UNIVERSITÀ DEGLI STUDI DI PADOVA

DEPARTMENT OF POLITICAL SCIENCE, LAW

AND INTERNATIONAL STUDIES

Master's degree in

European and Global Studies

REDUCTION OF FOOD WASTE IN COMPARISON OF ITALY AND TURKEY

BACKGROUND OF THE FOOD WASTE AND HOW TO SOLVE IN COMPARISON OF ITALY AND TURKEY

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A.Y. 2022/2023

ABSTRACT

Italy and Turkey have shown different approaches in their efforts to combat food waste. Italy took significant steps against food waste with the enactment of the "Gadda Law" in 2016. This law includes measures that encourage food donations and prevent waste. Italian businesses gain advantages such as tax reductions and exemptions from waste taxes when they make food donations. Additionally, a budget has been allocated for research on innovative packaging and transit methods to reduce food waste. Italy's legal steps aim to achieve a 20% reduction in food waste by 2020.

In Turkey, the fight against food waste is more focused on creating awareness and education. The "Turkey Food Waste Prevention Project," launched in 2019, investigates the causes and consequences of food waste and aims to create public awareness on this issue. The project plans to establish a national database for measuring and monitoring food waste and aims to develop legal, economic, and technological solutions. Turkey does not yet have as advanced legal regulations as Italy regarding food waste.

Both countries have taken significant steps in reducing food waste, but their approaches differ. Italy intervenes in this problem with legal regulations and economic incentives, while Turkey tries to combat it primarily through awareness and education.

Keywords: Food Waste, Italy, Turkey.

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INTRODUCTION

Food waste is one of the biggest problems the world faces. It can be defined as the loss or spoilage of food during production, processing, distribution, consumption, and waste stages. Food waste has negative effects both environmentally and socially. It threatens sustainable development in terms of food security and nutrition, as well as the conservation of natural resources and combating climate change. Various measures at both individual and institutional levels are necessary to prevent food waste. These measures include researching the causes, dimensions, and consequences of food waste, measuring and monitoring food waste, developing legal, economic, and technological solutions to prevent it, and raising awareness about food waste.

This article compares and evaluates the efforts of Italy and Turkey regarding food waste prevention. Italy is one of the leading countries in Europe in the fight against food waste. In 2016, Italy enacted a law to reduce food waste and successfully reduced it by 20% by 2020. In contrast, Turkey ranks high globally in terms of food waste. Every year, 7.7 million tons of food are discarded in Turkey, leading to an annual economic loss of 555 billion Turkish Lira. There is still no sufficient legal regulation in Turkey to prevent food waste, but awareness about the issue has increased in recent years, with various campaigns, projects, and initiatives being launched. This article evaluates the efforts of Italy and Turkey in preventing food waste in terms of sustainable development. Sustainable development is a concept that aims to provide a quality of life that meets the needs of people today while ensuring that future generations can also meet their needs, encompassing economic, social, and environmental dimensions. Food waste can be seen as both a cause and a consequence of sustainable development. It negatively impacts sustainable development in terms of food security, nutrition, conservation of natural resources, and combating climate change. Conversely, developing policies, strategies, and actions to prevent food waste is necessary for achieving sustainable development. The purpose of this study is to compare and evaluate the efforts of Italy and Turkey in preventing food waste in terms of sustainable development.

CHAPTER ONE

INTERNATIONAL ORGANIZATIONS IN THE FIGHT AGAINST FOOD WASTE

1.1.World Food Programme

From the moment mankind existed, there has been a need for food. Humanity, in order to meet this need, began to produce and eventually established a system, sustaining their lives with desired levels of production. Over time, with the increasing population and developing industrial facilities, access to natural products has become more difficult. Negative developments and the prevalence of underdeveloped societies have led to a situation where people cannot even meet their basic nutritional needs. This has led to the emergence of economic and food crises in our lives. Along with such crises, millions of people have faced the risk of complete destruction of already poor agricultural and food supplies.

Additionally, deficiencies in agricultural and production services, or problems such as unfair distribution, have led to food issues. For example, in the United States, despite the world producing more food than the population needs, hunger remains a significant issue. Millions of people in the country live in households without food security (Hampton, 2007). This situation has worsened with the pandemic. Before COVID-19, approximately 13.7 million households, or 10.5% of all U.S. households, experienced food insecurity at some point in 2019, while during the pandemic, over 35 million Americans were unable to obtain enough food to meet their needs or were uncertain where their next meal would come from (Silva, 2020). While this is the situation in the U.S., conditions are even more dire in countries in Africa and South Asia. In these underdeveloped regions, death rates due to hunger, malnutrition, and poor food policies are increasing every day. More details on this will be provided in the following sections.

In the face of all these adversities, the United Nations World Food Programme (WFP) has become a focal point. The World Food Programme, although criticized by many for its policies, has found its place among respected organizations today. Lynch (2019) wrote in Foreign Affairs

that WFP staff complained of misuse of authority, harassment, and widespread discrimination in the World Food Programme. This has led to increased and continuing discussions. The institution, which is important for designing food policies more actively on the international stage, should have been expected to take on much greater responsibilities considering the political, social, and economic conditions. It is expected to play a constructive and enforcing role in adopting more active participation and governance systems in the continuing global issues of poverty and poor nutrition.

The World Food Programme (WFP) is currently one of the largest and most successful of the United Nations Special Agencies, but has received little examination by international relations experts since the early 1990s (Ross, 2007). The United Nations World Food Programme, being a part of humanitarian aid operations, has attracted the interest of many academics and scientists. The primary problems in food policy and distribution are hunger, poverty, and minimizing malnutrition, with the multiplicity, efficiency, and effectiveness of humanitarian aid operations being crucial in achieving these goals (Cozzolino et al., 2012). In the shadow of all these thoughts, the question of whether the World Food Programme really combats fundamental necessities to protect and strengthen the international community against issues like food, hunger, and malnutrition has been a matter of debate (Finnemore and Sikkink 2001). One of the main focuses of criticism is the interest-oriented programs run by such organizations. The biggest criticism of implementing interest-oriented policies is the risk of falling under the monopoly of Western-centric countries. Ross (2011) in his book, emphasizes that the World Food Programme responds too readily to the calls of corrupt governments and that there is a greater risk of corruption as no one can compete with the UN's World Food Programme. It is necessary to explain and support the applied policy norms and ideas with theories of political science, public administration, and international relations.

"In recent years, innovative research in agriculture and food policies has been attracting attention worldwide. Although political decision-making mechanisms are primarily in the forefront, we can clearly see that the private sector, civil society organizations, and the media also play an active role. Elements that come together for a single purpose can of course show differences in some aspects. At this point, there are significant tasks for both public agencies and civil organizations in many areas, such as more cooperation, better determination of variables, obtaining higher quality data, careful examination of international agreements, and transparent presentation of policies.

The agriculture and food sector can be considered an ideal example for studying the political economy of public policies (Anderson et al., 2013). Looking at the agriculture and food sector from the mid-20th century onwards, we can analyze that most policy developments in the sector have been sudden and transformative, as well as gradually continued. However, several recent international developments have elevated the political economy of agricultural and food policy to the top of the international trade and development agenda (Swinnen, 2010).

Worldwide and for most of history, the agriculture and food sector has been subject to some of the heaviest government interventions (Dorward and Kydd, 2004; Jayne, 2012). These interventions periodically increase in economic importance for the wider society, and the current Covid-19 process is a good example of this. One of the factors that have made the current situation more intractable is the private sector. Private sector organizations play a critical role in shaping the food environments of individuals and populations, and there is currently very limited independent monitoring of private sector actions related to food environments (Sacks et al., 2013). Ideally, the nutritional quality of foods should be measured against nutrition standards or guidelines established to meet the policy goals of a particular country because nutrients of public health concern can vary by country (Centers for Disease Control and Prevention, 2010).

Nutrition policies/programs in public sector environments are important for making healthy foods more accessible (L'Abbe et al., 2013). While food policies are often determined by government, state agencies, civil society organizations, or private sector elements, many public sector environments lack a nutrition policy or program, and very little information has been collected about the nutritional quality of foods in these environments (L'Abbe et al., 2013). At this point, it is necessary to take a broad look at the food policies offered by government agencies. Foods served in service areas such as hospitals, schools, and government agencies can be important in this regard. In conclusion, examining current examples for the implementation, monitoring, and evaluation of food policies and programs in public sector environments will help us obtain healthier forecasts.

We need to look at the framework established by the World Health Organization in 2008, which set out and monitored global strategies related to diet, physical activity, and health. The World Health Organization divides its recommendations for member states into various action areas according to the level and type of activity. These are, in order: National strategic leadership, supportive environments, supportive policies, supportive programs, monitoring, surveillance,

and evaluation (WHO, 2008:6). For the realization of these policies, special emphasis has been placed on monitoring and evaluating activities that promote healthy eating and physical activity, with specific targets for implementation and milestones for not reaching these targets (WHO, 2008:8). It is emphasized that any national plan or strategy developed must include monitoring and evaluation and a budget line. Ideally, a multi-sectoral team should lead the continuation and implementation of the program at the national and sub-national levels. Identifying existing monitoring and evaluation activities and responsible institutions is important. Furthermore, it has been emphasized that appropriate indicators should be determined to monitor and analyze the process, outputs, and outcomes of the programs put forward. Consistent and repetitive implementation of monitoring and evaluation activities for any revision or adjustment in implementation activities is inevitable. Repeating this process within a certain periodic process will also help reach a higher quality level. These rules will help maintain transparency in the process and actually help implement healthier policies and allow people to encounter a healthier food system.

Another example is Canada. Significant steps have been taken in the implementation of food policies with the web-based Healthy School Planner developed jointly by the University of Waterloo and the Joint Consortium for School Health. Healthy Schools, as an internationally recognized and evidence-based approach to creating healthy school communities, involves bringing together the entire school community to share ideas, plan, and take action to help children live a healthy and active life. The goal of this program is to reduce health inequalities among the student population using healthy schools in partnership with school communities (Healthy Schools, 2021).

The United Kingdom's Safe Food Programme is also one of the significant examples that come to mind. This program, providing expert advice, education, and support to everyone who provides food to children, appears as a comprehensive program that includes improving lunch hours and menus, tips on cooking with children, starting food clubs, cooking education for all ages, and healthy recipes. Additionally, this program can be used by schools and food and beverage companies to help evaluate the current evidence of compliance with food-based and nutrient-based standards against recommended minimum evidence.

In the United States, the Department of Agriculture (USDA) through its Food and Nutrition Service (2012) SP34-2012: Child Nutrition Reauthorization 2010: Certification of Compliance with the New Meal Patterns - Certification Tools, Specifications, and Prototype Statement of

Approval, among many other regulations, controls the food sector and ensures that policies are implemented with these regulations. Similarly, the Nutrition Standards Committee for Foods in Schools works on implementing standards, evaluating progress and impact, determining nutrition standards for foods in schools, and working towards a healthier youth. Its mission is to increase food security and reduce hunger by providing food access, a healthy diet, and nutrition education to children and low-income people in a manner that supports American agriculture and inspires public confidence.

The International Obesity Task Force (IOTF) Working Group has developed a set of seven principles (the Sydney Principles) to guide actions on changing food and beverage marketing practices targeting children. The principles state that actions to reduce marketing to children should (Swinburn et al., 2011): 1. support children's rights; 2. provide substantial protection to children; 3. be statutory in nature; 4. take a broad definition of commercial promotions; 5. guarantee commercial-free childhood environments; 6. include cross-border media; 7. policies should be evaluated, monitored, and enforced.

Along with these state-led implementations, an important role is expected from the private sector and civil society organizations. In this direction, some action plans for the private sector regarding food environments have been proposed in the Global Diet and Physical Activity Strategy and the United Nations Political Declaration on Non-Communicable Diseases. Following the decisions made in 2004, the World Health Organization (WHO) Global Diet and Physical Activity Strategy (DPAS) listed the following actions for the private sector (World Health Organization, 2004):

• Limit levels of saturated fats, trans fatty acids, free sugars, and salt in existing products and consider introducing new products with better nutritional value;

• Continue to develop and offer consumers economical, healthy, and nutritious choices;

• Implement responsible marketing practices that support DPAS, particularly for marketing and promotion of foods high in saturated fats, trans fatty acids, free sugars, or salt content to children;

• Provide consumers with adequate and understandable product and nutrition information;

• Publish simple, clear, and consistent food labels and evidence-based health claims that help consumers make informed and healthy choices about the nutritional value of food;

• Promote healthy eating and physical activity in accordance with national guidelines, international standards, and the overall objectives of DPAS; and

• Provide information on food composition to national authorities.

New decisions were made and new recommendations presented in the United Nations (UN) Political Declaration on Non-Communicable Diseases in 2011 (United Nations, 2011). In line with these recommendations, the following conclusions can be drawn: Take measures to implement a set of WHO recommendations to reduce the impact of marketing unhealthy foods and non-alcoholic beverages to children, considering existing national legislation and policies; Consider reformulating products to provide more food products consistent with a healthy diet, including those that are affordable and accessible and comply with relevant nutrition facts and labeling standards, including information on sugars, salts, and fats, as well as considering reducing trans fat content; Promote and create an environment conducive to healthy behaviors among employees; Work to reduce sodium consumption by reducing salt use in the food industry.

As can be seen, over time, there have been positive developments at both the state and private sector levels in terms of delivering healthy food to consumers. However, it is inevitable to increase the number of existing constructive policies and to determine policies that encompass everyone globally rather than locally. In a world where poverty is increasing day by day, slogans about ending poverty by 2050 unfortunately do not seem realistic unless action is taken. It serves no other purpose than a policy of saving today.

1.2.United Nations Food And Agriculture Organizatıon

1.2.1. General Structure And Fınance

The Food and Agriculture Organization of the United Nations (FAO) has 194 member states. Its highest decision-making body is the Conference, where each member state is represented by one person. States with alternate member status can participate in discussions but do not have voting rights. One person cannot represent more than one primary or alternate member. Each member state has only one vote. The Conference can invite other organizations related to its activities, but these organizations do not have voting rights. Representatives of member states meet biennially at the FAO Conference. A majority vote at the regular conference can decide to convene the next year. The Conference can meet extraordinarily upon the request of the Council, the decision of the Director-General, or the request of one-third of the member states.

Except in cases specified in the Founding Treaty, decisions at the Conference are made by a majority vote. The Committee on World Food Security assists the Conference, which also reports to the UN General Assembly and the UN Economic and Social Council. The Conference approves the organization's biennial policy and budget. With a two-thirds majority, the Conference can express opinions on national problems of primary and alternate member states. The Conference can advise any organization within the framework of FAO's objectives. The same general rules apply to regionally held conferences.

The Council, serving as the management board, has 49 members selected by the Conference, each with one vote. The Conference can send independent observers to the Council. The Council can delegate authority to the conference, but not vice versa, except in special cases. Decisions of the Council, except in special cases defined in the Founding Treaty or the internal regulations of the Conference and Council, are also made by a majority vote. Committees assist the Council, which is guided by the Program Committee, Finance Committee, and Legal Committee. Technical matters are handled by committees such as the Food Security Committee, Agriculture Committee, Commodity Problems Committee, Fisheries Committee, and Forestry Committee. Commissions working on issues like food safety and quality, fisheries, and genetic resources also conduct various technical studies. In terms of responsibility, the committees report to the Council, which in turn reports to the Conference.

Commissions can be established by the Conference or Council, and membership is open to all primary and alternate members. These commissions offer advice on regional policies and monitor their implementation. Commissions for cooperation with other supranational organizations can also be established.

The Director-General, elected by the Conference for a four-year term, can serve a maximum of two terms. If the position becomes vacant due to the end of the term, the Conference selects a new Director-General to serve until the next regular Conference meeting. The current Director-General is José Graziano de Silva.

Regional and sub-regional offices are established with the proposal of the Conference and the approval of the Director-General. The Director-General can establish liaison offices through agreements with countries. In the early 1990s, FAO decided to review its structure, resulting in its most significant structural change since its founding. It shifted from a centralized operation

to more active and cost-effective operations. Currently, FAO has 5 regional, 9 sub-regional, and 6 liaison offices.

All member states regularly communicate with the Director-General through publications and correspondence. The Conference, Council, or Director-General can request information or reports from member states.

The organization's relations with the United Nations are governed by Article 57 of the UN Charter. Agreements with the UN are approved by the Conference. Agreements with other organizations or member states must be related to food or agriculture and require a two-thirds majority for approval.

FAO's funding comes from member states. At each Conference, the Director-General presents the budget for approval. Each primary and alternate member pledges to pay their share of the approved budget, with a distinction made for alternate members. Members must pay a certain amount of the budget in the first financial period, which coincides with the conference period. Approval of the budget requires a two-thirds majority. Member organizations not required to pay the budget must contribute financially to cover expenses and cannot vote on budget arrangements. The budget is allocated to technical cooperation programs, cooperation, information transfer, policy setting, operations, general administration, and security.

1.2.2. Purposes, Functions And Activities

The main purpose of the Food and Agriculture Organization (FAO) is to ensure access to sufficient and high-quality food for every human being, thereby fostering a healthy generation.

The introduction of the organization's founding treaty states:

1. States have signed this treaty with the aim of establishing general welfare in line with the following objectives:
2. Enhancing nutritional values and improving living standards of people within their sovereignty.
3. Ensuring and securing the productivity of agricultural and food products.
4. Improving the situation in rural areas.
5. Thus, eradicating hunger in the global world economy.

6. The members of the FAO, referred to as "the Organization" in this treaty, will report to each other the progress made within these objectives.

FAO's Priority Objectives:

Eradication of hunger, food insecurity, and malnutrition, and ensuring food security.

Making agriculture, forestry, and fisheries productive and sustainable.

Reducing agricultural poverty.

Enabling inclusive and efficient agricultural and food systems.

Strengthening livelihoods as a precaution against crises and threats.

In this context, the "World Food Summit" held in 1996 set the goal of halving world hunger by 2015. The Millennium Development Goals, adopted in the Declaration of the United Nations Millennium Summit in September 2000, include the following objectives:

1. Eradicating extreme poverty and hunger,
2. Achieving universal primary education,
3. Promoting gender equality and empowering women,
4. Reducing child mortality,
5. Improving maternal health,
6. Combating HIV/AIDS, malaria, and other diseases,
7. Ensuring environmental sustainability,
8. Developing a global partnership for development.

FAO establishes short and long-term sub-goals in line with these objectives and supports its goals with programs, campaigns, field studies, and technical cooperation programs.

Functions and Activities

The functions of the FAO are specified in Article 2 of Part 1 of its founding treaty. According to this article, FAO's functions are as follows:

1. Conducting scientific, technological, social, and economic research related to nutrition, food, and agriculture.
2. Developing education related to nutrition, food, and agriculture, and disseminating information related to these practices.
3. Conserving natural resources and adapting to advanced agricultural production methods.
4. Improving the marketing and distribution of food and agricultural products.
5. Producing policies related to food security at global and national levels.
6. Creating international policies for agricultural welfare.

