THE ROAD TO SUSTAINABLE FOOD CONSUMPTION

DEVELOPMENT OF A SELF-ASSESSMENT TOOL AND APPLICATION IN FIVE COUNTRIES

Edited by

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Preface

Ensuring responsible consumption becomes one of the prominent issue in accordance with the Agenda 2030 for Sustainable Development, adopted by all United Nations member states in 2015. The fact that food is one of the most wasted products makes it valuable to examine in the field of food consumption and consumer behaviour. The economic, social, health-related and ecological impacts of food consumption have been addressed in various studies for years. However, it is clear that food consumption is changing. Every year, more and more consumers are interested in issues such as ethical consumption, sustainable consumption, and dietary preferences. Yet, more than 1 billion tons of food are thrown away every year, and even more strikingly, about 60% of food waste at the consumer level is predicted to be preventable.

This book examines the issue of sustainable food consumption and presents findings on consumer behavior which might reveal the situation. This book is the fourth intellectual output of the international project consortium within the Erasmus+ strategic partnership on adult education projects 'Assessing and Changing Adults' Behaviour on Sustainable Consumption of Food' (N. 2018-1-TR01-KA204-058739). The aim of the project is (i) to analyze sustainable food consumption behaviour of adults by developing a multi-national self-assessment index, (ii) to exhibit the competence map of consumers resulting from this index and (iii) develop learning materials and a mobile app for consumers to support them in their road to have more sustainable food consumption.

The first chapter relates sustainable food consumption and consumer behaviour. The aspects of sustainable food consumption, food waste and the theories that explain consumer food consumption behaviour are surveyed. Chapter 2 propose a multi-national, self-assessment index, the Sustainable Consumption of Food Index (SCOFI), to measure sustainable food consumption behaviour. The index development process from creating an item pool to proposing the final version of the index is presented.

Consumers' sustainable food consumption behaviour is examined in Chapters 3 to 7 using SCOFI in Austria, Denmark, Slovakia, Sweden, and Turkey. In these chapters, the authors develop some specific suggestion for each country. Good practices and initiatives from partner countries are also presented to the readers. Chapter 8 is designed to explain how SCOFI can be used effectively during the behaviour change process to promote more sustainable food choices. The role of SCOFI in gathering feedback and documentation is presented. Chapter 9 presents a synthesis for behaviour change and the use of transformative learning for designing a behaviour-change program to support more sustainable habits of food consumption.

The chapters of this book have been written by team members of the project, which has been co-funded by the Erasmus+ programme of the European Union. I am grateful to all project team members of the consortium of 6 partners from 5 countries, especially the leader of the output, Prof. Klaus G. Grunert, and the authors of the different chapters. I believe that this book 'The Road to Sustainable Food Consumption' will provide both theoretical knowledge and practical insights to the readers from academia and business for considering and understanding the road to ensure more sustainable food consumption.

Zeki Atıl Bulut
Project Coordinator
İzmir
2021

Table of contents

Chapter 1: Sustainable Food Consumption and Consumer Behaviour **1**
Introduction 1
Sustainable Food Consumption 1
Food Waste 3
Consumer Behaviour in Context 4
Rational Behaviour in Food Consumption 5
Automatic Behaviour in Food Consumption 7
Reasoned Behaviour in Food Consumption 8
Socio-Demographic and Other Psychological Factors in Food Consumption 9
From Actual Behaviour to Sustainable Behaviour: Behaviour Change and Obstacles 11
Changing Behaviour to Reach Sustainable Food Consumption Goal 12
COVID-19 Impact on Food Sustainability 14
General Review and Evaluation 15
References 17
Chapter 2: Monitoring Sustainable Food Consumption: The Sustainable Consumption of Food Index **22**
Introduction 22
The Development of the SCOFI 23
Preparing Item Pool for SCOFI 23
Assessment of Items in the SCOFI by Experts 23
Pilot Study of the SCOFI 24
Measuring the Validity and Reliability of the SCOFI 24
How Does the SCOFI Work? 25
Sustainable Lifestyle 25
Food Consumption and Food Waste 25
Ecological Consumption 26
The SCOFI Calculation Method 26
Conclusion 27
References 27
Annex: SCOFI (The Sustainable Consumption of Food Index) 28
Chapter 3: Food Consumption and Sustainability in Austria **30**
Food Waste in Austria 31
Mapping Sustainable Food Consumption in Austria 34
Initiatives for the Future in Austria 38

References 41
Chapter 4: Food Consumption and Sustainability in Denmark 43
The Average Dane's Food Consumption 43
New Official Dietary Recommendations 44
Generation Ø – The Organic Movement 44
Local and Seasonal Consumption 44
Food Waste in Denmark 45
Initiatives to Reduce Food Waste 46
Mapping Sustainable Food Consumption in Denmark 46
The Competence Map 47
Demographic and Socio-Economic Differences 48
Initiatives for the Future in Denmark 50
Making the Sustainable Choice Easier 50
Healthiness and Sustainability 51
References 51
Chapter 5: Food Consumption and Sustainability in Slovakia 53
Barriers to a Sustainable Food Consumption in Slovakia 55
Examples of Good Practice 58
Mapping Sustainable Food Consumption in Slovakia 60
Initiatives for the Future in Slovakia 64
Framework for Current and Future Initiatives in Slovakia 64
Initiatives in the Sphere of Production, Trade, Services and Public Catering 64
Initiatives in Relation to Households and Individual Consumers 65
References 67
Chapter 6: Food Consumption and Sustainability in Sweden 70
Shifting patterns 70
Good Practices 70
Food Waste in Sweden 72
Mapping Sustainable Food Consumption in Sweden 72
The Competence Map 74
Initiatives for the Future in Sweden 76
References 76
Chapter 7: Food Consumption and Sustainability in Turkey 78
Food Production and Consumption in Turkey 78
Food Expenditures in Turkey 80
Food Loss and Waste in Turkey 83
Mapping Sustainable Food Consumption in Turkey 86

Initiatives for the Future in Turkey 91
Sustainable Development Objectives and Efforts, Presidency of the Republic of Turkey, Head of Strategy and Budget 91
Zero Waste Project 92
Food Communities and Community Supported Agriculture 92
Orange Flag 92
Green Directory Sustainable Living Platform 92
Balanced Nutrition Education Project 93
The Platform of Ruhun Doysun Project 93
Fazla Gıda 93
Food Rescue Association 94
WWOOF Turkey/TaTuTa 94
Buğday Association 95
References 95
Chapter 8: Towards a More Sustainable Food Sector - The Need for Documentation, Feedback, and the Role of SCOFI 98
The Green Transition, the Food Sector and the Consumer 98
Current Initiatives and the Potential for Behavioural Change 99
The Need for Documentation and Feedback 101
Taking Into Account Heterogeneity 102
Conclusions 103
References 104
Chapter 9: Behaviour Change and Transformative Learning – Ways to More Sustainable Living 106
Introduction 106
The Making of a Lifestyle 106
Transformative Learning in a Lifestyle Context 107
The Forming of a Lifestyle 107
Creating Conditions for Transformative Learning 107
Steps, Thresholds, and Transformation 107
Role of Critical Thinking 107
Understanding the Behaviour-Change Process 108
A Spiral Relation 108
A Process and a Condition 109
Place: A Bridge between Person and Planet 110
Lifestyle Components 111
Design Elements of a Behaviour-Change Programme 111
A Programme Structure 111

Focus 111
Choice of Delivery Mechanisms 112
Effective Use of Language 112
Monitoring and Evaluation 112
User Support 113
Transformation is more than Change 113
References 114

CHAPTER 1

Sustainable Food Consumption and Consumer Behaviour

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Introduction

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030 (www.undp.org).

The global challenges that the world struggles against, such as poverty, inequality, climate change, environmental degradation, peace, justice, sustainable consumption, and production, are handled in SDGs. According to the 2020 Global SDG Index, prepared by the Bertelsmann Stiftung and the Sustainable Development Solutions Network (SDSN), all ten countries closest to achieving the SDGs are in Europe, 17 of the top 20 countries – a remarkable performance from an international perspective. Nevertheless, there are significant gaps in performance across European countries: ranging from Sweden, Denmark, and Finland (ranked the top 3) to Bulgaria, Greece, and Romania (ranked 35th and lower) (IEEP, 2020).

The food system issues are essential on behalf of the sustainability of the world, as they affect all the SDGs. Furthermore, the food regime is one of the main drivers of climate change. Food system activities are divided into four categories: production, processing-packaging, distribution-retail sales, and consumption. It can be said that there is a strong relationship between food and nutritional security in terms of food management. Moreover, agriculture and food systems intersect at global, national, and local levels. In this concept, the food and agriculture sector's main issue is to meet the nutritional needs of the increasing population and protect natural resources for future generations and provide sufficient and quality food (Capone et al., 2014).

Sustainable Food Consumption

Biodiversity International and FAO redefined sustainable diets as: "Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security, as well as to a healthy life for present and future generations. They contribute to the protection and respect of biodiversity and ecosystems, is culturally acceptable, economically fair and affordable, adequate, safe and healthy nutritionally, and simultaneously optimize natural and human resources" (BCFN, 2016).

Gorgitano and Sodano (2014) define sustainable food as the food that meets safety, political and environmental requirements, such as safe, healthy, and nutritious diets for everyone; provides a viable livelihood for every member in the food supply chain; safeguards the environment and biodiversity; saves energy and minimises the waste.

Sustainable food products are defined as products that contribute to at least one economic, ecological, and social aspect (Reheul et al., 2001). Moreover, by adding health to these aspects, the sustainable food system concept should be considered to include economic, ecological, social, and health issues. Thus, this four-dimensional distinction has been preferred in order to present a more comprehensive approach in this chapter.

The *economic dimension* refers to a fair price for both producers and consumers. In contrast, the ecological dimension directs attention to caring for the living environment and the quality of life for humans. Additionally, as the last dimension, the social aspect relates the agricultural policies to the needs and priorities of society. It concerns the support for the agro-food sector from both the society and governments (Vermeir & Verbeke, 2006).

The *ecological dimension* (also referred to as the environmental dimension) includes the issues that reflect the impact of the food system on the environment. Following the increase in world population and income level across the developing world, the demand for overall food is predicted to increase by more than 50 percent, and demand for animal-based foods by nearly 70 percent. According to World Resources Institute (WRI; 2019), even today, there are hundreds of millions of hungry people, half of the world's vegetated land is used for agriculture, and this agriculture, and related land-use change, generate one-quarter of annual greenhouse gas (GHG) emissions.

The *social dimension* of food consumption includes many facets and behaviours. Social inequality in access to food, food consumption as a means of socialisation, guilt caused by food waste, ethical concerns in food consumption, social stress experienced by individuals regarding social acceptance due to sustainable or unsustainable behaviours can be counted among these.

Social consumption drivers include urbanisation, demographic change, and changing patterns of consumer needs, preferences, choices, tastes, habits, and practices (Capone et al., 2014). These drivers are relevant to food consumption as well.

The social impact of the food system is relevant concerning the way of buying, using, and disposing of goods and services in a sustainably way (Wolff and Schönherr, 2011). Also, Zhao and Schroeder (2010) suggest that the social component covers the complex social drivers of global environmental change, including global climate change. Besides, it can be said that ecologically and socially responsible citizens express their environmental concerns through their private consumption decisions (Lee, 2014).

Health is another dimension of sustainable consumption of food. Health related sustainable consumption behaviour is usually considered with other dimensions. Recent studies revealed that animal-based foods affect the environment more than plant origin foods (Joyce et al., 2014; Poore, 2018; Perignon et al., 2017; Van Loo et al., 2017); the latter being healthier. While meat production causes greater GHG emissions and harms the environment on the one hand (Dagevos and Voodouw, 2013; Macdiarmid et al., 2016), too much meat consumption increases the risk of chronic diseases on the other. Considering these damages, reducing the production and consumption of meat has been the main discussion point by academicians (Hallström et al., 2014). Animal-based foods such as meat and dairy products, extras like snacks with sugary foods and drinks, especially coffee and tea, alcohol, and juices, can also cause high GHG emissions levels (Van Dooren et al., 2014).

Considering the current consumption levels of these products, the need for a gradual change on the unsustainable consumption patterns towards healthier and more sustainable diets appears (Van Loo et al., 2017). Additionally, the consumption habits can be aligned with WHO and FAO guidelines through some strategies, such as suggesting a calorie intake in proportion to that required to maintain healthy body weight (Garnett, 2011], or applying a Mediterranean diet (Burlingame & Dernini, 2011). In this regard, consumption of organic foods is suggested to promote sustainable consumption patterns, as it is perceived to be safeguarding the environment and the welfare of future generations (Vermeir & Verbeke, 2006) by many consumers (Borsellino et al., 2020).

For a diet of high quality, diversity and balance of nutrients are essential as well as the adequacy and moderation of food consumed. Consumers are more protected against all forms of malnutrition and non-communicable diseases (NCDs), such as diabetes, heart disease, stroke, and cancer, with the help of applying healthy diets, which contain diverse, balanced, and appropriate food choices (FAO, 2020). The amount of calories consumed daily plays a crucial part in sustainable food consumption. The average nutritional requirement per person is around 2000 kcal per day. However, FAO's food balance sheet suggests that the retail sector in high-income countries makes over 3000 kcal of food a day available (FAO, 2010). Thus, individual responsibilities are also required for food consumption sustainably.

Food Waste

The lost or wasted foods along the entire supply chain are generally perishable foods, such as fruits, vegetables, and animal-based foods. Mostly fish, fresh milk, meat, and eggs are among the most perishable ones. The possible reasons for these kinds of losses and waste are inadequate market infrastructure and improper production and storage (FAO, 2020).

Global resources, which are already limited, are consumed as unlimited; people throw away much of the food they buy. This situation also has a significant impact on environmental pollution. 8% of the carbon emissions in the world are caused by food waste. On the other hand, 60% of food waste can be prevented by conscious practices (XTRlarge, 2018).

The waste hierarchy provides a hierarchy of options that present the best overall environmental outcomes (Papargyropoulou et al., 2014). As the figure presents, the most favourable option is to prevent waste incurrence. If not possible, re-using is the second-best alternative, followed by recycling and recovery, respectively. The last and the least preferred action is disposing of unused foods, although it is still an important part of the waste management system.

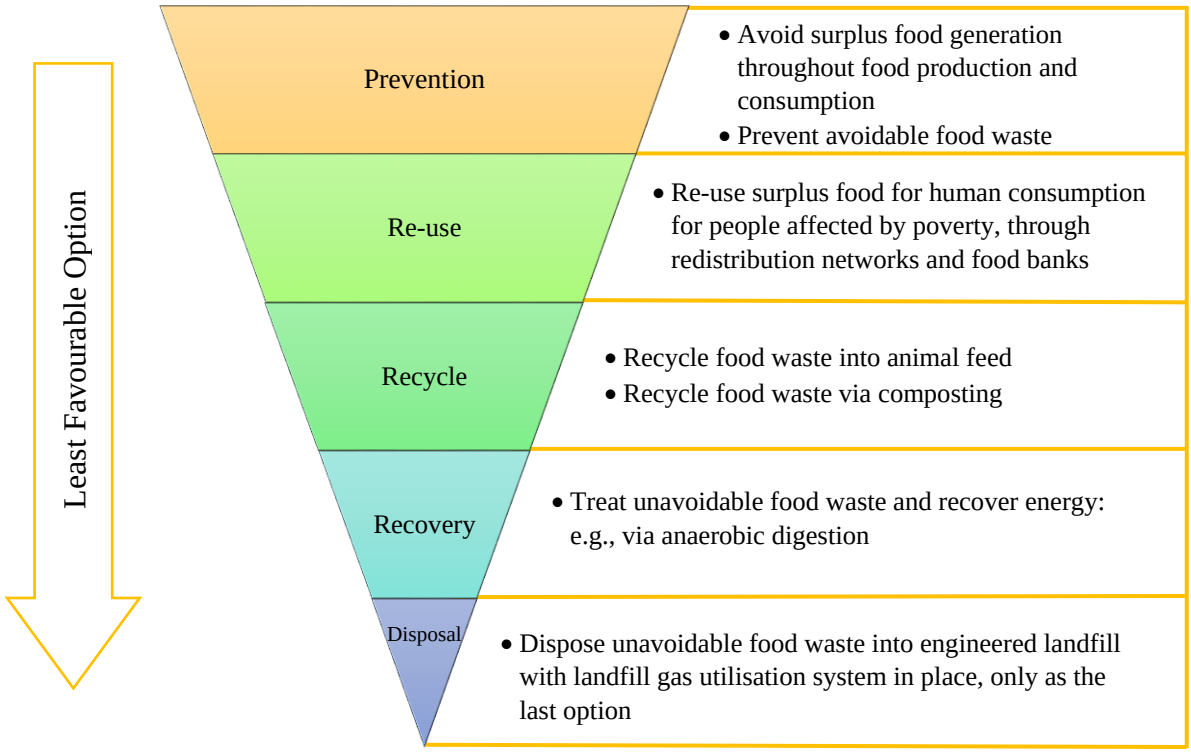

Figure 1: The food waste hierarchy
Source: Papargyropoulou et al., 2014

According to recent studies, around 14 percent of total foods worldwide are lost after the harvest stage of production but before the foods arrive at shelves in the retail markets (FAO, 2020). After this stage of the supply chain, buyers and consumers' malpractices, which also result in pollution and GHG emission, become the main reason for food losses and wastes. For example, unplanned buying behaviours, such as buying more than is necessary or inability to manage the household's food flow, are widespread malpractices among consumers in many countries. This increasing amount of food wastage has negative environmental, social, and monetary impacts (Stancu et al., 2016).

Developed nations, North America, Australia/New Zealand, Europe/Russia, and East Asia are the highest food wasters globally (www.fao.org). In industrialised countries, food losses and waste amounts are roughly $680 billion, while developing countries are $310 billion (www.fao.org). In developed nations, most food waste occurs due to quality standards at the retail and consumer level. On the other hand, in developing nations, most food waste originates from inefficient harvesting, poor infrastructure, inadequate transportation, and unsuitable farm conditions (Gustavsson et al., 2011).

Consumer Behaviour in Context

Consumer behaviour is one of the most important factors to consider in ensuring sustainability from purchase to disposal since they are at the heart of the food consumption cycle. Therefore, this part of the chapter explains the influences on consumers' food preferences and consumption patterns by using the developed theories on food preferences, together with the extant literature on influences on food consumption patterns.

Researchers have developed several theories and models on purchase behaviour to date. Many of these consumer behaviour theories and concepts have been applied to food consumption behaviour. One of the first models on consumers' food preferences belongs to Randall and Sanjur (1981). In their study, the factors that affect food preferences are classified into three main groups; product, person, and environment. It is worth noting that while each of these groups includes several characteristics (as seen in Fig.1), no causal relationship is established (Gorton & Barjolle, 2013).

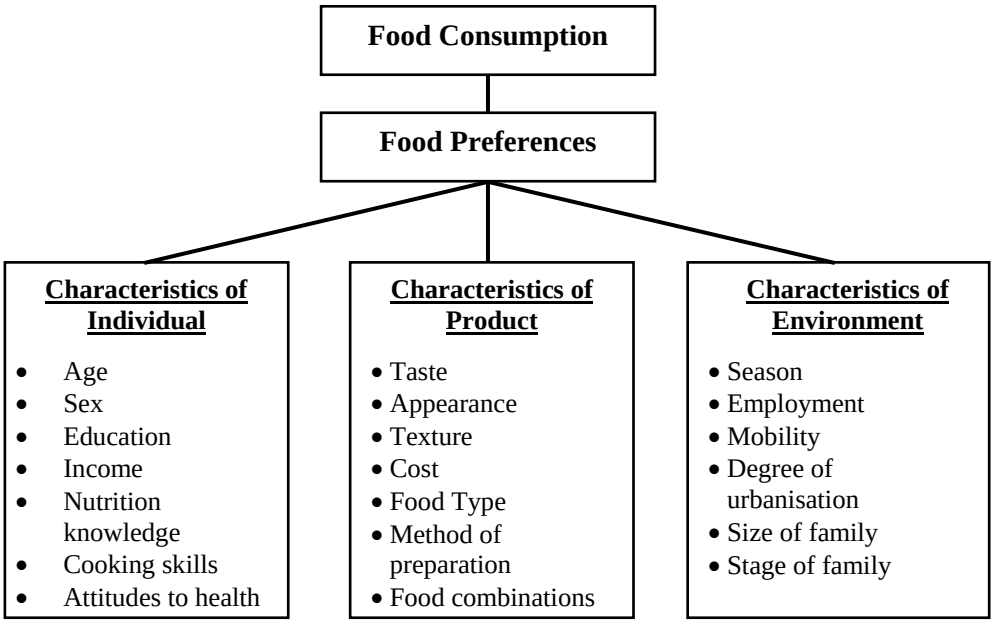

Figure 2: Factors ınfluencing food preferences
Source: Randall and Sanjur, 1981, p.154

More advanced models, which are developed after this model, reveal causal relationships to explain the factors affecting food purchase preferences by considering many different perspectives, such as marketing, economics, psychology, etc. (Sheth, 2011). Grunert et al. (2012) proposed that the behaviour explained by these theories and models can be grouped under three headings. According to this approach, behaviours take place on a line from rational to automatic behaviour. Reasoned behaviour is on the middle of this line.

Rational Behaviour in Food Consumption

Rational behaviour is based on economics and refers to functional way of a behaviour. According to this, consumers act rationally when consuming. In this chapter, the Economic Household Model and the Food Choice Process Model are being addressed as models that explain rational behaviour in food consumption.

The Economic Household Model has its origins in the study of Becker (1965). According to Becker (1965), households produce utility-yielding outputs by utilising the market goods and time. The available time is allocated to three activities; earning income to acquire market goods, producing outputs, and consuming them. (Gorton & Barjolle, 2013).

Utilising Becker's (1965) model, Bonke (1992) classified foods into three groups as non-convenience foods (i.e., ingredients for cooking from scratch), semi-convenience foods (i.e.,

frozen foods) and convenience foods (i.e., fast food meals); and concluded that households with more disposable income and/or less time available for cooking prefer convenience foods and vice versa. The rise in the number of restaurants and consumption of convenience foods during economic growth periods can be explained by using this model (Schumacher & Boland, 2005).

The Economic Household Model has some limitations as well. Therefore, additional factors may need to be considered. In other words, although income and time seem like the only factors influencing the food preferences in the model, some other factors, such as culture, should also be considered in analysing the cross-national differences in food preferences. For example, penetration of convenience foods in the market may vary for countries with different lifestyles.

The Food Choice Process Model is based on grounded theory and developed by Furst et al. (1996) on the basis of qualitative methodology. The model includes three main components; the life course, influences, and personal systems. According to Sobal et al (2009), all food choice decisions are grounded on personal and historical time. Moreover, as it is explained in further sections, the life course concept and its components make it possible to conceptualise dynamic and static dimensions of food choice decisions which are based on past experiences, present situation, and future expectations. In the model, life course is evaluated by taking current effects into account, but food choice cannot be fully understood without taking past events into account. From this point of view, it can be said that the model is based on rational preferences, as it is thought to explain the food consumption decision by evaluating both current influences and past experiences together as well as internal process of mental decision.

Current and past experiences of consumers determine the life course. According to the model, a researcher needs to understand a person's trajectories, which are made of personal thoughts, feelings, goals, etc., in order to understand the current consumption patterns of that consumer. Their past learnings and situational contexts shape consumers' consumption patterns. Changing these patterns may take a long time, such as the nutritional habits earned in the parental house. However, it is vital to avoid the pure historical determinism approach, considering that consumers may experience some situations that change their patterns during their lifespan (Sobal et al. 2006).

Furst et al. (1996) list the aforementioned influences as ideals, resources, social framework, and food context. The meaning and values that people assign to foods are what the *ideals* refer to. For example, eating and cooking may mean much more to some people, whereas others may consider food only as a must to live. This makes a difference in their nutrition patterns. On the other hand, *resources* consist of tangible (money, equipment, ingredients, space) and intangible (cooking skills, knowledge, time) inputs as the critical determinants of nutrition choices. Finally, *the social framework* refers to the role a person perceives to have in society by considering the interpersonal relationships, status, etc. In terms of food consumption, a family is regarded as the most influential social framework component by Furst et al. (1996). Because in a family, individuals are assigned some household food roles that may conflict with individual preferences (Furst et al., 1996).

The personal system refers to the internal process of mentally processing the influences and converting them to food purchase and/or consumption behaviours. In doing this, they consider both the values assigned to food alternatives, such as availability, affordability, convenience, quality, and strategies, which refer to habits and rules that individuals establish themselves (Gorton and Barjolle, 2013).

Consumers are generally under emotional and motivational influences on food consumption behaviours rather than rational decisions. Food shopping and consumption behaviours for reasons such as front-of-the-cash offers, promotions, rewarding or enjoying themselves can lead to unsustainable food consumption preferences. These consumer preferences can create barriers to more sustainable food consumption by paving the way for demand for unhealthy foods and sometimes food products that are not economically and environmentally sustainable. Therefore, in order to contribute to making food consumption more sustainable, adult consumers are expected to make more rational decisions at every stage of their food consumption preferences and to consider not only economic stimuli but also the ecological, social and health consequences of their choices. For this, it is necessary to upscale a thinking system in which economic factors and other elements of sustainable consumption are handled together. At this point, in all behaviours related to food consumption, it should be taken into consideration that the benefit to be obtained after the choices will contribute to creating social benefit, not just personal and hedonic.

Automatic Behaviour in Food Consumption

On the other side of the line, adults behave automatically mostly based on their habits. The automation of a behaviour can be due to many reasons. One of these is the development of a behaviour pattern as a result of previously experienced behaviours. For example, when the taste of a food product is liked, the product can be purchased again without paying much attention to the content of this product. Likewise, in cases where the price of the product is low, consumers automatically buy that product due to its price rather than considering the product's features.

Convenience products with low involvement are often purchased automatically. Adults do not spend much time and effort thinking about this kind of shopping. Some of the food products also fall into this category. Fruits and vegetables can be purchased automatically with the idea of "having it at home" rather than portion planning. Many consumers automatically buy bread in the same quantity each day. This purchase becomes automatic by ignoring many factors such as the amount left at home, the average consumption amount, portion and calorie planning. Involvement level of adults need to be risen to achieve more sustainable consumption of food.

Some external stimuli can also play a role in the automatic display of a behaviour. Friends, family, and others such as influencers are among them. Adults often attribute a special meaning to food for socialising. Dinners with crowded families, eating out with friends and the variety of celebrations can be seen as a source of unsustainable behaviours in food consumptions.

Marketing campaigns and techniques are also used for influencing purchase decisions and stimulating consumers. Open-air selling and sensory cues like smells may encourage consumers to buy food impulsively. Flash sales, unexpected discounts in front of cash, coupons, and in-store impulsive buying offers may persuade consumers and trigger automatic buying behaviours.

One of the perceptual biases affecting consumer behaviour is the halo effect, where products that are perceived as organic are also perceived as healthier, more nourishing, etc. For example, a product which has some visual cues about sustainability may not only taste better and have a smaller environmental impact than the other alternatives, but it is also perceived to be healthier (Lee et al., 2013; Wiedmann et al., 2014).

Reasoned Behaviour in Food Consumption

Intention is the main domain in reasoned behaviour. Many studies focus on the role of intention on actual behaviour and take intention as a precursor of behaviour. The well-known theory in food consumption within the framework of reasoned behaviour is the Theory of Planned Behavior (TPB).

The TPB, developed from the Theory of Reasoned Action (TRA), is one of the most widely used theories in previous consumer behaviour studies toward food consumption. The TPB reveals that behavioural intention has three conceptual premises. These are attitude towards behaviour, subjective norm, and perceived behavioural control. (Ajzen, 1985). The TPB postulates that the probability of actual behaviour depends on an individual's intention to engage in that behaviour. The individual's attitudes play a vital role in developing their intentions. Attitude towards behaviour refers to whether a person has a positive or negative evaluation of the behaviour, or the degree of evaluation. Attitude can be defined as the power of positive or negative feelings that may change the behaviour. Subjective norms can be related to social pressure. Subjective norms, referred to as the acceptability of the outcomes by reference groups (Ajzen, 1991), may lead to behavioural intention. Perceived behavioural control indicates the individual's level of control over what and how to buy. It is also associated with whether a product is easy, difficult, or impossible to consume.

According to TPB, in order for an individual to increase the probability of exhibiting the behaviour, the attitude and subjective norm of the individual should be as positive as possible, and the perceived behavioural control related to behaviour should be high. Han and Hansen (2012) found all determinants of TPB to be in association with sustainable food purchase/consumption behaviour. Among all three variables, attitude shows a significant strong impact on behaviour, followed by subjective norms and perceived behavioural control. Besides, it is found that personal norm, which has been added as a determinant to the TPB when explaining sustainable food consumption, has the most substantial impact on behaviour. (Han & Hansen, 2012).

In many other studies, TPB has been expanded by adding and combining various variables. For instance, Zhu et al. (2013) extend the TPB model by using individual values as mediators for the relationship between the external influencing factors and green food consumption intention. They found that the environmental value of consumers is needed to trigger green food consumption intention. Tsai et al. (2015) applied the decomposed theory of planned behaviour. They revealed that the ethical self-identity and food safety concerns, attitude, and dimensions of perceived behavioural control, self-efficacy, and facilitations conditions have a significant impact on the purchase intention of organic food.

Ting et al. (2016) investigated the moderating role of food neophobia on TPB relations and proved the moderating role of food neophobia on the association between subjective norm and consumption intention. Alam et al. (2020) added perceived value to the framework and found that perceived value and attitude, and social norms increase consumers' sustainable food consumption intention. In their studies, Soorani and Ahmadvand (2019) investigated the effect of guilt feelings of individuals on the intention to participate in the reduction of food waste within the framework of TPB and on food consumption management behaviour. According to the findings of the study, although guilt feelings have a significant effect on not wasting food, it is not equally effective in promoting and influencing household food consumption behaviour.

Although there is wide use of TPB, many criticisms of TPB have also been voiced. Contrary to the basic assumptions of TPB, consumers often do not display reasoned behaviour. Moreover, TPB ignores the emotional effects on consumers' behaviour. Besides, according to Thomson et al. (1994), TPB can explain 40-50% of the intention variance and 19-38% of behavioural variance.

Also, external factors are not considered in the context of the TPB. Guagnano et al. (1995) offered the A-B-C model of behaviour that incorporates behaviour, attitudes and external conditions. According to the model, behaviours are in association to external conditions, which include any external resources from the wide range of extremely unsustainable to extremely sustainable. Attitudes can predominate external conditions or vice versa. For instance, consumers who tend to consume organic products because of their higher environmental awareness, are willing to pay higher prices for organic products. If the places where they can reach organic products, such as local grocery stores, are long-distance and require personal transportation, they will not choose to go to these markets because of the same environmental concerns.

Socio-Demographic and Other Psychological Factors in Food Consumption

One of the consumer effects on food consumption is grounded in changing cultures. Although there are some contrary findings (Reich et al., 2018) consumers may prefer globalised, standardised, resource-demanding products to local, seasonal products. Home cooking loses ground in favour of processed products and out-of-home eating. With the change in lifestyles and the increase in urbanisation, there have been structural changes in consumer behaviour and the food culture, too. Besides, more participation of women in economic activities instead of staying in their homes also contributes to this situation (FAO, 2020). Thus, women, who are seen as responsible for food preparation in many cultures and responsible for food planning and shopping, have not much spare time due to their economic life obligation. From this point of view, practical food alternatives, such as hamburger, pizza, etc., instead of home cooking are preferred. Mostly this situation leads to unsustainable food consumption. As fruits and vegetables require frequent purchases with shorter shelf lives and longer time is needed for preparation, these kinds of sustainable foods may not be consumed because of the limited time available in the new lifestyles (FAO, 2020).

Demographic profiles of consumers are also explanatory in food consumption of adults. For example, some consumers have started paying more attention to food safety and quality concerns. Especially the higher-income consumers care about the environmental and social impacts of food production and consumption. These consumers have an increasing demand for organic products, including information about the products' origins, and the harvest methods used in their production. This increasing demand in high-income countries led to a decrease in prices for organic goods, such as coffee or organic spinach (FAO, 2020).

