ŞHRMUN'24

UNDP

STUDY GUIDE

Sustainable nourishment production and the food industry's transition to eco-friendly production

USG; CİHAN EMRE ELBİR

#FORABETTERWORLD

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LETTER FROM THE SECRETARY GENERAL

Esteemed Participants and Respected Advisors,

Welcome to the Eskişehir Şehir Schools Model United Nations (ŞHRMUN) conference, happening this April at Eskişehir Şehir Schools. As Secretary-General, I'm honored to address you.

ŞHRMUN'24 is our second annual gathering, where students from around the world come together to explore diplomacy, international relations, and how the United Nations works. This year's theme, "For a Better World," aims to spark insightful discussions and find real solutions to global challenges.

Our committee sessions offer workshops led by experts in different fields, providing valuable insights and skills. We'll also delve into various global issues to enrich your understanding.

As we look forward to ŞHRMUN'24, I encourage you to prepare by researching your assigned countries and topics, learning the rules of procedure, and honing your speaking and negotiation skills. Your active participation is key to our success.

I'm excited for the lively discussions, meaningful connections, and memorable experiences that await us at ŞHRMUN'24. Let's seize this chance to inspire positive change and make a difference in our global community.

Warm regards,

Zeynep Turkurkor

Secretary-General

Eskişehir Şehir Schools Model United Nations

Letter from Under-Secretary-General

Esteemed Participants of ŞHRMUN'24

My name is Cihan Emre ELBİR and I will be your Under-Secretary General during ŞHRMUN'24 Conference. It's an honour for me to serve you as the Under-Secretary-General in our committee where we will discuss and try to solve one of the most important problems of the current world. From my previous experiences, I learned that being a MUN and attending MUN is a unique experience that you can't forget in the future. Especially if you want to improve your academic career, you are taking the right step. And we (with our academia and organization team) are going to try our best for you to be the best in that step.

About our committee, we will talk about the general system of the United Nations Development Programme, their actions and collaborations about Sustainable Food Production and the Challenges faced while transitioning to Eco-Friendly Food Production. As your Under-Secretary-General, I spent many hours making this guide for you to understand the importance of sustainable food production, challenges, technologies, alternative solutions and some important examples of it alongside the 2024 perspective of the food industry against climate change and everyday increasing population. My only desire is for you to take this job seriously and always improve yourself, and learn from your mistakes, and don't forget to have fun and spend an amazing 3 days during so. I'm so excited to meet you all in the First Session on April 26 and waiting for the day to come.

If you have any questions about it don't hesitate to ask me via:

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With My Sincerely

Under Secretary General

Cihan Emre ELBİR

What is (the United Nations Development Programme) UNDP?

United Nations Development Programme or UNDP, established in 1965, is a UN organization that aims to remove poverty and works to achieve sustainable development goals. It emphasizes economic growth and improving the quality of human lives while protecting the environment and natural resources for future generations. It's headquartered in New York City, US. UNDP leads and funds the UN development assistance program for the nations of the world. It helps countries through Five-Year country development programmes specifically designed for each country and each region. This program aims to bring more foreign investments to the capital, train qualified and skilled workers and apply the latest and modern technologies.

UNDP also gathers and brings some experts to the countries. These experts help countries in their development. They make governance better by opening political and legal institutions that are fair to everyone, can respond to the crisis and are open for public and private sectors to expand and increase the economies to provide more jobs. UNDP in these programs mostly focuses on the reduction of poverty and, the development of strategies for treating and combatting viruses and bacteria (Exp: HIV/AIDS). UNDP also focuses on supporting environment-friendly energy and economic policies that go together with it and the expansion of communication systems and technological infrastructure.

UNDP works in some of the 170 countries and territories to help them develop themselves and it also coordinates with other UN organisations, programs, and governmental and non-governmental organizations. As the UN's Development Agency, UNDP plays a critical role in helping countries to achieve Sustainable Development Goals. The partnership is at the centre of UNDP development programs. This partnership also brings funding. To continue their mandate, funding is essential for UNDP. UNDP heavily relies on volunteers and the participation of the UN Agencies or governmental and non-governmental organizations. These many voluntary contributions bring many types of resources. A lot of resources and flexible responses mean in long-term development planning, UNDP can respond fast to any kind of emergencies and needs. This multi-sectoral response provides quality, innovation and assurance to the countries.

UNDP not only works on developing the economy but also focuses on the development of humans as well. It emphasizes the richness of human life rather than setting economic richness in the first place. It focuses on democratic governance and peacebuilding in the regions as well. In all of its activities, UNDP focuses on the protection of human rights, and the empowerment of women, the poorest and minorities are the most vulnerable, The main strength of the UNDP comes from the trust of the nations due to this humane approach. UNDP also plays a key role in helping agencies work together for sustainable development goals. UNDP also gives importance to UN volunteers, coming from different

countries and continents, to support the development and peace first through the regions, second through the countries and third through global.

In conclusion, UNDP helps countries with the eradication of poverty and, the reduction of inequalities and exclusion. It shows governance to countries for developing policies, leadership skills, partnerships, and institutional capabilities, and builds strong barriers to sustain development results. Progress in development is important for encouraging economic development and growth, improving technological and communication services, ensuring environmental sustainability, protecting good governance, and enhancing security. With deep knowledge of development theory and practical experiences from past decades at the national level, UNDP aims to assist countries in achieving their development goals and explaining the voices of citizens to the globe in decision-making processes.

Introduction to Agenda Item

Sustainable nourishment production or food production, means production of food in such a way that provides our needs now without hurting the environment and future generations to meet their own needs. It involves ways that are friendly towards the environment, and sustainable both socially and economically. It aims to make sure that food is produced in a way that is healthy for its consumers, respecting mother nature and lastly supporting local and regional communities.

There are 3 factors and key principles that sustainable nourishment production emphasizes:

1-) Protection of Environment:

Sustainable nourishment production aims to minimize environmental damage by encouraging less use of chemicals, protecting natural resources like water, and soil and also protection of biological diversity (number of living species.)

2-) Social Responsibility of Individuals:

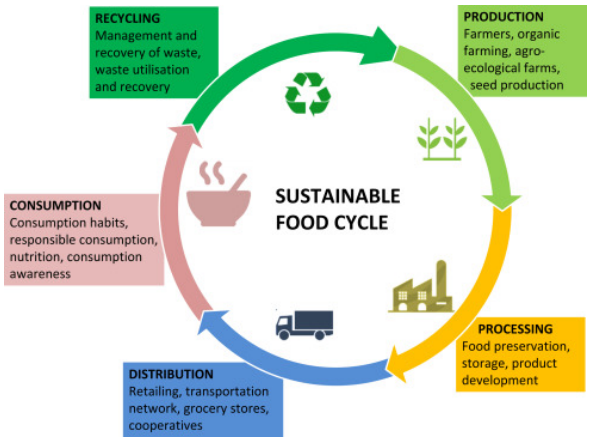
It includes being fair to the workers and making sure that the working class is being taken care of in local and regional communities. It's also about making sure that no matter which continent, country or region they live in every person can freely access nutritious food.

3-) Economic Livability:

Sustainable nourishment production focuses on a fair, equal approach and income to the workers and the farmers. They also aim for improved conditions and livability for them while protecting the environment and its resources, supporting the local communities etc.

Changing to Sustainable nourishment or food production requires different approaches and methods in farming: Harvesting process, distribution, delivery and consumption. It involves adjusting new technologies to reduce pollution, waste protection of natural resources, and reducing the effect of nature to the smallest possible extent. It also needs education and consciousness about the importance of it while protecting the well-being of future generations.

