

Forum:	Economic and Social Council		
Issue:	The Role of Technology and Innovation in Curbing the Effects of Food Insecurity		
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Introduction

Food shortage is a growing epidemic in the modern world. The inhabitants of over 50 countries face extreme hunger on a day-to-day basis, where diseases such as Marasmus and Kwashiorkor are not uncommon due to malnutrition. Unable to determine where the next meal is coming from, families and children are left hanging in the balance. Many children in countries such as Syria, have as little as one meal a day, with little to no variety in their diet. The level at which the crisis has reached unprecedented extremes, with over 124 million people victim to food shortage. However, the issue does not solely lie within countries who are already combatting food shortage as new research uncovers evidence that global food shortage is much closer than we think. With the world's finite resources nearing depletion, it has been suggested that in as little as ten years the epidemic could continue to spread to majority of the world, as reported by Gro Intelligence, a food and agriculture company. The United Nations department for Food and Agriculture has predicted that the world will need to increase their food production by 70% by the year 2050, a mere 30 years away, to accommodate a predicted population of 9.1 billion people. With crucial deadlines approaching on which the sustainability of humankind rests, we must act fast.

Breakthrough technological advances may be the drastic solution to the growing epidemic, and should be used to achieve Goal 2 of the sustainable development goals: Zero Hunger. To achieve this goal, drastic changes have to be made to the food and agriculture systems. Noting the scale of the issue (wherein in central africa, the average calorie intake per day is a mere 1760kcal, as reported by the food and agriculture organization), technological advances of the future may be one of the most realistic paths to achieve Goal 2. Throughout the years, large-scale corporations such as Google have been credited to new and cutting-edge technology, such as the recent introduction of virtual intelligence cameras, or Apple's new face identification camera. If we are able to have such an advanced level of technology at our fingertips, then it is not unrealistic to assume that, if the same effort is applied to developing

technology to combat food shortage that we could have several solutions to the issue at hand within a few years. The only thing that is developing as fast as the global food shortage is the advancement in technology. It is up to us to use this inverse proportion to our advantage. Seeing as modern day methods to address the issue are no longer efficient enough due to the issue's unprecedented scale, we must now look to methods of the future to find adequate and sustainable solutions.

Definition of Key Terms

Malnutrition

A person or people not having access to enough nutrients due to either food shortages or lack of accessibility, and therefore not having the recommended intake of nutrition and energy. Symptoms for this include significantly shorter height caused by lack of food, significantly low weight, or insufficient vitamins and minerals.

Famine

Scarcity of food in a region, typically due to external, uncontrollable influence such as weather or the destruction of crops.

Technological Innovation

Significant achievement or advancement in technology due to different inventions, discoveries or newly found processes. In this context, innovation refers to any technological creation or discovery that improves people's access to, or the availability of, food across the world.

Food Insecurity

Insecurities or inconsistencies in a person's access to food. If a person or group of people is not aware of the source of their future meals, or is not certain that they will have meals, in the near future, it is an indicator of food insecurity.

Extreme Poverty

Extreme poverty is defined by the World Bank as living on less than US\$1.90 per day per person, adjusted for the Purchasing Power Parity (PPP) of each region. PPP is calculated based on the amount of goods and services that a person can buy in a region for a given amount of money.

Background Information

224 million children are undernourished. 462 million adults are underweight. 836 million people live in extreme poverty. Food shortage is one of the most vital issues in today's world; people are constantly dying of unsafe or contaminated food, of starvation, and are living in famines in some of the poorest parts of the world. Technological innovation is the only way this problem can be solved.

Integrated Phase Classification

The Integrated Phase Classification, also known as the Integrated Food Security Phase Classification, is a system of classification for levels of food insecurity in an area, with five different levels that each indicate a certain level of severity and emergency among civilians. The IPC is often used to prioritize places around the world to address food insecurity according to the severity of their situation. Phase 1, minimal food insecurity, is considered to be a society with secure access to food for the vast majority of households. This food access is consistent and reliable for the near future. Phase 2, stressed, is moved to when a minority, but still a significant portion of the society, is left without secure access to food or has to sacrifice some other necessities in order to obtain food. Phase 3 is declared as a crisis scenario, where there is noticeable malnutrition among the population, while Phases 4 and 5 are declared as emergency and famine respectively, referring to a society with widespread malnutrition and severe lack of reliable access to food.

