value of food can be misleading. These hidden costs, known as externalities, encourage detrimental behaviours and create barriers to developing sustainable food systems (Hendriks et al. 2023).

Rapid solutions to overcome sustainability adversities are often unreliable and unsustainable in addressing current sustainability concerns. Most intensification methods usually result in destructive effects, including greenhouse gas emissions, depletion of water supplies due to mining, and infertile soil (Frison et al. 2011). For policymakers, it is vital to highlight the underlying causes of sustainability and view the food system to acknowledge the multiple dynamics involved (Allen and Prosperi 2016).

The current state of politics in Switzerland and internationally has embraced True Cost Accounting for Food (TCAF) as a catalyst for changing the food system (Barjolle et al. 2023). Nevertheless, there are downsides to TCAF execution, such as the method's complexity and the risk of reduced reliability brought on by insufficient supply chain data about externalities. Furthermore, broad public support would be necessary for any price increment resulting from the implementation of TCAF (Barjolle et al. 2023). Internalizing externalities into the food system can result in price increases. If consumers bear these costs, it could place additional pressure on those from lower socioeconomic backgrounds (Barjolle et al. 2023). Alternatively, food handlers could bear these externalities under polluter pay principle, but it necessitates highly accurate data (Barjolle et al. 2023). Given that

the food system involves multiple sectors, a multi-organizational framework is essential to evaluate true cost accounting for food (Baker et al. 2020).

Investigative studies could motivate stakeholders to adopt more sustainable practices (Barjolle et al. 2023). TCAF assessments can be conducted at multiple stages and offer a comprehensive understanding of implications (Seidel et al. 2023). The accurate measurement of externalities in all food production sectors can be ensured by True Cost Accounting (TCA). It makes expenses throughout the whole life cycle accessible to producers, the public, and decision-makers (Fitzpatrick et al. 2019). According to Barjolle et al. (2023), the TCAF technique needs to be reliable, consistent, and easily understandable by all customers as it should also be backed by solid metrics data.

2.1.1 Negative Externalities arising from Food System

As concluded by Rastoin (2022), while applying TCA approach in multiple countries or globally by researchers (e.g. Perotti 2019, in Switzerland; Fitzpatrick et al. 2019, in United Kingdom), found that health costs is the major contributing category for hidden cost, followed by environmental externalities and economic one. In the present study, the health, environmental and social externalities would be elaborated in further sections.

These external costs are not included in the market price, ultimately making sustainable and healthy food unaffordable for consumers and less profitable for producers (Hendriks et al. 2023). There are several streams through which society pays for the negative externalities in food production. For instance, water charges are partially used to mitigate pesticide levels in drinking water. Other costs include mitigating greenhouse gas emissions, environmental pollution, marine ecosystem pollution, healthcare costs for diet-related diseases, skin cancers due to environmental degradation, other cancers arising from pesticides, respiratory diseases, and antimicrobial resistance (AMR). Moreover, social costs include the decline of rural communities, and loss of cultural heritage for example (Fitzpatrick et al. 2019).

Even though the world spends a staggering 9 trillion dollars a year on food purchases, the externalities that food networks produce are not taken into account. These externalities; costs borne by people and society at large that are not reflected in market prices, highlight the necessity of taking into consideration the full costs of

producing and consuming food (Mirzabaev and Von Braun 2022). The economic response to these externalities is insufficient and imbalanced concerning the repercussions of the food system (Lord 2020). Frequent amendments in food production methods and consumption behaviours result in an elevated burden on society and the healthcare system (Fitzpatrick et al. 2019).

Internalizing externalities should be done without harming food security and considering vulnerable populations (Baltussen et al. 2016). Strategies for transforming the food system could include shifting to vegetarian diets to substantially reduce ecological impact and improve health outcomes, prioritizing the production of high-quality, healthier food over large quantities, and responsible utilization of agricultural land and aquaculture production to preserve ecosystems. Reducing food waste by at least half could also support sustainability goals (Willett et al. 2019).

Assessing consumption and demand patterns globally and predicting the transfer of demands in altered products is critical for stakeholders to make decisions throughout the food supply chain (Meade et al. 2014). Administrative policies should incentivize sustainable and healthier food producers, along with issuing strong guidelines (FOLU 2019).

2.1.1.1 Health Impacts of Food System Externalities

Health cost analysis is typically limited to the health sector, often overlooking costs outside these boundaries (Cobiac et al. 2013). Unhealthy food poses more threats to human life than other problems, and human health and environmental sustainability are interlinked through the diet we consume (Willett et al. 2019). The health costs related to food are based on production and consumption behaviours (Fitzpatrick et al. 2019). The direct or indirect externalities arising from the food system, both in natural resource loss and human welfare, are rarely accounted for by decision-makers, causing consumer unawareness (Fitzpatrick et al. 2019).

For example, the presence of nitrate in drinking water poses the danger of colon cancer in humans, in addition to brain tumours, leukaemia, and other diseases. This can be linked to the high use of nitrogen fertilizers in crops (Fitzpatrick et al. 2019).

2.1.1.1.1 Unbalance and unhealthier diets

The global consumption of unhealthy food is excessive compared to the suboptimal intake of a healthy diet (Afshin et al. 2019). However, food choices are also based on their affordability and cost (Lee et al. 2013).

According to the World Health Organization (WHO), a healthy diet is one that not only expels diseases but also provides absolute physical, mental, and social security (Willett et al. 2019). Consuming high-quality protein is beneficial for mitigating the effects of high carbohydrate intake, particularly from starch and sugar. However, proteins are commonly consumed as part of foods that also contain other components like fats, which can adversely impact health (Willett et al. 2019). An unbalanced diet, characterized by a high intake of sodium, meat, trans fats, and sugars, and a low intake of whole grains, fruits, seeds, nuts, and vegetables, poses significant dietary risk factors (Afshin et al. 2019).

