Module 1, Session 2

Slide 1

Introduction to Food Waste, Supply and Inventory Management

Slide 2 - Session 2

This session is concerned with the impact of food waste on sustainability and the environment. You will find information on social, environmental and economic consequences. We will tell you about global gastronomic trends: organic production, organic certification, local food, meat substitutes, and a sustainable future in catering.

Slide 3 - Responsible Consumption and Production

Among the 17 Sustainable Development Goals adopted at the UN in 2015, Goal 12 commits to changing consumption and production patterns to more sustainable ones. Sustainable development brings benefits to the environment, ensures sustainable economic development and social justice, but requires a systematic approach and cooperation of entities participating in the entire supply chain, from producers to consumers. Sustainable development has been defined as "development that meets the needs of the present generation without compromising the ability of future generations to meet their needs". Sustainable consumption and production is about doing something better and more with less. This leads to an increase in the net benefits of economic activity by reducing resource consumption and limiting degradation and pollution, while improving the quality of life.

Slide 4 - Consequences of food waste

Food losses and waste have a negative impact on society, the economy and the natural environment. Food waste is a social justice issue because it limits access to food. The economic dimension of the problem concerns food waste as a loss of financial value in the processes carried out, i.e. production, processing, transport, consumption. From an environmental point of view, food waste means a lack of efficiency in the management of resources such as land, water, energy and other resources at all stages of the product life cycle, as well as an increase in greenhouse gas emissions resulting from it.

Slide 5 - Environmental

Food production intended for human consumption consumes natural resources and burdens the environment. The burden on the environment is even more significant when wasted and thrown away instead of consumed, primarily when waste is disposed of incorrectly. Processing food products uses various raw materials, auxiliary materials and technologies. It is, therefore, a source of waste, sewage emissions into water and soil, and dust and gases into the atmosphere. Feeding the world population in an environmentally sustainable manner will become increasingly challenging over the coming decades. The global demand for agricultural outputs is forecast to increase by 35–50 percent between 2012 and 2050 as a result of population and income growth. Meeting this demand will further strain the world's natural resources and may cause considerable environmental damage, including climate change, land degradation, water scarcity, water pollution and loss of biodiversity. Against this background, food

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loss and waste reduction is seen as a way to improve the environmental sustainability of the global food system.

Slide 6 - Land use for food production

Primary production requires agricultural land for growing crops, orchards for growing trees, meadows and pastures for grazing animals, land for fish farming, and agricultural land for housing for people and animals. Arable land can grow crops, while non-arable land is unsuitable for growing crops. About 900 million hectares of uncultivated land are used to raise livestock for meat production. About 11.5 billion hectares of the global land surface are used for agriculture. Large areas of the world that were once covered in forests and wilderness are now used for agriculture. This loss of natural habitat has been a major factor in reducing global biodiversity. Growing food that goes to waste uses up about 18% of cropland.

Slide 7 - Soil degradation

Agriculture, if conducted improperly, also contributes to the deterioration of soil quality. Soil degradation refers to the loss of organic matter, changes in the structural state of soil and/or a decline in soil fertility. It is often the result of human activity, such as traditional agricultural practices, including toxic chemicals and pollutants. Suppose we keep our practices and take action to protect the soil. In that case, the food security of billions of people worldwide will be irreversibly compromised.

Slide 8 - Water use for food production

At every stage of food production (from farm to household), water is needed, and in very large quantities. It is estimated that as much as 70% of freshwater resources are used by agriculture and forestry. Around 23-24% of freshwater is used to produce wasted food. Water is a common good, threatened not only by the deepening climate crisis, but also by the way water resources are managed. The effects of climate change will be very severe for agricultural production. We live in an area where water shortages can occur regularly, and droughts are very dangerous for plant cultivation. On a global scale, agriculture is responsible for the largest consumption of water. Water should be saved in all areas of our lives. It is very important not to waste food, because its production uses very large quantities.