Financial reasons are the main motive of decreasing wastage of food for households. Besides, some people could minimise their food waste for other reasons. However, they think that they purchase more than they require (Graham-Rowe et al., 2014). One of the main drivers of food consumption behaviour is income. Setti et al. (2016) suggest that food waste is related to; (1) consumers' food purchasing and preparation practices and behaviour; (2) consumers' eating behaviour. Consumers' food purchasing and preparation practices have financial consequences. Because low budget consumers buy cheaper products in larger quantities, this situation causes

food waste. Similarly, consumers' eating behaviour also has consequences for keeping costs down. Because low budget consumers buy low quality food products, this kind of food products might increase the food waste because of their taste, flavour, etc. (Setti et al., 2016).

Rees et al. (2019) reveal the effect of consumers' level of recognition of sustainability cues on packaging on purchase intention and purchasing behaviour. The study shows that when the level of income increases, the level of recognition of sustainability cues also increases (Rees et al., 2019).

In addition to the income level, consumers' and households' other demographic characteristics also significantly affect the food and nutrition preferences, both alone and in conjunction with their impacts on the level of awareness about the environmental aspects and healthy diets. For example, while women are found to have a higher tendency towards sustainability issues compared to men individually (Tobler et al., 2011; Hayley et al., 2015), when considered on a household basis, adults are suggested to pay more attention to food safety, healthy diet preferences and environmental impacts when they have children. Furthermore, consumers' education level and profession are other vital factors that affect consumer behaviours and preferences. It can be suggested that the higher the social status (referring to education level and profession), the higher the level of awareness and knowledge on environmental and health issues.

Psychological factors such as learning and knowledge, perception, attitudes and beliefs, and motivation influence consumers' food behaviours. Consumers' knowledge about the environmental consequences of their food choices is very crucial. Food labels that contain such information will inform citizens on this issue (Vanham & Leip, 2020). For example, it would be better to have such food labels that involve some information about their carbon footprint, water footprint, ecological footprint, etc.

Azzurra et al. (2019) suggest that consumers who prefer organic foods have a higher level of sustainability perception concerning their available food choices. These consumers also have more sustainable lifestyles. Moreover, the organic consumption intensity of consumers mostly regardsconcerns about food safety. Fostering consumption of organic food is often recognised as a way to improve the sustainability of food systems and promote the spread of sustainable diets (Mørk et al., 2017).

On the other hand, while individuals exhibit sustainable consumption behaviour, they act not only by thinking about themselves, but also by considering other people, future generations, and the natural environment. In this respect, it is suggested that egoism (self-oriented), altruism (society-oriented) and biospheric (biosphere-oriented) value orientations underlie the environmental attitudes and behaviours of individuals (Stern & Dietz, 1994). From the perspective of food consumption, the literature considers egoistic, altruistic and biospheric values (e.g. authenticity, the responsibility for future generations and environmentalism) as determinant values, while the functional values (e.g. availability, price, promotions, etc.) are considered as supportive for retaining sustainable food consumption.

According to Kaiser and Byrka (2015), individuals' participation in attitude-relevant dietary practices is relevant to their environmental attitudes (Kaiser & Byrka, 2015). It is also clear that environmental-friendly purchase is socially desirable behaviour (Yamoah & Acquaye, 2019). Besides, shopping environments could affect consumers' food choices, negatively or positively. In a study done by Coucke et al. (2019), the sales of more sustainable meat products could be

affected by changing the display area's size and the number of displayed products in the display area. It can be said that consumers perceived these kinds of facts as visual cues that cause them to purchase more sustainable (or not).

In addition to attitudes, beliefs have also impact on behaviours. The good news is that high-quality, health-oriented, and organic foodstuffs have become increasingly popular, with the help of health and fitness concerns gaining more attention from consumers. As distinct from the findings of Azzurra et al. (2019), European consumers, with little differences among countries, are found to prefer organic food, primarily because they believe it to be healthier, (Thøgersen, 2009; Willer & Kilcher, 2012). Besides, healthier eating food patterns encourage producers to produce more sustainable food products and reduces food wastage (Baudry et al. 2017).

Consumer involvement plays a vital role in sustainable consumption through motivation. According to the research done by Vega-Zamora et al. (2020), consumers who have a higher level of involvement with food in general consume more organic foods than others. Thus, raising environmental awareness and involvement of consumers for more sustainable consumption may lead adults to adopt sustainability into their lives.

Many motivations can trigger more sustainable food behaviours. According to the findings of Stancu et al. (2020), restrictive behaviours such as limiting meat consumption stem from the desire to adapt to social groups such as friends. Similarly, purchasing organic or other sustainable foods with the effect of self-consciousness, separating waste to create good image on others are among motives that are determined as introjected motivations (e.g., impress others, public self-consciousness) and can be linked to "the right thing to do". The fact remains that the impact of some external motivations such as price, perceived taste, or high-quality can be seen in the buying process. On the other hand, internalised motivations arising from sets of values, such as respecting animal rights, protecting the environment by preventing contamination of the soil and water, play roles in buying sustainable food products. An interest in sustainability or enjoying sustainability efforts such as seeing plants growing through composting can come from intrinsic motivations.

It is clear that more sustainable food consumption motives can be reached when consumers play active roles in some steps. According to Quested et al. (2013), these steps could be listed as; planning food purchase, storage, preparation, food consumption. Many motives play different roles in these steps. For example, motives such as variety seeking, socialising, and hedonism lead to less sustainable behaviours such as eating out, whereas motives like success, ambition and security trigger more sustainable behaviours such as cooking at home or involvement with food shopping (Botonaki & Mattas, 2010).

From Actual Behaviour to Sustainable Behaviour: Behaviour Change and Obstacles

According to Campbell (1963), the "arithmetic difference" between own general attitudes and the potential costs of considered behaviour drives an individual to choose among alternative courses of actions. Campbell's opinion, called Campbell Paradigm, is based on the relationship between the performance factors, such as past purchase habits, premium pricing, availability and variety of products, and sustainable food purchase behaviour. It is suggested that if a customer is significantly affected by these factors, either individually or in combination, he/she is less likely to purchase sustainable food products. (Yamoah & Acquaye, 2019).

There is an unsolved paradox in sustainability while investigating consumer behaviour (Gruber & Schlegelmilch, 2014). To find an explanation of this complexity, many studies focus on the gaps between attitude and behaviour. For instance, Gorgitano and Sodano (2014) identify three main obstacles to have more sustainable food consumption patterns: the rebound effect, the knowledge-to-action gap, and the behaviour-impact-gap. The rebound effect refers to the consumers' mental choices about sustainable consumption behaviour and its final effect that is less sustainable. For example, when consumers eat sustainable foods, they believe that he/she gains the right to eat something less sustainable. This may even result in overconsumption of less sustainable alternative. Another obstacle, knowledge-to-action gap, states that even if the consumers have enough knowledge about the sustainable behaviour alternatives, they may not prefer behaving in that way. For example, the negative impacts of alcoholic drinks on health are known; however, people go on consuming. This reflects an obvious gap between the knowledge and action. As the final obstacle, the behaviour-impact-gap reflects the situation that when the required behavioural change is achieved expected results deviate from observed outcomes. For example, the ecological impact of vegetarian diet can be offset by substituted food products' negative impacts, resulting in increased footprints (Csutora, 2012).

Changing Behaviour to Reach Sustainable Food Consumption Goal

Food consumption, especially sustainable food consumption habits and behaviour of adults are difficult to change. As explained theoretically in the previous sections, internal factors such as knowledge, attitudes, beliefs, values, lifestyle, demographics, and psychological factors, or external factors, like social influence, media and marketing, social norms and regulations are influential factors for developing and changing behaviour.

Considering this wide range of factors and obstacles *behaviour change requires a systematic process.* The goal directed framework developed by Vermeir et al. (2020) is one of the leading studies that examine this process in detail in the literature.

The Goal-Directed Framework proposes five steps; consumers: (1) positively value the environment, (2) discern a discrepancy between the desired versus the actual state of the environment, (3) opt for action to reduce the discrepancy, (4) intend to engage in behaviour that is expected to bring them closer to the desired end state, and (5) act in accordance with their intention. The framework has been applied to environmentally sustainable food consumption. In each component of the framework, many interventions and barriers have been associated to environmentally sustainable food consumption.

According to the framework, first, consumers if the behaviour to be promoted is perceived as contributing to the consumer's values'; for example, if the individual does not value eating healthy, it is unlikely that the consumer will be interested in the nutritional values or content of the food products he/she buys. Second, individuals will only take action towards the targeted behaviour when they think that there is a discrepancy between their situation and the final situation that has a positive value. If the consumer does not feel a discrepancy between the current and final situation, there is no need to act to reduce or remedy this. For instance, if the consumer already attaches importance to a healthy diet and believes that he/she is eating healthily, he/she is less likely to eliminate saturated fats from his/her nutrition. Third, even if there is a perceived discrepancy between the current state and the desired state, people may choose to devalue the intended end situation in order not to make an effort, rather than take action to achieve that desired state. The same situation may arise with changes in belief about

the difference between the current and desired states. In cases where the information about the ingredients of the products (e.g. saturated - unsaturated fat ratio) can be reached by reading the label, a person who finds label reading time-wasting may ignore the information about saturated/ unsaturated fats, even if he/she is aware that his/her current fat preference is unhealthy. He/she bases this behaviour on the thought that he/she consumes other kinds of healthy foods and/or have a low frequency of purchasing that kind of foods. Fourth, even if people decide to reduce a perceived deviation between the current situation and the desired end state, they need to choose between different courses of actions. For example, although both high-saturated fat and high-carbohydrate diets have adverse effects on health, if high-saturated fat is more harmful for health, consumers prefer products with high-carbohydrate to products with high-saturated fat. Fifth, some behavioural intentions may not be realised. One of the reasons for this is that it is sometimes impossible to carry out the intended behaviour. The second reason for not performing an intended behaviour is related to the other goals the individual strives for. If the individual's other goals are incompatible with the efforts he or she will attempt to achieve the intended behaviour, the individual may have to make a choice. If the expected benefits to achieve when a goal is reached are less than the costs for other goals, the intended behaviour will not be fulfilled (Vermeir et al., 2020). Even if a person believes that high-saturated fat harms his/her health and intends to reduce its consumption in his/her diet, he/she may still not succeed to eliminate the consumption due to unavailability of heathy foods. The whole framework is presented in Figure 1.

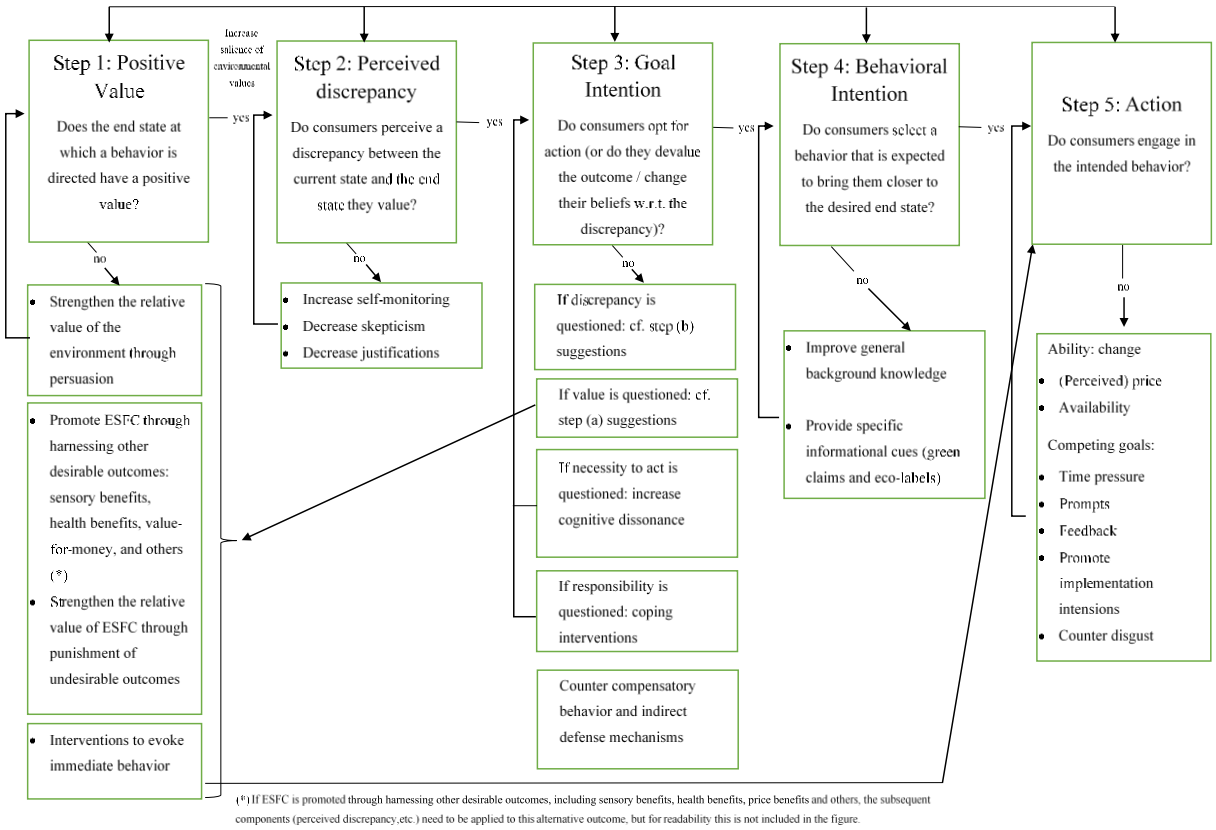

Figure 3: The goal directed framework
Source: Vermeir et al., 2020

Raising awareness, willingness, and motivation are essential but not enough for developing and maintaining sustainable consumption behaviours. In many cases, consumers are concerned about environmental, social, and economic aspects of sustainable consumption. However, this

situation is not reflected in their consumption behaviours. This situation can be explained partially by a variety of barriers that buyers/consumers face (WBC, 2008).

Combining the barriers stated by Quoquab and Mohammad (2017) with the Goal Directed Framework, the effects these barriers have on each step can be understood. For example, lack of awareness among consumers and inadequate policies in force on the issue of sustainable consumption prevents people either to assign positive values or perceive any discrepancies. On the other hand, some personal characteristics of consumers may also act as important barriers on behaviour changes. Changing consumption patterns and having new eating habits may be very difficult because of social norms and/or selfish behaviours of consumers, as well as their unaffordability of healthy and environmentally friendly foods. These barriers prevent creating intentions towards behaviour change. Even if the consumers have intention, these factors work as barriers on the possibility of changing the behaviour.

Barriers should be handled from a cultural perspective as well. For example, in some countries, guests are exaggeratedly hosted by providing healthy and/or abundant food for guests. Graham-Rowe et al. (2014) define this concept, which is a substantial barrier to reduce food waste, as being a "good provider." Besides, it is clear that living geography shapes the cultural structure in many aspects. Diet type is one of the critical reflections of culture. From this point of view, some countries may have traditional food consumption barriers while others do not. For example, the Mediterranean diet includes olive oil, olives, fruits, vegetables, cereals, legumes, nuts, etc. and is healthier and more sustainable than some other type diets by nature (Dernini & Berry, 2015). Some people do not think that food waste is a significant problem. Thus, these people do not take any action to reduce their food waste. Furthermore, some people are not aware of their role in the food waste problem (Graham-Rowe et al., 2014).

However, it would probably be mistaken to base sustainable food purchase decisions entirely on the attitude-behaviour gap because of this relationship's inherent subjectivity. There may also be various barriers that are independent of the consumers' preferences. For example, availability of sustainable foods, unawareness of sustainability issues, lack of trustworthy information about the products, poor product quality, premium pricing, etc. are only some other factors that may prevent sustainable food purchase behaviour (Gleim et al., 2013; Bezawada & Pauwels, 2013; Dean et al., 2012). For example, it is found that 50 percent of barriers that hinder consumers from consuming organic foods consist of lack of trust and certification (Tranter et al., 2009).

Briefly, the barriers can be classified into two groups, namely "personal barriers", such as lack of knowledge, lack of cooking skills, unawareness about the effect of the individuals, ignorance of sustainability concept, etc. and "external barriers", such as insufficient purchase power, uninformative labeling, marketing strategies causing over-purchase, inaccessibility, etc. (Shariff et al., 2012). The personal barriers can be overcome by some external interventions, such as; education programmes, public policies, nudging strategies, etc.

COVID-19 Impact on Food Sustainability

COVID-19 is a significant setback for sustainable development, with negative short-term impacts in Europe as in the rest of the world, along with longer-term impacts that are much harder to predict, as they largely depend on the ability of the global community to learn lessons from the pandemic with which to build more sustainable, inclusive and resilient economies (Policy, 2020).

The sustainable development goals related to poverty (SDG 1), food security (SDG 2), health (SDG 3) and the economy (SDG 8) are negatively affected by the COVID-19 pandemic. According to the IMF, 90% of countries will face a recession in 2020. In addition, hunger and food insecurity are the other problematic areas for Europe (IEEP, 2020). With the existing trends, more than 840 million people (9.8% of population) may be affected by hunger by 2030 (FAO, 2020). Although the number of undernourished people is expected to decrease in the recovery period, it will still be below the target level before the pandemic outbreak. In line with this, dramatic increases in budgets of 2021-2027 are planned by the EU (IEEP, 2020).

Besides, worldwide trends in food consumption behaviour have changed due to COVID-19 situation. Thus, people have tended to cook at home more than before, purchasing from small and local retailers has increased. Moreover, people prefer online food shopping instead of traditional shopping. People choose to have healthier food products because of health concerns, and their food wastage has been decreased (Borsellino et al., 2020). Janssen et al. (2021) conducted a study in Germany, Denmark, and Slovenia to reveal the changes that the epidemic caused on the eating behaviour of consumers during the first wave of the pandemic. According to the results of this study, the consumption frequency of the participants has changed by 15-42% depending on product types. The biggest change is observed in long shelf-life products such as frozen food, canned food, and snacks, while the change was lower in products such as bread, alcoholic beverages, and dairy products. Apart from this, there has been a decline in demand for perishable products such as vegetables and fruits.

The COVID-19 situation affects individuals' perception of consumption of food. According to a report by International Food Information Council (IFIC) (2020), 25% of people in USA participating in the research think that meat has become less safe since the COVID-19 pandemic began. Besides, the same report states that, people under 45 years believe dairy products, infant foods and beverages, protein from plant sources, and other packaged food are less safe by around 11-13% compare to pre-COVID-19 pandemic. Another interesting finding in this report indicates that women perceive fresh fruits and vegetables less safe after COVID-19 situation became a global pandemic.

The food shopping behaviours have also changed with the COVID-19 pandemic. The report prepared by European Institute of Innovation and Technology (EIT) considering 10 European countries stated that online shopping tendency has sharply increased, people started to buy in higher volumes and planned their purchases, resulting in decreased impulse purchases, compared to the pre-pandemic period. In addition, the decrease in income levels has caused consumers to prefer inexpensive foods and unknown brands more. Next to the price of foods, packaging is considered as another important criterion in the purchasing decisions. Consumers have started to pay more attention to have sustainable and informative packages. Finally, the findings of the report show that people have opportunity to spend more time for cooking and experiencing new recipes (EIT, 2020).

General Review and Evaluation

The world faces serious problems such as global warming, soil loss, rapid depletion of natural water resources, unfair distribution of resources, hunger, and obesity. The estimation that the world population will reach 10 billion by 2050 shows how much these problems will worsen. With the increase of the world population, food demand will increase to meet the basic need for nutrition (BBC, 2019). Increasing demand, together with the decrease in resources, brings along

essential problems. Increasing demand for food can be met by increasing agricultural production. However, the utilisation of agricultural land for other purposes resulting from urbanisation and erosion makes it difficult for consumers to access sustainable, local and organic products easily. Therefore, alignment of consumer behaviour towards sustainable consumption becomes a crucial issue.

One-third of the food loss occurs before foods reach the consumers. Huge retailers' unwillingness to sell imperfect (ugly) foods that do not meet grocery standards causes food losses in the food chain before the consumption phase. These losses can be avoided by raising consumer awareness about these products' usability, because consumers' tendency to prefer this kind of food may direct retailers to sell these foods in their markets. From another perspective, the producers and retailers also have a crucial role in raising consumer awareness on sustainable food consumption. For instance, labels including information about the environmental and social impacts may help create more conscious consumers. Additionally, by keeping the products with higher sustainability, such as organic foods, more prominent on the shelves and increasing their visibility, consumers can be directed to such foods. The studies concluded that the sales of sustainable products increased and the sales of other products decreased by increasing the areas where sustainable products are displayed and decreasing the areas covered by less sustainable products such as meat (Coucke et al., 2019).

It can also prevent losses during the entire food chain from production to disposal if policy-makers and institutions with regulatory power develop and apply proper strategies and programmes. Another critical role of policy-makers is to improve consumers' skills to question, discuss, debate, and reflect on their consumption behaviour. This is possible by both short-run and long-run strategies. Informative activities, combined with the activities for increasing awareness, are the means of applying short-run strategies, whereas updating the education system is a decision that works for long-run strategies. Additionally, governments need to provide some mechanism for consumers that enables them to take action and participate in the formulation of environmental policies (Menegat, 2002).

These aforementioned losses and wastes are mostly the problems in underdeveloped and developing countries and can be resolved with the help of various policies and resolute practices. However, the vast majority of losses in developed countries occur at the consumer level, and much more effort is required to create a change in behaviour in this regard. At this stage, joint efforts of the consumers, industry, and the public are required.

Food waste emerging at the consumer level arises from three different stages of consumption. Behaviours pre-, during and post-consumption phases are associated with the demographic, social and behavioural characteristics of the consumers.

In the pre-consumption phase, food waste arises from improper behaviours such as unplanned shopping, ignoring the production process of foods, not having the habit of reading labels, lack of meal planning, not preferring local products and/or producers, preferring packaged or processed foods due to high working hours and time constraints, excessive purchases under the effect of promotions, etc.

The improper behaviours during the consumption phase can be listed as lack of cooking skills, mistaken ordering of the timing of food with different 'best before dates', improper portioning, excessive cooking, high frequency of eating outside, lack of nose-to-tail usage, lack of skills in re-using leftovers, etc.

Finally, the undesired behaviours during the post-consumption phase are improper storage or use of leftovers, not composting the leftovers, sharing / donating the unconsumed foods, etc.

Even though consumers are informed about the impact of their food consumption preferences on sustainability, they are not always successful in transforming this into behaviour. The reasons for this can sometimes be personal (time, income, convenience, etc.). At the same time, they occasionally occur due to social impacts (culture, socialisation, consumption habits that have become a trend, etc.) as a result of interpersonal interactions.

It can be clearly stated that there are many ways to drive sustained behaviour changes. While recommendations specific to a country and specific consumer groups are presented in the following chapters, prominent recommendations that can be put forward universally include:

• If consumers have accurate information about the nutritional values and environmental effects of foods, they may plan their menu with food alternatives that have the same nutritional value but are more sustainable.

• Actions taken to increase food literacy and get consumers to adopt a habit of reading labels enable them to understand the environmental impacts of foods and thus provide motivation for behaviour change.

• Establishing and expanding producer markets to provide easy access to local producers and developing policies in this direction. Thanks to the cooperation of market chains and local producers, access to local products becomes easier.

• Introducing innovators and early adopters as role models for consumers and promoting good examples can encourage consumers.

• Training materials and programmes, public service ads, in-store arrangements, up-cycling campaigns may drive sustained behaviour change.

In the following chapters, the existing country-based situation in food consumption patterns is examined in more detail.

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CHAPTER 2

Monitoring Sustainable Food Consumption: The Sustainable Consumption of Food Index

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Introduction

Sustainable food consumption regarding environmental issues has been on the agenda as one of the important issues that civil society, governments, and supranational organisations have been concerned with in recent years. The awareness created by initiatives focused on environmental sensitivity or interest in society, and governments triggers many scientists in many different scientific fields to carry out studies on sustainable food consumption. After "sustainability" and "sustainable development" became accepted concepts after the Brundtland Commission of the United Nations in 1987, the concept of “sustainable consumption” was highlighted in the following years under the leadership of intergovernmental organisations (IGOs). In 1994, the Oslo Symposium defines the concept of sustainable consumption as "the use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations” (Norwegian Ministry of the Environment, 1994).

Social scientists study in detail social actors and processes such as producers, consumers, and supply chains by focusing on sustainable food consumption according to the interests of the stakeholders. In the field of social sciences, studies on sustainable food consumption are progressing within the framework of basic objectives such as "understanding the current situation in food consumption", "developing implementation proposals for sustainable execution of food consumption/production processes" and "raising awareness in all stakeholders of the subject" (Reisch, Ulrike, & Lorek, 2017; Vermeir & Verbeke, 2006, 2008; Azzurra, Massimiliano & Angela, 2019; Smith & Gregory, 2013; Herrero et al., 2020).

Measuring consumer behaviour to understand the current situation in food consumption undoubtedly presents important data for those concerned. In essence, this chapter aims to introduce the “Sustainable Consumption of Food Index”, developed with the motivation to understand adults’ sustainable food consumption behaviours, and to contribute to the process of creating primary data on sustainable consumption behaviours by the end consumer through the use of this measurement tool. The Sustainable Consumption of Food Index (SCOFI) is a measurement tool developed in 2019 to measure the sustainable consumption behaviour of adults. The main dimensions of SCOFI are listed as "Sustainable Lifestyle", "Food Consumption and Food Waste" and "Ecological Consumption". To measure sustainable lifestyle, "Consumer Sophistication (CSO)", "Environmental and Social Impact (ESI)" and "Nutrition (NUT)" were used as sub-dimensions. To measure food consumption and food waste, "Planned Behaviour (PBE)", and "Avoiding Food Waste (AFW)" were used as sub-dimensions. "Ecological Consumption (ECO)" was was not divided into subdimensions. The purpose of this chapter is to introduce SCOFI as a tool to measure sustainable food consumption

behaviours. To this end, the preparation processes of SCOFI, including validity and reliability analysis, and its features as a measurement tool will be introduced in the first part. In the second part, the dimensions/subdimensions and calculation/working principles of SCOFI will be detailed.

The Development of the SCOFI

SCOFI is a measurement tool developed to measure the food consumption behaviour of adults. All statistical analyses of SCOFI were conducted with data collected from Turkey, Denmark, Sweden, Slovakia, and Austria. Therefore, SCOFI can be classified as a measurement tool suitable for cross-country comparisons. In the development process of SCOFI, basic steps have been followed. These steps include determining the items that will constitute the dimensions of SCOFI, obtaining expert opinions to evaluate the items in terms of content and scope validity, conducting the pilot study of the tool prepared in the light of expert evaluations and collecting the final data for statistical analysis including the validity and reliability tests of the measurement tool.

Preparing Item Pool for SCOFI

Researchers from Turkey, Denmark, Sweden, Slovakia, and Austria proposed items suitable for a 5-point Likert format to measure the food consumption behaviour of adults for SCOFI. The items suggested by the researchers from these countries were compiled under certain categories, the necessary arrangements like elimination of dualities and ambiguity were made, similar items were combined, and the SCOFI item pool was prepared for an expert opinion.

Assessment of Items in the SCOFI by Experts

The SCOFI item pool was presented to experts from Turkey, Denmark, Sweden, Slovakia, and Austria to create a more comprehensive and complete index. In order for the items to be used in an intercultural measurement tool to work, they must be tested for content validiy. In this context, expert evaluation is important for a comprehensive and proper scale tool. The experts categorised the items into four different categories; "the item is not necessary", "the item is necessary but major revision required", "the item is necessary but minor revision required", and "the item is necessary". 27 experts from six countries were consulted and the item pool was revised accordingly and prepared for the pilot data collection. According to the expert assessment, 67 items of the 83 proposed items were regarded as necessary. 13 items were eliminated, because at least half of the experts did not consider the item as necessary. The validity of the items was scored in the range of 0 - 1 according to the evaluations of the experts, and the valid acceptance limit was determined as 0.5. The content validity rates of the accepted items ranged from 0.5 to 0.9. Any item must be ranged as "necessary" by more than half of the experts and have some degree of content validity. The more experts (beyond 50%) who perceive the item as "necessary," the greater the extent or degree of its content validity. The response of the experts according to the four options given was used to calculate the Content Validity Ratio (1). Those in acceptable value ranges have been reviewed according to the suggestions (2) of the experts. Thus, the item pool was reviewed in two stages and the SCOFI was made ready for the pilot study.

Pilot Study of the SCOFI

Within the scope of the pilot study, the SCOFI draft was applied to 98 adult participants and SCOFI was revised according to the feedback received during this application (also discussions with partners) and set up for the first round of data collection.

Measuring the Validity and Reliability of the SCOFI

Respondents were sampled among adults living in Turkey, Denmark, Sweden, Slovakia, and Austria. The data were collected in 2019. The construct validity of the Index was tested with Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). The collected data were divided into two at random, and EFA was carried out with the data from the first sample group and CFA with the data from the second sample group. The statistical analysis is based on data from 830 adults for EFA and CFA.

In determining the validity of SCOFI, first exploratory factor analysis (EFA) was performed, and then confirmatory factor analysis (CFA) was applied to determine whether the structure in the questions was valid. For the reliability of the index, item-total correlation and Cronbach's alpha internal consistency were examined. The normality of the distribution and extreme values were examined to determine whether the data met the requirements of factor analysis (Yorulmaz, Çolak, & Altınkurt, 2018). In determining the normality of the distribution, skewness and kurtosis coefficients were examined. It was seen that these values were between +1 and -1. In determining the extreme values, Z and Mahalanobis calculated the distances. According to Z values greater than + 3 and less than -3 and .01 significance level, Mahalanobis values above 2 were determined as extreme values and removed from the data set.

The Kaiser Meyer Olkin (KMO) value and the Bartlett Sphericity Test were used to examine whether the data were suitable for factor analysis. The KMO value was .95, and the Bartlett Sphericity Test [$x2 = 12500.96$; $p = .00$] was found significant. These values show that the data are suitable for factoring (Yong & Pearce, 2013). The scree plot based on the eigenvalues of the factors and the contribution of each factor to the total variance were examined, and a three-factor solution was adopted. Two criteria were taken as a basis for the items to remain in the scale. First, the factor loadings should be greater than .40 (Şencan, 2005) and secondly, the difference between the factor loadings of items that have high loadings on more than one factor is at least .10 (Büyüköztürk, 2014). 48 items were excluded from the measurement tool, because the factor loadings of the items were high on more than one factor. The item expulsion process was first started with overlapping items, then continued with the lower factor load value. The items were removed from the scale one by one, and the analysis was repeated each time. EFA was applied to the scale of 37 items after the items were removed. When the findings obtained from the CFA were evaluated, the $\chi 2/df$ ratio (2336.38/626) was 3.73. CFA was applied in order to test the structure that emerged as a result of the EFA. Other goodness of fit indexes computed by CFA were: GFI= .84, CFI=.85, AGFI = .83, NFI=.81, VE RMSEA = .05. Cronbach's alpha internal consistency coefficient was examined for the reliability of SCOFI. Cronbach's alpha score regarding the reliability of SCOFI is .93. Cronbach's alpha scores regarding the reliability of SCOFI for each dimension are: Sustainable Lifestyle= .91, Food Consumption and Food Waste= .78, Ecological Consumption=.61.

The final version of the SCOFI consists of 37 items. These items measure three main dimensions and six sub-dimensions of consumers' sustainable consumption of food. The main dimensions are named "Sustainable Lifestyle", "Food Consumption and Food Waste" and

"Ecological Consumption",. According to the repeated exploratory factor analysis for the Sustainable Lifestyle, this main dimension consists of three sub-dimensions. The sub-dimensions of the Sustainable Lifestyle dimension are called Consumer Sophistication (CSO), Environmental and Social Impact (ESI) and Nutrition (NUT). According to repeated exploratory factor analysis for Food Consumption and Food Waste, this main dimension consists of two sub-dimensions. The sub-dimensions of the Food Consumption and Food Waste dimension are named as Planned Behavior (PBE) and Avoiding Food Waste (AFW).

