

# **1. Impact Of Covid19 On Food Industry - Reflections From A Stakeholder Perspective**

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## **Abstract:**

Coronavirus pandemic also known as Covid19 has brought the busy world and its business functions into a turmoil leaving an adverse impact globally. From the retail and consumers perspective, impact on food safety and availability of nutritive food topped the list of challenges. United nations set zero hunger goals to be achieved by 2030 [7]. Due to the recent crisis of corona virus, achieving the target seems quite challenging. According to the recent statistics by the State of Food Security and Nutrition in the World, as many as 130 million people might be deprived of nutritive food and starve. This is quite alarming. The key challenges cited are economy slowdown, food supply chain disruption, healthcare challenges, malnutrition and much more. However, this chapter focuses primarily on food safety and food supply chain perspectives of various stakeholders and how information system and emerging technologies can play an indispensable role in handling these challenges to some extent.

Most of the nations had called for lockdown and systematic unlock ever since the pandemic has been doing rounds in developed and developing nations. During the cycles of lockdown and unlock, the food production and end consumer delivery supply chain were highly perturbed, and the shortage of labour added to the menace. This chapter throws light on various stakeholders' perspectives and their reflections on food safety issues and consumer expectations and challenges in addressing the same. In addition, this chapter proposes emerging digital technologies that have potential benefits in handling challenges during such global crisis.

## **Keywords:**

Food safety, Covid19, Impact of Covid19 on food supply chain, Emerging technologies for crisis, Consumer food safety and nutrition.

## **Introduction:**

The recent global crisis of corona virus has gained more attention of global authorities on food safety and nutrition availability. According to the United Nations - Extreme Poverty and Human Rights forum, everyone must get an equal opportunity to food and nutrition balance. Especially, the extreme poverty- stricken sect of people must be given priority by the nations [9]. From government perspective, supply of proteins and nutritive food packages to its citizens became a high priority agenda during the pandemic.

The food production industry set its investment focus more on plant proteins while the supply chain companies restructured their operations from business to consumers with more offline points of sale like temporary markets with social distancing, door to door delivery of health packages and essentials, etc [2]. The end consumers were highly active on e-commerce (in urban areas) and voice commerce (both urban and semi urban areas) during the lockdown period due to the restricted physical movement. This shows that digital technology plays a key role in the consumer behaviour.

## **Literature Review:**

This section looks in to existing literature on food industry related statistics, food safety norms and regulations, prevailing technologies and challenges facing the food industry as a whole globally. The global food industry and grocery retail stood at USD 7.8 trillion in 2018 and is expected to grow at around -7% CAGR (negative growth) between 2020 and 2021 adjusted to the impact of Covid-19 [10]. The expected growth is much lower compared to the projected rate of 5% CAGR between 2020 and 2025 according to statista[11].

According to USDA, the food system is a complex network of farmers and the industries that link to them. Those links include makers of farm equipment and chemicals as well as firms that provide services to agri businesses, such as providers of transportation and financial services. The system also includes the food marketing industries that link farms to consumers, and which include food and fiber processors, wholesalers, retailers, and

foodservice establishments[12] [13]. The food system recommends certain indices to measure the well being of consumers. For example, HEI Healthy Eating Index by US government sets norms for balanced diet and nutrition and average scores of various age groups of its citizens to keep a check on malnutrition and related issues. HEI average value for children aged between 2 to 18 years is about 53 points out of total score of 100 points [13]. Similarly indices are calculated based on ethnic races, income range, gender and other types of segments. Such indices are of help especially at the time of crisis like Covid-19, when the demand for protein food rose high compared to fats, meat and other dietary components.

The food industry is one of the highest contributors to GDP (Gross Domestic Product) growth of developed and developing countries. For instance, the food industry in India (the second highest populated country in the world) provides employment opportunities to nearly 120 million farmers and 140 million agriculture related industries. Another instance is that 4.8 millions of Americans are employed in agriculture and related industries. The top two regions that contribute higher growth to country's GDP through food and allied industries are Asia Pacific and Africa [14].