Additional functions are listed in Article 3 of Part 1 of the founding treaty. According to this article, the FAO:

Provides technical assistance upon the request of states.

Organizes cooperation among states that are parties to the FAO founding treaty, within the framework of the obligations imposed by the treaty.

Takes necessary and appropriate actions within the objectives outlined in the introduction of the FAO founding treaty.

FAO operates within the framework of the functions listed in its founding treaty. In this regard, FAO's activities are categorized under five main headings:

1. Disseminating information to support the transition to sustainable agriculture: As an information network, FAO gathers, analyzes, and shares information utilizing the expertise of its personnel.
2. Consulting to improve agricultural policies: FAO shares its accumulated knowledge with member states and supports applications in line with its policies, striving to create financing when necessary.
3. Establishing private and public partnerships to support small farmers: As a neutral forum, FAO facilitates the coming together of wealthy and poor nations to generate common understanding, incorporating food industries and non-profit organizations to strengthen the food sector.
4. Applying knowledge on the ground: FAO uses millions of dollars from industrial states, development banks, and other sources in its projects, working with the World Food

Programme and other humanitarian organizations in crisis situations to protect and assist people in rural areas.

5. Minimizing the risks in agriculture, food, and nutrition for countries: FAO develops mechanisms to prevent multifaceted risks and threats, provides information on food and agricultural policies for proper risk management, and coordinates disaster relief plans as needed.

1.2.3. Turkey – FAO Relatıons

Turkey became a member of the FAO in 1948. The organization has a representation in our country, responsible for implementing the targeted projects. Initially a national representation, it transformed into the FAO Subregional Office for Central Asia following the "Host Country Agreement." This subregional office, officially opened in Ankara on July 11, 2007, includes Turkey, Azerbaijan, Turkmenistan, Kyrgyzstan, Uzbekistan, and Tajikistan.

According to the 2007 agreement, the Subregional Office for Central Asia focuses on six priority areas in its scope:

- Food Security
- Agricultural and Rural Development
- Management of Natural Resources, including Forestry and Fisheries
- Agricultural Policies
- Food Safety
- Plant and Animal Genetic Resources

To regulate relations with member countries, the organization's council created regions. Turkey is a member of the European Regional Group and an observer in the Near East Regional Group. Turkey is also a member of several committees within the FAO (Agriculture Committee, Food Security Committee, Fisheries Committee, Forestry Committee).

Turkey places great importance on actively participating in FAO's committee meetings, commissions, and advisory meetings. Prime Minister R. Tayyip Erdogan's attendance and opening speech at the Food Security Summit in 2009 and the 36th FAO Conference exemplify this commitment.

The Ministry of Agriculture, Food and Rural Affairs is the main interlocutor for the organization in Turkey. FAO's technical expertise is mainly transferred to our country through

projects developed under the Technical Cooperation Program (TCP). Currently, 24 projects supported or coordinated by FAO are being implemented in Turkey. The FAO-Turkey partnership program (FTTP) includes 7 regional, 10 multinational, and 7 national projects aimed at Central Asian countries.

Turkey's projects and technical assistance from the FAO can be categorized into nine topics:

- Erosion and poor water use
- Nutritional issues
- Forestry projects
- Prevention of animal diseases
- Improving the status of rural women
- Enhancing efficiency in fisheries and aquaculture activities
- Healthy fertilizer usage
- Agricultural statistics development

The budget allocated for projects in the Subregional Office for Central Asia was distributed as follows:

- 25% for food safety and security
- 35% for natural resource management
- 25% for institutional reforms and national capacity development
- The remaining 15% is distributed among the other three priority areas.

As of 2011, Turkey's contribution to the FAO's general budget was 0.383% of the total budget. However, due to an increase in the national income, the United Nations adjusted this rate to 0.62% from 2012 onwards.

According to 2008 data, a total of 381 experts were trained in agriculture by Turkey. From these data, we can infer that in recent years, Turkey has become a consulted expert in FAO-related issues within its own region. However, this is limited to its own region, as globally we are still far behind developed countries in modern agriculture. There is a significant number of undernourished people in Turkey, and this number is proportionally increasing with the population. Despite these challenges, Turkey has transitioned from a recipient of FAO

assistance to a contributing country. FAO's contributions to Turkey mainly involve project implementation and sharing of technical knowledge.

1.3.Food Waste In Terms Of Sustainable Development

Food waste is a critical issue that has significant implications for sustainable development. The United Nations Sustainable Development Goals (SDGs) emphasize the importance of responsible consumption to minimize food waste (Fraj-Andrés et al., 2022). The management of food waste is crucial for achieving sustainable development goals, as it has environmental, social, and economic impacts (Cahyani et al., 2022). By implementing effective food waste management strategies, it is possible to reduce the environmental impact of food waste and contribute to sustainable development goals (Cahyani et al., 2022). Furthermore, reducing food waste can be an important factor in improving environmental and social sustainability (Ramirez-Bryan et al., 2021). Therefore, addressing food waste is essential for promoting sustainable development and achieving the SDGs.

Food waste not only has environmental implications but also affects economic inequality and relative poverty (Setti et al., 2016). It is estimated that food waste in the U.S. accounts for the same amount of greenhouse gas emissions as 37 million passenger vehicles each year (Swinburne & Sandson, 2019). Additionally, food waste represents 25–35% of the European Municipal Solid Waste (MSW), highlighting the critical need for sustainable waste management practices (Panteli et al., 2020). Thus, addressing food waste is essential for mitigating its environmental impact and promoting sustainable development.

In the context of sustainable development, it is crucial to consider the role of different sectors in addressing food waste. For instance, the study by emphasizes the need for a comprehensive, political approach that unites all food system stakeholders around a shared vision of responsible consumption and sustainable development (Alharbi et al., 2020). This underscores the importance of collaboration and coordinated efforts across various sectors to tackle food waste and promote sustainability.

Consumer behavior also plays a significant role in food waste. Research has shown that consumer behavior has a direct impact on food waste generation (Aktaş et al., 2018). Therefore, understanding consumer attitudes and preferences towards food waste is essential for developing effective interventions to minimize waste and promote sustainable consumption practices. Moreover, informative initiatives have been identified as useful tools to raise

awareness of food waste and encourage responsible consumption (Fraj-Andrés et al., 2022). By influencing consumer behavior and raising awareness, it is possible to reduce food waste and contribute to sustainable development goals.

Food waste has far-reaching implications for sustainable development, encompassing environmental, social, and economic dimensions. Addressing food waste is crucial for achieving the United Nations Sustainable Development Goals and promoting sustainable consumption practices. By implementing effective food waste management strategies, raising awareness, and fostering collaboration across sectors, it is possible to mitigate the impact of food waste and work towards a more sustainable future.

CHAPTER TWO

FOOD WASTE

1.1.The Concept Of Waste

Waste, otherwise known as extravagance, refers to spending or consuming unnecessarily, excessively, or too much, while the complete opposite of this behavior is called miserliness. Waste is considered to be an excess in expenditure, whereas miserliness is not spending or consuming when necessary. Accordingly, just like waste, miserliness is an extreme orientation of humankind (Ural, 1999: 15). Similarly, waste is the opposite of 'temperance and moderation,' which means economy. In short, it is possible to consider 'anything that is not used properly and beneficially' as waste (Güner, 2013: 14).

The concept of waste, known as "Waste" in English, is also the subject of scientific studies worldwide (Ömürgönülşen et al., 2004: 93). When the studies conducted worldwide are examined, it is seen that the concept of waste has various and different meanings. Even in the European Union, where the concept has been studied the most, the subjectivity of the concept, ambiguity in its definition, and the possibility of having double meanings have made it mandatory to evaluate the concept on a case-by-case basis (Pocklington, 2003: 220).

Today, waste has become a common subject of study for many disciplines such as economics, business management, engineering, ecology, biology, health, and the like. The organization of the "International Congress on Balancing Waste and Environment" in France in 1999, with the participation of the United States (USA) and Japan, along with 15 European Union countries, also indicates the global importance of waste (Editoral, 2002: iii).

Waste also signifies the loss of scarce but valuable resources for humankind (Kautto and Melanen, 2004: 1). Darlington (1999) identified waste with the concept of "Muda." Muda, in other words waste, is the expenditure of resources and raw materials without creating any value.

Like waste, "Muda" is a result of human activities. The common point of both concepts is the absence of new added value (Darlington 1999: 26). Waste is also a situation where no economic value can be derived from the product produced or when the product cannot be reused after fulfilling the desired function (Pongracz and Pohjola, 2004: 143).

1.2. Definition And Etymological Structure Of Waste

Although a general definition of waste is made, a review of the related literature reveals that there is no single concept on which there is a consensus (Lebersorger and Schneider, 2011: 1; Ömürgönülşen, 2004: 91; Uzgören, 2006: 1). The reasons for the lack of consensus in the definition are that the phenomenon of waste enters every area of human life, is complex, and involves human behaviors that contain value judgments (Uzgören, 2006: 1).

Looking at the studies conducted worldwide, it is seen that various definitions related to waste are made. For example, according to some authors in England, which is pioneering on the subject, waste is the surplus production, scrap, or leftovers after any production practice, as well as objects that need to be disposed of when spoiled, broken, or worn out (Bates and Phillips, 1999: 580).

The concept of waste, as related to economic life, uses the term to indicate that the consumption of goods and money is unnecessary or superfluous; however, from a broader perspective, waste can be defined as various negative and harmful behaviors, such as inefficient use of scarce resources, insufficient production, low yield from the field, inefficiency, inadequate employment, and depleting or destroying natural resources as raw materials causing their reduction or extinction (Ural, 1999: 15).

In Finland, which is one of the countries with extensive studies on waste, waste is defined as materials or objects that the owner no longer wishes to keep (Kautto and Melanen, 2004: 3). Moreover, waste is not limited to unwanted materials but also includes all kinds of raw materials such as time, energy, food, and water (Metallurgia, 1999: 16).

The world's literature shows that waste is a broad concept. Although expressed differently in every language, it is fundamentally defined in the same terms due to being a human-induced action. Thus, waste represents the unnecessary consumption of various values (such as time, labor) as well as raw materials and natural resources.

1.3. Food Waste And Its Definition

In the last decade, there has been increasing interest in the topic of food waste within the scientific community. Research indicates that food waste contributes to environmental and ethical problems, inefficient resource usage, economic disturbances, and also leads to price increases. Many countries and international organizations are working to prevent food waste in order to address the resulting social injustices, environmental pollution, ecological imbalances, climate changes, and poor resource utilization (Gjerris and Gaiani, 2013: 6).

Although significant research institutions have tackled the issue of preventing food waste, there is currently no consensus on a consistent definition of what food waste actually is (Schneider, 2013: 187). Therefore, when examining both domestic and foreign literature, it becomes evident that there is no universally agreed upon definition of food waste (Lebersorger and Schneider, 2011: 1924; Gjerris and Gaiani, 2013: 6).

While the European Union defined food waste from 1975 to 2000 with directive 2008/98/EC as "Any discarded or to be discarded raw or cooked food substance," the Department for Environment, Food and Rural Affairs (DEFRA), in 1991, added categories (processed, semi-processed, unprocessed) to the definition of food waste. Therefore, like many organizations, the European Union has added new dimensions to the definition.

When considering the general principles in the European Commission's regulation, the terms and conditions in the food law are considered as "food; whether processed, semi-processed, or unprocessed, is any substance or product intended or expected to be reasonably consumed by people" ((EC) No. 178/Section 2/2002, European Commission, 2002: 31/7).

Further on, the same regulation also mentions substances or products that are not considered "food." Accordingly:

- Feed
- Live animals not intended for human consumption
- Pre-harvest plants
- Medicinal products
- Cosmetic products
- Narcotic and psychotropic substances (agents that temporarily affect human perception, mood, consciousness, and behavior)

- Tobacco and tobacco products
- Residues and contaminating substances

These are included in the category of substances not considered "food" within the scope of the regulation ((EC) No. 178/Section 2/2002, European Commission, 2002: 31/7).

To accurately define food waste, it is first necessary to clarify the question, "What is food?" In other words, one of the primary issues encountered in forming a common definition of food waste is related to whether a substance or product is considered food. The problems associated with determining whether a substance or product is considered food can be listed as follows:

Due to the cultural practices and traditions of some countries, certain products are not consumed by people, while in other countries, these same products are consumed. For example, animal lungs, intestines, and other offal (Gjerris and Gaiani, 2013:6-8; Schneider, 2013: 187).

Animals that die or are killed before reaching the market are not considered food. For instance, male calves that are slaughtered because they are not viable for milk production or roosters that are culled because they are not used for egg production are not considered under food waste. These farm animals are not included in food waste since they were not initially intended for human consumption (Schneider, 2013: 187).

Plants left in the field because they are not harvested or collected due to low market prices or failing to meet visual quality standards (such as color, size) are also not seen as food waste (Schneider, 2013: 187).

When reviewing literature, another reason for the lack of consensus on a definition of food waste is the interchangeable use of multiple terms for the concept of waste. For example, terms like kitchen waste, bio waste, food and beverage waste are used interchangeably (Schneider, 2013: 188). Additionally, terms such as food loss (Gustavsson et al., 2011: 2; Kummu et al., 2012: 478), food waste (DEFRA, 2010: 41), post-harvest loss (Hodges et al., 2011:38), kitchen waste (European Commission, 2004: 5), food and beverage waste (The Waste and Resources Action Programme (WRAP), 2010: 12), spoilage, and damage (Lundqvist et al., 2008: 4) are also widely used by authors in the literature. Especially in the international literature, as works on food waste are translated from their original languages into English, various aspects of the definition become evident (Schneider, 2013: 188). In this context, the definition of food waste

can vary depending on what it includes, where the food is produced, and where it is discarded (Gjerris and Gaiani, 2013: 6).

In the United States in the 19th century, Professor Atwater (1895: 16) and his team working on food and nutrition defined food waste as "The disposal of edible food for any reason without being consumed." The disposal of cooked foods such as meat, vegetables, bread, cakes, and pastries without being eaten, as well as the discard of the edible portion before cooking, was considered food waste. Conversely, parts like bones, membranes, offal, and fish scales were excluded from this definition.

According to Atwater (1902: 8), food refers to the products that we personally purchase from the market or as a service at the table. A portion of the purchased food, such as the offal of meats, fishbones, bones, skins, eggshells, and seeds of fruits and vegetables, does not fall under the category of food. However, when calculating food costs, the importance of these parts should be considered. Food items contain varying amounts of non-edible or inedible parts, yet these are called food components. The fact that these parts are not defined as food does not mean they have no nutritional value. For instance, bones contain a significant amount of calcium, minerals, some fats, and proteins, while eggshells are almost entirely mineral, and wheat bran has high fiber and woody material. Seeds and husks of plants possess delightful essences and aromas. Vegetables, fruits, meats, and meat products suitable for human consumption that build tissue or produce energy in the body, as well as all alcoholic and non-alcoholic beverages, are included in the food definition (Atwater, 1895: 16).

Cathcart and Murray (1939: 45), in their study on food waste in England, distinguished the concept of waste into two categories: waste that is trash and waste that is food waste. Trash refers to the inedible parts of animals (such as bones, skin, nerves) and plants (such as seeds), whereas waste refers to the edible parts of food suitable for human consumption but thrown away due to consumer preference, like parts of meat and bread.

Food losses occur in the food supply chain at production, harvest, storage, and processing stages, while food waste arises at the end of the supply chain in retail or final consumption stages due to consumer behavior. Food prepared specifically for human consumption, if used for any non-food purposes (like bioenergy, feed, etc.), is also considered food loss and waste. This approach must differentiate between "planned non-food use" and "unplanned non-food use" (Gustavsson et al., 2011: 2).

The Food and Agriculture Organization of the United Nations (FAO), in its 2011 report on food waste, has categorized food waste into three types:

Preventable food waste: Food that is still usable, consumable by people before being thrown away. For example, whole bread bought but not eaten, meals served on a plate but not consumed, sliced bread, fruits, and packaged foods not past the consumption date being discarded.

Partially preventable food waste: Food waste resulting from different consumption habits. For example, not eating bread crusts, not thoroughly stripping bones and fishbones, peeling apples or potatoes too deeply during preparation.

Inevitable waste: Waste that naturally occurs during cooking and preparation, also known as trash. These inevitably produced wastes are not consumable by people, such as animal bones and skin, eggshells, fish scales, coffee grounds, peels of vegetables and fruits, seeds, etc. (Parfitt et al., 2010: 3073).

In conclusion, as there is no consensus on the concept of waste, there is also no consensus on the definition of food waste, indicating that waste should be evaluated on a case-by-case basis. Therefore, governments, international organizations, and related units define food waste themselves. For example, the United States has introduced provisions that allow states to define food waste differently for their own purposes (California Integrated Waste Management Board, 2009: 12).

Author/Organization	Year	Definition of Food Waste
Food and Agriculture Organization (FAO)	1981	Food waste is the loss, spoilage, or disposal of all food products designated for human consumption. Or the destruction by pests at any stage of the food chain.
FAO	2013	Food waste is the disposal of food suitable for human consumption, typically at the retail and consumption stages, without use.
European Commission	2014	Food waste is the destruction or disposal of products produced for human consumption throughout the food supply

		chain due to economic or aesthetic reasons, or because they are still edible despite being close to the expiration date.
United States Environmental Protection Agency (USEPA)	2014	Food waste includes uneaten or inedible foods. It consists of leftovers created during food preparation in residences, commercial and institutional establishments such as homes, markets, restaurants, bars, factory cafeterias, and company cafeterias.
United States Department of Agriculture (USDA) (Buzby et al. 2014)	2014	Food waste is a subset of food loss. It occurs with the disposal of food that was otherwise in a state suitable for consumption by people, without being eaten.
World Resources Institute (WRI)	2015	Food waste is the disposal, for any reason (such as uneaten food on the plate, losses during cooking, inadequate cooling, etc.), of food obtained post-harvest and suitable for consumption by humans throughout the food supply chain.

1.4.Historical Development Of Food Production-Consumption And Waste

One of the most fundamental activities that humans perform daily to sustain life is eating. It appears that studying the history of this basic need, namely nutrition, is tantamount to examining the history of humanity from various perspectives (Belge, 2013: 33).

To trace the changes in human attitudes and behaviors towards food from the earliest periods to the present day, it is necessary to explore not only the written history but also prehistoric times. However, determining the dietary habits of the earliest humans and defining their food attitudes is a challenge acknowledged by archaeologists due to the perishable nature of foods and the undeveloped state of food preservation methods of that time, preventing information about the foods used from reaching us today (Beardsworth and Keil, 2011: 30). Indirect

evidence shedding light on this issue includes certain animal bones, reptile shells used as food containers, animal scapulae, stomachs, and some artifacts made by humans (Sürücüoğlu and Özçelik, 2007: 1291).