How Does the SCOFI Work?

As a measuring tool, SCOFI measures the food consumption behaviour of adults based on 3 dimensions. In this context, this section will examine how SCOFI works. First of all, 3 main dimensions that make up the SCOFI will be discussed. These dimensions can be listed as "Sustainable Lifestyle", "Food Consumption and Food Waste" and "Ecological Consumption". Then the sub-dimensions of these dimensions will be examined in terms of scope. Finally, the calculation model of SCOFI will be explained in the light of these dimensions and sub-dimensions, and the working method of SCOFI will be detailed.

Figure 1: Dimensions of the SCOFI

Sustainable Lifestyle

The sustainable lifestyle can be defined as "all behaviours of people" and the way of living by guaranteeing the basic life needs and taking into account their ecoregion capacity (Devuyst & Volsem, 2001). Supporting this definition, the sustainable lifestyle dimension of SCOFI measures how sustainable the behaviours of adults are within the framework of food consumption. The basic measurement of this dimension is based on the behaviour of adults regarding their lifestyles. In essence, this dimension measures whether the lives of adults are sustainable within the framework of food consumption. The sub-dimensions of the Sustainable Lifestyle dimension are called Consumer Sophistication (CSO), Environmental and Social Impact (ESI) and Nutrition (NUT).

Food Consumption and Food Waste

Food consumption means all food-related consumption. Food waste is "the food removed from the food supply chain" (Östergren et al., 2014). By staying within this framework, SCOFI measures the sustainability of food consumption behaviours of end-consumer adults within the

scope of the Food Consumption and Food Waste dimensions. The measurement of adults' food consumption behaviours by correlating them with food waste and scoring is in this context performed by using this dimension. The sub-dimensions of the Food Consumption and Food Waste dimension are named as Planned Behavior (PBE) and Avoiding Food Waste (AFW).

Ecological Consumption

Associating adults' food consumption behaviours with ecological issues, and measuring the sustainability of consumption behaviours is carried out through this dimension. By measuring the relationship of food consumer behaviour with ecological concerns, the sustainability of adults' food consumption behaviours is measured. There is no sub-dimension for this dimension.

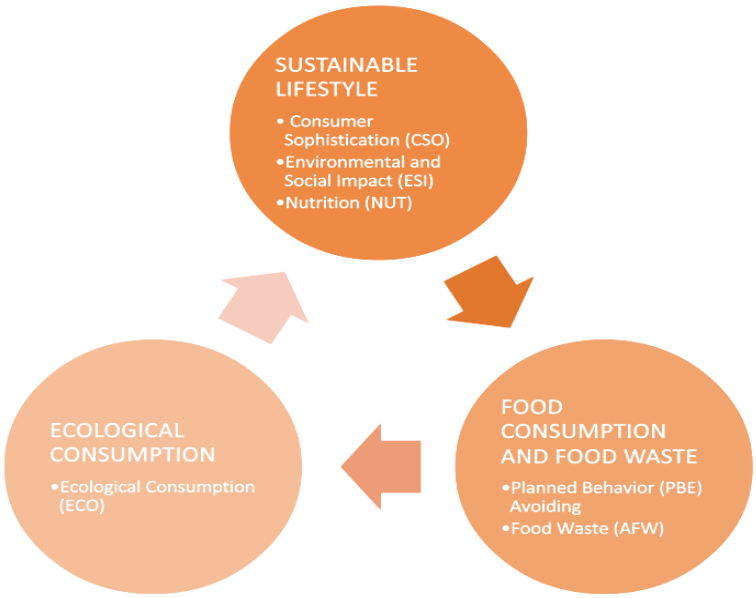

Figure 2: The structure of the dimensions

The SCOFI Calculation Method

The SCOFI calculation method has been established using EFA and CFA results. Some weightings and conversions were made to ensure that these basic and sub-dimensions (as in some international index calculations such as the European Commission Digital Economy and Society Index and the United Nations Human Development Index) are represented in the SCOFI ratio.

Weighting: Each sub-dimension is weighted over 100 in its dimension and then in three basic dimensions in the total explained variance. In other words, the explained variance of each sub-dimension is divided by the sum of the sub-dimension loadings in the basic dimension, and the explained variance of each basic dimension is divided by the sum of the explained variance of the three basic dimensions, and the percentile weights of all sub- and top-dimensions are obtained. For example: CSO's explained variance, which is 19.7, is divided by 52.2, being the sum of three sub-factors explained variance in Sustainable Lifestyle, and 37.8%, obtained by dividing three main dimensions by 44.4, which is the explained variance of 23.9.

SCOFI is an index to measure how sustainable adults food consumption behaviour is. Adults using SCOFI respond separately to a total of 37 items as 1 means "totally agree" and 5 means "totally disagree". The SCOFI then calculates the total score of the participants and their scores based on three dimensions. While the total score refers to the participant's sustainable food consumption score, the dimensions calculate the participant's score in the specific segments described above.

Conclusion

In this chapter, "The Sustainable Consumption of Food Index" was introduced. Firstly, it was explained how the index was developed and then how the index works together with the dimensions that make up the index. SCOFI is a tool developed to measure sustainable food consumption. This tool has been developed with data collected from Turkey, Denmark, Sweden, Slovakia, and Austria. The main feature of the tool is to measure the food consumption behaviour of adults who are the end consumers. SCOFI consists of three dimensions. These dimensions can be listed as "Sustainable Lifestyle", "Food Consumption and Food Waste" and "Ecological Consumption" respectively.

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Annex: SCOFI (The Sustainable Consumption of Food Index)

Please indicate your approval to the following statements 1: "totally disagree" to 5 "totally agree"					
Items	1	2	3	4	5
1. I encourage my friends to consume eco-friendly food.					
2. I search where and how food products are produced.					
3. I buy products that have no negative impact on society.					
4. I buy animal foods that are produced with respect to animal rights (in accordance with ethical animal husbandry).					
5. I buy food products that are not eco-friendly.					
6. Food labels influence my purchasing decisions.					
7. I buy food products that are sustainable.					
8. I have access to information about which foods are more sustainable than others.					
9. I use leftovers to avoid food wastage.					
10. If there are leftovers from my meals, I eat them myself later.					
11. When there are alternatives, I buy fair trade food products.					
12. I have access to farms or farmers' markets.					
13. I separate my food waste for public recycling.					
14. The food I purchase is locally-grown.					
15. I make a shopping list before going food shopping.					
16. I keep leftover ingredients for cooking at another time.					
17. I have sufficient knowledge about food product labelling (e.g., environment, social/working conditions).					
18. There are food products that I choose not to buy on ethical grounds (e.g., animal rights, environmental rights, workers' rights).					
19. I plan my meals to meet my nutritional needs.					
20. When purchasing a food product, I look for less packaging.					

21. I behave environmentally sensitively when consuming food products.					
22. When buying fruits and vegetables, I choose those that are in season.					
23. I avoid food and drink products with added sugar.					
24. If I will consume them anytime soon, I would buy foods with an upcoming expiration date.					
25. I avoid buying processed products.					
26. When available, I choose to buy from companies that provide reliable and comprehensive information about their production processes.					
27. Even if the recommended consumption date of a packaged food has recently expired, if I find it is still good, then I will consume it anyway.					
28. I try to cook only as much as I can eat.					
29. I check the stock status at home before I buy food.					
30. I buy products sold by food/agriculture cooperatives.					
31. When buying a food product, I read the packaging instructions before I decide.					
32. I try to create as little waste as possible while cooking.					
33. I keep foodstuffs under recommended conditions.					
34. When cooking from previously purchased ingredients, I prioritise based on expiry dates.					
35. I buy small quantities of perishable food products to reduce food waste.					
36. I do not buy GMO (genetically modified) food products.					
37. I throw away food products without checking whether they are consumable.					

CHAPTER 3

Food Consumption and Sustainability in Austria

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Based on an international Food Sustainability Index (FSI), Austria is ranked number 9, behind Sweden (ranked 8) and Denmark (ranked 6), out of a list of 67 countries worldwide (The Economist with Barilla Center for Food & Nutrition, 2021). The FSI uses 38 indicators and 90 individual metrics, which measure sustainability of food production and consumption systems in three categories: Food waste and loss, sustainable agriculture and nutritional challenges. In the FSI, Austria has top scores for sustainable agriculture, which is related to the high share of organic farms in Austria and the existing subsidy programmes for environmental measures in conventional farming. Based on the FSI, there is room for improvement with respect to food waste and nutrition behaviour of Austrians.

Austrians still consume too much meat and meat products, sugar and saturated fats based on the Austrian Nutrition Report (Elmadfa & Freisling, 2017). The Austrian Nutrition Report (ANR) is a cross-sectional study of 2,129 Austrians (782 men and 1,347 women) and describes in detail the food consumption of Austrian men and women between 18 and 64 years. It is representative for the Austrian population in three age groups (19 to 25 years, 25 to 51 years and 51 to 65 years). Due to the fact that participation in the ANR is voluntary, there is a bias in that more women participate, but nevertheless the ANR is the best information available to describe Austrian food consumption. The following summary is based on the most recent Austrian Food Report 2017 (Elmadfa & Freisling, 2017), which compares the food intake of Austrians with the recommended food pyramid.

Concerning *alcohol-free beverages*, Austrian women (2.3–2.4 litres) and men (2.3–3.0 litres) consume more than the recommended 1.5 litres a day. Remarkable is that the older the men, the less they consume beverages (age group 19–25 years: 3.0 litres; 25–51 years: 2.6 litres; 51–65 years: 2.3 litres). Austrian women and men do not consume enough *fruits*. Instead of eating two portions of fruits a day (250 to 300 g a day), Austrian men only consume 132 to 147 g on average, which corresponds to one portion of fruits. Austrian women eat a little bit more fruits (150 to 220 g), but also stay below the recommended daily intake. Instead of the recommended three portions of *vegetables*, Austrian men and women consume only one portion a day (ranging from 200 to 218 g a day). From the five recommended portions of fruits and vegetables, only two are consumed. In the category *grain and potatoes*, only three of the four recommended portions are consumed. Both women and men consume only a quarter of one portion of potatoes. 2.75 portions of the three are grain products. For *milk and dairy* products three portions daily are recommended, which again is not achieved by the majority of Austrians. Women consume approximately half of the recommended milk and dairy products (255 to 268 g), men a little bit more with 260 to 318 g per day.

Meat and meat products are in stark contrast to the above-mentioned food categories. The recommendation is three portions per week, which is a maximum of 300 to 450 g. Austrian men consume three times more meat than recommended. Women eat significantly less meat and meat products. They consume slightly more than recommended per week, 483 to 546 g. With increasing age, meat and meat products are consumed less for both genders. What we also see

in Austria is an increasing share of vegetarians and vegans. 13 years ago there were 3% vegetarians (including vegans), nowadays there are 10% vegetarians in Austria. For *eggs*, the recommendation is three eggs per week (approximately 180 g of eggs). Men consume 217 to 252 g of eggs a week (approx. 4 eggs), but women are in the recommended range with 161 to 217 g per week. Comparable to the meat category, egg consumption decreases with rising age. The Austrian Food Pyramid recommends for *fats and oils* between one and two tablespoons, which correspond to 8 to 16 g. Austrian women consume 30 g per day and Austrian men 40 g per day, which is much more than recommended. It has to be noted that also oil and fat, used for cooking, is included into this estimation, and spreadable fats such as margarine as well.

On the top of the food pyramid are *sweets, foods rich in sugar or fat, pastries, snacks and soft drinks*. The recommended maximum is one per day. Not much is consumed in the category salty snacks, cakes and pies. However, in the category sugar, chocolate and sweets it is much more. Men consume 38 to 51 g per day and women between 37 and 41 g per day. Despite the low quantity of salty snacks, Austrians consume too much food from the top of the food pyramid.

Concerning *lemonades* (soft drinks), both genders consume significantly more than recommended, especially young men. Women consume 84 to 141 g and men 238 to 167 g (the latter amount for older consumers). Austrian men consume more *alcohol* than women do. Alcohol consumption rises with increasing age, from 212 g in the age group of 19 to 25 to 339 g in the age group of 51 to 65. Women show also an increase of alcohol with rising age, but with much less amounts, 72 to 86 g.

Austrian women consume 39% of the daily energy intake *out of home;* men consume 43% out of home. Almost all participants in the survey consume breakfast, lunch and dinner. Two thirds of women eat breakfast at home (66.8%) and three quarters (75%) of men eat breakfast at home. 50% of women eat lunch at home, but only 38.4% of men. Dinner is the preferred meal at home; only 14.3% of women eat out of home and only 18.4% of men.

The Austrian Food Report also measured the *body weight* index of the participants. 41% of the investigated age groups are overweight or obese. Men are more often overweight than women are. 2% of the sample were classified as underweight (especially women under age 50), 57.1% had normal weight, 28.9% were overweight and 12.1% obese. Compared to previous studies from 2008 and 2012, those numbers are more or less the same.

An existing deficit of all Austrian health guidelines is the missing connection to the sustainability aspect of food products.

Food Waste in Austria

In the following, we discuss the volume and reasons for food waste at different levels in the food chain in Austria.

There are several reasons for food waste of plant and animal raw material in *agriculture*, such as extreme weather events, lack of proper harvest technology and so on, but experts agree that a significant amount of food waste is generated due to regulatory standards and quality assurance. In Austria, 25% of vegetables get lost at the place of production, 5% during handling and storage, 10% during distribution and 19% at the consumer level (Leibetseder, 2012).

Besides those numbers, there are no reliable estimates for other crops or animal products being wasted at the agricultural level.

In the Austrian *food industry***,** a recent study estimated the unavoidable food waste, which is also called "organic by-products", at 1,338,000 tons. Of these organic by-products 7% are estimated to be avoidable food waste, which corresponds to 121,800 tons (Hietler & Pladerer, 2017).

In Austria, data about food waste at the *supermarket level* is highly reliable. ECR Austria (Efficient Consumer Response Austria) did a study together with the food retailers REWE, SPAR, HOFER, M-PREIS and PFEIFFER, which cover a market share of 83% of all supermarket sales (Hietler & Pladerer, 2017, p. 18).

	Value (Mio. €)	Volume (metric tons)	Percentage of sales food and non-food (value)	Percentage of sales food (value)	Percentage of sales food (volume)
Loss and depreciations	255.3	74,099	1.41	1.51	1.36
Taken back by suppliers	11.7	35,607	0.62	0.66	0.66
Sum of food losses in retail	367.0	109,696	2.03	2.17	2.04
Transfer to charity organisations	29.1	6,629	0.16	0.17	0.12

Table 1: Food waste in Austrian retail
Source: Lebersorger & Schneider, 2014.

In 2013, the total sum of food waste at *retail level* in Austria was 109,696 tons, of which 6,629 tons have been transferred to charity organisations. The biggest share of food waste at retail level in terms of volume concerns fruits and vegetables, which account for 50%, followed by bread and bakery products, processed meat, convenience products, dairy and fresh meat, fish and poultry. Based on value, fruits and vegetables amount to 30% of food waste. A significant majority of food in the categories "loss and depreciations" and "taken back by suppliers" is edible but due to regulations not saleable.

In 2015, a research project called "United Against Waste" estimated 280,000 tons of food waste and losses in *out-of-home consumption***,** of which 175,000 are avoidable (i.e., gastronomy, canteens, hotels …). Theoretically, these numbers for out-of-home food waste represent a value of 380 million Euro, or in average for each enterprise 5.2 tons or 9,600 Euro.
The following table shows the most common reasons for food waste in Austrian *households*.

Purchase related (41%)	No overview about storage and stocks. People don't know which food they have at home, stockpiling, no use of shopping lists, food purchase from the partner (when usually the other partner makes the food shopping)
	Best before date has passed
	Special sales offer and advertising: Price promotions, cheaper bulk products, not suitable package sizes
	Food brought by guests
	Seasonal fruit and vegetable harvests from own garden
Attitude (38%)	During shopping no attention has been paid to freshness and shelf life
	Reluctance to eat the same food more than once
	Purchase of a lot of different food because family expects a variety of foods at home
	Cleaning to make room for new stuff
	Freshness and taste: Uncertainty, if food is still edible or not. Believe that after „best before date" food is spoiled
	Health beliefs / shopping for good consciousness: Fruits and vegetables are bought because it would be healthy to eat them
Lifestyle and consumption habits (11%)	Change of life circumstances like nutrition style changes, or number of persons in the household has changed
	Flexible recreational time planning, spontaneous out of home consumption, change of cooking plans
	Portions for children are often too big
	Purchase for specific persons and events
Wrong storage (3%)	Storage on not suitable places: storage of frozen food in the refrigerator or closet; storage of chilled food outside of refrigerator, hidden storage at the back of the refrigerator behind other food
	Freezer burn

Table 2: Reasons why private households throw food away
Based on Selzer, 2010

An often-mentioned reason is the misunderstanding of "best before date" and "expiry date". The best before date is the date for which a food company guarantees that the food product, under right storage and closed packaging, maintains its specific attributes (e.g. taste, look, consistency, nutritional values …). Food can still be edible after the best before date, and it can still be sold. The expiry date is normally in use for highly perishable foods such as fresh meat, raw minced meat, fish, raw milk and so on. After the expiry date it is not allowed to sell these food products (Hietler & Pladerer, 2017).

Table **3** shows the volume of food waste in the different stages of the Austrian food chain. From the 878,500 tons, 618,800 tons are avoidable food waste, which represents 70% of the food waste accumulated over all levels in the Austrian food chain.

Food Industry	121,800	14%
Retail	110,000	13%
Gastronomy, canteens, hotels	280,000	32%
Households	366,700	42%
Sum	878,500	100%

Table 3: Food waste in the Austrian food chain

Own calculation based on Hietler & Pladerer, 2017; Pladerer et al., 2016

The following diagram displays the numbers from
Table **3** in percentages. It clearly visualises the potential of saving food waste on the household level, which with 42% has the biggest share, followed by gastronomy and canteens. Even with agricultural data missing in this calculation, the importance of educating adults to change their food consumption behaviour becomes evident.

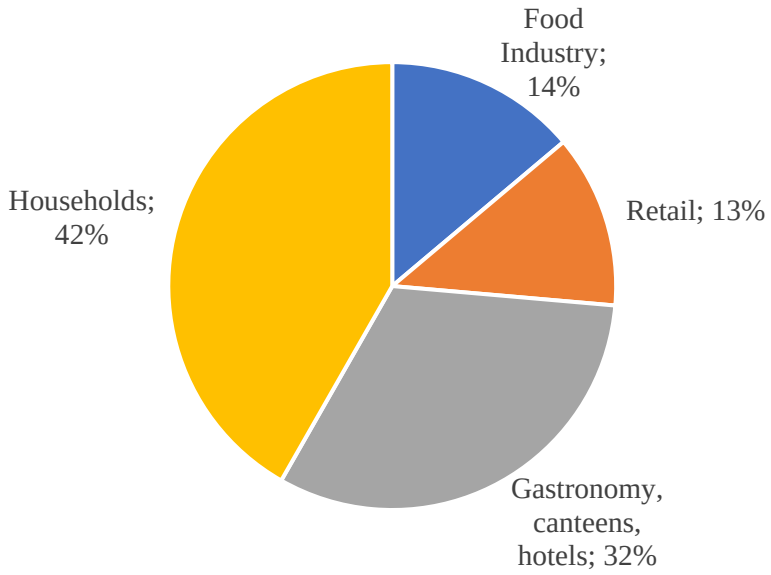

Figure 1: Food waste in Austria
Own calculation based on Hietler & Pladerer, 2017; Pladerer et al., 2016

On average, a household in Austria throws food away with a value of 300 Euro every year. The most frequent wasted food category is bread and bakery products. The second most wasted category is fruit and vegetables. Milk and eggs are on third place; meat, sausages and fish on fourth place (Schneider, Böhm, Scherhaufer, & Part, 2012).

Mapping Sustainable Food Consumption in Austria

The data collection for the SCOFI Index in Austria took place in March 2020 over a period of two weeks. The respondents were recruited by a private company providing a consumer online panel. A quota representative of the Austrian population between 19 and 79 years old with a 50% split between men and woman was used. The quota for the age distribution can be seen in the following table. The sample size was 300. A limitation for this form of data collection is that consumers without internet access or with reduced internet literacy could not take part in the survey.

Age group	Percentage
19 - 23 years	7.7
24 - 39 years	28.2
40 - 55 years	30.9
56 - 74 years	31.9
75 - 79 years	5.7

Table 4: Age quotas for the Austrian sample

Figure 2: Sustainable Consumption of Food Index Austria

The SCOFI numbers indicate that Austrian consumers follow a sustainable lifestyle with a strong focus on ecological consumption. That D1 "Sustainable Lifestyle" is relatively low compared to the other two dimensions indicates that Austrians see their sustainably lifestyle more critical than their food waste behaviour or ecological consumption. There is room for improvement in the SCOFI categories "Consumer Sophistication", "Environmental and Social Impact" and "Nutrition". As we know from the Austrian Nutrition Report, the factual dietary behaviour from the majority of Austrians is far away from the dietary health guidelines and from sustainable guidelines as well.

Austria	SCOFI	Sustainable lifestyle	Food consumption and waste	Ecological consumption
Index	73	69	80	75
Gender				
Men (49.4%)	71	67	77	73
Women (50.6%)	76	71	83	78
Prefer not to say (0%)	0	0	0	0
Generation				
Generation Z (7%)	71	65	80	71
Millenials (25%)	71	67	78	75
Generation X (33%)	71	67	79	73
Boomers (28%)	78	75	84	79
Silent (6%)	75	71	79	78
Place of living				
Town (40.7%)	68	69	78	72
Suburb (21.5%)	69	69	80	76
Rural area (37.8%)	71	69	82	79

Table 5: SCOFI values by gender, generation and place of living - Austria

For the interpretation of the SCOFI Index and its sub dimensions, it is important to keep in mind that the numbers are based on self-assessment, which could lead to bias. Some of the consumers could have seen their sustainable life style more critical, rating themselves worse than their actual life style would have deserved, or some of them could have overestimated their sustainable life style due to social desirability. If we assume that the self-assessment was done correctly by the respondents, the SCOFI Index shows that Austrian women in general are more sustainability oriented than men are. The overall SCOFI Index is higher for women on all three dimensions of SCOFI as well (see Table 5). This makes sense, because many studies report a higher involvement of women into their food-related life styles and a higher health consciousness, both factors leading to a more sustainable food life style.

Baby Boomers see themselves as the most sustainable as measured by SCOFI, followed by the Silent group. Consumers of the Silent group are known to consume less compared to other generations. Whether Baby Boomers live more sustainable than other groups is questionable, because they are a group with relatively high income in Austria. With respect to place of living, rural area consumers show higher SCOFI values compared to suburban consumers or consumers living in towns. People in rural areas have easier possibilities to compost food waste, but we do not know if this is the reason for higher SCOFI values in the dimension “Food consumption and waste”.

Table 6 shows SCOFI scores with respect to education level, current economic activity, household income and the share of food expenditures in total of household expenditures. From what we know about the influence of education on sustainable behaviour, we could have expected that higher levels of education show higher levels of sustainability, which is not the case in the Austrian sample. Low and high levels of education show almost the same SCOFI values.

According to the economic activity of respondents, employed and retired people display the highest SCOFI values. The lower SCOFI values of students could also be an indicator that

younger, educated people see their food lifestyle more critical with respect to sustainability. Low- and middle-income households report lower levels of SCOFI, which could be due to the fact that organic or fair trade food products are more expensive than conventional food products. It is easier for high-income households to spend money on organic or fair trade products. On the other side, high-income households probably spend more money on flights, which would change the picture concerning their sustainable lifestyle. However, SCOFI only focused on food-related sustainability and let other consumption habits like frequency of flying or use of plastic products aside.

Austria	SCOFI	Sustainable lifestyle	Food consumption and waste	Ecological consumption
Index	73	69	80	75
Level of education				
ISCED 1-4 (81%)	73	69	80	76
ISCED 5-8 (19%)	74	71	79	75
Current economic activity				
Student (3%)	65	58	75	69
Employed (56.0%)	73	69	80	76
Retired (27%)	76	73	82	76
Other (14%)	70	64	77	72
Household income				
Low (16%)	72	67	80	75
Medium (76%)	73	69	80	75
High (8%)	77	74	81	80
Share of household food expenditures in total monthly household expenditure				
Up to 10% (9%)	70	66	77	66
Up to 20% (36%)	75	70	82	69
Up to 30% (36%)	73	69	80	67
Up to 40% (13%)	76	72	81	63
More than 40% (6%)	69	63	78	62

Table 7: SCOFI values by education, economic activity, household income and food expenditures - Austria

Concerning share of household food expenditures, it is interesting that the group that spends up to 40% of their household income on food has the highest SCOFI values, but the next group, which spends more than 40%, has significantly lower values. It could have been expected that with a rising share of household food expenditures, food gets more precious and thus less food waste would be produced. However, the food waste values are almost equal for all groups. It is questionable whether the respondents estimated their share of food expenditures correctly. In average, households spend 12% of their income on food in Austria, but in our sample, 55% of the respondents reported to spend more than 20% of their income on food.

Austria	SCOFI	Sustainable lifestyle	Food consumption and waste	Ecological consumption
Index	73	69	80	75
Respondents' eating habits				
Vegan (1%)	60	52	84	75
Vegetarian (5%)	71	69	78	66
Flexitarian (16%)	77	76	83	77
Omnivore (79%)	73	68	81	76
Sole or shared responsibility for the purchase and/or cooking of food in household				
Yes (86%)	74	69	82	76
No (14%)	72	67	76	74

Table 8: SCOFI scores by eating habits – Austria

Concerning eating habits, Austrian flexitarians show the highest SCOFI numbers. But, some index numbers do not correspond to what we expected based on other studies. Vegans should report the highest sustainability in their food consumption because they do not use any animal food products. The environmental footprints (water, carbon and ecological footprints) for meat and meat products are the highest compared to all other food categories (Barilla Center for Food and Nutrition, 2012). Nevertheless, the vegans in the Austrian sample evaluate themselves with the lowest SCOFI Index from all dietary types. That vegans and vegetarians report lower SCOFI Index numbers may be due to the low number of respondents, where outliers have a stronger influence on the average. Another reason could be that the vegans in our sample have a more critical view upon their own life style and consumption habits.

Initiatives for the Future in Austria

There are several programmes focusing on improving nutritional health and on reducing food waste in Austria (Hietler & Pladerer, 2017; Pladerer et al., 2016). The *Austrian National Nutrition Action Plan*, shortly NAP.e, founded by the Federal Ministry of Work, Social, Health and Consumer Protection in 2013, aims to coordinate „health in all policies“. Reducing over-, under- and malnutrition and fighting obesity are the main goals. In this policy strategy, kindergartens, schools and nursing homes are mainly addressed. Communication campaigns focus on consumer segments of infants, children, juveniles and pregnant women. Part of this programme is the development of guidelines for school canteens. Another outcome of NAP.e was a new nutrition pyramid for Austria, which has been part of communication campaigns to help consumers improve their eating behaviour.

Part of the Austrian National Nutrition Action Plan is a health promotion campaign called “*Eat healthy, from the beginning*” (“Richtig essen von Anfang an!”). It appeals to pregnant women, mothers with babies and children up to the age of 10 years. The initiative offers free information for multiplicators all over Austria. Already 2,000 people have been trained to teach a wider public (Elmadfa & Freisling, 2017).

Based on a federal law in Austria to support healthy life styles, a Fund Healthy Austria was founded with an annual budget of 7.25 million Euro (Fonds Gesundes Österreich; http://fgoe.org). Fund Healthy Austria supports projects up to 72,000 Euro and aims to share

information between policy makers, practitioners and universities. Health-related publications are available for free download (http://fgoe.org/index.php/node/92).

A consortium of stakeholders from public health organisations (Chamber of Medical Profession, Austrian Anti-Aging Society, Society for Gastroenterology und Hepatology, Austrian-Adipositas-Society, SIPCAN Institute), supermarket chains (SPAR) and stakeholders from food industry (Rauch Fruit Juices, Berglandmilch) started in 2019 the Alliance to Reduce Sugar in beverages (Zucker-Raus-Initiative; https://www.zucker-raus-initiative.at). This consortium is dedicated to reduce gradually the sugar content in their beverages without replacing it with artificial sweeteners. The food retailer SPAR is running a sugar reduction programme for its private labels since 2017. The objective is to remove 1,000 tons of sugar until 2020 in their own store brands. The daily intake of sugar of Austrians is 93 g, up to double the recommended amount from the WHO. 93 g of sugar are 24 pieces of sugar cubes. The "invisible" sugar added to processed food and beverages is the main reason for this kind of overconsumption.

Those efforts seem to bear fruit, because more and more companies are following this example. Since 2010, a decrease of 19.7% of the average sugar content in beverages has been achieved (SIPCAN, 2019). The SIPCAN Institute (Special Institute for Preventive Cardiology And Nutrition) reports on an annual basis a list of approx. 700 beverages available in Austrian retail stores. Around 65% of those beverages contain less than 7.4 g of sugar per 100 ml. In 2019, the average sugar content of beverages was 6.15 g per 100 ml from their sample. Industry partners who participate in the sugar reduction programme only offer beverages below 6.7 g/100 ml. For milk products, the maximum is 11.5 g/100 ml (incl. the natural sugar content of milk). No artificial sweeteners are allowed to replace the sugar (https://www.oesterreich-isst-informiert.at).

Besides existing programmes promoting healthy eating habits, an ongoing success story in Austria is the wide availability of organic food products in supermarkets. "Ja natürlich" ("Yes naturally") is an organic store brand, which belongs to the most successful food brands in Austria. This store brand alone encompasses more than 1,000 different products, had a growth rate of 7%, which is well above the average growth rates of food products, and sales of 394 million Euro alone in 2017 (Groll, 2017).

Together with partners from the food industry, retail, municipalities, charity organisations and consumers, the Austrian Federal Ministry for Sustainability and Tourism started an initiative called food is precious ("Lebensmittel sind kostbar") to reduce food waste in Austria in 2018.

Supermarket chains are increasingly aware of their responsibility to reduce food waste. The four biggest food retail companies in Austria (SPAR Austria, REWE International AG, Hofer and Lidl covering more than 80% market share) started a cooperation with "Die Tafeln" to reduce food waste. "Die Tafeln" is an NGO providing food to people living in poverty (https://dietafeln.at). In this cooperation, the supermarket chains provide the NGO with non-saleable food, which is still edible. The number of organisations benefiting of donations is constantly rising. More than hundred caritative organisations provided food donations to people in need. The food donors are part of the whole food chain, from farmers, wholesalers, food processors, retailers to households (Hietler & Pladerer, 2017).

Food products, which are near or over the "best before date", are offered at supermarkets for prices reduced up to 50%. Bread from the day before, which is responsible for a big part of food waste at supermarkets, is also sold at prices reduced 25 to 50%.

"Wunderlinge" is a project of REWE Austria to decrease waste of fruits and vegetables, which do not fit the usual commercial standards of conventional produce. "Wunderlinge" is a wordplay, which could be best translated with "weirdos". Produce, which is out of the norm, such as curved cucumbers or carrots with two roots, normally would not be sold in supermarkets. Now, the company educates consumers via social media (see https://youtu.be/pYz6z_m_JgE) to teach them the value of produce outside the norm. Success seems to prove the project right, in three years the retailers sold five million "wunderlinge" in Austria, 5620 tons alone in 2015 (Anon, 2016).

Food waste at supermarket level is only one important source of waste in the food chain. A significant part of food waste is produced at out-of-home consumption. United Against Waste is an initiative that aims to reduce food waste from restaurants, company or communal canteens by 50% until 2030 (https://united-against-waste.at).

A form of peer to peer sharing between households is the Food Sharing initiative ("Foodsharing – share food instead throwing it away!,,, „Lebensmittel teilen statt sie wegzuwerfen"). This non-profit initiative coordinates food sharing between households. Consumers are invited to post digital food baskets they want to give away. The initiative runs refrigerators in public buildings with opening hours. On the website of foodsharing, interested consumers can inform themselves about the available food in these refrigerators (www.foodsharing.at).

