



**Plan of the City of Sarajevo
on prevention and reduction of food waste
2021-2025**

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LIST OF ABBREVIATIONS

BiH	Bosnia and Herzegovina
CR	Czech Republic
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
GFN	Global FoodBanking Network
GHG	Greenhouse gas
MoE	Ministry of Environment
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Co-operation and Development
REC	Regional Environmental Center
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNICEF	United Nations Children Emergency Fund
WBIF	Western Balkans Investment Framework

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ASSIGNMENT

Assignments for this work have been delivered in advance as the baseline summarizing suggestions and the structure of the plan of the City of Sarajevo on prevention and reduction of food waste 2021-2025 in Bosnian(A) and English language (B).

A) Assignment in Bosnian language

Plan Grada Sarajeva za sprečavanje i smanjenje nastajanja otpada od hrane 2021 - 2025

- Ključne mjere i pripadajuće aktivnosti kojima se djeluje na sprječavanje nastajanja otpada od hrane duž cijelog prehrambenog lanca.
- Potvrda predanosti Grada Sarajeva ostvarenju plana EU i ciljeva UN-ove Agende 2030. za održivi razvoj

STRUKTURA:

1. Pravni osnov
2. Uvod (podaci i definicije)
3. Cilj
4. Odrednice Plana

Analiza zakonodavnog okvira, izrada vodiča, uspostava sistema sprječavanja i smanjenja nastajanja otpada od hrane, preusmjeravanje viškova te smanjenja bacanja hrane, razmjena informacija što treba doprinijeti razumijevanju negativnih učinaka gubitka, neiskorištavanja i bacanja hrane kao i jačanju motiviranosti građana za odgovornim postupanjem s hranom.

5. Mjere i aktivnosti

- Analiza zakonodavnog okvira, uključujući edukaciju o istom te izradu vodiča u svrhu pojašnjavanja odredbi i detektovanja gdje su potrebne izmjene
- Uspostava i rad Sarajevo Food Lab-a koji okuplja sve relevantne pojedince i institucije koji se bave ovom tematikom
- Izrada Studije izvodivosti Banke hrane u Sarajevu te zavisno o rezultatima Studije, umrežavanje ciljnih grupa u svrhu pokretanja daljnjih aktivnosti
- Poticanje boljeg iskorištavanja fondova EU i drugih donatora u području sprječavanja otpada od hrane i doniranja hrane
- Promocija društvene odgovornosti prehrambenog sektora- koordinirano djelovanje prema proizvođačima hrane, distributerima, trgovcima, ugostiteljskom sektoru te institucionalnim kuhinjama kroz izradu sektorskih vodiča, sklapanje dobrovoljnih sporazuma o smanjenju otpada od hrane, doniranja hrane i motivaciju kroz dodjelu posebnih priznanja za najistaknutije primjere dobre prakse u sprječavanju nastajanja otpada od hrane

- Uspostavljanje digitalne Platforme za dijeljenje vlastitih iskustava, medijske kampanje, pisane brošure kroz koju će se provoditi edukacija, odnosno posredno i neposredno djelovati prema krajnjem potrošaču u vidu podizanja svijesti o problematici otpada od hrane te razumijevanja oznaka datuma roka trajanja na hrani
 - Edukacija djece predškolske i školske dobi te stručno usavršavanje odgojno – obrazovnih radnika
 - Utvrđivanje količina otpada od hrane
 - Podsticanje istraživačkog rada i inovativnih rješenja koja doprinose sprječavanju i smanjenju nastajanja otpada od hrane
6. Praćenje indikatora učinka mjera predviđenih Planom
 7. Vremenska dinamika provedbe Plana
 8. Finansijska sredstva za provođenje Plana

B) Assignment in English language

Plan of the City of Sarajevo on prevention and reduction of food waste 2021-2025

- Key measures and related activities to prevent food waste from emerging along the entire food chain.
- Reaffirming the City of Sarajevo's commitment to the achievement of the EU plan and the objectives of the UN Agenda 2030 for Sustainable Development

Structure:

1. Legal basis

2. Introduction (data and definitions)

3. Target

4. Plan Options

Analysis of the legislative framework, development of guides, establishment of a system for preventing and reducing the generation of food waste, redirecting surpluses and reducing food waste, exchanging information on what should contribute to understanding the negative effects of loss, non-use and food waste, as well as strengthening citizens' motivation for responsible treatment of food.

5. Measures and activities

a) Analysis of the legislative framework, including education on the same and the development of a guide to clarify the provisions and detect where amendments are needed

b) Establishment and **operation of Sarajevo Food Lab** that brings together all relevant individuals and institutions dealing with this topic

c) Preparation of the **Feasibility Study of the Food Bank** in Sarajevo and depending on the results of the Study, networking of target groups for the purpose of launching further activities

d) Encouraging better use **of EU funds and other donors** in the field of food waste prevention and food donation

e) Promotion of social responsibility of the food sector - coordinated action towards food producers, distributors, retailers, hospitality sector and institutional kitchens through the development of sectoral guides, conclusion of voluntary agreements on reducing food waste, food donation and motivation through the granting of special recognitions for the most prominent examples of good practice in preventing the emergence of food waste

f) **Establishment of a digital Platform** for sharing one's own experiences, media campaign, written brochure through which education will be conducted, i.e. indirectly and directly act towards the end consumer in the form of raising awareness of the issue of food waste and understanding the expiration date labels on food

g) Education of preschool and school-age children and professional development of educational workers

h) Determining the quantities of food waste

i) Boosting research work and innovative solutions that contribute to preventing and reducing the generation of food waste

6. Monitoring the impact indicators

7. Timeline of the implementation of the Plan

8. Financial resources for the implementation of the Plan

1. Introduction

The City of Sarajevo, similarly as other cities and countries, is going to take action in reduction and prevention of food waste and losses. Food waste is a global complex problem as it brings very serious social, environmental and economical impacts that are interconnected. Disposed food waste is a source of emissions of GHGs that are generated in landfills and at the same time the food is missed by more than 20% of the population of Bosnia and Herzegovina (BiH) who are estimated to be living at or below the absolute poverty line. Food waste and loss prevention also represents financial potential to save costs connecting to food waste processing and usually ineffective usage of food sources. That is why food waste deserves high priority and attention by various actors to set up smart strategies and implement effective measures ensuring food waste reduction. From the point of view of the circular economy, let's consider waste as valuable material, no waste. In case of food waste is this attitude absolutely appropriate as food surplus can be distributed to help and feed many people in need.

The aim of the work is to suggest a solution helping to reduce 500 tons of food waste which are daily landfilled in Bosnia and Herzegovina. Specific focus is dedicated to the City of Sarajevo that is focusing on food waste situation analysis. Based on findings, there is evidence that more than 12% of daily waste disposal at the landfill consists of discarded food in Canton Sarajevo. City of Sarajevo is aiming to adopt food waste prevention measures that might have potential to be spread and scaled to other parts of the country.

The author of this work is developing the structure of the Plan of the City of Sarajevo on prevention and reduction of food waste 2021-2025 (Assignment) which was provided as a baseline document. Comments and suggestions are based on findings within literature research, interviews with the director of Food Bank Prague and own experience with food waste prevention practices in the Czech Republic, home country of the author.

2. Legal basis

Food waste policies development

Food waste has no long history in terms of policy internationally as the first action was taken by 2010 when the “Preparatory study on food waste across EU27” was published. Lately In 2011, the FAO reported that about one-third of all food production gets lost or wasted and is not consumed by humans which boosts next EU actions in the form of policies¹. We can observe the development of several series of policies, which is showing the importance and increasing support of the food waste prevention issue.

Closing the loop – An EU action plan for the Circular Economy

In 2014, the European Commission launched an initial circular economy package. In the final action plan entitled “Closing the loop”, food waste is identified as a priority area with an EU commitment to food waste reduction.²

EU Green Deal and “Farm to Fork” strategy

European Commission is the author of the European Green deal which is a set of policy initiatives aiming to make Europe climate neutral by 2050. Issue of food waste prevention is described in one of the parts within the “Farm to Fork” strategy that is considered as a key document of European Green Deal. The Farm to Fork Strategy’s action is a long-term plan containing legally binding targets for food waste reduction by 2030. In a nutshell: “Farm to Fork strategy aims to make the food system fairer, healthier, and more environmentally friendly over the next decade. This would mean that the way we purchase and consume food will change in some ways.”

The [Farm to Fork strategy](#) addresses 3 key areas of the food supply chain: production, transporting, and food waste. Specifically, the strategy is focusing on promoting organic farming and food, innovative packaging and single-use cutlery, sustainable alternative protein options, changes in food labels and food security.³

¹ Bos-Brouwers, H., Burgos, S., Colin, F., Graf, V., 2020: Policy recommendations to improve food waste prevention and valorisation in the EU. REFRESH Deliverable 3.5. Available at: <https://eu-refresh.org/policy-recommendations-improve-food-waste-prevention-and-valorisation-eu>

² European Commission, 2015. Closing the loop - An EU action plan for the Circular Economy. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52015DC0614>

In case of food waste prevention the Commission is committed to halving per capita food waste at retail and consumer levels by 2030 (SDG Target 12.3). There is a new methodology for measuring food waste and data are expected from member states in 2022. Results will help to set up a baseline and propose targets to reduce food waste across the EU. Then the food loss and waste prevention will be integrated in other EU policies.

Obviously, there is a long term misunderstanding and misuse of date marking ('use by' and 'best before' dates) lead to food waste. Also this issue will be revised as well as quantification of food waste levels and food losses at the production stage will help to explore ways of preventing them. "Coordinating action at EU level will reinforce action at national level, and the recommendations of the EU Platform on Food Losses and Food Waste will help show the way forward for all actors."⁴

EU Food donation guidelines

European Commission adopted EU Food donation guidelines (2017/C 361/01) as a part of the Circular Economy Action Plan published 16 October 2017. This 42 pages document is covering all the important information considering food donation.