Famine and Starvation

The United Nations classifies malnutrition as a case of starvation where: "20% of population face extreme food shortages with limited ability to cope; acute malnutrition rates exceed 30% for children under 5; [there are] 2 deaths per 10 000 people, or 4 deaths per 10 000 children per day." Famine and starvation almost always manifest their effects in symptoms such as disease and epidemics, as malnutrition leads to weaker immune systems and therefore a greater chance of succumbing to diseases. The 21st century has seen relatively few cases of famine as compared to the 20th century, which saw significant amounts; however, there remain areas around the world where famine is prevalent and more severe than ever in history.

Yemen

Yemen is facing one of the greatest food crises in its history, classified as phase five on the IPC: Famine. A total of 50,000 children died due to hunger and disease in 2017. Yemen is currently host to 1.8 million undernourished children and 8 million children who do not have secure, reliable access to food and water. This famine is the product of the Yemeni Civil War, a conflict that began on 22nd March, 2015, and has since continued. Although food is arriving to the ports of Yemen, it has no way to reach the people of Yemen due to blockades constructed along the coast. Any food that does pass the blockades is not able to be distributed among the civilians.

Somalia

1.5 million people stand at risk in Somalia, with fifty thousand children facing death. This is the second famine in the last decade in Somalia, the first being in 2011, and it is significantly worse than the first. Although the statistics are better than the projected outcomes of 2.7 million people at-risk in February, these 1.5 million have been classified as Emergency, Phase 4 on the IPC, and require immediate care in order to avoid starvation. Moreover, an additional 3.1 million people classify as Stressed, Phase 3, resulting in a total of 4.6 million people suffering from severe food insecurity and requiring care in the near future. In order to combat this, humanitarian organizations have attempted to continue providing humanitarian assistance while simultaneously publicizing the issue and raising funds on its behalf.

Reasons for Food Insecurity

Food security is defined as the access of a population to a reliable source of food and nutrition. Reliable, in this context, refers to the sustainability of the current source of nutrition and the probability that a population will have access to a proper source of nutrition in the near future. Food insecurity is declared when it is highly probable that a demographic will not have access to a healthy source of nutrition in the near future or they currently do not have access to such a source.

Food insecurity is caused due to multiple reasons; as seen in the case of Somalia and Yemen above, civil war and political instability are some of the most widespread causes of malnutrition in the world. When a government or a population is focused primarily on ensuring day-to-day survival, therefore neglecting the sustainability of food resources. For instance, farms and agricultural fields may be ravaged by a population in crisis. The population, in this situation, may solely focus on ensuring that they have enough food to survive for the next day and would neglect taking care of the farms to ensure that they aren't harmed in the long-term. This could result in over-production, over use of fertilizers, and over-irrigation; desperation of causes a lack of foresight.

Another reason for food insecurity is the lack of proper transportation of food. While transporting foods from the source to the population, if the transportation lacks in hygienic conditions a large portion of food could go to waste. Furthermore, cross-contamination between living animals being transported to meat needs to be prevented, resulting in additional precautions taken to separate different animals. Controls for humidity and temperature may also be necessary in certain cases, such as with the case of milk-products. The lack of proper care when transporting foods could result in food spoilage and waste or, if not noticed early enough, widespread disease among a population ("From Farm to Fork"). Transportation is necessary, however, in order to disseminate food across a large population, and thus ensuring that there are proper methods of transportation is a vital part of this issue.

