SIA thematic factsheets

EIT Strategic Innovation Agenda (SIA) 2014 - 2020
EIT 2016 Call for KIC proposals

Factsheet 3: Food4Future

Factsheet 4: Added-Value Manufacturing

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Factsheet 3: Food4Future – Sustainable Supply Chain from Resources to Consumer

1. THE CHALLENGE

The global food supply chain is facing a complex set of challenges.

On the demand side, the situation is characterised by an increasing world population, by an increasing standard of living (especially in the emerging countries) creating demand for a more varied, high-quality diet requiring additional food production. As a result the UN has predicted that food demand will rise by around 70 % by 2050[1]. At the same time, the fast expansion of the bioenergy sector further accentuates the demand for by-products derived from the food production process.

On the supply side, global climate change will aggravate pressures on food production and food supply. In addition, a number of food production systems in the world are unsustainable. Without change, the global food system will continue to degrade the environment and compromise the world's capacity to produce food in the future.

These problems in particular have to be seen in connection with consumers' attitudes, concerns and behaviours, as production is driven by consumers and markets. During the last two decades the complexity of food consumption has increased dramatically. Consumers demand affordable, diversified, high quality and convenient food products responding to their tastes and needs. Concerns regarding various issues, ranging from food safety and environmental protection to ethical considerations, such as fair trading practices or animal welfare, are continuously increasing and result in growing demands by consumer groups for political action. Finally, food consumption habits (including food wastage) can have strong impacts on consumer health and well-being, as well as on primary production and on the environment.

Horizon 2020 addresses this complexity and defines the challenges relating to this sector: "The challenge is to secure supplies of safe and high quality food and bio-based products and to ensure sustainable management of biological resources, contributing to both rural and coastal development and to competitiveness of the European biobased industries, while preserving terrestrial and marine eco-systems, reducing fossil-dependency, mitigating and adapting to climate change and promoting zero-waste and resource efficiency."

[1] Food and Agriculture Organisation of the United Nations (FAO). 2009. Global agriculture towards 2050.

2. RELEVANCE AND IMPACT

A KIC on a sustainable supply chain will help meeting Horizon 2020 priorities, namely those defined in the context of the societal challenge "Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bio-economy".

This thematic field is in addition highly relevant in terms of economic and societal impact. Questions of food safety and security have a bearing on nearly all sectors of our economy and society, and very often call for regulatory action.

The food industry is the largest manufacturing sector in Europe and plays an essential role in Europe's wider economic development. Despite its relevant role, the competitiveness of the European food and drink industry is being challenged. Over the last decade, Europe's share of the global market has declined from 25 % to 21 % in the face of competition from emerging economies, such as China, India and Brazil. Increasingly unable to compete on cost alone, the European food industry needs to be able to add value by creating healthier, more sustainable and resource-efficient products if it is to reverse this decline.

Action is needed to ensure a climate resilient and sustainable global food system while meeting the increasing food demand within the constraints of available land and declining fish stocks, protecting the natural environment and safeguarding human health.

A KIC in this area will focus on the food supply chain. This focus lends itself particularly well to the holistic approach of a KIC. It comprises resource input in the very beginning of the chain (fertilisers, etc.), food production, processing, packaging and distribution; and it ends with the consumers which might be a specific priority of a KIC (reduction of food waste, healthy nutrition, etc.). The objective is to ensure a more efficient and effective food supply chain system, while improving the sustainability and traceability in all parts of this chain.

Addressing the food supply chain via a KIC will thus give the possibility to address not only some of the major economic and societal relevant challenges Europe is facing, but also to mobilise investment and long-term commitment from the business sector – namely, in the deployment of new and innovative technologies, processes and knowledge to increase sustainable food production, processing, packaging and distribution, to reduce waste and promote better nutrition. Through its integrative approach, a KIC in this area will be able to influence the industry approach to focus more on consumer-driven innovation, thereby benefiting consumer health and quality of life. This will go along with the potential of new business models and market strategies that focus on consumers' needs and trends and build upon enhanced awareness of the food chain, which can have potential to get innovations and technological possibilities in line with consumer interests and thus create new business opportunities.

A KIC in this area will be very important to overcome the high level of fragmentation of the whole food supply chain. It will blend a critical mass of excellent research, innovation, education and training stakeholders along the whole chain. All elements of the chain (primary sector, food production, food processors, retailers, food service channels and – not least – the consumer) are inextricably linked to each other for the conception of future innovations. A KIC will provide the necessary systemic and transdisciplinary approach to tackle these issues.

The major added value of a KIC in this area will be its role in addressing the current shortage of skills and human resources. Currently, probably as many as half of the European food and beverage manufacturing industries are facing a shortage in scientific and skilled personnel. This is a barrier to innovation in this sector. By integrating education with the other sectors of the knowledge triangle, a KIC will address this issue. It will at the same time offer

the opportunity to stimulate new educated entrepreneurial people, capable of developing new innovative technologies and business. This focus on entrepreneurship would be particularly relevant in the food sector, which is characterised by a high number of SMEs.

The major risks associated to the success of a KIC under this theme are mainly related to the necessary accompanying innovation framework conditions, which KICs are not directly addressing. For increasing sustainability throughout the food supply chain, some changes in regulation may be needed in order, for example, to internalise food production costs. Therefore, the KICs need to liaise with ongoing Union and national innovation and policy activities on these matters (see next section).