EU food donation guidelines seek to:

- facilitate compliance of providers and recipients of surplus food with relevant requirements laid down in the EU regulatory framework (*e.g.* food safety, food hygiene, traceability, liability, VAT, *etc.*);
- promote common interpretation by regulatory authorities in the EU Member States of EU rules applying to the redistribution of surplus food³.

Food redistribution in the EU

European Commission also published another practical and useful document: Food redistribution in the EU - Mapping and analysis of existing regulatory and policy measures impacting food redistribution from EU Member States. It is a 300 pages document that is describing policies connected to food donation in each EU member country⁴.

Agenda for Sustainable Development Goals, UN

The Agenda for Sustainable Development Goals is connected to the issue of food waste within SDG 2 - zero hunger and mainly within SDG 12 - Ensure sustainable consumption and production

³ European Commission, 2017. EU Food Donation Guidelines. Available at: https://ec.europa.eu/food/safety/food_waste/eu_actions/food-donation_en

⁴ Bos-Brouwers, H., Graf, V., Aramyan, L., & Oberc, B. (2020). *Food redistribution in the EU – Mapping and analysis of existing regulatory and policy measures impacting food redistribution from EU Member States*. EU. <https://doi.org/10.2875/406299>

patterns, particularly target 12.3. that aims to “halve per capita food waste at the retail and consumer levels, and reduce food losses along production and supply chains by 2030”. The indicator is the Global Food Loss Index.⁵

Food safety and hygienic rules in EU

Food donation has to be in compliance with General Food Law and EU rules on food hygiene which can sometimes be accompanied by national measures and/or guidance by each country. The basic rules are defined by General Food Law (Regulation (EC) No 178/2002)⁶ and Food Hygiene Package (Regulation (EC) No 852/2004⁷ and 853/2004)⁸. There are specific rules for food supply chain actors operating with products of animal origin (meat, fishery and aquaculture products, dairy products, eggs and egg products, etc.) as they must apply specific hygiene requirements of Regulation (EC) No 853/2004.⁸ “EU food hygiene rules are general and offer a large degree of flexibility according to the type of establishment, but they often involve:

- The registration of the establishment to competent authorities
- The application of good hygiene practices
- The implementation of procedures based on Hazard Analysis and Critical Control Point (HACCP) principles.”⁹

Food surplus from HORECA sector

Food donation is more complicated and limited for the hospitality and catering sector for food safety reasons. However, there is usually a space for specific attitude and identification of particular situations and cases “for example, cooling meals at the end of service can facilitate food donation. Some Member States and trade organisations have established or are currently developing specific guidelines for the sector”.⁹

Financial rules on food donations

⁵ UN, 2015. Sustainable Development Goals. Available at: <https://sdgs.un.org/goals>

⁶ General Food Law (Regulation (EC) No 178/2002). Available at: <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32002R0178>

⁷ Regulation (EC) No 852/2004. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32004R0852>

⁸ Regulation (EC) No 853/2004. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32004R0852>

⁹ European Commission. 2017. Factsheet: Donating food in the EU: food safety and hygienic rules. Available at: https://ec.europa.eu/food/sites/food/files/safety/docs/fw_factsheet_fd_safety-hygiene_en.pdf

One of the main financial issues in the context of food donation are taxes. Based on European Commission, article 7.2. (2017/C 361/01)³, tax barriers should not prevent food donation.

Value added tax

Value added tax (VAT) should support the transfer of surplus food from donors to food banks and other charity organisations. “VAT rules and other fiscal instruments can provide economic incentives for food donation to support the redistribution of surplus food and the prevention of food waste. The EU VAT Committee agreed on guidelines to ensure the uniform application of the VAT Directive across Member States.”¹⁰

“[...] the taxable amount shall be the purchase price of the goods (or of similar goods or, in the absence of a purchase price, the cost price of the goods) donated, adjusted to the state of those goods at the time when the donation takes place [...]”¹⁰

Recommended attitude is when “little or no VAT is paid on food donation as the value of the donated food close to its ‘best before’ or ‘use by’ date is small or zero” as it is in several EU countries as well as in the Czech Republic.¹⁰

Fiscal incentives for food redistribution in the Czech Republic

In the Czech Republic, there are guidelines for the application of VAT in the specific case of donation of foodstuffs to a food bank established by the General Directorate of Finance. These guidelines, aimed at retailers, charities and food banks, laid out how to calculate the VAT rate to reduce to zero or close to zero on donated food items. Several steps like the definition of the rules for VAT were initiated due to the Ministry of Agriculture that is supporting the dialog in the form of round tables between deputies of food banks and the government. These meetings surfaced the need to develop the various existing guideline documents, such as the “Guidelines for the application of VAT to food donated to food banks”, issued in 2014¹⁸⁰.⁴

Rules for tax donations in EU

Generally, there can be observed two ways in the EU how to set up rules for taxes for food donation:

- 1) **Tax deductions** - Stimulation of food donation by offering tax deductions - applied in majority of EU member states e.g. “In Portugal, donors can deduct up to 140 % of the value of the food at the time of donation (limited to 8/1000 of the donor’s turnover) if the food will be used for a social purpose”.^{3, 10}
- 2) **Tax credits** - Providing tax credits in support of redistribution schemes - applied only in a minority of EU member states e.g. “In France and Spain, 60 % and 35 % respectively of the net book value of donated food can be claimed as a corporate tax credit. This percentage can be deducted from the corporate tax on their revenue”.^{3, 10}

The information about financial rules are clearly arranged in the factsheet¹⁰ published by the European Commission that summarizes this topic. Detailed overview about the financial system in European food banks of EU member countries is processed in the document *Food redistribution in the EU – Mapping and analysis of existing regulatory and policy measures impacting food redistribution from EU Member*.⁴

Legal basis in Bosnia and Herzegovina

Bosnia and Herzegovina is a signatory of the Paris Agreement signed on April 22, 2016, which along with the other United Nations (UN) member states confirmed the commitment to reduce food waste by 50% until the year 2030, set out in the 2030 Agenda for sustainable development, adopted at the UN summit in New York, in September 2015.

The Green Agenda for Western Balkans

The Green Agenda for Western Balkans is a strategy created to accompany The European Green Deal. The Green Deal's main goal is to take Europe to climate neutrality by 2050. To create “the first climate-neutral continent” it is necessary to engage also the EU’s neighbours in the Western Balkans. Commitment in the form of the Green Agenda was confirmed on Western Balkan Summit in Sophia, 10 November 2020 by leaders of six countries involved in The Green Agenda: Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia.

The Green Agenda for Western Balkans focuses on 5 main areas: Decarbonisation: climate, energy, mobility; Circular economy; Depollution: air, water & soil; Sustainable food systems & rural areas; Biodiversity: protection & restoration of ecosystems.

Issue of food waste prevention is part of the area of Sustainable food systems & rural areas where it is claimed that: “The EU will assist the agri-food sectors in the region to increase food security and quality, reduce waste, improve compliance with EU food safety and animal welfare standards, and promote environmentally friendly and organic farming”.

Also the area of Circular Economy is concerned with preventing waste in general: “Preventing waste from being created in the first place is key, but once waste has been created, it needs to be transformed into high-quality resources. The region has to look for options to reduce the consumption footprint and increase the circular material use rate, which in turn will boost economic growth.” Generally, the transition to a circular economy is crucial for EU and Western Balkans therefore the EU is ready to support Western Balkan partners “in developing strategies to improve the sustainability of raw material production, preventing, reducing, recycling and managing waste looking at the entire lifecycle of products.”¹²

The area of Depollution: air, water and soil is focusing on food loss and waste reduction together with preventing land degradation and deforestation as well as promoting sustainable food production.

¹⁰ European Commission, 2017. Factsheet: Financial rules on food donation. Available at: https://ec.europa.eu/food/sites/food/files/safety/docs/fw_factsheet_fd_financial-rules_en.pdf