Obesity has tripled in high-income countries over the past 30 years (Abdulrahman & Galea 2015). Many interventions based on anti-obesity policies targeting the consumption of unhealthy food have been implemented but have had limited impact (Abdulrahman & Galea 2015). Healthier diets are more expensive than unhealthy foods, creating anomalies in the current health structure (Drewnowski & Darmon 2005). Both healthy and unhealthy foods and diets should be monitored based on price and affordability to study the effects of rising prices, especially on vulnerable societies, so they can have access to a nutritious diet (Lee et al. 2013).

Regardless of socioeconomic status, young adults and adults are consuming too much sugary food without sufficient intake of foods that promote health. The high consumption of packaged food with poor nutrient quality is prevalent in both high- and low- to middle-income countries (Global Nutrition Report 2018). Consumption of unhealthy food during adolescence can increase BMI in adulthood, associated with numerous health costs (Kalamov et al. 2020). Policies should consider sustainable consumption patterns, making the food supply sufficient, and targeted at reducing the consumption of energy-dense, poorly nutritious food (Kearney 2010).

2.1.1.2 TCAF and Environmental Externalities

Natural resources can be subdivided into finite and infinite renewable resources, and includes land, water, pollinators, minerals and fuels, for example. These resources are being exploited by humans (Fitzpatrick et al. 2019). Agricultural practices largely depend on finite resources and degrade infinite ones, unless these factors are included in the balance sheet of agriculture, this degradation will continue (Fitzpatrick et al. 2019).

Key environmental impact areas mostly relate to biodiversity, land, forest, and soil degradation. Most ecosystems in Europe are stressed due to pollution and other impacts of human activities (Bates et al. 2008). Along the food chain, many outputs are produced besides consumable food, such as pollution and waste (Allen and Prospero 2016).

At least a 75% decrease in current radical farming practices is foreseen to transform the food system into a more sustainable one by 2050 (Willett et al. 2019). This transformation requires the involvement of multiple stakeholders and other actors in the supply chain to provide a nourished and sustainable diet to all (Willett et al. 2019).

2.1.1.2.1 Inadequate Farming Practices

The agriculture sector is one of the largest sources of reactive nitrogen pollution, use of nitrogen-based fertilizer almost doubled since 1978 and 2014 worldwide (UNEP 2023). Producers often overuse natural resources to gain economic benefits. According to the European Nitrogen Assessment, the negative impact of nitrogen fertilizer utilization is up to three times more than the economic benefits derived (Fitzpatrick et al. 2019). Currently, around 80% of reactive nitrogen is lost in the environment each year (UNEP 2023).

Agriculture based on agrochemical practices can increase production, which is effective for a growing population. However, some externalities arising from agricultural practices include farmers' dependence on fertilizers and pesticides, cultivating a single crop, and having limited areas for livestock, causing intensive consequences (Fitzpatrick et al. 2019).

The high demand for animal protein results in the intensification of livestock production (Baltussen et al. 2016). Environmental externalities arising from animal production are substantial, in terms of carbon costing, implying that the costs we

pay are not high enough for animal protein consumption (Baltussen et al. 2016). According to Springmann et al. 2018, limiting animal protein can be effective in high-income countries for reducing environmental impacts.

2.1.1.2.2 Biodiversity Loss and water scarcity

Biodiversity loss is significantly driven by food production and consumption patterns, which are influenced by climate change, environmental degradation, and water stress (Altieri 2000).

Biodiversity is endangered by livestock through direct and indirect means such as grazing, defecation, or land use, leading to deforestation and climate change (Baltussen et al. 2016). To meet the needs of the population while dealing with climatic impacts and focusing on sustainability imposes significant challenges, maintaining better cropping and agricultural biodiversity plays a key part in this (Frison et al. 2011).

Issues such as the decline in the population of pollinating insects, responsible for producing food crops in North America and Europe, are mainly due to the overuse of pesticides and the cultivation of monocultures on both arable and pastureland (Fitzpatrick et al. 2019). Marine and coastal biodiversity, which contribute to nutritional needs of more than three billion of the global population, and source of income for 10-12% peoples worldwide, are also at irreversible risk (The Nature Conservancy 2021). External inputs are then required to mitigate the impacts caused by the absence of natural environmental inputs. As the soil loses its fertility and pest control abilities, crops require external inputs, thereby reducing functional biodiversity and increasing management costs (Altieri 2000).

Biodiversity is continuously declining, yet no financial value accurately describes the loss of biodiversity. Putting value on ecosystem services and less glamorous species is critical as they play a significant role in maintaining ecological balance (Fitzpatrick et al. 2019).

In addition, around 70% of freshwater resources are consumed by irrigated agriculture globally (Fujs and Kashiwase 2023). The over-exploitation of water resources in certain agricultural areas is having a detrimental impact on ecosystems (OECD 2010). The use of groundwater resources in irrigation also affects economic viability (OECD 2010).

Alterations in precipitation patterns and rainwater trends caused by climate change are closely linked to water availability (Freibauer et al. 2011). Due to salinization, fertile land is lost in dry regions, and high-water demand results in nutrient loss and high energy costs (Freibauer et al. 2011). Irrigation and water supply are closely linked to fulfilling the food supply. Heavy metals and other pollutants are continuously depleting air, water, and land due to human activities (Freibauer et al. 2011). The high concentration of agrochemicals and nutrients present in soil and water pollutants is impacting water quality, further exacerbating water scarcity (Bates et al. 2008). The water needed to produce animal-based products requires several times more than that needed to plant-based products of similar nutritional value (Freibauer et al. 2011).

