



Excellencia MUN '23

Food & Agriculture Organization

EXECUTIVE SUMMARY

FAO Background Guide

AGENDA: Deliberating upon the innovations in Agri-Tech for rural development and empowering small farmers.

Letter from the Executive Board

It is an absolute honor to serve in the Executive Board in this edition of Excellencia MUN '23. I am Raghav Pathak, Chairperson for the Food and Agriculture Organization (FAO) and we have with us, Chintan Das, who will be serving as the Vice-Chairperson. With immense pleasure, we welcome you to delineate the duties of a diplomat of your country and officially step into the shoes of an emissary to play a very crucial role of discussing, debating and arguing your country's stand and approach towards our agenda. We have prepared this background guide, which is essentially to give you some idea about the agenda at hand and to cater your basic research. Please note that the Background Guide is used to give you an overview of the topic, and you need to do some research on your own regarding the policies and opinions of the country you will be representing. As the Executive Board, we look forward to inspiring the next generation of MUN delegates by fostering a stimulating, engaging environment.

FAO expects you to use your soft skills, critical thinking, fast-paced attitude, analytically approach to problems and suggest relevant solutions, exercise competency and discipline and to contemplate assiduously your judgment and opinions. In this background guide, I and Chintan have used a plethora of international conventions, ratifications, citations, statistics, laws, amendments, treaties, charters, FAO/organizational reports, surveys, UN resolutions etc. which we both hope you all will comprehend meticulously as they will pitch in your speeches and arguments.

The Food and Agriculture Organization of the United Nations (FAO) is a specialized agency of the United Nations that leads international efforts to defeat hunger and improve nutrition and food security. It helps governments and development agencies coordinate their activities to improve and develop agriculture, forestry, fisheries, and land and water resources. It also conducts research, provides technical assistance to projects, operates educational and training programs, and collects agricultural output, production, and development data.

We know that you may come across a lot of doubts/queries to which the EB is always available (mostly 90%). Don't be afraid to ask questions and discuss vigorously, as that will enliven the debate and make for a more substantial experience. In particular, if you have any questions about the content, operations, or format of this committee, feel free to email us at raghavpathak@unitednationssc.org and chintandas144@gmail.com we wish you all the best in your preparations and look forward to seeing you at the conference.

Best Regards,

Raghav Pathak, Chairperson / FAO

Chintan Das, Vice-chairperson / FAO

Introduction & Approach towards the Agenda

Abstract & Background

Agri-Tech is a word which is a combination of Agriculture and Technology. AgriTech, as the name suggests, uses various technologies to increase agriculture, horticulture, and aquaculture production. The major turning point for the development of different agriculture technologies is the Industrial Revolution. Involving technology in agriculture, aquaculture and horticulture are AgriTech. The aim of combining technology with these agriculture and associated practices have the same purpose; increasing yield, profitability, and efficiency. AgriTech can be services, products or applications extracted from agriculture to improve various input and output processes. The various types of technologies and applications used in AgriTech are the following; IoT-based sensors and photography, Drones, Satellite-based sensors and photography, Weather forecast, Use of automated irrigation systems, Phase tracking, also using light and heat control systems in some cases, using intelligent analysis software for detecting pests and also,, predicting diseases, soil management, and other related tasks, Biotech is a different type of AgriTech.

In order to feed the estimated 9.7 billion people on earth in 2050, agriculture must overcome many pressing challenges: increasingly meat-heavy diets, degradation of fertile land, widespread water shortage, increasingly volatile weather, and climate change. Addressing the question of how to utilize the next generation of technology and jump-starting the Third Agricultural Revolution remain crucial for the future of agriculture companies.

Domains and Factors Revolutionizing AgriTech Innovations

With 815 million people on the planet suffering from hunger and 1 in 3 malnourished already, the Food and Agriculture Organization of the United Nations have set sustainable development goals to eliminate world hunger by 2030. Adding at least 2 billion more people to feed by 2050, the FAO has estimated food production will have to increase by 70%.