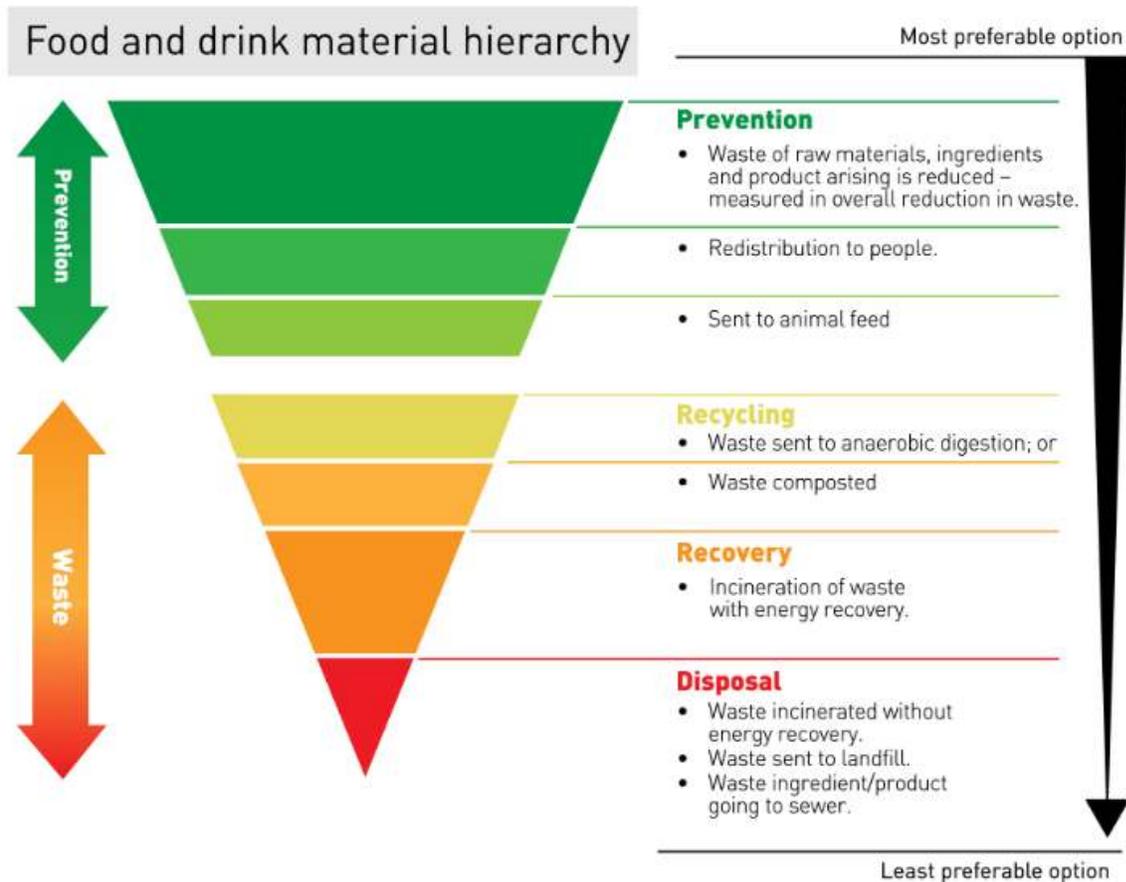


Fig. 1 Food waste hierarchy obtained from WRAP (2018).

3. Data and definitions

To understand the terminology connected to food waste, there are several definitions to be explained e.g. food loss, food waste, food supply chain, best before, use by date.

Food loss

Food loss is defined as ‘the decrease in quantity or quality of food. Food loss typically takes place at the production, storage, processing, and distribution stages in the food value chain. It’s usually the unintended result of an agricultural process or technical limitation in storage, infrastructure, packaging, and/or marketing.¹¹

Food waste

Food waste is part of food loss and refers to discarding or alternative (non-food) use of food that is safe and nutritious for human consumption along the entire food supply chain, from primary production to end household consumer level.¹¹ It refers to food that is of good quality and fit for consumption, but does not get consumed because it is discarded—either before or after it is left to spoil. Food waste typically, but not exclusively, takes place at the retail and consumption stages in the food value chain. It's usually the result of negligence or a conscious decision to throw food away.

Although both food loss and waste happen all over the world, food loss tends to be more prevalent in developing countries, while food waste tends to be more prevalent in developed countries. The difference in the terminology is due to the fact that food waste is often easier to solve with education. Reducing food loss requires smart logistical improvements.

Food supply chain

The food supply chain is the connecting series of activities used to produce, process, distribute and consume food. The food supply chain starts when the raw materials for food are ready to enter the economic and technical system for food production or home-grown consumption.¹²

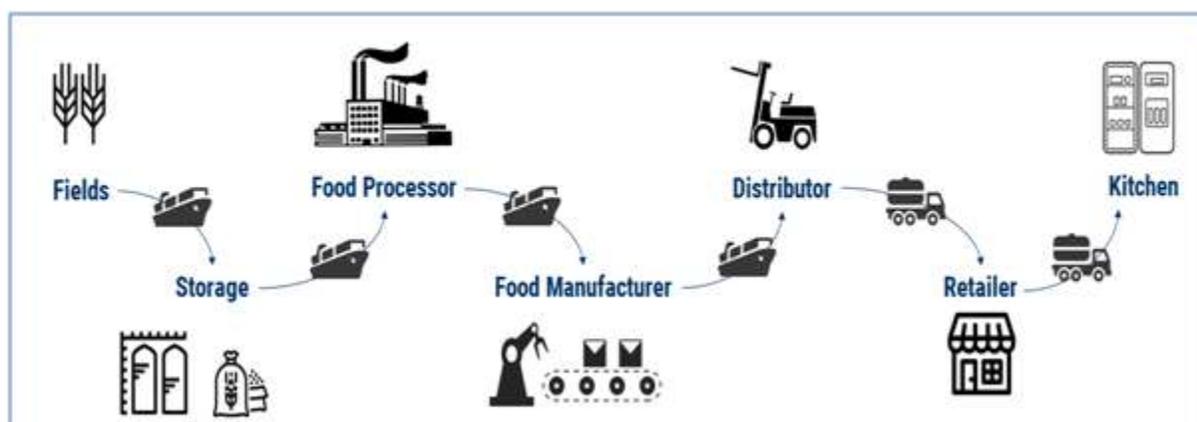


Fig 3. Food supply chain, INSIGHTS, 2017

Best before

¹¹ FAO. Food loss and food waste. Available at: <http://www.fao.org/food-loss-and-food-waste/flw-data>

¹² FUSIONS. Definitional Framework for Food Waste Full Report 2014 Available at: <http://www.eu-fusions.org/phocadownload/Publications/FUSIONS%20Food%20Waste%20Quantification%20Manual.pdf>

indicates the date until when the food retains its expected quality. Food is still safe to consume after the indicated “best before” day on the condition that storage instructions are respected and packaging is not damaged, but it might begin to lose its flavor and texture.¹³

Use by date

Don't use any food after expiration of the “use by” date. It indicates the date until when the food can be eaten safely.¹³

Global problem of food waste

Food waste is recognised as a very complex and global problem. It is defined as one of the Sustainable Development Goals (SDGs) as it brings sociological, environmental and economical impacts. However, there are several world organizations and institutions besides the UN's SDGs focusing on the issue of food waste. Most relevant data are available from FAO, UNDP, EU etc. The most commonly used data are:

- Around 1/3 of the world's food was lost or wasted every year. (FAO, 2011)
- Food waste is roughly 30 percent of all food globally which refers to 1.3 billion tonnes per year. (FAO 2015)
- More than 830 million people do not have enough to eat today.¹⁴

Data shows that the most food waste within the food supply chain is generated by consumers: *“European consumers at home are the biggest wasters with a share of 38%. This is followed by agriculture (23%), the hotel and catering sector (14%), the processing and storage sector (12%), supermarkets (9%) and the food industry (5%).*¹⁵ The most wasted commodity at households are fruit and vegetable, and cereals.¹⁶ However, there might be differences between regions. The study shows that that is correlation between level of development and amount of food waste when: *“Regionally, about 56 percent of total food loss and waste occurs in the developed world—North America, Oceania, Europe, and the industrialized Asian nations of China, Japan, and South Korea—whereas the developing world accounts for 44 percent of the loss”.*⁸

¹³ European Commission. Factsheet: “Best Before” and “Use By” dates on food packaging Understand them right to prevent food waste and save money. Available at: https://ec.europa.eu/food/sites/food/files/safety/docs/fw_lib_best_before_en.pdf

¹⁴ FAO. The state of food and agriculture. 2019. Available at: <http://www.fao.org/3/ca6030en/ca6030en.pdf>

¹⁵ Netherlands Nutrition Centre. 2014. Fact sheet: Consumer food waste. Available at: https://ec.europa.eu/food/sites/food/files/safety/docs/fw_lib_vc_sheet_voedselverspilling_en.pdf

¹⁶ Lipinski, B., et al., Reducing Food Loss and Waste, working paper, in Creating a sustainable food future. 2013, World Resource Institute: Washington. Available at: https://pdf.wri.org/reducing_food_loss_and_waste.pdf



Fig. 2. Global data about food waste, Aljazeera/ FAO, UN, 2019

Data and situation in Bosnia and Herzegovina

As there is no implemented mechanism to measure and evidence food waste regularly and systematically, there is no exact data so far for the BiH. However, this challenging task is planned to be realised by the City of Sarajevo. As usual, food waste is created within each phase and by each actor of the food supply chain.

“It is estimated that there is 500 tons of food waste which is daily landfilled in Bosnia and Herzegovina. Based on findings, there is evidence that more than 12% of daily waste disposal at the landfill consists of discarded food in In Canton Sarajevo.¹⁹ Furthermore, about 20% of the population are estimated to be living at or below the absolute poverty line.

According to Cero et al (2018), the average waste generation rate is 0.89 kg/cap/day (2015 data), the total amount of municipal waste generated annually is around 1.3 million tons (2015). Food waste (organic waste) is the dominant fraction and varies from 25 % (cantonal average) up to 50 % (municipal average).¹⁷

¹⁷ Cero, M., Silajdžić, I., Kurtagić M., 2018. Waste Management in Bosnia and Herzegovina – Current Situation and Perspectives. Available at: https://www.vivis.de/wp-content/uploads/WM8/2018_wm_109-118_cero?fbclid=IwAR0O0wfAIPrf6gxdYz3hMtB-2MzBKRpKXMW8AuRzoHmwhQi9_-sRiyoH9Yo

4. Target

To tackle the issue of food waste across the entire supply chain it is necessary for the government to set targets, implement new policies, and create campaigns aimed at preventing food waste.

“Targets set ambition, and ambition motivates action. That’s why we see target-setting as an important first step toward achieving big reductions in food loss and waste”.¹⁸

Target on food waste

To define targets for food waste reduction within a country, relevant data has to be collected first. There is already some data connected to food waste for all the BiH and also for Sarajevo canton. However, data are not specified for each sector of the food supply chain.

General target on food waste

The general objective is suggested to be to reduce food waste generated across all the food supply chain sectors in Canton Sarajevo. The objective is supposed to contribute to the realisation of the goals set out in the EU and UN 2030 Agenda for Sustainable Development with the relevant Sustainable Development Goals, specifically Target 12.3 Ensure sustainable consumption and production patterns, with the specific aim to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains.