There is still a lot we have to understand better about how to induce behavioural changes for a healthier and more sustainable life style. To fight unsustainable food consumption we need a better understanding of how to help practitioners to develop interventions that promote a healthy and sustainable life style (Meadows & In Wright, 2015). Providing rational information alone will not change behaviour. Improved attitudes, knowledge and values are not enough to change dietary lifestyles (Dibb & Fitzpatrick, 2014; Verbeke, 2008). To start behavioural change campaigns have to have a strong emotional appeal (Kollmuss & Agyeman, 2002; Piazza et al., 2015). As Darnton and Evans (2013) emphasize, you have to "provide emotional and empathetic messaging", it doesn't work to "merely make rational appeals to people to change behavior based on factual and logical arguments …". To change meat consumption patterns, communication strategies have to be tailored to gender, age and socioeconomic status (Stoll-Kleemann & Schmidt, 2017). Messages have to be framed suitable for the specific target groups, such as possible future scenarios for younger generations or health implications of food consumption for elderly people (Stoll-Kleemann & Schmidt, 2017; Dibb & Fitzpatrick, 2014; Joyce, Dixon, Comfort, & Hallett, 2012; Garnett, Mathewson, Philip, & Fiona, 2015). Empathy is a core element to convince consumers to change their behaviour (Zaki, 2014). Making people feel guilty often has the opposite effect on the intended behavioural change (Genevsky, Västfjäll, Slovic, & Knutson, 2013; Lertzman & Baragona, 2016). Apocalyptic doomsday scenarios are often not achieving the desired effect (Lertzman & Baragona, 2016).

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CHAPTER 4

Food Consumption and Sustainability in Denmark

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Environmental issues and challenges surrounding sustainability have come to most Danes' attention in recent years. Almost all Danish consumers worry or care about environmental issues, and many would like to act more responsibly and change their consumption behaviour. According to a consumer study by the Danish Agriculture & Food Council (Landbrug & Fødevarer, 2020), more than half of the Danish consumers think about sustainability when grocery shopping. More than half of the Danes are also willing to change their habits and behaviours for the sake of the climate, environment and sustainability. Most Danish consumers believe that sustainable consumption of food is about taking care of nature and passing on a globe in good condition to the future generations.

On the Food Sustainability Index, created by the Barilla Centre for Food and Nutrition Foundation in cooperation with the Economist Intelligence Unit, Denmark ranks sixth on overall sustainability, among 67 countries (Barilla Centre for Food and Nutrition, 2018).

The Average Dane's Food Consumption

The Danish food culture and heritage has its roots in the old farming life. The cold weather conditions have had a great influence on the farming life, and for centuries, Danes have been eating a lot of potatoes and a lot of meat – especially pork. In fact, there are more pigs in Denmark than there are people. Norms, values and culture play an important role in our eating habits, and the Danish food culture is characterised by a diet with a relatively large amount of animal products, such as meat and dairy products, and only few vegetables, fish and whole grains, and practically no legumes (Trolle et al., 2019).

In 2018, the average Dane was eating 52 kg of meat per year. The food culture seems to be slowly changing, and more and more Danes have meat free meals – or even days. About 24% of Danes eat vegetarian at least once a week. This number has increased by 20% in just one year. The number of "full time" vegetarians is equal to 2.4% of the Danish population (Fagt et al., 2018).

Recent studies of the Danes' food consumption reveal the CO_2-emissions of the average Danish adult. About 57% of the CO_2 from an average Dane's food consumption comes from animal food products, and about half of this is from red meat (beef, lamb, pork). Approximately 24% of the food-related CO_2 derive from consumption of sweets, snacks and various drinks (excluding milk). Vegetable products, such as fruits, vegetables, grain and bread, account for about 15% of Danes' food related CO_2 contribution (Trolle et al., 2019).

The Danes' food expenditure has decreased over time, but in recent years, the level of earnings spent on food has stabilised at around 10% of the disposable income (Landbrug & Fødevarer, 2020).

New Official Dietary Recommendations

The Danish Veterinary and Food Administration (DVFA) advises and issues recommendations to consumers and enterprises about nutrition, healthy eating and food production. For many years, the DVFA have promoted healthy eating, especially through a list of official dietary recommendations. Denmark published its first set of dietary guidelines in the 1970s. These recommendations have been revised in 1995, 2005, 2008, 2013 (Barilla Centre for Food and Nutrition, 2018), and most recently in 2021; In January 2021 the DVFA launched a new set of official dietary recommendations that focus on both health and the climate. The recommendations include eating less meat, more legumes, vegetables and fruit and choosing plant based oils (Fødevarestyrelsen, 2021).

Sustainability and healthiness of food are closely related. About one in four Danes state that they buy sustainable food products for quality and health related reasons (Landbrug & Fødevarer, 2020), and many Danes could reduce their CO_2 footprint by following the health recommendation "eat a variety of food, but not too much".

Generation Ø – The Organic Movement

Many Danish consumers perceive organic food products as sustainable, and Denmark is one of the biggest consumers of organic products (per capita) in the world. Compared to conventional agriculture, organic farming has a beneficial effect on biodiversity and thus on the environment. On average, there are 30% more wild plant and animal species in and around organic fields. The main reasons for this superior biodiversity are the absence of pesticides, the use of organic fertilisers and a different crop distribution on the organic farms (Trolle et al., 2019).

This all sounds great; yet, some still claim that eating organic food does not really make a difference when it comes to minimising the impact on the climate, as organic production usually yields a smaller amount of food per acre, and organic products tend to perish faster than conventional products. Many Danes, however, still consider organic products to be more sustainable than the conventional alternatives, and studies find that consumers who eat more organic food products tend to eat more fruit and vegetables and less meat, making their overall consumption more sustainable after all (Baggesen et al., 2015; Baudry et al., 2017).

Local and Seasonal Consumption

Of course, there are also other factors to consider here. An organic vegetable from a far-away country will most likely not be the more sustainable choice, if the alternative is a locally (but conventionally) grown one. In our globalised world, the Danish supermarkets are always stocked with fresh fruits and vegetables – including products that are not in season in Denmark. We simply import the products from warmer climates, when it is not possible to grow them locally. This means that a vast amount of food products are being transported through great distances, often in cooled containers and wrapped in extra plastic packaging to keep fresh. In relation to sustainable consumption, Danes are therefore often advised to eat by the seasons and choose local products, as this will emit less CO_2. Again, there are of course exception; with the cold climate in Denmark, it costs more energy to grow some fruits and vegetables, such as tomatoes, than it will cost to import them from Southern Europe. There is a lot to consider when evaluating the lifecycle and sustainability of a food product, which sometimes makes it hard for the average Danish consumer to choose sustainably. According to the Danish Agriculture and Food Council (Landbrug & Fødevarer, 2020), the Danish consumers generally want to

prioritise the organic, local and seasonal products, but it needs to be made easier for them to choose sustainably. Stancu, Grønhøj and Lähteenmäki (2020) also found, in a study of Danish consumers' meanings and motives for sustainable actions, that participants closely linked sustainability in food with organic and local produce, but there was still some confusion about which of the two is more sustainable in different situations.

Food Waste in Denmark

Generally, Danish consumers are against food waste and have become increasingly conscious about avoiding food waste at the household level. The Danish Veterinary and Food Administration (DVFA) also reports that Danes have become increasingly better at reducing food waste. In 2017, 14,000 tons less food than in 2011 were thrown away. However, plenty of edible food is still discarded in Danish homes every day. On the Food Sustainability Index Denmark is 40th of the 67 countries listed in the food loss and waste dimension (Barilla Centre for Food and Nutrition, 2018).

The (self-reported) frequency of food waste among Danish consumers is distributed as follows (Landbrug & Fødevarer & Stop Spild Af Mad, 2013):

- Daily: 5%
- 3-4 times a week: 23%
- A couple of times a month: 46%
- Rare: 18%
- Never throw out: 6%
- Don't know: 2%

Danes report that their most common reason for throwing away food is that it has expired. The types of food most commonly thrown away are (Landbrug & Fødevarer & Stop Spild Af Mad, 2013):

- Fruits and vegetables: 36%
- Baked good: 25%
- Long lasting foods: 16%
- Meat products: 16%
- Dairy products: 7%

When it comes to meals, most commonly, dinner leftovers are thrown away. About 20% of Danes discard dinner leftovers 3-4 times a week, making dinner the meal that accounts for the largest amount of food waste in Danish households (Landbrug & Fødevarer & Stop Spild Af Mad, 2013).

Initiatives to Reduce Food Waste

In recent years, various initiatives and practices to reduce food waste have emerged in Denmark. This includes apps, such as *Too Good To Go* and *RedMaden* (Save the food), that allow consumers to purchase leftover food from local restaurants and/or almost expired food from supermarkets at a lower price, thus "saving food" which would otherwise have been thrown away. Today, the Danish *Too Good To Go* app is the world's largest marketplace for surplus food, and the app has helped save over 7.9 million meals in Denmark alone (Too Good To Go, n.d.).

Many Danish supermarkets also have special designated areas for food items close to their expiration date thus being sold at a lower price. One supermarket chain has even eliminated multi-buy offers – which promote buying more of the same product, such as '2 for 1' sales – for food products (REMA 1000, n.d.). Aside from this, supermarkets and food producers can donate food products close to expiration or with packaging flaws to one of the country's seven *WeFood* stores. The Danish relief organisation, DanChurchAid (Folkekirkens Nødhjælp), is behind the concept, and all the profits go to charity. In the stores, consumers can purchase a variety of different food products at an advantageous price and at the same time help reduce the food waste and contribute to the organisation's charities. In 2018, the *WeFood* stores sold more than 173 tonnes of food that had been discarded by other stores (Folkekirkens Nødhjælp, 2021). Another initiative, *Eat Grim* (Eat Ugly), allows consumers to subscribe to 'fruit and vegetable boxes' with organic fruits and vegetables of different shapes and sizes than what is usually found in the supermarkets and that otherwise would be discarded (Eat Grim, n.d.).

Aside from initiatives that help save surplus food from stores and restaurants, plenty of helpful and practical information about how to avoid food waste in the home is available to the Danish consumers. For instance, the app, *For Resten*, provides information about how to store and treat different food products, and helps consumers evaluate the durability and edibility of different foods (Knutsson, 2020).

Mapping Sustainable Food Consumption in Denmark

The SCOFI survey, developed for the SUSCOF project, was translated into Danish and distributed through a data collection agency in March 2020. Aside from distribution quotas for age and gender, the agency also ensured representative quotas for geographical location. In total, 301 Danish responses were collected. Based on national data from Statistics Denmark, it was assessed that the data collected in Denmark is representative in terms of both age and gender. The sample is, however, quite small, and when breaking down the participant into groups based on other socio-demographic attributes, the different samples are not all representative, and so, the results and comparisons should be interpreted with caution.

There are also limitations in dealing with self-reported behaviour as it may differ from actual behaviour. Self-reporting is a common approach used in data collection, but participants may be unable to accurately assess their own behaviour, or they may chose the answers they find most desirable rather than true. Factors such as culture, language and interpretation could also influence the outcome. Danish people might for instance have a different understanding of sustainability and sustainable behaviour than (some of) the other participating countries. It is important to keep this in mind when looking at the study's results.

The Competence Map

In the following, we will look closer into the SCOFI results for the Danish sample. For the Danish participants, the average SCOFI value is 62 points (Figure 1). The participants demonstrate the least sustainable behaviour within the *sustainable lifestyle* dimension, where the average index value is 50. Especially the evaluation of their *environmental and social impact* yields a low score for the Danish participants, followed by the categories *nutrition* and *consumer sophistication*. For the Danish participants, '*food consumption and food waste'* was the most sustainable dimension with an index value of 80 points, and both the category of '*planned behaviour'* and of '*avoiding food waste'* contribute to the high value. Finally, the third dimension, '*ecological consumption'*, has an index value of 65 points for the Danish participants.

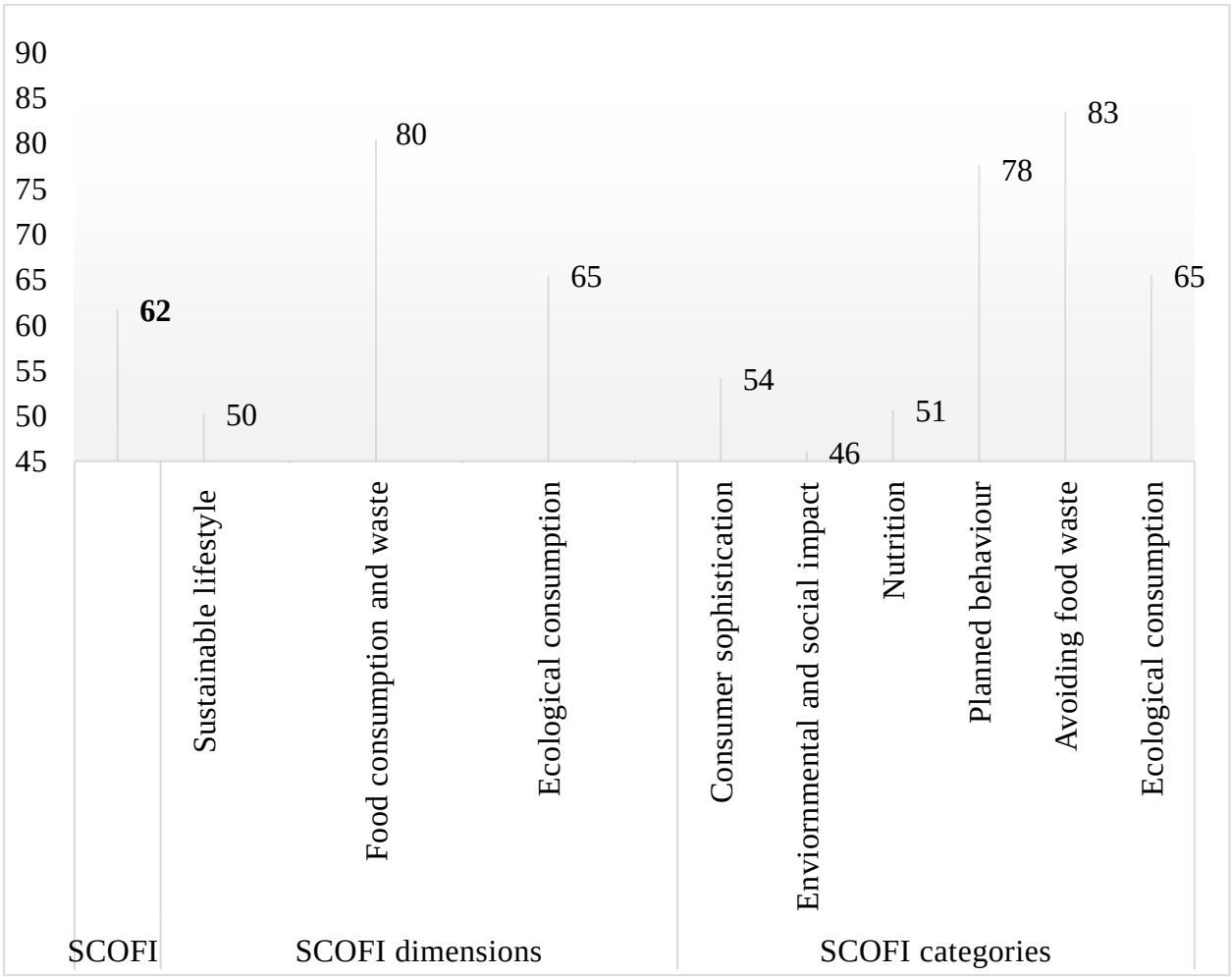

Figure 1: Sustainable food consumption index – Denmark

In this study, the Danish participants had the lowest overall SCOFI score – only in very few categories, the Danish participants ranked higher than the average of the five participating countries – but, as mentioned, various limitations and biases can impact the results across cultures, and Danish people might have a different understanding of sustainability and sustainable behaviour than (some of) the other participating countries. It could also be the case that Danes are more critical and judge themselves and their behaviour harder than others. We know from other international studies that Denmark is among the more sustainable countries in general. Therefore, we should not conclude anything about Danes behaving less sustainable based solely on their relatively low SCOFI scores. What the data can help us gain a better understanding of, however, is in which specific areas the Danes report a higher level of sustainable behaviour, and which socio-economic and demographic attributes seem to have an impact on the level of sustainable behaviour.

Demographic and Socio-Economic Differences

In Table 1, we see the relationship between demographic characteristics and the level of SCOFI. First, we see that Danish women have a higher SCOFI than men across all three dimensions. Second, the younger generations (Generation Z and Millennials) have higher over-all SCOFI levels than the older age groups. Generation X has the lowest SCOFI of all the groups. This picture, however, changes a bit, when looking closer at the three dimensions. In Dimension 1 (sustainable lifestyle), the Silent generation has a higher SCOFI level than Millennials, and in Dimension 2 (food consumption and food waste) Generation X scores higher than Boomers and the Silent generation. Lastly, results shown in Table 1 also indicate that Danes living in rural areas generally have a higher SCOFI scores than those living in either towns or suburbs.

Denmark	**SCOFI**	**Sustainable lifestyle**	**Food consumption and waste**	**Ecological consumption**
Index	62	50	80	65
Gender				
Male (50%)	59	49	76	63
Female (50%)	64	51	85	68
Generation				
Generation Z (5%)	66	56	84	68
Millennials (29%)	64	51	85	70
Generation X (28%)	59	47	79	61
Boomers (29%)	61	51	77	65
Silent (9%)	61	53	76	62
Place of living				
Town (64%)	61	50	80	63
Suburb (13%)	61	50	77	64
Rural area (23%)	65	52	84	72

Table 1: SCOFI values by gender, generation and place of living - Denmark

We also see some small differences in the SCOFI levels for different types of households. Among Danish participants, the household structure that had the highest SCOFI was one with three adults and one child, followed by a household consisting of one adult and one child and

then two adults living with two children. The lowest scores, among the Danish participants, were found in households with more than four children and in households with four adults.

Table 2 presents the SCOFI scores combined with the socio-economic attributes: education, current economic activity, and household income. Higher SCOFI scores were found for respondents with higher levels of education in the Danish sample; those who have a PhD (ISCED 8) have the highest SCOFI, followed by those who have a Bachelor's degree (ISCED 6). However, when comparing the lower levels of education to the higher levels of education, in general, as shown in Table 2, we do not see any major differences between the two groups. When looking at the respondents' current economic activity, Danish retired participants and those with 'other' economic activities (leave of absence, unemployed, unpaid workers) have slightly higher SCOFI scores than both the employed participants and students – especially when it comes to the 'food consumption and waste' dimension. The results also indicate that the Danish participants with a medium-level income have the highest SCOFI, and participants in the high-level income group have the lowest SCOFI. It is especially in the dimension for 'food consumption and waste' that the high-level income group differs from the other groups. It is noted that 16% did not answer the question of household income, and that this group has a slightly higher SCOFI score than the low-level and high-level income groups. The results, shown in Table 2, also indicate that the higher the share of food expenditure of household income, the higher is the SCOFI.

Denmark	**SCOFI**	**Sustainable lifestyle**	**Food consumption and waste**	**Ecological consumption**
Index	62	50	80	65
Level of education				
ISCED 1-4 (69%)	61	48	81	65
ISCED 5-8 (31%)	63	53	80	66
Current economic activity				
Employed (45%)	60	49	77	65
Student (13%)	60	50	79	62
Retired (35%)	64	52	84	67
Other (7%)	65	53	85	67
Household income				
Low (25%)	60	48	81	63
Medium (37%)	64	54	81	67
High (22%)	59	48	76	63
Prefer not to say (16 %)	62	48	84	69
Share of household food expenditure				
Up to 10% (27%)	60	47	81	64
Up to 20% (49%)	61	50	79	66
Up to 30% (19%)	65	55	80	66
Up to 40% (4%)	67	55	89	65
More than 40% (1%)	71	55	90	91

Table 2: SCOFI values by education, economic activity, household income and food expenditures – Denmark

Initiatives for the Future in Denmark

Generally, climate, environment and sustainability are widely discussed issues in Denmark, and like in the rest of the EU, these are important items on the political agenda.

As mentioned, there are many initiatives in place to help reduce food waste, such as apps like *Too Good To Go*, and there are plenty of initiatives and organisations promoting sustainable consumption in general. Denmark has vegetarian associations, vegan activists, Organic Denmark has a consumer section, and Denmark has the Danish Consumer Council, Stop Wasting Food and many more initiatives than the ones mentioned here. Still, it is not always easy for the consumer to make the more sustainable decision. The concept of sustainability can seem rather broad and overwhelming, and some Danish consumers express inconsistency and confusion around the meaning of sustainability (Stancu et al., 2020). People tend to associate sustainability with areas that they can relate to themselves, and so sustainability is often linked with food and other consumer goods in the consumers' minds. However, there is still a lot of doubt about how to behave sustainably within the food domain. There are a lot of elements to consider; should one look for the more sustainable option within the product category, and how does one assess what attribute is more sustainable? For example, should it be organic rather than local – or should one even replace certain products with something else (e.g. replacing milk with plant drinks)? Even though Danes express a willingness to change behaviour, there is still a long way to go and many barriers on the road to sustainable consumption. The next steps could therefore be to look closer into what can be done to minimise the Danes' confusion and thereby make the sustainable food choice easier.

Making the Sustainable Choice Easier

Consumers need manageable, simple and credible guidelines to help them navigate through the complexity of behaving sustainably. Ways to guide the consumers could be through label schemes that not only highlight sustainable product attributes, but also make the product alternatives more easily comparable. As discussed, it can be hard for consumers to evaluate which potentially sustainable attribute weights heavier. Is the organic vegetable from Southern Europe more or less sustainable than the conventionally grown vegetable from Denmark? It can be quite difficult to assess how the origin and type of production can affect the level of sustainability, as this also varies from product to product and from season to season. Labels and/or guides in the shopping situation might make these types of evaluations more manageable – or perhaps it will confuse the consumers even more. Danes are constantly exposed to suggestions on how to live and eat more sustainably from various sources. It seems mostly positive that the information is so easy to access, but it can be hard to sort through the many "easy tips", pieces of advice, and recommendations to find what could actually be helpful and doable for each individual consumer.

Consumers are different and people have their own different habits and priorities when it comes to food choices. It is therefore also important to offer solutions that do not interfere too much with their established habits and routines. By now, most people are aware of the negative environmental impact of for example red meat, yet, this is still an important part of many consumers' everyday meals. We cannot expect everyone to completely cut meat from their diets over-night, and recommendations should thus perhaps rather focus on limiting the current consumptions and/or using more climate-friendly alternatives, at least to some extent – options which still have more impact than doing nothing, and which might seem more within the consumer's capabilities (Landbrug & Fødevarer, 2020).

Another way of making it easier to evaluate sustainability is by educating the consumers – both about which options are more or less sustainable, but also about how to actually change their behaviour without feeling like compromising important attributes over sustainability. However, even with the many different campaigns and initiatives, it seems that it can be difficult to reach and educate the household decision makers – especially those who are not actively seeking out advice on how to act and eat more sustainably. In recent years, various food related sustainability programmes have naturally started making their way into Danish schools throughout the country, making the youngest consumers increasingly aware of sustainable practices and related issues (Bang, 2019; Lauritsen, 2021). Educating the youngest household members is likely to also influence the household decision makers, and thus their food related behaviour, but it still seems that more education, targeted towards adults, could be beneficial as well.

Of course, there are still other factors that influence Danes' food choices aside from sustainability, and even though many consumers want to act more sustainably, other criteria are competing with sustainability both in the shopping and cooking situation. Other factors influencing the consumers' decisions could be familiarity, practicality and price. A product can market itself as a sustainable option, but this attribute can rarely stand alone. Another way to deal with the issue could therefore be through price regulations. When adding fees to the least sustainable alternatives you might even nudge unaware consumers to purchase more sustainable products.

Healthiness and Sustainability

Aside from sustainability, it is also important to inform consumers about the need for healthy choices and behaviour. Barilla Centre for Food and Nutrition (2018) highlights the Danish official dietary recommendations as an example of best practice for promoting healthy eating. With a simple list of actual practical recommendations, it is easy for the individual consumer to assess what behaviours can and maybe should be changed and how. Luckily, health and sustainability often go hand in hand, as we see with the new Danish health recommendations that highlight the sustainability of the healthy choices. We have yet to see the results of the new version of the dietary recommendations, but they could very well be a great step in the sustainable direction. Hopefully, they can also help guide the consumers that want to, but who perhaps are in doubt about how to make sustainable choices.

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CHAPTER 5

Food Consumption and Sustainability in Slovakia

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Overall, it can be concluded that consumer behaviour is greatly influenced by the views of nutritionists, who have been presenting the same diet model for several years in print or electronic and audio-visual medias and, more recently, on social medias. As a result, Slovaks have changed their food consumption preferences over the last twenty years in terms of eating less meat, potatoes and bread. Pasta, vegetable dishes and fish thus push out the meat on the plates. According to analyses, traditional side dishes are mainly replaced by pasta. The above analysis is based on available data from the Statistical Office of the Slovak Republic, obtained from a sample of surveyed households. In a detailed analysis, we concluded that official statistics lack data on self-sufficiency.

Given that almost 45.6% live in the countryside (according to the 2011 Census of Population of Housing and Dwellings), it is reasonable to assume a possible self-sufficiency of certain types of food, whether seasonal fruits and vegetables or domestic products, which may ultimately distort official data.

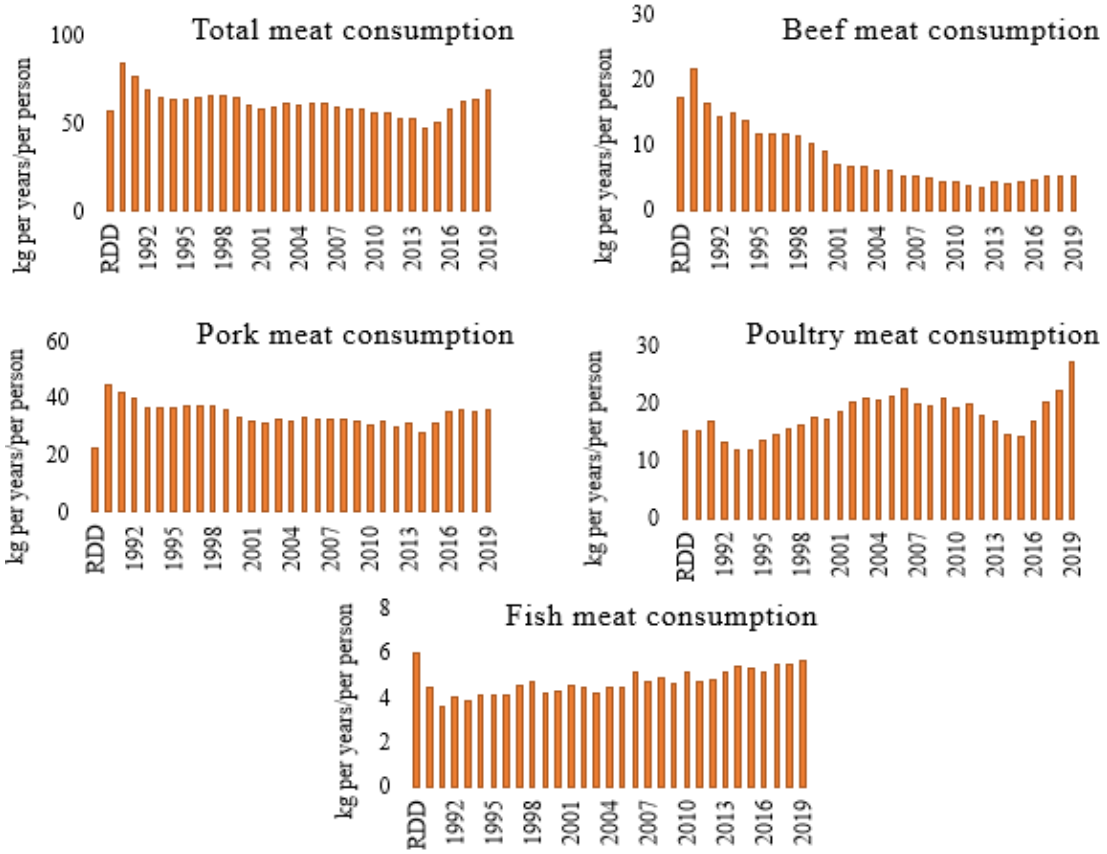

Figure 1: Consumption of different kinds of meat in Slovakia
Source: Statistical Office of the Slovak Republic

The graphs in figure 1 show the development of consumption of individual types of food. The first bar in each chard represents the recommended daily dose (RDD), set by the Food Code of the Slovak Republic.

During the examined period of overall meat consumption, the decline in bovine consumption and the increase in poultry consumption by 2013 were recorded. Subsequently, meat consumption has started to grow gradually. Important factors causing this situation include strong pricing policy of large retail chains, problems of domestic production and imports of lower quality products. Sedlák (2012) describes in detail why the consumption of beef and veal is critically low. Fish consumption is constantly below the recommended dose, as Slovaks do nott have a habit of consuming fish; if they have to choose between some kind of meat and fish, they choose meat.

Despite the fact that Slovak beef production would be sufficient for domestic demand, import does exist. Avoidance of imports could reduce the country's carbon footprint, if consumers were aware. Do Slovaks really need an Argentinian steak? Looking at the graph of pork consumption, it is reasonable to assume that Slovakia is a pork country. Not only do they consume above the recommended dose, but they have to import it all, because diseases and a devastating subsidy policy have killed any farmers' desire to produce pigs. Consumption of chicken meat shows a stable curve, but it is less expensive meat and nutritionally poorer. There is plenty of poultry in Slovakia and the country is self-sufficient in this aspect, as well as with eggs.

Regarding the consumption of fruit and vegetables, these are imported into the country and their consumption is well below the daily recommended dose. People consider vegetables a more expensive item. In terms of fruits and vegetables, Slovakia is not self-sufficient. Slovakia has been considered a potato country; one of the main ingredients of each dish was potatoes, however ,the decline in potato consumption is a signal indicating that Slovaks are no longer interested in potatoes. The second significant decrease is the decrease in legume consumption, though, legumes are a very important item in the diet. They do not burden the ecosystem during production, they are not sprayed so much, they can be sown, and they are nutritionally balanced. Also, in the stores they have lentils, which could be grown in Slovakia, but which are directly imported from Canada or Kazakhstan (Gondeková, 2016).

These elements affect the sustainability of consumption, asthere are foods that could be produced on Slovak soil, and those foods would not have to cross half the planet. Sustainable consumption implies preference for organic products and the consumption of renewable amounts of natural resources and products. Sustainable consumption should be understood in a dynamic way. It does not always mean quantitatively lower consumption, but rather the consumption of products in a different and especially smarter way. It follows from the above that sustainable consumption includes not only the minimisation of consumption itself, but also its reorientation in terms of a change in customer orientation towards a more sustainable lifestyle and purchasing decisions.

The principles of sustainable food consumption in Slovakia are gradually gaining public awareness, and many companies and supply chains have also taken a responsible approach. Many consumers care about the sustainability of food products, although this positive attitude is not always translated into purchasing behaviour (Pipková, 2020).

Barriers to a Sustainable Food Consumption in Slovakia

The key barriers to sustainable food consumption in Slovakia can be divided into the following categories:

- climate changes
- food security and sustainable nutrition
- consumption habits
- food waste
- awareness of the carbon footprint of food.

Climate changes. Domestic production loses competitiveness after harvest when suitable equipment for post-harvest treatment is lacking, especially for washing, drying, sorting, market processing, packaging, labelling, fast transport in suitable conditions, and for storage. The cultivated vegetables in Slovak conditions are competitive; they have comparable, often better quality parameters in terms of nutritional value and taste properties than imported vegetables (Uvírová, 2018). During the years, extreme weather changes in Slovakia have been seen, which result in a decrease in crop production in all segments, and for this reason, Slovakia cannot be self-sufficient in the production of grain, vegetables or fruits.