Humanity's progression from being in a state of need for basic daily sustenance in the earliest periods to the current position of modifying, producing, marketing, and distributing animal and plant products worldwide is considered a historical achievement (Laughlin, 1968 Cited by: Beardsworth and Keil, 2011: 35).

The historical development of the food production-consumption concept and food waste throughout human history is discussed below in periods, including ancient times, the Middle Ages, the modern era, and from World War I to the present day.

2.4.1. Ancient Times

In the earliest times, humans struggled to survive and sustain life, later turning eating into an activity of pleasure and taste. The beginning of cooking food with fire and the resulting diversification in diet directed humans beyond merely satisfying hunger to seeking taste and pleasure from their food (Delemen, 2003: 1). It is a recognized fact that this pursuit of pleasure has led a certain class of people in every historical period to waste large amounts of food and drink. A review of the nutrition-related literature reveals that the long span of human history known as the ancient period is divided into the hunting and gathering period and the Neolithic period.

2.4.1.1.Hunting and Gathering Period

The Hunting and Gathering period is a time frame believed to be quite long, starting from the first appearance of humans on Earth and continuing until the transition to the settled period (Neolithic Period) (Beardsworth and Keil, 2011: 34; Akın et al. 2015: 39; Belge, 2013: 33). During this period, it is thought that human diets consisted of both animal and plant sources, with gathering (especially fruit gathering) being more predominant due to its relative ease compared to hunting. As time progressed, the division of labor in life became gender-specific, with women gathering and men hunting. Belge (2013: 35) describes this period as one where "people at that time definitely ate to live." Therefore, it would be more accurate to say that

during this period, the emphasis was on finding, utilizing, preserving food, and preventing its loss rather than on waste.

The Hunting and Gathering period is also characterized as the "first affluent society" due to the minimal labor humans had to invest in obtaining food and consequently having an abundance of leisure time (Salish, 1974 Cited by: Beardsworth and Keil, 2011: 42).

The societal, cultural, and physical development opened by hunting has been a focus of much research. Hunting facilitated the development of human brain structure and effective use (like perfect color vision, sharp sensing, cognitive ability), the emergence of abilities (such as running fast, lifting weights, adapting to different temperatures, and dexterity in hand usage), weapon making, usage, setting traps, communicating with others, and fostering cooperation (development of language) which led to many developments (Beardsworth and Keil, 2011: 35-36).

2.4.1.2.Neolithic Period

Approximately 14,000 years ago, the retreat of glaciers to the poles brought about significant environmental and climatic changes on Earth. With the advent of the Neolithic period, humans began to settle in temperate regions and engage in what we might call primitive agricultural activities (Beardsworth and Keil, 2011: 38).

In later periods, people began to cultivate fruits and vegetables suitable for the climate of their continents and regions. It is known that wheat, barley, legumes, grapes, melons, and almonds were first cultivated on the Asian continent. Olives, grapes, figs, and grains were grown in the Mediterranean region's climate, while potatoes and rubber trees were cultivated in Africa. The American continent is also known for the initial cultivation of corn, beans, pumpkin, and tomato-type vegetables and fruits (Beardsworth and Keil, 2011: 38; Belge, 2013: 36-72).

At the same time, with the domestication of certain animals, the use of these animals in agriculture and transportation (Beardsworth and Keil, 2011: 40) not only influenced the local human food culture and dietary habits but also affected the population density of the continents. For instance, while Africa's population was 100 million in 1650, the population of America, which lacked domesticated animals, was only 13 million (Belge, 2013: 74).

The period also known as the ancient era was a time when some regions of the Earth experienced severe food shortages. People living in these areas could consume daily food

according to their social status (like a warrior, for example). This situation compelled people to share their food with others to survive (Schneider, 2011: 2). Civilizations like the Romans and Greeks, which used very little of their land for cultivation, had a vegetarian diet, and hunting was done for victory and spoils collection (Montanari 1995: 19). Like all eras, there were class distinctions among people. While the Greek upper class used scented clay for washing hands along with bread and water for dinner, the lower class's primary goal was to secure their daily food (Schneider, 2011: 2). Looking at the Germanic and Celtic cultures, labeled as barbarians, they forcibly took forests and civil lands to use for food production. With their staple food of meat, as they began eating wild fruits over time, their menus diversified. During this period, the concern was more about food loss than waste. The most important thing was how to preserve the food found or cultivated healthily. Salt was the most crucial preserving agent developed, and there is information that Emperor Gallienus was able to preserve grapes for three years without spoiling and consume melons during the winter months (Montanari, 1995: 19-25). In ancient times, the Phoenicians, among others, developed trade networks to transport food over long distances. However, there is no information on how much of the transported food was lost during transit or after arrival (Schneider, 2011: 2).

The conquests of the ancient period also brought about an increase in food variety between regions. For instance, the surprisingly successful conquest career of Alexander the Great (356-323 BC), who set out from Macedonia and quickly dominated the Persian Empire, resulted in the transfer of Greek lifestyles to the Middle East through Greek migrants. In return, the riches of the Middle East passed into the hands of Greek society. The prosperity brought by wealth also led to serious levels of food waste in society. For example, the food waste during the wedding of the contemporary ruler Canarus led to devastating inflation in Greece, causing severe social unrest. The gluttony of the citizens and the indifference of the cooks resulted in food and wine waste, which became staple comedy themes at the annual theater festivals of the time (Grainger and Dalby, 2001: 3). In Ancient Greece, the concept of food was seen as a symbol of civilization, and banquets became a part of life. The Bacchanalia Festival, a banquet and entertainment for the God of Wine Bacchus, known for its unlimited extravagance, is still known today. In such a philosophy of life, cooking was also regarded as the most respected profession (Gürsoy, 1995: 11).

The holy scriptures also did not ignore the issue of food waste. For instance, we learn from the Bible that Persian King Xerxes gave a feast lasting 180 days and that King Solomon slaughtered 22,000 cattle for a festival. Historical records mention that Assyrian King Sardanapalus saw

eating as an art, enjoyed magnificent banquets, and held competitions among cooks to strive for better (Gürsoy, 1995: 11).

The situation was not much different during the Roman era. Romans, who acquired a rich cuisine from the conquered lands, increased their respectability in society thanks to their chefs, who were often male slaves from Greece. It is known that Roman emperors provided unlimited food and drink to many people at days-long feasts, victory celebrations, and ceremonies. King Julius Caesar is known to have given a feast for 260,000 people after a victory, and King Lucullus, who turned feasting into a passion, nearly bankrupted the Empire (Gürsoy, 1995: 12).

While the rich led prosperous lives, the Greek and Roman populace lived in poverty, with bread being the primary food item. Some cities, including Rome, distributed free bread. The poor who could not afford to bake their own bread made porridge or polenta (a dish from the Venetian Cuisine made with cornmeal) with their wheat or barley. For many, the diet was limited to bread, foraged vegetables and fruits, and shellfish or snail-like seafood (Grainger and Dalby, 2001: 4).

It is also worth mentioning that the first cookbook in history was written by a Roman. Some of the recipes from the book written by Apicius are still used today in New York's famous Forum and Four Caesars restaurants. Although the name of this cookbook's author is remembered through food, it was food that prepared his tragic end. Driven to bankruptcy after a lavish feast, Apicius found no other solution but to take his own life (Gürsoy, 1995: 12-13).

Since ancient times, Turks have developed various methods to preserve food. For example, they learned to keep meat as preserved food by filling intestines, calling the dried version and its cooked form "sucuk" (Ögel, 1991 cited in Kılıç and Albayrak, 2012: 710). The dried form of yogurt prepared for winter consumption was known as "kurut" (Güler, 2010: 25). "Kak" was the preserved form of dried fruits (Ögel, 1991 cited in Kılıç and Albayrak, 2012: 714). Molasses and vinegar were also commonly used food items in the old Turkish cuisine. "Tarhana," one of the most important soup varieties, has survived from that period to the present day (Güler, 2010: 25).

The Chinese developed their own food preservation methods. For instance, there is evidence that they were able to preserve fish, a staple in their diet, from the 2nd century by filling them with salted rice, weighing them down with heavy stones to remove the air, and fermenting them, which could keep them for two months to three years (Schneider, 2011: 3). During this period,

while rice was the staple in Asia and bread in Europe, the spread of Christianity in Europe also gave bread a sacred significance (Montanari, 1995: 30). After the fall of the Roman Empire, extravagant feasts became less common, and instead, meals were given by monks and priests in monasteries (Gürsoy, 1995: 13). The periods between the 3rd and 6th centuries in Europe were quite dramatic, with famines and epidemics due to rural migrations, wars, armed gangs, and political reasons. While city dwellers could afford white bread and eat fresh meat three times a week, villagers could not even find basic bread (Montanari, 1995: 15-16). In the Middle Ages, there was a considerable difference between classes, and people set their tables according to their status and economic situation in society (Gürsoy, 1995: 15). Aristocrats and lords/barons could give feasts at lavish tables resembling today's buffet services, while serfs could only eat meals like papara (Belge, 2013: 366). Food was used not only for hosting guests but also as a symbol of power and for representation. To combat excessive food waste, in 1356, Florence issued a decree regulating the amount of food per person and how much meat was to be put in dishes. The decoration of foods at feasts was so exaggerated that, for instance, in the 14th century, a chef had to work for four weeks on the ornate decorations for a gala dinner for twenty people (Schneider, 2011: 3). In the same period, King Peter III of Aragon ordered that leftovers from grand feasts (such as sour wine, moldy bread, spoiled fruits, and vegetables) be donated to the poor. Doctors believed that such spoiled food, which they saw as rough for the poor, would not affect them (Montanari, 1995: 106). In the 15th century in the Netherlands, bread placed on the table as a food variety was collected and thrown into trash or soaked and given to the poor after large feasts. To prevent the bread, the main food item, from molding, it was thoroughly baked, and legal measures were taken by governments to preserve the mass and quality of the bread. In the Middle Ages, a middle-income family spent about 80% of their income on food, and the people did their best to avoid wasting food. For example, the name of a widely consumed dish among the people, "Sammelsur," means "sour food," made by adding vinegar to food leftovers (Schneider, 2011: 4).

During this period in Europe, it was observed that the upper class was indulging in excessive food waste. With the advancement of trade, kings, nobility, and the clergy, who became even wealthier, considered good food and drink as indicators of welfare (Gürsoy, 1995: 15).

The banquets presented at invitations were an occasion for the host to display their power, taste, and generosity. Therefore, the dishes served were abundant in both variety and quantity. At the end of each course, the cloth was removed to reveal new dishes. Not only were new varieties of dishes placed on the table, but fruits were also piled high (Belge, 2013: 370).

Materials related to or unrelated to food were used for lavish decorations. In the 17th century, the upper class used "Schauessen," which were plates of food made for show but not for consumption. These foods, which were mixed with coloring dyes and hardeners, included almond paste, sugar, and butter, as well as decorative figures of swans, storks, and other birds, landscapes, and statues of animals. These decorative foods were left on the table for a while before being removed without being tasted. The extent of decorative presentations was such that serving turtle soup in its shell or making elephants out of butter or sculptures reminiscent of Roman feasts were common practices (Belge, 2013: 370; Schneider, 2011: 4).

As dishes traveled from the kitchen to the dining castles, they would cool down and their appearance would deteriorate. There is information that these foods, sent back to the kitchen, were often stolen by hungry staff on the way. In the 18th century, foods used for decoration were replaced by ceramic products. Members of the upper class would dine at restaurants and, as a matter of etiquette, would not finish the food on their plates. With the administration announcing that leftovers could be sold to the poor, the remnants of the upper class's feasts began to be sold at popular stores known to everyone at affordable prices for the lower class. The Vienna Emperor donated the revenue from the sale of food leftovers in the palace to a fund created for the widows and orphans of palace officials, and remaining food waste was taken home by palace staff to survive on for a few days. If there was still food waste, it was given to beggars and hospitals. A similar practice was recorded in Paris, where a pre-selection was made at the Maitre d'Hotel on where the food waste from the palace should be distributed. It is also known that a similar food prevention measure was carried out at the Saxony Palace (Schneider, 2011: 4).

Around the year 1750, the upper class developed a new form of entertainment using the leftovers from their extravagant and dazzling dinners. They filled tables with various foods, and at a given signal, hungry soldiers would run to these tables (with 100 hungry soldiers per table). Society members sitting in their boxes took great pleasure in watching the soldiers fight over the food scraps (Schneider, 2011: 5).

In the pre-industrial United States, most food waste consisted of household food scraps (Thyberg, 2015: 12). Researcher Atwater in 1902 identified the reasons for waste: Americans bought expensive foods that were not particularly nutritious due to a peculiar virtue ethos, heavy foods were provided on tables regardless of life conditions and work styles (such as laborers needing more daily calories than the rich who did not expend much energy), and losses due to

lack of proper knowledge in food preparation, cutting, peeling, and cooking techniques. Towards the end of the period, the development of self-service stores in the US, with an increased variety of products on shelves, long-lasting and colorfully packaged foods, customer satisfaction, and continuous encouragement of the purchasing impulse also opened another door to waste (Schneider, 2011: 6).

From World War I to the present, food shortages have occurred due to wars, trade restrictions and sanctions, and a shortage of human labor in agriculture. During this time, people tried to use their economic resources and food in the most efficient and effective way possible. Ensuring that soldiers were adequately nourished daily for strength and morale was seen as an important issue (Schneider, 2011: 6).

In 1917, the U.S. Food Administration introduced the Clean Plate Club to the public to reduce food imports from abroad, use food most efficiently without waste, and shape the community on the issue of food waste (Wikipedia, Clean Plate Club, 2016).

The Clean Plate Club, a campaign to educate the entire community, especially worked on getting children to finish the food on their plates and make it a habitual behavior. Posters with "Food Will Win the War" were printed, reminding the U.S. population of their responsibility in the face of thousands of hungry people and soldiers in Europe. These posters were also translated into the languages of European immigrants to raise awareness about food waste throughout the community. By the 1930s, the global economic crisis and the outbreak of World War II brought the Clean Plate Club Campaign back to the forefront (Wikipedia, Clean Plate Club, 2016).

Today, there is speculation that this project has led to misunderstandings in society about food consumption. Generations who grew up during the war with the habit of finishing the food on their plates passed this behavior on to subsequent generations. These generations, raised with this message and behavior, encountered rapid weight gain and obesity-related health problems due to economic prosperity worldwide, an abundance of food varieties, and, most importantly, the increase in plate sizes and portion amounts (Schneider, 2011: 6).

During World War I in England, food waste was identified as a problem, and posters with recommendations were prepared. The posters emphasized the importance of food and suggested that food waste, especially from household leftovers, should be used to feed pigs and poultry on farms. In 1915, the Women's Institute (WI) was established with the goal of preventing food

waste and making the most out of leftover food. During World War II, a declaration called "Food Economy Campaign" was issued in England, calling on all families to tighten their belts due to rising global food prices, to avoid food waste, and to use their available food in the best possible way. In 1918, the first rationing of foods like butter, sugar, meat, pork, and margarine was started. This rationing was also applied during the scarcity between 1940 and 1954 (The Boston Globe Associated Press, 2008; Alleyne, 2007; WI, 2016).

It can be said that the foundation of current waste prevention campaigns conducted by governments and various non-governmental organizations is inspired by the practices of World War II (Gray, 2009; BBC News, 2009).

By the mid-20th century, consumers were able to produce their daily food needs at home. Industrialization and the associated rapid production led to growing economies worldwide, creating a new shopping culture and changing attitudes towards eating and drinking. Grocery stores gave way to chain stores. Where once consumers could buy the food they wanted in the amounts they desired, they now found standardized quantities of pre-packaged products (Montanari, 1995: 175-176). Today in the USA, the increase in food variety, along with the cheapness and abundance of prices, has significantly increased the amount of food waste (Bloom, 2010: 66). The newly established economic system's focus on consumption has replaced the frugality principle previously instilled in consumers with a notion of must-buy and must-consume to keep the rapidly growing economies afloat (Schneider, 2011: 8).

As a result, a new generation has emerged that finds and consumes prepared foods easily and in excessive amounts, does not question the food they eat, moves away from the culture of eating meals with family, thinks individually, consumes fast food quickly, and has a quite high obesity rate.

2.5. Factors Influencing Food Waste

With the economic development of countries, an increase in wastage in every field is being observed, which also manifests in the formation of food waste. There are many factors contributing to food waste, originating from residential, institutional, and commercial sectors. In developed countries, especially in the USA, as the volume, usability, and accessibility of food increase (Rozin, 2005: 108), the quantity of food consumption, the rate of obesity, and consequently, the amount of food waste also increase (Blair and Sobal, 2006: 64). While we

waste food due to our personal preferences, it is thought that cultural, geographical, political, and economic factors also play a role in the background (Pearson et al., 2013: 120).

2.5.1. Modern Food Systems Factor

By definition, the modern food system is a set of interconnected, continuous, and variable relationships between the development, production, and distribution of nutrients, which are the basic needs of the human population (Beardsworth and Keil, 2011: 60). In other words, the modern food system is the entire chain that ensures the production, development, collection, processing, distribution, marketing, and ultimately, delivery of food to the consumer's table.

Beginning in the 18th century and gaining momentum in the 19th century, today's modern food systems, influenced by technological developments and science, have reached a dimension that is quite different from traditional food systems, making the whole world dependent on them (Beardsworth and Keil, 2011: 63).

The rates of globalization, urbanization, industrialization, and economic growth of countries affect the modern food systems in those countries. As a natural consequence, the eating habits and preferences of the society, the types of food consumed, and the amounts of food waste change (Popkin, 1999: 1910; Hawkes, 2006: 2). These changes can vary from person to person, society to society, and year to year (Thyberg and Tonjes, 2016: 115).

2.5.1.1.Industrialization Factor

Considered as one of the significant milestones in human history, the Industrial Revolution in the 19th century impacted every field, including the production, processing, distribution, and consumption of food.

In the pioneer countries of industrialization, such as the United Kingdom and France, societal changes began towards the end of the 19th century, transitioning from a grain-based diet to one rich in proteins and fats. In countries like Italy and Spain, this shift extended into the 20th century. The industrialization in the food industry has partially overcome barriers, feeding Europe's hungry population and mitigating seasonal variations in food availability (Montanari, 1995: 169-170).

Thanks to technological and scientific advancements allowing mass production, the gap between the rate of food production and population growth has been closed, technically overcoming the issue of "scarcity". The famines currently faced are thought to stem entirely from political structures (Beardsworth and Keil, 2011: 75) (Belge, 2013: 8).

With the advancement of industrialization, small producers have given way to larger ones. Large producers, significantly influential in the food sector, have played an important role in changing societal eating habits. Particularly through extensive advertising networks created via media, many foods traditionally eaten on special occasions (like holiday meals) have lost their "meaning" and "cultural uniqueness", transitioning towards a uniform global dietary pattern (Montanari, 1995: 170-171).