Specific objectives on food waste

- To redirect a food surplus that generated across all the food chain sectors towards people in need.
- To promote the food waste prevention plan among all the actors of the food supply chain, educate them about the issue and measures and motivate them to participate in it.
- To map all the generators and streams of food waste to reveal potential donors of food surplus as well as map potential recipients organisations and charities who would accept and redistribute donated food surplus.
- Establish a food bank.

UN SDGs target

¹⁸ Lipinsky, B. 2017. How the World Can Cut Food Loss and Waste in Half.
Available at: <https://www.wri.org/insights/how-world-can-cut-food-loss-and-waste-half>

Bosnia and Herzegovina as a member of the United Nations is supposed to adopt and follow UN SDGs 12.3. that aims to “halve per capita food waste at the retail and consumer levels, and reduce food losses along production and supply chains by 2030”. Based on existing data connected to food waste in BiH and Sarajevo Canton, there can be estimated the target for food waste reduction commitment.

BiH target on food waste

- **Estimate for current situation:**
 - 500 000 t/ year of food waste

- **Estimate target 2030 on food waste:**
 - 250 000 t/ year of food waste

Data has been used from the UNDP BiH article:“ Estimates show that nearly 500 tons of food waste end up at the landfill every day. In Canton Sarajevo, more than 12% of daily waste disposal at the landfill consists of discarded food”.¹⁹

Sarajevo Canton

- **Estimate for current situation** (based on limited available data):
 - 50-63 t food waste is generated daily in Sarajevo Canton (= 18 250 - 22 995 t/ year)
- **Calculation:**
 - 438 443 (no.of Sarajevo Canton inhabitants) x 0,00089 t/cap/day of waste in BiH = 390,21 t x 0,15 (average percentage of food waste in municipal waste in Sarajevo, different data sources) = 59 t of food waste per day (= 21 535 t/ year)

- **Estimate for target 2030 on food waste:**
 - 29,5 t food waste per day (= 10 768 t/ year)

Additionally, CENER states in its article that “Research carried out at the University of Sarajevo indicates that around 2000-3000 t of food waste is generated each year in Canton Sarajevo in the hospitality industry only and disposed of at the city landfill”.²⁰

Data on food waste generated by other food supply chain actors would help to illustrate the whole situation across all the sectors e.g. households, supermarkets, manufacturers, agricultural business etc. It is recommended to specify data on food waste for each sector of the food supply chain and choose the adequate measure for food waste reduction.

¹⁹ UNDP BiH. 2020. Food waste: our daily dread. Available at: https://www.ba.undp.org/content/bosnia_and_herzegovina/en/home/Blog/FoodWaste-OurDailyDread.html

²⁰ CENER. 2018. Reducing food waste in Bosnia and Herzegovina. Available at: <https://cener21.ba/2018/09/15/reducing-food-waste-in-bosnia-and-herzegovina/>

5. Plan Options

There is several steps needed to realize as they were already suggested in Assignment: Analysis of the legislative framework, development of guides, establishment of a system for preventing and reducing the generation of food waste, redirecting surpluses and reducing food waste, exchanging information on what should contribute to understanding the negative effects of loss, non-use and food waste, as well as strengthening citizens' motivation for responsible treatment of food.

All these tasks have to be analyzed and prepared to ensure a sustainable food waste prevention system. Some of these tasks are going to be commented on and developed in the following chapters.

6. Measures and activities

a) Analysis of the legislative framework

Analysis of the legislative framework, including education on the same and the development of a guide to clarify the provisions and detect where amendments are needed.

The complex guidelines/ guidebook is a document informing about the legislative framework and stressing new challenges and changes necessary to adopt within the law based in the context of measures the City of Sarajevo is going to implement.

b) Sarajevo Food Lab

Establishment and operation of Sarajevo Food Lab that brings together all relevant individuals and institutions dealing with this topic.

Food lab does not have an official definition so far. However, these are usual terms for a research and innovation center with a mission to find solutions to reduce food waste and support a sustainable food system. Food lab is based on collaboration of various actors across sectors which is developing diverse perspectives.

Food lab operation

Food labs can be in the form of individual organizations, or centers connected to universities, companies or its accelerating incubators. Food lab is usually understood as a physical place, center. However, the core of the food lab are appropriate individuals which might be also called a working group of experts on food waste. In the consequences of today's situation connected to the coronavirus pandemic, this working group of experts might work together online and create a virtual platform for meetings. It is also possible to create a partnership with some of the coworking spaces/ hubs in Sarajevo. Another option is to share the space with some other local NGO, or

other similarly oriented organization in Sarajevo. Coworking centers/ hubs are usually serving not only space to work and meeting rooms but they are also supporting innovative ideas and initiatives with positive impacts.

Mission of Food lab

Main idea of the food lab is to bring together relevant individuals and institutions that are working on solutions for the food waste prevention and reduction regularly. Interdisciplinary team members from different fields together with deputies of food supply chain from practice can suggest very progressive ideas and strategies for food waste prevention. The experience from the actors from practice is crucial as well as other experts from the field of IT, economy, innovation, logistic, project management, communication, design thinking, human centered design, etc.

Food lab members cooperate together and they are coordinated by the project coordinator of the center. Food lab can be funded from national/ international donation programs or from private sector e.g. companies within their social responsibility programs.

Food lab and Food hub

There is also a term “Food hub” which might be used as synonyms of “food lab”, but sometimes it can differ from it as in some cases food hubs refer more to the body connecting local farmers with local restaurants and other food retailers aiming to shorter and quicker food supply chains and support local small scale farmers. However, it is very individual what mission and activities will be part of the agenda of Food lab or Hub, and from some point of view it can be just word-splitting.

The USDA Regional Food Hub Resource Guide defines Food hub as “a business or organization that actively manages the aggregation, distribution and marketing of course-identified food products primarily from local and regional producers to strengthen their ability to satisfy wholesale, retail and institutional demand”. (DreamHub, 2018)

Establishment of a food lab is supposed to have a positive impact as this group represents the best mixture of local experts on food waste from the food supply chain.

Inspiration from abroad

- **Foodhub.hu in Budapest**

This food hub aims “to reconnect small-scale farmers directly with businesses looking for local, high-quality fresh ingredients, be they restaurants, farmer’s markets or food retailers”. Their mission is to cultivate relationships between food system actors to build a community that fosters transparency and fair business. Some of their projects were funded from the EU's Horizon 2020 research and innovation program.²¹

- **Food system Lab in Canada**

This food lab is connected to Simon Fraser University, Burnaby, Canada so the actors are mainly students and researchers of the university. They have been asked to contribute to Canada's food policy. They are experienced with realisation of social innovation workshops and hackathons. The Lab is trying to fulfill its commitment to reconciliation, innovation, as well as inclusivity in developing food systems solutions.²²

- **Food Hub in Kane County, Illinois, USA**

Kane County Food Hub prepared a well structured feasibility study in 2015 with the aim to determine an optimal business model based on the identified characteristics and needs of stakeholders across the local food value chain.²³

c) Feasibility Study of the Food Bank in Sarajevo

Preparation of the Feasibility Study of the Food Bank in Sarajevo and depending on the results of the Study, networking of target groups for the purpose of launching further activities.

According to Global Food Banking Network (GFN), a food bank is an organization formed to procure surplus, wholesome, and safe food from the commercial food system that might otherwise go to waste or to landfills and repurpose it for distribution to those facing hunger, typically through community service organizations. Food banks create a win-win situation by redirecting this surplus, safe food from food producers, reducing negative environmental impacts and supplying the excess food to the hungry.

²¹ Foodhub.hu Budapest. More information available at: <http://foodhub.hu/>

²² Food system Lab in Canada. More information available at: <https://foodsystemslab.ca/>

²³ Food hub Kane. Feasibility study. Available at: <https://www.countyofkane.org/FDER/Documents/Food%20Hub/Kane%20County%20Food%20Hub%20Feasibility%20Study%20Summary%20Report.pdf>

The very first food bank was established 50 years ago, in 1967 in Phoenix, Arizona, by John van Hengel. The concept has spread to the national level and today there are about 200 food banks in the USA (Feeding America, 2021).



THE STATE OF GLOBAL FOOD BANKING 2018: NOURISHING THE WORLD 08

Fig 4. How food banking works, *The state of global foodbanking, 2018*

Efficiency:

According to GFN, the food bank model is a highly effective hunger relief solution. Food banks play an important role in ensuring food security in all countries. Food banks play a vital role in redirecting surplus, wholesome food to the hungry. In light of the international community's commitment to end hunger by 2030, as articulated in the UN Sustainable Development Goals (SDGs), it is important to better understand the unique and valuable service food banks provide to feed the hungry and reduce food insecurity in nations and communities around the World.

- More information on website of GFN: <https://www.foodbanking.org/>²⁴

²⁴ GFN. 2018. Report: State of Global Food banking. Available at. <http://www.foodbanking.org/wp-content/uploads/2018/10/GFN-The-State-of-Global-Food-Banking-2018.pdf>

Actors in the redistribution of food surplus

Food surplus is generated by food operators in each stage of the food supply chain. Based on definition by EU guidelines on food donation we can define two main groups of actors within redistribution of food surplus i.e. “Donor” organisations and “Receiver” organisations.