Transitioning to eco-friendly production systems means a change in the ways of procurement by reducing the environmental impacts or effects while addressing the global need for food. This transition or change is motivated by concerns about unstable climate change and the risk of running out of resources. This gives importance to the Sustainable Development.



Firstly, the Transition to eco-friendly production encourages food producers to get their ingredients from food suppliers who prefer sustainable or in other words 'organic' farming. Organic farming avoids using synthetic pesticides and fertilizers and regenerative agriculture focuses on improving soil health and capturing or reducing carbon levels.

Secondly, It aims to reduce food waste at every stage of food production and supply chain (procurement, distribution and consumption). This plays a critical importance in inventory management (making sure they have the right amount of food in stocks), optimal packaging (better packaging with less damage to nature) and education of customers (why it's important not to waste food and increasing the awareness).

Thirdly It emphasizes the use and prevention of waste of energy. During food production from powering machines to fridges and delivery to stocking, It uses a specific amount of energy. The food industry, according to the transition to eco-friendly production must invest in efficient energy usage and the technologies needed for it. This careful investment results in a decrease in carbon footprint and minimizes energy consumption ultimately resulting in a decrease in natural damage.

Fourth and lastly combatting the water scarcity and conservation (protection) of water. Water Scarcity is a big and growing problem for countries and local communities in parts of the world. Transition to eco-friendly production enforces and highly urges the minimal usage of water in food production. This includes methods such as using irrigation smarter and carefully, increasing reusing of the water and helping the development of technologies that reduce water waste.

In conclusion, the transition to sustainable nourishment production and the transition to eco-friendly food production methods or practices are important for addressing the social and environmental challenges that our globalising world in the 21st century is facing today. By using sustainable actions like reducing waste, protecting natural resources and promoting biological varieties, the food industry plays an important role in providing a more sustainable future for the next generations. It is necessary for the food producers, consumers, and policymakers (UNDP and other organizations) to work together on this occasion for better tomorrows, for better futures and to transition to more sustainable and eco-friendly food production systems.

Some Key Terms

1-) Sustainable Agriculture:

Sustainable Agriculture means farming that aims to protect, aid (help) and expand the environment and natural resources. It also aims to make the best use of non-renewable energies and promotes renewable energy systems. It has three main goals: Eco-friendly environmental management, profitability in farms and prosperity in communities. It includes practices such as crop rotation, protection and integration of pest management to maintain ecosystem services, efficiency of soil, and biodiversity.

2-) Agroecology:

Agroecology is practice of the ecological practices in agricultural systems. It focuses on the relationship between plants, animals, humans, and the environment to create sustainable food production systems. It includes methods such as diversification of crops, reforestation and the use of natural predators (bug-eating bugs) for pest control.

3-) Food Security:

Food security means all people's access to sufficient (enough), safe, nutritious (rich in terms of nourishment), in their daily lives for active and healthy food consumption. It covers the availability, access, use and stability of food supplies.

4-) Climate Smart Agriculture (CAS):

Climate Smart Agriculture (CAS) is an eco-friendly nourishment management system that aims to increase productivity, strengthen resilience to climate change and reduce greenhouse gas emissions. CSA practices include the use of drought-tolerant crops, improved water management, and agroforestry.

5-) Circular Economy:

Circular Economy is an eco-friendly economic system that aims to eliminate waste, and recycle, minimise the use of raw materials and increase the longevity of products.

6-) Biodiversity:

Biodiversity refers to the variety (types) of life forms (humans, animals, plants, insects, bacteria, viruses etc.) It includes diversity between species and ecosystems. It's essential for the eco-friendly system functioning and resilience against any challenging factors.

7-) Eco-System Services:

Eco-System services refer to the benefits people gain from them. This includes some of the things that nature gives us: food and water, which are called provisioning services. There are also regulating services like climate control and pest management. Cultural services include spiritual and recreational benefits. Lastly, supporting services like nutrient cycling and soil formation help keep ecosystems healthy.

8-) Sustainable Development Goals (SDGs):

Sustainable Development Goals (SDG) are a set of 17 goals accepted by the United Nations in 2015 and included in the 2030 Agenda for Sustainable Development. They aim to address global challenges such as poverty, inequality, climate change, environmental harms, peace and justice.

9-) Food Sovereignty:

It refers to the right of every human being's equal, healthy and culturally appropriate (suitable) approach to food production, environment-friendly and sustainable methods, and their right to establish (make) their own agricultural systems.

10-) Eco-Friendly Production:

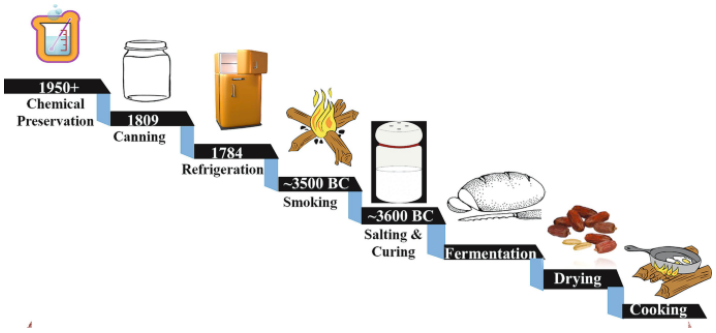
Eco-friendly Production means environment-friendly methods aim to minimize harm to nature. This includes reducing resource use, minimizing pollution and promoting sustainable practices.

Historical Background of the Food Industry and Its Impact on the Environment

Food is a substance (product) that living beings need to consume to stay strong, stay healthy and continue their vital daily (minimal bodily functions) activities. Many people don't consider food to have its own state industry but despite this common belief food industry is one of the most important industries if we compare it overall. Without the food industry, the World would be much poorer and hungrier. To prevent this food and its industry evolved and developed itself from its starting point to today throughout the centuries.

Processing of food started around 1.5 million years ago with the simplest method: Cooking. It aimed to heat the meat, vegetables etc. to make it more tasteful. It is estimated that the first use of cooking methods roots goes back to ancient civilizations in Mesopotamia. These civilizations also used other simple methods for food processing such as salting, pickling, drying, smoking and fermenting. Unfortunately, because cooking was invented before writing, many of the ancient cooking methods are lost but especially after the Ancient Egyptian pictography and their translation to modern alphabets, we were able to learn about some ancient cooking techniques.

Another important step for the food industry was the dawn of agriculture. It's not certain where it was first established but It's estimated that (according to the fossil evidence) Ancient Chinese, Mesopotamian and Central American civilizations knew about agriculture. Require for agriculture was birthed from the unstable climate changes, an increase in the human population, overhunting and lastly improvement of human technology. After the agricultural advancements and farming, we started to see the early civilizations and the nations established. Agriculture played a big role in supplying the people and development of the civilizations. Agriculture also established new jobs for the people and created the idea of the countryside. This idea established the towns and the villages. Some people became soldiers or workers in towns and some became peasants and farmers in the countryside.



Agriculture helped the development of civilizations but it also brought a big problem for humanity: Famine. Due to bad harvesting, bad or unstable weather conditions or wars and sieges that lasted years, people started to lose their healthy access to food from time to time and this caused a decrease in human population, especially in the crowded areas, and even collapse of cities, towns and civilizations. In different parts of the world food industry developed and even established its own cultures and regional dishes. These cultural and regional establishments started the early roots of trading and food industry.

The food industry we know today started to be established after the Industrial Revolution. The Industrial Revolution brought mass production and an increase in demand in the market. Around the 1800s 3 important discoveries helped the establishment of the food industry and its methods. The first one was the Pasteurization. Founded by Famous French microbiologist Louis Pasteur, Pasteurization was important for the protection of drinks and milk which can easily be affected by bacteria. Pasteurization eliminates harmful microbes by using heat while keeping the food's nutrients and flavour still.

