

Advancing value chains for agrofood,
forestry and environment with smart tech



Boosting innovative Digitech Value chains
for Agrofood, forestry and environment



This project has received funding from the European Union's Horizon 2020
research and innovation programme under grant agreement N° 777610.



Digital Trend Map for the Agrofood, Forestry and Environment sector



Drivers of Change

Drivers of Change

Population Growth

Demand Shifts

Climate Change

Urbanization

Globalization



Urbanization



Population



Demand Shift



Climate change



Globalization

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URBANIZATION

In 2025, 5 billion of the world's population will live in towns and cities. By 2050, 2/3 of the population will likely be urban, giving rise to new natural resource management issues.

Natural resource problems will be exacerbated by the growth of megacities of an as-yet unforeseeable size.



Population



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POPULATION

In 2050, the global population will have risen to 9.1 billion people. The least developed countries will have the biggest population share, rising from 5.4 to 7.9 billion inhabitants against 1.2 billion in the wealthy countries by 2050. This estimate is up from the last UN published figures in 2004.



Demand Shift



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DEMAND SHIFT

By the middle of this century, we will watch an increased wealth, greater purchasing power, and higher demand for processed food, meat, dairy, and fish (Godfray et al., 2010).

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CLIMATE CHANGE

The effects of climate change will primarily influence agriculture via alterations in plant growth, with alterations in water availability, nutrient availability, increased temperature and elevated CO₂.



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GLOBALIZATION

The Agrofood chain has become long and complex. It comprises of farmers, processors, distributors, wholesalers, traders, purchasing companies, supermarket chains, retailers, and consumers all around the world.



Business Trends

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Business Trends

Data Economy

Stakeholders in data sources, exploiters and consumers create a set of economic activities around the asset that has become increasingly strategic: Data.

As the Internet of Things (IoT) grows, data is collected in so many places and in such vast quantities that its potential has yet to be fulfilled. Some of the scenarios in which data assists are decision making, product tracing, safety and gaining consumer insights. It is becoming so important that many new business models heavily rely on this strategic asset.

As data becomes so valuable, concerns arise around security, privacy and ownership. Owners of data develop a reluctant attitude to share and aggregate data, leaving a lot of value for industry and a variety of research fields untouched. Technologies such as the blockchain have the potential to solve some issues by storing, sharing and verifying data securely.

Management is becoming increasingly data driven throughout every stage of the value chain with the development of Information services, decision support systems; and predictive models and more throughout every stage of the value chain. These services however should keep in mind the final goal of data: To extract value by delivering meaningful and actionable information to users. This way data helps actors have a positive impact on the main challenge of the agro food, forestry and environment sectors: sustainability.

Digital Solutions that address the Data Economy Trend:

- Facilitate interoperability for horizontal and vertical collaboration of business partners
- Leverage and stimulate data aggregation that allows the generation of new scientific knowledge.
- Convert the knowledge into predictive analysis and decision support tools.
- Unlock the potential of shared data.
- Ensure data security, protection and authenticity

Business Trends

Digital Economy

A digital transformation provides social and economic benefits resulting from online connections among people, businesses, devices, data and processes.

As the digital transformation unfolds, industries become smarter through communication, optimization and automation. Therefore, competitive advantage relies increasingly on technological innovation. The technology adoption among some SMEs in the agricultural industry however has been slow due to investment and a skill gap. Within the retail and marketing sectors technological innovation provides many new business opportunities, but the need of some is questionable.

Technology adoption leads to an increase of digital enablers in the value chain and provide the potential to monitor the status of products throughout a supply chain that can become increasingly complex. This allows not only the optimization of internal and external processes but also the improvement of food safety. Data is not only collected about location, but also about variables such as temperature and pH levels that will reveal information about a products quality. Subsequently, smart packaging can communicate relevant product characteristics and fulfill the consumer's need for more information.

Some technologies such as smart tags supported by QR or Barcodes are ready for adoption. For other innovations to take place further development is required such as sufficient computational power and energy autonomy.

Digital Solutions that address the Digital Economy Trend:

- Facilitate the management, automation and optimization of processes internally and between operations in the value chain.
- Extract value from the traceability of products. Some of the opportunities lie in product safety and the properties of products such as packaging.
- Promote and aid the adoption of technology such as Fintech and Elearning.

Business Trends

Circular Economy

More value can be extracted from resources by using them more efficiently and for longer through sharing, reusing, repairing and recycling.

It is Important in the circular economy to use resources more efficiently throughout the process and to address the current wasteful system. Initiatives to either close or narrow the loop can take place at the company level, but also through local initiatives and sector organization. An example of it can be found in the promising bio economy concept which proves that the circular economy can serve to reduce environmental as well as economic costs. It is not only about preserving value, but also about driving revenue.

The circular economy is one response to deal with higher and more volatile commodity prices. Products such as farm equipment can be provided as a service, and recycling offers opportunities as the number of consumer touch points is increased.

Closing and tightening the resource loop requires significant effort and is not an incremental innovation. Different partnerships with a variety of stakeholders are required to collaborate in order to achieve a bioregional food system that optimizes water, energy and waste.

Digital technologies are essential to guide transformations. Sharing and integrating information about the location, availability and quality of resources optimizes inputs and minimizes transaction costs and uncertainty.

Digital Solutions that address the Circular Economy Trend:

- Educate and create awareness about the circular economy
- Capture value from transparency by communicating origin and other product attributes
- Form networks of stakeholders to connect, collaborate and co create in a bioregional system.
- Optimize operations by reducing risks, transaction costs and uncertainty.