Food availability, security, and quality can be compromised by the amount and quality of water (OECD 2010). Imposing costs on proper water usage and pollution could minimize water risks (OECD 2013). The policies involved in the agricultural and energy sectors directly and indirectly influence water security, impacting other environmental factors as well (OECD 2013).

The reduction in groundwater levels occurring in many areas makes further extraction difficult for future generations. Hence, policies and investments should account for the long-term "scarcity cost" imposed on future generations by current usage. The cost should also account for pumping costs and the cost of having less water in the future (Freibauer et al. 2011). Economic incentives should be provided for those who use water for irrigation in the most efficient way possible and for growing the most efficient crops that are beneficial both for production and economic aspects (Freibauer et al. 2011). Enhancing the efficiency of water usage in drought-prone areas is also important for the future resilience of agriculture (OECD 2010).

2.1.1.2.3 Climate Change

Global warming is largely contributed to by agricultural emissions through methane, nitrous oxide, and carbon dioxide (Fitzpatrick et al. 2019). All human sectors are impacted by climate change, which also poses a threat to biodiversity (Freibauer et al. 2011). Climate change impacts the entire supply chain, which must be acknowledged by all stakeholders, Thus, awareness is required to mitigate potential

impacts, take appropriate actions, and be prepared to bear the costs of these impacts (Bates et al. 2008).

2.1.1.3 Social Impacts of Food System Externalities

The existing system involving property, infrastructure, or institutional rights that has been developed over time, often disregarding the rights of marginalized groups, mainly women, minorities, immigrants, and other vulnerable communities, thereby imposing social costs through injustice (Hendriks et al. 2021).

2.1.1.3.1 Vulnerable society at risk

Agriculture supports the livelihood of a large population. Any decrease in agricultural output affects poverty levels and endangers food security (Bates et al. 2008). Regions whose economies are largely based on agricultural activities are particularly affected by water scarcity, poverty, and deteriorated soil caused by climate change. Even slight climate variability can increase the risk of hunger, with sub-Saharan Africa being most affected (Bates et al. 2008). Severe floods and droughts have damaged many agricultural areas in OECD countries. This could be due to human interference in water systems and land use policies. (OECD 2010). Bilateral and multilateral conflicts are also arising due to the degradation of shared water resources and the competing demands for natural resources and water shortages (Bates et al. 2008). Adequate water supply is essential for human health, encompassing physical, social, and psychological well-being. (Bates et al. 2008).

2.1.1.3.2 Social security

Current food system facing “Triple challenge”: to combat food insecurity with the provision of nutritious diet for whole population, and to provide the means of economic stability to millions of people associated with food network in an environmental resilient way (OECD 2021). Low-income farmers usually have agriculture as their primary source of earnings that effect by many social factors which hinderance in expanding their livelihood, moreover, lifecycle risks further cause obstructions in sustaining economically (Sato 2021).

According to Allieu and Ocampo (2019), gaining benefits from social protection is challenging especially for rural workers resulting from legal, financial and administrative barriers. The social security program also lacks in provision of economic security to African American workers, racial and gender disparities often

observed in expansion of benefits which leads to high poverty rate (Kijakazi et al. 2019).

2.1.1.3.3 Child labour in agriculture

Child labour is an issue mainly found in agricultural sector, around 70% children are working in agriculture, livestock aquaculture and other related fields globally (FAO 2024). Mostly these children are unpaid members of the farmers family (ILO 2024). However, not all work done by children termed as child labour as suitable tasks for their age and does not have perilous impact, along continuing with their education may be useful for enhancing skills and may contribute to battle food insecurity (FAO 2024). Consequently, most of the work in agriculture do not comply with these criteria (FAO 2024).

2.1.1.3.4 Income disparities among farmers

Small scale farmers despite of being the core in food supply chain that valued at billions in global market- leads a live in poverty (Fairtrade n.d). According to Costa 2023, farmworker wages were 40% lower than non-agricultural employees in 2022. The farmers who own lands has many farming expenses to manage, after which limited income left to cover the household needs, and those who are hired by others may have good wages but lacks with job security, have inadequate working environments and being exploited by their supervisors (Fairtrade n.d).

2.1.2 Positive Externalities

Positive externalities such as sequestration of CO₂ and nitrogen fixation (Fitzpatrick et al. 2019) arising from food networks should be encouraged, failing to do so will result in economic losses that could outweigh the gains from innovations (Baltussen et al. 2016). Nutrient recycling, microclimate control, regulation of hydrological processes, and detoxification of hazardous chemicals can be considered as ecosystem services (Altieri 2000). Agricultural practices can be either detrimental or beneficial to functional biodiversity depending on the implementation of best management practices, which can enhance the sustainability of agroecosystems concerning the ecological services provided to the crops (Altieri 2000). Good agricultural practices, such as appropriate manure, pasture, and soil management, considering animal welfare, should be promoted. Excessive use of fertilizers should be avoided (Baltussen et al. 2016). A change in consumer diet behaviour, such as shifting from beef to chicken, would be favourable for natural capital (Baltussen et

al. 2016). To transition the food system, the impacts should be measured to benefit humanity and the planet (FOLU 2019). The sustainability measures need urgent implementation to overcome climate change and fulfil global sustainability goals (FOLU 2019).

2.2 Consumer Perception Studies

According to Fitzpatrick et al. 2019, an improperly designed pricing system encourages unsustainable practices and disadvantages those who conserve, putting them at a competitive disadvantage. Furthermore, purchasers are treated unfairly as they must pay taxes and extra costs for purchasing sustainable products. True pricing could be the answer for tackling true costs, current economic system often disregards externalities, causing the implications for the society. True pricing reflects the true costs along with market price, asserting that it makes the transparency, payment and mitigation of the external costs (De Groot Ruiz 2021)

True price can be used as a cost-reduction strategy, by identifying and remediation of the external environmental and social costs (Taufik et al. 2023). Tony's Chocolonely's is one of the first company who computed the true price of their chocolate bar and make it available to the stores (De Groot Ruiz 2021). This company works in favour of chocolate production free of slavery. Since 2012, they have only bought cocoa beans from cooperatives of farmers in Ghana and the Ivory Coast. The company discovered that during a five-year period from 2013 to 2017, Tony's Chocolate was 54% less expensive than the true cost of average cocoa sourced from Ghana and Côte d'Ivoire when using True Cost Accounting (TCA) methodology. (True Price, 2018).