Slide 9 - How much water is needed to produce 1 kilogram

The need to determine the amount of water needed for food production stems from the fact that freshwater reserves are limited on the one hand and essential for the survival of life on Earth on the other. One of the available indicators estimating the demand for water in production cycles is the water footprint (WF). This indicator is closely related to virtual water, meaning the water contained in a product used throughout production. The practical application of the virtual water concept involves providing knowledge about the impact of a given product on the environment. Knowledge of the virtual water content in products increases awareness of the amount of water needed to produce various goods, thus providing an idea of which goods have the most significant impact on the water system and where water savings can be achieved. The amount of water needed to produce various food products varies greatly and is approximately 300 l per

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1 kilogram of tomatoes, potatoes, and apples. And almost 2000 l per 1 kilogram of pasta and bread.

Slide 10 - How much water is needed to produce 1 kilogram

Much more significant amounts of water are needed to produce food of animal origin, especially meat. Water is required to grow animal feed plants, water animals, keep rooms clean, etc. The longer the animal breeding cycle, the more water is used. For example, about 5,000 l is used to produce 1 kilogram of poultry meat, and 3 times more, over 15,000 l, to produce 1 kilogram of beef. Then, the water is used in production and catering establishments to wash raw materials, equipment, etc.

Slide 11 - How much water is needed to produce

Therefore, producing raw materials that could constitute, for example, a breakfast consisting of a slice of cheese and cold meat, one egg, one glass of milk, a roll and a tomato means using approximately 7,000 litres of water.

Slide 12 - Average water consumption to produce 120 g of raw materials used to prepare a sample meal

The average water consumption necessary to produce a meal consisting of 120 g of rice, roast pork and white cabbage salad will be approximately 1,050 l.

Slide 13 - Greenhouse gas emissions

Food waste contributes to adverse climate change. One ton of food stored in a landfill emits 4.5 tons of harmful greenhouse gases into the atmosphere. Greenhouse gases include carbon dioxide, freons, methane and industrial gases. Greenhouse gases are components of the Earth's atmosphere that can retain solar energy within the Earth's atmosphere. These gases directly impact the greenhouse effect because they absorb infrared radiation from our planet. The energy cannot be released into space, so the atmosphere's temperature and the Earth's surface increase. The total amount of greenhouse gases emitted during the entire life cycle of a product, expressed in kilograms of CO2 equivalent, is called the carbon footprint. Different levels of CO2 emissions characterize food products during their production. Understanding carbon footprint can help limit the impact of your consumption on the environment. Small changes can make a big difference in the long run

Slide 14 - 6% of global greenhouse gasemissions come from losses and waste

Food waste and losses account for approximately one-quarter of greenhouse gas emissions annually; if it was a country, food waste would be the third-largest emitter of greenhouse gases, behind China and the US. With these statistics in place, there is a huge need to reduce this environmental footprint.

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Slide 15 - average reduction per person per year in tonnes of CO2 equivalent

Climate change can still be tackled – but only if people are willing to embrace major shifts in the way we live. They have put together a list of the ten best ways for people to reduce their carbon footprints. Living car-free is at the top of the list, and it saves an average of 2.04 tonnes of CO2 equivalent per person annually. This is followed by driving a battery electric car - 1.95 tonnes of CO2 equivalent per person annually - and taking one less long-haul flight each year - 1.68 tonnes of CO2 equivalent per person. Seventh is switching to a vegan diet, which saves 0.8 tonnes.

Slide 16 - Our food choices affect the climate

The rapidly growing plant-based sector has the potential to be the lifeline the planet needs. Sales of alternative food have boomed in recent years. The Sixth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC) delivered a clear message: we can avert global warming simply by switching from traditional to plant-based or cultivated meat as data show a remarkable difference in their environmental footprint. According to the Good Food Institute (GFI), plant-based chicken emits 86% fewer greenhouse gas emissions than its conventional counterpart, while cultivated chicken produced with renewables accounts for 17% less emissions. But beef and pork are even better. Plant-based and cultivated beef generate respectively 99% and 92% less emissions than traditional beef. As for pork, the plant-based version saves up to 92% emissions while the cultivated one has half the impact of conventional pork.