Though this industry enjoys the privilege of highest contributors to economy of the nations, it is posed with several challenges especially safety hazards. The four common safety hazard categories in food industry are chemical hazards, microbiological hazards, physical hazards and allergens. The other categories include temperature and humidity related hazards, agronomical hazards and so on. The best method to protect from these hazards is to follow 3C principle namely Clean, Cook and Chill which means maintain cleanliness and hygiene during food preparation cook the food thoroughly at the appropriate temperature and in accordance with the due procedures and keep the food protected from cross contamination.

### **Stakeholders' Of Food Industry: Attitude And Behavior – Pre Vs. Post Covid19 Comparison:**

In the previous session, we had introduced various types of food hazards. This session exclusively covers the consumer attitude towards food safety and the various types of hazards. In addition, this session also presents a comparative view of consumers' attitude prior to the covid19 pandemic and the aftermath as the most preliminary studies revealed that animal foods had a role in the spread of corona viruses, though was not scientifically proven. The general level of concern on food safety increased with hazards such as chemical issues

(artificial colors, pesticide residues, hormones, preservatives, irradiated foods, excessive processing of foods, and plastic packaging), spoilage issues (restaurant sanitation, shelf-stable foods, pasteurized foods, refrigerated, prepared foods, improper food preparation, microbiological contamination and nutritional imbalances), health issues (vitamin, calorie, carbohydrate, fat, cholesterol and sugar content), regulatory issues (pesticide safety, fish and imported food inspection, and health labeling of food), deceptive practices (naturally occurring toxins, food ingredients associated with allergies and weight reduction diets advertised as healthy) and information issues (availability of detailed information at stores, markets and restaurants) [16].

Though the study by Center for disease control and prevention states that there is no empirical evidence to prove the spread of corona virus through food and food packaging or food handling units, it insists sanitation to be followed even at homes [17]. However, during lockdown period the worst impact were the restaurants, food delivery and supply chain, hotels, food courts, food processing units, packaged food handling units and so on. In the contrary, OECD (the Organization for Economic Co-operation and Development) had cited that Covid19 had adversely impacted creating bottlenecks in farm labour, processing, transport and logistics, as well as creating momentous shifts in demand. Most of these disruptions were the result of policies adopted to contain the spread of the virus. Food supply chains had faced a remarkable resilience in the face of these stresses [18]. This implies that the variations in stakeholders perspectives on food safety during and after covid19 was one of the reasons for momentous shift in demands. Another interesting trend worldwide in food and food service market was that the shift from meat based products to vegetables by omnivorous customers due to the fear of virus contamination in animal foods [19]. The market analysis by leading analysts in USA and Europe had opined that sustainable and nutritive food supply scarcity would be on the rise due to covid19 pandemic. Another interesting observation made by the analysts were that low financial investment players (small stall setups for cooked food pickup) in readymade and cooked food deliveries were on the rise during lockdown. This was primarily due to the restriction of entry in to restaurants and only take away were allowed. The demand for protein rich food and supplements also surged suddenly post covid19 and the pulses prices shot up during the lockdown period according to their observation. For online buyers, there was sudden increase in the orders placed for readymade food and groceries , however the deliveries could not be made on time due to shortage of labour availability during lockdown and transit periods.

### **Experts' Opinion On Food Industry Trends And Its Impact Due To Covid19:**

In March 2020, the Food Price Index calculated by the UN's Food and Agriculture Organization (FAO) showed that despite surges in panic-buying among consumers in many countries, global prices actually dropped 4.3 percent from February 2020. This was largely cited as a result of Covid-19-related demand contractions amid lockdowns and quarantines. Another probable reason could be fear of unemployment owing to lockdown and impact on purchasing power of consumers. According to CSIS, the outlook for farmers in low- and middle-income countries where agriculture accounts for a greater share of GDP, relative to wealthier countries is worse due to shortage of labor [20]. The world bank looks at this issue from a different perspective of exports and closed borders during lockdown[21]. Despite demand, the supply could not be met due to pandemic restrictions prevailed from April 2020 for different time periods in different countries ranging from a month to several months. The experts also opined that the food industry and its production to be viewed from multiple dimensions such as affordability, accessibility, sustainability, availability and nutritional values of the food produced especially as an outcome of covid19 crisis. Prior to covid19, many countries did not consider labour shortage in farming seriously, but due to the disruptions created in demand supply chain as an impact of covid19, many countries are now revisiting their assessment of food and agriculture industry for future sustainability [22].