Without this innovation, the progress in food processing would have been significantly less and the ability to store and transport food globally would have been severely decreased.

The second method was the invention of canned cans and the canning process. The canning process was important for the safety of packaging, stocking for the future and keeping the food fresh. Canned cans are allowed to carry and travel with the ready-to-eat meals to long distances. This caused the cultural exchanges for food and spread its influence to the nearby regions.

The third and last method established at the beginning of the 20th century came with the development of science and technologies: Mechanization of Agriculture and Population Boom. Mechanization of Farming massively

(hugely) increased the efficiency and production. This massive increase in nourishment in the markets gave people access to more food types and the decrease in the prices and establishment of ministries of agriculture and food for inspection ultimately resulted in an increase of consumption per person and rapid growth in the human population.

During the World Wars, countries mobilized their economy like never before to supply their soldiers and continue. This huge mobilization created and changed the food industry forever. It made refrigerators more common in every house, and the invention of microwave ovens, and commercials of food on television became basic human needs.

After the 2 devastating world wars and the destruction of nature and the environment, countries realized that some steps must be taken to stop this war we're against nature which will ultimately result in either our destruction or downfall. Despite this chaos and disorder, many new things were introduced to the world in terms of food processing. There were new ways to make food, new ingredients to use, and even new machines to help with the process. These changes made it much easier to package and store different types of food. They also made preserved (stocked) foods taste better by adding artificial sweeteners and colours. In our homes, we had new household appliances like ovens, microwaves, and blenders that made it quick and easy to prepare meals. Factories also played a big role in this, using mass production techniques to make lots of food quicker. Thanks to all of these advancements, we now have popular foods like frozen dinners, instant noodle cups, and baking mixes that are enjoyed all around the world.

In the 21st Century population increased even more. Between 1900 and 2011, the number of people in the world increased from 1.6 billion to 7 billion. This was a huge growth. Even with so many people, thankfully the farmers were able to produce enough food in 2012 to feed everyone, and even have extra for 1.6 billion more people. However, hunger is still a big problem around the world. This is because the food is not shared equally among everyone, and a lot of food goes to waste.

In the late 20th and early 21st century, people started to worry about the nutritional value and importance of processed foods to human health. Even though they were

quick and cheap to produce, many storage and compression methods took away important vitamins and minerals from otherwise healthy foods. Adding fat, sugar, and oil made the calorie count went up, but didn't make the food any healthier. People also started to worry about the long-term effects of preservers on their health. The amount of plastic packaging that was thrown away also became a big concern. While food processing made it easier to buy and cook meals, there were still some downsides that hadn't been addressed yet.

Today, the food industry in terms of production has a bright and hopeful future. The industry is coming up with new ideas and new modern solutions to the problems in our current world. Demand is increasing every day, and consumers are becoming more conscious about their health and the environment. Governments and working agencies are acting more eco-friendly compared to the previous century. Lastly, the entrance of computers and the internet into our lives increases the control of beverage manufacturing (production of food systematically), financial control, production management and most importantly reducing waste and pollution.

Today, these functions and developments are becoming more and more significant as manufacturers face the new fruitful advancements and barriers that lie ahead of us. It's a world that is becoming increasingly connected and the food and beverage industry is in many ways, at the centre of these transformations (changes), and for the preservation (protection) of our nature and its rich resources.

Challenges and Opportunities Faced by The Food Industry in Transitioning to Eco-Friendly Production

Transitioning to Eco-Friendly food production is something that is global and has benefits for the whole world but in our globalizing world food industry and sustainable food production face a lot of challenges. This challenge slows down or sometimes even limits the production.

One of the most important challenges the food industry faces is Cost Impact. Cost Impact means switching to eco-friendly production requires a lot of money and can cause financial problems. Transitioning to eco-friendly production also requires new technologies, and investments and if the food producer doesn’t have them they’ll either need to buy them or build their own both of which will cost a lot for them.

Another important Challenge is the lack of Educational Awareness. Due to this lack of awareness both consumers and suppliers can cause damage to nature and natural resources due to wrong methods caused by lack of proper education.

Another important challenge that is faced is the Complexity of Supply and Food Chains. In the 21st century, our globalizing world and international trade reached its peak (highest) point in history. There are multinational companies that are using food deliveries not only

from country to country but also from continent to continent at any time and any place. Managing this complexity is important because failure means delays or even worse no deliveries which can cause bankruptcies or even small-time famines in some regions.

Another important challenge that this transition faces is Compliance with Nature. Following environmental rules and standards can be hard for food makers, especially when the rules keep changing and getting stricter. It's also hard for food makers to not damage the environment while also gaining benefits from their production.

And last important challenge faced during this process is Resource Limitations. It's hard to produce eco-friendly food in areas where there's a lack of water, and natural resources and if the region is overpopulated this might cause famines, scarcity or even worse both of them. Sichuan Province in China or Calcutta in India is a great example of these challenges faced during this transition. These Indian and Chinese regions saw great famines and scarcity throughout their history due to bad governance but at last, they solved the problem by solution of using the transition to fully eco-friendly production and with heavy reliance on foreign export and trade.

Transition to eco-friendly production brings many challenges with it but It also brings innovations and opportunities as well. One of the most important Opportunities is Consumer Demand. More and more people want eco-friendly food, so food makers can pay attention by making sustainable products for those who care about the environment.

Another Opportunity is Cost Savings. While Transition costs a lot during changing products to eco-friendly, If we look at the long-term graphics, we can see that It can lead to cost savings through improved resource efficiency and waste reduction both for people and for businesses. It's obvious that in the long term, using eco-friendly methods will be better for everyone

Another Opportunity is the Increased Reputation (Fame) of the Brands and Companies. Transition to Eco-Friendly food products creates a positive image for brands and

companies and this encourages them and other companies to adapt their products to be eco-friendly. This also increases the trust and loyalty between the customer and seller.

Transition to eco-friendly food production also brings advancements to technology. Innovations and, the development of new technologies benefit both people and the environment. It improves the situation and decreases the risk of pollution and waste. It also helps the further development of 21st-century high technologies developing every day with amazing progress.

The last and most important opportunity this transition brings is the ‘’Access to new markets and Market Growth’’. Producing environmentally friendly food products has the potential to open up new markets and business opportunities, especially in places where customers are increasingly looking for sustainable nourishment products. By focusing on practices that are good for the environment, companies can meet the growing demand for goods that benefit both consumers and the planet. This change towards sustainability can result in higher sales and stronger customer loyalty among those who care about the environment.

Developing food products that are aware of environmental damage can help businesses stand out in the market by addressing a wider group of environmentally conscious consumers. As more people become worried about how their purchases affect the environment, companies that give importance to sustainability can distinguish themselves apart from their competitors. This distinction can lead to a larger market share and increased profits for companies that embrace eco-friendly practices.

Integrating eco-friendly initiatives into food production can also assist companies in reducing their environmental effects and contributing to a healthier planet. By using sustainable practices, businesses can not only attract and impress new customers but also help improve the overall health of the environment. This dual benefit of giving importance to business growth and environmental protection emphasizes the importance of prioritizing eco-friendly food production in today's market.

Government Policies and Regulations

Government Policies and Regulations play an important role in the transition to eco-friendly food production. This transition encourages businesses and governments to adopt these sustainable practices because it creates a positive image of them to the general public. Governments using environmental regulation policies aim at reducing the environmental impact on food production. These regulations include limitations on greenhouse emissions, restrictions to the use of deodorants, pesticides, fertilizers, waste management and recycling planning.

Sometimes Governments give loans (subsidies) or special benefits (charters) to food producers to encourage them to transition to eco-friendly production. This can be things like giving financial support to farmers with 0 VAT or giving tax breaks to companies for them to use energy-saving machines.