Actors in the redistribution of food surplus	
“Donor” organisation	“Receiver” organisations
<ul style="list-style-type: none"> • Primary production e.g. agricultural sector 	<ul style="list-style-type: none"> • Back line organisations - e.g. food banks. These organisations receive food surplus directly from donor organisations. They ensure the transportation, storage and redistribution of the food surplus via charities, social enterprise and NGO’s. In some countries food banks provide food surplus also directly to individual beneficiaries.
<ul style="list-style-type: none"> • Food processing and manufacturing e.g. food producers 	
<ul style="list-style-type: none"> • Retail and other distribution e.g. supermarkets, groceries 	<ul style="list-style-type: none"> • Front line organisation - These organisations receive food surplus from “back line organisations or directly from food actors. They ensure distribution directly to their clients e.g. directly to people in need, soup kitchens, etc.
<ul style="list-style-type: none"> • Catering and hospitality sectors e.g. HORECA sector 	

Tab 2. Actors in the redistribution of food surplus, EU guidelines on food donations, 2017

Receiver organisations

NGOs and charities

Usually cooperation between food banks and charities is created very naturally and organically. Charities that cooperate with people in need are usually very open to these partnerships. It is recommended that receivers are those who are ensuring the transportation and they are coming for food to the central storage of the food bank. This is a very effective partnership as the NGOs already have their net of clients in need.

Cooperation of food banks and refugee camps in BiH represents another effective way to distribute food very effectively directly to those who are in crisis. Sometimes refugee camps are

located remotely from the city, so the logistics and transportation have to be organised and managed.

Individuals in need

Food bank of Prague is preparing to also own food donation bags and ensure distribution twice a week. Paper bags are prepared early in the morning and then distributed by employees of or volunteers of the food bank. There is a specific administration - people in need can come for the bag one per week and they have to prove that they are recommended for this support by confirmation from local municipality or other social institutions or NGOs to avoid abusing the law as the food is for free.

Donor organisations

Beside supermarkets, groceries and manufacturers there might be cooperation also with farms and agricultural businesses. However, it is necessary to verify the interest of these actors. Information from some of the Czech agrobusiness is that they are not a rich source of food surplus as they count very well their investment into season and their goal is to gain the invested financed back. However, on the other hand, there are experiences with smaller farms and agro businesses who are open to offer non-esthetic fruit and vegetables which are not suitable for selling in supermarkets just because of their visual look. In the Czech Republic, local NGO Save the food has cooperated with farmers who let volunteers to come to the field and harvest the fruit and vegetable that is not suitable for selling commercially.

How to involve donor organisations

Onboarding donor organisations will ask for preparation of the concept of cooperation between food bank and donors. Important is to explain how the model works and what are the benefits of food surplus donation. The cooperation is confirmed via agreement of supply.

Based on the experience of Food bank Prague, it was easier to start to involve international producers and retailers e.g. Tesco, Nestlé, Wrap, e.t.c. who already had experience with food donation from other countries, so they have been aware of the concept of food bank and its benefits.

Reasons for donor organisations to cooperate with food banks
Environmental impact: food waste prevention
Social impact: hunger and poverty, Community engagement

Economical: potential to reducing disposal cost, tax deductions and fiscal incentives, where applicable

Corporate social responsibility (CSR)

Tab 3. Reasons for donor organisations to cooperate with food banks, Food Drink Europe, 2020²⁵

Experience from the Czech Republic

There are 15 food banks in the Czech Republic (CR) which represent 100% coverage of the area of the country. The Czech Republic is divided into 14 regions so there is at least one in each region. The Czech Federation of Food banks is an umbrella non-governmental organization that manages and supports all the 15 food banks. It is a member of several national and international organizations like European Food Banks Federation (FEBA) or the Global Foodbanking Network. Beside redistribution of food surplus from regular partners (supermarkets, companies,...), there is one more important activity that is organized by the Czech Federation of FB and by each particular food bank in the region, which is regular national food collection. (Czech Federation of Food Bank, report 2019). There is more than 800 000 t of food that is wasted per year. It is equal to 80 kg of food waste per cap per year in the Czech Republic.²⁶

History of food bank in CR

The concept of a food bank appeared in Czechoslovakia in 1992, when Iija Hradecký opened the first food bank in Prague. Two years later, the Czech Federation of Food Banks was founded as a civic association. Although the food bank already existed, it did not function as effectively as the banks in France or Canada, because Mr. Hradecký focused mainly on the operation of partner NGO Naděje which was the main consumer organization of the Food bank. The Czech Federation of Food Banks had to be reformed in 2005 and then applied for admission to the European Federation of Food Banks (FEBA). The aim of the transformation was to fulfill the provisions of the Charter of European Food Banks.

Financing of Food Bank

Czech Federation of FB as well as some of the FB are receiving regular financial and methodical support from the Ministry of Agriculture. Other support can be ensured by the Ministry of

²⁵ Food Drink Europe. 2020. Every meal matters. Available at: <https://www.fooddrinkeurope.eu/>

²⁶ Statistika a my. 2021. Plýtvání potravinami v českých domácnostech. Available at: <https://www.statistikaamy.cz/2021/04/20/plytvani-potravinami-v-ceskych-domacnostech>

Environment or national, regional authorities. Long-term partnership with donor companies is also the way to gain financial or material support. Anyway some work is realized due to volunteers, especially national food waste collections.

National food collection in the Czech Republic

One of the activities on how to gain the food for the food bank and via them for people in need is the concept of National food collections. It is organised by the Czech Federation of Food banks. These collections usually occur twice a year, in April and November. Recently there was the 9th National food collection in spring 2021, where people donated 318 t of food and hygiene supplies. More than 800 supermarkets, groceries, shops got involved. In practice, people are buying extra food and products in involved supermarkets and they give them to volunteers or boxes who are waiting behind the cash desk. It is recommended to buy long-lasting food like pasta, rice, canned food, hygiene products etc.²⁷

Legal Framework of Food bank in CR

Food banks in the Czech Republic, similarly as in other countries, are non-profit organizations. The legal form is a civic association, a form of NGO. Food banks have to fulfill the law 110/1997 On food and tobacco products and 2017/C 361/01 of European Commission concerning food donation.

According to the law set up by Czech Ministry of Agriculture, there is since 2018 an obligation on food retailers, shops to donate food to charity - food banks. All shops over 400 m² are obliged to distribute over unsold food but still safe food for consumption. These are foods with damaged packaging or incorrect labeling, but also foods after the expiration of the minimum shelf life, which are not dangerous to human health.

Case study: Food bank of Prague

Food bank of Prague was established in 2009 and today it is the biggest food bank in the Czech Republic. Currently there are 260 receiver organisations who are regularly getting food from the Food bank of Prague (e.g. Hope, The Charity, Red Cross, Diaconia, Asylum Homes, Romodromes, the Christian Aid Center and dozens of others). Most of them are charities and NGOs working with people in need. The Food bank of Prague is distributing a food surplus also directly to individuals - this direct distribution wasn't part of the Charter of food banks by FEBA earlier until it was successfully promoted by Food bank of Prague.

²⁷ Sběrka potravin. 2021. Available at: <https://www.sbirkapotravin.cz>

On the other hand there are donor organisations which are mainly supermarkets, food producers or agriculture businesses as well as hotels or schools. Regular donors of food surplus in the Czech Republic are Makro, Tesco, Penny, Globus, Albert, Billa, Lidl, Kaufland, Unilever, Mondelēz, Nestlé nebo Coca Cola, Marks & Spencer, Ikea, etc. In 2017 there was 1100 t of food distributed from donors to receiver organisations that means 90 tons of food per month.²⁸ It seems it was not difficult to persuade donor organisations - supermarkets and manufacturers to donate food to the Food bank as most of them had known this practice from abroad. Furthermore, the offer from the Food bank is very convenient for them as they can save costs for food disposal, they do not need to ensure transport and most of them have their CSR commitments.

At the very beginning of the Food bank of Prague the organisation was started with three employees. There are practices like this when a food bank is starting very simply as NGOs raised by two or three people. Similar stories can be observed in the food bank of Kyjev or Belgrade.

Transportation of the food

Transportation of the food surplus from donor organisations to central storage of the Food bank is ensured by 5 refrigerated trucks (3,5 t) in Prague. However, at the beginning when the Food bank of Prague operated with a low-cost budget they used to have only 2 pick-up trucks. Lately, due to the support by partner - donor companies, they have received financial support to buy trucks and one truck was given to them as a gift from a partner. Food bank of Prague similarly as other food banks does not ensure transportation to charities, only from donors. Charities are responsible for coming for the food by themselves.

Composting of organic waste in food bank

Organic waste can occur in food banks among donated fruit and vegetables e.g. supermarket donates several lemons in a net bag, when in each bag is at least one lemon which is rotten. These rotten fruit or vegetables have to be removed from the net bag manually and separated to organic waste. Food bank Prague has decided to buy a bigger worm farm composter. However, this solution was unfortunately working very well so they use organic waste collection service if organic waste occurs. Director of the Food bank Prague says that composting of the organic waste is not common practice so far within European food banks or she has not heard of it. However, composting in the site can help to save a cost for collecting waste service and furthermore the foodbank can produce its own fertiliser. There are very simple wooden or plastic constructions of composter as well as very sophisticated composting technologies that can process up to 300 litres of organic waste daily. In the Czech republic these technologies are already used within projects and companies when organic waste is generated.

²⁸ Potravinové banky. 20201. Available at:<https://potravinovebanky.cz/>

10 steps recommended to establish the food bank

1. Map a food surplus in the location
2. Contact FEBA for consultation
3. Set up a non-profit status - Food banks usually work as non-profit organisations. It is recommended to set up a non-profit status officially by a local responsible authority.
4. Cooperate with local authorities e.g. town hall. Their support is very important.
5. Find a space for food bank central storage - As a food bank collects and distributes food surplus it is necessary to ensure a proper central storage for all the food surplus. It is supposed to be a spatial, dry, clean building suitable for storing food. Refrigerators and freezers are recommended as a part of the storage for food which demands a certain temperature.
6. Ensure cars or trucks
7. Map a food surplus in the location
8. Involve donor and recipient organizations
9. Prepare administration

Feasibility study of food bank

Helpful manual focusing on the feasibility study of food banks was published by GFN in 2017: Feasibility Analysis: Starting a Food Bank System²⁹. The establishment of a food banking system involves these phases:

1. Assessment Phase
2. Planning Phase
3. Capitalization Phase
4. Implementation Phase
5. Adjustment Phase

The manual brings practical checking answers which should be answered by implementers in each phase.