### **Challenges Facing Food Industry And Trends In The Recent Times:**

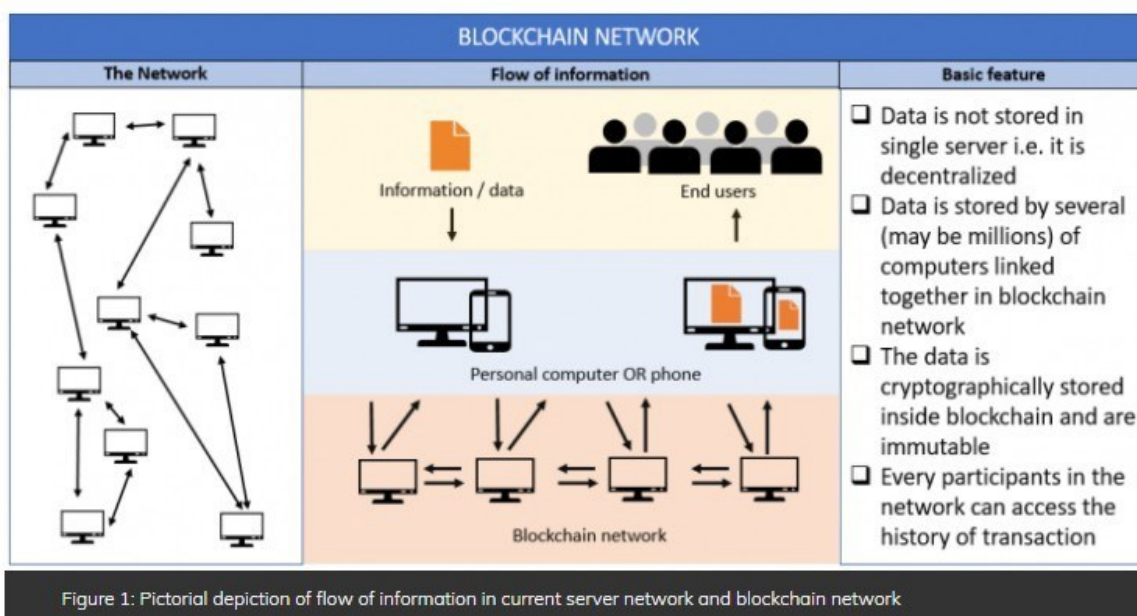
The key challenges facing food industry as a whole are food scarcity, extreme hunger people, food security, demand supply mismatch, shortage of labour, consumers craving for convenience due to lockdowns and quarantines, demand for high protein and fibrous food supplies, price pressure and so on. The right to adequate food as a basic human right was first recognized in the Universal Declaration of Human Rights in 1948, as part of the right to a decent standard of living (Art. 25): 'Everyone has the right to a standard of living adequate for the health and well being of himself and his family, including food.' It became legally binding when the International Covenant on Economic, Social and Cultural Rights (ICESCR) entered into force in 1976 [23]. Today, due to covid 19 impact several millions (as high as 260 millions) are pushed to the category of extreme hunger from last year of 2019. In the world's highly populated countries like India and China, "zero hunger" sustainability goal is still a dream far away. These countries grapple with challenges such as poverty, famine, shortage in food supply and massive hike in prices of basic foodstuffs and recent coronavirus

crisis [24]. DST-NRF Centre of Excellence in Food Security (CoE) is an initiative of the Department of Science and Technology – National Research Foundation. The mission of the CoE is to examine how a sustainable and healthy food system can be achieved, to realise food security for poor, vulnerable and marginal populations [25]. This COE also stated that every year, 6 million children die, directly or indirectly, from the consequences of undernourishment and malnutrition – that is, 1 child every 5 seconds which is quite alarming. As we listed earlier, accountability from the government, access to food resources for certain sects of people are all vital to fight against food insecurity and poverty. Malnutrition is already a known challenge and with recent corona crisis, the need for protein and fiber rich food supplies has surged and meeting such sudden splash of demand bound to be very difficult for densely populated countries. With industrialization and development on one hand, shortage of farming land and labour on the other hand, meeting both ends needs strategic planning at a higher level.