The effects of industrialization on food production can be summarized as follows:

- Alongside traditional food preservation methods like salting, drying, and pickling, chemical substances have also been introduced.
- Natural fertilizers have been replaced by chemical fertilizers.
- Through the development of thin plating and the work of Nicolas Appert and Louis Pasteur, canning has been developed to minimize health risks.
- Advancements in temperature control systems have solved seasonal issues, especially in dairy products through pasteurization, extending their shelf life.
- Due to developments in road, rail, and sea transport, especially with temperature control systems, foods can easily be transported worldwide (Beardsworth and Keil, 2011: 66; Montanari, 1995: 167-168).

The modern food industry, with its technological advancements, has created a food profile quite different from previous generations. Accordingly:

Mass production has led to an excess of food.

Desired foods are easily accessible without significant labor.

There is an increase in food variety and continuous promotion (like advertising) for purchase.

New, high-calorie "superfoods" (like margarine, chocolate) are produced in large quantities thanks to technology (Rozin, 2005: 108).

In industrialized food systems, consumers often purchase meat products pre-cut, sectioned, and packaged. For example, chicken and beef are sold in various cuts in markets and butchers. The waste generated during the consumption of these foods is attributed to the consumer, while waste from the production or processing of these foods is attributed to the food industry (Thyberg and Tonjes, 2016: 115). Therefore, waste can originate from both consumers and businesses.

From another perspective, the industrialization of food systems has distanced people from food production and preparation. Handmade foods have been replaced by frozen or packaged foods. In areas with a food industry presence, a large quantity of food is processed and released into the market as frozen food or canned goods. Sobal (1999) notes that especially in developed countries, the frequency of dining out and consuming packaged foods at home has increased (Cited in: Thyberg, 2015: 19). One reason for this is thought to be the inclusion of women in the workforce. Selecting, purchasing, and preparing the ingredients for a meal requires time and effort. Those who consume traditionally handmade meals value their food more due to the effort put into its preparation. In contrast, those consuming ready-made foods or dining out are more likely to waste food easily. Given the rapid shift in food consumption towards restaurants and supermarkets, an increase in the amount of food waste and variations in the type of waste seems inevitable (Thyberg and Tonjes, 2016: 115).

2.5.1.2.Economic Growth Factor

When looking at the annual amount of food waste worldwide from the perspective of countries' economic development, it is evident that there is significant waste at the consumer level in middle and high-income countries, while in low-income countries, there is little waste at the consumer level, but significant food losses occur during production (Nahman and Lange, 2013: 2496). In Europe and North America, the per capita food waste at the consumer level is 95-115 kg/year, whereas in Sub-Saharan Africa, South and Southeast Asia, it is around 6-11 kg/year (Gustavsson et al., 2011: 5). This disparity in per capita waste can be attributed to the economic development of countries.

There are various reasons for high amounts of food waste in developed countries, including:

- Economic prosperity brought by income growth.
- Increased quantity and diversity of food consumption.
- Increased habit of eating out.
- Diversification and increase in shopping channels.
- Increase in urbanization rate.
- Consumers distancing from nature and agriculture.

Particularly promotional activities within the marketing mix (Dölekoğlu et al., 2014a: 172).

Constant encouragement of food consumption through mass media (advertisements).

- Easy access to food.
- Low food prices.
- Existence of a wasteful generation that doesn't see, know, or therefore appreciate the value of food from farm to table.

The regions with the most food waste are North America and Oceania, which are part of strong economies, where approximately 42% of produced foods are wasted (Lipinski et al., 2013: 9). In the USA, 32-40% of produced food is wasted at the consumer level (Buzby et al., 2014: 11). Europe follows these countries in food waste.

Despite high levels of food waste in European Union member countries, about 79 million people live below the poverty line due to reasons like income inequality, with 16 million receiving food aid from charities. The annual food waste in the EU is 89 million tons (179 kg per person), and without any measures, it is estimated to increase by 40% to 126 million tons by 2020 (EESC, 2014). According to the European Commission's 2010 data, 42% of food waste occurs in households, 39% in the food industry, 14% in restaurants, and 5% during distribution (EC, 2010: 13).

In the UK, 8.3 million tons of food are thrown away annually, with about 4.2 million tons of this waste still being edible (WRAP, 2009: 80). A study in Greece with 231 households found that despite positive attitudes towards preventing food waste (like creating shopping lists and focusing on fresh food), about 40% of edible and unexpired food was wasted due to ignoring expiration dates on labels (Abeliotis et al., 2014: 237). The Dutch Ministry of Agriculture

reported that citizens throw away 8-11% of their purchased food, amounting to 43-60 kg per person, costing approximately 270-400 euros annually (Parfitt et al., 2010: 3074).

In low-income countries, especially in Africa, outdated harvesting methods, poor storage and transportation conditions, and the application of backward technology due to the low economic level are the main reasons for food loss. While 76% of the total waste in terms of energy value occurs at this stage, food waste at the consumer level is only about 5% (Gustavsson et al., 2011: 1). Post-harvest losses not only increase hunger but also waste costly inputs like fertilizer, labor, and water. The World Bank's 2011 study found that the annual value of post-harvest losses of cereals, a staple food in Africa, is about $4 billion, equivalent to the amount paid for imported cereals (WB, 2011, xiii). Similarly, in South Africa, the total cost of food losses throughout the supply chain is estimated to be about $7.7 billion annually, equivalent to 2.1% of the country's gross domestic product (Nahman et al., 2012: 2147).

When food waste is assessed based on individuals' economic status, a direct correlation between income level and food consumption habits is observed (Pingali and Khwaja, 2004: 2). Studies have shown that high-income families reduce their consumption of starchy and carbohydrate-rich foods (Bennet, 1941: 56), while increasing their consumption of meat, fish, dairy, and poultry (Parfitt et al., 2010: 3068). The consumption of bread, considered a staple food for humanity, has been rapidly declining in developed countries. The abundance of food variety in these countries, bread no longer being the main staple, the decline in quality and taste of industrially produced bread, and concerns about weight gain are the primary reasons for this decline (Belge, 2013: 43).

As a result of the shift from Asian-style to Western-style diets, there has been a global trend towards the consumption of ready-to-eat foods, as well as foods rich in protein and energy. Consequently, rice consumption among individuals is decreasing (Pingali and Khwaja, 2004: 1). The main characteristics of products used in Western diets are that they have a short shelf life, are delicate and prone to spoilage, are effortless and quick to prepare, easily accessible, and heavily laden with energy-giving substances and sweeteners. This predisposes to food waste, leading to the degradation of natural resources.

Rathje and Murphy (2001) in their book "Garbology: Our Dirty Love Affair with Trash" observed that the nature of the waste produced reflects the demographic characteristics and eating habits of a society. Cultures with a variety of foods on their tables tend to waste more

food, while cultures with repetitive and less diverse diets waste less (Cited in: Thyberg and Tonjes, 2016: 115). For example, Mexican families use easily available ingredients in their meals, their diet is repetitive and less varied. In America, areas with Mexican families have been observed to produce less food waste (Thyberg and Tonjes, 2016: 115).

People with a good economic status spend a smaller portion of their total income on food (Pearson et al., 2013: 124). Individuals with better economic status, who can access their desired food at any time, do not value food the same way as those with poorer economic status. This difference in valuation leads to wastage. Gustavsson (2011: v) has stated that the less value food has in someone's eyes, the more careless their attitude towards it, resulting in a higher amount of household waste.

2.5.1.3.Urbanization Factor

With the advent of settled life and the establishment of cities in history, for the first time, a distance emerged between food production and consumers. The construction of cities not based on agriculture and the long working hours have caused this distance to form, meaning people are unable to grow their daily food needs themselves (Beardsworth and Keil, 2011: 63).

Today, with urbanization and even metropolitanization, the distance between consumers and food products has further widened (Parfitt et al., 2010: 3067). People who used to consume food products they grew in their own gardens and fields have completely changed their eating habits and attitudes with urbanization, which has also changed the amounts of food waste. Additionally, the food supply chain, which intermediates between the individual and the product, offers a wide variety of products to the consumer, inevitably binding them to itself. Any disruption in the food chain leads to waste (Thyberg and Tonjes, 2016: 116). For instance, the use of large amounts of chemicals for higher yield of fruits and vegetables grown by the farmer, as well as during their growth, will lead to taste loss and thus, their disposal without being consumed, leading to food waste.

The nutrition system in Europe has completely transformed into an urban dietary style. It is thought that this is influenced by the tendency of rural populations to imitate urban lifestyles. However, today's dissatisfaction with the uniform urban diet has given way to a longing for "village life", "natural living", "rediscovery of life outside the city", etc. (Montanari, 1995: 171). The current trend of city dwellers seeking natural living, wanting more green spaces in living

areas, and paying attention to consuming village-style organic foods are some of the most evident examples of this trend.

Rapid urbanization is happening worldwide. Consequently, the population engaged in agriculture and farming is decreasing. The city population not witnessing the labor involved in growing products, not having internalized it, and not being sufficiently informed about products, affects their perspective on food and consequently the amount of food waste (Parfitt et al., 2010: 3067).

City markets may contain a wide variety of products from other regions besides local produce. Therefore, the eating habits of rural dwellers differ from those of urban residents. Lebersorger and Schneider (2011: 1930) found in a study in Austria that the amount of food waste in urban populations is significantly higher compared to rural populations.

2.5.1.4.Globalization Factor

Globalization, meaning connection, facilitates the integration of locally, regionally, and nationally grown products with the world. With changes in the food system, local and regional products have started to become global foods with desired qualities such as type, quantity, cost, appeal, etc. (Hawkes, 2006: 2).

Traditional local eating habits passed down through generations have changed with globalization, giving rise to new and common eating habits (like fast food) worldwide (Pingali and Khwaja, 2004: 5). Consumers' ability to obtain processed imported products in addition to local plant and animal products from shopping stores is a result of globalization (Pingali and Khwaja, 2004: 17). Foods produced are now traveling international distances (Pretty et al., 2005: 2). Supermarkets, a result of the production and distribution channels of modern food systems, are the biggest indicators of the scale the system has reached in terms of quality and reliability (Beardsworth and Keil, 2011: 59). A product grown in one climate of the world is entering the market in a very different climate and is offered to consumers. Thus, consumers are turning to supermarkets that sell a variety of products instead of local markets (Thyberg and Tonjes, 2016: 117). Globalization is continuously encouraging dietary changes through communication tools (internet, advertisements). The likelihood of a consumer who cannot establish a connection with the products reaching their table to easily waste food, exhibit wasteful behavior, and turn it into a habit is quite high.

2.5.2. Cultural Factor

Although the act of eating food to meet daily energy needs may seem at first glance to be merely satisfying a biological necessity, upon closer examination, it becomes apparent that eating is also a cultural act. One of the fundamental characteristics that distinguish humans from other beings is that their responses to stimuli (like eating when hungry) are shaped within the context of cultural determinants (Beşirli, 2010:159).

Anthropologists view the act of eating entirely through the lens of culture. According to them:

a) Culture is a determining factor in what foods a person will consume.

b) Culture is learned. Eating habits acquired at a young age are not easily changed after being learned.

c) Foods are a complementary element of culture (Tezcan, 2000:1).

Within the scope of cultural determinants, each society has its own unique cultural history and tangible daily life, which over time has developed "structures of feeling" and even "structures of sensation" (Belge, 2013: 19). People in different cultures can react differently to the same stimuli. Not only aspects like the selection, preparation, cooking, presentation, style of eating, number of meals, timing, and portion sizes are culturally determined (Beşirli, 2012: 125; Tezcan, 2000:1), but also the traditions, beliefs, and habits that are part of culture influence the creation of food waste.

A person born in a society grows up hearing and getting used to the language of that society from infancy, learning and using it. Similarly, they encounter, get used to, and naturally accept and adopt the taste structures that have formed in that society over time (Belge, 2013: 20).

The development of an individual's palate is entirely shaped within the context of cultural determinants (Beşirli, 2012: 146). Research has shown that the amniotic fluid during prenatal development and breastfeeding after birth significantly influence children's food preferences in later life (Saad, 2012: 57). Additionally, the mother's diet during infancy, followed by child-rearing practices and adult behavior models, take place within the cultural atmosphere as part of socialization (Beşirli, 2012:147).

"Taste", which responds to our physical need and is among the primary flavors, along with "sugar" found abundantly in breast milk, are the first tastes encountered, and the rest of the flavors are learned in the "cultural environment". Accordingly, what is considered "tasty" or "tasteless" to individuals is entirely shaped around historical and social factors (Belge, 2013: 25).

Taste preferences can vary from person to person. What may be delicious to one may not be pleasant to another. Like other senses, culture plays an active role in the sense of taste. McDonald's prepares suitable menus in different countries to cater to varying taste perceptions. For example, they offer seaweed soup in Japan, curry burgers in India, and meatball burgers in Turkey (Odabaşı, 2016: 141).

Culture plays a role in shaping people's eating habits, attitudes towards food, and dietary patterns (Rozin, 2005: 108), and it also plays a significant role in the creation of food waste (Sobal, 1998: 385). For example, in Western culture, the Newfoundland folklore includes the character of "Crust Man", a big ugly man who goes from house to house to ensure children eat their bread crusts. He takes away children who don't finish their crusts at night (Beardsworth and Keil, 2011: 96). In Turkey, from a very young age, children are taught that bread is a great blessing, it should not be placed on the ground, stepped on, or thrown away, and that blessings are hidden in its crumbs (Beşirli, 2012: 147).

Food culture, while being a learned value, is formed over time, blending with a society's traditions and beliefs (Beşirli, 2012: 134). In determining whether foods are "edible" or "inedible" in a society, it is the cultural determinants, rather than the metabolic benefits of the food (such as carbohydrates, fats, proteins, vitamins, or minerals), that play a crucial role (Beardsworth and Keil, 2011: 90; Belge, 2013: 34). For instance, foods with high nutritional value (like insects and larvae, which are sources of protein) may not be considered edible, while certain foods with questionable nutritional value or potential dangers (such as oysters and mussels known to contain dangerous biotoxins) are considered edible. In the USA and the UK, for example, horses, goats, and dogs are not considered edible mammals, while in other countries, these animals are consumed (Beardsworth and Keil, 2011: 90). Insects, cats, dogs, and especially reptiles in Chinese cuisine, as well as snails and frog legs in French cuisine, are not considered food in many societies (Belge, 2013: 34; Tezcan, 2000: 2).

Religious systems, as influential in every aspect of people's lives, play a significant role in the formation of eating cultures. Accordingly:

a) Religions influence which foods individuals can consume. In Islam, blood and alcohol are prohibited, as are pork and carrion.

Judaism prohibits the consumption of blood, mixing meat and dairy, and only certain parts of cloven-hoofed, cud-chewing animals are permitted.

Hinduism forbids the killing and consumption of any animal.

Jainism is based on non-violence and not causing harm. Its adherents are vegetarian and avoid even root vegetables (to prevent plant destruction).

b) Religions influence what individuals can eat on specific days of the year. Catholics abstain from meat on Fridays.

The Greek Orthodox Church observes fasting on Wednesdays and Fridays. Jews do not cook on Saturdays.

c) Religions determine when food can be eaten during the day, especially during fasting periods.

In Islam, eating is not permitted from dawn until sunset.

Buddhist monks do not eat after noon (Tezcan, 2000: 113-114).

The influence of religious systems and social trends on the formation of a society's food culture is significant, as are the "edible" and "inedible" rules they establish, which are thought to be decisive factors in the creation of food waste (Schneider, 2011: 1).

Foods also acquire symbolic meanings within their societies (Rozin, 2005: 108). A host, through a feast, essentially displays their power, taste, skill, and generosity to guests. In every society, feasts given by rulers are seen as a display of power, with the abundance and variety of food being directly proportional to the ruler's power.

The socio-economic status of countries, agricultural and health policies (Beşirli, 2012:129), shopping practices, and the sizes of stores and grocers are factors influencing food waste (Jorissen et al., 2015: 2698). Intercultural differences in daily food practices can also affect the creation of food waste. For example, the frequency of shopping trips, the quantities and patterns

of purchased foods, the amounts stored at home, and storage methods and conditions can vary (Neff et al., 2015: 10). In developing countries, people tend to buy less food and only as much as needed daily compared to developed countries (Thyberg and Tonjes, 2016: 117).

In countries with a deep food culture like France and Italy, the development of recipes and cooking techniques has occurred over a long period (Gatley et al., 2014: 71), and the climate and the produce grown in response to it play a fundamental role in the formation of food culture. For instance, in Turkey, there is a preference for fish in the north, vegetables in the west, and meat in the east, exemplifying this phenomenon. Additionally, Saad (2012: 58-59) notes that many kitchen traditions have been shaped by regional climatic conditions. For example, there is a positive correlation between the amount of spice used in dishes and the climate of the region, especially noticeable in meat dishes. In warmer regions, spices are used to combat food pathogens, as warmer climates tend to have a greater variety and faster spread of pathogens.

2.5.3. Socio-Demographic Factors

Consumer preferences are influenced by various factors such as history, social environment, race, religion, age, geography, marital status, and levels of education and knowledge. Socio-demographic characteristics also play a significant role in the amount of food waste generated. Recent studies confirm a relationship between food waste and socio-demographic factors. For instance, it's seen that age is a decisive factor in food waste generation, with younger people wasting more than the elderly. In Australia, it was found that people aged 18-24 waste approximately 30 AUD worth of fresh food daily, which is 38% more than those over 70. In the UK, older people waste less food than the rest of the population, likely due to frugality during World War II.

The formation and size of a family are also determining factors in waste. Single individuals and families with children waste more food than childless couples. For example, it's noted that in Swedish families, food waste often results from children not finishing their meals. Larger families have a lower per capita food waste than smaller ones. A report by WRAP (2007) mentioned that young, full-time working individuals aged 16-35 waste 42% of food, families with children under 16 waste 45%, and those living in affluent neighborhoods waste 35%.

When looking at gender differences, it was found that single women tend to waste more food than men. Income level also affects the amount of food waste. Earlier studies, such as Atwater's (1895) research in Saxony, showed that low-income families had almost no food waste due to poverty. In contrast, wealthy neighborhoods in New York showed significant food waste, leading to high economic losses. Cathcart and Murray's 1939 study in the UK found that food waste mainly consisted of meat, vegetables, and bread, and the amount of waste correlated with purchasing power. Additionally, rural families often fed their food waste to animals, making it hard to accurately measure waste levels.

Cox and Downing (2007: 2) in their study found that as income levels increase, so does the rate of food waste. Parfitt et al. (2010: 3075) observed that with the decrease in food product prices, particularly in developed countries and among families with high income levels, a generation displaying wasteful behavior has emerged. Similarly, another study in Australia found that as family income levels rise, the amount of food waste increases (Baker et al., 2009: 8). However, some studies have found no correlation between income level and waste (Wenlock et al., 1980: 53; Koivupuro et al., 2012: 189).

