TRANSFORMATIVE TECHNOLOGIES IN AGRICULTURE: THE RISE OF AI, AUTOMATION, AND NANOTECH IN FOOD PRODUCTION

Abstract

The emergence of new technologies in agriculture food has increased significantly in recent years and is concentrated in a small number of countries, institutes and discipline. The findings enable the identification of paradigm shifts and the consolidation of different scientific domains. It is easy to see that robotics, automation and artificial intelligence are gaining momentum and that genomics and biotechnology are losing momentum, and genetic improvement is losing momentum. There is little research on economic and social analysis, and their relationship with the environment. Technological advances in agriculture have led to the integration of more efficient firms that have transformed the sector into a more vertically integrated production and quality oriented business. One of the relevant field of technology is artificial intelligence, which is changing the way we consume and use resources in agriculture. The power of nanotechnology have been demonstrated in nearly every area we can think of. But today, nanotechnology has comes of age in a real sense by making a significant contribution to the food sector with the increasing number of people needing nourishment, food production cannot keep up food must be preserved to reach people around the world.

Keywords: Genetic improvement, Smart agriculture, Development of Artificial intelligence, Food sector.

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I. INTRODUCTION

At the present, population growth aging migration and urbanization are global trends that have significant impacts on economic and social growth, as well as on economic and social growth, as well as on environmental sustainability (UNC, UNCTAD) United Nations, General assembly, United Nations Commission on the status of women, United Nations Humanitarian Aid, United Nations Human Rights Council, United Nations Educational Scientific and Cultural Council, United Nations Economic Commission for the promotion of Human Right and Human Development UNESCO, Council of Europe Council of the United Nations (United Nations, Council of Europe). Rapid populations' increases and changes in the demands of the world's population have a significant impact on all agricultural food systems. In other words, we need to grow more food, produce food with certain characterize use natural resources more efficiently, use inputs more sparingly, and conserve the environment all of these things can only be achieved through science, technology and innovation combined with great political well (Beddington et al., 2010) (Crute et al., 2011) (Vasquez-caneles., 2012).

The scientific and technological advancement of the agricultural sector to change and transformations has enabled its productivity to continuously grow. Technology in agriculture is necessary to enhance agricultural practices and to be able to adapt to the ever-evolving world of agri-food. The implementation of technological tools enables farmers to enhance agri-business management and to achieve a higher level of efficiency and food security (Carpio santos 2018).

Technology is affecting every aspect of our modern lives and agriculture is no exception. Technologically speaking, we can think of technology as the set of skills that enable us to build things and machines to meet our needs. Ag Tech, also known as technology in agriculture, has rapidly changed the industry, in recent years.

Technologies are helping farmers to increase efficiency and maximize yield. Some of the main technologies that are commonly used in agriculture includes: Harvest automation Autonomous tractors seeding and weeding Drones. Recent trends have shown that technology is changing the way we manage livestock, whether it's for poultry, dairy, cattle or other agribusiness. Livestock is a great source of renewable resources that we rely on every day. It is the most widely used technology. Many farm are finding it cost-effective to strategically place sensors access their land to recap the many benefits. Sensors combined with image recognition technologies are enabling farmers to monitor their crops from any location around the globe. Agricultural sensors aid in the process of traceability by providing real time understanding of the current state of the farm forest or water.

Due to the current state of nanosciences and nanotechnologies, the relationship between materials properties and filler size has gained a lot of attention. Due to this, most of the research is still in its early stages and there is no definitive answer as to the impact on polymer systems of nanosized inclusions. The following sections provide a review of the processing the experimental results and their possible interpretations for polymer matrix nano-composites.

II. PROMISING POTENTIAL OF ONGOING TECHNIQUE ADVANCEMENTS

From the origins of modern society to the present day, agriculture and food technology have gone hand-in-hand. This review starts with a historical overview, summarizing the parallel evolution of the two. The food manufacturing section explains the reasons why food is processed, and provides information on various food processing methods that guarantee food safety and maintain product quality. From the origins of modern society to the present day, agriculture and food technology have gone hand-in-hand. This review starts with a historical overview, summarizing the parallel evolution of the two. The food manufacturing section explains the reasons why food is processed, and provides information on various food processing methods that guarantee food safety and maintain product quality.

It is evident from every ancient civilization the people overcome hunger and disease throughout history. This is not only due to the fact that food was obtained from cultivated land, but also because it was processed in complex ways. Today our food system is complicated and our food is mostly safe, delicious, healthy plentiful variety, convenient and uses expensive and easier to access than ever before. Our food system encompasses agricultural production and harvesting, holding and storing raw material food production. Forming, processing packaging transportation and distribution, retail food service and food service and food preparation at home.

Food science and technology have played a major role in the development and success of the this new food system by bringing together a wide range of discipline, including but not limited to biology chemistry physics engineering material microbiology nutrition toxicology biotechnology genomics computer science and many more. From addressing nutritional deficiencies to improving food safety at home.