*Food security and sustainable nutrition***.** The food self-sufficiency of the country includes the ability to cover the needs of the domestic market with its own production potential. This is the country's ability to secure a domestic market for food of domestic origin. The degree of food self-sufficiency is one of the most important indicators that reflects the overall economy and social level of the country. The fact is that Slovakia's food self-sufficiency is constantly declining. There is no country that is completely self-sufficient in all types of food, however, more and more food is imported into this market from other countries. Even the ones which can be produced at home. Import is pushing domestic food out of the market and liquidate the country's domestic producer and production potential. Slovakia´s food self-sufficiency in monetary terms of all foods is 53% and in quantity for basic foods 74.57 %. It is the sixth worst country in the EU in terms of food self-sufficiency. The main importers to the Slovak Republic are Germany, the Czech Republic, Italy, Austria, Poland, Hungary and France. All imports from the European Union account for up to 89 % of food imports and the above imports up to 69%. Foods where the Slovak Republic has the largest negative trade balance in monetary terms are meat, fruit, vegetables, cereal preparations, milk preparations and milk itself. Compared to other small open economies, the Slovak Republic has a low level of food self-sufficiency, which continues to decline relatively quickly. The level of food security is equally low. The country is currently unsatisfactory in offering vegetables, potatoes, sugar, eggs, fruit, milk, poultry, beef and veal and pork. Meat, fruit, eggs and vegetables can be identified as potentially deficient foods. They are potentially scarce, because even the current major importers do not have high surplus production of these foods, and with low surpluses they can, at any time, become reluctant to export as much food as is needed, and there could be supply shocks, especially in times of crisis (O potravinách, 2019).

Consumption habits. The civic association *Free Food* points out that the average Slovak household spends a fifth of its monthly expenses on the purchase of food. The main cause of waste is that Slovaks buy more food than they can consume, and they cannot use and store it properly.

The recent statistics provided by Ipsos showed (Tvnoviny, 2019):

- 3/4 of Slovaks waste food
- fruits, vegetables, bread, salami and cheese are most often thrown away
- 1/5 of Slovaks have gaps in the correct storage of food
- 75 % of Slovaks experience the phenomenon of an empty refrigerator 7 times a week
- 42 % of Slovaks lack inspiration for cooking
- 48 % of Slovaks are lazy to cook something from the food they have at their disposal
- childrens' pickiness is 1/3 of the reason for waste.

A survey of Czech and Slovak households, carried out by the Hellmann's brand in cooperation with Ipsos in 2019, revealed that one of the causes of food waste is the 'empty refrigerator phenomenon'. Most food is wasted in households. Households are responsible for up to 53% of all thrown away food. The main idea of the new Hellmann's campaign in Slovakia follows the brand's long-term responsible attitude towards food and calls on all consumers to be considerate in their consumption habits. The aim is to draw attention to the so-called ***empty refrigerator phenomenon*** which refers to when people think that the refrigerator is empty, but in fact, they just lack the imagination of how to prepare food from those ingredients that they normally have at home. The long-term priority of the national campaign is to take the thinking of all stakeholders one step further as well as to inspire consumers with a sustainable approach to food. The aim is to awaken in them the imagination of how to creatively combine food, and thus prevent waste. The campaign will cover from all television channels, social networks and other digital medias to in-store presentations (Stratégie, 2019).

Slovaks can be described as consumers that do not have time, are lazy to cook and lack inspiration. They usually buy food once or twice a week. The Slovaks in the survey confirmed that they like up to 78 percent of theirrefrigerated food, and only two thirds of Slovaks buy healthy food. However, cooking or preparing a good meal at home and using all the food available is a problem. The reason why they do not cook at home as often as they would like is the lack of time (87 %). Another reason is laziness to cook something from the food available (48 %) and 42 % of Slovaks lack inspiration to cook (O médiách, 2019).

Children are also responsible for food waste in Slovak households. Eight out of ten Slovaks who have children at home oftenthrow away food. About a third of parents directly identified children's pickiness as one of the reasons why they waste food. Their pickiness even makes it difficult for them to buy food. That is why parents cook the same favourite foods over and over again trying to avoid food waste. This makes shopping easier, cooking faster and leftovers minimal.

In Slovakia there are excellent conditions for people to grow their own fruits, vegetables or to keep their own animals for meat. However, for the sake of convenience, many people go to the supermarket and buy various processed foods. It is therefore important to spread awareness about the benefits of own production. Home farming could be an opportunity to promote sustainable consumption in Slovakia (Holienčinová, 2016).

Nowadays, the issue of food waste resonates within many countries, and Slovakia is no exception. The situation in this regard is deplorable, and government circles are beginning to realise this. While millions of people around the world are starving, Slovaks throw away an incredible 600,000 tons of food a year.

Advertising and various promotions of traders on the Slovak food market also contribute to food waste. These factors need to be regulated for the benefit of the consumer, i.e. the quality

of the goods, not for the benefit of comfort. The problem is also the surplus of goods on the shelves, e.g., bread and pastries. The sellers do not have the right estimate and wish to have fresh bread always during opening hours. This leads to waste and losses, and food is not sold even at a reduced price (Golian, 2015).

Food and raw materials are lost throughout the supply chain, but most food, more than 50% of the total volume of food waste, is discarded by final consumers. Every fifth Slovak admits that they waste food. An average person throws away 111 kilograms of food a year. The Agriculture Ministry warns that wasting food also wastes natural resources, as well as people and their energy. It is not only irresponsible towards the environment, but also immoral towards people who cannot afford quality food. In the list of countries that waste the most food, Slovakia ranks eighth (The Slovak Spectator, 2018).

According to a nationwide representative survey carried out by the AKO agency for the Ministry of Agriculture and Rural Development in 2018, around 23 percent of Slovaks admit that they throw away leftovers. Nearly half of the respondents say that they try to use the leftovers for further cooking or give them to animals. One-third of the respondents state that they do not throw away any food. The survey suggests that people aged 23-49 years are wasting the most food. The share of wasting in households tends to increase with education and income. Slovaks mostly dispose of bread and baked goods (35 percent), while 29 percent throw away the cooked food leftovers. When asked why they had leftovers, up to 74 percent of the respondents said that they cooked more than they ate. In 34 percent of the cases, the food deteriorated or its date of consumption expired (TASR 2018). Food waste is not only a problem in households; restaurants also deal with the issue of not throwing away the food that has to be eaten that day due to strict hygienic rules. Hungry Slovak, a mobile application by two Slovak women, may help them solve the problem (The Slovak Spectator, 2018).

Compared to the Czech Republic, twice the amount of food is thrown away in Slovakia. In Slovakia, the amendment to the Food Act of 2017 finally grants the trader the opportunity to donate food after the date of minimum durability for charitable purposes. On the other hand, another law says: If such food is found by another inspection body on the shelves, they are considered as life-threatening and the trader gets a fine of about 1 – 5 mil. €. Many shops or traders support the anti?-waste marketing and promote the activities through educational message. Liquidation fines and food consumption are still a discussed topic in Slovakia. The adoption of the Food Donation Act in 2017 was the next step for Tesco Stores Slovakia in the fight against food waste. The *"Perfectly Imperfect"* project with the aim of saving food, sells selected fruits and vegetables that do not meet aesthetic requirements (Podnikajte, 2019). The Billa food retail chain sells foods with an upcoming expiration date with a 25-50% discount. Food that is still not sold is disposed of in accordance with current legislation. Currently, traders can donate food after a minimum shelf life, if it is safe to donate to registered charities. Products must be disposed of by law after the expiration date (Kapitánová, 2020). From January 2024, larger stores will be required to donate food to charities that have reached the date of minimum durability, as long as it is safe. Parliament approved an amendment to the Food Act to make products available to the socially disadvantaged people. The charity will be able to handle food only after registration and will be obliged to ask the regional public health office to inspect each dispensary before the start of the donation. For smaller shops, donations still remain voluntary (Denník Slovensko, 2019).

Awareness of the carbon footprint of food. The goal of various environmental initiatives in Slovakia is to make people aware that food production is responsible for one-quarter of the

world's greenhouse gas emissions. Eating is an important part of a person's overall ecological footprint. By a suitable choice of food, we can reduce the burden on nature significantly. Small changes in the menu and respecting the ecological footprint can reduce it by 20%. At the same time, we do not have to limit ourselves in any radical way - from the point of view of the ecological footprint, it is not a problem, if you are not a vegetarian and, perhaps surprisingly, even if you eat food grown on the other side of the planet. There is rightly a growing awareness that our diet and food choices have a significant impact on our carbon 'footprint', thus, the key question that every consumer should be asking themself is: "What can I do to really reduce the carbon footprint of my breakfast, lunch, and dinner?" (Kondeková, 2019; Kašiak, 2015).

At the end of 2020, the Institute of Environmental Policy (part of the Ministry of the Environment of the Slovak Republic) introduced a new carbon footprint calculator. The calculator prepared by the ministry calculates a person's greenhouse gas emissions per year. The calculator works with data from the users about their methods of transport, housing or consumption. According to the minister, the carbon calculator is an excellent way to translate general talk about global warming and the climate crisis into the picture of our everyday life. It is specifically made for Slovakia; it takes into account the local raw materials for the production of electricity and heat (Inštitút environmentálnej politiky, 2020).

Examples of Good Practice

Examples of good practice from Slovakia can be divided into several groups based on the main aim which they try to reach:

- To improve eating habits toward healthier and more nutritional food (social and education activities)
- Environmental issues including waste minimisation (environmental and educational activities)
- Local economic development while supporting local farmers, slow food and short supply chains (economic and educational/promotional activities).

Nutrition. Hovorme o jedle (Let's talk about food) is a project of the non-governmental organisation "Centrum rozvoja znalostí o potravinách" in cooperation with Slovak Agriculture and Food Chamber focused on improving the level of education of primary schools pupils and teachers regarding food and nutrition. The aim of the competitive educational activity is to initiate and support the cooperation and the active participation of children, youth and adults in building the ability to make appropriate food choices and lifestyles, the ability to take responsibility for their health, awareness of the importance of foods in promoting regional development, employment and environmental protection (Centrum rozvoja znalostí o potravinách, 2020).

Skutočne zdravá škola (Really healthy school) is another civil society initiative, by Jem iné. The main idea is to transform school food and nutrition through several framework activities, for instance:

- Revision of food balance sheets for school canteens to include more vegetables, less sugar, limited use of pre-cooked products, reduced proteins and milk, limited use of flavourings, provide meatless food options
- Revision of the food pyramid.

Jem iné has also created a platform for healthy food enthusiasts through cooking schools and health catering production using local and seasonal ingredients. The main goal is to improve the quality of nutrition at school- and hospital canteens and other communities (Skutočne zdravá škola, 2019).

The project Viem čo zjem (I know what I eat) was conducted in 2016-2017 by the multinational company Nestlé in cooperation with the Public Health Authority of the Slovak Republic. The main idea was to show opportunities to prevent bad health resulting from incorrect nutrition and to initiate changing of eating habits. The project produced methodical material for the education of pupils aimed at introducing food components necessary to ensure a balanced diet, including positives and negatives alternative approaches to eating as well as selected food intolerances (Viem čo zjem, 2018).

Environment and education. The second group of good practices in Slovakia refers to environmental issues including food waste reduction (environmental and educational activities). One of these is a grant programme called Pomáhame vyrásť (We help to grow). Several grant calls were announced within a programme called Green School aimed at supporting practical activities at schools focused on food with the connection to energy and water saving and waste reduction (Zelená škola, 2018).

Projects that received grants addressed i.a.:

- practical food saving in school canteens
- implementation of saving steps connected with food preparation and distribution
- implementation of green management in schools
- reduction of waste from school canteens
- composting activities
- innovative education in these fields.

Neplytvaj-Spotrebuj! (Waste no, Consume yes!) is another good example. It is a long-term information and educational project which monitors the situation in the field of food waste (globally and in Slovakia), publishes relevant information and thus raises awareness of the general public about this important issue. Food after shelf life is a considerable source of food waste. The aim is to open a society-wide discussion and to raise awareness that food after shelf life could still be fit for consumption and are a huge source of unnecessary waste (Moderný obchod, 2017).

Perfectly imperfect is a strategy of the Tesco retail chain, which can be characterised as the possibility to offer for sale also fruits and vegetables which are not in conformity with standards ("funny fruit") for a lower price, which contributes to the reduction of waste of these perfectly edible products (Tesco, 2020).
Local food production. Local economic and educational activities while supporting local farmers, slow food and a short supply chain can be mentioned as good practices.

The Farmfoods project is based on bringing 10 separate agricultural producers together into the concept of short supply chain and building common stores. The project is driven by the idea of the possibility to positively influence the problematic position of Slovak producers and the, sometimes, poor quality of imported foods. It is based on the following pillars: healthy soil, healthy plants, healthy animals, healthy foods, healthy people, undisturbed landscapes, GMO-free and production without unnecessary additives (Farmfoods, 2017).

With a goal to simplify penetration of local producers into large chain stores the project Chcem dodávať (I want to deliver) builds on cooperation between the Ministry of Agriculture and Rural Development and chain stores. It aims to simplify contractual terms and conditions in favour of small producers.

Likewise, online portals are aimed at improving access of consumers to small and local food producers:

- The main idea of Lokálny trh (Local Market) is to offer a complex portal containing information about as many Slovak producers as possible, creating a map of them in order to make it easier for consumers to find them (Lokálny trh, 2021).
- Svet bedničiek (World of Boxes) is one of the adaptations of the relatively well-known box delivery concept to small and local producers, functioning as an online store for combining purchases of products from the current offerings (partly seasonal) of many producers. By gradually supporting the sale of domestic production of farmers and producers, they wish to achieve the development of agricultural regions in Slovakia (Vidumská, 2019).

There are also initiatives by chains of stores (and indeed petrol stations) to promote local and seasonal produce:

- Starý otec (Grandfather) is a store chain focused on carrying traditional grocery from domestic small and medium-sized producers, counteracting their generally weak marketing support in comparison with well-known brands. The main idea is to offer only high-quality foodstuff produced without artificial sweeteners, unhealthy additives, or colourings (Starý otec, 2021).
- The Moja krajina (My country) grocery stores focus on bringing traditional local high-quality foodstuff to consumers, with the difference that the product is supplied not only by small producers but also by surpluses from local gardeners (and own customers) (Ochutnaj pravé slovenské, 2018).
- The campaign Moje najlepšie (My best) is aimed at creating opportunities for Slovak producers who are not able to bring their food production to traditional retail chains. The project is based on offering these traditional foods through a well-known chain of petrol stations as a part of improving the strategy and concept of its services for customers.

Finally, the project *Quality from our regions* is aimed to support Slovak products through consumer education campaigns. The main idea is to explain the impact of the preference of domestic food and other products on regional economics and quality of life. The brand name is an essential part of the project. The producers are mainly small businesses (farmers). The sales of local products have great significance both from environmental and economic aspects (Horská and Yespolov, 2013).

Mapping Sustainable Food Consumption in Slovakia

The data collection for the SCOFI index took place in February-March 2020, resulting in 411 responses with demographic and socio-economic variation. To provide a sample representative in terms of generation and gender, a random sampling method has been used to select 300 responses.

The overall SCOFI value calculated for the Slovak sample is 71 (see figure 2). The lowest score for any of the dimensions is in the evaluation of the Sustainable lifestyle dimension (D1), where the value of the index is only 63. Among the categories, the lowest score is in the Environmental and Social impact (ESI) category. The dimension Food consumption and food waste (D2) have a significantly higher overall rating of 84. The category Avoiding food waste, which is a part of D2, reaches the highest value of 86. The index value of the third dimension, which assessed ecological consumption, falls between the evaluation of previous dimensions and is at almost the same level as the total index value. The highest score is in relation to food consumption and food waste. The lowest score is in the category of sustainable lifestyle.

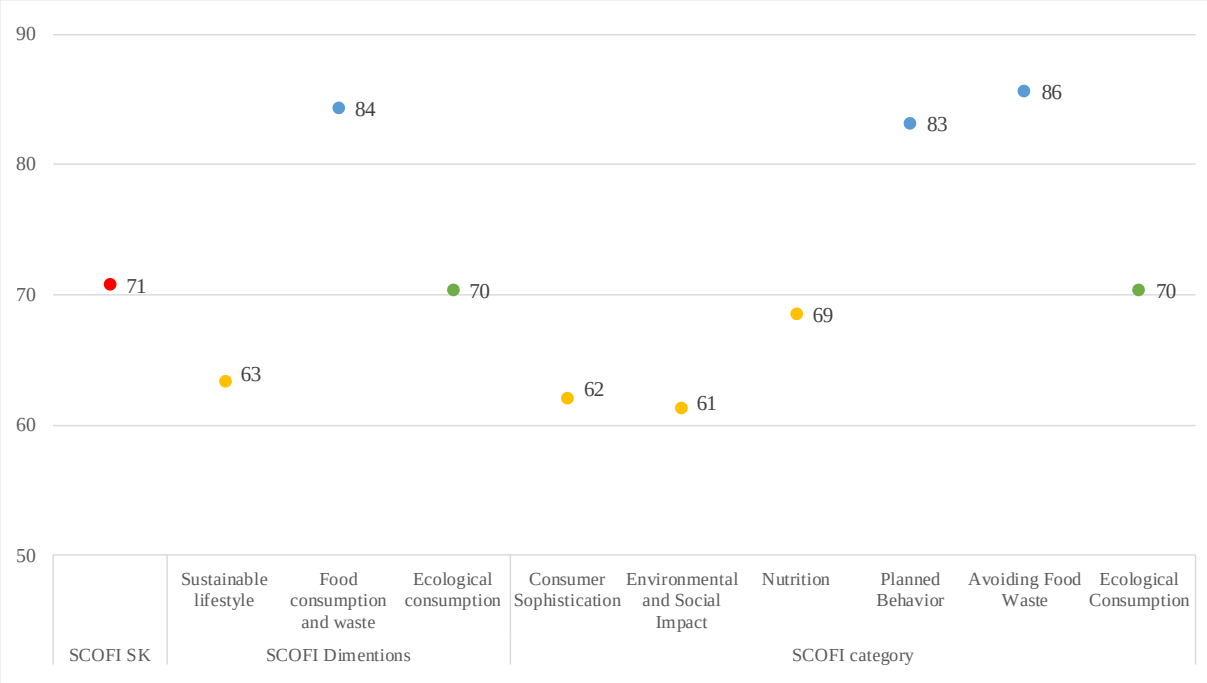

Figure 2: Sustainable Consumption of Food Index – Slovakia

It is generally known that women tend to be more concerned about a healthy and sustainable lifestyle than men. This is also confirmed for the sample of Slovak respondents. Women achieve an average of 6 points more than men on all dimensions of the index (table 1). The smallest difference is in the score of the ecological consumption dimension, which is only 3 points lower for men. The lowest value is reached by men in the dimension evaluating sustainable lifestyle; 59 points and the highest; 88 points are reached by women in the dimension focusing on the food consumption and food waste.

Slovakia	SCOFI	Sustainable lifestyle	Food consumption and waste	Ecological consumption
	71	*63*	*84*	*70*
Gender				
Man (49%)	67	59	81	69
Woman (51%)	74	67	88	72
Prefer not to say (0,7%)	72	65	86	69
Generation				
Generation Z (7%)	69	58	86	77
Millennials (29%)	69	60	85	68
Generation X (28%)	72	66	84	70
Boomers (30%)	74	67	86	75
Silent (6%)	62	55	76	58
Place of living				
Town (61%)	70	63	83	69
Suburb (6%)	74	66	88	73
Rural area (33%)	72	64	86	72

Table 1: SCOFI values by gender, generation and place of living - Slovakia

The evaluation of sustainable food consumption behaviour according to different generations of Slovak adults, showed that for the overall SCOFI index as well as for D1 and D2, the baby boomers are the ones with the highest score index and the silent generation has a significantly lower score. For the dimension of ecological consumption generation Z has the highest score of 77 points.

Regarding the place of living, the highest scores are achieved by adults living in the suburb areas and the lowest by adults living in town. This fact is probably in line with the current trend of Slovak inhabitants' preference to live in the suburbs which brings many socio-economic benefits, possibly leading to higher sustainability behaviour. The lowest score of 63 is in D1 for respondents living in the town and the highest 88 in D2 for the suburb area residents.

Based on the distribution of data in the survey sample, we decided to merge the education categories into low education (primary and secondary) and high education. This shows that Slovak adults with a higher level of education reached a higher score of the sustainable food consumption behaviour compared to primary and secondary educated adults (see table 2).
The assessment of sustainable food consumption according to the current economic activity shows no significant relationship. The SCOFI value with the lowest score was reached among students, probably due to students' lifestyle.

Concerning household income level, the Slovak adults with a medium-sized income achieve the highest value of SCOFI in all dimensions. The principal difference is observed in comparison with the group of low income adults in the dimension of ecological consumption, by up to 18 score points. These conclusions support the well-known fact concerning low-income households, for whom the price and not the quality of food is decisive. High income households lag behind the medium income in the assessment of sustainable food consumption in the range of 1-4 points in SCOFI (2 points) and across the dimensions.

Slovakia	SCOFI	Sustainable lifestyle	Food consumption and waste	Ecological consumption
	71	*63*	*84*	*70*
Level of education				
ISCED 1-4 (31%)	67	58	82	69
ISCED 5-8 (69%)	73	66	85	71
Current economic activity				
Employed (63%)	72	58	85	70
Student (10%)	68	57	85	73
Retired (22%)	70	62	82	70
Other (5%)	72	66	84	71
Level of household income				
Low (4%)	64	59	79	55
Medium (52%)	72	64	86	73
High (44%)	70	63	83	69
Share of household food expenditures				
Up to 10% (4%)	69	60	83	69
Up to 20% (22%)	72	64	86	73
Up to 30% (41%)	71	64	83	70
Up to 40% (27%)	71	63	86	69
More than 40% (7%)	69	61	83	70

Table 2: SCOFI values by level of education, economic activity, hourshold income and food expenditures

We do not observe significant differences in the Slovak sample of adults according to the share of food expenditures of the total monthly household income.

In conclusion, we can describe the most sustainably behaving adult, in relation to food consumption in the sample of respondents from Slovakia, as an employed woman of the baby boomer's generation, with higher education, flexitarian, living in the suburbs, and medium household income with sole or shared responsibility for the purchases and/or cooking of food.

In the interpretation of the results, it should be noted that this was a self-evaluation of the 300 respondents in Slovakia, rather than an assessment of their real behaviour.

Initiatives for the Future in Slovakia

Initiatives for the future in Slovakia reflect needs of the society in the area of environmental policy, food security and deal with the approach towards the food at the national level, the sectoral level as well as at the level of households and individuals.

Framework for Current and Future Initiatives in Slovakia

Initiatives aimed at sustainable food consumption are based on strategic documents and guidelines, which include the following:

- *A European Green Deal as a plan for the sustainable EU*. A healthier and more sustainable EU food system is a cornerstone of the European Green Deal. Among policy areas, we emphasise the From Farm to Fork area that aims at creating a food environment for a healthy and sustainable choice of food but at the same time fights against food waste.
- *Strategy of the Environmental Policy of the Slovak Republic until 2030*, issued by the Ministry of Environment of the Slovak Republic, in cooperation with the Institute for Environmental Policy, as a part of the challenge "prevention of the production of biodegradable and food waste."
- *Waste Prevention Program of the Slovak Republic for the years 2019 - 2025*, issued based on Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste.
- *Food Avoidance Prevention Plan*, issued by the Ministry of Agriculture and Rural Development of the Slovak Republic in 2016.
- Related legislation.

Initiatives in the Sphere of Production, Trade, Services and Public Catering

According to the Strategy of the Environmental Policy of the Slovak Republic until 2030, the Slovak Republic will limit food waste production by 2030. Restaurants and supermarkets will be obliged to make use of the foods, for example, by charity donation of the foods that fulfil food safety requirements. If they are no longer suitable for consumption, they will be utilised in another way (e.g. by selling at a reduced price for feeding purposes, except for the feeding of wild animals). As in other EU countries, it will be possible to sell such foods in special facilities. Slovakia will remove "best before" food labelling and introduce uniform "use by" labelling, as foods after the date of minimum durability may still be suitable for consumption, if they are well stored. Labelling "minimum durability" increases food waste production and is therefore abolished in most European countries. Other legislative restrictions and unnecessarily stringent standards that can lead to the generation of waste from still usable foods will also be reviewed. Last, but not least, it is necessary to provide information campaigns and behavioural measures aimed at changing human behaviour with regard to food waste in order to prevent its production. The prevention to limit the biodegradable waste will be encouraged, with an emphasis on biodegradable municipal waste.Households will be able to comfortably compost the waste they produce. A sufficient network of collection and recovery facilities for separated biodegradable kitchen and restaurant waste will be built. Particular attention will be paid to the collection and treatment of green waste (e.g. from gardens, parks or meadows). At the same time, bio-waste disposal options will be increased, for example, only those biogas plants collecting separated biodegradable waste for biogas

production will be able to apply for public support, while the biogas by-product will meet the criteria for use as a secondary nutrient source in agriculture (Ministry of the Environment of the Slovak Republic, 2020).

The Ministry of the Environment, in cooperation with the Ministry of Agriculture and Rural Development, will participate in the development of a methodology for the consistent determination of the amount of food waste generated and the methods of food waste management. They will actively support the implementation of the measures of the Action Plan for the Prevention of Food Waste and provide information support. At the same time, they will support the construction of non-standard food zones (e.g. optically non-standard fruits and vegetables) in retail (Food Avoidance Prevention Plan, 2016).

As in Slovakia there are no information sources in relation to the amount of wasted food obtained using a single manual, it is necessary to obtain information from both the public and private sectors. Once this information has been obtained, it is important to ensure cooperation with the EU institutions in order to prevent food waste as effectively as possible.

One important measure is to raise awareness in all actors of the food chain about ways to reduce food waste. In particular, it is about organising training seminars for primary producers, producers, traders, providers of public catering and households, where they will be explained their responsibilities, possibilities and new knowledge on the prevention of food waste. This society-wide change in behaviour in this area must also include public authorities and institutions, which should lead other consumers, producers and food retailers by example.
In summary, the main objectives of measures at the level of primary production, production, trade, services and catering are:

- A change in behaviour leading to a reduction in the amount of food losses and food waste in the various links of the food chain.
- Promoting better use and understanding of the information that indicates the use-by date and the date of minimum durability (best before date).
- Aligning economic efficiency with sustainability issues at the level of production, logistics, handling, storage, planning and content of promotion.
- Administrative and legislative facilitation of forms of food donation for charitable purposes or reclassification and use of food for animal feed purposes.
- Mutual cooperation of food chain actors and state administration bodies in quantification of food losses and food waste.
- Institutional support for activities aimed at reducing food waste (use of economic andnon-economic instruments and measures).

Initiatives in Relation to Households and Individual Consumers

The biggest problem and challenge in the field of food waste reduction in Slovakia is low and insufficient awareness in society as a whole. Likewise, the activities developed in this direction are not visible enough, they are not attractive and their organisation at the national level is insufficient. The competent authorities are aware of the shortcomings, and several stakeholders agree that the most important goal is consumer education. Measures and activities aimed at educating consumers and households include:

- Educational campaigns aimed at clarifying societal objectives (national and global) related to food waste.

- Providing practical experience that can contribute to increased interest in reducing food waste, providing clear information and advice to the public, creating information portals, using various forms of advertising and promotion (outdoor and indoor ads, social medias, etc.).
- The general popularisation of the food waste problem within society, but also for individual market segments (e.g. based on position and functions in the household, interest in the food thematic area, healthy nutrition, specific forms of nutrition, age categories, place of living); Segmentation and targeting of information campaigns can bring a deeper knowledge and individual/collective engagement on food waste topic inthe society
- Involvement of influencers as opinion leaders in the information campaign; Influencers have great power due to their popularity and the great influence of social media on society
- The use of various instruments (pricing instruments, sales promotion, taxes, other instruments) for more efficient shopping for individuals and households (or benefits/rewards) and sustainable consumer behaviour

The Ministry of the Environment and the Ministry of Agriculture and Regional Development coordinate these activities. In addition, we note the great initiative of non-profit organisations and civic associations. Activities coordinated by the Ministry of the Environment are linked to non-formal environmental education. In 2015, the Ministry of the Environment approved the plan for environmental education and training until 2025, which responds to current needs and new challenges in the field of environmental protection in Slovakia. Its main goal is to create a functioning comprehensive system of environmental education, training and awareness in the field of environment in accordance with several international conceptual documents. One of the most famous activities is the film festival, Envirofilm, which creates a platform for discussions on current issues of sustainable development. On the other hand, the Ministry of Agriculture and Rural Development organises the Agrofilm festival every year, which addresses current issues of primary production, the food industry, healthy nutrition and sustainable consumption.

All information on environmental education, training and awareness is available on the EWOBOX website (www.ewobox.sk). The Slovak Environment Agency has set up a unique site that is supposed to serve all the people who care about the environment. The site contains up-to-date information such as news from global environmental protection, the latest information from events in the European Union in the field of the environment, but also information locally from regions, cities, municipalities, NGOs, schools and school facilities. There we find an overview of the possibilities of financial support for educational and awareness-raising activities, grants, subsidies, loans, but also events that take place in the near future, publications and many other interesting information in the field of environmental education (Ministry of the Environment of the Slovak Republic, 2021).

The Institute of Environmental Policy operates as an independent analytical department alongside the Ministry of the Environment. Its mission is to provide quality and reliable analyses and forecasts in the field of the environment for the Slovak government and the public. In 2020, the Institute created calculators that clearly illustrate the conclusions of several studies and provide space for personalised calculations. The topic of the impact of an individual's life on the environment deals with in the "Carbon footprint calculator." In addition to housing and transport indicators, this calculator (https://iep.sk/kalkulacka) also includes food, consumption and lifestyle, including waste sorting.

The issue of obtaining information on food waste in the Slovak Republic is a relatively lengthy and complex process. The results of our research show that there are visible differences in the perception of individual dimensions of the SCOFI index among respondents depending on their diet, place of residence, gender, age, education or employment. Vegans and flexitarians achieve higher values compared to those who consume anything.

This is understandable, as consumers who prefer special diets (or ways of eating) pay more attention to food; its composition and preparation, are more interested in reading articles and literature on food in various contexts, want to protect the environment, support the nature around us and their sustainable way of life includes attitudes towards ecological consumption, lifestyle and food waste. Another category that achieved higher values for the individual dimensions of the SCOFI index are women, who are usually involved in food supply to the household, cooking, food storage and food waste handling. These findings lead us to emphasising the importance of a diversified approach to the content and ways of consumer education.

An interesting finding of the research is the fact that the values of individual dimensions in the group of Slovak respondents are relatively high despite the relatively low level of public education and enlightenment. The research team explains this fact as insufficient knowledge of the issue and overestimation of the consumer awareness and behaviour of the individuals and the households. The Slovak consumer considers the activities which he/she is currently carrying out in the interest of sustainable behaviour on the food market, and how he/she is behaving to be sufficient. We propose that consumer education should focus not only on activities related to reducing food waste, but also on increasing consumers' comprehensive awareness of environmental protection and the consequences of irresponsible behaviour by the individual consumer and the household.

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CHAPTER 6

Food Consumption and Sustainability in Sweden

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Shifting patterns

The Swedish national agricultural agency (Jordbruksverket, 2015) points out that eating patterns have shifted considerably over the past half century. They take the period 1960 - 2013 and note that:

- Rice and pasta are consumed in much greater quantities, whereas consumption of fresh potatoes has dropped
- Consumption of fresh vegetables has tripled
- Meat consumption has risen, especially of poultry, where consumption in 2013 has risen by *70 percent* since 1960
- Milk consumption has dropped dramatically, while cheese consumption has more than doubled

More recent statistics show a continuation of these trends, with the exception of a small decline in meat eating.