2.5.4. Consumer Behavior Factor

Although cultural, political, economic, geographical, socio-demographic, and similar factors are the primary causes of food waste, waste that arises entirely from personal choices and attitudes is also possible (Thyberg and Tonjes: 2016: 118). Although food losses occur at stages of production, distribution, and retail, Buzby and others (2014: 22) concluded in their study that in the U.S., the majority of food waste occurs at the consumer stage (31%-40%).

When individuals' daily lives are examined on an action basis, dozens of wasteful actions are evident. Thus, when food waste is considered within the context of consumer behaviors, it becomes clear that waste is not the result of a single action but a combination of multiple behaviors. For example, in households where food waste is most prevalent: waste can occur at any stage of the consumption process, such as shopping, planning, storing, preparing, and personal preferences. To prevent this, individuals storing and keeping fresh products bought in large quantities at regular intervals under appropriate conditions will extend the shelf life of food, thereby reducing waste (Quested et al., 2013: 4). It is believed that the repetition of incorrect practices related to daily food consumption at home inadvertently creates waste habits in people.

The Waste and Resources Action Programme (WRAP, 2007: 6) in its survey found that participants, to varying degrees, engaged in waste. According to this, 30% of households waste food at a “high level”, 27% at a “medium level”, and 43% at a “low level”. To many, behaviors leading to waste are seen as ordinary and routine, hence not given much thought. Moreover, many people are not fully aware of the amount of food waste they generate daily. Additionally, the belief that waste generation in daily chores is inevitable or that it is a normal behavior, coupled with the fact that waste in homes is not visible from the outside, prevents a proper understanding of the global food waste problem (Graham-Rowe et al., 2014: 21). Individuals with this mindset do not feel any responsibility towards reducing waste.

In middle and high-income countries, it is known that consumers discard many edible foods, not recognizing this as food waste. The abundance, low cost, and easy accessibility of food in these countries are thought to trigger a tendency to waste among consumers (Gustavsson et al., 2011: 10). In developing countries, however, people tend to buy food products frequently and in quantities just enough for their needs, leading to minimal food waste (Pearson et al., 2013: 124). Nevertheless, in many middle and low-income countries, those who are economically better off also exhibit extravagant eating habits and excessive food consumption (Smil, 2001: 23). Therefore, it can be said that there is a direct correlation between the economic strength of countries and individuals, and their behavior in wasting food.

Poor planning for shopping, bulk purchasing, temptations during shopping (such as food discounts, new features in products, organic options, large packages being economically priced), or preparing too much food at home can also lead to waste (Koivupuro et al., 2012: 186).

Waste can also occur due to a lack of cooking skills in the kitchen. In England, 40% of food losses occur during food preparation and presentation in homes (Quested and Johnson, 2009: 44). Additionally, the inability of the person preparing the meal to accurately gauge the necessary amount results in excess food, which also leads to waste (Pearson et al., 2013: 125).

It is thought that consumers' lack of awareness and concern about food waste leads to an increase in waste amounts (Quested et al., 2013: 13; Pearson et al., 2013: 123; Buzby et al., 2014: 22). Additionally, consumers often shop without considering where they will use the food (Gustavsson et al., 2011: v) or even if they shop with a plan, they are tempted to buy different products due to promotions (buy one, get one free) (Odabaşı and Barış, 2016:378). In this

context, it is believed that programs aimed at creating awareness about food waste in society through education, skill development, and promotion, and encouraging thrifty behaviors against waste, should be implemented (Parizeau et al., 2015: 216; Parfitt et al., 2010: 3079; Gustavsson et al., 2011: 14).

In the USA, a widespread awareness among consumers regarding food waste behaviors and attitudes, and their knowledge and consciousness levels, has been researched. According to the findings, 24% of participants described themselves as “very knowledgeable” and 38% as “quite knowledgeable” on this topic. Regarding age, 30% of older individuals and 23% of younger ones considered themselves “very knowledgeable”. Economic concerns topped the list of consumers' motivational reasons, followed by setting a good example for children and feelings of guilt, with environmental concerns coming last (Neff et al., 2015: 11-13).

Quested et al. (2013: 5) list the behaviors that can prevent food waste at home as follows:

- Making plans about what will be eaten before a meal.
- Checking the levels of food in the fridge and cupboards before going shopping.
- Preparing a shopping list before going out to shop.
- Storing foods like meat and cheese in their packaging or wrapping them appropriately.
- Storing foods like apples and carrots in the fridge.
- Using a freezer to extend the shelf life of foods.
- Serving dishes like rice and pasta in portions.
- Reusing or repurposing leftover meals.
- Preferring foods with date and label and consuming them in date order.
- It is thought that small measures implemented in homes can prevent the amount of waste and lead to a change in behavior towards thriftiness through daily practices.

In literature, the reasons for waste formation at the consumer level are stated as follows:

- Damaged, improperly packaged, damaged packaging and bruised boxes (Parfitt et al., 2010: 3066).
- Unsold foods, especially in holiday regions (Buzby and Hyman, 2012: 563).
- Excessive preparation or stocking due to inability to accurately determine the number of guests (Buzby and Hyman, 2012: 563).

- Not purchasing quality food (biological aging and sprouting after purchase in grains and tubers or fruits) (Buzby and Hyman, 2012: 563).
- Lack of knowledge and awareness about expiration dates and labels, not paying attention to best before dates (Parfitt et al., 2010: 3066).
- Lack of knowledge about foods (Buzby et al., 2009: 8).
- Legal reasons preventing some foods from being offered for human consumption (leftovers on plates in restaurants cannot be re-served) (Buzby and Hyman, 2012: 563).
- Personal behaviors and attitudes, psychological reasons, religious reasons for not eating certain foods (not reaching the desired quality or aesthetics).
- Increase in the size of dinner plates over the years, both at home and outside (leading to increased obesity and waste) (Wansik and Wansik, 2010: 943).
- Socio-demographic factors (Buzby and Guthrie, 2002: 10).
- Seasonal factors (Food waste is more prevalent in summer) (Buzby and Hyman, 2012: 563).

2.6. The Importance Of Efforts To Prevent Food Waste

The gradual occurrence of food waste on an individual level leads to it becoming a normal part of daily human life, as people get used to it (WRAP, Love Food, Hate Waste: 5). However, when the food waste generated at both household and business levels are accumulated, the total amount of food waste poses a serious impact on national economies. Furthermore, when considering that each food loss harms not only humans but also animals, plants, and the entire ecosystem, the significance of the issue becomes more apparent (Gjerris and Gaiani, 2013: 16).

In order to understand the importance of efforts to prevent food waste, it is essential to examine and develop sustainable policies. It is believed that public awareness about the adverse effects of food waste can be achieved through public initiatives, leading to a societal shift in behavior (Thyberg and Tonjes, 2016: 112). Therefore, unless such sensitive issues are embraced by individuals and incorporated into their life principles, the success of efforts to prevent food waste seems unlikely (Ural, 1999: 14).

2.6.1. Economic Losses Caused by Food Waste

Consumers wasting any edible food due to their own preferences negatively impacts not only themselves but all individuals, organizations in the food supply chain, and the national economy (Thyberg, 2015: 16). In other words, the waste of food by modern consumers, who can easily

access food whenever and in whatever quantity they desire, implies throwing away all inputs involved in the process from farm to table, including time, capital, labor, effort, cost, natural resources, and similar inputs. When the food waste made by individuals in a consumption-oriented society is accumulated, it constitutes a significant total for national economies (Dölekoğlu, et al., 2014a: 177). For instance, the societal cost of food waste in households in South Africa is estimated to be about 2.7 billion dollars annually, accounting for approximately 0.82% of South Africa's Gross Domestic Product (GDP) (Nahman et al., 2012: 2147).

In Turkey, the exact amount of food waste and its economic burden are not fully known, but it is estimated that the annual cost of bread thrown away is around 1.3 billion TL (TMO, 2014: v). Moreover, the disposal of such waste incurs additional costs for municipalities.

According to the FAO's 2013 report, one-third of global food production is thrown away. The economic cost of food waste is 750 billion dollars, which is roughly equivalent to about 1/10 of the world's energy consumption (FAO, 2013). Annually, about 1.3 million tons of food waste occurs, with approximately 56% in developed countries and 44% in less developed countries (WB, 2016).

2.6.2. Environmental Losses Caused by Food Waste

It is a globally recognized fact that every stage in the food supply chain - production, processing, packaging, distribution, marketing, preparation, and consumption - and the food waste and losses occurring at these stages, impose burdens on the environment (Jones, 2002: 560; Gustavsson et al., 2011: v; Godfray et al., 2014: 3). Countries and international organizations are conducting research to identify, reduce, and prevent food waste. Research shows that food waste leads to environmental degradation, economic inefficiency, ethical issues, health problems, and even price increases. This situation adversely affects not only human health but also all plants, animals, and the ecosystem (Gjerris and Gaiani, 2013: 16). Each instance of food loss and waste leads to unnecessary greenhouse gas emissions, water and land degradation (Lipinski et al., 2013: 9). Additionally, the inefficient use of scarce resources is found to reduce biodiversity, contribute to climate change, and harm the biosphere, the living surface of the earth (Gjerris and Gaiani, 2013: 15).

Food waste and losses mean that all production factors used for the production of food (such as labor, workforce, the opportunity cost of entrepreneurship, natural resources) are not utilized

effectively and efficiently. Furthermore, the management and disposal of waste also bring additional economic burdens (Dölekoğlu et al., 2014a: 177).

With globalization, foods produced in a particular region are now available for consumption in various climates around the world (Pretty et al., 2005: 2). Nowadays, especially the increasing demand for non-seasonal fruits and vegetables, increases the amount of energy required for their production, import, distribution, and marketing, including labor and workload (Thyberg and Tonjes, 2016: 113). The growing global demand for food necessitates more extensive use of soil, air, and water resources (Cuellar and Webber, 2010: 6464).

The production of out-of-season foods and products involves various artificial substances, including chemicals, which contribute to the pollution of soil, air, and water. Moreover, the excessive use of various chemicals reduces the expected taste quality of these foods or products, leading to a majority of them being thrown away at the dining table without being consumed. This situation emerges as a dimension of waste in this context. The environmental risk areas here are soil, air, and water.

SOIL: This century has seen significant productivity gains in the agricultural sector. Factors such as agricultural machinery, efficient fertilizers, development of hybrid strains and seeds, genetic improvements, and increasing knowledge in the field of agriculture are the main reasons for this productivity. Farmers can now achieve high yields with less effort, even on small lands. However, this has led to the pollution of vital soil and water resources for human health (Trautmann et al., 2015).

In an attempt to meet the growing food demand, the environmental damage often goes unnoticed. For example, it is known that a large majority of the chemicals used worldwide are applied in the Çukurova region and its surroundings. Agricultural pesticides used to preserve foods and achieve more efficient and quality results, and uncontrolled fertilization, threaten both human health and environmental health (Odabaşı, 2013: 181). It is known that the formation of 1 inch of fertile, humus-rich soil on the Earth's surface takes about 300 years (Trautmann et al., 2015).

Soil can be damaged and eroded during food production, leading to deforestation, desertification, and a decrease in biological diversity. Biggelaar and others (2004) have stated

that globally, the amount of soil lost annually due to land degradation and soil erosion is approximately 20,000- 50,000 km2 (Nellemann et al., 2009: 40).

The shift in global eating habits, especially towards increased meat consumption, is also negatively affecting the soil. For example, while wheat and legumes harvested from 1 hectare can feed 19-22 people for a year, the meat from animals fed with the produce from the same field can only feed 1-2 people for a year.

In the same way, the land, water, and energy used to produce 1 kg of meat can alternatively produce 3-5 times more fish (Çetiner, 2015: 26). Another perspective suggests that excessive consumption of animal products by consumers is also considered food waste (Gjerris and Gaiani, 2013: 15). Therefore, to prevent waste, it could be advisable for consumers to consume plant-based products instead of animal products (Smil, 2004: 23), and incentives for this could be developed.

A study in Sweden found that due to food waste in food businesses, 1.5% of the country's total cultivated land is wasted (Buzbry et al., 2012: 562). In England, it is estimated that the land required for storing food waste is about 19,000 km² (WRAP, 2012: 11). However, the degradation of agricultural lands used reduces biodiversity, leading to the complete destruction of the ecosystem (Pretty, 2005: 2).

WATER: It is known that a large portion of the Earth's limited water resources is used in agriculture. Thus, casually discarding food not only wastes food but also the scarce freshwater resources. The increased global demand for food products is leading to more water pollution. Nutrient runoff from fertilized fields can cause eutrophication in large lake beds (Lundqvist et al., 2008: 4). Additionally, waste generated from food waste, when not properly stored, produces methane gas, and if storage conditions are not met, leakages (such as rainwater and liquid waste mixture) can contaminate groundwater (Buzbry and Hyman, 2012: 562).

Globally, food waste leaves an annual water footprint of 250 km³. This volume is equivalent to the annual flow of the Volga River (FAO, 2013). In the USA, it is estimated that over 25% of drinking water is polluted due to food waste (Buzbry and Hyman, 2012: 562), while in England, 6% of the annual freshwater requirement is wasted in this manner due to household food waste (Chapagain and James, 2013 Cited in: Dölekoğlu et al., 2014a: 177).

In Mediterranean countries, it has been determined that fertilizer usage in food production is significantly higher than the world average, and 65% of freshwater resources are used in agricultural fields. While the availability of water was ample in the 1950s, the demand for water has doubled today (Lacirignola et al., 2014: 2).

AIR: The increase in the world's population also increases the daily demand for food. The rising demand for food and its rapid, unconscious consumption naturally encourages food production. The carbon dioxide released into the air by agricultural machinery used in food production and vehicles used in food transport increases the formation of greenhouse gases in the atmosphere (Weber and Matthews, 2008: 3508). Additionally, the disposal of food waste after consumption also negatively affects the air. For example, the incineration of waste, especially, increases the concentration of carbon dioxide in the air, causing air pollution (Buzbry and Hyman, 2012: 562).

Over the past 100 years, the conversion of food waste in landfills into methane gas has intensified the effect of greenhouse gases, further triggering global warming (Thyberg and Tonjes, 2016: 115). In the USA, composting food waste, park and garden waste, dirty water, and other organic wastes is quite common. However, because food waste is moist and prone to decay, leading to quicker decomposition and dissolution, composting is primarily used to prevent methane gas production from food waste (USEPA, 2016: 31).

According to FAO data, food waste results in a global carbon footprint of 3.3 billion tons (FAO, 2013b: 1), with the carbon footprint per person being approximately 500 kg of carbon dioxide (FAO, 2013: 22). The per capita carbon footprint in developed countries is significantly higher than in less developed countries. For example, in Europe, North America, Oceania, and industrialized Asian countries, the per capita carbon footprint is 700-900 kg of carbon dioxide, while in African countries, it is around 180 kg of carbon dioxide (FAO, 2013: 22).

In a study conducted across the 27 member states of the European Union, it was found that the greenhouse gas emissions from food waste (59 million tons in production, 78 million tons in households, and 33 million tons from other sources) amounted to a total of 170 million tons of carbon dioxide emissions (EC, 2010: 16).

In the UK, the greenhouse gas emissions from preventable food and drink waste in households are equivalent to 17 million tons of carbon dioxide (WRAP, 2012: 10). It is also estimated that

reducing preventable food and drink waste could save local governments £85 million (WRAP, 2012: 6).

2.7. Food Security And Waste

Safe (healthy) food refers to a food item that has not lost its nutritional value and is clean from a physical, chemical, and microbiological standpoint. "Food safety" involves processing, preparing, storing, and presenting foods in a way that prevents or eliminates the risk of biological, physical, and chemical substances that could lead to various foodborne illnesses. In short, food safety means preparing and consuming foods in a manner that is suitable for consumption and does not harm human health.

Meeting the daily fundamental need for nutrition, ensuring that the demanded food is available in sufficient quantities, clean, healthy, and safe, and is easily accessible by all segments of society, is a necessity for both individual and community welfare (Thyberg and Tonjes, 2016: 114).

Safe nutrition as one of the most fundamental rights of individuals is also stated in the United Nations "Universal Declaration of Human Rights." According to it, every person has the right to nutrition, clothing, housing, and medical care for their own and their family's health and well-being. Therefore, in a social state, meeting the nutritional needs in a safe and healthy manner is a fundamental right for every person (UDHR, Art.25/1).

The highly flexible concept of food security has been developed over time in line with needs, leading to new definitions. The concept of food security, defined by the United Nations Food and Agriculture Organization (FAO), founded in 1945 to organize food studies worldwide and ensure their reliability, as "all people having physical and economic access to basic foods at all times" in 1983, was updated in the 2001 report to "all people having continuous physical and economic access to adequate, healthy, reliable, and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO, 2003: 27-28).

Today, many issues combined pose a threat to global food security. These issues include:

- Rising energy prices,
- Decreased investments and productivity in the agricultural sector,
- Increase in food demand due to economic growth and population pressure,
- Disruptions in ecological balance,

- Trade-disruptive supports and biofuels (Abruzzese, 2014: 2).
- Without international measures, access to sufficient, healthy, and safe foods will become more difficult, leading to the rapid spread of various diseases and hunger around the world (Koç and Uzmay, 2015: 39).

According to the World Hunger Education Service (WHES & Hunger Notes), it is estimated that of the world's population of 7.3 billion in 2014-2016, about 795 million, or 1/9th of the population, struggle with chronic undernourishment (WHES, 2016). This shows that while there are sections of the world consuming and wastefully discarding food without a second thought, there are others in different parts of the world struggling with chronic hunger.

According to the 2014 data from the World Resources Institute (WRI), by the year 2050, the world's population is expected to reach 9.6 billion, and approximately 70% of this population is predicted to struggle with hunger (WRI, 2014). Naturally, this situation will be more evident in underdeveloped countries lacking food security. Although the issue of hunger and poverty has been on the global agenda for the last 30 years, it has been a significant problem throughout history. Despite partial improvements resulting from various studies, poverty and malnutrition continue to be major global issues (Dölekoğlu et al., 2014a: 173).

Food safety and quality are major concerns in underdeveloped countries. Particularly, deficiencies in harvesting, storage, refrigeration facilities, as well as packaging and marketing systems, due to administrative, economic, and technical inadequacies, are seen as significant causes of food waste and loss. Additionally, factors like toxins in the food itself, incorrect use of agricultural pesticides, residues from such use, and the use of contaminated water can lead to food insecurity. Access to safe food and the ability to afford it economically seem quite challenging. Research shows the necessity of urgent measures in these countries (Gustavsson et al., 2011: 1-15).

Political instability, natural disasters, economic fluctuations, civil wars, and similar circumstances in underdeveloped countries make it difficult to implement decisions made by international organizations aimed at eradicating problems like hunger, malnutrition, and food insecurity (FAO, 2015: 5). Moreover, public investment in infrastructure is required in these countries to increase capital in the food chain and prevent food waste and loss (Godfray et al., 2010: 816).

While technologies used in the food supply chain in developed countries contribute significantly to food safety, serious food losses occur in countries lacking these technologies. For example, in India, 35-40% of fresh food products are wasted due to a lack of cold storage facilities (Godfray et al., 2010: 816).