Projected Food Necessities

As of May 2018, there is a world population of 7.6 billion people and a population growth rate of 1.09% per year. Although the growth rate is decreasing, by 2050 it is still predicted that we will have a world population of 9.1 billion, 20% higher than it is today. The Food and Agriculture Organization, the FAO, predicts that in order to meet this large, increasingly urban population food production will have to increase by significantly: annual cereal production will need to reach approximately 3 billion tonnes, rising about 400 million from today, and meat production will need to be at 470 million tonnes, a 140 million ton increase from today. It is estimated that in order to meet these goals, developing countries would have to invest at least US\$209 billion per year into agricultural growth; investment in the agricultural sector “been neglected in most low income countries (FAO).” As LEDCs have focused on technological change and military power, there have continuously been less funds allocated to agriculture. Furthermore, the political instability in a large number of LEDCs and, in certain cases, the influx of refugees results in an inefficient allocation of resources, again neglecting agriculture and other important sectors.

Genetically Modified Organisms

One of the largest changes to technology in the food and agriculture sectors has been the scientific progress and widespread use of Genetically Modified Organisms (GMOs). GM crops have been used to minimize the amount of resources needed to grow a crop, thereby resulting in less resources needed for an amount of food. Furthermore, the decreased time required to produce GM food results in food being able to be produced and disseminated at a significantly faster pace. This results in faster access to food for large amount of the population; a requirement in an ever-growing world of over 7.5 billion people. Furthermore, GM crops can be engineered to repel certain pests which harm them, resulting in less crops going to waste, and more food production per field (“Genetically Modified”).

GM crops, however, are not accepted without inhibitions. There is controversy surrounding their effect on the human health in particular of ingesting these. In order to ensure that GM crops repel insects, for instance, there is required use of certain pesticides, which could have unexpected effects on the human body. Furthermore, it is argued that the decreased time taken to produce GM crops results in a loss of overall nutrition. It is certain that in order to feed the world’s population, genetically modified organisms are a necessity; however, there will need to be more research conducted on the effects of these engineered crops and their influence both on an area’s biodiversity, and on the human population.

Major Countries and Organizations Involved

African Agricultural Fund

The African Agriculture Fund (AAF) is a private equity fund that invests in the agricultural and food processing sector across Africa. Their aims are to improve the issue of food insecurity as well as the housing situations within Africa through equity fundings, creation of enterprises and aiding in farmers management of food production. Their approach towards helping to solve these issues is modernized and industrialised, where they make use of updated knowledge and current technology to improve the business and financial situations of farmers within Africa, as they have stated: “We constantly strive to be innovative, challenge industry wisdom, create new ideas and solutions, never once resting in pursuit of our goals.” They ensure that they achieve these goals as well as work towards using technological resources to create a positive environmental impact, including the technology for carbon sequestration and reduction in emissions. Some achievements by this organisation in improving the food insecurity situation through the use of technology includes the creation of a portable water delivery system in Daru, Sierra Leone. The organisation has managed to positively impact the issue of food insecurity within Africa, for they have seen an increased annual weightage in food production by 31% as of recently. The AAF portfolio companies have also managed to produce a total of 648,000 tonnes of agricultural and food related outputs over the last year.

TechnoServe

TechnoServe is an international non-profit organisation that promotes business based solutions to poverty in developing nations. This is done through connecting people to information, capital and markets as well as works with enterprising these people to build competitive farms, businesses and industries. This organisation was established in 1968 and is based in Washington, DC, USA. With 50 years of growth and impact, the organisation has connected itself to 29 developing countries and aided them in several aspects of poverty, many of which include improving smallholder farmers’ food security through helping them increase their crop yield and increase income to tackle the central issue of poverty in these developing nations. With over 1500 people employed into this organisation, 90% of them are host country nationals who work in the field. They collect employees and staff with the expertise to provide local knowledge, develop relationships and develop farmer proficiency. “Our staff combine business expertise with local knowledge, relationships, and context to help hardworking men and women generate income, jobs and wealth for their families, and communities.” An example of the technological innovation that this organisation has offered would be their portable soil testing method known as ‘SoilDoc’. This is a method developed by Columbia University that is now being used by farmers in South Africa. “SoilDoc allows field workers to conduct laboratory-grade tests without having to send samples to South Africa for analysis, a logistical drain on time and resources. Under the pilot project,

the results of the tests are uploaded to a central website, and recommendations are sent back to the field agronomist to enable rapid advice for smallholders on tailored fertilizer and organic inputs.”