In 2020, patterns have been affected by the Covid-19 pandemic. Although restrictions on public life in Sweden have been fewer than in most other European countries, there has been for instance a notable increase in home cooking. In other words, the sharp drop in restaurant meal servings has been compensated not (or not wholly) by an increase in purchase of ready-made meals but by more home cooking, notably - especially in the early part of the year - bread baking. One major food retail chain notes that sales of onions are a good indicator of the amount of home cooking, and that in 2020 they increased by 14% over 2019 (ICA, 2020). EIT Food, in the *COVID-19 impact on consumer food behaviours in Europe* (2020), reported from Sweden "a significant increase in planning food purchases, shopping online and bulk buying."

One researcher, an ethnologist specialising in food culture (MSN, 2021), points out that in times of crisis there is a tendency to revert to eating 'old' or 'comfort' foods. In Sweden, this would mean i.a. eating more potatoes and simple dishes made with wheat or rye flour. This is validated by retail statistics.

Good Practices

Legislation. A new action plan "More to do more" was initiated and developed from 2017 on by the Swedish National Food Agency together with the Swedish Environmental Protection Agency and the Swedish Board of Agriculture. The action plan is part of the government's food strategy and should contribute to the United Nations Agenda 2030, especially goal 12.3 (food loss and food waste). Four crucial issues for a successful implementation have been identified: (1) A national goal and monitoring methods from the government for better commitment of private and public players. (2) Collaboration between the industry and the food supply chain for more commitment and contributions. (3) Behaviour changes among consumers such as

raising awareness and motivation. (4) Enhance knowledge about the causes of food loss and the effectiveness of measurements (Livsmedelsverket, 2018).

42 measures were developed of which some are driven by the Swedish Environmental Protection Agency and the Swedish Board of Agriculture, and some are driven by other players such as actors within the industry or municipalities. “A crucial fact is that everyone who deals with food matters has a responsibility to integrate food loss and food waste issues in their work, to work in the long term, and to do as much as they can for the goal to be attained.” (Livsmedelsverket, 2018:4).

40 out of 42 measures are in progress by now, however most of them need to be intensified further and only few make good progress. In 2020, the government adopted two new milestone targets (Livsmedelsverket, 2020). One aims at food waste and includes the goal to reduce the amount of food waste (weight per capita) by at least 20% from 2020 to 2025. The other newly adopted milestone target addresses food loss and aims at increasing the share of food products that reaches retailers and consumers by 2025. The goal is to reduce food loss at the production levels. A reduction level has not yet been set (Naturvårdsverket, 2021).

Several national agencies are concerned with *food waste*, with a national goal that by 2023, 75% of food waste from all sources should be sorted for recycling via digesters or composting. Using organic matter for landfill is forbidden (Elander et al., 2016).

Other legislation regarding food is primarily in the area of hygiene, in particular setting standards for food processing and distribution; the national agencies for environment, consumer protection, food, and health tend to issue recommendations rather than edicts.

Eating habits. Advice is offered by several government agencies, though only in the form of information; numerous municipalities have taken a more active stance to promote and encourage sustainable eating, and more are planning or considering doing so. This is in line with Swedish culture and legislation, where direct interaction with citizens is the province of local, not national, government.

The extensive and broad discourse on sustainability in food habits has activated a social “pressure” as a means to get more people to consume more sustainably. According to recent research by the Swedish Consumer Agency, the public debate on climate effects has made Swedish consumers re-evaluate the changes they could make regarding buying meat and where they dine. Environmental information seems to be an effective tool as it has been creating changes in Swedish food habits (Konsumentverket, 2020:26-32).

According to a report by Food & Friends (2020), 23% of the Swedish population has reduced their consumption of meat because it is the healthier option – and 18% chose to reduce meat consumption for environmental reasons. With the year’s food trend being eating more vegetarian, 59% of Swedes ate vegetarian dishes at least once a week. Dishes such as vegetable soup, salads, and pasta with sauce were favourites.

This picture is far from complete. In civil society as in government, many of the most innovative initiatives are local. Taken as a whole, however, the impact on Swedish eating habits is barely noticeable, with the possible exception of the rise in numbers of people who regard themselves as vegetarians or vegans.

The 11 nationwide adult education organisations, otherwise a powerful influence in Swedish society, have with one exception (Studiefrämjandet) been relatively passive so far in relation to sustainable food consumption. Major behaviour-change programmes have come primarily from elsewhere in the NGO sector, notably the Swedish Society for Nature Conservation (Naturskyddsföreningen) and WWF Sweden (see below, Initiatives for the future).

Food Waste in Sweden

In Sweden, the Environment Protection Agency – Naturvårdsverket – publishes statistics on food waste every two years. From 2020 (i.e. to be published in 2022), such statistics are required to be reported to the EU, which may affect the periodicity and the future comparability of statistics.

According to their current statistics, households are responsible for the largest volume of food waste. The volume is slowly diminishing; numbers per person for households are reported for the following years (Naturvårdsverket, 2020:21):

2012	**2014**	**2016**	**2018**
81	74	71	69

Table 1: Food waste per person (in kg)

When liquid disposal is included, the numbers have varied from 81kg to 95kg of food waste per person per year (Naturvårdsverket, 2020:21). About 45kg of the food waste is classified as avoidable, i.e. food that could have been eaten if it had been handled differently (Naturvårdsverket, 2020:9).

Public policy is directed not only at reducing food waste, but also at minimising negative effects of disposing of food waste: “at least 50 percent of food waste from households, large scale catering establishments, food stores and restaurants [*should be handled so as to recover*] plant nutrients." This was later amended to 75% by 2023 (see above). In addition, "...at least 40 percent of the food waste should be treated in such a way that energy is also recovered” (Naturvårdsverket, 2020:8).

Mapping Sustainable Food Consumption in Sweden

The SCOFI questionnaire asks respondents to evaluate themselves and estimate their level of sustainable behaviour related to food. This brings in a wide and biased scope of answers where some responses might reflect a more critical examination than others do. Respondents to questionnaires sometimes tend to answer what they desire or what they think is expected from them rather than analysing their actual behaviour. This should be considered when interpreting the following results.

Recruitment to the survey was designed to also test the viability of dissemination via social media, without paid acquisition of respondents. The result was a smaller number of responses (116) but still sufficient to draw some preliminary conclusions.

The major vehicle selected for dissemination of the questionnaire was Facebook, with some dissemination also via Twitter and LinkedIn. Initially, the invitation to participate was posted in selected Facebook groups, each having broad participation with a focus on Sweden, several

with a focus on food. Subsequently, the invitation was re-posted in other groups (e.g. concerned with sustainability) and by individuals. As a supplement, an email mailing list drew attention to the Facebook posts. A few individuals took initiatives to spread the invitation within their own networks.

Response to the Facebook invitations accounted for at least half of the responses, with most of the remainder coming from direct mail invitations. We were unable to trace any impact via LinkedIn or Twitter reliably.

The sample is not representative in terms of gender: two thirds of the respondents were women. This is in line with voluntary recruitment, since women are generally found to be more engaged than men are in questions concerning the environment.

	Males	**Females**	**Total**
Population	50	50	100*
Survey respondents	33	66	100**
*** SCB (2021) **1% prefer not to say gender.**			

Table 2: Sample composition by gender (in %)

The lowest and highest age groups are under-represented - a reasonable effect of the recruiting strategy since those age groups are least engaged in Facebook. The three 'central' age groups born in 1981-96, 1965-80, and 1946-64, are reasonably representative: they are evenly distributed in the population (28%, 26%, 27%) as well as in the sample (31%, 32%, 30%).

	Generation Z 1997 - 2001	**Millennials 1981 - 1996**	**Generation X 1965 - 1980**	**Boomers 1946 - 1964**	**Silent before 1946**
Population*	7	28	26	27	12
Survey respondents	1	31	32	30	6
*** SCB (2020)**					

Table 3: Population structure by age (in %)

Respondents were on average better educated than the population (table 3).

Most respondents live in small households with no children (30% single households with no children; 34% two-person households with no children). This is consonant with the large numbers of single-person households in Sweden, especially in cities.

When asked to categorise their eating habits, respondents replied as in table 4:

Vegan	**8**
Vegetarian	9
Flexitarian*	38
Omnivore	61
*** mostly vegetarian but also egg and fish**	

Table 4: Eating habits (in %)

The fact that only just over half identify themselves as omnivores might be indicative of a long-term trend.

The Competence Map

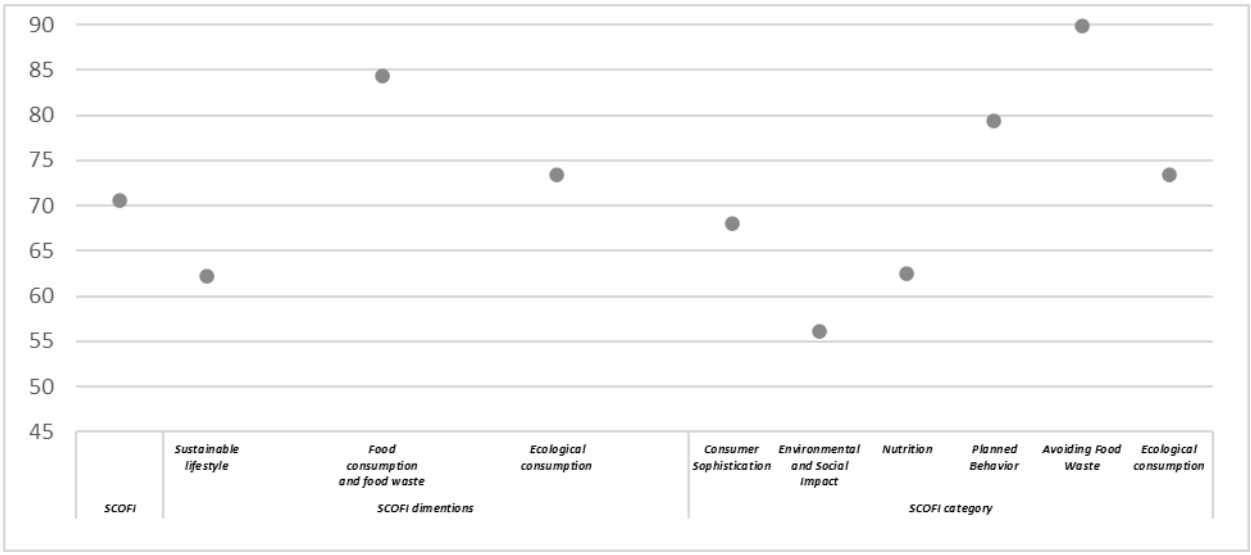

Figure 1: Sustainable food consumption index - Sweden

The SCOFI index in Sweden is 71. Swedish respondents see their food waste behaviour as rather sustainable. This is shown in the high SCOFI score in the "Food consumption and food waste" dimension (D2) as well as the high SCOFI score in the category "Avoiding Food Waste"(AFW). The first dimension "Sustainable lifestyle" (D1) however shows with 22 index points below D2 the lowest SCOFI score within the three dimensions, indicating that Swedish respondents assess their lifestyle as less sustainable.

	SCOFI	Sustainable lifestyle	Food consumption and waste	Ecological consumption
		Gender		
Man	66	57	81	70
Woman	73	64	86	75
Prefer not to say	85	76	100	88
		Generation		
Generation Z	-	-	-	-
Millennials	67	56	81	74
Generation X	71	63	85	73
Boomers	75	68	87	76
Silent	68	59	87	59
		Place of living		
Town	70	60	84	74
Suburb	68	59	82	73
Rural area	77	72	88	73

Table 5: SCOFI values by gender, generation, and place of living - Sweden

Gender: Men (SCOFI index of 66) evaluate themselves as less sustainable in terms of eating habits than women with a SCOFI index of 73. The biggest difference can be seen in the category "Sustainable lifestyle" (D1) with a difference of 7 in the SCOFI index between men and women.

Generation: Boomers have, with 75, the highest SCOFI score.

*Place of livin*g: Respondents living in rural areas reach a higher SCOFI index than respondents from suburban and urban areas do.

	SCOFI	Sustainable lifestyle	Food consumption and waste	Ecological consumption
Level of education				
ISCED 1-4	70	61	86	68
ISCED 5-8	71	62	84	75
Current economic activity				
Employed	71	61	84	73
Student	65	50	85	79
Retired	73	66	87	74
Other	71	68	80	68
Household income				
Low	70	61	84	70
Medium	70	63	83	69
High	72	63	85	77
Share of household food expenditures in total monthly household expenditure				
up to 10%	71	61	86	77
up to 20%	71	61	87	73
up to 30%	70	63	82	72
up to 40%	68	58	82	75
more than 40%	79	72	87	84

Table 6: SCOFI values by education, economic activity, household income and food expenditures – Sweden

Level of Education: Swedish respondents are relatively highly educated. Only six percent of the respondents have an education level ISCED 1-4, while the majority has a master's degree or doctoral level. Higher educated respondents reach a significantly higher value in dimension three, while the SCOFI value as well as dimension one and two show no big differences. However, with only a few respondents for ISCED 1-4, a meaningful comparison is not possible.

Current economic activity: Overall, students show the lowest SCOFI value. Unpaid family workers (74) and retired respondents (73) evaluated their food consumption behaviour with the highest SCOFI values.

Level of household income: High-income households (72) have a slightly higher SCOFI index than low-income households (70) do.

Food expenditure: The SCOFI value increases slightly with increasing food expenditure in proportion to income. Respondents who spend ten percent or less on food have a higher SCOFI score (72) than respondents who spend up to 40% on food (SCOFI 68).

Persons in household: There is a weak pattern. The more adults in a household, the higher the SCOFI value. Respondents with children tend to have a lower SCOFI value than households with adults only do.

Initiatives for the Future in Sweden

The Swedish EPA commissioned a study of some European programmes intended to lead to more sustainable lifestyle choices, including but not limited to food. The report, in Swedish, was presented to the EPA in February 2019 (Naturvårdsverket, 2019:35).

Of the programmes studied, several concerned short-term campaigns. Those that continue to operate are:

- BeChange, a commercial enterprise offering courses in sustainable lifestyle
- Greenhack GBG, a long-term programme of the city of Gothenburg

Other Swedish initiatives:

- WWF has stepped up its commitment to changes in food habits. WWF Sweden has six major food projects, of which one - One Planet Plate (2021) - specifically targets consumption.
- The Swedish Society for Nature Conservation (Naturskyddsföreningen), with over 200,000 members, produces and distributes information about the effects of food consumption habits on climate and environment (Naturskyddsföreningen, 2018).

The report also documented a Hungarian programme that originated in Sweden,

- Ökokörök (EcoTeam), which continues to spread in Hungary through the Conscious Consumers Association.

More recently, the Swedish national research fund for sustainable development, Formas, has funded a fast research project to secure and analyse data concerning Covid-19-driven changes to food habits.

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CHAPTER 7

Food Consumption and Sustainability in Turkey

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Food Production and Consumption in Turkey

Agriculture is one of Turkey's major industries with a 5.8% GDP contribution accounting for 20% of the working population. The value of the food industry by current prices increased 77.7 % from 2002 to 2016, reaching USD 43.2 billion in 2018. Turkey is the second-largest country in Europe in terms of the agricultural economy in 2018, and second-largest agricultural economy among OECD countries. Turkey is the world's 9th largest agricultural producer overall and is the world leader in the production of dried figs, hazelnuts, sultanas/raisins, and dried apricots. The country is also one of the leading honey producers in the world. Turkey boasted production of 18.5 million tons of milk in 2016, making it the leading milk and dairy producer in its region. Turkey has 23.2 million ha agricultural land and more than 3 million agricultural enterprises. The country also sows 34.4 million tons of cereal crops, it grows 30 million tons of vegetables and 22.3 million tons of fruit, and it produces 2.1 million tons of poultry meat and 1.1 million tons of red meat. Also, Turkey has an estimated total of 11,000 plant species, whereas the total number of species in Europe is 11,500. This bountiful production allows Turkey to maintain a significantly positive trade balance thanks to its position as one of the largest exporters of agricultural products in the Eastern Europe, Middle East, and North Africa (EMENA) region. Globally, Turkey exported 1800 kinds of agricultural products to more than 190 countries, accounting for an export volume of USD 17.7 billion (Republic of Turkey Investment Support & Promotion Agency (RoTIO), 2018).

Consumption statistics also highlight the current situation in Turkey from the viewpoint of sustainability. Turkish people eat almost 280 kg of vegetables in a year. In Turkey, 200 kg grain and 52.3 kg potatoes are consumed in a year per capita (TZOB, 2017). In parallel with the increasing population in Turkey, wheat demand is also increasing. Wheat consumption, including consumption of bread, wheat grains, pasta, semolina, biscuits, starch, and other wheat-based bakery products, is around 19 million tons. According to TURKSTAT data, per capita, rice consumption is 9.4 kg in Turkey (TZOB, 2019).

Turkish people eat almost 140 kg of fruit per year per capita. Although Turkey is one of the leading fruit producers worldwide and has favourable opportunities for fruit production, a lack of fruit consumption can be considered. For instance, Turkey, which ranks first in world hazelnut production, remains at a low hazelnut consumption level. Approximately 90-100 thousand tons of hazelnuts are consumed annually in Turkey, which represent 1.18 kg per capita. Grape consumption per capita per year, approximately 45 kg in the early 1990s, now ranges between 26-29 kg. The domestic consumption of seedless raisins is around 35-50 thousand tons. In total it means 0.53 kg per capita per year. The annual per capita consumption of dried figs in Turkey is estimated to be approximately 0.20-0.25 kg.. Turkey's average annual consumption of dried figs is around 6-8 thousand tons; 0.09 kg per capita. The per capita consumption of fresh figs in our country is 0.40-0.60 kg per year (TZOB, 2019).

According to the Ministry of Agriculture and Forestry Agricultural Economic and Policy Development Institute (TEPGE) (2020), red meat consumption per capita in Turkey is lower than in developed countries. When the consumption of red meat in the last five years is examined, it is seen that the annual consumption per person, which was 12.4 kg in 2012, was 12.9 kg in 2014, and it increased to 14.1 kg in 2017. In 2018, the per capita consumption of red meat was 14.84 kg, of which 13.3 kg was veal.

A massive proportion (98%) of Turkish adults consumes poultry meat. This rate is relatively high. Annual poultry meat consumption in Turkey is 19.3 kg/per capita/per year. It seems to be very low compared with other countries. Similarly, Turkey's egg consumption per capita is 180 pieces per year, which appears to be very low compared with other countries (TZOB, 2019). The most important reasons for low consumption of poultry meat products are dislike of the taste of poultry meat and dislike of slaughter and feather pecking methods (Durmus et al., 2012). In Turkey, people consume 25 kg of milk and 30 kg of yogurt in a year, or about 100 g per day of dairy products excluding cheese (TZOB, 2017).

Food consumption is an essential element as an indicator of social lifestyle, an aspect of popular culture, the desire to express social status, the search for difference, and the young generation's self-expression in Turkey. This situation increases food consumption outside the home. Restaurants and cafes are an important part of the consumption society and are seen as a way of socialisation. Thus, out-of-home food consumption is increasing. As proof, it was determined that 54.7% of the Turkish adults ate outside the home at least once a week (Dölekoğlu & Çelik, 2018). In parallel with the rise of the number of restaurants that serve either tradition or fast food, ads and promotion campaigns have a notable impact on widespread overconsumption of food. In the years following the opening of fast food restaurants for the first time, various cuisines specific to Turkish culture have become widespread under the name of fast food or in other restaurants. The culture and habit of eating outside are gaining momentum in Turkey. Food consumption and production frequently occur out of houses. Thus, this causes the rapid growth of food consumption in Turkey. Besides, convenience foods and fast food restaurants affect social and cultural characteristics (Akkoç, 2017).

According to Dölekoğlu and Çelik (2018), *food selectivity* and *healthy eating* are identified as two dimensions of purchasing tendencies of food products for Turkish consumers in Generation Y who are workers. Although no significant difference has been found in terms of gender, the perception of healthy nutrition of men has higher scores compared to women. It has been found that university and graduate students differ in food choices compared to others who have a lower level of education. The favourable attitude to healthy eating in the age groups of 25 and above was more positive than for younger adults. Income was also found to be a significant determiner of food selectivity. Food selectivity increases as income increases. Although out-of-home food consumption increases as income increases, concerns about healthy living and nutrition as a part of it also increase. This necessitates the implementation of routines mandated by nutritional criteria such as the consumption of traditional home meals, the meal time to be in a specific time range, and a balance of snacks and main meals. Also, living with the family is an influential factor in out-of-home food consumption. In the study, it was determined that the participants younger than 9 years old and those over 27 years old eat less frequently outside the home and are more sensitive to healthy eating (Dölekoğlu & Çelik, 2018).

Several motivations play a role in the food choice of Turkish adults. Need and hunger, liking, and natural concerns (contains no harmful substances like pesticides or pollutants, not genetically modified) play a primary role for breakfast and dinner. At the same time, their food

choices are influenced by sociability, variety seeking, social norms and pleasure habits, convenience, need and hunger, and natural concerns, and health were found to be almost equally important as drivers of food choice. Interesting finds were related to groups of foods investigated in the study. Bread, fruits, and vegetables, which are most wasted by Turkish consumers, were linked to motivations such as liking, need and hunger, and habits. Moreover, these food categories did not associate with variety seeking, visual appearance, and social factors such as social image, social norms, and sociability (Chambers et al., 2016). This shows that the rate of food waste may decrease when consumers are willing to have different tastes in meals by using their creativity in cooking with leftovers, consuming these foods in various social settings, and ignoring the visual appeal of these foods when buying.

According to the study of Güneysu (2020), almost 60% of the consumers prefer supermarkets for purchasing food. Local markets come in second with a rate of 31.3%, followed by grocery, which is specialised in selling fruits and vegetables. During the COVID-19 quarantine period, preference for supermarkets has increased and reached 70% due to the restrictions on market places and for other reasons. The percentage of food packaging in the composition of domestic waste was calculated as 55.5% during the COVID pandemic period, while it was only 41% in the pre-quarantine period. The prevention of spoilage can explain the decrease in the waste or spoiled food during the quarantine process due to the increase in consumption and the production of meals in more controlled and sufficient quantities. The most dramatic decreases are seen in the waste rate of bread, fruit, and vegetables during the pandemic time. Although the overall food waste rate decreased during the pandemic days, food waste in the process of preparing and cooking increased, while food waste decreased dramatically at the stage of storage both before and after consumption. This behaviour change may be limited to the pandemic conditions; however, a worldwide trend has occurred for more sustainable food consumption. As Borsellino, Kaliji, and Schimmenti (2020) have stated, a remarkable number of adults have been a part of efforts to avoid food waste. They have also shifted their food consumption behaviour towards more sustainable ways by applying essential tips such as cooking at home, preferring local markets and producers, and choosing online shopping for food[1].

Food Expenditures in Turkey

Food and non-alcoholic beverage consumption expenditures have a remarkable share of household expenses in Turkey. Expenses for food and non-alcoholic drinks took second place with a percentage of 20.8% of total consumption expenditures after housing and rent expenditures. This does not cover the expenses of food consumption in restaurants, canteens, hotels, etc. The household budget survey in 2019 revealed that food and non-alcoholic beverages increased their share to 20.8% from 20.3% relative to 2018. However, monthly average consumption expenditures per household rose from 900 TL in 2018 to 1033 TL in 2019. This corresponds to an increase of about 15% from 2018 to 2019 (TURSTAT, 2020).

The share of food and non-alcoholic beverage expenditures of total consumption expenditures of Turkish households since 2002 is presented in Figure 1.

[1] However, the claim that online shopping for food is more sustainable, is debatable.

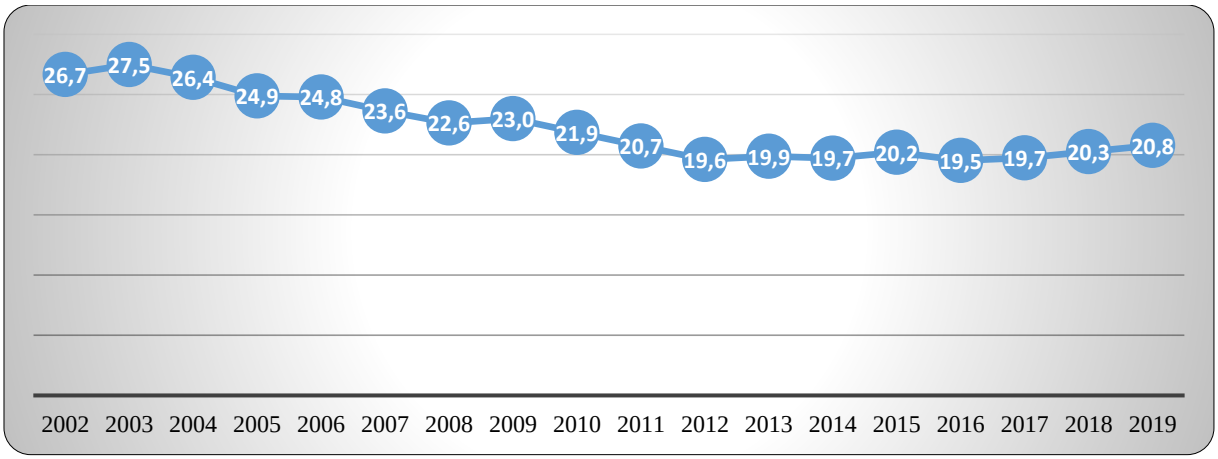

Figure 1: The share of food and non-alcoholic beverages of total consumption expenditures in Turkey since 2002
Source: TURKSTAT, 2020

The expenditures for meat, fish, and seafood accounted for the largest share of spending on food and non-alcoholic beverages in 2019 with 19.4%, followed by bread and cereals with 17.8%, vegetables with 16.6%, and dairy products and eggs with 13.9%. The share of all categories of food consumption can be seen in Figure 2.

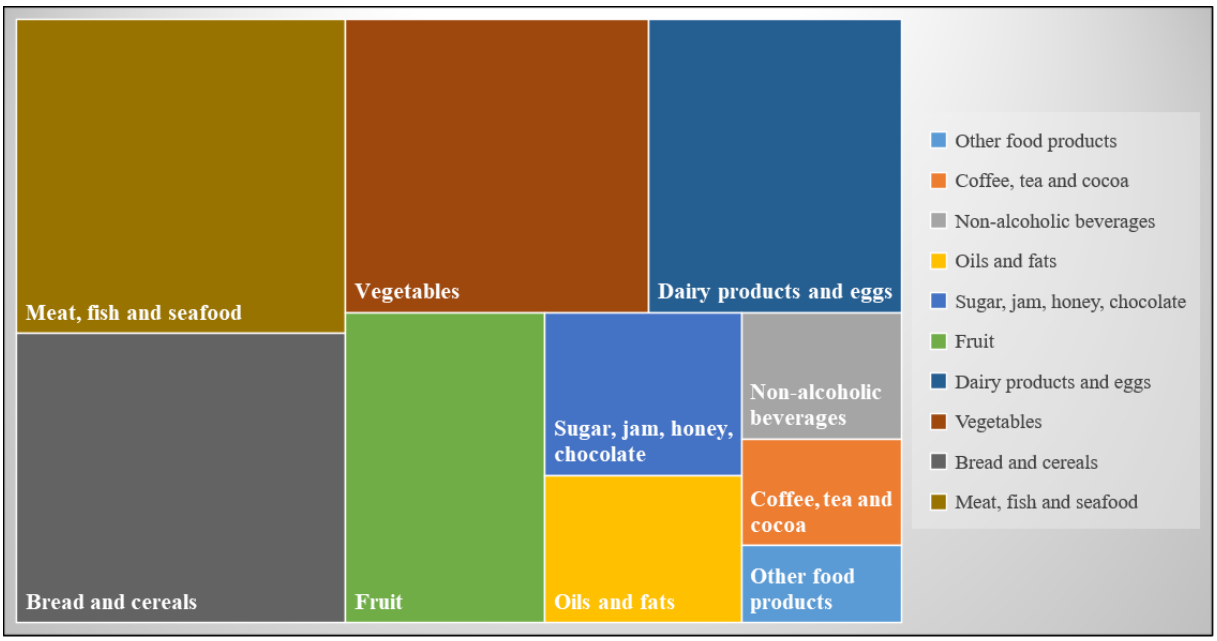

Figure 2: The share of food categories in food and non-alcoholic beverage expenditures in 2019 in Turkey
Source: TURKSTAT, 2020

The change in the distribution of food expenditures for the last two years in Turkey is presented in Figure 3. As it can be seen from Figure 3, expenses for vegetables increased 0.5%, and bread and cereals increased 0.3%, whereas expenditures for meat, fish, and seafood decreased 1.5%. In other categories, it looks almost the same for the two years.

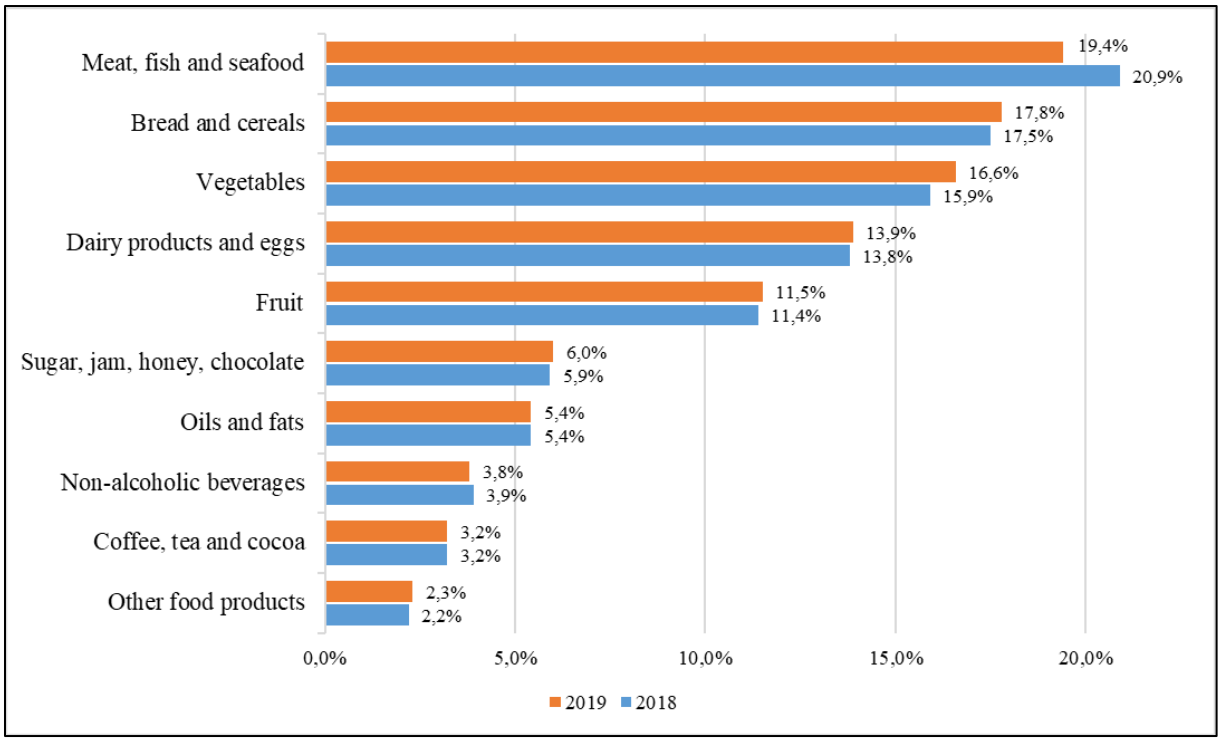

Figure 3: The distribution of food expenditures in Turkey
Source: TURKSTAT, 2020

When investigating the distribution of consumption expenditures by quintiles ordered by income in 2019, it is seen that the share of food and non-beverage expenditures decreases as the household income increases. The percentage for food and non-alcoholic beverages is 30.7% in the lowest quintile, while the share of food and beverage expenditures is 15.3% for the highest quintile. Thus, it can be said that the percentage of food and non-alcoholic expenses in total consumption expenditures falls by half from the lowest income group to the highest income group. Also, restaurant and hotel expenditure is 8.1% in this consumer group (TURKSTAT, 2020).