Slide 17 - Social

The social problem of food waste is multifaceted, affecting people in different ways. It can lead to hunger and malnutrition in some parts of the world while contributing to the obesity epidemic in other parts. One of the most significant consequences of food waste is hunger and malnutrition. According to the FAO, about 820 million people suffer from chronic hunger globally, while 2 billion people suffer from micronutrient deficiencies. The irony is that while millions of people are starving, a vast amount of food is wasted each year.

Slide 18 - Hunger in the World

It should be emphasized that currently, global food production can meet the basic needs of all inhabitants of the globe, even though we observe overproduction of food in highly developed countries. Despite this, hunger and malnutrition occur. Almost 10% of the world's population suffers from hunger. However, we observe great diversity; in Africa, over 20% of people live in conditions of food shortage, while in Europe or North America, it is approximately 2.5%. The world has been not even on track to achieve the goal of Zero Hunger by 2030 before the COVID-19 pandemic, and the current situation is deepening the food crisis.

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Slide 19 - World Food Programme

The World Food Programme has identified reducing food waste as one of five steps necessary to eliminate world hunger.

Slide 20 - People at risk of poverty or social exclusion

In 2023, 94.6 million people in the EU (21% of the population) were at risk of poverty or social exclusion, i.e. lived in households experiencing at least one of the three poverty and social exclusion risks: risk of poverty, severe material and social deprivation, and/or living in a household with very low work intensity. The figure slightly decreased compared with 2022 (95.3 million, 22% of the population).The shares of people at risk of poverty or social exclusion varied across the EU countries in 2023. The highest values were reported in Romania (32%), Bulgaria (30%), Spain (27%) and Greece (26%). On the other hand, the lowest shares were recorded in Czechia (12%), Slovenia (14%), Finland and Poland (both 16%).

Slide 21 - Economic

Food losses and waste hurt society, the economy, and the natural environment due to the direct costs of this process, i.e., the inputs and factors used for its production, processing, and distribution, as well as the numerous indirect costs associated with them. In the latter group, environmental fees and high social costs should be considered.

Slide 22 - Financial consequences of food waste

FAO has estimated food waste's global annual economic implications to be USD 2.6 trillion. Of this, USD 1 trillion is the estimated direct value of lost food, i.e. the value of raw materials and their processing and transport. Estimating indirect costs is a much more difficult task because it is related to the impact of waste on the natural environment, with the essential elements being greenhouse gas emissions (estimated at USD 305 billion) and water pollution (estimated at approximately USD 200 billion). Several other factors should also be considered, i.e., the deterioration of human living conditions caused by the reduction in the quality of the environment and the extinction of species and biodiversity. Therefore, by reducing food waste, we will not only save significant financial resources but also contribute to improving our living conditions and our well-being.

Slide 23 - How much money do we waste on wasted food at home?

The highest economic costs associated with food waste can be expected in the last link in the food chain, i.e. consumption. It is difficult to answer how much money we waste with thrown-away food. A study conducted in Great Britain estimated that each household throws away food worth 291-464 euros per year. On average, a Danish household wastes food worth about 390 euros per year, while a Finnish household wastes 220 euros. On average, one American household spent almost 1200 euros per

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year on food that was not consumed. Undoubtedly, reducing food waste can help consumers save significant financial resources.

Slide 24 - How much money do we waste on wasted food in the food sector?

According to calculations in the United States, the food service sector wastes between 4 and 10% of the food purchased (before production begins) and 21% of the food available in restaurants is not consumed. Food waste in the UK costs restaurants around 23% of their turnover. Due to differences in food prices, it is a good idea to relate the financial loss to the value of a single meal. It has been calculated that this loss was between 0.44 and 0.74 CHF. Therefore, the weekly savings for one company could amount to between 1314.34 and 1518.40 CHF. As other calculations show, a large catering company in Switzerland can save 20 CHF per 1 kg of food by reducing food waste. These figures indicate the economics of the processes and the need to minimise losses at this stage of food management.