Governments also create certification programs. This program aims to check that food meets specific environmental and sustainable production standards. For instance, the USDA Organic certification in the United States guarantees that organic food is made using eco-friendly methods or the TSE logo in Turkish products with 'HALAL' writing.

Research and Development funding for some researchers or scientists is also an important regulation (political arrangement) a government can do. This funding can help businesses to adapt swiftly to environmentally friendly and sustainable production. International agreements, cooperations and conferences also help to increase the popularity and trust for it. This international participation aims and develops its programs according to the suitability to the SDG (Sustainable Development Goals) and decisions taken in the Paris Climate Change Conference.

Some Examples of Government Regulations and International Organizations Policies about the Agenda

1. The European Union has a policy called the Common Agricultural Policy (CAP) that helps farmers use sustainable practices and protect the environment when producing food. EU aims for cooperation and an increase in efficiency with this continental policy. This policy also cooperates with the industrial development agencies of the EU for further development of industry and preservation of nature.

2. In the United States, the Environmental Protection Agency (EPA) has rules to control the amount of greenhouse gases released during food production, which helps make it more eco-friendly. This Agency cooperates with the Federal Government, the White House and State governors for the protection of the Environment and its natural resources. It also cooperates

with educational institutions for awareness and even makes nationwide awareness programs to minimise the damage being given to nature while developing the American Heavy Industry.

3. Canada has standards for organic food production called the Canadian Organic Standards, which make sure that food is produced in an environmentally friendly way and helps consumers find eco-friendly products. Canadian government and their humane approach to nature due to their limited resources and Canadian weather conditions, was an example to the whole world. Canadian industry building alongside food production mixed with each other. They execute the building and production process suitable to the sustainable and eco-friendly transition requirements.

4. UNDP globally helps more than 130 countries with their SDG agencies and partnered organizations in the countries. They aim not only for food production but also for infrastructural development, and the opening of more businesses as well. UNDP also further cooperates with other UN Agencies such as UNEP, UNICEF, UN WOMEN and even UNESCO for sustainable nourishment production and transition to environmentally friendly methods. This method includes minimalizing the damage given to nature and prioritizing human health first.

Technological Investments

Since the Industrial Revolution, the development of technology and technological investments have been important not only for the food industry but in every sector. Especially after the 2000s the rapid rise in technological investments helped further the development of the food industry and enabled a lot of alternative ways for the transition to sustainable and environmentally friendly food production.

As the industry develops and evolves, technology adapts and provides new solutions for new and upcoming challenges. The food industry to develop itself continues and pursues further cooperation and adaptation with the latest technological developments. For example, technological development greatly improved food production and distribution. Advanced machinery and automation technologies increased the efficiency of production and complicated food and supply chains with the invention of online management (mostly fueled by IoT) and analytical calculations ensuring that customers reach the food at the exact and planned time while maintaining freshness and reducing spoilage.

Technology also plays an important part in ensuring the safety of food and the quality of the product. Blockchain is usually used for following the products from the farms to the tables. Giving importance to transparency is essential so blockchain is important for traceability. Another innovation MAP (Modified Atmosphere Packaging is the latest edition of technology that even further predicts traffic jams, calculates the delay and even tells the methods to stabilize the decreasing quality of the product due to passing the time.

Lastly, technology also enabled an important development. It revolutionized the way customers interact with the food industry Technology helped customers to access, prepare, and enjoy their food from online deliveries. This not only helps the customer's experience but also creates new jobs and opportunities for people.

Some of the most impacts of the technology to food industry can be categorized like this:

1- Increase in productivity and efficiency
2- Change of food consumption habits
3- Focusing more on sustainable production and health
4- Improvements in food safety and quality control
5- More Eco-Friendly and Greenist approach
6- Intensified and Expanded Transparency and Traceability
7- Strengthened Customer Experience

In conclusion, technology has made the production process better and more efficient. It has changed the way people eat (habits) too. For example, online grocery shopping has made it simpler and more convenient to buy food. With technology, companies can keep track of their impact on the environment and make changes to reduce their carbon footprint and their damage to nature.

Moreover, technology has also made it easier to ensure food safety and quality control. It helps in tracking and recalling packaged and out-for-distribution products. Additionally, technology has allowed businesses to use eco-friendly methods such as using solar power and energy-efficient equipment. It has also allowed businesses to provide a personalized and interactive experience, whether it's through online ordering and delivery or in-store technology like self-checkout and digital menus. Technology has a positive effect on industry and with continuing technological advancements we can only expect these positive impacts to continue even more.

Some technologies that are positively affecting the food industry

1-) Robots:

Robots are important in the food industry. They help with the picking, harvesting, packing and shipping. They also reduce the human error factor (with the usage of machines) nearly to zero. They improve efficiency and unlike humans can work non-stop which means they can produce more and the jobs are being done faster compared to the human workforce. Usage of Robots in simpler jobs also helps humans to focus on more complicated ones which ultimately contributes to all sectors and units of production.

2-) Drones:

Drones are used in farming and agriculture to manage crop health and irrigation systems. They also help in harvesting and planting as well. Drones reduce the time and effort needed for these tasks and even give important data to farmers from the sky (above). In addition, when drones are used in getting food from the farm to the store, they can help keep track of how much food there is and deliver it to places that are far away or tricky (hard) to get to.

3-) Eco-Friendly Packaging and Waste Reduction:

New technologies have made it possible to create packaging that is biologically degradable (does not take long to decompose in nature) and eco-friendly. Also, things like turning waste into energy and using smart systems to manage waste help cut down on trash and support sustainability in the food industry. This means that companies can lessen their

impact (negative effects) on the environment and keep up with the needs of people who care about the Earth.

4-) Blockchain: Blockchain technology is about transparency and traceability of the food supply chain. It allows real-time food tracking from farms to the tables.

5-) Smart Sensors:

Smart sensors play an important part in continuing the quality standards in the food industry. By constantly monitoring (regularly showing from the screen) temperature level, humidity, dryness and other important factors, they help ensure that food remains safe and fresh during storage and transportation, ultimately reducing waste and bringing maximum quality to the customers and tables.

6-) 3D Printing:

3D Printing used in the food industry helps with the customization of items. It enabled chefs and food producers to shape their foods in ways that were not possible before. They also aim to use plastic at minimal levels reducing the damage to nature.

7-) AI-based solutions:

AI used in the food industry analyses the weather, crops and their conditions, possible errors made by producers maturation time etc. The usage of AI helps businesses for future planning and the maximum efficiency of the product. This both reduces the waste and damage to nature and also helps manufacturers and businesses to make a profit from it.

8-) Hackhatons:

Hackhatons or problem-solving events are used for the challenges faced during food production. Hackhatons brings groups of programmers, designers and industry specialists together to create innovative solutions. Hackathons gather together and find proposals that will turn into solutions usable only for the short time crises.

9-) IoT (Internet of Things): IoT devices are used in monitoring and managing the food delivery system. IoT collects real-time data for maximum efficiency. IoT also records the

former maturation, harvest, and delivery process to show the past mistakes and not to repeat them again

10-) Data Analytics:

Data Analysis helps companies to understand their customers and how they should operate even predict trends. It's mostly used for making strategies for selling and preserving nature, resources etc. Data Analytics are essential for preventing the high amount of water levels and affecting the food industry directly.

11-) Online Marketing and Internet:

Online marketing platforms and the Internet are used for the direct approach to the customers and also for advertising sustainable development goals. Through sales from the internet and feedback on the internet, companies can adopt new strategies and also can test the effectiveness and compare themselves with eco-friendly and non-environmental friendly approaches and products.