Output of the feasibility study should be the ability to answer the following questions: Who is your target group? How will you reach these folk? Or how will they reach you? (The rationale behind your push/pull system.) What is it that your target group wants, and how do you know this? How

²⁹ Food banking. 2017. Feasibility Analysis: Starting a Food Bank System. Available at: https://www.foodbanking.org/wp-content/uploads/2017/05/GFN_Tool_Kit_-_Feasibility_Analysis.pdf and at: <https://slidetodoc.com/starting-a-food-bank-feasibility-assessment-david-millar/>

do you provide what your target group wants? Do you know your own expertise and limitations? How should you operate? What are the current trends in the market? How are you qualified to do what you want to accomplish? Do your assumptions make sense to someone unfamiliar with your 'business'? Are your financial projections believable and do they make sense? How will you measure your progress (financially and in other ways)? What will you do to make it easy for people to work with you? Why would a food donor use your services as opposed to anyone else or destroying the product? Why would a beneficiary or agency use your services as opposed to any other service provider or retailer? (Feasibility Analysis: Starting a Food Bank System, 2017)

Appendix 1b



Sample Food Bank Organization Chart

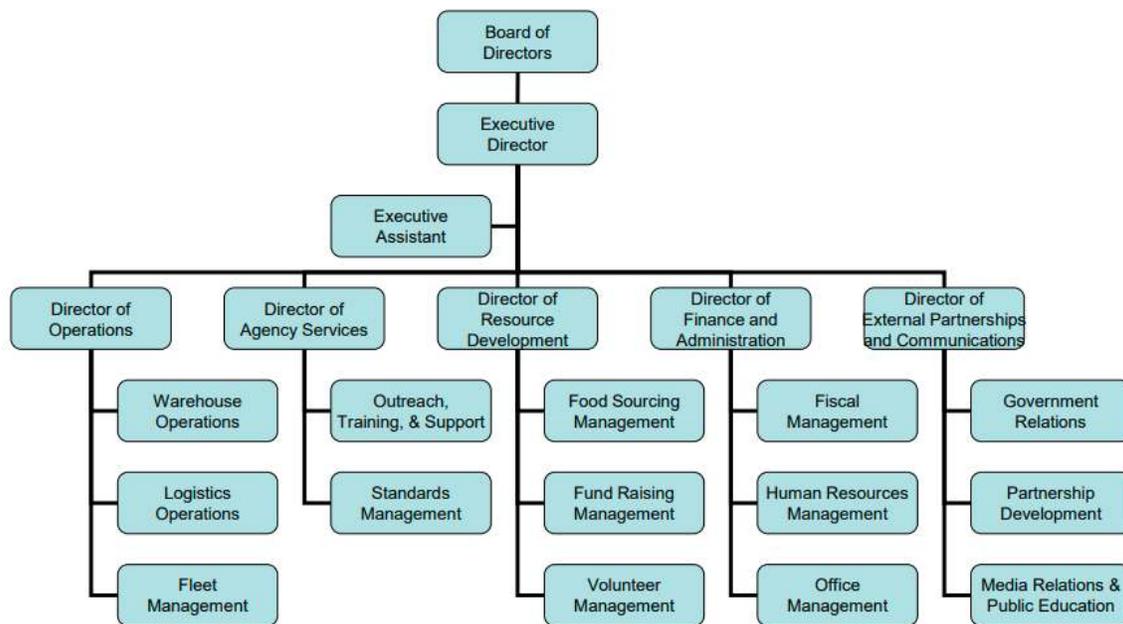


Fig.5. Food bank Organization, GFN, 2017

Planned Sarajevo Food Bank

Information about the planned concept of a food bank and mobile app can be found on the website of the City of Sarajevo. Positive information is that based on the initial research, the city of Sarajevo is ready for a food bank establishment as there is obvious demand by recipients and donors. Mobile apps will serve as practical tools to connect and inform people about conditions on how to donate or gain food. (Consul.Sarajevo.ba, 2019)

d) EU funds and other donors

Encouraging better use of EU funds and other donors in the field of food waste prevention and food donation.

EU funds can support food waste prevention projects as it is practised in other countries who have already experienced this issue. It is recommended to watch EU donating programs as they occur in a particular time period. In practice it is convenient to give this responsibility to the team of financial managers. There is an experience for example with the EU donation program Horizon for food waste issues. Other donors are often the Ministry of Agriculture, Ministry of Environment, etc. There might also be potential to build partnerships with commercial sector actors.

e) Promotion of social responsibility of the food sector

Promotion of social responsibility of the food sector - coordinated action towards food producers, distributors, retailers, hospitality sector and institutional kitchens through the development of sectoral guides, conclusion of voluntary agreements on reducing food waste, food donation and motivation through the granting of special recognitions for the most prominent examples of good practice in preventing the emergence of food waste.

Food producers are very important actors which deserve attention and motivation as well as to be involved into the system of food waste prevention. The practice from the Czech Republic is that NGOs are those who are receiving financial donations for projects that are focused on food waste or promoting sustainability in the HORECA segment. The projects are focused on consternatio, food analysis or raising awareness campaigns and informational material, conferences, workshops etc. There was also a project RedPoT financed by the Technology Agency of the Czech Republic that focused on fast food dining. The project was about measuring the food waste in the chosen canteens, creating methodology and giving recommendations. Practical workshops for sharing experience were organized for all the stakeholders - Ministries, food retailers, consumers, NGOs, academic researchers etc. The strategy is searching for restaurants which are open to accept aspects of sustainability business. Then there is an intention to help them to create good practice examples of them. Inspiration is coming mainly from abroad and it is recommended to inform the society about these trends via communication channels.

f) Digital platform, media campaign, written brochure

Establishment of a digital platform for sharing one's own experiences, media campaign, written brochure through which education will be conducted, i.e. indirectly and directly act towards the end consumer in the form of raising awareness of the issue of food waste and understanding the expiration date labels on food..

Digital Platform

Digital platforms are considered as one of the most effective food waste prevention tools as they can spread the information about food surplus quickly and effectively to customers. The purpose of digital platforms is to connect local food surplus producers (restaurants, retail stores etc.) and consumers by sharing information about discounts. (Reducing food waste through digital platforms, 2020)

Digital platforms are usually in the form of mobile applications which allow quick access to the information almost anytime. It is important to ensure activity of all the actors to make the application actualized and used.

Digital platforms can foster food waste reduction by creating the necessary ties. Specifically, by connecting retail stores and consumers, digital platforms play a crucial role in enhancing the effectiveness of last-minute discounts, thereby also helping to reduce food waste.

Limitations:

Information on these last-minute discounts do not always reach consumers in time which means the most consumers are not in the store when the discount is available and as a result remain unaware of the offer, implying an information asymmetry problem. To exploit this untapped potential, the effectiveness of retail stores' current initiatives to reduce food waste largely depend on digital platforms. (Reducing food waste through digital platforms, 2020)

Good practice examples

- **Tanjer Više, Bosnia and Herzegovina**

Tanjer Više

Tanjer Voše is the one of the winners of the Innovation Challenge contest. The mobile app is aiming to connect caterers and households reporting excess food (food donors) with food donation recipients, as well as educate households to reduce the amount of food thrown away. (UNDP BiH, 2020).¹⁹

- **Too Good To Go (TGTG), Denmark**

Too Good To GO is a food waste prevention mobile app that was created in Copenhagen, Denmark in 2016. Today is an app used worldwide in 15 countries. According to TGTG, app helps everyday people fight food waste in their local communities by connecting them to restaurants and grocery stores with surplus meals and ingredients. Users can choose from their favorite local spots to pick up meals like sushi, or ingredients like apples and avocados for a third of the normal price. This presents a win-win-win solution in which consumers get great food, store owners no longer throw away delicious surplus, and we, together, help the planet by reducing waste. This app is proving the efficiency and positive impact as it saves more than 100,000 meals every day and in 3 years the app helped to save 2 500 tonnes of CO2 emissions (Resource, 2019).³⁰

- **Nesnězeno and Jídlov, Czech Republic**

In the Czech Republic, there are two mobile apps focusing on food waste prevention. Nesnězeno was developed by a young architect who brought her inspiration from Paris. The apps show discounted food products of restaurants, caffés and shops. According to the author, the significant target group are students who appreciate price discounts and in the end they can save for example 10 EUR for a meal. The other application is Jídlov that works on very similar princip.

- **Phoenix, France**

A French start up, lately a company, has developed a platform that connects companies with extra food and charities in need. Phenix is very successful as it works with more than 900 stores in France, Spain and Portugal, as well as more than 550 food banks, soup kitchens, farms, zoos and other organisations in need of food.³¹

Media campaign

Another powerful tool for raising awareness about food waste issues beside a digital platform are communication campaigns which can be spread via various communication channels. Currently in the Czech Republic, the most common are online raising-awareness media campaigns run via social networks. The most effective are short videos explaining or pointing to the current problem and giving recommendations and motivation. Celebrities and influencers can help to maximize a reach of the campaign. Popular are also audio series in the form of “science education” podcasts.

³⁰ Too Good To Go, Denmark. Available at: <https://toogoodtogo.com/en-us/press>

³¹ Phoenix, France. Available at: <https://wearephenix.com/en/>

To prepare a high quality campaign, it is necessary to ensure the cooperation of experts on the issue with a production agency that will prepare a creative plan and will execute the video realization.

Defined target groups are the key of the successful campaign. It might be described in a special workshop with experts.