In general, meat and meat products are among the food groups with a high income elasticity. A 1% increase in income level increases the demand for meat and meat products by 0.48%. The income elasticity of vegetable and fruit expenditures, which have the largest share in food expenditures, is 0.38%. The lower level of income elasticity for vegetable and fruit expenditures is because these products rank first in food expenditures and therefore are included in the group of compulsory goods (Yazıcı & Demircan, 2018). According to food groups, high or low income elasticity is one of the determining factors in changing food waste rates.

The distribution of household food consumption expenditures by household size is presented in Figure 4. The share of food expenditures in total consumption expenditures generally increases in parallel to household size as expected.

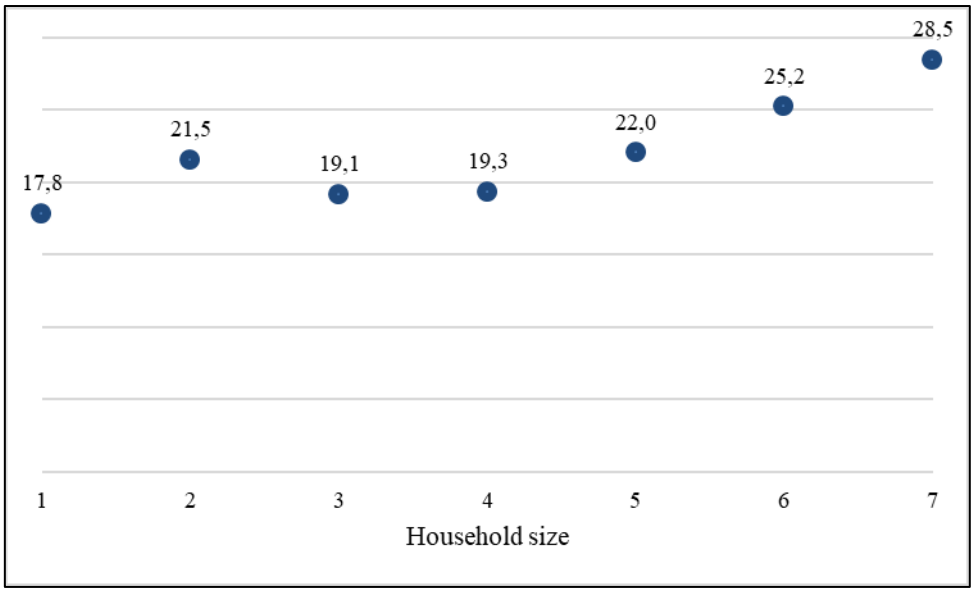

Figure 4: The share of food expenditures by household size
Source: TURKSTAT, 2020

Food Loss and Waste in Turkey

The current situation in Turkey about food loss and waste is not encouraging. According to studies conducted by the Federation of Food and Drink Industry Associations, the amount of food wasted in Turkey is 26 million tons per year. This amount corresponds to 214 billion Turkish Liras. 25-40% of the 49 million tons of fruit and vegetables a year are wasted or lost in Turkey. According to the studies conducted by TÜBİTAK, with an optimistic estimate of waste, the amount of wasted vegetables and fruits is 12 million tons and 25 billion Turkish Liras. This amount is more than four times that of Turkey's total exports of fruits and vegetables. 1.7 billion breads per year corresponding to 4.9 million breads per day are wasted in Turkey (TIOV, 2019). According to the UNEP Food Waste Index Report 2021 prepared by the United Nations Environment Programme, a total of 7.76 million tons of food waste occurs at household level in Turkey. This finding corresponds to 93 kg of food wastage per person per year at the household consumption level. This amount is approximately 26% higher than the world average of 74 kg indicated in the report (UNEP, 2021).

FAO (2013) carried out a study to identify the percentages of food loss and waste in Turkey's food supply chain in 2013 (Table 2). The researchers used data from the FAO statistics (FAOSTAT), the Turkish Statistics Institute (TURKSTAT), various national reports, outcomes of focus group meetings with producers and stakeholders, and replies to semi-structured questionnaires by experienced critical persons in the respective sectors. The most considerable losses for all commodities occurred at the agricultural production step of the food supply chain in Turkey. Gustavsson et al. (2011) reported that in medium- and high-income countries, food is wasted mostly at the consumption stage, while it is lost mainly during the earlier steps of the food supply chain in low-income countries.

	Agricultural production	Postharvest handling and storage	Processing and packaging	Distribution	Consumption at household level
Cereals	5.1%	4%	2%	1%	5%
Roots and tubers	7%	6%	2%	3%	2%
Oilseeds and pulses	15%	5%	7%	1%	4%
Fruit and vegetables	25%	12%	13%	11%	5.1%
Meat	10%	0.2%	5%	0.5%	1%
Fish and seafood	10%	0.02%	0.04%	0.01%	2%
Milk	10%	1%	1.5%	6%	1.5%
Eggs	6%	1%	2%	1%	0.01%

Table 1: Percentages of food loss and waste in Turkey
Source: FAO, 2013

According to FAO (2013), food loss and waste occurring at various stages of the food chain vary according to both the stages of the chain and the food categories. Although food losses occurring in the agricultural production phase vary between 5% and 25%, it is observed that the loss is high, especially in the vegetable, fruit, and oilseeds group. Loss and waste rates of fruits and vegetables generally decrease from the production stage to the consumption stage. On the other hand, the situation at each step of the chain differs in other food groups. During the consumption phase, cereals, fruits, and vegetables are more wasted than other foods. Because of the high level of bread, fruit, and vegetable consumption, and their low costs for consumers, adults tend to buy more of these food products than they need, while restaurants also waste many of these food products.

One of the main reasons behind the food waste in Turkey arises from the consumer level. Thus, a more detailed investigation of consumer-level food waste would be useful for understanding consumer behaviour and developing recommendations for the prevention of food waste at individual level. According to a recent report prepared by the Ministry of Trade (RoTMT) in 2018, *the Turkey Waste Report*, the majority of adults stated that they shop for food from the supermarkets and convenience stores (63.3%). As the place where food is exchanged, the local markets, which are set up periodically, are ranked second (17%). The rate of those who state that not all the meals cooked in their homes are consumed is 40%. Nearly a quarter of the individuals cannot finish the food they bought on their plate. The rate of consumption of purchased foods is 77.2%. It can be said that there is a high tendency for food to be thrown away without consumption in high-income groups. Food spoilage (74.2%) comes first among the reasons for throwing out food, and second (29.8%) is inadequate consumption. Some other statistics provided in the report showed:

- 25.4% of Turkish consumers use leftovers,
- 28.4% of Turkish consumers store excess food in the freezer,
- 30.8% of Turkish consumers prepare shopping lists
- 47.6% of Turkish consumers do not buy food products with close expiration dates
- 70.8% of Turkish consumers buy fruit and vegetables, which are not in season

According to another study done in Izmir, although food waste rates in households vary by food product categories, more than two thirds of the consumers stated they waste food. It was found that not wasting food was associated with the behaviours of not going hungry for shopping and not purchasing more food products than needed. Reasons for the occurrence of food waste are listed as (Daysal & Demirbaş, 2020):

- the expiry date of food products
- the mold of food products
- going food shopping when hungry
- keeping food products in the fridge too long
- improper storage conditions
- curiosity for new food products
- the fact that households are unaware of each other and at the same time shopping for food

These findings point to the need for training to raise awareness and change consumer behaviours on food waste. Many Turkish adults are not aware of the difference between the expiry date and the best before date.

A significant portion of consumers agrees that food waste is an important issue. Yıldırım et al. (2016) stated that 80% of Turkish consumers consider food waste an important issue and want to reduce or avoid food waste. However, 50% of the consumers state that they will not change their consumption habits soon to prevent food waste. Based on this, it can be said that while a large part of the consumers believes that this is an important issue, they are not equally willing to develop behaviour change. It is undeniable that it will not be possible to reduce food waste caused by consumers unless consumers transform their sensitivities into behaviour. According to the study done in Turkey, more than half of the adults feed animals with unconsumed food products. Furthermore, more than one third of Turkish consumers throws unconsumed food away, while only 7% of them reuse food leftovers for composting (Ündevli et al., 2019).

Although many reasons cause food waste at the consumption stage, some stand out. Unneeded consumption as a dimension of sustainable consumption behaviour defined by Bulut et al. (2017). In particular, actions against sustainable food consumption, such as not making a shopping list before and during shopping, going shopping while hungry, purchasing more food products than necessary due to various promotions and marketing activities, and low tendency to change eating habits, are the basis for the increase of unnecessary consumption of food products. Lack of knowledge about food preparation causes excessive food waste or low utilisation of usable parts of food. Apart from this, this lack of information causes prolonged cooking times and energy loss. Other prominent factors that are caused by the lack of knowledge can be listed as follows:

- insufficient knowledge of storage conditions
- incomplete knowledge about adequate portion sizes and nutrition balance
- inadequate knowledge about using up leftovers
- low awareness of or ignoring the ecological impact of food consumption

According to the results of a study conducted with Turkish consumers, it has been shown that consumers exhibit more health-oriented sustainable consumption behaviours than environmental-oriented behaviour. They have a high level of intention of avoiding waste food

and intention to reuse usable parts of food products. On the other hand, consumers do not engage a lot in planned purchasing behaviour and sustainable consumption behaviour scores. In the same study, a clustering method was conducted, according to which Turkish consumers are divided into three groups: indifferents, sustainability enthusiasts, and sustainability pioneers according to their sustainable food consumption behaviours. It was shown that when moving from indifferents to sustainability pioneers, the ratio of women, those in the baby boom generation and married people, increased (Bulut et al., 2019).

Mapping Sustainable Food Consumption in Turkey

SCOFI (please see Chapter 2) was used to map sustainable food consumption among adults in Turkey. The data have been collected in February, 2020. It had been planned to collect all the data by a face-to-face questionnaire. However, due to the COVID-19 pandemic, some of the data had been collected using a digital platform, Google Forms. The face-to-face data collection has been conducted in two cities; İzmir and Muğla. Furthermore, online surveys have been promoted by using social media channels and e-mails. Adults aged 18 and above were invited to participate in the research. Quota sampling was used to provide an accurate representation of generation (Generation Z, Millennials, Generation X, Baby Boomers, Silent Generation) and gender categories. The size of each quota was calculated according to Address Based Population Registration System Results provided by the Turkish Statistical Institute. Although 347 responses were collected, 48 questionnaires were removed from the database due to missing data. Finally, the analysis has been carried out with the remaining 298 questionnaires.

The overall SCOFI score in Turkey was found to be 68. This score is very close to the average ($\bar{x} = 68.6$) obtained from five countries where SCOFI was applied. However, when compared with Food Sustainability Index, which is developed by Barilla Center for Food and Nutrition, it is seen that the SCOFI score of Turkish adults shows a low level of sustainable behaviour in food consumption. The lowest score was found for the third dimension, "Ecological Consumption" (D3). The highest score has been observed for the second dimension, "Food Consumption and Waste" (D2). The score in dimension one, "Sustainable Lifestyle" (D1), is almost equal to the overall SCOFI score.

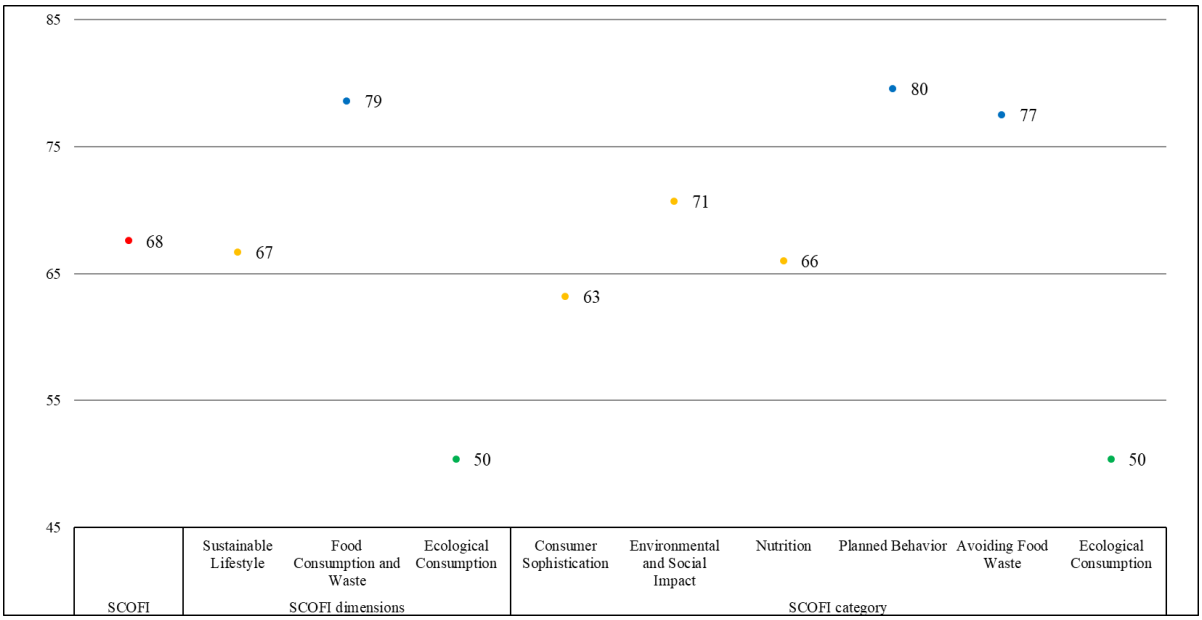

Figure 5: Sustainable Consumption of Food Index – Turkey

The score for “Environmental and Social Impact” (ESI), one of the sub-dimensions of D1, is the highest among the sub-dimensions of a sustainable lifestyle. It is followed by “Nutrition” (NUT) and “Consumer Sophistication” (CSO). The scores in the sub-dimensions of D2 are close to each other. However, the “Planned Behaviour” (PBE) score is slightly higher than the score of “Avoiding Food Waste” (AFW).

Taking or sharing responsibility for purchasing food products and/or preparing them for consumption can also affect sustainable food consumption behaviours. The SCOFI findings demonstrate the impact of taking responsibility in purchasing food products or preparing them for consumption. It was found that the adults who take responsibility for buying and preparing food have a value of 6.5 points higher than the others have. This difference corresponds to a difference of more than 10% between the scores of the two groups. In the light of these findings, it is seen that taking responsibility in the processes of shopping for food products and preparing food for consumption, which are two crucial stages of the sustainable food consumption process, will be an essential behavioural change in making food consumption behaviour more sustainable. It can be said that adopting this way of behaviour has a high probability of creating significant improvement, especially in food consumption and waste and ecological consumption dimensions of sustainable consumption of food behaviour.

There is a general opinion that the level of awareness of adults of sustainable consumption of food products differs according to their demographic characteristics. This is supported by data obtained from Turkish consumers. Table 3 presents the SCOFI values based on gender, generation, and place of living of consumers from Turkey.

Women have higher values than men in overall SCOFI scores and in scores in sub-dimensions. Men and women have almost similar scores in food consumption and waste dimension. On the other hand, women achieve a 7 points higher score in the ecological consumption dimension than men. Similarly, the differences are 4 points in the overall score of SCOFI and sustainable lifestyle dimension in favour of women. These findings are generally consistent with expectations.

The SCOFI scores according to the age of the consumers have been evaluated by considering the generations they belong to. Although some exceptions are observed, it can be said that while the age of consumers increases, their tendency to exhibit sustainable consumption behaviour towards food products increases as well. The most notable difference between the scores of consumers in two different generations emerges in the sustainable lifestyle dimension. There is a significant difference (up to 20%) between Gen. Z and Baby Boomers. Likewise, consumers in the Silent generation have a value about 18% higher than Millennials and Gen. X on the ecological consumption dimension.

Turkey	%	SCOFI	Sustainable lifestyle	Food consumption and waste	Ecological consumption
Index		68	67	79	50
Gender					
Man	50	66	65	78	47
Woman	49	70	69	79	54
Prefer not to say	1	60	55	78	50
Generation					
Generation Z	11	66	62	78	55
Millenials	34	65	63	77	49
Generation X	28	69	68	81	49
Boomers	22	72	74	79	52
Silent	5	72	73	78	58
Place of living					
Town	75	68	66	79	50
Suburb	20	68	68	78	51
Rural area	5	64	64	69	54

Table 3: SCOFI values based on gender, generation, and place of living

Nevertheless, there is a difference of only 4 points between the lowest and highest values of two generations in the food consumption and waste dimension, which corresponds to 5%. Interestingly, adults in different generations have the highest and lowest scores on the three dimensions of SCOFI. For instance, Gen. X adults exhibit sustainable consumption behaviour splendidly in a sustainable lifestyle dimension while they exhibit sustainable behaviour poorly in the ecological consumption dimension.

In Turkey, total SCOFI values indicate that adults living in town and suburb areas act more sustainably than adults living in rural areas. According to the SCOFI scores, it was found that adults living in the suburbs have a more desirable behaviour on the sustainable lifestyle dimension. At the same time, consumers in towns are better at food consumption and waste, and people living in rural areas have more ecological consumption. This is not a surprise because adults living in rural areas have more opportunity for producing their own foods, i.e. mostly fruits and vegetables.

Table 4 presents the SCOFI scores broken down by education, current economic activity, household income, and the share of food expenditures in total expenditures of a household. It is generally accepted that as the education level increases, the tendency to exhibit sustainable consumption of food behaviour increases. However, findings based on the SCOFI survey in Turkey do not confirm this expectation. Adults who have a lower education level (ISCED 1 to 4) have a higher score in total SCOFI. This is also the case for all dimensions of SCOFI.

According to the current economic activity, all groups have almost equal values in total SCOFI scores. Adults categorised as others, who are unemployed, unpaid family workers, persons on maternity or parental leave and other unpaid workers, have the lowest score in total and sustainable lifestyle, while retired adults have the lowest score in food consumption and waste

dimension, and employed adults who are employee, employer or self-employed, have the lowest score in ecological consumption.

Turkey	%	SCOFI	Sustainable lifestyle	Food consumption and waste	Ecological consumption
Index		68	67	79	50
Level of education					
ISCED 1-4	20	70	69	80	53
ISCED 5-8	80	67	66	78	50
Current economic activity					
Student	18	67	63	78	58
Employed	53	68	69	80	48
Retired	17	69	72	76	50
Other	12	64	60	78	50
House income					
Low	31	69	66	81	54
Medium	47	67	66	77	49
High	22	68	68	80	48
Share of household food expenditures					
Up to 10%	3	65	63	82	40
Up to 20%	19	68	67	79	51
Up to 30%	29	67	66	78	51
Up to 40%	31	67	66	77	50
More than 40%	18	71	70	82	53

Table 4: SCOFI values by education, economic activity, house income, and food expenditures

Regarding household income level, Turkish adults with the lowest level of income achieve the highest SCOFI value in total. Although the adults with the highest income level performed better in a sustainable lifestyle, adults with the lowest income level also ranked better on the overall average thanks to their high scores in food consumption and waste and ecological consumption dimensions. This finding becomes more meaningful when related to the ratio of food expenditures in the households' total spending. As expected, adults who dedicate more than 40% of their household income to food spending, score higher than others do. Therefore, it can be concluded that, in general, adults in the low-income group exhibit or have to exhibit a more sustainable food consumption behaviour as they have to devote a significant part of their income to food expenditures.

Interestingly, high-income consumers who allocate a small portion of their household income to food expenditures have high values regarding food consumption and waste. This supports that consumers in the upper-income group plan their food consumption more and exhibit conscious behaviour about preventing food waste. However, the adults' ecological consumption scores in this group are significantly lower than those in the other groups. This is because they may have habits such as eating out and preferring ready-to-eat food products. Their desire to buy out of season food products due to their high incomes can also be listed as one reason of this low value in this dimension.

In conclusion, the findings support the fact that Turkish adults are neither in a good nor bad situation regarding sustainable consumption of food. Although all dimensions correlate with each other, there is a common need to improve mindfulness in all aspects of sustainable food consumption. Since these scores reflect only the current situation, the results should be evaluated by considering that eating habits can change over time.

Turkish adults are especially good at food consumption and waste dimension, which reflects the planned behaviour such as preparing a shopping list, planning menus, etc., and avoiding food waste. The traditional roots of Turkish consumers can explain this. Wasting is haram due to the common belief in Turkish society. Food consumption is one of the areas where this belief's effects are reflected in daily life most intensely. Throughout its history, Turkish society has had to struggle with famine and poverty due to wars. With the impact of these periods, it made an effort to use its resources efficiently. Among these efforts, there are socio-cultural influences such as the proliferation of methods such as pickling, canning, and drying for the long-term storage of food products, Turkish cuisine expanding with the effect of efforts to evaluate excess food, neighbourly relations, and cultural heritage based on sharing.

In addition to the cultural impact, the economic and demographic environment are also among the primary areas of food consumption and waste. Food expenditures take an essential share in total consumption expenditures for low-income families with many children. Therefore, they pay more attention to use food products without wasting them. Especially in recent years, the increase in food inflation makes the possibility of turning to higher-priced ecological alternatives harder.

In parallel with the increase in the level of knowledge and awareness with the effect of recent initiatives on sustainable consumption, these products' prices have increased significantly with the rise in demand for food products offered by domestic producers. For this reason, it is observed that many low- and middle-income consumers have to prefer processed products that are sold in supermarkets and have a higher environmental impact instead of natural and local food products. Food products grown in greenhouses, exposed to chemicals to preserve freshness for a long time, and produced with genetically modified seeds to increase productivity, could be labelled as non-ecological alternatives. The low score of Turkish adults in the ecological consumption dimension can be explained by the consumption patterns mentioned above.

Precautions for creating a more sustainability-focused society should be taken with a holistic perspective, covering all eating habit groups and all demographic groups, because consumers' ability to influence each other must also be taken into account in ensuring more sustainable food consumption. Each adult, who will become conscious of more sustainable food consumption and reflect this in his/her behaviour, can also trigger a broader change in understanding by positively affecting other people in his/her environment. Thus, it should be tried to create opinion leaders and role models to lead this understanding in society. The fact that these role models have different demographic profiles will expand the range of the intended impact.

The common findings of the study highlight the need for education. Training materials should be developed concerning different consumer groups based on their demographic profiles. Although initiatives, both private and public, and tools have started to create awareness of sustainable food consumption in recent years in Turkey, these efforts are not sufficient yet. Moreover, adults' sustainable behaviour should be triggered with the help of special motivations provided mostly by local governments.

Initiatives for the Future in Turkey

This part of the chapter describes initiatives supporting sustainable consumption of food and that are expected to be more active in the future of sustainable food consumption.

Sustainable Development Objectives and Efforts, Presidency of the Republic of Turkey, Head of Strategy and Budget

Concurrently with its development in economic and social areas, Turkey also prioritises the care for ecologic aspects considering its global responsibilities. Starting with the adoption of the 2030 Agenda for Sustainable Development, Turkey has underlined its commitment to sustainability issues and became one of the 22 countries that submitted their first Voluntary National Review (VNR) Reports to the High-Level Political Forum (HLPF) in 2016. This VNR has revealed a path to achieve Sustainable Development Goals (SDGs), while the second VNR in 2019 has focused on the level of achievement of these SDGs (PSB, 2020).

Following the adoption of Agenda 2030, Turkey has assigned responsibilities for a total of 218 indicators to its institutions. Then, the Turkish Statistical Institute has published a responsibility kit including 83 SDG Indicators in February 2019. These indicators have mostly focused on SDGs 3, 7, and 9; however, the indicators of SDGs 1, 2, 12, 13, and 14 still need some further work. In relation to SDG 12, the National Environmental Strategy and Action Plan, EU Integrated Environmental Adaptation Strategy (2007-2023), Turkey Climate Response Strategy (2010-2023), Turkey Industry Strategy (2015-2018), Productivity Strategy and Action Plan (2015-2018), National Clean Production/Eco-Efficiency Program (2014-2017), Turkey Tourism Strategy 2023, National Waste Management and Action Plan (2016-2023), National Recycling Strategy and Action Plan (2014-2017), Turkey Automotive Sector Strategy and Action Plan (2016- 2019), and Turkey Cooperativism Strategy and Action Plan (2012- 2016) are among the key policy documents as well as the NDPs and strategic plans of relevant public institutions.

Along the entire food supply chain, the agricultural production, the first stage, is the stage with the highest rate of food losses. However, by strengthening the registration system, expanding the licenced warehousing and logistic infrastructures for fresh fruits and vegetables, it is possible to reduce food losses in the supply chain. In Turkey, priorities are given to packaging, transportation, storage, standardised retail sales, and regulatory actions on efficiently functioning wholesale food markets. For example, the Eco-Label practice was applied in 2018 to raise awareness of consumers' environmental impacts on products (PSB, 2020).

Important actions are taken towards protecting and improving health through spreading healthy eating habits and physical activities with the help of relevant programmes. For example, schools are certificated as Nutrition Friendly Schools based on their reliance on promoting healthy eating habits and active living, and their practices for improving the school environment and students' health. The number of schools labelled as Nutrition Friendly has increased from 1,225 in 2016 to 11,866 as of the first quarter-end of 2019.

Additionally, the *Zero Food Loss from Field to Table Project* has been launched in 2013 to minimise the waste in vegetables and fruits during the food supply chain, while the ongoing

campaigns on food waste prevention are expected to contribute to improvements in food security (PSB, 2020).

Zero Waste Project

"Zero Waste" is a project that is carried out within The Ministry of Environment and Urban Planning, under the leadership of Emine Erdoğan and auspices of the Presidency of the Republic of Turkey. It is defined as waste management that involves preventing the wastage, using the resources more efficiently, reviewing the reasons for waste formation, preventing or minimising waste formation, and collecting and recovering waste at the source separately (Sıfır Atık, n. d.).

By enabling households to separate their waste, i.e. glass, plastic, metal, and organic and recycling them, it is aimed to earn back annually 42 million trees, reduce greenhouse gas by 585 million kg, reduce water usage by 69 million m3, reduce energy usage by 20 billion kWh, and add approximately 2 billion euros of value (Sıfır Atık, n. d.).

Besides public projects in Turkey, there are also many private initiatives that are supporting sustainable food consumption. Some of these are listed below.

Food Communities and Community Supported Agriculture

Turkey has more than 40 food communities operating to disseminate conscious food consumption and integrate it into food production. Many of them also carry out Community Supported Agricultural Activities. Community Supported Agriculture is defined by Organics International (IFOAM) as "the interdependent partnership between a farm and its community of supporters that establishes a direct link between food production and consumption." In this partnership, consumers usually cover the farm's annual operating expenses by purchasing a share of the harvest and sometimes by helping the farm business. In return, the farm provides them with the healthiest and freshest produce possible (Gıda Toplulukları, n. d.).

Orange Flag

The "Orange Flag", an application that aims to reduce food waste by 70% in hotel and restaurant businesses, was implemented by the "Food Waste Prevention & Awareness Platform" in 2018. Within the scope of this project, in the enterprises given the orange flag, the extent of the waste is analysed and reported, then training and certificates are given to the purchasing, kitchen, and service personnel of the establishment, and the processes of purchasing, production, consumption, sorting, and recycling of food are organised. Finally, the "food bank" was created. Surplus meals are delivered to those in need. Again, within the orange-flagged businesses, visual materials and activities aiming to increase the awareness and knowledge level of reducing waste for customers are included (Orange Flag, n.d.; Food Waste Prevention and Awareness Program, 2019).

Green Directory Sustainable Living Platform

Yeşilist (yesilist.com) describes itself as "Turkey's first green directory and sustainable living platform." It was designed in 2010 as a guide to list firms that produce environmentally friendly, sustainably, and clean. Yeşilist has grown into an organisation that provides both online and

offline services, with the contributions of its followers over time. As of today, there are more than 60 authors, and a guide that includes hundreds of companies and thousands of articles on green/sustainable living. The platform has objectives such as informing consumers about green living, organising training and workshops, providing green consultancy, and meeting their curiosity and needs in all areas of sustainability. On the website, the menu named "food" presents four different categories; "vegetarian and vegan", "eating and drinking", "recipes", and "food agenda". A rich list of contents of the website informs visitors about the sustainable consumption of food and waste management (Yeşilist, n.d.).

Balanced Nutrition Education Project

Balanced Nutrition Education Project is a project prepared and maintained by the Sabri Ülker Foundation since 2011 in cooperation with the Ministry of National Education General Directorate of Basic Education to gain healthy eating habits for primary school age children. Since 2011 the project, which continues in 500 schools in 10 provinces, including Istanbul, Izmir, Aydin, Antalya, Erzurum, Gaziantep, Kayseri, Kahramanmaraş, Sinop, and Trabzon, has included 15 regions in Ankara, Adana, Bursa, Eskişehir, and Rizer. It is carried out in the city centres and 750 schools. Its main message is, "You can eat anything in a balanced way. In this project, where all you have to do is learn how to establish balance, the rules of adequate and balanced nutrition are taught to children with fun under their teachers' guidance. For this purpose, age-appropriate exercises, interactive games, presentations, food cards, and posters are prepared" (Balanced Nutrition, n.d.).

The Platform of Ruhun Doysun Project

It is an experiential marketing practice carried out by Grundig, a consumer electronics and home appliance manufacturer, on the basics of sustainable food consumption. Grundig declares in its manifesto "to give nature the care it deserves, to offer people the quality of life they deserve, and to live without forgetting tomorrow". The platform invites people to share an experience on where the food comes from and where it goes. There are statistics on food, informative publications on natural nutrition and healthy living, expert opinions, news about sustainability worldwide, and practical information for consumers. Besides, people can watch many video contents about many aspects of food and food consumption. Organising the refrigerator and using the oven effectively, storage conditions, using herbs, motivating children to prepare and cook, upcycling food products, etc. (Ruhun Doysun, n.d.).

Fazla Gıda

It is a commercial enterprise that aims to help the economy, society, and the environment by finding a solution to food waste with a technology-based initiative. The initiative was implemented in 2016 by two Turkish entrepreneurs, Olcay Silahlı and Arda Eren, with the idea of contributing to the target of 50% reduction of waste in the food supply chain in line with the "2030 Sustainable Global Development Goals" determined by the United Nations in 2015. Fazla Gıda was selected as one of the nine impact-focused initiatives from around the world for the Acceleration Program, which the United Nations Development Program organised. The initiative took place in the 2017 Geneva Social Good Summit organised by the United Nations Development Program as the only representative from Turkey. On the company's website, it is mentioned that 8% of the carbon emission that causes climate change is caused by food waste.

It is required to bring the contributions of commercial enterprises, public institutions, and non-profit organisations together to handle and consider the issue (Fazla Gıda, n.d.).

Food Rescue Association

Food Rescue Association is working to avoid food waste and share unused food products with others who need food. Food Rescue Association conducts necessary communication and awareness studies for the prevention of food waste and loss in our country, identifies the needs of non-governmental organisations operating in various ways in the field of food waste prevention, and supports them in different areas such as technology, human resources, financial support, process design and improvement, and supports Food Banks in finding continuous food donations and increasing competency and capacity. The association also provides resources to non-governmental organisations across the country by funding. The two main projects of the association are *Defend Your Food* and *Food Truck.*

Defend Your Food aims to improve the communication and advocacy skills of CSOs interested in reducing food loss and waste, capacity building, funding, and cooperation, and establishing better partnerships with the government and other relevant public authorities in participatory decision-making processes. During the project, an advocacy toolkit will be prepared with the gains to be achieved in the draft works and workshops to be organised with NGO representatives, Corporate Firms, and HORECAs (hotels, restaurants, catering), public local administrations, and government representatives. A recommendation report will also be prepared to be submitted to decision-makers with gap analysis studies in the regulations on food waste management and food donation.

The Food Truck project was implemented with the eBay Foundation's support, a part of the Silicon Valley Community Foundation, to support collecting food donations and waste reduction efforts. Excess food in HORECA (out-of-home consumption – hotels, restaurants, and catering) companies is monitored and collected via a truck. The recovered food is delivered to food banks that do not have sufficient logistic facilities, to be given to those in need. By carrying out more than 200 operations in 5 months with the truck, supplied within the scope of the food truck project, 150 tons of food, which are equivalent to 750 thousand Turkish Liras are saved. In this process, the recovered food is delivered to more than 15 thousand households and 60 thousand people in need. (Food Rescue Association, n.d.).