In Conclusion, Technology benefits the food industry in many ways with its accurate predictions for supply and demand, reducing the risk of goods perishing, increased flexibility in restaurants and markets, better customer experiences, rise in eco-friendly packaging, improvement of the efficiency and transition to eco-friendly practices for the protection of the environment and natural resources.

Case Studies

Case studies are some examples of companies or regions that have successfully transitioned to eco-friendly production practices in the food industry. They used different methods and strategies to reach an outcome for eco-friendly production.

Here are some examples of Case Studies of Companies

1-) Stonyfield Farm (United States Of America):

Stonyfield Farm is a leading organic yoghurt producer, and has successfully transitioned its production to eco-friendly nourishment production. The company's main source is organic milk from farms using sustainable nourishment production and practices like

rotational gazing and organic feeding. Stonyfield also invests in renewable energy and has reduced its carbon footprint through energy-efficient practices and packaging.

2-) Denmark's Organic Food Industry (DØF):

The Danish state-supported food industry is one of the biggest examples of transition to eco-friendly food production. Countries' policies towards environment-friendly building and eco-friendly nourishment methods alongside animal welfare led to the rapid growth of the industry and a major success for sustainability.

3-) Costa Rican Coffee Industry and Central American United Fruit Company (UFC):

Costa Rican Coffee Industry, Coffee Barons and UFC (United Fruit Company) trade giants in the Central American market embraced eco-friendly approaches to their production. They used methods like shade-grown coffee and organic farming. They also started campaigns for the protection of biodiversity and water protection measures in the region.

4-) Patagonia Provisions (Argentina):

Patagonia Provisions is an outdoor clothing brand in Patagonia. It helps sustainable food production with financial support to farmers and they even support environmentally friendly packaging in their shops.

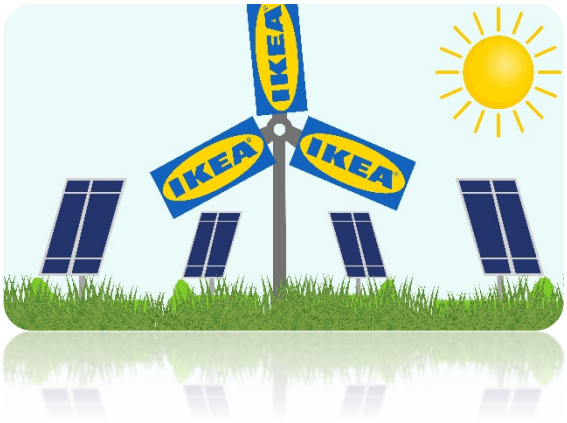
5-) Netherland's Sustainable Dairy Farming:

The Netherlands implemented sustainable dairy farming methods in their country such as using methane digesters to catch cows and reuse methane from cow manure (cow poop gas). The Netherlands also due to geographical reasons invested in the technologies to reduce water usage. Both of these policies and efforts helped to make Netherland's economy more eco-friendly and sustainable products.

6-) IKEA (Sweden):

Swedish Furniture Retailer IKEA implemented several eco-friendly methods and practices. The company uses paper, wood and cardboard allowed by (Forest Stewardship

Council) FSC from certified forests for their products. IKEA aims for more energy-efficient products with the usage of renewable energy sources like solar panels, and wind turbines to power their factories. IKEA also executed a lot of recycling and waste reduction programs in their productions and their factories. IKEA single-handedly lead the furniture industry's transition to eco-friendly production. IKEA also gives a lot of loans and financial support to the small Swedish food industries and pays nearly all of the costs if manufacturers agree to the use of eco-friendly methods.



7-) New Zealand's Organic Diary Industry:

New Zealand has a developing industry that adopts eco-friendly production. Organic dairy farms in New Zealand focus on pasture-based farming, and sustainable nourishment methods and protect animal welfare. The country's organic dairy industry has increased a lot in recent years, driven by consumer demand for organic and sustainable dairy products.

8-) Brazil Sustainable Soy Industry:

Brazil has made important progress in promoting sustainable soy production and environment-friendly policies. The country's soy industry has adopted sustainable farming practices, such as zero-deforestation promises and responsible land use. Brazil's sustainable soy industry has gained international recognition for its efforts to reduce deforestation and promote environmental protection.

9-) Chipotle Mexican Grill:

Chipotle Mexican Grill is a Mexican Fast-casual restaurant chain. While making its products it uses ingredients that are made by sustainable and eco-friendly methods. Chipotle gets organic and locally grown fruits and vegetables, meat without hormones, and milk products from cows raised in pastures. They're also focusing on reducing waste, like recycling and composting, to help the environment.

10-) Organic Buddhist Farming Movement of Bhutan:

Bhutan, a small Himalayan nation has made remarkable progress in the farming sector. Buddhist spiritual method of living in balance with nature's principles made it easier for Bhutan and its farming industry to transition to eco-friendly production. The government of Bhutan and local monks promoted the traditional and religious ways of farming. Even

though outdated compared to general ratios and modern techniques Bhutan's products are more sustainable and eco-friendly products. Bhutan became the leading producer on the crop production, rice and vegetables. Even though Bhutan is an underdeveloped country, It is one of the most successful nations in food self-sufficiency and environment-friendly food production.

Future Trends

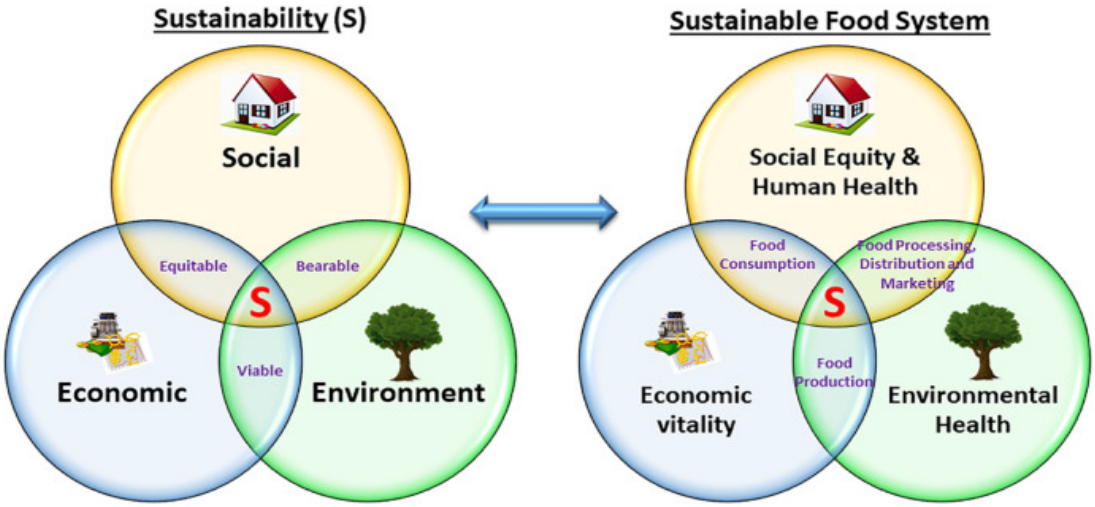
Future Trends in sustainable nourishment and transition to eco-friendly food production means policies, methods, technologies, approaches and practices that can further develop, continue and increase the sustainability and environmental preservation (continuation of protection) in the food industry. These trends are based and established according to innovations, market demands, environmental challenges, sustainable agricultural methods, packaging solutions and lastly supply chain management.

Several Trends are expected to shape the future of the eco-friendly food industry such as:

• Regenerative Agriculture, aims to store carbon in the soil, enhance water retention, and decrease the reliance on artificial substances, which will result in food production systems that are more sustainable and resistant.