Another problem is the large and increasing gap in food security in some parts of the world. Up to 50% of food produced and consume in poor and developing countries is never consumed in part due to inadequate handlings, processing, packaging and distribution practices. In the popular press, some books on food have suggested that the food industry has used the knowledge of food science and technology to create processed foods that lead to poor dietary habits. Some critics of processed foods suggest that the knowledge of chemistry and physical properties of food ingredients allow the food industry to create foods that lead to over eating and drive the public away from the whole foods.

Other reasons for negative public opinion about processed foods include the rise in obesity in many developed or industrialized countries, the use of chemicals or additives in food production, limited personal interaction between consumers and the agriculture and food manufacturing industries, food safety concerns and concerns that particular ingredients (especially salt) may contribute to diseases or influence children’s growth.

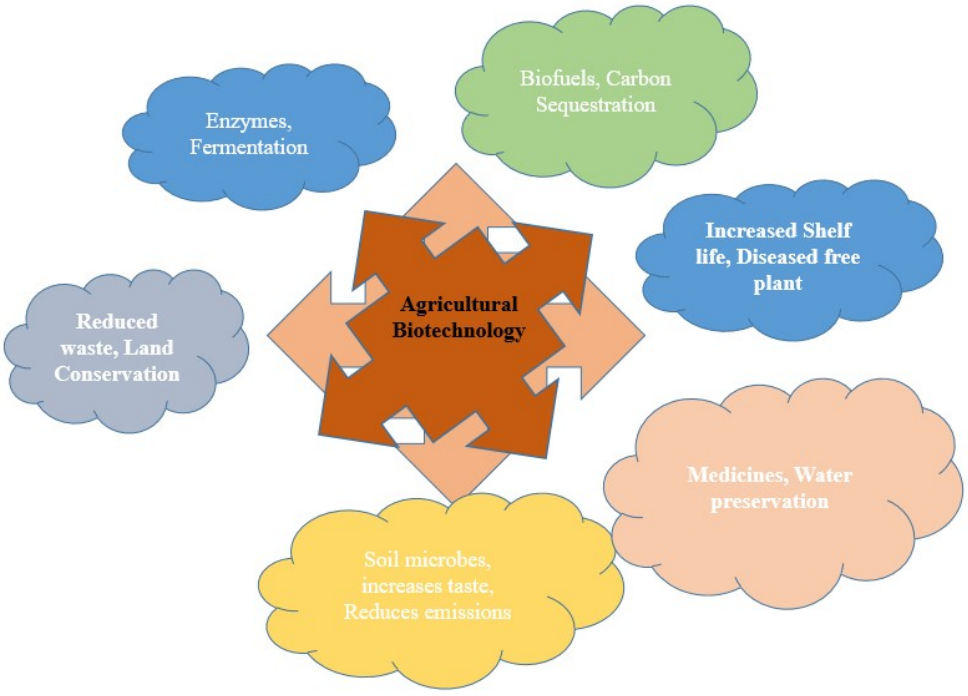

Figure 1: Emerging Technologies in Agriculture

III. CHALLENGES AND PERSPECTIVE AGRICULTURE AND FOOD SCIENCES

1. **Set out a Sustainable Elemental Treasury Sub-Structure:** The challenges are the large and increasing gap in food security in some parts of the world. Upto 50% of the food that is grown and harvested in less developed and developing countries is never consumed in part due to adequate handling, processed, packaging and distribute methods. Starvation and vitamin, mineral protein and calories deficiencies are still widespread across as a result, science-driven advances in agricultural production, food science and technology and food distribution systems are essential to reduce this gap. In addition, resource efficiency and conversation are becoming increasingly important to ensure that everyone has access to enough food in a sustainable and environmentally responsible way, without compromising our valuable natural resources, we need to dramatically increase agricultural production from today's levels. Food manufacturing system must also become more efficient reduce waste, produce food with longer shelf life.

   While advances in science and technology during the 20th century enabled nutritional deficiencies to be addressed and almost 7 billion people to be fed, advances in sustainable food production are needed to feed the growing population of the 21st century in both developed and developing countries. In reality, meeting the food requirements of the future will require rapid advances in both agriculture and food production.

2. **Engineer Trait Variation and Exacerbate of Innate Risk:** In addition, urbanization, population increase and increase in per capita income will alter the demand patterns for food and agri-produce goods thus affecting the production patterns. In addition, while the

need for food is on the rise, the growth in crop yields has started to slow down. These trends will put pressure on the use of natural resources and together will highlight the need to improve resource use efficiency (G. Feenstra., 2002).

While demand for agricultural land will decline in high income countries, the opposite will be true in low income countries. Thus the constraint will not be land availability, but lack of access due to poor infrastructure, disconnection from major markets or vulnerability to disease events. In addition, the available land will be concentrated in a small number of countries. Where these resources will face environment and social pressures. In addition to land ability issues water stress in a concerned for the future of food and agriculture system. Shift in water demands combined with variations in temperature and precipitation will also lead to variation in water availability as an additional source of water stress issues.