True pricing has potential for educating consumers about the external costs of products and helping them choose sustainable options (Taufik et al. 2023). According to Taufik et al (2023), consumers are more likely to buy a product because of its green value which is followed by consideration for social status (Taufik et al. 2023). In another study with a virtual market scenario, increasing prices through taxes and subsidies by around 20-40% demonstrated consumers' inclination towards healthier substitutes (Waterlander et al. 2019).

Michalke et al. (2022) study applied in a German supermarket awareness campaign that featured products with two different price tags: one that displayed the existing market cost and the other that displayed the "true" price, which comprises multiple

ecological externalities ascertained by True Cost Accounting (TCA). The study revealed that, in general, consumers are intrigued by the idea of true food pricing and are somewhat willing to pay the "true prices" of the foods that they have inquired about (Michalke et al. 2022). However, it is feared that social justice and communication issues will arise during TCA implementation due to inadequate transparency and unequal wealth distribution (Michalke et al. 2022).

Similarly, in the Netherlands, a supermarket aiming to contribute to a healthy, social, and sustainable society, carried out a true price campaign, a study with coffee based on the true price and a survey (TruePrice 2023). The study revealed showed a willingness to pay (WTP), and 20% indicated that they would switch their product preference based on reduced externalities (e.g., smaller volume, vegan-based, without milk, etc.). Conversely, the sales data showed that only 15% of consumers chose the true price payment at checkout, and no significant switch was considered (TruePrice 2023). In addition, plant-based dairy consumers showed more willingness to pay the true price (TruePrice 2023). This experiment revealed the potential to increase consumer awareness. Furthermore, criticism was also displayed among consumers and stakeholders, suggesting that the market should pay the true price of the product instead of asking consumers to do so (TruePrice 2023).

Furthermore, concerning evaluating the reception of true cost by the consumer, the primary question of Wilken et al.'s (2024) study addressed whether True Cost Campaigns (TCCs) influence consumers to make sustainable purchases. More precisely, providing consumers with a precise cost estimate at the time of purchase, motivating them to select environmentally friendly options. The results showed that while TCCs can increase consumer preference for sustainable products, they do not always have an impact on sustainable decisions when specific requirements are met. Specifically, TCCs work efficiently when the hidden costs of green foodstuff are lesser than those of conventional ones. An increase in the perception of price fairness explains this effect, emphasising the importance of educating customers about the advantages. However, customers still need to have access to reasonably priced sustainable solutions, so affordability is still important (Wilken et al. 2024). Consumers role in shifting the economy greener is quite crucial, as 'use' and 'disposal' are the most impacted phases of the product life cycle, hence consumers

can be referred as 'agents of change' (Testa et al. 2020). To access consumer perception towards sustainability, Nielsen (2015) conducted a survey corresponding to 60 countries and around 30,000 respondents, Nielsen concluded that 62% consumers showcased that trust on the brand is the driving factor for purchasing sustainable products, and more than half of the respondents demonstrated the influence of products health and societal factors as a decision driver. According to Isaak and Lentz (2020), environmental sustainability features are most concerning for consumers followed by social and economic attributes. However, the increased awareness of sustainability among the consumers is profitable for firms in any case (Galbreth and Ghosh 2013).

Concerning the significance of spreading information and labelling information on consumer perceptions of the true cost of food products, Aschemann-Witzel et al. (2019) described that clear labelling regarding production approaches, and environmental and social effects can positively influence consumer purchasing decisions. Although ethical aspects of products are generally valued by consumers, their attitudes and actual purchasing behaviour frequently differ (Vermeir and Verbeke 2006). Attitudes and intentions towards sustainable products are greatly influenced by situational and individual factors, including perceived availability and social norms (Vermeir and Verbeke 2006). The informational campaigns and communication initiatives can successfully affect these variables, encouraging consumers particularly the younger generation to steer market trends in the future to consume food more ethically and sustainably (Vermeir and Verbeke 2006).

Societal factors also play an important role in building the consumers' perceptions of food costs. Studies by Verain et al. (2015) discussed that consumers keep the social consequences of food production in mind such as reasonable pay for farmers, care of the animals, and labourers in the food industry. However as observed by Verain et al. (2015), there is always a difference between consumers' stated values and their actual purchasing behaviour that makes it difficult to decode the social problems into consumers' choices. According to PwC's 2019 Global Consumer Insights Survey, Dutch consumers, presumed to be the most sustainability-conscious, are still lagging in sustainable purchasing and are less willing to pay premium prices for products produced sustainably or by altruistic brands.

Bellows et al. (2008) in their study, found that small portion of people consider production method while regularly purchasing organic food, while majority shows appreciation for organic farming but often do not prioritize organic food while making food choice. Authors also postulates that multiple purchasing hurdles like affordability, accessibility, quality or availability can restrict non-organic food buyer to obtain organic food despite of their consideration.

According to Steg et al. (2014) consumer's part is crucial to shift the current system to greener economy, through adopting sustainable practices and choices, their impact on the ecosystem could be reduced. There is a rise of consumers population who shifted to sustainable lifestyle in 2023, however, Inflation and high cost of goods remains prime hurdle to make the sustainable choices (Deloitte 2023). Kovacs and Keresztes (2022) found that young people are relatively more interested in sustainable consumption. Furthermore, women are more willing to pay for sustainable attributed products than man. However, generally consumers are willing to pay the additional charge of around 29.5% for considering the sustainable manufacture in the products (Kovacs and Keresztes 2022).