• Alternative proteins, due to the high demand proteins for proteins, aim for more sustainable products with the use of fewer resources, energy and cost during the process.

• Circular Economy Practices, such as reduction of food waste, increase in the recycling packaging reuse and usage of by-productions aim to minimize waste and maximise resource efficiency.



• Use of High-Technology and Fragile Devices such as AI, drones, robots and systems. This high-technology usage aims for minimal cost and maximum efficiency for the food industry while protecting nature and using eco-friendly approaches.

• Water Management, with increasing water scarcity and scramble for water resources, new water management solutions such as drip irrigation, rainwater harvesting, and water recycling will become more important in sustainable food production.

• Carbon Farming, includes some agricultural methods that can help reduce the amount of carbon dioxide in the atmosphere and combat climate change. Practices like agroforestry, cover cropping, and no-till farming can increase the levels of organic carbon in the soil and make it healthier.

• Local and Seasonal Food Production, aims for production with minimal energy use, decreasing carbon footprint and methods (Spring, Summer, Fall, Winter,) changing the climate and weather conditions.

UNDP's Role in Sustainable Development in Food Production

UNDP plays an important role in sustainable food production. UNDP makes several approaches, programs, partnerships, and collaborations to assist sustainable food production.

Firstly, UNDP supports the policies made by governments or investors that encourage (supporting the increase in use) sustainable food production. This includes supporting the national development strategies, plans and government regulations that give importance to sustainability and resilience in agriculture.

Secondly, UNDP provides capacity building to expand the quality, skills and knowledge of the farmers. UNDP uses the 'Agricultural Extension Workers' policy and cooperates with the stakeholders for the transition to sustainable farming practices. Capacity building policy includes methods such as precision agriculture, agroforestry and natural resource management.

Thirdly, UNDP supports and encourages the usage of modern technologies and innovations to improve production efficiency, productivity, resilience and sustainability. This involves backing the development and spreading of technologies like precision agriculture, agroforestry, and sustainable irrigation systems.

Lastly, UNDP works together with governments, international organizations, NGOs (Non-Governmental Organizations), and the private sector to support the development of sustainable food production. They form partnerships to make the most of available resources, exchange knowledge and successful methods, and carry out collaborative projects and attempts with each other. Additionally, the UNDP conducts (leads) research and knowledge-sharing activities to find solutions and best practices for sustainable food production based

on evidence. They also publish reports, case studies, and policy briefs on sustainable agriculture and food security to spread awareness and understanding.

Partnerships and Collaborations of UNDP

For the healthy continuation of sustainable nourishment and eco-friendly food production, UNDP collaborates with a variety (different types) of partners, organizations governments etc. These collaborations increase the trust in eco-friendly methods, help the development of the regions and country parts, encourage people to buy products produced with sustainable methods and lastly aim for the preservation of natural resources.

UNDP works closely with the governments to develop policies for sustainable development and environment-friendly food production. This includes technical assistance, capacity building, and policy support. Kenya and Colombia can be considered as 2 great examples of this collaboration.

Kenya partnered with UNDP and implemented a policy of the National Climate Change Action Plan to give importance to climate-smart agriculture and sustainable food products.

Colombia also partnered with UNDP to develop its National Strategy for Sustainable Agriculture which aims to increase sustainable farming practices in the countryside.

UNDP also works closely with international organizations such as ‘‘Food and Agriculture Organization’’ (FAO), ‘‘World Food Programme’’ (WFP) etc. to promote sustainable nourishment production and eco-friendly food production.

UNDP and FAO collaborated on the project called ‘‘Integration of Agriculture in National Adaptation Plans’’. This project aims to strengthen the agricultural capacity by integrating it into the adaptation plans of the project.

UNDP also collaborated with the WFP in the project called Purchase for Progress (P4P) aiming to promote agricultural productions and their sustainability in the smallholder farmers and markets.

UNDP collaborates with some civil society organizations CSOs (Civil Society Organizations), NGOs (Non-Governmental Organizations) and CBOs (Community-Based Organizations). OXFAM and WWF can given as an example of this.

OXFAM and UNDP partnered in the Food Security and ‘’Livelihoods Resilience Programme," which aims to improve food security and living conditions in important communities through sustainable agriculture practices (methods).

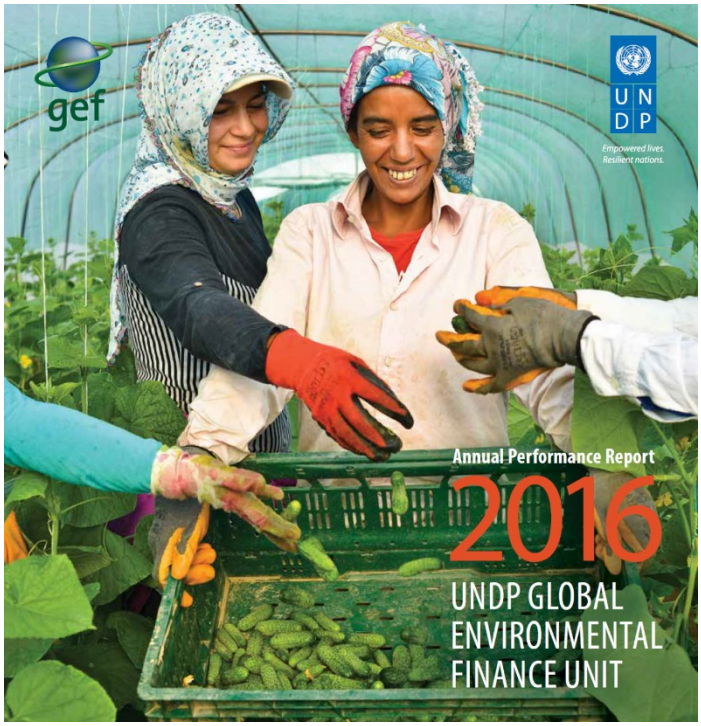
WWF and UNDP cooperation in the "Living Planet Report," which emphasizes the importance of sustainable food production for the protection of animal diversity and welfare.

UNDP also collaborates with the private sector which includes businesses, and industrial complexes. This cooperation usually focuses on sustainable food supply chains, innovations and discoveries in food production technologies, and investment in sustainable agriculture which includes financial aid and farmer subsidies which can be financed from governments or the private sector. Mars and Nestlé can be given as examples of these partnerships.

UNDP collaborates with Mars on a project called ‘’Sustainable Food System Programme’’ and collaborates with Nestlé on the ‘’Nestlé-Cocoa Plan’’. Both projects aim the promote sustainable farming practices, agriculture and food production.

UNDP also helps the academies and research institutions for the generating of new research, data, knowledge etc. These partnerships include supporting research projects both local and international, studies aiming to further develop, and spread the awareness or consciousness for sustainable food production.

In this field of research, UNDP’s partnership with Columbia University and Ghana University can be shown as a grand example. UNDP financed the Columbia University project called ‘’Sustainable Development Solutions Network," which aims to encourage scientific and technical research to promote sustainable development. UNDP also partnered with Ghana University to break the climate change barriers in the "Climate Smart Agriculture Project,"



which aims to promote sustainable agriculture practices among smallholder farmers in response to the geographical situation of the country.

Lastly, UNDP partners with donors and funding agencies such as the European Union (EU) and the Global Environment Facility (GEF). These partnerships with the donors and funding agencies include multiple regions and countries for the development, and usage of sustainable agricultural methods and food production. European Union's "Green Commodities Programme," aims to promote sustainable production practices in key commodity (raw material or goods) sectors and GEF's "GEF Small Grants Programme," supports community-based projects that promote sustainable food production methods can be given as examples to the UNDP's partnerships with the donors and funding agencies.

