LM1: Food Value Chain and the Food System

1.1 Module objectives

"The primary aim of this module is to provide an understanding of the global food system and the global food supply and value chain, how they function and how this impacts the environment and society. Technological innovations that increase transparency or change economic and social power will also be presented."

1.2 Learning outcomes

Current food supply chains are complex and involve many stakeholders. Every stage of food production is performed by different stakeholders, and as food supply chains have become globalised and interconnected, they have become more opaque. The importance of food chain transparency has increased. In recent years, several factors have increased the need for transparency, including an increase in the number of food-borne illness outbreaks, increasing consumer demand to know about their food, and a growing awareness of the environmental and ethical impacts of food supply chains. In order to achieve greater transparency, a combination of regulation and technology have to be developed and adopted. Currently, there is a lot of variation around Europe and the world on implemented regulations (e.g., on the use of pesticides) and the adoption of suitable technologies. The global food system and food supply chains operate in a relatively unstructured and complex governance environment. The sharing of information at each stage of the food supply chain, food safety standards, regulations, and food policies vary from country to country. There is a growing use of technologies to enable the collection and sharing of data across supply chains. Several emerging technologies like IoT and Big Data are believed to have great potential in providing greater transparency and ensuring food safety. Here again, there is significant variation among supermarkets in developed countries using complex ERP systems and extensive data analytics, while in other countries the level of technological penetration is limited even for documenting supply of core food products (e.g., coffee, bananas).

To attain an effective solution for the global food system and food supply chains requires a complete consideration of stakeholders involved and their understanding of a wide range of food supply chain challenges like food insecurity, technology integration, agri-food policies, and sustainability concerns. To achieve this we not only need to consider technology inputs but also create stakeholder coordination at various spatial scales, deal with broad governance

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concerns, and recognising challenges of sustainability. In coming years, the global food system and food supply chain will face a severe pressure to provide sustainable and secure supply of food to 9 billion people. Maintaining the global socio-ecological system sustainably, achieve greater transparency, and increasing the resource efficiency of the entire value chain with the help of agri-food technology innovations and regulation is the need of the time.

To summarise, the learning outcomes of this course are:

- To provide an overview of the overall global food system, food security, food value chain, and food governance.
- To make course participants aware of food safety, sustainability and transparency challenges.
- To summarise current practices of food safety standards and gaps.
- To make course participants aware of a wide range of emerging technologies like IoT and Big Data analytics and their application at various stages of the food supply chain in a wide range of food products.
- To enable course participants to use gained skills in either group projects or developing test case studies as per participant needs.

1.3 Course content

Part 1: Global food system

- Globalisation of the food production
- Challenges of food value chain and the food system

Part 2: Global supply chains

- Impacts of global food supply chain
- Role of technology in the food value chain
- Drivers, barriers and opportunity for technology

Part 3: Consequences and impacts of the global food system

- Environmental impact
- Social Impact
- Economic impact

Part 4: Case Studies

- DiTECT
- The story of Oaklands Farm Eggs and GS1 Global Standards

1.4 Mode of study

- Lectures
- Literature study
- Individual assignments
- Case studies, and
- Presenting the results to the group

1.5 Recommended study material

Selected examples of articles, book and online study material.

- Bouzembrak, Y., Marvin, H.J.P., 2016. Prediction of food fraud type using data from Rapid Alert System for Food and Feed (RASFF) and Bayesian network modelling. Food Control.
- Ingram, J., 2011. A food system approach to researching food security and its interactions with global environmental change. Food Security.
- Hou, M. A., Grazia, C., & Malorgio, G. (2015). Food safety standards and international supply chain organization:A case study of the Moroccan fruit and vegetable exports. Food Control.
- Kamilaris, A., Fonts, A., & Prenafeta-Boldú, F. X. (2019). The rise of blockchain technology in agriculture and food supply chains. Trends in Food Science & Technology.
- Mc Carthy, U., Uysal, I., Badia-Melis, R., Mercier, S., O'Donnell, C., Ktenioudaki, A., 2018. Global food security – Issues, challenges and technological solutions. Trends Food Science and Technology.
- Sarpong, S. (2014). Traceability and supply chain complexity: confronting the issues and concerns. European Business Review.
- Trienekens, J.H., Wognum, P.M., Beulens, A.J.M., van der Vorst, J.G.A.J., 2012. Transparency in complex dynamic food supply chains. Advanced Engineering Informatics.
- Vorst, van der, J. G. A. J., Tromp, S. O., & Zee, van der, D. J. (2009). Simulation modelling for food supply chain redesign; integrated decision making on product quality, sustainability and logistics. International Journal of Production Research.
- Yan, J., Erasmus, S.W., Aguilera Toro, M., Huang, H., van Ruth, S.M., 2020. Food fraud: Assessing fraud vulnerability in the extra virgin olive oil supply chain. Food Control.

1.6 Coordinator

Maastricht University / AgTech7 online platform

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