Consumers are developing progressively dedication on sustainable production routines for their agricultural supplies (Isaak and Lentz 2020), Consumers concerns about the environment can have the impact on the purchasing behaviour, along with the practical and functional advantages of the product or services (Hartmann and Apaolaza-Ibáñez 2012). As sustainability became the key notion for social, economic and everyday life, consumers perceive preservation of natural resources as the most significant form of sustainability which is closely followed by adequate working conditions for employees and provision of healthy and safe food (Peano et al. 2019). Moreover, Consumer showed inclination to purchase product if the price and carbon emission is lower, but if the price increases their willingness to buy low carbon product significantly reduced (Li et al. 2017). Overall sustainability factors strongly influence the purchasing intention of the consumers (Kovacs and Keresztes 2022).

According to Galbreth and Ghosh (2013), greater environmental awareness among the consumer will lead to enhanced demand for the product and services, which would be beneficial for a company in terms of competitiveness. However, the firms who are lacking in combating sustainability issues could play their part in providing

awareness to the consumers by supporting the initiatives (Galbreth and Ghosh 2013). According to Bellows et al. (2008), initially the small scale organic market which based on agronomists, consumers and suppliers collaboration to promote ecologically and socially stable farming practices, the success of this venture attracted the market at global scale, which dominated the industry, and significantly disrupting the close knit network among food handlers, which renders the complications and undermines the ecological and economic business factor of organic farming (Bellows et al. 2008).

As per Jaca et al. 2018, consumer's organizations are working towards promoting the sustainable attitude mainly through environmental issues among public through information sharing, though, these organizations often overlook the other dimensions such as health issues and circular economy. Considering that consumers who prioritize sustainability also take care of their personal well-being (Buerke et al. 2017)

Behavioural characteristics can be impacted by social influences, norms, public observability, habits, etc. Psychological effects play an important role in prosocial behaviour (White et al. 2020). While discussing the psychological factors, Siegrist et al (2015) indicated that consumers often depend on simplified decision strategies and cognitive shortcuts when assessing the true cost of food, which leads to cheaper pricing or the inclination towards lower prices with lower quality. Considering this perceptible is important while designing effective policies and strategies to encourage more sustainable food consumption behaviours.

Therefore, understanding Swiss consumer attitudes and perceptions towards the true cost and true price implementation is necessary to support changes in the Swiss Food System.

3. Research methodology

3.1 Empirical study

A survey link was sent out by email to 788-panel members in June 2024. Participants had two weeks to answer the survey. The response rate was 30.1% (n=237). During data cleaning, cases that failed the instructional manipulation check were removed leading to a final sample size of n= 224. Sample characteristics are displayed in Table 1.

Table 1. Sociodemographic characteristics of respondents (n= 224).

Characteristics	%	
Sex	Female	59.4
	Male	40.6
Age	18-39 years old	10.7
	40-59 years old	36.6
	> 60 years old	52.7
Nationality	Swiss	94.2
	Other	5.8
Diet type	Omnivore	54.5
	Flexitarian	35.3
	Vegetarians	6.3
	Vegans	4
Education	None	
	Mandatory school	2.2
	Secondary level II (vocational education)	15.6
	Secondary level II (general education)	4.9
	Tertiary degree (higher vocational education)	36.2
	Tertiary degree (Applied school/University)	41.1
Employment status	Full-time ($\geq 90\%$)	25.9
	Part-time (50–89%)	22.8
	Part-time (<50%)	10.7
	Not working	40.6
Household income	I don't want to answer/ don't know	12.1
	Less than 3,000 CHF	4.5
	3,000 – 4,500 CHF	8.0
	4,501 – 6,000 CHF	16.5
	6,001 – 7,500 CHF	14.7

		7,501 – 9,000 CHF	12.9
		9,001 – 10,500 CHF	10.7
		More than 10,500 CHF	20.5
Responsible for buying food		Me	57.6
		Someone else	4.5
		Me together with someone else	37.9
Responsible for preparing the meals		Me	56.3
		Someone else	13.4
		Me together with someone else	30.4

3.2 Measures

In the first part of the survey, participants answered questions regarding diet type (Omnivore: with meat, fish and/or seafood; Flexitarian: mainly vegetarian with occasional meat or fish consumption; Vegetarian: no meat, fish or seafood consumption or Vegan: without animal products) and previous knowledge towards true cost accounting for food (Table 2). Then, questions regarding true cost accounting for food and true price were queried (Table 2). Next, participants were invited to answer questions on food and food consumption in general, followed by attitude toward true cost (Table 2) and sociodemographic.

Table 2. Scales and items used in the survey.

Parameters/scales	Cronbach's Alpha
<p>1. Previous knowledge of TCAF* (Based on Brunner et al., 2018)</p> <p>I've already read/heard about the TCAF method.</p> <p>I already knew about the environmental costs associated with food.</p> <p>I already knew about the social costs associated with food.</p> <p>I already knew about the health costs associated with food.</p> <p>I noticed that TCAF was presented in the media.</p>	0.76
<p>2. Belief in TCAF (new)</p> <p>I believe TCAF will uncover hidden costs for the benefit of the population's health.</p> <p>I believe TCAF will uncover hidden costs for the benefit of the environment.</p> <p>I think TCAF will be successfully implemented in the Swiss context.</p> <p>If TCAF is implemented, I trust that it will be done correctly.</p>	0.83
<p>3. Scepticism towards true price** (new)</p> <p>Selling foods at the true price reduces the competitiveness of Switzerland.</p> <p>Selling foods at the true price puts tourism in Switzerland at risk.</p> <p>Selling foods at the true price lowers the exportation of goods by Switzerland.</p>	0.78
<p>4. True price effect on consumption** (new)</p> <p>If the price of chocolate increases due to the "True Price" concept, my consumption will be reduced.</p> <p>If the price of meat increases due to the "True Price" concept, my consumption will be reduced.</p> <p>If the price of fruits decreases due to the "True Price" concept, my consumption will increase.</p>	0.79