In light of all this information, despite the growing global population and resource scarcity, reducing the amount of preventable food waste can significantly contribute to meeting future food needs (Pearson, 2013: 119; Godfray and Garnett, 2014).

In a study conducted in Australia in 2015, Reynolds and others found that the value of recoverable food was $190 billion, or 1.8 trillion calories. Had this food been saved, it could have met the annual nutritional needs of approximately 921,000 people (Reynolds et al., 2015: 4715).

2.8. Efforts To Reduce Food Waste Around The World

Since the Industrial Revolution, the rapidly increasing production has led to a world that is evolving towards a consumption-focused lifestyle (Aksoy 2015: 1). Humankind, which has operated on a use-consume-abandon approach for about 10,000 years and possesses limitless desires, must also consider the realities of our planet with its limited and scarce resources (Dölekoğlu et al., 2014a: 172).

In our world with a population exceeding 7 billion, about 1 billion people go to bed hungry every day while 1.9 billion struggle with obesity. Since 1980, obesity rates have doubled to 600 million, and every year, 2.8 million people die from diseases related to excessive weight (WHO*, 2014). Furthermore, one-third of the food produced globally is thrown away, amounting to approximately 1.3 million tons of food waste (FAO, 2013: 6).

Food waste and loss, a significant global issue, is being addressed by governments, international organizations, NGOs, and businesses through various activities. Projects to prevent food waste are supported, TV programs are produced, and efforts are made to educate consumers on this issue (Dölekoğlu et al., 2014a: 178).

North America, Oceania, and Europe lead in food waste globally (Gustavsson et al., 2011: v). The European Union, in January 2012, at the European Parliament, committed to halving food waste by 2025. Member states were asked to make decisions in accordance with the food

hierarchy by December 2013. Moreover, 2014 was declared as the "European Year Against Food Waste" (EU, 2014).

The EU and its member states, as part of the "Sustainable Development Goals" adopted in September 2015, formed a working group with the aim of halving losses in food production and supply chains, as well as reducing food waste at the retail and consumer levels by 2030. Efforts are being made to translate compilations and projects designed to raise awareness about preventing food waste into all the languages of the EU member states and disseminate them through communication tools. In addition, a decision was made to develop a common EU methodology for measuring food waste (EC, 2016).

The World Expo, considered the world's third-largest organization with a global and economic impact, chose "Feeding the Planet, Energy for Life" as its main theme for the 2015 event in Milan. The event focused on issues such as the rapidly growing world population, decreasing agricultural lands, addressing food losses, reducing food waste, and renewing food consumption habits (Çetiner, 2015: 26).

2.9. Efforts To Prevent Food Waste In Turkey

Recently in Turkey, both the government and civil society organizations have engaged in various activities to prevent food waste. The establishment of the Turkey Waste Prevention Foundation (TİSÖV) in 1998 has been a starting point in this field. The three main objectives of TİSÖV can be summarized as follows:

- To prevent waste in general and to organize seminars and campaigns to raise public awareness about it.
- To combat poverty by providing microcredits to help people establish their own businesses.
- To help those in need by establishing food banking.

TİSÖV defines waste as "unnecessary, useless, and purposeless activities and processes." As of 2007, 214 billion TL of the 856 billion TL Gross National Product (GNP) was wasted, which is about 25%. Among the countries of the Organisation for Economic Co-operation and Development (OECD), Turkey, which is economically one of the least developed, unfortunately ranks high in terms of waste (www.israf.org, accessed: 02.02.2016).

In Turkey, due to the lack of comprehensive studies on the scale of food waste and losses in the food chain, it is difficult to obtain precise data. Studies in the last 10 years have focused on product-based waste, particularly on bread, which is a staple food and considered a blessing (Tanık, 2006:1) (Dölekoğlu et al. 2014a: 176). In light of all this information, the absence of any study on food waste in Turkey's vital tourism sector, its dimensions, and measures to prevent it, is seen as a significant gap.

Bread, being the most wasted food item, has prompted action from the Toprak Mahsulleri Ofisi (TMO), leading to campaigns in 2008, 2012, and 2013 titled "Do Not Waste Your Bread." The results indicate these campaigns were somewhat effective. For example, the bread waste rate, which was 5% in 2008, increased to 6% in 2009 and decreased to 5.4% in 2013. According to 2012 data, 6 million loaves per day and 2.17 billion loaves per year were wasted in Turkey. In 2013, these figures were 5 million loaves per day and 1.82 billion loaves per year. This means that approximately 5.9% of the bread produced in a year, enough to feed Turkey for 23 days, is thrown away. The economic burden of this loss is approximately 1.3 billion TL, equivalent to the revenue from being the world's leading flour exporter (TMO, 2014: v).

The 2006 study "Household Food Waste in Turkey" by Pekcan et al. is the first foundational study on this topic in Turkey. Conducted in Ankara with 500 households and 1736 individuals, it measured waste amounts based on daily energy consumption (Pekcan et al., 2006: 6). The study examined waste in three stages: purchasing-preparation, cooking-serving, and plate-to-trash. Working with three different groups classified as high, medium, and low socio-economic status, waste amounts were calculated separately. The results showed that waste was highest in the purchasing and preparation stage across all socio-economic groups. The most wasted products during cooking and serving were fruits and vegetables, while bread was the most wasted in the plate-to-trash stage. The average daily energy loss was 481.7 kcal per household and 215.7 kcal per person (Pekcan et al., 2006: 13).

A 2003 study in Adana by Gül et al. on bread consumption found an average daily waste rate of 9.63%, with higher rates in higher-income families and lower rates of 6.96% in lower-income families. The reasons for waste included habits, excessive purchasing, and dislike for stale bread (Gül et al., 2003).

Another study in 2012 in Tokat with 272 families on bread consumption found that 47.79% of purchased or homemade bread was left over, and 63.08% of families wasted bread. More than

half of the consumers thought the quality and hygiene conditions of commercially sold bread were insufficient (Bal et al., 2013: 65).

A study in Sivas with 400 individuals on bread consumption attitudes examined the relationship between demographic characteristics and the amount of waste. It found that younger people wasted more bread than older people, waste increased with higher income, waste rates increased with fewer people in the household, and the highest bread waste was among students (Aydın and Yıldız, 2011: 179).

A 2015 study in Isparta with 384 families on bread waste found that 13.61% of daily purchased bread was leftover for the next day, 4.7% became stale, and 1.18% became moldy. Families used 87.8% of stale bread in other food forms, while 8.9% threw it directly into the trash (Ertürk et al., 2015: 297).

In Turkey's eastern region, consumers are more sensitive to bread waste. A study by Koç (2011:1) in Van found that 48.50% of consumers repurposed stale bread into different meals, 40.53% gave it to dairy farmers, 5.65% threw it directly into the trash, and 5.32% gave it to needy people.

A 2011 study in Adana, Mersin, and Antalya with women consumers aged 20 and above found that 38.2% of daily purchased bread was wasted, averaging 2 slices per person per day, with an annual economic loss of 107 TL per person (Dölekoğlu et al., 2014b: 1).

These studies highlight the waste occurring at the consumption stage of bread. Due to the lack of data on food losses in the production stage from farm to table, the actual extent of waste is thought to be higher (Aksoy and Solunoğlu, 2015: 5).

2.4. Studies In The Literature

Research in literature shows that one of the major problems of the 21st century is sustainability (biodiversity loss, air and water pollution, global warming, overgrazing and overhunting, deforestation, food security, and environmental pollution). Sustainability issues stem from and are explained by individuals' behaviors (Vlek and Steg, 2007). One significant issue in this context is food loss and waste, which poses a threat to food security. Many studies conducted around the world have increasingly found that a substantial portion of all food produced for consumption is wasted every year. This particularly harms the environment and the future of sustainable agriculture (Martin-Rios et al., 2018).

Kılıçarslan (2000) aimed to determine bread consumption, waste, and the reasons for waste in institutions that offer mass feeding in the province of Konya. For this purpose, a survey was conducted with a total of 507 individuals at six institutional cafeterias, including student institutions such as Konya Social Services Boys' Orphanage Directorate and Çetinkaya Girls' Orphanage cafeterias, worker institutions like the Village Services Provincial Directorate and Medaş cafeterias, and employee institutions such as the Selcuk University Medical Faculty Hospital staff cafeteria and Konya Treasury cafeteria. The study used descriptive statistics and the Chi-Square test for analyzing the research findings. The findings indicated that the preferred type of meal played a role in leaving bread leftovers; 62.30% of those who preferred grilled-kebab type meals and 42.00% of those who preferred meaty vegetable dishes left bread leftovers. It was observed that the rate of leaving bread leftovers was higher among men and that young people consumed more bread compared to middle-aged and elderly individuals. It was also noted that the presentation style of bread influenced waste, with thicker slices leading to higher consumption and waste rates, suggesting that offering bread in the form of sandwich loaves could reduce both consumption and waste.

TMO (2012) aimed to determine the dimensions of waste and influencing factors, the amount of bread consumption in Turkey, and individuals' attitudes and behaviors related to bread consumption. For this purpose, a survey was conducted with 252 bakeries, 53 employee cafeterias, 53 student cafeterias, 611 restaurant and hotel authorities, and 552 consumers eating in these institutions across 12 provinces determined by TUIK in Turkey. Descriptive statistics were used in the analysis of the data. The findings revealed that 30.1% of individuals gave stale and moldy bread to birds and street animals, while 7.0% threw it in the trash. According to calculations, bakeries and institutions with their own production facilities produced approximately 101 million loaves of bread daily, of which 3 million were wasted without being sold. Including the waste from restaurants, hotels, employee and student cafeterias, and households, the daily waste amounted to 5.9 million standard (250g) loaves of bread, most of which were used as animal feed, and the rest were thrown away.

Beretta et al. (2013) aimed to investigate food losses at various stages of the food value chain (agricultural production, food service institute, processing, household, and retail) in Switzerland. They analyzed data from 22 food categories, the food value chain covering 31 companies, associations, public institutions, and literature. They found that 48% of the total

produced product was lost at all stages of the food value chain. They determined that the most preventable food losses could occur at the stages of agricultural production, homes, and processing.

Stefan et al. (2013) aimed to determine the impact of food choices and other food-related activities on food waste formation among Romanian consumers. The main material of the study consisted of a survey conducted with 244 Romanian consumers. The research concluded that consumers' food waste behaviors were significantly influenced by planning and shopping routines. They stated that moral attitudes and behaviors against food waste were determined by control. They emphasized the importance of creating efforts to change consumers' food waste behaviors and providing skills and tools that could prevent waste in food-related activities.

TMO (2013) aimed to determine the bread production, consumption, and waste situation in Turkey, a country playing a significant role in wheat production and having high bread consumption. It also sought to identify consumers' attitudes and behaviors related to bread and what could be done to prevent waste. For this purpose, interviews were conducted with 242 bakeries, 75 hotels, 526 restaurants, 39 public institution cafeterias, 13 hospital cafeterias, and 1549 households in 12 provincial centers representing Turkey.

Abeliotis et al. (2014) conducted their research on food waste generated by households in Greece in 2012. The main material of the study was a survey conducted face-to-face with 231 consumers. They found that consumers had a positive attitude and behavior towards preventing food waste, with many planning their food purchases. However, they identified that 40% of consumers misunderstood the meaning of food consumption date labels.

Gümüş (2014) aimed to raise awareness among target groups with a study on social responsibility campaigns regarding bread waste. The study involved interviews with 90 students aged 14-18 from middle and upper-income levels in Ankara's Mamak and Çankaya districts, along with 30 randomly selected academics from the Faculty of Fine Arts, Graphic Design Department, and 30 professionals from advertising agencies in Ankara. The research used descriptive statistics and the Chi-square test for analysis, concluding that the majority of students and professionals believe the main reason for bread waste is purchasing more than needed and that the strategies of social responsibility campaigns to prevent waste were appropriately determined.

Güneş et al. (2014) aimed to examine the concept and applications of the green economy and identify areas of green economy practice in the Turkish food sector. They used secondary data, including books, articles, and reports, to determine the current state and areas of application of the green economy in the Turkish food industry. They noted that consumer frenzy, reckless use of natural resources, and environmental pollution led to the idea of a green economy, which has impacted the food sector. They found that green products are expensive and lack consumer awareness, limiting their application, and that producers do not engage in green economy practices due to high initial investment costs. They suggested that development policies should support the green economy.

Marangon et al. (2014) aimed to determine the impact of family size on food waste and consumer attitudes and purchasing habits towards food waste in Northeast Italy. They conducted a survey with 512 consumers, 350 online and 162 face-to-face, over two months from October 2013. They found that consumer age, income, and attitudes towards waste influenced food wastage, with planning and shopping routines playing a significant role in waste behavior.

Martindale (2014) aimed to identify the sustainability characteristics of fresh and frozen foods. The main materials of the study were established carbon footprint data for various food types and survey data from 83 households. He used graphical tables for data interpretation, stating that greenhouse gas emissions are related to diet and that frozen foods reduce emissions due to 47% less wastage compared to fresh foods. He found that consumers wasted 10.4% of fresh food and 5.9% of frozen food.

Marx- Pienaar and Erasmus (2014) conducted their study based on the necessity of limiting food waste to prevent climate change. They aimed to determine the knowledge level of consumers in South Africa about climate change and to prove the importance of primary product and consumption practices in reducing the issue. They surveyed 560 consumers in Tshwane, a significant urban area in South Africa, including questions on factors influencing fresh product consumption. They found that young consumers' status consciousness significantly affected their fresh product purchases and emphasized the need for education not only on climate change but also on changing unsustainable consumption practices.

Dölekoğlu Özçiçek et al. (2014a) aimed to explore the extent of waste in the consumption of bread, one of the most important food items. They obtained research data from studies conducted by TUÎK in 2011 with women over the age of 20 living in three major cities (Adana, Mersin, Antalya) in the Mediterranean Region, which experienced significant population growth. The survey revealed that 63.0% of the respondents were under 40 years old, 46.4% had primary education, and the average monthly income was 659.22 TL. They found that only 10.9% of consumers bought just enough bread and did not waste any. The study indicated a bread wastage rate of 38.2%, with 8.1% of the purchased bread being thrown away and 30.1% used as animal feed. It was also found that stale or surplus bread was used in dessert and meal preparations in the three cities under study. They anticipated that the primary measures to reduce waste would be purchasing the right amount and creating proper storage conditions.

Dölekoğlu Özçiçek et al. (2014b) stated that the world has been in a contradiction of hunger, poverty, and inefficient use of resources since its existence. They noted that while 1 billion people go to bed hungry every day, approximately 1.4 billion people have health problems due to obesity, resulting in the death of 2.8 million people. In contrast, 1.3 million tons of food are wasted. They identified the primary causes of loss and waste in the food chain as households, the ready-made food sector (restaurants-cafes), retail centers, farmers, and manufacturers. They found that the highest daily calorie wastage per capita, at 1520 calories, was in North America and Oceania, with 61% of this waste occurring at the consumer level.

Aschemann-Witzel et al. (2015) conducted a literature review on the factors causing food waste at the supply chain stage and by households. They concluded that motivation, food preparation, and food processing methods and skills have a significant impact on preventing food waste formation.

Elmenofi et al. (2015) conducted their study in Egypt, noting the lack of sufficient research on food waste and the scarcity of related data. Therefore, they aimed to provide an overview of household food waste in Egypt. The main material of the study was survey data obtained from 181 consumers selected randomly for online and face-to-face surveys in February and May 2015. They used descriptive statistics for data analysis. The survey showed that 64.6% of the participants were women, 59.1% were under the age of 44, and most had a degree-level education. They confirmed the widespread nature of food waste in Egypt, with only 13.8% of consumers stating they did not throw away food. The most wasted items were fruits, vegetables, grains, and bread products. They found that most consumers understood food labels correctly,

attributing this to the high level of education, and noted the effective role of correctly reading food labels in reducing food waste. They emphasized food safety as a primary reason for food loss and waste in Egypt.

Ertürk et al. (2015) aimed to determine the bread consumption and sensitivity to waste among households in Isparta. The main material of the study was a survey conducted face-to-face with 384 families selected through sampling in Isparta. They used a single-stage simple random sampling method to determine the number of families to survey. They observed variations in bread type consumption according to taste preferences, with 46.2% preferring Isparta home bread and 31.3% white loaf bread, while pita and flatbreads were the least consumed. They found that 60.7% of consumers bought only the bread they needed, 37.5% bought more than needed daily, and 0.8% bought excess bread as a precaution.

Jörissen et al. (2015) aimed to determine the impact of household behaviors (shopping, eating, and food preparation) on the formation of food waste. For this purpose, they conducted an online survey among consumers at two European research centers, JRC/Ispra in Italy and KIT/Karlsruhe in Germany, involving a total of 857 consumers (453 in Karlsruhe and 404 in Ispra). The findings showed that over 40% of consumers in both regions wasted vegetables, fruits, cheese, and bread. In Ispra, 37% of consumers and in Karlsruhe 28% did not throw away edible food. The average weekly food waste per person was 140 grams in Karlsruhe and 127 grams in Ispra. They found that 70% of consumers in Karlsruhe and 82% in Ispra were already making special efforts to reduce food waste.

Thi et al. (2015) focused on examining the differences in food waste formation trends between developed and developing countries and conducted an analysis of the current situation of recycling activities in developing countries, based on previous studies. They highlighted Taiwan's success in food waste management, suggesting it as a model for developing countries. The overview of food waste management in these countries was presented in two sections: the current situation and future perspective. The current situation was described in terms of food waste management, policy regulations, and recycling behaviors, while the future perspective included educational initiatives on the subject and an integrated food waste management system plan. They recommended holistic management system practices for food waste management in developing countries.

Mallinson et al. (2016) investigated whether domestic food waste among young consumers in the United Kingdom was linked to lifestyles based on convenience food consumption. They conducted an online survey with 928 consumers aged 18-40, responsible for household food shopping. Using cluster analysis of 24 lifestyle factors related to food, they identified five consumer groups: epicureans, traditional consumers, ordinary consumers, food-independent consumers, and kitchen dodgers. They found that ordinary consumers and kitchen dodgers were most reliant on convenience food. Factors influencing food waste included household size, packaging, price consciousness, and marketing.

Dölekoğlu Özçiçek (2016) aimed to assess the origins, causes, and consequences of food wastage, defined as loss and waste, at different stages of the food chain and to discuss recent civil initiative efforts to address this issue. The study highlighted that food, a basic human need, undergoes quality and quantity loss at many stages from farm to table. It noted an increasing trend of food wastage, with high and middle-income countries experiencing significant waste during consumption, while low-income countries faced high waste at the production stage. The study observed increasing global, national, and regional efforts to solve this problem and suggested initiatives like establishing a food waste combat day/week, providing foundational education on food waste, and prioritizing projects aimed at resolving this issue for social responsibility.