### **Mitigating Challenges With Emerging Digital Technologies – A Viewpoint:**

Food security is a global challenge. According to recent data from the United States Department of Agriculture (USDA), approximately 14.7% of U.S. households experience low or very low food security. This equates to nearly 50 million people in the United States, including about 17 million children [26]. In response to food insecurity, the U.S. government offers food assistance to low income families through a program namely Supplemental Nutrition Assistance Program (SNAP). This program facilitates families with electronic benefits like a debit card to purchase breads, cereals, fruits, vegetables, meat, and dairy products from approved stores. The federal government also funds school breakfast and lunch programs and mid noon meal scheme is a known practice in countries like India several decades ago. Some community-based organizations, such as food banks, help address families' immediate food needs, while other volunteer groups work to address the root causes of food insecurity, improve local access to nutritious food, and provide community-based nutrition education. Blockchain is yet another emerging digital technology allowing all pervasive financial transactions among distributed untrusted parties, without the need of intermediaries such as banks [26]. This is an enhancement of service as against earlier discussion on debit card or credit card from pre-approved stores by federal government. Here there is no need for any intermediaries like retailers, banks or third party transaction service providers. A blockchain is a digital transaction ledger, maintained by a network of multiple

computing machines that are not relying on a trusted third party [26]. Individual transaction data files (blocks) are managed through set of software platforms that allow the data to be transmitted, processed, stored, and represented in human readable form. The food chain globally is highly multi-role based and distributed, with numerous different actors involved, such as farmers, supply chain players, wholesalers and retailers, distributors, and consumers. It is found that the cost of operating supply chains makes up two thirds of the final cost of goods [26]. Thus, there is much space for optimization of the supply chains, by effectively reducing the operating costs using bit coins and blockchain technologies. As the transactions are highly secured, it avoids errors and fraudulent acts due to manual intervention as depicted in the figure 1 given below.



According to Juniper research report, ‘Key Vertical Opportunities, Trends & Challenges 2019-2030’, blockchain used with IoT sensors and trackers will have several advantages as mentioned below [28].

1. Blockchain technologies embedded with IoT capabilities will streamline the supply chain, reducing retailers’ costs
2. These technologies offer simpler regulatory compliance
3. It will enhance and expedite the food recall process
4. It will enable \$31 billion in food fraud savings globally by 2024

Another trend of digital technologies pervading food and agriculture industry is the smart farming. There are several startups which could provide digital assistance to local farmers at an affordable cost. This predominantly helps farmers monitor the crop temperature, humidity, soil fertility and several other important parameters using their mobile phone itself. There are other expensive techniques for large farm monitoring and forest monitoring like drones, satellite imagery analysis, embedded sensors in the farmland and so on which could not be afforded by all farmers. However we find that the emerging digital technologies play a vital role in food and agriculture industry development and help address some of the challenges discussed in this chapter throughout.

### **Summary And Future Directions:**

This chapter views food industry from various stakeholders perspective especially during the global pandemic crisis and how various players of the food industry are adversely impacted due to covid19 issue. This chapter also listed out some of the prominent challenges facing the industry and how various analysts, experts and policy makers look at the industry in a holistic manner. This chapter also discussed some of the emerging technologies and their support during global crisis worsened with lockdown and quarantines. The coronavirus pandemic has taught us following of social distancing and cleanliness at all times going forward. In future, we could witness more start up technology companies playing an indispensable role in the research of high yield good quality crops, seeds, scientific based cultivation with less available cultivable lands, real time monitoring of farms, timely decision making by farmers and agriculturists, dynamic pricing strategies powered by digital technologies and so on. The emerging digital technologies have enabled the solution providers, policy makers, governments and other tech savvy stakeholders to revisit the food industry from the dimensions of access to information technologies, affordability and utilization of such technologies right from production to marketing of goods and services and that is the path ahead towards zero hunger sustainability goals.

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