Impact of Climate Change on Food Production

Climate change is one of the most important problems the humanity is facing in the 21st century. Melting and decreasing ice masses in the North Pole, unstable daily temperature changes, weather conditions that do not match the season and lastly Global Warming are a few of the impacts of climate change. These changes impact a lot of things in daily human lives and Food Production is one of them.

The most important Impact of Climate Change on Food Production is Rising Temperatures, Changes in the Temperature and Types of Precipitation (Rain). In the countries that are at risk of food shortages, Climate Change can change how rainy or how hot the weather could be. This directly affects water availability and ultimately crop productivity. These unstable weather conditions increase the challenges for sustainable agricultural production. An increase in heat makes land less productive. Soil loses most of its nutritive and organic matter. Too much rainfall can cause flooding of the soil. Flooding means the full destruction of crops and all efforts made for the production of it. In tropical or Arctic regions

these temperature changes even cause the loss of the land. In a year approximately we lose 100 tonnes per hectar square.

Another Impact of Climate Change on Food Production is ''Overuse of Chemical Pesticides and Fungicides''. Changes in temperature and humidity levels can create favourable conditions for pests and diseases that affect crops. To combat this, farmers use Chemical Pesticides and Fungicides but farmers sometimes use more than the normal dosage and this can lead to negative impacts. Chemicals remaining on the crops can also damage the consumers of the food and this can result in decreased crop yields and financial losses for farmers, ultimately impacting food security and availability. To combat these challenges, by adopting sustainable farming practices and reducing the use of chemical pesticides and fungicides, farmers can not only protect the environment and human health but also improve the quality of their crops and ensure long-term sustainability and efficiency in agriculture.

Unstable Climate Change also affects Irrigation in many regions and can even cause water scarcity. Without using sustainable practices like rainwater harvesting, and drip irrigation, Food productivity and efficiency will worsen and force farmers to use traditional friendly methods.

Unstable Climate Change can also cause loss and even critical changes in the habitats and ecosystems, resulting in the loss of biodiversity. This can also affect some of the sustainable food production methods such as soil fertility, pollination of plants and natural mechanism and balance of the pests (friendly bugs eating bugs which are damaging the crops.)

Lastly, due to Climate's direct effect and causes of the decrease in production; an increase in prices and disruption of the supply-need balance, result in instability in the markets. If major crops like wheat, maize, and soybeans fail in major breadbasket regions (the places that produce most of the food), food prices will increase, making it difficult for people in poorer parts of the world to afford food. These results have worrying risks and dangers for poorer regions. Sub-Saharan Africa, Northern South Africa, Eastern Belgium, Northern Spain and Southern Italy etc can be shown as some examples of regions that are directly affected by climate change.

Some Examples of Sustainable Nourishment Production affected by Climate Change:

• Coffee Production in Ethiopia is one of the largest coffee producers in the world. Climate Changes in Rainfall directly affect coffee production in the region and farmers are struggling in the region due to extreme and unpredictable rain and floods caused by it.

• Wine Production in France is one of the most famous and impacting production in the continent. Rising temperatures and unstable heat changes directly affect the ripening time of the grapes and cause negative changes in the flavours.

• Rice Production in Southwestern Asia countries such as Thailand, Vietnam and China are important for the nourishment production in the region. Climate Change also directly affects the region with more frequent extreme weather conditions, flooding, causing famines and failure in harvesting.

• Fisheries in the Caribbean is an important progress for the region. Livelihoods and security highly depend on this. Due to climate changes, reserves or stocks of fish in the ocean decrease. The increase of the Ocean's heat levels, acidity, destruction of habitats and overflows also destabilize the fisheries and trade in the Caribbean.

• Maize Production in Malawi major maize production in Africa. Unstable rainfalls and dryness of the soil cause big challenges to maize production. These challenges cause failures in crop production and even cause food shortages to decrease more in already famine-risk areas.

Five Key Principles of Sustainable Food Production

Food and Agriculture production systems face many challenges due to increasing demand for food from everyday increasing population, climate change, overexploitation of natural resources and lastly waste. To combat this problem, the idea of ''Sustainable Food Production Systems'' established and grew its popularity around the world, especially in the 21st century after the great natural crises. Sustainable Food Production is a complex and long process but in simple it should include five points or key principles to become the solution to our problems:

1-) Increasing productivity and employment,

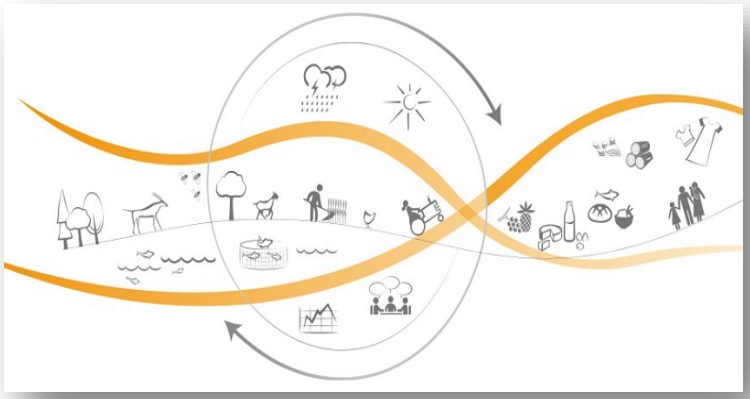
2-) Protecting and Enhancing the Natural Resources,

3-) Improvement of the livelihoods and boosting economic growth,

4-) Strengthening the Resilience of people, communities and ecosystems,

5-) Adapting governances to the new changes or problems.

There are many ways to boost the productivity of food and agricultural systems by changing current practices and methods to eco-friendly ones. It's important for productivity to keep rising to make sure there's enough food and other agricultural products for the people and the demand.



But to achieve this in an eco-friendly way, it should not expand on agricultural land too much and should protect the environment. This is the key to making food and agriculture systems sustainable. Stabilization of the situation also gives a lot of opportunities for unemployed people to work on this cause to strengthen sustainable food production.

Food and farming rely on natural resources, so the sustainability of production depends on the sustainability of those resources. There are many ways to lessen negative impacts (effects) and improve the condition of natural resources. While intensification can have positive effects on the environment by reducing agricultural expansion and limiting encroachment on natural ecosystems, it can also have negative consequences.

The most common form of agricultural intensification involves heavy use of farm inputs like water, fertilizers, and pesticides. This also applies to animal farming and aquaculture, leading to water pollution, destruction of freshwater habitats, and damage to the soil quality. Intensification has caused a significant (important) decrease in crop and animal diversity. These practices are not suitable and come alongside sustainable agriculture and pose a threat to future food production.

By being sure that farmers and producers have enough access to the resources and foods they need for producing enough for the demand and closing the gap between genders, can make a big difference in reducing poverty and hunger in rural areas. Out of all the economic activities, agriculture requires the most amount of labour from the people. It directly and indirectly supports the livelihoods of nearly 2.5 billion people living in rural and countryside households. However, poverty is closely associated with agriculture, and it is also one of the riskiest types of businesses to do so. For agriculture to be suitable for sustainable food production, it must provide fair and improved working conditions to those who work in this sector that should be economically and physically safe and promotes good health to the people. For the people, Of the people and By the people.

Extreme weather conditions, unstable market demands, and social unrest. These three threaten the stability and productivity of agriculture. To combat these threats, making new policies, adopting new technologies, and promoting resilient practices can help ensure sustainability.

Recent events and conditions in our world have highlighted the dangers that can damage agriculture, forestry, and fisheries. Unstable Climate, whether linked to climate change or not, affects farmers and their output. In addition, rising food prices affect both producers and consumers who may struggle to adapt and even cause them to go bankrupt. Globalization has likely increased the speed at which these shocks and damages spread worldwide, making their impact on production systems more unpredictable. Building durability (strength to counter) is crucial for the change towards sustainable agriculture, addressing both natural and human factors.