Japan

Japan is primarily acknowledged as an extremely industrialised nation, and with the significant technological developments that the nation has made in order to aid or improve many different issues, food scarcity has become one of Japan's focuses. In recent years, the topic of food scarcity has become widely discussed in Japan, particularly referring to the tightening of supplies and the excessive demand in the market. The Ministry of Agriculture, Forestry and Fisheries has acknowledged and established a new goal for Japan with regards to the issue of food scarcity, which goes as: “to enable all citizens to have access to quality food at reasonable prices now and in the future.” The nation has turned to technology to aid in solving the problem, for they have introduced various new technological innovations that will allow the nation to come closer to a permanent solution or at least will buy them time to come up with more stable solutions. Examples of some technological innovations that Japan has begun to execute is the introduction of high-rise urban farming and indoor food factories. By using technology to aid in Japan's food production, they are ensuring that they do not make excessive use of the available resources and become too reliant on them, for they understand that resources are scarce and demand is high.

United Nations Commission on Science and Technology for Development (UNCTAD)

The United Nations Commission on Science and Technology for Development (UNCTAD) is a subsidiary body of the Economic and Social Council, a committee as part of the United Nations general branch. It was established by the General Assembly and accepted in its resolution 46/235 and was founded on the 30th of April, 1992. The commission makes use of science and technology to tackle several worldwide issues, including the issue of food scarcity. On the issue of food scarcity, the organisation has created a resolution with several ideas as to how to use science and technology to tackle the many different areas and factors involved with food scarcity by 2030. Some of these factors include aiming to improve crop productivity, livestock agriculture, water availability, farming in urban environments and many more. With these various ideas, the organisation aims to improve the food scarcity situation on a global level and creates a range of solutions that can be implemented according to different nations statuses.

China

China has shown signs of rapid technological development over these past decades and has become one of the most technologically advanced nations at this present time. With the issue of a food crisis being a main national worry, the nation is taking preventative measures to ensure that the nation, and hopefully the world, does not enter into a food crisis. These preventative measures involve technological

innovations. With the current issue of high food demand in China, the land reforms that the nation conducted years ago lifted the production of grains like rice and wheat and resulted in millions taking an interest in more rare food luxuries such as beef and milk. In order to prevent more trends such as these from developing into a food crisis, the nation has decided to execute 4 factors of improvement; market control, improving farm efficiency, curbing land loss and imports. In order to achieve this, the nation is spending billions on technological innovations such as water systems, seeds, robots and data science to develop sustainable food industries and high-yield farms.

Relevant UN Treaties and Events

- Sustainable Development Goals, Goal 2: Zero Hunger
- Resolution 2417, 24th May 2018, (**S/RES/2417 (2018)**)
- Second International Conference on Nutrition, 19-21st November 2014
- Milan Declaration on Enhancing Food Security and Climate Adaptation in Small Island Developing States, in the framework of the SAMOA Pathway

Previous Attempts to solve the Issue

Proper Use of Fertilizers

Fertilizer is an extremely important element in determining the quality and quantity of a farmer's yield. It is also a key factor in aiding in the issue of food insecurity if manipulated correctly, in which the organisation known as Meridian has begun these experiments and processes. Meridian is one of the regions leading fertilizer producers and distributors and has set an aim to increase Malawian farmers' yield by 20%. The factor of weakness in Malawi smallholder farmers is that they continue to use old fertilizer formulas, which proves to currently be ineffective and has severely depleted soils of critical nutrients. The solution that was established by Meridian in cooperation with TechnoServe was to allow these smallholder farmers to conduct 'portable soil testing'. A system known as SoilDoc was developed by Columbia University and allows field workers to "conduct laboratory grade tests without having to send samples to South Africa for analysis, a logistical drain on time and resources." The results of the tests are uploaded to a website which includes recommendations by agronomists as to how they can tailor and adjust their fertilizer formula to aid with their yield. The project hired a total of 30 agronomists to collect and test over 2000 soil samples. This benefitted over 6000 smallholder farmers in Malawi and as this project continues, the results show slow increases in the yield of the farmers' crops.