WWOOF Turkey/TaTuTa

WorldWide Opportunities on Organic Farms, Turkey (WWOOF™ Turkey, known as TaTuTa) introduces visitors to organic farmers and growers and promotes cultural and educational experiences on the basis of trust, so that it helps to build a sustainable international community. By doing this, it is expected to provide visitors with practical skills in organic farming, experience and share daily life in rural areas, raise more awareness of organic farming and sustainability issues, and participate in a cultural exchange.

WWOOF further aims to establish networks within the ecological movement, provide in-depth knowledge about agro ecological farming, show ecological methods' viability, and promote cooperation and ethical economy.

WWOOF Turkey/TaTuTa currently lists 74 active WWOOF Hosts. Last year, our Hosts opened their doors to 137 WWOOF visitors (WWOOFers) from all over the world.

Buğday Association

The Buğday movement started officially in 2002 at the Buğday's (Wheat) Vegetarian Cafe, a small market stand, which has been selling whole rice, olive oil, sage, thyme, and sea salt at the Bodrum bazaar since 1990, under the name of Buğday Association for Supporting Ecological Living. Buğday's Vegetarian Cafe is transformed to Basak Naturcafe that prepares its local and seasonal, unrefined food by using olive oil and sea salt. It is also used as centre of exhibitions on nature and ecological life, as well as a library of publications in these fields.

Buğday has provided direct support to the production of products such as bread, grain, ecological vegetables, etc., thereby contributing to the expansion of environmental circulations and encouraging that kind of production. Besides, following the increase in the number of people who seek information related to sustainable production, organic farming, etc., it published the bulletin, The Buğday Magazine. This magazine became the reference point for any field of ecological life, such as organic farming, healthy nutrition, natural healing methods, consumption behaviours, environmental architecture, etc.

Buğday Association has been publishing the Ecological Life Guide since November 2009, after Buğday Magazine, which has been among the publications that pioneered in spreading ecological life information for 11 years. The Ecological Living Guide, which is published every three months, gives clues about the nature-friendly life and appeals to everyone who wants to lighten their footprints on the earth by addressing the agenda's ecological issues. Each issue includes sections such as Natural Medicine, Seasonal Flavors, One of Us, and the Lunar Calendar. Products touted as "ecological" for the parsley page will be tested by experts, and the results are shared with readers. On the agenda pages, topics such as permaculture, natural birth, vegetarianism, and GMO are discussed in line with readers' suggestions. Proposals such as Go, See, Read, Click, and Sign Up, which will be found in every issue, give new ideas about nature-friendly life. Buğday Ecological Living Guide is distributed to Buğday Association members and interest groups.

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CHAPTER 8

Towards a More Sustainable Food Sector - The Need for Documentation, Feedback, and the Role of SCOFI

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The Green Transition, the Food Sector and the Consumer

Food is not only necessary for survival, but has for a long time been known to affect our quality of life, our health, our life expectancy. More recently, it has been acknowledged to have massive effects on the environment. Food production is estimated to account for 30% of global greenhouse emissions and 70% of fresh water use (Willett et al., 2019). The food sector also provides jobs and income for a sizable share of the global population. Because of this multi-facetted importance of the food sector, it has always been under societal scrutiny and has been the aim of several policies, including health, employment, economic growth, rural development and, recently, sustainability.

Demands on the food sector to assure food security, safety and nutrition have been around for a long time. They have more recently been supplemented by demands for low environmental impact, for resilience and for being fair, inclusive and ethical, while still being economically viable (e.g., SAPEA, 2020). This multidimensional set of demands has led to call for a 'green transition' of the food sector, as embodied, for example, in the Green Deal that the European Commission has put forth as a roadmap for the future food system (EC, 2019). The Green deal calls, among other things, for more efficient use of natural resources, enhancement of biodiversity and reduction of pollution.

The green transition of the food sector needs to involve all actors in the sector. Farmers, food manufacturers, food service providers and retailers play central roles, with suppliers of machinery and of ingredients, financial institutions, NGOs and not least policy makers playing additional roles. Consumers, however, play a special role. Consumers, by their choices, are the final judges of food products coming on the market (Grunert, 2011). Consumers can make innovations fail and can delay or even prohibit the adoption of new technologies, even when those are claimed to have advantages in solving problems of feeding the world, as the example of genetic modification of food has shown (e.g., Grunert et al., 2003). Likewise, consumers can accelerate transition processes in the food sector, as was the case when consumer demand for organic food rose dramatically in countries like Denmark in the 1990s. Any plans and policies for a green transition of the food sector therefore need to embrace changes in the pattern of consumers' food-related behaviours. Currently, consumers buy foods that are not good for their health, they buy foods that have a strong environmental footprint, they buy foods produced under ethically problematic conditions, and they waste more food than necessary. The green transition of the food sector needs to include provisions aimed at modifying these patterns of behaviour.

As anybody who has worked in consumer marketing will be able to confirm, changing consumer behaviour is a complex undertaking. Consumers, in their decision, are neither fully autonomous nor fully controlled by external forces. As has been shown in Chapter 1, consumer decisions are governed by a complex network of factors. Not all of these are well understood, but consumer research provides both a set of theories for understanding consumer choices and

a set of tools that can be used for deepening our understanding of any particular behaviour. Consumer research has for many years been used in the context of social marketing, i.e., attempts to use marketing tools to bring about behaviours that are desirable from a societal point of view (Kotler & Lee, 2008).

There has been a good deal of research on the reasons for consumers making choices that are not sustainable (White, Harbib & Hardisty, 2019). The reasons are often grouped into three groups of factors: Those related to the motivation to perform the behaviour, those related to whether consumers have the ability to perform the behaviour, and those related to whether the environment in which the behaviour takes place provides the opportunity to perform the behaviour (Ölander & Thøgersen, 1995). A lack of motivation can mean that people just don't get excited about sustainability, but it can also mean that the sustainability motive is dominated by other motives. Food choice is always governed by multiple motives, and the sustainable alternative may not be bought because it lacks taste, because it is too expensive, or because a consumer's lifestyle implies a need for convenience that is difficult to reconcile with a more mindful approach to food choice. Consumers may lack the ability to distinguish the more from the less sustainable, for example when deciding between an organic product exported from far away and a locally produced, but conventional product, or they may lack the ability to understand and use the labelling provided. Finally, consumers may not even have the opportunity to make sustainable choices, when more sustainable alternatives are simply not available.

When trying to promote sustainable consumer choices, an additional challenge is that the sustainability concept is in itself multi-dimensional, which can introduce additional trade-offs. The most ethical production method may not be economically viable. The product with the least environmental impact may not be the healthiest.

Any policy aiming at the green transition of the food sector needs to involve consumers. Without a change in the pattern of consumer choices, there will be no green transition. However, as has been argued here, changing consumer behaviour is a complex task. As a tool for aiding the development and implementation of behavioural change program, models of change have been developed, like the one proposed by Vermeir et al. (2020) discussed in Chapter 1. Building upon the above mentioned categorizing of factors that drive consumer choice, they usually distinguish between creating the motivation for change, providing the information that can transform the motivation in to a behavioural intention, and turning the intention into actual behaviour. Some models (e.g., the Health Action Approach, Schwarzer & Luszczynska, 2008) additionally distinguish between adopting a new behaviour and maintaining this behaviour and turning it into a daily routine. Routinized and habitual behaviour are common in consumer behaviour and pose special challenges in the context of behaviour change (White et al., 2019).

The previous chapters have given an overview over current attempts to influence food-related consumer behaviour towards more sustainable ways in five European countries. How likely is it that these will actually achieve lasting behavioural changes?

Current Initiatives and the Potential for Behavioural Change

The preceding chapters in this book gave, for five European countries, a good overview of initiatives already ongoing that aim at changing consumers' food-related behaviours. This overview showed a number of main areas in which such initiatives take place.

Generally, the consumer-aimed initiatives were aimed at furthering healthy eating or at reducing food waste. There are considerably less initiatives aimed at furthering choices with low environmental impact or choices based on ethical considerations.

Part of this is due to history. Healthy eating has been a policy aim for decades and many countries have had for many years initiatives trying to promote it. Examples for this are the adoption and promotion of dietary guidelines and the development and implementation of nutrition labelling schemes. The other aspects of sustainability are, with regard to food policy, much newer and awareness of the environmental impact of food choices has been slower to develop. In addition, the criteria for what is an environmentally sustainable food product are less clear. We do not yet have any guidelines for sustainable food choice that are nationally adopted and promoted and considerations on eco-labelling are still in its infancy. The environmental impact of different types of food is not intuitively clear to people and the information is complex and difficult to share in a way adapted to everyday decision-making.

The fact that food waste has received more attention than other aspects of sustainability can be partly related to the fact that there is an easily communicable aim and it is likewise easy to communicate the importance of it. In addition, there is a well-defined KPI, namely the amount of food waste prevented.

In terms of the instruments for behavioural change employed, the predominant tool used is the provision of information. This can take many forms, like information campaigns, online platforms, education and labelling. In initiatives aimed at the reduction of food waste, other instruments employed are price reductions and network facilitation, where contact among owners of surplus food and potential users is facilitated. There are also initiatives trying to further product reformulation towards a healthier nutritional profile.

From the point of view of behavioural change models, most initiatives aimed at changing food-related behaviours towards more sustainable choices and behaviours provide information that is partly aimed at raising motivation, partly at the formation of behavioural intentions. Raising motivation is commonly done by pointing out the negative consequences of current behaviour and the positive consequences of changes in behaviour. The most common instruments are informational campaigns and education. Formation of intentions is supported by pointing out alternative courses of action. This includes diverse matters like nutrition and eco-labelling, concrete advice to reduce food waste, dietary guidelines that take into account environmental impact and food banks for reuse of otherwise wasted food.

There is considerably less attention to turning the intentions into action, even though the gaps between attitudes, intention and behaviour have been widely documented, also in the food area (Vermeir & Verbeke, 2006). In addition to possible conflicting motives or the lack of alternative courses of action, discussed above, a major reason for difficulties of translating intentions to actions in the food area is that many food-related decisions are routinized or habitual. Changing habitual behaviour involves breaking an existing habit, adopting a new behaviour, and then habitualizing this new behaviour (Verplanken & Wood, 2006). In other words, decisions normally not done with a lot of deliberation first need to be lifted out of the realm of habitual behaviour by encouraging deliberation and reflection, such that the behaviour will change, before a new process of habitualization can start. Nudging-type interventions – changes in the choice environment that affect the choices people make without necessarily creating awareness of the change (Thaler & Sunstein, 2008) - have become popular in some areas because they

seem to carry the promise that behaviour can be changed just by appealing to subconscious processes and thus avoiding the painful process of first making a mindless decision mindful, but we have yet to see evidence that nudging interventions, even when they result in short-term behavioural changes, indeed can result in long-term changes of habitualized behaviours. For all we know, nudging-type interventions are unlikely to bring about permanent behaviour change unless they are embedded in a broader change strategy where appealing to subconscious processing is only a part (Grunert & Reisch, 2021)..

Research on habit formation has emphasized the role of stable environments in the formation of habits. Habits thrive best when the environment in which the behaviour occurs does not change. Turning this around implies that chances of breaking habits are higher when environments change. The COVID-19 pandemic has been a disruptive event that did change the environment in which food-related behaviours take place for many people, by restricting mobility, limiting get-togethers, sending kids home and closing restaurants. Recent research shows that even while food-related behaviours have been quite resilient even during the pandemic, many people report having changed, and some of these changes have been towards more mindful food choices, including more attention to both health and environmental matters (Grunert et al., 2021a, b). The learnings from how people coped with the pandemic need to be studied for their implications for bringing about behaviour change in the food area in the post-pandemic era and generally the potential for bringing about behavioural change by making changes in the choice environment, for example by changes in retail and food service formats, is something that needs more attention.

The Need for Documentation and Feedback

Most consumers have, over time, developed basic notions about which foods are more and which are less healthy. This enables them to take health into account when making food-related decision, even when many times other consideration prevail. Also, health is directly related to personal well-being, and therefore people are normally motivated to lead a healthy life, even though this motive may compete with other, often more short-term motives. Sustainability is more complicated. People are only now developing some notions about which foods are more and which are less sustainable, and considerable uncertainty prevails, both because of a lack of information and because of the potential trade-offs between the different dimensions of sustainability.

Eco-labelling of food products has been advocated as a major tool to empower consumers to make sustainable choices (Thøgersen, 2002), and meta-labels have been proposed to overcome the issues related to the multi-dimensionality of sustainability (Torma & Thøgersen, 2021). Once widely available, and if it possible to implement them in a credible and understandable way, consumers will have the means to include sustainability into their product-level decisions.

However, just how a series of healthy food choices not necessarily adds up to a healthy diet, some sustainable food choices will not necessarily add up to a sustainable lifestyle. The transition to a sustainable consumption of foods will be aided if there was a more aggregate benchmark that can be used to map the degree of sustainability in one's food-related behaviours, one that also can be used to give feedback to consumers who have a desire to become more sustainable in their food-related life.

The SCOFI could be such a device. While beset with all the limitations of self-reported measures of behaviour, it provides a relatively simple measure that still covers some of the

multidimensional complexity of sustainability. The SCOFI can be used to map the degree of sustainability of groups of consumers, as has been done in the preceding chapters, but it could also be used to formulate goals and provide feedback to consumers.

As noted above, one-time behavioural change needs to be followed by a process where the new behaviour becomes the new normal. The motivation that caused the original change can dissipate over time. Healthiness, environmental impact and ethical production are credence characteristics of food, i.e., characteristics that consumers cannot see, taste, feel or smell, and that hence depend exclusively on information (Grunert, 2005). Therefore, no positive experience with the food itself can provide reinforcement for the choices made. In analysing the development of behavioural patterns in consumer behaviour over time, Foxall (1992) has developed the Behavioural Perspective Model, trying to incorporate elements of cognitive processing into a model inspired by the principles of operant conditioning. This model includes informational gratification in addition to the hedonic and utilitarian gratifications that result in the reinforcement of behaviours.

Feedback can be a form of informational gratification. Feedback has been widely used in behaviour change attempts in many areas, including healthy eating (Pedersen, Grønhøj & Thøgersen, 2016) and other health behaviours (DiClimente et al., 2001) and sustainable behaviours like energy consumption (Chatzigeorgiou & Andreou, 2021), and it is widely acknowledged that it can contribute to behavioural change. Different forms of feedback can be distinguished, depending on whether the feedback is personal, group-specific or at the population level. SCOFI could be used to provide feedback to consumers and thereby provide an information source of gratification that can contribute to keeping motivation for sustainable choices up.

Feedback is closely related to goal-setting, another tool widely used in behaviour change interventions (Coskun, Zimmerman & Erbug, 2015; Cullen, Baranowski & Smith, 2001). People can formulate goals in response to documentation of behaviour of the population or group they are part of, in response to their own behaviour, or a combination of both. Feedback can involve information about goal attainment as an informational reward. Consumers could formulate goals in terms of the SOFI dimensions and monitor their own progress.

Taking Into Account Heterogeneity

In the previous chapters, we provided some results from applying the SCOFI in five different countries. While the samples are small and most of them are convenience samples and thus not representative for the country in which the data were collected, we can still use the result to compare different consumer groups. This gives us an indication of the sensitivity of the instrument, and at the same time shows us the heterogeneity currently existing when it comes to food-related sustainable behaviours.

Some of the results are not surprising and in line with the literature. Females show generally more sustainable behaviours than males, a result in line with segmentation studies dealing with food and sustainability (see the reviews of Gazdecki et al., 2021, and Verain et al., 2012). People with higher incomes have higer scores than people with lower incomes – also this is in line with previous literature, although it has been argued that the relationship between income and environmental concern is in fact not linear (Park, Choi & Kim, 2011). Some other results are more surprising. People in rural areas generally score higher on the SCOFI than people in urban areas. While people in more rural areas can be expected to be closer to nature, earlier research

has also shown them to be more conservative with regard to some food choices, for example when it comes to buying organic food. Research by Gazdecki et al. (2021) suggests that urban consumers exhibit higher levels of environmental concern, but people in rural areas are more likely to exhibit sustainable behaviours. Also, in several countries the baby boomer generation actually had higher scores than the younger generation. Previous research has concluded that the relationship between age and environmental concern and sustainable behaviours is unclear.

In marketing, segmentation is the tool to deal with heterogeneity in a market, and social marketing has early started to adapt this tool when it comes to attempts to change people's behaviour. However, using segment-specific approaches is difficult to reconcile with the broad information campaign approach that has been typical of many early approaches to influence food-related behaviours from a policy perspective, when segmentation techniques have bee used, they have been relatively simple, like using an a-priori segmentation based on demographic criteria (Kazbare, van Trijp & Eskildsen, 2010). This is in contrast to segmentation studies of sustainable food behaviours in academia, where demographic variables have mostly been used to profile segments, but not as a segmentation base (Verain et al., 2012). Finding differences between consumer groups says nothing about why these differences exist or which different approaches to behavioural change are required. Demographic factors like gender, age, income and place of residence are seldom directly causally related to consumer behaviour, but they may covary with other factors that are, like age with learning, place of residence with opportunities for behaviour, and income with the ability to buy more expensive food. Demographics profiling of segments is useful in order to reach those segments, for example by communication. The segmentation base itself, though, should ideally consist of variables that are causally related to the behaviours that we are interested in.

The findings do show, though, that different consumer groups may require different approaches, and that designing interventions for behavioural change will require adaptations to different target groups. Such target groups could be identified based on the values of the SCOFI dimensions themselves. This type of behavioural segmentation then needs to be complemented by research-based insights into the reason for the differences found. Alternatively, segmentation could be based on measures of variables that are known to be causally related to sustainable behaviours, like endorsement of biospheric values, environmental concern and other socio-cognitive variables.

Conclusions

Changes in the patterns of food-related behaviours need to be an integral part of any strategy aimed at a green transition of the food sector. Promoting more sustainable food choices is a difficult task, though. Part of the difficulty is that sustainability is a complex, multidimensional and abstract concept that is difficult to communicate and not always easility translated into concrete recommendations for decision-making. The other part of the difficulty is related to the problems when trying to change behaviour that is routinized and habitual. The long standing attempts to influence consumer behaviour towards healthier choices, mostly based on providing information, show the difficulties one faces. Future attempts a behavioural change in the food area should be evidence-based and build on an understanding of the complexities of consumer behaviour. The SCOFI index can play a dual role in this context. First, it can be used to map differences in current levels of sustainable food behaviours and thus provide the groundwork for a segment-adapted approach to developing behavioural change programs. Second, it can provide documentation and feedback for consumers, such that consumers themselves can formulate goals for their own behaviour and received feedback on the changes achieved.

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CHAPTER 9

Behaviour Change and Transformative Learning – Ways to More Sustainable Living

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Introduction

This chapter represents a synthesis of the experience, research, and thinking that has enabled the findings described in earlier chapters to be transformed into an interactive lifestyle-change programme, with the ambition of supporting a transition to more sustainable habits of food consumption.

It begins broadly with an overview of how lifestyle develops in each individual and, indeed, in communities. With a focus gradually narrowing from the concept of transformative learning, via an understanding of the habit-changing process, it continues with a condensed summary of practical guidelines for designing a behaviour-change programme, and concludes with a note on the subject of transformative learning.

The Making of a Lifestyle

From being transmitted almost automatically from generation to generation by parents, priests, and teachers, and seldom called into question, European lifestyles have become increasingly fluid for the past century. Previously, largely determined by origins (geography, gender, and social standing), lifestyle is today also dictated by fashion. It is sometimes claimed to reflect year of birth (Generation X, etc.) rather than origins – though this is by no means uncontested; major divides may in fact be between urban and rural cultures (Zonis, 2009), between social classes (still), and to some extent between professional categories.

In the past five or six decades – within living memory – *food culture* has changed so radically that our forebears would find it difficult to recognise our diets. For instance, some regional dishes have become ubiquitous – think pizza or sushi. Fresh fruit and vegetables are available year round. Some foods, for instance chicken, have become incredibly cheap. Perhaps the biggest single change is the shift from home cooking to eating out or buying pre-processed foods.

The changes were driven first by convenience, spurred by the entry of middle-class women into the labour market. A second wave of change was driven by 'fashion': the cultural baseline ("this is how we eat") was augmented or modified to include aspirations to eat like others.

Both these waves continue, primarily promoting large-scale industrial food products. Such propaganda has proved more powerful than exhortations to buy fresh produce and cook at home. The result is a tendency towards ever more unsustainable and unhealthy food habits (Drewnowski & Popkin, 1997).

Transformative Learning in a Lifestyle Context

The Forming of a Lifestyle

As mentioned above, market analysts categorise lifestyles according, *i.a.*, to year of birth or socio-economic standing. All such categorisations build on the assumption that lifestyle 'choices' are indeed hardly choices but are the outcome of external forces. This assumption is the basis for many behaviour-change campaigns, ranging from product marketing to public and private 'nudging'. On the contrary, other campaigns are based on the simplistic view that more and better information will lead to conscious lifestyle changes.

As has been amply demonstrated (e.g., Bujold et al., 2020; Timlin et al., 2020), neither approach is bringing about the necessary shift to more sustainable lifestyles. Rather the opposite: lifestyles, specifically in regard to food culture, are shifting in the direction of *less* sustainability and resilience (Drewnowski & Popkin, 1997). Major factors behind this shift are largely business driven, appealing to perceived convenience and social norms.

Creating Conditions for Transformative Learning

Conscious lifestyle choices are a function of empowerment. A person who believes s/he is powerless experiences a lack of choice: life becomes something that happens, rather like the weather. Delivering an effective lifestyle-change programme thus hinges upon the ability to empower the intended audience: to create or reinforce their belief in their own power to take meaningful action (Benaim et al., 2015; Mehlmann et al., 2010; Oppe et al., 2018).

Steps, Thresholds, and Transformation

'Change is not something you plan. It is something that happens when there is a reasonable balance between disappointment and hope.' - Warren Ziegler

A successful lifestyle-change programme seeks to establish that balance: fuelling disappointment through stories of problems, yes, but only to the extent that they are balanced by stories of the potential for action. Both are necessary. The negative stories need to be calibrated to the self-perceived scope for action of the audience. In practice, this frequently means offering incremental actions so that each person can find their own balance within a collaborative context (Chew, 2020; Gambrell, 2016).

'Change takes place at the growing edge of the comfort zone.' - Danaan Parry

In the centre of our 'comfort zone', there is no disappointment and therefore no incentive to change. However, if we are thrown too far outside, for instance by being confronted with all the life-threatening consequences of soil loss caused by the ways in which our food is produced, then the balance is lacking and we tend to experience paralysis and denial rather than action.

Role of Critical Thinking

Transformation is a key facet of any learning for sustainable development (UNESCO, 2021); see the closing section of this chapter. It often takes flight in grand acts of the imagination, visions spurred by emotions, intuition, and a clarity of purpose or values. Nonetheless, in order

for the learning to become grounded and to affect behaviour and society, it also needs the critical thinking that can discern the true from the false - or from the simply unknown (Biester & Mehlmann, eds., 2020).

Understanding the Behaviour-Change Process

Most educational programmes and information campaigns build upon a linear, mind-focused model:

This is a poor model of reality. We educate and inform, for example about the risks of consuming sugar. If the scientific model were an accurate picture of reality, there would be very little demand for refined sugar in the world today.

In practice, almost the opposite of the linear model seems to be true. Each of us is bombarded with gigantic amounts of information every day, maybe hundreds of thousands times as much as we can actually absorb. Somehow, each of us decides what to hear and what to activate; and educational information is easily offset by the more seductive and better-funded advertising of pre-processed, often addictive food.

A Spiral Relation

One way to understand the behaviour-change process is to view information and action as two elements in a circular or spiral relationship (Benaim et al., 2015). The third main element is attention, or caring, which affects the take-up of information in a reciprocal relationship:

- We take in information about things we care. Someone who decides to investigate home composting will see information about methods and equipment that were previously 'invisible'.
- We care about things we believe we can affect by our own actions. Conversely, if we believe ourselves powerless to influence something, we screen out information about it.

Long-term behaviour change, or change of habitual behaviour, is thus intimately connected with empowerment, which in turn, in its most effective guise, builds upon critical thinking and transformative learning (see closing section of this chapter).

A Process and a Condition

A European meeting of researchers and practitioners (Stockholm, 1996; internal report to the Swedish EPA) noted that empowerment is *both a condition and a process*.

The *condition* is described as a scale from 'victim' (totally disempowered) to 'agent'. It has two aspects: the general and the specific. A person might be generally highly empowered but, for instance, disempowered in relation to climate change; or might be generally disempowered but, for instance, empowered in relation to governing the family's eating habits.

The *process*, too, was found to be dual. On the one hand, the central and essential process is internal: that taking place within each person over time. On the other hand, external processes such as behaviour-change campaigns can promote or hinder the internal process.

Any programme intended to bring about long-term behaviour and lifestyle change, as a part of an external empowerment process, has a number of strategies from which to choose, for instance Informing, Educating, Coaching, Consulting; and 'Nudging', *i.e*. changing the context for the behaviour.

In all cases, the success of the programme will depend on a few important factors (Mehlmann & Pometun, 2013):

- A clear focus or ambition: what is the desired behaviour, and why?
- A caring and respectful attitude: the programme *invites*, does not judge
- Feedback: enabling participants to see and contextualise the effects of their actions

- Possibilities for incremental change combined with continuity: the message/support is delivered over months rather than days or weeks, with a predictable rhythm
- Community: participants are enabled to see themselves as part of a movement
- Legitimacy: the desired behaviour is supported by people and institutions held in respect by the participants

In general, a 'nudging' programme does not meet these criteria. To succeed more than momentarily, it needs to be reinforced by either rewards or 'punishments'.

Place: A Bridge between Person and Planet

The 'individual vs collective responsibility' debate is reminiscent of the 'nature vs nurture' debate at the individual level. The only reasonable answer is that both are important, the weaving between them even more so.

One possible conclusion is that a person-oriented behaviour-change campaign, in order to be fully effective, also needs to engage the collective (Chew, 2020). A potentially powerful linking factor is place. When individuals see both challenges and benefits to their own habitats (neighbourhoods, communities), they are more likely to persevere with their own new habits. When local collective actors, for instance a local authority or business, experience the willingness of individuals to make long-term changes in their own lives, they are increasingly motivated to put in place support mechanisms such as recycling opportunities.

Another aspect of such weaving is the conscious dissemination of new habits from a few individuals to many: theories of *social diffusion* allow the design of campaigns that spread effectively in place and give rise to new norms (Rogers, 2003; AtKisson, 1996).

Lifestyle Components

Awareness of lifestyle elements	**General**	**Food-related examples**	**Interventions: Their nature**	**Interventions: Their focus**
Conscious, transformative	Crisis perception leads to search for radical solutions	Shift in quality perception e.g. including organic, Fair Trade, CSA	Social/societal programmes for behaviour change open for changes beyond the specific	Person
Conscious, (incre)mental	Repair/re-use dwindle; recycling normalised, relies on voluntary use	Many 'try' vegetarian food, increase vegetable intake	Social/societal programmes for specific behaviour change	Person, place
Unreflected	Shifting work-life patterns lead e.g. to normalisation of commuting	Italian food (spaghetti, pizza) added to 'normal' N European diets	Advertising focused on social norms	Person
Unconscious, external influence	Increasing reliance on out-of-household production, e.g. pre-processed food	Frozen fish fingers and frozen chips	Advertising focused on convenience	Person
Unconscious culture *(baseline)*	This is the way it's done in my country, ethnic group, social group... Other identifiers	Fish on Fridays and chips with everything	-	Place

Design Elements of a Behaviour-Change Programme

This summary is a highly condensed version of design guidelines from several sources, notably from the work documented or mentioned in the references, in particular Mehlmann & Pometun (2013).

A Programme Structure

The programme needs to cater for continuity and community by offering:

- A paced delivery with a recognisable rhythm over a period of months
- A means for each participant to experience her/himself as part of a community of practitioners

Focus

The programme designers need to be clear about the behaviours they wish to promote, and why; and to identify and get to know their preferred audience in the light of that focus.

Unless the desired behaviour change is very simple, it is common to divide the focus into a small number (2-5) topic areas. In the case of a focus on food, the topic areas could for example be environment, health, food waste, and ethics.

Choice of Delivery Mechanisms

Increasingly, programmes are delivered *asynchronously* via an app or an interactive web site. This is a choice that offers huge flexibility for the participants and poses interesting challenges for the designer; especially in regard to securing continuity and community within the programme structure.

One solution is to make delivery partly synchronous: that is, all participants who sign up during a given period are treated as a single cohort and encouraged to complete a full cycle of the programme within a given time period.

Online synchronous programmes give less flexibility but greater opportunities to build community, for instance via webinars and forums.

Face-to-face programmes, e.g. evening classes, are still viable when sufficient focus is on a particular place, and can indeed be delivered as *hybrid* programmes with occasional face-to-face meetings interspersed with online events and activities.

Almost independently of the technology choice, the designer can select from a range of *formats* in which to deliver material to participants. For example, text, videos, lectures, quizzes, games, fora, peer support, coaching...

Effective Use of Language

Empowering language - that is, language that is likely to lead the reader or listener to take action - is the subject of a self-study course in itself. Two very basic principles concern tone and knowledge transfer.

Programme developers need to choose and maintain a consistent, non-judgemental *tone*. Use of pronouns should be consistent. The material should be closer to spoken than to written language (no matter whether spoken or written in the programme). The designer needs to avoid unnecessary technical terms/jargon as well as any assumption of superiority.

When it comes to *knowledge transfer,* it's more important to awaken curiosity than to satisfy it. The developer should offer nuggets of information in a non-confrontational way, leaving 'space' for participants to formulate questions/wonder/find out.

Translation and cultural adaptation: As a basis for a preliminary translation, the guidelines for use of empowering language are particularly important, not only for the original author but also for the translator.

Monitoring and Evaluation

Any monitoring system of a behaviour-change programme serves several purposes. The first is the most important.

1. Provide feedback to each participant on their own and, where relevant, group progress.
2. Provide ongoing testing and insights into the relevance and efficacy of programme design features, enabling modifications.
3. Provide evidence (or otherwise) of the efficacy of the programme in relation to its stated objectives.

Such systems rely largely on self-reporting via questionnaires or interviews, especially as regards qualitative parameters such as the attention paid when purchasing food to labels indicative of environmental, social, or health aspects of the products.

With all the recognised deficiencies of self-reporting, it plays an important part in providing feedback to each participant. To be fully effective, it needs to be repeated over time; since personal and cultural biases tend to remain constant, the *difference* between 'before and after'-assessments is a reasonably reliable measurement of the effectiveness of interventions.

User Support

The availability of support for individuals or groups can make a big difference to outcomes. In one (unpublished) study in Sweden in the late 1990s, a lifestyle-change programme delivered to teams of households was reinforced by the addition of specially trained 'empowering' coaches. The number of teams completing the full, rather demanding, course went from about one third to more than 90%.

Such intensive support can be expensive - even if cost effective. There are many less demanding options open to the designer.

Transformation is more than Change

Any educational programme designed to bring about behaviour change needs to consider not only habit-forming processes, as outlined above, nor only the role of encouraging learners to exercise critical thinking in their choice of actions; it needs also to take into account the difference between simple and transformative change.

At a basic level, the difference is easy to grasp; simple change is generally reversible. You may for instance be persuaded to buy only organic, grass-fed beef; and later change your mind. Transformative change, however, builds not on persuasion or coercion, but on a broadening of perspective: the learner comes to see the world differently. In particular, the palette of action options shifts. Once that shift has taken place, going 'back' to a narrower worldview becomes difficult.

In the context of sustainable development, transformative learning is a key facet of education (UNESCO, 2021). While not all learners may experience the shift in worldview, educational programmes need to be designed to encourage and enable transformative learning (Förster et al., 2019). This is not only the challenge but also a major opportunity for a programme promoting the sustainable consumption of food.

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