The transition to sustainable production can only take place when there is a balance between the current situation and new upcoming challenges. Continuation of sustainability in food and agriculture systems towards a good dimension (route) requires good governance or management. Sustainability will only be possible through effective and fair governance, including the right and enabling policies, and environments that manage the right balance between private and public sector initiatives, and ensure accountability, equity, transparency and the rule of law. After the establishment of good governance countries or organizations can (with the previous investments and support from the donors, cooperations and technological developments) respond to the problems with minimal damages.

Benefits of Sustainable and Eco-Friendly Production

In our world with rapid population growth, we see that increasing demand for food production alongside the rapid decline of our natural resources is a big threat to the future of humanity. To respond to this crisis governments and countries to address their environmental problems; famine social crises economic stagnation or even worse bankruptcies use sustainable food production methods and eco-friendly food production practices. These practices have a lot of benefits concerning everyone (producers, deliverers, customers etc.).

Acts Against Climate Change:

One of the biggest advantages of Sustainable food production is according to the calculations from the UNEP, Global emissions of greenhouse gases would fall by 64% by 2050 if we reduced the use of non-co-friendly methods by %50.

Protection of Forests:

Sustainable food production methods help to stop deforestation by reducing the use of land for livestock farming. For example, Livestock farming expansion is responsible for the %75 destruction of the Amazon Forest.

Improving Human Health and Contribution to Food Security: More sustainable nourishment or food production consumed by people can prevent 11 million premature deaths and even reduce obesity which is starting to become an important problem for humanity.

Protection of Endangered Animal Species:

According to the data from the UNEP between %20 and 40%40 of mammals and birds could become extinct by 2060 due to livestock farming and the usage of non-renewable energy to fuel their production. Out of the 28,000 endangered species, Nearly around 24,000 of them are facing this threat because of agriculture and livestock farming. This means that 86% of all endangered species are directly affected by these human activities.

Protection of Water Resources:

The usage of water resources during the eco-friendly approach reduces waste. This reduction also causes that surplus of water will contribute to animal feed in wildlife but in livestock farming, less water would be used and the pollution of rivers and coastal areas due to livestock or the breeding of animal feed would be reduced.

Importance of Seed Production and Climate Change's effects on it

Seeds are tiny, strong structures with all the essential features required for a young plant to grow including all the nutrients and a protective coating. Once a seed provides suitable conditions, such as proper soil, water, and sunlight, it will spread and develop into a fully grown plant. Therefore, seeds play an important role in plant reproduction and growth. Seeds are living products that need to be grown. After the growth harvesting begins. After the harvest, next comes packaging and delivery. This process like in other products needs to be eco-friendly for the protection of natural resources and the need for sustainable nourishment due to the rapid growth of the human population.

Good Seed quality also affects crop yields. Seed also directly affects human health so getting maximum quality from seed means how healthy human beings who consume that will be. The quality of seeds is determined by various factors such as their health, (physiology and anatomy), ability to germinate, and physical characteristics. These factors include the presence or absence of diseases, usage of chemicals, insect infestation, as well as the presence or absence of weed seeds or other types of plants that negatively affect the quality.

Quality Seed needs to be genetically pure meaning that they stay true to specific types of traits needed for human body. Physical appearance such as size, shape, colour, determines the uniformity of the seeds. It is important for seeds to be well produced which means they should be chubby, well-developed, and didn't get any damage, disease, or insect infestations. There are many factors affecting the seed production. The most important one is Climate Change. Throughout the twenty-first century, there have been too many differences in the expected weather conditions in many countries and regions. The unpredictability of crop production has risen since the start of the century due to extreme weather events like the ''2003 Drought and Summer Heatwave'' and ''2007 Spring Drought and Great Heatwave of 2009''. The decline in genetic diversity poses a hidden but crucial danger to biodiversity, as the extinction of unique populations leads to smaller effective population sizes.

In 2011, the world population hit 7 billion people. Right now, 80% of these people live in less-developed regions. At the start of the century, it was 70% of people living in it. By 2050, it's predicted that 90% of the world's population will be in these less-developed areas, and the total population will be over 9 billion. As the population grows, so does the need for food. But food production isn't keeping up with the population growth, leading to food shortages and insecurity.

Unstable and unpredictable Climate change scenarios show that there will likely be even bigger gaps in crop yield production between developed and developing countries in the future.

Seed is very important for farmers and agricultural communities. It holds all the special traits and abilities that make crops grow well. Using good quality seeds from different types of crops can help farmers grow more food and make sure populations and regions have enough to consume. The seed industry is a big part of making sure communities have enough food. They give farmers the best seeds at the right time and in the right place. By using these good seeds and taking care of the crops with fertilizers and water, farmers can grow even more food.

It's been estimated (guessed) that using good quality seeds can increase crop yield by 15-20%. On this occasion, climate change affects seed production and the seed industry. We know that things like temperature, dry periods, and carbon dioxide can have a big impact. But there are other factors like precipitation, ultraviolet-B radiation, ozone pollution, and greenhouse gases that can also affect seeds. Farmers and producers need to think about all of these factors when it comes to growing food.

Extreme Temperatures, including heatwaves and cold winds, directly affect the seed production. High temperatures can reduce seed vitality and its strength. Cold Temperatures damages the seed and reduce the germination. 2019 Australian heatwave which had negatively affected the seeds wheat and barley, is the most recent and destructive example of this factor.

Another Example is the Unstable and unpredicted rainfalls. It directly effects the soil moisture and water availability. Reduced soil moisture levels lead to lower seed yields and poorer seed qualities. Most Recent and important example for this happened in United States of America in 2009. Drought in Midwestern American States caused by unstable rainfalls damaged the seeds of corns, soybeans and decreased the production by %38,5 and even some climatologists said this was the second most effective drought in US history except the Great Heat Wave of 1936.

Lastly Climate Change causes malfunctions or disruptions in the genetics of plants. It can cause a disease, slower germination, disruption on the shape and size etc. This disorder in seed negatively effects the quality of product and human health. Spread of Fusarium Fungus and Genetic Diversity disorders resulted from it can be shown as an example for climate changes direct effect on the seed production.

In conclusion, Climate change is a big problem for seed quality It can cause to slow growth and less productivity from the seed. In order to achieve the eco-friendly nourishment production, Eco-friendly seed and production methods must be protected for a better future.

Questions to be considered

1-) What kind of policies (regulations) and encouragements can be done from governments for farmers and producers to prefer sustainable nourishment production and eco-friendly food production?

2-) What kind of measures can be used to promote sustainable nourishment production?

3-) What steps can be taken to ensure that everyone has access to healthy and sustainable food options?

4-) What role can technology and research innovation play in help in grow food more sustainably and protect the environment?

5-) How can the governments, businesses and non-governmental organizations make partnerships and collaborations for supporting the transition to sustainable and eco-friendly food production methods?

6-) What roles education can play in increasing the awareness and promoting the benefits of sustainable and eco-friendly food production practices, including seed production, among farmers, consumers, and policymakers?

7-) How can we save and share seeds to preserve plant diversity and ensure future harvests for by using sustainable and eco-friendly food production methods?

8-) How can agriculture react and respond to the impacts of climate change, such as unpredictable weather conditions, unstable rainfalls and extreme events, to ensure sustainable food production for the future?

"Broken food systems are not inevitable. They are the result of choices we have made. There is more than enough food in the world to go around. More than enough money to fund efficient and sustainable food systems to feed the world, while supporting decent work for those who grow the food we eat." (UN Secretary General, Antonio Guterres)

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