3. **Avoid Transboundary Pests and Disease:** Crop yields, fish stocks and animals health are also affected, food availability and stability are also affected by climate changes, which affects the income and livelihoods of farmers. As the number and intensity of cross-border animal and plant pest and disease infestations continue to rise, food and agriculture system are at risk. This, in turn, leads to food safety problems and the risk of radiological events. One of the main reasons for this is the rise in cross-border disease caused by climate change. Food safety is also at risk due to the overall unsanitary environment and the unsafe water used to process, handle, and store food. These challenges are compounded by antimicrobial resistance which is linked to a variety of disease and infection prevention and treatment methods. Currently, there is a lack of capacity and eradicating cross-border diseases. Integrated pests management helps in the preventions and control of cross-border pests and diseases. It also reduces yield loss in agriculture and improves productivity.

IV. THREATENED FOR FOOD ACCESS AND EXERTION

People living in rural areas who earn their living through agriculture, forestry and fishing are most likely to suffer from poverty and hunger. Reducing poverty depends on several factors that go beyond agriculture, such as education, diversification of the economy into non-agricultural activities, social protection mechanisms, and job creation. Eliminating extreme poverty would require measures to promote productivity and profitability in agriculture, connecting farmers with markets. In rural areas, women face more obstacles that men when it comes to economic opportunities and are often excluded from decision making.

Agriculture and food systems will have to keep up with the changing diets caused by rising incomes and population growth. We will need to make more food to meet the demand but we will also need to make sure our supply chains are up to scratch so that farmers can connect with urban markets and that consumers can get good food at food prices. We will also needs to keep up with customs and social protection measures to make sure everyone has access to the food they need.

1. **Anninilate Intense Indigence and Reduce Variation to Enhance Income-Earning Privilege in Back Areas and Number the Root Causes Of Shift:** As the world's population continues to grow its important to bring young people into the job market.

This is especially true in places like south Asia and sub- Saharan Africa, where the number of young people is growing faster that new jobs can be created. Unfortunately, many countries with low to middle income incomes and urban areas haven't been able to provide new jobs to people who used to work in agriculture. This means that a lot of the new job opportunities will have to come from rural areas. It's also important to note that women in rural areas could see their poverty rates go down faster if they have access to income outside farming.

2. **Assemble Resilience to persistent Crisis, Disasters and Division:** The average duration of a protracted crisis is eight years or more, and these crisis are caused by a variety of factors, such as anthropogenic pressures, natural catastrophes, conflicts, protracted food crises, and weak governance and institutional capacity to address them.

   Conflicts and disasters have become more frequent and intense globally over recent decades. To halt and address these rising trends, incisive and fair resilience and development practices are essential. Plant disease and animal health high-calorie low nutrient foods less access to markets for small farmers and producers high levels of food waste modern distribution systems are often focused on urban centers and big producers because they are concentrated in the more affluent urban areas super markets have stringent uniformity and supply requirements that are difficult for small producers to meet.

3. **Make food systems more economical inclusive and Resilient direction the needs for identified and potent National and International Governance:** The challenges food and agriculture systems face are interrelated and need to be addressed through integrated policy frameworks at all levels. These frameworks are not simple to design and in general, sector-specific policies have not been successful, this has highlighted governance gaps at all levels, such as regulation, monitoring and accountability. The 2030 sustainable development agenda and related global agreements also recognise the need to leverage cross-sectoral actions to achieve multiple goals, maximising synergies between SDGs and their objectives. This outlook will inevitably bring new challenges to policy-making processes, promoting new institutional structures and improved coordination at different levels. Agricultural sectors rely on many cross-border resources and rapid environmental changes inevitably lead to shifts in resource availability. One of the unintended consequences will be changes in human activity. To address climate changes, climate risk prevention and management policies will need to shift their focus from local to international cooperation mechanisms.

   Some trends are systemic and can influence other trends agriculture investment, food system shifts, food and nutrition governance and development financing. These trends, if well-managed, can be used to address current and future issues in agri-food chains.

   In contrast, resilience to long-term crises, disasters and conflicts seem to address the challenges of access to and use of food as well as the stability and availability of food. This could be because resilience is cross cutting. Increasing resilience of food systems would necessitate solutions that go beyond technological improvements and a wider focus

than simply increasing agricultural productivity. Trade-offs with changing environments would also need to be systematically addressed.

V. CONCLUSION

The aim of this study was to provide a global starting point for international policy actions to promote small holder agriculture. Some of these include improving monitoring of SDG goal 2 3, aimed at doubling farm size as an indicator (SSN, 2015). Our funding indicate that previous estimate of small holder food production percentages were either inflated by public sector views (ETS, 2009, MAASS WOLVENSEN, 2013, FAO, 2014) or still required directly measured data to measure quality (Herreo, 2017, Samberg, 2016). A nutrient diversity farming landscape includes diversity of farm sizes as each farm size generates a unique crop index.

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