Slide 25 - Caring for the natural environment

Pro-ecological activities in gastronomy are part of a global trend and are an opportunity to attract customers who care about the well-being of our planet. Pro-ecological activities in gastronomy can reduce the consumption of resources and make the environment gain measurably. Pro-ecological activities in gastronomy are one of the elements of corporate social responsibility (CSR). CSR is a strategy that companies use to reduce the harmful impact on the natural environment and support the local community. Reducing toxic gas emissions or reducing waste is also a nod to people living near the catering establishment. Many companies that strongly focus on ecology disseminate information about such activities. Care for the natural environment can distinguish a catering establishment. Pro-ecological activities in gastronomy can bring an excellent reputation and recognition.

Slide 26 - Pro-ecological activities

The main principle of waste segregation is the appropriate separation of waste into those that are and are not suitable for recycling. We segregate waste into (1) metals and plastics, (2) paper, (3) glass packaging, (4) biodegradable waste, and (5) mixed waste. Only food scraps of plant origin, e.g., vegetable and fruit peelings, which can be composted, can be thrown into the BIO WASTE container (BIO) (if we have a composter, this is the place for BIO waste). Important - edible oil, food scraps of animal origin, bones, and cold cuts can not be thrown into BIO waste.

Slide 27 - Pro-ecological activities

Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment is intended to minimise the damage associated with plastic pollution of the seas and oceans. The document is part of a broader strategy to transform the EU economy into a circular

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economy. According to the directive, single-use plastic products are to be excluded, i.e. drinking straws, disposable cutlery, disposable plates, drink stirrers, polystyrene containers for food and drinks, and polystyrene cups for drinks. Practical containers made of natural materials, e.g. sugar cane pulp, are available on the market. Such packaging is suitable for heating, freezing, and composting after use. It is worth using them in combination with biodegradable foil. Paper containers are also an alternative.

Slide 28 - Plant-based cuisine

The popularity of plant-based cuisine is still growing due to a large group of customers who limit their meat consumption daily and are happy to reach for dishes without animal products. Health is one of their motivations, although not the only one – they also pay attention to climate issues, ethics or simply the desire to diversify their daily diet.

Slide 29 - Meat substitutes

There are many reasons for wanting to incorporate meat substitutes into your diet, even if you're not following a vegan or vegetarian diet. Eating less meat is not only better for your health but also for the environment. Alongside protein-rich foods like peas and beans, soy is one of the most common ingredients used in meat substitutes. Tofu has been a standby in vegetarian diets for decades and a staple in Asian cuisines for centuries. While lacking flavor on its own, it takes on flavors of the other ingredients in a dish. It's made similarly to the way cheese is made from cow's milk— soy milk is coagulated, whereupon the curds that form are pressed into blocks. Tempeh is a traditional soy product made from fermented soy. The soybeans are cultured and formed into cakes. Unlike tofu, which is made from soy milk, tempeh is made using the whole soybean, so it has a different nutritional profile.
It contains more protein, fiber and vitamins than tofu. Additionally, as a fermented food, it may benefit digestive health.

Slide 30 - Local and seasonal

The menu should be dominated by locally produced products, i.e. those available at a given time of year. The climate typical of a given country determines the possibilities of food production, which change with the seasons. The variety of the offer, especially vegetables and fruits, will depend on the harvest season and how they are processed and stored. In the European Union, a local food system is considered to be one in which food is produced, processed and sold within a specific geographical area, covering 20 to 100 km. Eating local and seasonal products is beneficial for the environment, as it reduces pollution resulting from food transport over long distances and minimizes the amount of packaging. It is worth remembering that such products are characterized by high quality, including nutritional value.

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Slide 31 - Products with certificates

You should choose food produced sustainably, i.e. taking into account care for the environment, animal welfare, and compliance with social standards. Such products are marked with appropriate symbols and certificates. The EU organic food logo, Euroleaf, appears on the packaging of certified organic products. The obligation to mark organic products that meet strict EU standards is intended to guarantee the quality and origin of food and beverages purchased by consumers. The Euroleaf marks products from farms that apply natural principles of animal breeding and cultivation plants. The principles of organic farming also include respect for the landscape and values that are part of the heritage of future generations. The Fair Trade movement works to improve the living and economic conditions of small producers and workers from poor countries in the South. Currently, the most popular Fair Trade products include coffee, cocoa beans, bananas, tea, fruit, and nuts.

Slide 32 - Thank you

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