The campaigns should help to contribute to societal behavioral changes as well as it helps to develop the social value of environmental protection and respecting natural resources.

The important message in the context of food waste prevention is to explain the terms of food waste, food loss, "best before", "use by date", shock and express consumers by the facts about the amount of food waste and explain the consequences with people in need, environmental problems and economical aspects.

Case studies of media campaigns

- **Love Food Hate Waste (LFHW) campaign, UK**

This awareness campaign was implemented in the United Kingdom in 2007-2012 in the form of large-scale communications campaigns, local engagement and changes to products, packaging, labelling, media advertising. Target groups were households, authorities, businesses in the UK. According to the effectiveness of the campaign, there was 15% reduction, or a reduction of 1.3 million tonnes of household FW in 2012 compared to 2007. Furthermore, 85% of this reduction refers to avoidable FW; avoidable FW thus reduced by 21-24%. Campaign costs: £26 million over 5 yrs (expenditures by WRAP, local authorities, Courtauld Commitment signatories and community groups). Savings over 5 yrs: £86 million for local authorities (avoided FW disposal) + £6.5 billion for households (avoided purchase of food)

Written information material

Informational materials are helping communicate the complicated issue to involved actors and should be part of every project. Outputs are usually expected in printed and online versions. Materials should be visually attractive for the target group and have clear and informative content. That's why the author of the content should be an expert on the issue as such an experienced person can deliver correct information. It is very important to define who is the target group and choose the level of expertise language and tonality. Experts can be sometimes paralyzed by the quantity and quality of expert information so it is recommended to cooperate on informational material with communication experts who will help to ensure intelligibility for the final reader. Visual and aesthetic character of the material plays an important role so cooperation with a graphic designer is necessary. Graphic designers can help you to express the context of the issue

within illustrations or schemas which can help to avoid a big amount of continuous text. The usual forms of information materials are brochures, one pagers, posters. It is recommended to use interactive patterns like stickers as a part of the brochure, pull out posters in the middle of the brochure, quiz or checklist to motivate the user to do the action.

Poster and brochure for the HORECA sector was the output of the Czech project of the Technology Center of Academy of Science CR and NGO Zachran jidlo, which was focusing on food waste prevention (Zachran jidlo, 2020)

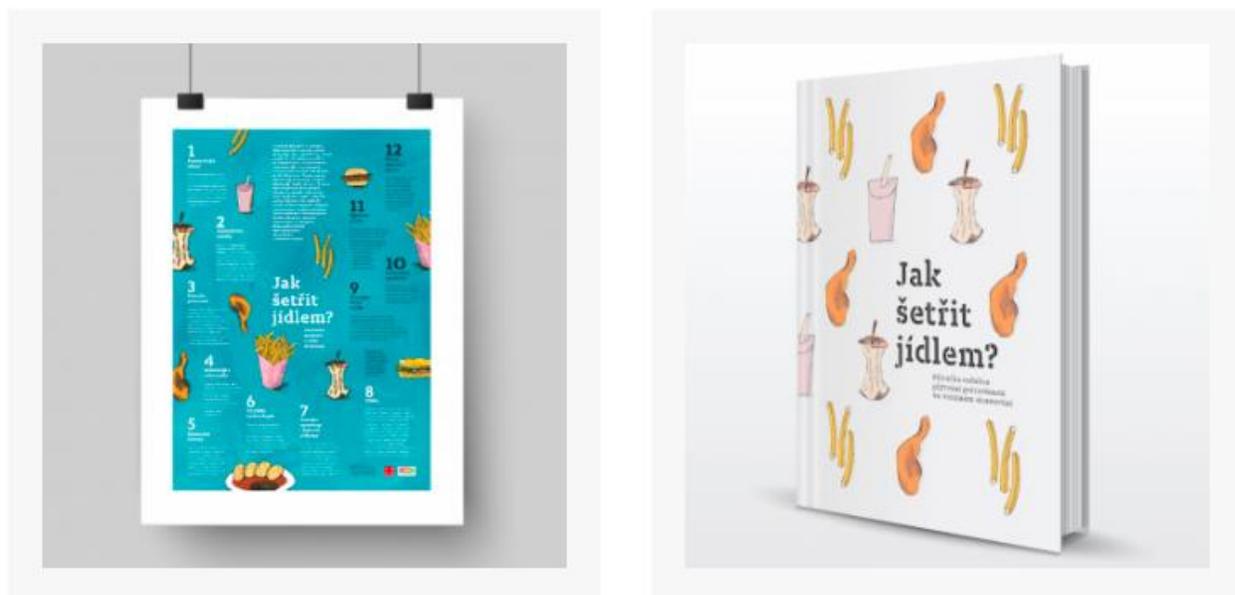


Fig.6. Poster and brochure about food waste prevention, Zachran jidlo, 2020

Written messages in the canteen

Very simple and effective might be communication and sensibilization in the space of schools or company canteens, restaurants. There is an experience from the US university dining room in the form of written messages in the students' dining hall reminding diners to “eat what you take”. The effect was estimated at 15% reduction in food waste.

In the area of canteens, there might also be other more practical measures helping reduce amounts of food waste e.g. bread on demand, bulk meal delivery, choice of portion size, menu options, quicker status update, visualisation/ show of the meal on the plate, etc.

g) Education of preschool and school-age children and professional development of educational workers

School programmes focusing on food waste are very important and efficient as children can adopt new information very easily. The issue of food waste should be explained but at first it is necessary to develop and design working material for children as well as prepare and train the teachers. It is true that teachers are in a continuous process of learning as there are many phenomena that were introduced lately like climate change issues or sexual education. Teachers need support and materials to be able to study the issue.

Experience from the Czech Republic

There is an online study program for teachers in the Czech Republic which was created by a local NGO People in Need, focusing on climate change. The online course has 6 hours and it is made of several parts where experts on climate change are explaining the issue. Each block is finished by test. After passing all tests, the certification is provided. Similar form of online education might be designed on the issue of food waste prevention. (People in Need, 2019)

h) Determining the quantities of food waste

The amount of food waste refers to crucial data that have to be measured to calculate the impact. It is useful for evidence of the progress and effectiveness of implemented food waste prevention measures. Measuring can be ensured by simple methods or sophisticated technologies. Usually the monitored weight (kg) of food waste, volume, and food waste is specified by the description of food waste content.

The document Food waste measurement methodology for BiH was already proposed by consultant Dr. Hynek Roubik. The proposed methodology for food waste measurement in Bosnia and Herzegovina is a combination of methods including direct measurements, gathering of data at various levels of the food waste generation chain and finally, systems dynamics approach to understand the food waste flows and the influencing factors.

There is also European Commission Common methodology and minimum quality requirements for the uniform measurement of levels of food waste from 2019.

Description of the methods by European Commission:³²

³² European Commission. 2019. Common methodology and minimum quality requirements for the uniform measurement. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2019.248.01.0077.01.ENG&toc=OJ%3AL%3A2019%3A248%3ATO

Methods based on direct access to food waste/direct measurement:

Direct measurement (weighing or volumetric assessment)

Use of a measuring device to determine the mass of samples of food waste or fractions of total waste, directly or determined on the basis of volume. It includes measurement of separately collected food waste.

- **Scanning/Counting**

Assessment of the number of items that make up food waste, and use of the result to determine the mass.

- **Waste composition analysis**

Physical separation of food waste from other fractions in order to determine the mass of the fractions sorted out.

- **Diaries**

An individual or group of individuals keeps a record or log of food waste information on a regular basis.

Other methods

- The following methods shall be used when there is no direct (physical) access to food waste or when direct measurement is not feasible:

- **Mass balance**

Calculation of the amount of food waste on the basis of the mass of inputs and outputs of food into and out of the measured system, and processing and consumption of food within the system.

- **Coefficients**

Use of previously established food waste coefficients or percentages representative for a food industry sub-sector or for an individual business operator. Such coefficients or percentages shall be established through sampling, data provided by food business operators or by other methods.

In the Czech Republic companies and HORECA segments are usually aware of the amount of generated food waste as they have the obligation to separate food waste to special bins that are collected by waste management companies. This collecting service is very costly. They do not weigh food waste in most cases but they can say the volume based on the volume of collection bins.

There are also very sophisticated and smart technologies that can automatically weight the food, take a picture and evidence the amount of food waste. One of these technologies is Logio which is suitable for cantens, restaurants, pricing companies, storages, and food retailers. Logio is used by the Czech very popular online shop selling food and providing its delivery, Košík.cz. The device can analyze millions of sales transactions, identify seasonality, predict future sales and the effects of promotions. Legio helped Košík.cz reduce the volume of food waste at the end to a quarter, i.e. by 75%. (Zachraň jídlo, 2021)

It is also recommended to introduce the Food Waste/ Loss Index by UNEP which is more elaborated in part 6.

i) Boosting research work

Boosting research work and innovative solutions that contribute to preventing and reducing the generation of food waste.

Institutions as well as private companies providing reaserch should be involved in the issue of food waste. They should be aware of the importance of this problem and participate in projects aiming to eliminate food waste. First step is to inform this target group about the issue for example at meetings or conferences. It is also convenient to build partnerships with universities, whose students and researchers can focus on this issue. In the Czech Republic, there are already some diploma or bachelor thesis focused on food waste or food banks. Innovation and sophisticated technologies like the Internet of things (IoT) can help to move the project and increase the effectiveness of the measures. One of the programs focusing on food waste measurement and dialog between stakeholders in the Czech Republic, named Red Pot, was supported by a grant from the Technology Agency of the Czech Republic that supports research and innovation. There were two partners cooperating on this project - Technological center of Academy of Science and local NGO Zachraň jídlo - Save the food. The project focused on measuring food waste in fast

food restaurants and canteens. Methodology was developed for measuring as well as own measurement. Information materials were also created - brochures and posters.