Setti et al. (2016) explored the relationship between consumers' household food waste behaviors and their incomes. They gathered data from interviews with 1,403 consumers reached through a panel in Italy. Their findings indicated that middle and low-income consumers purchased lower quality products and generated more food waste.

Stancu et al. (2016) aimed to determine the impact of socio-demographic characteristics, psycho-social factors, and food routines on food wastage among consumers in Denmark. They conducted a survey with 1,062 consumers. The study found that shopping habits, perceived behavioral routines, and controls related to reusing leftovers were the main drivers of food waste. Planning routines also indirectly influenced waste. They noted that consumers' shopping routines related to household management skills. While precautionary norms and attitudes affected food waste, perceived behavioral control and moral norms did not have a significant impact.

Yıldırım et al. (2016) focused on the economic, social, and demographic characteristics influencing household attitudes towards food waste in Turkey and examined factors devised to solve the country's food waste problem. They conducted an online survey with 150 Turkish participants between January and March 2015. The study found that 71% of the participants were women, 38% were aged between 35-44, and 62% had postgraduate education. About 70% lived in metropolitan areas. According to the survey, 95% of the participants believed they were responsible for food waste formation, and 90% thought food waste increased during Ramadan. Approximately 50% were aware of the negative impacts of food waste on nature and the economy and expressed a desire to reduce food waste, indicating a need for information in this area.

Salihoğlu et al. (2017) aimed to determine the current status of food waste in Turkey and conceptualize its potential as a resource. They compiled their findings in a report, estimating the total annual food waste at approximately 20 million tons, with 8 million tons attributed to distribution and consumption.

Taşcı et al. (2017) focused on the flour preferences used in bread production and the bread waste generated by bakeries in Ankara, Turkey. They surveyed 180 bakeries selected through a complete count method. Their findings indicated an average daily production of 6 million loaves of bread, predominantly white bread. Unsold bread was collected in the evening by contracted bakeries and sold at low prices for animal feed, while a small portion was sold to consumers preferring stale bread or those with low income. They discovered that on average, 4.5 truckloads of bread were wasted daily without being consumed as human food. The study concluded that competitive pricing leading to excess bread purchase was a primary cause of this waste.

The Turkey Waste Report (2017) sought to determine the extent of bread waste and provide a basis for preventive measures. Using stratified random sampling, they surveyed 1,650 individuals from 26 cities across Turkey. Descriptive statistics and the Chi-square test were used for data analysis. They found that 50% of respondents were female, with an average age of 38.8 years. Approximately 39% always cooked only the amount of food they would consume to reduce waste, 39.6% always compared prices during shopping to choose affordable options, and 29.9% always prepared a shopping list. About 80.2% finished the food on their plates, while

3.8% threw away food they could not consume before the next shopping trip, but 25.2% preserved food in the freezer to prevent waste. They observed that 96.8% preferred unpackaged bread, and 65.9% purchased bread daily. The study estimated an annual household bread waste of approximately 81,347 tons, with 65.6% buying only the amount they would consume, 22.4% utilizing leftovers, and 20.2% preserving bread in the fridge to prevent molding and staling.

Abiad and Meho (2018) conducted a literature review on food loss and waste in Arab countries, with a population of over 400 million and an annual per capita food loss exceeding 210 kg. Despite the importance of the issue, they found a lack of sufficient data and called for more research on food loss and waste in the Arab world.

Chalak et al. (2018) aimed to examine the process of food waste formation after harvest, processing, and transportation to consumers. They compiled data from secondary sources in 33 developed countries across Europe, Asia, North America, and Oceania. Regression analysis was conducted to identify factors influencing food waste formation. The study concluded that comprehensive legal frameworks, awareness campaigns, and financial incentives could significantly reduce food waste.

Kılınç et al. (2018) investigated the causes and prevention of food waste in hotel operations, along with practices for reusing generated waste, focusing on current applications to prevent food losses. Data was collected through interviews with managers of 24 five-star hotels in Muğla, Istanbul, Izmir, Antalya, Gaziantep, Ankara, and Denizli. They found that these hotels generated 8,871.04 kg of waste per day, predominantly food waste (67%), followed by glass (12%), paper-cardboard (10%), plastic (6%), and metal (5%). The average waste generated per hotel customer per day was 0.5 kg, with food loss constituting approximately 70% of the total waste.

Schanes et al. (2018) aimed to identify reasons for household food waste through a literature review. They concluded that consumers over 65 wasted less food, while families with children wasted more. The study also found that per capita waste decreased as household size increased.

The Turkey Waste Report (2018) aimed to determine food consumption behaviors and dimensions of waste in Turkey, focusing on areas where waste occurs most. The survey included 2,209 individuals from 26 cities across Turkey. The findings showed that 32.8% of participants shopped for food weekly, with increased shopping frequency correlating with higher income levels. About 63.32% preferred supermarkets for food shopping, and 17% chose

markets. It was found that 5.4% of individuals often failed to finish home-cooked meals, leading to waste, while 30.1% used leftovers to prevent waste. Approximately 78.9% bought bread daily, with 33.5% purchasing two loaves at a time. The average daily bread consumption per individual was 0.78 loaves. About 47.5% of participants used all the bread they bought, 40.8% used leftover bread to prevent waste, and 11.7% threw away unused bread. The study estimated a weekly waste of approximately two loaves of bread per household, noting a decrease in waste as awareness increased.

Berjan et al. (2019) aimed to provide an overview of household food waste in Montenegro. They conducted an online survey with 371 randomly selected consumers in 2015, using descriptive statistics for data analysis. The survey revealed that 70.1% of respondents were female, 90.1% were under 44, and 81.2% had a college education. The study found that a majority were concerned about food waste, estimating its monthly economic value between 5-25 Euros.

Demirbaş (2019) examined the role and importance of food packaging in reducing food waste and loss at different stages of the supply chain, using national and international literature. The study categorized the causes of food loss and waste into primary (post-harvest spoilage, mechanical damage, pest infestation) and secondary (causes of primary reasons, legislation, transportation/storage issues, lack of cold chain). It was noted that packaged foods have slower quality loss and longer shelf life, which helps reduce food loss and waste. The study emphasized the importance of packaging in achieving a sustainable society by reducing food waste and loss.

Karakaş (2019) aimed to identify factors leading to food waste among consumers in the central district of Çorum, Turkey. A survey of 583 individuals revealed a five-factor structure causing waste behavior: norms, intent, outcome awareness, purchasing behavior, and planning. These factors were quantified as norms (25.129%), intent (15.777%), outcome awareness (14.893%), purchasing behavior (11.120%), and planning (9.693%).

Neff et al. (2019) focused on informing U.S. consumers about food date label policies and educational activities. They collected data from 1,029 consumers through a bi-weekly online survey in 2016, asking about food waste frequency according to food types and date labels, and whether date labels were federally regulated. The study found that 84% of consumers occasionally discarded products nearing their package date. Over a third of consumers were mistakenly under the impression that date labels were federally regulated.

Niyaz and Demirbaş (2020) aimed to identify the attitudes and behaviors of consumers in Northwestern Turkey towards food waste. They conducted face-to-face surveys with 400 consumers in Çanakkale, representing one-third of the region, between August and October 2015. Using Chi-square and Factor analysis for data evaluation, they found that 62.5% of participants were female, 38.8% had 9-12 years of education, and 32.4% were over 50 years old, with 70% living in households of 1-3 people. The Chi-square analysis showed significant relationships between age, education, gender, and food waste. Factor analysis revealed that intention not to waste and shopping behaviors were significant factors in food waste, while planning routines were not.

Gover et al. (2020) aimed to provide an overview of WRAP's (Waste and Resource Action Programme) social, environmental, and economic actions, identifying effective change initiatives and how these activities could be scaled for SDG (Sustainable Development Goal) 12.3. They emphasized the critical importance of combating food waste and loss, citing studies from the UK and Mexico. In the UK, about 25% of purchased foods were wasted, with food safety being a key issue affecting waste. They noted a 96% increase in redistributed food from 2015 to 2018 through business alliances and charities, doubling the amount of food redistributed, a significant step in reducing food waste. In Mexico, studies showed that households wasted 11 mt of food, with about 35% of total produced food being lost or wasted. Additionally, they highlighted that 9 million people in Mexico struggle with food insecurity and extreme poverty.

Aschemann-Witzel et al. (2021) investigated the relationship between consumer lifestyles and food waste to contribute to the reduction of food waste. They surveyed 4,214 consumers in five Northern and Western European countries (Germany, Denmark, Norway, Sweden, and the Netherlands). Cluster analysis was used to highlight inter-country differences in consumers' food waste and lifestyles, identifying five clusters: “well-planned meals and frugal food use”, “young male waste”, “convenience and price-focused low income”, “last-minute market”, and “staging”.

Whartona et al. (2021) researched how a multifaceted educational approach could affect household food waste production. They conducted interviews with participants from 53 households in the USA, including one person from each household in the study. The participants were given a 7-week period, including an initial week (waste reduction education), a 5-week intervention, and a follow-up week. They were trained on how to properly collect, weigh, and

report their weekly household food waste. They found a significant reduction in household food waste from the beginning to the end of the follow-up period ($p=0.008$). The study concluded that the 7-week educational intervention effectively reduced food waste by 27.85% among participating households.

CHAPTER THREE

TURKEY AND ITALY FOOD WASTE PRACTICES AND COMPARISON OF TWO COUNTRIES

3.1.Solutions to Food Waste in Italy

Italy has taken several significant steps in the last decade to combat food waste. These measures include legislative regulations, campaigns, projects, training, and technological applications. The main institutions involved in food waste initiatives in Italy are:

Italian Ministry of Agriculture, Food and Forestry Policies: In 2016, the Ministry introduced a law to prevent food waste. This law provides tax deductions for businesses donating food and penalizes those generating food waste. It also eases food safety standards to facilitate food donations and collaborates with food banks. The Ministry organizes various campaigns to raise awareness about food waste. For example, the "No Food Waste" campaign highlights the environmental, economic, and social impacts of food waste and offers tips to consumers to reduce it.

Last Minute Market: Founded in 1998, Last Minute Market is a social enterprise that collects unsold or unused food from markets, restaurants, schools, and hospitals to distribute to those in

need. In addition to reducing food waste, it promotes social justice and solidarity. Last Minute Market has collaborated with over 500 businesses and saved more than 100,000 tons of food.

Food for Good: Launched in 2015, Food for Good is a platform that brings together stakeholders in the food industry to reduce food waste and increase food donations. It acts as a bridge between food producers, distributors, retailers, restaurants, hotels, food banks, NGOs, and government agencies. Food for Good collects data on food waste, provides logistical and legal support for food donations, conducts educational and awareness activities, and shares best practices for reducing food waste.

Too Good To Go: Established in 2016, Too Good To Go is a mobile application that offers unsold or unused food from businesses like restaurants, markets, bakeries, cafes, and hotels at affordable prices. It helps both businesses and consumers reduce food waste and save money. Too Good To Go has reached over 3 million users in Italy and saved 4 million portions of food.

Food Sharing: Created in 2017, Food Sharing is a website that connects people who want to share surplus food from homes, workplaces, or events. It not only reduces food waste but also strengthens neighborhood relations and social networks. Food Sharing has reached over 10,000 users in Italy and saved 20,000 kilograms of food.

In conclusion, the efforts by various institutions in Italy over the past decade have played a crucial role in preventing food waste. These initiatives have demonstrated that tackling food waste requires environmental and social responsibility. Combining legal, economic, educational, and technological methods is necessary to reduce food waste. Fighting food waste is important for efficient resource use and ensuring food security and justice.

Italy is one of the countries that has taken serious steps to tackle food waste. In 2016, the Italian Parliament approved a new law on food waste prevention and recovery, which aims to reduce food waste by 20% by 2020, from 5 million tons to 4 million tons per year. The law is considered a model for other European countries, as it adopts a positive and incentive-based approach, rather than a punitive one (Martina vd., 2018: 2).

The main features of the Italian law on food waste are (İtalian Parliament, 2016):

It simplifies the procedures and regulations for food donation, making it easier and safer for food producers, retailers, caterers and consumers to donate surplus food to charitable organizations, without risking legal sanctions or liability.

It encourages food donation by providing tax benefits and reducing waste taxes for food donors, based on the amount and quality of food donated.

It promotes the use of innovative packaging and transportation methods to extend the shelf life and preserve the quality of food products, and allocates 1 million euros for research and development in this field.

It supports the use of reusable and recyclable packaging, and allocates 3 million euros for this purpose.

It fosters the education and awareness of consumers and students on food waste prevention and reduction, and the valorization of food resources.

It establishes a national food waste monitoring system, to collect and analyze data on food waste generation and reduction, and to evaluate the effectiveness of the law and its measures.

The Italian law on food waste is based on the principle of the food waste hierarchy, which prioritizes the prevention of food waste at the source, followed by the recovery of surplus food for human consumption, then for animal feed, and finally for composting or energy production. The law also follows the principle of subsidiarity, which means that the implementation of the law is delegated to the regional and local authorities, in order to adapt to the specific needs and contexts of each territory (Osti vd., 2017: 4).

The Italian law on food waste is the result of a collaborative and participatory process, involving various stakeholders from the public, private and civil society sectors. The law was initiated by a parliamentary intergroup on food waste, which consulted with experts, associations, NGOs, food banks, and other actors involved in food waste prevention and recovery. The law also received the support of a popular petition, signed by more than one million citizens, which called for a national strategy on food waste reduction.

The Italian law on food waste is aligned with the international and European frameworks and commitments on food waste reduction. In 2015, the United Nations adopted the 2030 Agenda for Sustainable Development, which includes a target to halve per capita food waste at the retail

and consumer levels, and reduce food losses along the production and supply chains by 2030 (Target 12.3). In 2016, the European Commission adopted an EU Action Plan for the Circular Economy, which includes a target to reduce food waste by 50% by 2030, and a proposal to revise the EU Waste Framework Directive, which introduces a common definition and methodology for measuring food waste .

The Italian law on food waste has been praised and recognized as a best practice by several international and European institutions and organizations, such as the FAO, the European Parliament, the European Economic and Social Committee, and the European Court of Auditors. The law has also inspired and influenced other countries, such as France, Spain, Portugal, Greece, and Romania, to adopt similar or complementary measures to address food waste.

The Italian law on food waste has also been evaluated and monitored by several studies and reports, which have assessed its impact and effectiveness, as well as its challenges and limitations. Some of the main findings and recommendations of these studies and reports are:

The law has contributed to increasing the amount and quality of food donated to charitable organizations, especially by large food retailers and distributors, and to reducing the administrative and fiscal burdens for food donors. However, there is still room for improvement, especially for small and medium food businesses, catering services, and farmers, who face more difficulties and barriers to donate food.

The law has also contributed to raising the awareness and involvement of consumers and students on food waste prevention and reduction, and to promoting a culture of food valorization and solidarity. However, there is still a need for more information, education and communication campaigns, as well as for more behavioral change initiatives, to reduce food waste at the household level, which accounts for the largest share of food waste in Italy.

The law has also contributed to fostering the innovation and sustainability of food packaging and transportation, and to supporting the use of reusable and recyclable packaging. However, there is still a need for more research and development, as well as for more incentives and regulations, to enhance the efficiency and effectiveness of these solutions, and to ensure their compatibility with food safety and quality standards.

The law has also contributed to establishing a national food waste monitoring system, which collects and analyzes data on food waste generation and reduction, and to evaluating the effectiveness of the law and its measures. However, there is still a need for more harmonization, standardization and integration of the data sources and methods, as well as for more transparency and dissemination of the results, to ensure the reliability and comparability of the data, and to support the decision-making and policy-making processes.

The Italian law on food waste is not a static or definitive instrument, but a dynamic and evolving one, which requires constant revision and adaptation, in order to respond to the changing needs and challenges of the food system, and to achieve the ambitious goals and targets of food waste reduction. Therefore, the law is subject to periodic review and update, based on the feedback and suggestions of the stakeholders and the public, and on the evidence and lessons learned from the monitoring and evaluation activities.

The Italian law on food waste is an example of a comprehensive and innovative policy, which addresses food waste as a multidimensional and complex phenomenon, and which involves and engages multiple actors and sectors, from the production to the consumption stages of the food chain. The law is also an example of a coherent and consistent policy, which is aligned and integrated with the international and European frameworks and commitments on food waste reduction, and which contributes to the achievement of the sustainable development goals, especially those related to food security, climate change, natural resources, and social inclusion.

Last Minute Market (LMM) is a social enterprise that aims to reduce food waste and promote circular economy in Italy. LMM was founded in 1998 as a spin-off of the University of Bologna, and since then it has developed various projects and services to prevent and recover food surpluses, as well as other types of goods, such as medicines, books, and non-food items. LMM works with different stakeholders, such as companies, institutions, schools, and third sector organizations, to create a win-win situation for the environment and the society. In this essay, I will describe some of the main activities and achievements of LMM, based on the information available on its website and other sources (Last Minute Market, https://www.lastminutemarket.it/, Erişim Tarihi: 1.11.2023).

One of the core activities of LMM is the recovery of food surpluses from supermarkets, restaurants, canteens, and other food operators. LMM collects the food that is still edible but cannot be sold or consumed for various reasons, such as approaching the expiration date,

damaged packaging, or overproduction. LMM then distributes the food to local charities and social organizations that help people in need, such as homeless, migrants, elderly, and low-income families. This way, LMM reduces food waste and contributes to food security and social inclusion. According to its website1, LMM has recovered more than 100,000 tons of food since 1998, benefiting more than 2,000 organizations and 500,000 people (Last Minute Market, https://www.lastminutemarket.it/, Erişim Tarihi: 1.11.2023).

Another activity of LMM is the analysis of food losses and waste along the food supply chain, from production to consumption. LMM conducts research and studies to identify the causes and the impacts of food waste, as well as the possible solutions and best practices to prevent it. LMM also provides consultancy and training services to food companies, institutions, and schools, to help them implement waste reduction strategies and improve their environmental and social performance. For example, LMM has collaborated with Barilla, a leading pasta and sauce producer, to analyze the losses and waste of pasta and tomato products, and to propose actions to optimize the production and distribution processes. LMM has also worked with Ribò, a school catering company, to measure and reduce the food waste in school canteens (Last Minute Market, https://www.lastminutemarket.it/, Erişim Tarihi: 2.11.2023).

A third activity of LMM is the communication and awareness-raising on the issue of food waste and circular economy. LMM organizes events, campaigns, and educational projects to inform and engage the public, especially the young generations, on the importance and the benefits of reducing food waste and adopting more sustainable consumption behaviors. For instance, LMM has launched the Zero Waste Campaign in 2010, which is still the main awareness campaign on food waste in Italy1. LMM has also created the Waste Watcher project, which is a network of volunteers who monitor and report the food waste in their communities, and promote good practices and initiatives to prevent it1. LMM has also developed educational programs for primary and secondary schools, such as Frutta che Frutta non Spreca, which is a project that aims to reuse the surplus fruits and vegetables by transforming them into jams, juices, and other products (Last Minute Market, https://www.lastminutemarket.it/, Erişim Tarihi: 3.11.2023).