<p>If the price of vegetables decreases due to the “True Price” concept, my consumption will increase.</p>	
<p>5. Affordability importance** (new)</p>	<p>0.93</p>
<p>For me, affordability is more important when deciding to buy food than paying for social externalities.</p>	
<p>For me, affordability is more important when deciding to buy food than paying for health externalities.</p>	
<p>For me, affordability is more important when deciding to buy food than paying for environmental externalities.</p>	
<p>I do not think it is fair to incorporate the costs of externalities in the price.</p>	
<p>If I have the choice, I will buy products at true price only if they become cheaper than today.</p>	
<p>6. Green trust**(Based on Chen 2013 and Taufik 2023)</p>	<p>0.93</p>
<p>I trust that the true prices are calculated correctly.</p>	
<p>I trust that revenues will indeed be used to solve problems in the environmental and social domains.</p>	
<p>I trust that investments will be made in agricultural companies where the food products are made so that the hidden costs will decrease there.</p>	
<p>7. Remediation beliefs and green value**</p>	<p>0.82</p>
<p>(Based on Noppers et al 2014, Chen 2013 and Taufik, 2023)</p>	
<p>Buying a true price product creates extra revenue for organizations who contribute to decreasing environmental and social costs</p>	
<p>Buying a true price product contributes to a cleaner environment</p>	
<p>Buying a true price product contributes to improved (social) living condition</p>	
<p>8. Social status**(Based on Noppers et al 2014 and Taufik 2023)</p>	<p>0.82</p>
<p>Buying a true price product lead to positive reactions from others</p>	
<p>Buying a true price product sets a good example towards others</p>	
<p>9. General health interest (Roininen et al. 1999)</p>	<p>0.69</p>

The healthiness of food has little impact on my food choices. ^R	
I am very particular about the healthiness of the food I eat.	
I eat what I like, and I do not worry much about the healthiness of food. ^R	
10. Price quality/relation (Brunso and Grunert, 1995)	0.65
I always try to get the best quality for the best price.	
I compare the prices between product variants in order to get the best value for money.	
It is important for me to know that I get quality for all my money.	
11. Price criteria (Brunso and Grunert, 1995)	0.77
I always check prices even on small items.	
I notice when products I buy regularly change in price.	
I look for ads in the newspaper for store specials and plan to take advantage of them when I go shopping.	
12. Food involvement (Bell and Marshall, 2003)	0.66
I don't think much about food each day. ^R	
Talking about what I ate or am going to eat is something I like to do.	
I enjoy cooking for others and myself.	
I care whether or not a table is nicely set.	
13. Environmental protection *** (Lindeman & Väänänen, 2000)	0.91
Has been prepared in an environmentally friendly way.	
Is packaged in an environmentally friendly way.	
Has been produced in a way which has not shaken the balance of nature.	
14. Local and seasonal *** (Verain et al., 2021)	0.91
Is a local/regional product.	
Is a seasonal product.	
Comes from close by (little transport distance).	
15. Natural content *** (Steptoe et al, 1995)	0.92
Contains no additives.	
Contains natural ingredients.	

Contains no artificial ingredients.

16. Familiarity * (Stephoe et al, 1995)**

0.80

Is what I usually eat.

Is familiar.

Is like the food I ate when I was a child.

Dependent variable: Attitude towards TCAF

0.93

(Based on Brunner et al., 2018 and Lucas and Brunner, 2024)

“In general , I think that the method of TCAF is...”

not interesting - interesting

not to be applied - to be applied

not to be supported - to be supported

Negative - positive

Legend:

*Introductory statement: *“Did you know that there are multiple environmental (e.g. biodiversity loss, soil degradation), social (e.g. underpayment, child labour) and health costs (e.g. obesity, malnutrition) associated with food? These costs are currently not accounted for. The main goal of the method of True Cost Accounting for Food is to uncover these hidden costs and to offer consumers a more transparent view of the products they buy and consume. Through this survey, we want to study the understanding, perception, and attitudes of the Swiss residents towards True Cost Accounting for Food (TCAF). It is not necessary to have already heard about TCAF to fill out the questionnaire. Even without experience, you certainly have an opinion on the subject, and it is this view that interests us. How much do the following statements apply to you?”*

**Before the questions related to the true price being queried the following statement was presented: *“The prices of food items we see on supermarket shelves do not reflect the various externalities and their cost. In fact, these costs are currently paid by individuals or the society as a whole. For example, the cost of unhealthy eating and the associated diseases is paid by the whole population through health insurance costs and poses an important economic burden to individuals (income loss due to ill health for instance). Likewise, the use of too many pesticides that might contaminate drinking water, which would then have to be treated at great expense, is paid for by society. The concept of the “True Price of Food” accounts for the cost of food including all these externalities. The price for a product on the shelf in a supermarket would then reflect the true price. For some products, this price would be higher than today, for healthy and sustainable products this price could be lower than today. The one generating the externalities should pay for them. Some of this could be transferred to consumers. Having to pay the true price will make healthy and sustainable products more attractive and therefore, lead to a healthier and more sustainable society. How much do the following statements apply to you?”*

*** Introductory statement: *“It is important to me that the food I eat on a typical day:”*

^R Reversed for analyses.

Note: Scales ranging from 1- strongly disagree to 6- strongly agree.