Stimulation of the cooperation of the food sector and scientific and research institutions is necessary for development of new innovative solutions that will contribute to the reduction of food waste generation.

7. Monitoring the impact indicators

Monitoring the impact is a crucial part of the project of food waste prevention strategy. Indicators are supposed to be set up for each implemented food waste prevention measure. To measure indicators connected to the issue of food waste, it is important to know the current situation and have data which can be compared with the data that will be gained after the implementation of the measure.

The impact should be monitored by measuring the quantity of food waste in accordance with a common methodology for measuring the quantity of food waste.

According to UNEP who is an author of the Food Waste Index report 2021, there are two indicators elaborated:

SDG 12.3 covers food and inedible parts that exit the supply chain and thus are lost or wasted, and is tracked through two indicators:

- Indicator 12.3.1(a), the Food Loss Index, measures losses for key commodities in a country across the supply chain, up to but not including retail. FAO is its custodian.
- Indicator 12.3.1(b), the Food Waste Index, measures food waste at retail and consumer level (households and food service). The United Nations Environment Programme (UNEP) is its custodian. In contrast to the Food Loss Index, the Food Waste Index measures total food waste (rather than loss or waste associated with specific commodities). The Food Waste Index also allows countries to measure and report on food loss generated in manufacturing processes, which would not be captured under key commodity losses by the Food Loss Index. (UNEP, 2021)

There are 3 suggested approaches/ levels on how to measure the FW/L index. The most common is the second one as it involves measurement of food waste in countries. The nature of the measurement will vary according to sector and circumstances. It will be either undertaken by national governments or derived from other national studies undertaken in line with the framework described below. Level 2 generates primary data on actual food waste generation and fulfils the requirement for tracking food waste at a national level, in line with the SDG 12.3 target. (UNEP, 2021)



Fig.7: The food waste index measurement approach, UNEP, 2021

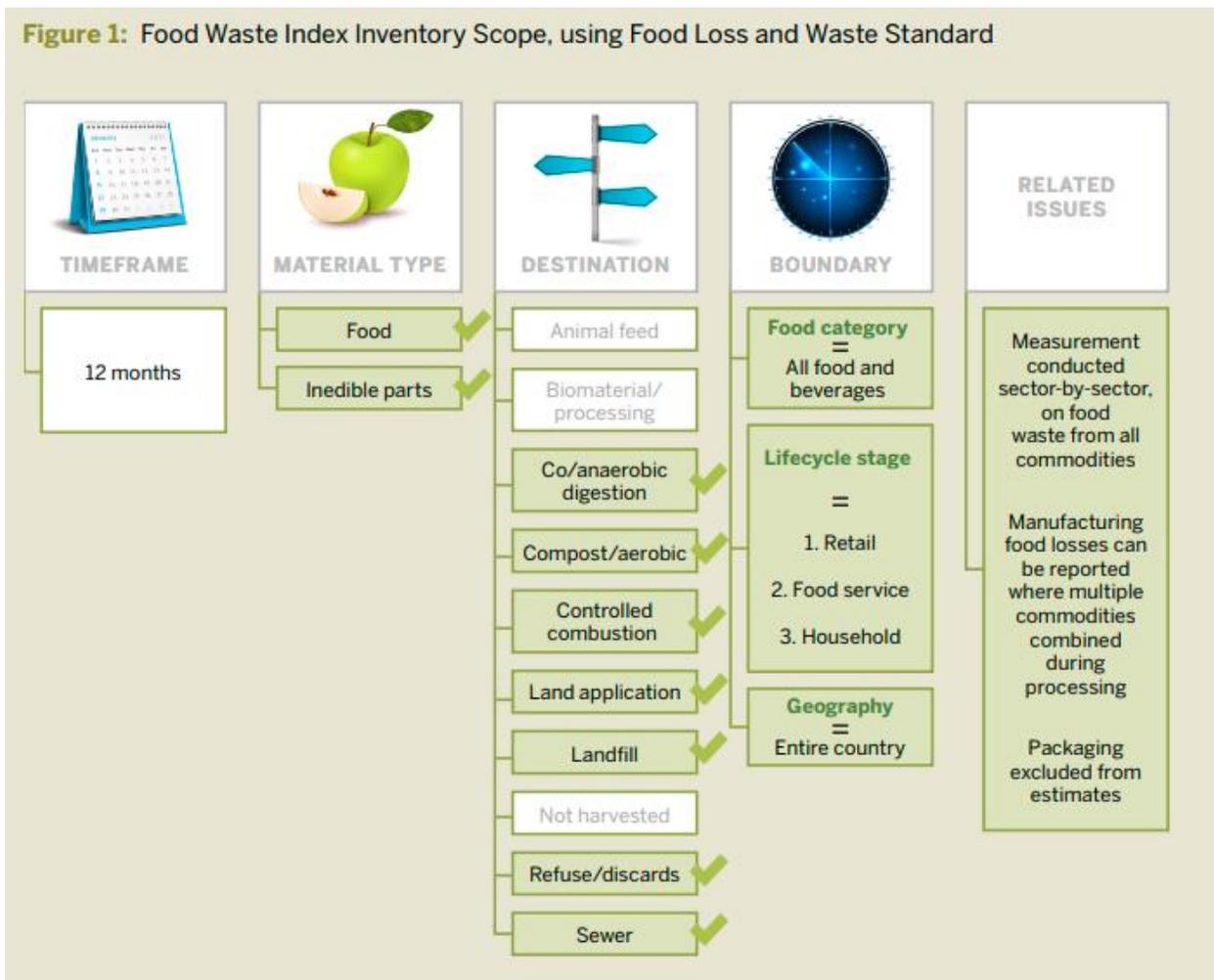


Fig. 8: Food waste measurement methodology, UNEP, 2021

Sector	Methods of measurement					
Manufacturing (if included)	Direct measurement (for food - only waste streams)	Waste composition analysis (for waste streams in which food is mixed with non-food)	Volumetric assessment	Mass balance	Counting/scanning	
Retail						
Food service						
Household						Diaries (for material going down sewer, home composted or fed to animals)

Tab 4. Appropriate methods of measurement for different sectors, UNEP, 2021

8. Timeline of the implementation of the Plan

Some activities are already in progress. However some other activities and measures are more time-demanding and can be dependent on several activities and tasks delivered by different actors.

Type of the Measure	III.Q 2021	IV: Q 2021	I. Q 2022	II. Q 2022
Analysis of the legislative framework	✓	✓		
Sarajevo Food Lab (continuing development and activities)	✓	✓	✓	✓
Feasibility Study on Food Bank		✓	✓	

Use of EU funds and other donors	✓	✓	✓	✓
Promotion of social responsibility of the food sector	✓	✓		
Digital platform	✓	✓	✓	✓
Media campaign	✓	✓	✓	✓
Informational materials		✓	✓	✓
Education of preschool and school-age children, educational workers			✓	✓
Determining the quantities of food waste	✓	✓	✓	
Boosting research work and innovative solutions	✓	✓	✓	✓

Tab 5. Timeline of the plan

9. Financial resources for the implementation of the Plan

Successful implementation of such a complex plan is dependent on financial investment. The best and sustainable solution obtained regular financial support. It is recommended to prepare financial analysis and business models for every action or project.

Implementing food waste measures and preparation steps asks for financial input. Financial support may be asked from the private and public sector - partner companies, institutions and organisations.

Based on the interviews with the director of Food bank Prague, there can be observed several measures across Europe that started under a low cost model. However, based on the own experience of the director, at least support from the city or local government and some investment was welcomed to cover 2-3 salaries of the first few employees of the food bank. Lately there were sponsorships from partner donor companies who supported them by finances or e.g. by truck for transportation of food etc.

Case study: Croatia

Republic Croatia has suggested and developed a food waste reduction plan recently in 2019 and they estimated expected financial resources for each measure of the Plan for 4 years (2019-2022).

Measure Estimated financial resource	Estimated financial resource (BAM) (converted from HRK to BAM)
1. Improving the food donation system	570 161
2. Encouraging the reduction of food waste generation	570 089
3. Promoting the social responsibility of the food sector	34 906

4. Raising awareness and informing consumers on prevention and reduction of food waste generation	1 087 634
5. Determining the quantity of food waste	260 511
6. Investing in research and innovative solutions that contribute to the prevention and reduction of food waste generation	130 255
Total	2 653 556

Tab 6. Comprehensive overview of estimated financial resources required for each measure of the Plan.³³

Financial investment in Scotland

Scotland has invested close to £30 million in food waste prevention, management and re-use. To reduce food waste by 33% by 2025, implementing the Measures outlined of the Plan, the further investment of approximately £20 million is expected.³⁴

Recommended financial sources

Support is usually asked from the local government and its ministries e.g. Ministry of Agriculture, Ministry of Environment, Ministry of Social Affairs, Ministry of Education. Finances might be obtained also from the private sector (businesses and companies) who will be involved in the issue of food waste. There are already several international companies (supermarkets e.g. Tesco,

³³ Official Gazette of the Republic of Croatia 61/2019 (21 June 2019), Decision on Adoption of the Plan for Prevention and Reduction of Food Waste Generation of the Republic of Croatia 2019 – 2022. Available at: https://ec.europa.eu/food/sites/food/files/safety/docs/fw_lib_fwp-strat_national-strategy_hrv_en.pdf

³⁴ Scottish Government. 2019. Food Waste reduction Action Plan. Available at: https://ec.europa.eu/food/sites/food/files/safety/docs/fw_lib_fwp-strat_national-strategy_sco_en.pdf

Makro, manufacturers e.g. Nestlé) who are used to support food waste reduction initiatives in the world. There are also possibilities to ask for international grants from the various European or international programs of institutions or private companies.

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