A fourth activity of LMM is the participation in European projects and networks on food waste and circular economy. LMM is a member of the EU Platform on Food Losses and Food Waste, which was established in 2016 and supports all actors in the food chain to define and implement

measures to prevent food waste, share best practices, and evaluate the progress over time1. LMM has also supported the Province of Rimini for the STREFOWA project, which stands for Strategies to Reduce and Manage Food Waste in Central Europe. The project aims to provide an overview of the existing good practices and initiatives on food waste reduction in Europe, and to apply and implement them in eight selected cities (Last Minute Market, https://www.lastminutemarket.it/, Erişim Tarihi: 3.11.2023).

LMM is a social enterprise that has been working for over 20 years to reduce food waste and promote circular economy in Italy. LMM has developed various projects and services to prevent and recover food surpluses, as well as other types of goods, and to distribute them to people in need. LMM has also conducted research and studies to analyze the causes and the impacts of food waste, and to propose solutions and best practices to prevent it. LMM has also communicated and raised awareness on the issue of food waste and circular economy, and has participated in European projects and networks on the same topic. LMM is a successful example of how waste can be turned into a resource, and how circular economy can create environmental and social benefits.

Food for Good is a project that was launched in 2013 by the Italian Federation of Public and Social Catering (Federazione Italiana Pubblica e Sociale Ristorazione, FIPES) and the Italian Food Bank Network (Banco Alimentare). The aim of the project is to recover surplus food from catering services, such as canteens, schools, hospitals, and events, and donate it to charitable organizations that assist people in need. According to the project website, Food for Good has recovered more than 15,000 tons of food, equivalent to 30 million meals, and donated it to over 2,000 charities across Italy (Vittuari et al., 2016: 84).

Food for Good is based on the principles of the circular economy, which seeks to minimize waste and maximize the value of resources. By recovering surplus food, the project not only helps to fight hunger and social exclusion, but also to reduce the environmental impact of food production and consumption. According to a study by the University of Bologna, Food for Good has prevented the emission of about 47,000 tons of CO2 equivalent, and saved about 70 million cubic meters of water and 28,000 hectares of land (Gazzetta Ufficiale della Repubblica Italiana., 2016).

Food for Good is also aligned with the national and international policies and goals on food waste prevention and reduction. In 2016, Italy passed a law to facilitate food donation and distribution for social purposes and to limit food waste (Law n. 166/2016). The law introduced several measures, such as simplifying the procedures and requirements for food donors and recipients, providing tax incentives and benefits, promoting education and awareness campaigns, and supporting innovative solutions and best practices3. The law also contributed to the implementation of the Sustainable Development Goals (SDGs), especially SDG 2 (Zero Hunger) and SDG 12 (Responsible Consumption and Production), which call for halving per capita food waste and reducing food losses along the supply chain by 2030 (Coldiretti, 2019).

Food for Good is one of the examples of how Italy is tackling the problem of food waste, which is estimated to amount to about 5 million tons per year, equivalent to 8.5 billion euros. The project involves various actors and stakeholders, such as food service operators, food banks, charities, local authorities, institutions, and citizens. It also relies on the collaboration and coordination of different networks and platforms, such as the National Plan for Food Waste Prevention (PINPAS), the Italian Platform for Food Waste Reduction (PIRSA), and the European Platform on Food Losses and Food Waste (FLW Platform) (Montanari, 2015).

Food for Good is not only a social and environmental project, but also a cultural and ethical one. It reflects the values and traditions of the Italian cuisine, which is based on the respect and appreciation of food and its quality. It also challenges the dominant model of food consumption, which is often characterized by excess, waste, and indifference. By recovering and redistributing surplus food, Food for Good promotes a more responsible and sustainable way of eating, which is mindful of the needs and rights of others, as well as of the impacts and consequences of our choices (Vittuari, et al., 2018: 1090).

Too Good To Go is a mobile app that connects users with local restaurants, bakeries, supermarkets, and other food businesses that have surplus food at the end of the day. Users can browse the app and reserve a “magic bag” of food that would otherwise be thrown away, for a fraction of the original price. They can then pick up their bag at a specified time and enjoy a delicious meal while saving money and reducing food waste. The app also provides tips and information on how to store, cook, and compost food, as well as how to join the global movement against food waste.

According to the Food Waste Index Report 2021, produced by the UN Environment Programme (UNEP) and partner organization WRAP, 17% of all food produced globally is wasted, and 61% of this waste occurs at the household, food service, and retail levels. This has significant negative impacts on the environment, as food waste accounts for 8-10% of global greenhouse gas emissions, and wastes precious resources such as land, water, and energy. Moreover, food waste contributes to food insecurity and poverty, as millions of people around the world suffer from hunger and malnutrition, while edible food is discarded. (UNEP, 2021)

The report also highlights the importance of measuring and monitoring food waste, as well as implementing policies and actions to prevent and reduce it. The report presents a methodology for countries to measure food waste at the retail and consumer levels, and to track progress towards the Sustainable Development Goal (SDG) 12.3, which aims to halve per capita global food waste by 2030. The report estimates that the global per capita food waste is 121 kg per year, and that reducing this by 50% would save 2.7 billion tonnes of CO2 equivalent, 1.5 billion hectares of land, and 250 km3 of water annually. (UNEP, 2021)

Too Good To Go is one of the initiatives that supports the goals of SDG 12.3, by providing a practical and convenient way for consumers and businesses to reduce food waste. The app has been successful in Italy and other European countries, as well as in the US, Canada, and Australia. As of March 2021, the app has more than 36 million users, 80,000 partner businesses, and has saved more than 65 million meals from going to waste. The app also claims to have prevented more than 163,000 tonnes of CO2 emissions, equivalent to taking 37,000 cars off the road for a year. (Too Good To Go, 2021)

The app has also received positive feedback from users and businesses, who appreciate the economic, social, and environmental benefits of the service. Users report that they enjoy discovering new places and cuisines, saving money, and feeling good about their contribution to the planet. Businesses report that they increase their revenue, reduce their costs, attract new customers, and improve their image and reputation. Moreover, the app creates a sense of community and solidarity among users and businesses, who share a common vision and mission to fight food waste. (Too Good To Go, 2021)

However, the app also faces some challenges and limitations, such as the availability, quality, and quantity of the food offered, the reliability and convenience of the service, the awareness

and education of the users and businesses, and the legal and regulatory framework of the food sector. Some users complain that they receive too little or too much food, or that the food is not fresh or varied enough. Some businesses complain that they have to pay a commission to the app, or that they have to deal with cancellations, no-shows, or late arrivals of the users. Some users and businesses are not aware of the app, or do not understand how it works, or do not trust its safety and hygiene standards. Some countries and regions have strict laws and regulations on food safety, labeling, and donation, which may hinder the operation of the app. (Bosello et al., 2020)

Therefore, the app needs to address these challenges and limitations, and to improve its service and performance, in order to achieve its full potential and impact. Some of the possible solutions and recommendations are:

To increase the supply and diversity of the food offered, by expanding the network of partner businesses, and by encouraging them to offer different types of food, such as fruits, vegetables, dairy, meat, and fish, as well as prepared meals.

To ensure the quality and safety of the food offered, by verifying the hygiene and storage practices of the partner businesses, and by providing clear and accurate information on the ingredients, allergens, and expiration dates of the food.

To optimize the quantity and price of the food offered, by using data and algorithms to match the supply and demand of the food, and by adjusting the price and portion of the food according to the time, location, and preferences of the users.

To enhance the reliability and convenience of the service, by improving the communication and coordination between the users and businesses, and by offering flexible and convenient options for the reservation, payment, and pickup of the food.

To raise the awareness and education of the users and businesses, by promoting the app through various channels, such as social media, word-of-mouth, and events, and by providing tips and information on how to prevent and reduce food waste at home and at work.

To adapt to the legal and regulatory framework of the food sector, by complying with the local and national laws and regulations on food safety, labeling, and donation, and by advocating for

more supportive and favorable policies and incentives for food waste reduction. (Bosello et al., 2020)

In conclusion, Too Good To Go is an innovative and promising initiative that aims to reduce food waste and its environmental and social impacts, by connecting users and businesses through a mobile app. The app has been successful in Italy and other countries, and has saved millions of meals from going to waste, while providing economic, social, and environmental benefits for both users and businesses. However, the app also faces some challenges and limitations, such as the availability, quality, and quantity of the food offered, the reliability and convenience of the service, the awareness and education of the users and businesses, and the legal and regulatory framework of the food sector. Therefore, the app needs to address these challenges and limitations, and to improve its service and performance, in order to achieve its full potential and impact.

3.2. Solutions to Food Waste in Turkey

While the number of people suffering from hunger is increasing worldwide, the issue of food waste has gained importance. In Turkey, significant food waste occurs mainly in regions with high tourist activity and in major cities. Efforts to curb nationwide food waste are being undertaken by the "Food Waste Prevention and Awareness Platform." This initiative focuses on raising awareness about preventing food waste, particularly in the tourism sector, as indicated by the implementation of the orange flag program (Food Waste Prevention and Awareness Platform, 2018).

The establishment of the Turkey Waste Prevention Foundation (TİSÖV) in 1988 was a pioneering public sector effort in the country (www.israf.org).

3.2.1. Food Banking

This system facilitates the transfer of donated or excess food to those in need. Initially used in the United States since 1967, this system was adopted in Turkey in 2010, leading to the formation of the Food Banking Association (GBD).

To promote the use and expansion of food banking, amendments have been made to the Income Tax Law in Turkey. These changes have allowed donated food items to be listed as expenses.

Additionally, each donated food item's delivery has been exempted from VAT (Value Added Tax).

The GBD (Food Banking Association) conducts prevention efforts related to hunger and poverty. These methods include:

- Raising awareness among the Turkish population about hunger and malnutrition,
- Supporting food banks in Turkey with donations, technology, and financing.
- Facilitating the establishment of new food banks where needed,
- Directing philanthropic individuals towards this purpose.

In its early years, the association distributed excess production foods and those with approaching recommended consumption dates to those in need. In 2014, the association began offering support focused on segments of the population not participating in employment. Consequently, with their experience in this field, they started working on establishing food banks. A new association named the Food Banking and Basic Needs Association (GBTİDER) was formed. GBTİDER established a food bank called “Support Market” in Istanbul Maltepe in 2015, helping disadvantaged individuals to meet their needs like food and clothing for free. This initiative aims to reduce food waste and ensure the proper use of food (GBTİDER, 2015, Food Banking Association, 2015, T.C. Maltepe District Governorship, 2015).

3.2.2. Bread Waste Prevention Campaign

This campaign, initiated by the Turkish Grain Board (TMO), started in 2008 and was the first study in Turkey about bread waste. It was repeated in 2012 and 2013. The study broadly examined bread consumption and waste in Turkey. Any non-consumption of bread, for whatever reason, was considered waste, including feeding stale bread to animals.

The study measured knowledge about bread storage and reuse. It investigated habits related to bread consumption in Turkey, the extent of waste, and how it occurs. The largest 12 cities were chosen as the study universe. Discussions were held with 257 bakeries; 74 hotels, 558 restaurants, and 53 student cafeterias also participated, totaling 738 interviews.

Since household consumption is high in Turkey, households were also included in the study to investigate food waste. Interviews were conducted with one member of 1,648 households, representing 5,652 individuals. These individuals were asked about their bread consumption

habits, including the amount of bread they buy daily and how much they consume. They were also asked about how they utilize leftover bread and their bread storage methods.

Including those who produce bread in the study was also deemed crucial. To this end, interviews were conducted with the managers of 50 flour factories and mills.

Various reasons for bread waste emerged, such as:

Purchasing more bread than needed,

Producing more than can be consumed,

Lack of knowledge about consuming stale bread,

Inadequate storage conditions.

The fundamental reason for bread waste identified in 2012 was due to individuals' lack of knowledge regarding bread consumption. It was found that 6 million loaves are wasted daily, leading to an annual waste worth 1.6 billion Turkish Liras.

Under the coordination of the Ministry of Food, Agriculture, and Livestock and the Turkish Grain Board (TMO), a campaign was conducted in 2013 with various institutions and organizations, following a "Prime Ministerial Circular." Public service announcements, informative posters, and brochures were used. The results of these activities in 2014 showed the following:

- The daily bread consumption per person decreased from 319 grams to 284 grams,
- The number of bread wasted nationwide per person reduced from 5.95 million to 4.9 million,
- Per capita bread waste was reduced from 19.9 grams to 16.2 grams.

3.3.Comparison between Turkey and Italy

Food waste is one of the most significant issues facing the world. It has negative environmental and social impacts. To combat food waste, various measures need to be taken at both individual and institutional levels. This article compares the efforts to tackle food waste in Italy and Turkey.

Italy is one of the leading countries in Europe in the fight against food waste. In 2016, Italy implemented a law to reduce food waste. According to this law, supermarkets that do not donate unsold but edible food to charities face fines. Additionally, businesses that donate food are exempt from waste taxes, and the government allocates budget for research into innovative packaging and transit methods to prevent food waste. The goal is to reduce food waste by 20% by 2020.

Turkey, on the other hand, ranks high globally in terms of food waste. According to the 2021 report of the United Nations Environment Programme (UNEP), each person in Turkey wastes about 93 kilograms of food annually, totaling 7.7 million tons. This corresponds to an economic loss of 555 billion Turkish Lira, or 15% of the national income. Turkey lacks sufficient legal regulations to prevent food waste. However, awareness has increased in recent years, and various campaigns, projects, and initiatives have been launched. For example, in 2019, the Ministry of Agriculture and Forestry initiated the "Turkey Food Waste Prevention Project." This project investigates the causes, scale, and consequences of food waste and develops and disseminates educational materials, seminars, brochures, posters, and videos.

Comparing the efforts of Italy and Turkey in combating food waste, we can draw the following conclusions:

- Italy is more advanced in combating food waste through legal, economic, and technological means. Turkey is still focusing on raising awareness and providing education.
- Italy encourages food donations and penalizes those who do not donate, while Turkey has not yet established a legal mechanism to facilitate food donations and prevent waste.
- Italy allocates budget for research on innovative packaging and transit methods to reduce food waste. Turkey has not yet focused on developing technological solutions for this issue.
- Food waste is both a global and national issue. To prevent it, both individual and corporate responsibilities must be taken. Italy and Turkey, though at different stages in combating food waste, can collaborate to achieve a common goal. Sharing best practices and developing new solutions are important in reducing food waste.

The foundation of Italy's efforts to combat food waste is based on a law enacted in 2016, known as the "Gadda Law." This law includes both incentives and sanctions to prevent food waste. The incentivized measures to prevent food waste are as follows:

- Businesses that donate food are exempt from waste taxes, making food donation a more economically viable option.
- Food-donating businesses are not held responsible for the quality of the donated food as long as they comply with food safety and hygiene standards, thus protecting them from potential legal liabilities.
- Businesses that donate food can benefit from tax deductions proportional to the amount of food donated, providing financial support for these efforts.
- Budgets are allocated for research into innovative packaging and transit methods, fostering the development of technological solutions to reduce food waste.

The punitive measures to prevent food waste include:

- Supermarkets that do not donate unsold but still edible food to charities are fined, making food donation a mandatory practice.
- Businesses failing to meet set targets for preventing food waste are barred from participating in public tenders, encouraging them to comply.

With this law, Italy aims to reduce food waste by 20% by 2020. To achieve this goal, a national database has been established to measure and monitor food waste. Additionally, campaigns, educational programs, and events are organized to raise awareness about food waste.

In Turkey, the foundation of efforts against food waste is the "Turkey Food Waste Prevention Project," launched in 2019. This project investigates the causes, scale, and consequences of food waste and develops widespread educational materials, seminars, brochures, posters, and videos. The project includes:

- Plans to create a national database for measuring and monitoring food waste, allowing for the determination of its extent and sources, and setting targets for reduction.
- Development of legal, economic, and technological solutions to prevent food waste, aiming to create a mechanism that includes both incentives and sanctions.
- Organization of campaigns, educational programs, and events to raise awareness about food waste, aiming to change public knowledge and behaviors.

RESULT

Sustainable development is a concept that aims to provide a quality of life that meets the needs of people today while ensuring that future generations can also meet their needs, encompassing economic, social, and environmental dimensions. Food waste can be seen as both a cause and a consequence of sustainable development. It negatively impacts sustainable development in terms of food security, nutrition, conservation of natural resources, and combating climate change. Conversely, policies, strategies, and actions to prevent food waste are essential for achieving sustainable development.

In this context, comparing and evaluating the efforts of Italy and Turkey in terms of food waste prevention can be beneficial. Italy is a pioneer in combating food waste in Europe. In 2016, Italy passed a law to reduce food waste. According to this law, supermarkets that do not donate unsold but edible food to charities are fined, and businesses that donate food benefit from incentives like tax reductions and waste tax exemptions. Additionally, the law allocates a

budget for research into innovative packaging and transportation methods to prevent food waste. Italy aimed to reduce food waste by 20% by 2020, creating a national database and organizing campaigns, trainings, and events to raise awareness about food waste. Italy's efforts in this area contribute to both the economic and environmental dimensions of sustainable development, supporting food security and nutrition as well as conservation of natural resources and the fight against climate change.

Turkey, on the other hand, ranks high globally in terms of food waste. According to the 2021 report of the United Nations Environment Programme (UNEP), Turkey discards 93 kilograms of food per person annually, totaling 7.7 million tons, equating to an economic loss of 555 billion Turkish Lira and corresponding to 15% of the national income. Although there is no sufficient legal regulation in Turkey to prevent food waste, awareness has increased in recent years with various campaigns, projects, and initiatives. For example, in 2019, the Ministry of Agriculture and Forestry launched the "Turkey Waste Prevention Project." This project investigates the causes, dimensions, and consequences of food waste and develops trainings, seminars, brochures, posters, and videos to prevent it. Turkey's efforts aim to contribute to the social and environmental dimensions of sustainable development, supporting food security and nutrition as well as the conservation of natural resources and the fight against climate change.

Comparing the efforts of Italy and Turkey in food waste prevention from a sustainable development perspective leads to the following conclusions:

Italy is more advanced in combating food waste through legal, economic, and technological means, while Turkey is still in the stage of raising awareness and providing education.

Italy encourages food donations and penalizes non-donors, whereas Turkey has not yet established a legal mechanism to facilitate food donations and prevent waste.

Italy allocates budgets for research on innovative packaging and transportation methods to reduce food waste, whereas Turkey has not focused on developing technological solutions for this purpose.

Italy has created a national database to measure and monitor food waste and has successfully reduced it by 20% by 2020. Turkey is establishing a national database to measure and monitor food waste and setting targets for reduction.

Food waste is both a global and national issue. Individual and institutional responsibility is essential to prevent it. Italy and Turkey, although at different levels in combating food waste, can collaborate to achieve a common goal. Sharing good practices and developing new solutions are important to reduce food waste.

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