3.3 Statistics

All analyses were performed using IBM SPSS Statistics (v.29). Descriptive statistics and regression analyses using the Backward method were applied following Giacomuzzo et al. (2024). Attitude towards TCAF was used as dependent variable while the other 16 variables (Table 2) and sociodemographic (sex, age, education and employment status) were used as independent variables

4. Results

4.1 General Findings

As emphasized by European Commission (2023), TCAF can be the guide to achieve more sustainable agrifood policies, by addressing the externalities of food system. Table 3 indicates the moderate previous knowledge of TCAF ($M = 3.37$) among the respondents. According to Vermeir and Verbeke (2006) previous knowledge of a certain subject can positively affect the intention. The current knowledge of consumers can be improved by informational campaigns and communication initiatives. The authors suggest encouraging consumers, particularly the younger generation, to consume food more ethically and sustainably (Vermeir and Verbeke 2006). The average score of belief in TCAF ($M = 4.12$) indicates that consumers showed positive perception towards TCAF methodology, besides believing in its successful implementation.

The skepticism towards true price ($M = 3.40$) was neutrally scored, implying that the participants also observed some disadvantages related to this methodology application. The true price effect on consumption ($M = 3.15$), showed neutral to negative responses from the participants, suggesting that true pricing will not cause a change in certain consumption patterns of the sample, as it was expected. In contrast, Andreyeva et al., (2010) suggested that price intervention could influence the dietary choices of the consumers.

Table 3. Descriptive statistics of the independent variables (N=224).

Scales used as independent variables in the regression model	Mea	
	n	SD
Previous knowledge of TCAF	3.37	0.92
I've already read/heard about the TCAF method.	2.03	1.28
I already knew about the environmental costs associated with food.	4.13	1.35
I already knew about the social costs associated with food.	4.08	1.32
I already knew about the health costs associated with food.	4.50	1.29
I noticed that TCAF was presented in the media.	2.12	1.20
Belief in TCAF	4.12	0.89
I believe TCAF will uncover hidden costs for the benefit of the population's health.	4.40	1.04
I believe TCAF will uncover hidden costs for the benefit of the environment.	4.58	1.08
I think TCAF will be successfully implemented in the Swiss context.	3.47	1.01
If TCAF is implemented, I trust that it will be done correctly.	4.02	1.23
Scepticism towards true price	3.40	1.02
Selling foods at the true price reduces the competitiveness of Switzerland.	3.58	1.27
Selling foods at the true price puts tourism in Switzerland at risk.	2.77	1.19
Selling foods at the true price lowers the exportation of goods by Switzerland.	3.87	1.20
True price effect on consumption	3.15	1.09
If the price of chocolate increases due to the "True Price" concept, my consumption will be reduced.	2.76	1.23
If the price of meat increases due to the "True Price" concept, my consumption will be reduced.	3.19	1.47
If the price of fruits decreases due to the "True Price" concept, my consumption will increase.	3.32	1.38
If the price of vegetables decreases due to the "True Price" concept, my consumption will increase.	3.32	1.45
Affordability importance	2.47	1.09

For me, affordability is more important when deciding to buy food than paying for social externalities.	2.54	1.24
For me, affordability is more important when deciding to buy food than paying for health externalities.	2.38	1.20
For me, affordability is more important when deciding to buy food than paying for environmental externalities.	2.38	1.15
I do not think it is fair to incorporate the costs of externalities in the price.	2.42	1.34
If I have the choice, I will buy products at true price only if they become cheaper than today.	2.63	1.30
Green trust	3.77	1.19
I trust that the true prices are calculated correctly.	3.84	1.24
I trust that revenues will indeed be used to solve problems in the environmental and social domains.	3.66	1.35
I trust that investments will be made in agricultural companies where the food products are made so that the hidden costs will decrease there.	3.80	1.22
Remediation beliefs and green value	3.99	1.04
Buying a true price product creates extra revenue for organizations who contribute to decreasing environmental and social costs.	3.74	1.25
Buying a true price product contributes to a cleaner environment.	4.16	1.22
Buying a true price product contributes to improved (social) living condition.	4.08	1.18
Social status	3.85	1.15
Buying a true price product lead to positive reactions from others	3.73	1.17
Buying a true price product sets a good example towards others	3.98	1.31
General health interest	4.56	0.96
The healthiness of food has little impact on my food choices. ^R	4.41	1.43
I am very particular about the healthiness of the food I eat.	4.68	1.06
I eat what I like, and I do not worry much about the healthiness of food. ^R	4.60	1.16
Price quality/relation	4.18	0.87
I always try to get the best quality for the best price.	3.98	1.23

I compare the prices between product variants in order to get the best value for money.	3.67	1.26
It is important for me to know that I get quality for all my money.	4.89	0.86
Price criteria	3.82	1.20
I always check prices even on small items.	3.87	1.41
I notice when products I buy regularly change in price.	3.96	1.36
I look for ads in the newspaper for store specials and plan to take advantage of them when I go shopping.	3.64	1.56
Food involvement	4.35	0.88
I don't think much about food each day. ^R	4.81	1.04
Talking about what I ate or am going to eat is something I like to do.	3.81	1.29
I enjoy cooking for others and myself.	4.43	1.38
I care whether or not a table is nicely set.	4.37	1.27
Environmental protection	4.74	0.94
Has been prepared in an environmentally friendly way.	4.71	1.01
Is packaged in an environmentally friendly way.	4.80	1.05
Has been produced in a way which has not shaken the balance of nature.	4.72	1.00
Local and seasonal	5.06	0.87
Is a local/regional product.	5.07	0.95
Is a seasonal product.	5.12	0.89
Comes from close by (little transport distance).	4.99	1.01
Natural content	4.76	0.97
Contains no additives.	4.62	1.13
Contains natural ingredients.	5.00	0.86
Contains no artificial ingredients.	4.67	1.12
Familiarity	3.81	1.01
Is what I usually eat.	4.23	1.12
Is familiar.	4.16	1.17
Is like the food I ate when I was a child.	3.05	1.31