- ***Precision Farming:***

Precision farming combines information science with agricultural engineering, harvesting massive amounts of data from the farming process. Utilizing technological advances like advanced sensors, machine learning, and artificial intelligence for data processing, precision farming helps monitor big picture environmental factors like weather patterns, water distribution, and soil chemistry, as well as tiny measurements like nutrient deficiencies in individual plants. Called the next “digital revolution” for agriculture, precision farming has already been shown to increase crop yields while reducing fertilizer and pesticide use, which decreases the pollution of groundwater and depletion of non-renewable resources like phosphorus. GPS may not seem like a radical new technology, but its integration into John Deere tractors in 2001 allowed data to be collected on their location with precision down to a few centimeters. This innovation alone reduced fuel costs for tractors by as much as 40% in some cases by keeping them from covering redundant areas or missing a spot.

Using precision farming tech like driverless tractors tilling only specific land areas and quad copters collecting data on soil chemistry, water content, nutrients, and growth, Dutch farmers, the world’s top exporters of potatoes and onions, and the second largest exporter of vegetables in overall value, are able to produce more than double the amount of potato yield per acre compared to the global average and reduce dependence on water by 90%. For this trend to sweep the globe and be available to the 144 million farmers in Asia, basic digital literacy is the first step. While many of these populations now have access to smart phones, very few are using them for farming. Once these farmers are connected to digital infrastructures and can use these technologies to enable data-driven decision making, they too will be able to join the digital green revolution.

- ***Biotech***

Biotechnology that modifies the genetic code of crops to make them more nutritious, grow more quickly, and resist diseases and pests are the backbone of modern multinational industrial agriculture. Many anti-GMO lobbyists and farmers believe that tampering with the genetic code of food products is too risky to try at scale, but to grow

food under the conditions that global warming will bring, scientists are hastening on mutations that will help make crops more resistant to drought, heat, cold, and salt.

CRISPR, the gene editing bacteria that has been making headlines for its potential use in the human genome, is one of the biotechnologies that scientists are using to make crops grow more plentifully by allowing more efficient photosynthesis, as in the C4 Rice Project, or to encourage nitrogen fixing in crops that don't naturally pull nitrogen from the air, which would mean less fertilizer used, and less fertilizer runoff polluting groundwater. AgriTech is also turning to nature to find solutions to problems that are currently being solved synthetically with fertilizers and pesticides. As one example, Seattle's Adaptive Symbiotic Technologies have created non-toxic and non-pathogenic microbes that grow alongside plants and help them be more nutrient efficient, tolerate environmental stress, and yield more produce. In high stress growing seasons field tested across the globe, these microbes have increased crop yields by 10–50%.

Koppert Biological Systems, founded in the Netherlands, also use solutions found in nature by providing the natural predators and micro-organisms that can eliminate pests and diseases. Farmers using Koppert's bees instead of artificial pollination have reported a 20–30% increase in yields and fruit weight, another reason that saving the world's bee populations is essential to sustainable agriculture.

Biotechnologies have reached the developing world in the form of innovations like Golden Rice, a genetically modified strain of rice that contains vitamin A. According to a paper by Dr. R. B. Singh, the Assistant Director-General and Regional Representative for the UN's Food and Agriculture Organization in the Asia-Pacific region, 180 million children in developing countries suffer from deficiency in vitamin A, resulting in 2 million deaths annually. With the FAO behind the development and distribution of Golden Rice and the Bill and Melinda Gates Foundation supporting similar biotechnology projects like breeding bananas that provide higher levels of iron in sub-Saharan Africa, genetically modified crops will be a major technological trend in ending world hunger and providing for the population of 2050.

- ***AI & Machine Learning Technologies***

In the last two decades, global production of primary crops has increased by more than 50%. How did agricultural companies manage to double their production in twenty years, and how can they achieve even more impressive results in the face of a growing global population? The short answer is innovative agricultural technologies through AI & ML.

Connected farming is one of the most promising trends in agriculture, helping us understand how agricultural businesses can produce enough food to meet growing demand. Connected farming is about using new technologies in agriculture to monitor, manage, control, and ultimately improve key agricultural and farming processes at the pre-production, production, and post-production stages of the farming cycle. Connected farming is implemented through an ecosystem of diverse IoT devices that gather and exchange data in the field, within equipment, in the cloud, and in corporate offices. Monitoring fields is a good use case to show how farming innovations like IoT technology can replace inefficient and time-consuming approaches. Imagine a dozen sensors out in a field tracking the soil condition, air temperature, and humidity level. Once the level of a particular parameter reaches a yellow zone, a manager or field operator receives a real-time notification so they can take necessary actions.