Developing new Fertilizer Formulas

Technoserve looks to aid smallholders with their yield in order to assist in solving the issue of food insecurity while also attempting to tackle the issue of poverty. Currently, Technoserve conducts

research on the nation they are looking to assist and makes use of that information in order to apply their new solution. With many agronomists as part of the project Technoserve leads, they conduct soil analyses and design new fertilizer blends in order to suit the most popular crops within the nation. An example of where this was applied was in Malawi, in which the agronomists conducted research on the soil in Malawi and design new fertilizer formulas to suit the five most popular crops within the nation, which include: Maize, soya, groundnuts, cassava and sweet potato. This is in an attempt to increase the crop yield as well as the soil sustainability, which will ultimately help the farmers on a personal level as well through increased income.

Biotechnology and the Use of Enzymes

Biotechnology is one of the fields in which science has made significant progress in the last few decades. The use of enzymes in food has been implemented in order to replace synthetic chemicals. They are produced using existing bacteria and microorganisms. Enzymes have been used in order to reduce the waste-products in the production of food, especially as compared to processes which use synthetic chemicals, which in turn reduces pollution and provides higher quality products (“Modern biotechnology”). Enzymes overall have resulted in increased productivity and less costs in the production of food, therefore creating more food with lesser monetary and time expense, improving access to food for people. Furthermore, as with the case of soybeans, the removal of certain enzymes and proteins has removed sources of allergic reaction in certain foods, thereby ensuring that more people can eat certain foods.

Possible Solutions

Possible solutions are limitless in the area of technological advancements to curb food insecurity, as new advancements and breakthroughs are being discovered on a day-to-day basis. However, effort must now be focused on both existing and upcoming global food shortage to ensure both environmental and economical sustainability.

The governments of countries currently facing food shortages should invest in educating its population in biotechnology, as experts in this field would aid advancements in the agriculture sector. If the countries in question are less economically developed countries (LEDC's) and do not have the finances to do so, UN member states could pledge to invest further in the field of biotechnology and share their findings in order for countries facing food shortages to understand and implement new methods. A collaboration between MEDC and LEDC'S is an example, as the USA is a member state and

has conducted extensive research in biotechnology. By publishing such findings, LEDC'S could benefit widely.

Through the investment in the biotechnology field comes genetic engineering. Although many people in more economically developed countries (MEDC's) are skeptical of genetically modified food products due to their taboo, they could be the difference between life and death for starving children and families in poverty-stricken countries. Taboo could be eradicated through widespread awareness programs, and food producing companies could publicly take responsibility pledges. Fresh food could then be genetically modified to last longer in harsh environments and to also up the calorie and nutritional content of such foods as many countries are home to epidemics such as mass-malnutrition and calorie deficit.

Approaches such as improved and efficient irrigation systems, new fertilization formulas and genetically modifying seedlings to be more resilient could be developed through the means of new technology to ensure that crops produce more abundant yields. However, environmental sustainability must also be kept in mind whilst implementing the above measures. In this case we should also work towards developing methods to keep our soil robust and concentrated in nutrients, by, for example, developing soil serums for aftercare to ensure our heavy yields don't leave the soil leached and dead.

Although food shortage is prevalent, it is well known that much of the food product in the world goes to waste in MEDC's due to an uneven distribution of the world's food supply. This is why we must develop new technological methods to ensure our fresh food is transported faster and more efficiently to countries facing food shortage, and although the discovery of methods such as teleportation seem a few decades away, it is never too late to begin investing. Faster jets, carrier services and shipping methods could also be advanced and implemented.

The solutions listed above are on the more realistic side of the spectrum. However, seeing as technological advancements are hitting new peaks every few months, delegates are encouraged to not shy away from posing more creative solutions. One such example could be calorie-dense food substitutes, such as food capsules or single cell proteins. Single cell proteins (SCP) could be used as a food supplement in cases where malnutrition is severe, as they are derived from bacteria cultures. As SCP's are high in protein and can be mass produced, they are one effective solution to feeding the ever-growing population.

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