Surprisingly, the low average score in the scale affordability importance ($M = 2.47$) (Table 3), indicates less importance to affordability and willingness to pay for the externalities included in the true price, which is in accordance with previous studies (Kovacs and Keresztes 2022; TruePrice 2023). Green trust ($M = 3.77$), remediation beliefs and green value ($M = 3.99$), and social status ($M = 3.85$) have moderate scoring, which indicates cautious optimism among participants. Respondents showed the general belief in true pricing accuracy and perceive positively that true price has the potential to improve environmental and social predicaments. However, the moderate scoring also suggests that they have reservations. Taufik et al. (2023), revealed that social status and green value could convince consumers to buy true price products. However, the authors reported that, for remediation belief, the provision of more concrete evidence is required to judge consumer's purchasing behaviour (Taufik et al. 2023).

A high score of general health interest ($M = 4.56$) indicates that the sample evaluated are more likely to prioritize food choices based on its healthiness. This finding is in line with the findings from Zumthurm and Stämpfli (2024), who observe similar trends on health consciousness among the Swiss residents, when using the Swiss Food Pyramid as a nudge to reduce meat consumption.

The high price-quality relation ($M = 4.18$) suggests that the price paid for a product should be justified by the quality they receive, hence having careful consideration of the value of money. Concern for environmental protection was considered high ($M = 4.74$) and is one of the key motivators for adopting sustainable practices. According to Isaak and Lentz (2020), environmental sustainability features are most concerning for consumers followed by social and economic attributes.

The finding from Table 3 also revealed that participants have high scores for local and seasonal ($M = 5.06$), which implies that these consumers value products produced locally. Similar results are also found in a study by Giacomuzzo et al. (2024) ensuring that Swiss residents value the locality and seasonality of the product. Likewise, the high interest in natural content ($M = 4.76$) indicates the priority for foods without additives or artificial ingredients.

4.2 Regression analysis

The attitude towards the TCAF approach was $M = 4.72$ ($SD = 1.22$). A regression analysis was performed using the backward method (Giacomuzzo et al. 2024; Lucas et al. 2022), where four predictors out of twenty had a significant impact, and 51.0% of the variance was explained by the model (Table 4).

Belief in TCAF showed the strongest and most positive influence on the attitude towards TCAF, which was followed by remediation beliefs and green values and environmental protection. The predictor affordability importance appeared to be negatively related to attitude towards TCAF.

Table 4. Significant predictors of the positive attitude towards true cost accounting for food ($R^2 = 0.51$).

	B	SE B	β	p	VIF
Constant	1.611	0.486		0.001	
Belief in TCAF	0.393	0.092	0.287	<0.001	2.015
Remediation beliefs and green value	0.303	0.078	0.259	<0.001	2.019
Affordability importance	-0.236	0.062	-0.212	<0.001	1.397
Environmental protection	0.183	0.074	0.141	0.014	1.457

Legend: B= Unstandardized coefficient B; SE B= Coefficients standard error; β = Standardized coefficients beta; p = significance; VIF= variance inflation factor. Dependent variable: attitude towards TCAF ($M=4.72$ $SD=1.22$). $N=224$.

According to our results, belief in TCAF had a high influence on positive attitudes towards TCAF indicating their agreement with the revelation of health and environmental externalities, and confidence in its correct implementation. Previous research showed consumers had interest in the transparency provided by true food pricing (Michalke et al. 2022). This might be due to the reason that consumers are developing progressively interest in sustainable production methods for their agricultural supplies (Isaak and Lentz 2020).

The predictor remediation beliefs and green value positively influenced attitudes towards TCAF. The more consumers believe that buying a true price product could

contribute to a cleaner environment and improve social conditions, the higher the positive attitude towards TCAF methodology.

Affordability importance emerges as the negative predictor of positive attitude towards TCAF. Thus, consumers open to pay more for a true price food and to pay for externalities in the price (lower affordability importance), indicates more positive attitude toward TCAF. These consumers place higher priority on social, health and environmental externalities mitigation over affordability. Similar results were found in TruePrice (2023) campaign, where consumers showed willingness to pay a premium price for their sustainable products. In another study consumers were found to be willing to pay the additional charge for the sustainable manufacture in the products (Kovacs and Keresztes 2022). However, as observed by Verain et al. (2015), a difference between consumers' stated values and their actual purchasing behaviour can occur.

Environmental protection also emerged as a significant predictor for positive attitude towards TCAF, where the more consumers showed interest in protecting the environment, the higher their positive attitude towards TCAF. Previous research demonstrated that consumers' concern about the environment can have a positive impact on the purchasing behavior (Chen et al. 2022).

4.3 Limitations

The present study has limitations. Only the limited portion of the Swiss population was evaluated, and they showed high education level. Therefore, the findings cannot be generalized to the whole Swiss population. For the next studies we suggest targeting a larger sample size. Second, a difference in reported and actual attitude among the consumers can occur. Thus, we suggest for future studies to explore these differences by applying other methodologies such as conjoint analyses or by assessing consumers' behavior in real life scenarios.

5. Conclusions

The present study revealed that belief in TCAF, remediation beliefs and green value, affordability importance, and environmental protection are the significant predictors of a positive attitude towards TCAF. Belief in the capacity of true price to contribute in the environmental and social remediations was a strong driver of TCAF positive attitude. Whereas the less respondents showed concern about affordability and the higher positive attitude towards TCAF. This investigation can be useful to stakeholders along the food chain, marketers, policy makers and food handlers supporting strategies that can promote the successful implementation of TCAF methodology. Additionally, these findings can serve as a valuable contributor to foster a more sustainable food network in Switzerland and beyond.

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