As the system is highly customizable, it can be adjusted in a way that human involvement would in some cases not be required. For instance, inputs from sensors may instantly trigger aerial or ground-based irrigation drones. At every stage of the agricultural lifecycle, farmers must make dozens of timely and effective decisions. In the past, crop choice, soil preparation, fertilizer use, seed sowing, irrigation, weed protection, harvesting, and storage were determined by decisions based on instincts, manual calculations, and subjective opinions. Today, agricultural decision-makers can save plenty of time, get accurate predictions, and make better decisions using innovative ideas on agriculture powered by machine learning (ML) and artificial intelligence (AI) technologies.

Innovative agricultural technologies based on AI and ML can be used for diverse purposes, from predictive analytics for crop sustainability and demand forecasting to proactive identification of weed and crop infections and sustainable harvesting with minimized waste. Another use of new technologies in agriculture is AI-based robots. These can be applied in various ways, such as for smart cattle herding. Simply put, AI-driven farming innovations offered on the market can be divided into two groups: the Swiss army knife type that provide a diverse set of functionality and more specific solutions with limited yet deep specializations.

Now, think of a solution generating data-driven analytics and farm-level reports that help agriculturalists assess the performance of field inputs on crops and reveal the weaknesses of the crop management process. The value for an agricultural business may hardly be overestimated. Yet mass adoption of AI-based farming innovations is still being undermined by end users' lack of trust in algorithms in general and the black box problem in particular. The good news is that explainable AI is gaining momentum, which means more and more farmers will embrace AI soon. It's impossible not to mention the block chain when speaking of key innovations in agriculture and farming. Block chain and distributed ledger technology (DLT) are already being used at almost every stage of the agricultural business cycle to:

- ☐ Simplify the agricultural supply chain
- ☐ Enhance food safety and eliminate counterfeit items
- ☐ Track complete product paths from field to store
- ☐ Reduce financial risks and promote fair trade
- ☐ provide certifications required by authorities
- ☐ Provide farmers and businesses with smooth financial and insurance services
- ☐ To give an idea of how developing trends in agriculture work in practice, let's look at how a block chain helps farmers manage insurance policies.

Largely because farming has always been vulnerable to unpredictable weather and climate changes, insurance services are crucial for the financial health of an agricultural business. If you've ever worked with farms in harsh climates or within impoverished communities, you know that claiming indemnity payments becomes a monthly or even weekly routine. And that's where new technologies in agriculture and the blockchain come into play, reducing risks for stakeholders, speeding up claims processes, and eliminating human mistakes. With a block chain-based smart contract, indemnity payments can be automatically triggered once contractual conditions are met. For example, if monthly precipitation doesn't reach a particular level specified in a contract, a farmer can automatically get an indemnity payment within a contracted period. Smart contracts developed with distributed ledger technology make the indemnity payment process quick, easy, and safe.

Problems and Setbacks with Regards to Implementing Agri-Tech Solutions

The global demand for crops is expected to rise further. This growing demand exerts immense pressure on food producers worldwide. Hence, it is imperative to explore innovative solutions to enhance productivity while conserving resources.

1) Despite the potential benefits, the adoption of modern agricultural technology faces several challenges. Traditional farming methods deeply rooted in history create resistance to change, particularly outside the U.S. Technical stagnation on farms, often due to financial constraints, impedes the implementation of advanced technologies. Additionally, the soaring prices associated with setting up technologically advanced farms create financial barriers for many agricultural stakeholders.

2) Educational and Knowledge Barriers:

One of the fundamental challenges lies in the educational background of individuals in the agricultural sector. Globally, over 40% of the workforce is employed in the agrifood sector, including a significant portion in developing countries. However, a substantial number of farmers lack adequate education, limiting their ability to make informed decisions and adopt new technologies. This educational gap hampers the sector's progress, especially in regions where illiteracy rates are high.