Business Trends



On Demand Economy

Digital marketplaces have led to the immediate provisioning of goods and services as well as employment becoming detached, agile and adaptable.

Delivery has become safer and more reliable because of a smaller information gap. Brick and mortar stores are transformed into web shops and consumers are experiencing same day delivery as the new norm thanks to algorithmic efficiency.

Logistics have become a competitive advantage and the mindset “can’t touch won’t buy” belongs to the past. The next generation of logistics is fueled by technologies such as 3D printing.

The connection of people through digital infrastructures has resulted in the detachment of work and workplace. Last mile food deliverers are independent and are experiencing new levels of labor flexibility. Throughout the value chain, expertise and temporary labor will be available on demand by matching supply and demand.

For such temporary jobs, individuals can acquire highly sought-after 21st century skills. Especially in the agro-food sector with the unfolding of digitization training and expertise is required. Opportunities exist to find synergy between on demand learning and on demand labor.

There is however a dark side to this “cloud-based labor”; extreme flexibility demands, uncertainty and low prices are to be feared in the new gig economy.

Digital Solutions that address the On Demand Economy Trend:

- Provide on demand labor and learning with social responsibility in mind.
- Provide micro, small and medium enterprises market and logistic access.
- Fulfill the highly personalized demand through mass customization.

Business Trends

Sustainable Intensification

Efficiency gains are required while conserving natural resources and creating ecosystems that are resilient to climate change and market volatility.

Sustainable intensification is generally associated with the focus on intensifying the production side either through increased labor, input or technology. As the objective is to design an agri-food system that is sustainable in terms of economic, social and environmental perspectives, concepts of the circular and sharing economy are part of sustainable intensification as well.

One problem lies in the definition of sustainable. More research is required to understand all linkages, in order to reach scientifically based acceptable and shared norms that allow the implementation of cost-benefit analyses in daily management practices.

Digital Innovation Hubs aid the advancement of the sector through knowledge and technology transfer. Additionally, these Hubs provide the infrastructure for the formation and development of ideas by various actors. Other forms of open innovation are taking place such as governments opening research to agri-tech experts, the formation of multi-stakeholder communities, and supply chains collaborating to innovate.

For the durability of the system, the social aspects should not be neglected. Digital technologies need to increase access to opportunities of development through social inclusion and subsequently prevent rural abandonment

Digital Solutions that address the Sustainable Intensification Trend:

- Make cost benefit analyses based on all relevant perspectives
- Connect research to innovation and other forms of open innovation.
- Increase rural attractiveness

Business Trends



Sharing Economy

Sharing is about reducing ownership and increasing access by making underutilized assets and services accessible to off and online communities.

The sharing of resources like cars and houses has shown to be a viable business model. Some argue these models to be part of an access economy rather than a sharing economy as sharing implies some altruistic nature. Alternative Food Networks are somewhere in the middle as consumers and producers collaborate. These short distribution chains like self-harvest gardens and community-supported agriculture could experience new growth and increased member retention as labor intensity can be decreased and organization optimized with the implementation of digital technologies.

The demand for local food, the need for shorter distribution channels and the unsustainable food system for small farmers have led to the rise of regional and local food hubs. By sharing value creation, the competitiveness of stakeholders is enhanced as well as the condition of the community itself. Examples are the formation of brands around regions, and the attraction of talent.

There are however situations in which companies prefer horizontal collaboration abroad due to a lack of trust and therefore limited information exchange. Hybrid approaches that generate profit to accomplish social and environmental objectives have the opportunity to fill an important gap in the industry.

Digital Solutions that address the Sharing Economy Trend:

- Increase the amount of shared resources which may have traditionally been owned
- Optimize Alternative Food Networks processes
- Facilitate value creation by regional food hubs



Business Subtopic Trends

Act Local: To solve global problems action is needed at the local level. This is part of a new mindset that increasingly re-appreciates the local environment.

Bio Economy: The invention, development, production and use of renewable biomass across all sectors to replace fossil fuels and produce other biobased products.

Business Model Innovation: Increased importance of sustainability and new technologies lead to opportunities for new business models to capture maximum value from innovation.

Data Aggregation: The aggregation of data will assist research communities, allow stakeholders to compare performance and the development of apps and services.

Data Sharing: The sharing of data between stakeholders in the value chain increases efficiency and safety but technical barriers and legislative uncertainties remain.

E-Commerce: By conducting business activities increasingly online, wider access exists to consumer goods, production inputs, financial services and more.

Business Subtopic Trends

Energy Efficiency: Current energy intensive systems contain numerous opportunities for improvement based on monitoring, consumption reduction and renewable energy adoption.

Innovation hubs: To aid innovation and adoption these hubs and centers provide physical and digital infrastructure to facilitate connections and access to resources.

Precision Agriculture: Digital techniques measure variations among the field to add exactness to inputs and timing, resulting in higher yields and a lower environmental impact.

Reverse Logistics: Waste to be valorized needs to be collected and transported. This requires changes in behavior, careful organization and adaptation of transport.

Social Inclusion: It is about improving the terms on which individuals and groups take part in society by increasing access to develop opportunities

Traceability: The ability to follow the movement of a resource through various stages. This allows faster and precise identification of a product under review.

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Thank you

If you have any questions about this document please don't hesitate to contact us at:

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