3) Telecommunications Infrastructure Challenges:

The successful implementation of agricultural technologies relies heavily on reliable internet connectivity. Several parts of the world face challenges related to internet accessibility. In some rural areas, limited internet connectivity obstructs the integration of advanced agri-tech tools, creating disparities in technological adoption.

Initiatives and Projects taken up by FAO

FAO, or the Food and Agriculture Organization, has played a pivotal role in several international initiatives aimed at safeguarding global agriculture and addressing crucial issues such as pest management, genetic resources conservation, and food security.

1) Established in 1952, the International Plant Protection Convention (IPPC) is an FAO initiative designed to curb the international spread of pests and plant diseases in both cultivated and wild plants. With 183 contracting parties as of July 2018, the IPPC maintains vital functions, including the management of plant pest lists, tracking pest outbreaks, and facilitating technical assistance among member nations.

- 2) Another significant treaty under FAO's umbrella is the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), colloquially known as the Seed Treaty. This treaty, which took effect in 2004, focuses on conserving and sustainably utilizing plant genetic resources essential for food security. As the depositary for the ITPGRFA, FAO plays a central role in its implementation.
- 3) In the fight against hunger and malnutrition, FAO established the Alliance Against Hunger and Malnutrition (AAHM) in 2002. This global partnership connects local, regional, national, and international institutions, aiming to enhance coordination in efforts to combat hunger. Rooted in the UN Millennium Development Goals, AAHM strives to reduce hunger and malnutrition, aligning with FAO's mission to improve food security.
- 4) During the 1990s, FAO took a leading role in promoting integrated pest management, particularly for rice production in Asia. Through the Farmer Field School (FFS) approach, FAO trained hundreds of thousands of farmers. This initiative, funded by bilateral Trust Funds from countries like Australia, Netherlands, Norway, and Switzerland, received acclaim from NGOs, highlighting FAO's positive impact in the field.
- 5) FAO also established the Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases in 1994. Focused on diseases like rinderpest, foot-and-mouth disease, and avian flu, this system aids governments in coordinating responses. The Global Rinderpest Eradication Programme, a part of this system, has successfully eradicated rinderpest in large areas of Asia and Africa. Additionally, FAO's Desert Locust Information Service monitors global locust situations, keeping affected countries and donors informed.
- 6) Recognizing the need for enhanced plant breeding capacity in developing countries, FAO initiated the Global Partnership Initiative for Plant Breeding Capacity Building (GIPB). This global partnership aims to bolster the capacity of developing nations to improve crops for sustainable development and food security. By fostering a global network of plant breeders, leaders, managers, technicians, donors, and partners, GIPB strives to address food crises and increasing demands for crop-based sources of energy.
- 7) FAO's efforts also extend to investment in agriculture. Its Investment Centre works to mobilize funding from multilateral institutions such as the World Bank and regional development banks, assisting developing countries in formulating sustainable agricultural policies and projects.
- 8) Furthermore, FAO is involved in the Globally Important Agricultural Heritage Systems (GIAHS) Partnership Initiative. Launched in 2002, this initiative identifies, supports, and safeguards globally important agricultural heritage systems and their associated biodiversity, knowledge systems, and cultures. It

emphasizes the well-being of family farming communities, promoting sustainable agriculture and rural development.

9) Addressing biological diversity for food and agriculture, FAO established the Commission on Genetic Resources for Food and Agriculture (CGRFA) in 1983. This intergovernmental forum ensures the sustainable use and conservation of biodiversity while promoting the fair and equitable sharing of benefits derived from its use.

10) In the realm of Animal Genetic Resources, FAO focuses on preserving species used for food and agriculture. It assists countries in implementing the Global Plan of Action for Animal Genetic Resources, employing various conservation strategies such as cryoconservation to safeguard genetic diversity.

Questions to Consider

Q1) How can organizations like FAO facilitate the adoption of agri-tech solutions in rural areas?

Q2) What are the primary barriers hindering small-scale farmers from adopting agri-tech solutions and how can these be combated practically?

Q3) What are the emerging trends in agricultural technology, and how might these advancements reshape farming practices and rural economies in the future?

Q4) What policy recommendations can be proposed to governments and international organizations to promote the widespread adoption of agritech among small farmers and ensure long-term sustainability?