3. SYNERGIES AND COMPLEMENTARITIES WITH EXISTING INITIATIVES

The Union is fully engaged in this field. A KIC would contribute to address Horizon 2020 societal challenge "Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bio-economy". It would, in particular, co-operate with the proposed European Innovation Partnership (EIP) "Agricultural Productivity and Sustainability". Whilst the latter will put emphasis on building bridges between cutting-edge research and practical innovation, a KIC would in particular create complementarity in educating key actors, such as entrepreneurs and consumers. Coordination is also needed, with the Joint Programming Initiative "Agriculture, Food Security and Climate Change", which will pool national research efforts to integrate adaptation, mitigation and food security in the agriculture, forestry and land use sectors.

The European Maritime and Fisheries Fund will promote environmental and social sustainability of fisheries and aquaculture, thus highlighting the need for technical developments coupled with new entrepreneurial skills in these fields, in line with the evolution of consumers' behaviour, providing possibilities for synergies. Likewise, coordination will also be possible with the recently launched JPI "Healthy Food for a Healthy Life" and "Connecting Climate Research in Europe", and with European Technology Platforms in relating areas (in particular, the Food for Life Platform) or numerous projects under the Seventh Framework Programme. Similarly, it would build on eco-innovation market replication projects, under the CIP (Competitiveness and Innovation Programme), where food and drink has been one of the priority areas. Such experience will continue with Horizon 2020 namely in the context of the Climate action, environment, resource efficiency and raw materials societal challenge.

A KIC in this area would be complementary to these activities since it would focus on transdisciplinary activities within the knowledge triangle with a strong focus on innovative products and services and entrepreneurial education as well as on consumer issues.

4. CONCLUSION

A KIC which focuses on the food supply chain is most suited to address the challenges outlined above. It also meets the criteria put forward for the selection of KIC themes:

- It addresses a major economic and societal relevant challenge (the need to ensure a resilient and sustainable food system while meeting the increasing food demand within the constraints of available land, protecting the natural environment and safeguarding human health), and contributes to the delivery of the Europe 2020 agenda and its objectives on climate and energy, employment, innovation and education.

- This KIC focus is aligned with priorities defined in Horizon 2020 and complementary with other Union activities in the food sector, in particular with the EIP "Agricultural Productivity and Sustainability".
- It is able to mobilise investment and long-term commitment from the businesses sector and offers possibilities for various emerging products and services – namely, in the deployment of new and innovative technologies, processes and knowledge to increase sustainable food production, processing, packaging and distribution, to reduce waste and promote better nutrition and a healthier population.
- It creates sustainable and systemic impact, measured in terms of new educated entrepreneurial people, new technologies and new business. It will foster new technological developments and more efficient and sustainable production systems.
- It aims at overcoming the high level of fragmentation of the whole food supply chain; favouring traceability; and will bring together a critical mass of excellent research, innovation, education and training stakeholders along the whole chain.
- It thus requires transdisciplinary work involving different areas of knowledge, such as agronomy, ecology, biology, chemistry, nutrition, and socio-economy.
- It will address the European paradox, since it will find new innovative approaches to ensure a more sustainable and efficient supply chain and to improve food security.

Factsheet 4: Added-value Manufacturing

1. THE CHALLENGE

One of the major challenges defined in the European Innovation Agenda and which also has to be addressed within the framework of Horizon 2020, is the competitiveness of Union Member States on the global market. One of the sectors where the problem is particularly urgent is manufacturing.

Manufacturing in European countries is under considerable strain: increased competition from other developed economies, low cost production in developing countries, and scarcity of raw materials are putting pressure on the European manufacturing companies. Parallel to this, there are further factors driving change in the manufacturing sector: new market and societal needs, rapid advances in science and technology, environmental and sustainability requirements.

One possible answer to address these challenges is the development of a "high value (or added-value) manufacturing" industry. This concept defines an integrated system including the whole cycle of production, distribution and end-of- life treatment of goods and products/services applying a customer/user driven innovation system. Rather than competing primarily on cost, added value manufacturers deliver value by delivering product/service innovation, establishing process excellence, achieving high brand recognition and/or contributing to a sustainable society.

The manufacturing sector is of considerable economic, social and environmental significance. In 2010 the manufacturing sector accounted for 15.4 % of the Union's GDP and over 33 million jobs. This figure increases to 37 % if power generation, construction, and associated business services are included. At the same time, manufacturing also contributed to about 25 % of the waste, 23 % of greenhouse gases and 26 % of NOx generated in Europe.

Bearing this in mind, it is quite clear that the overall objectives in the field of manufacturing must be increased competitiveness of Europe within the global market as well as the development of more sustainable and environment- friendly manufacturing processes.

2. RELEVANCE AND IMPACT

A KIC on added-value manufacturing will help meeting Horizon 2020 priorities in terms of advanced manufacturing and processing, and its specific objective of "transforming today's industrial forms of production towards more knowledge intensive, sustainable, low-emission, trans-sectoral manufacturing and processing technologies, to realise innovative products, processes and services".

It will be able to mobilise investment and long-term commitment from the business sector, and to expand and create new markets. It could have in particular a function in supporting the actions defined in the Strategic Research Agenda of the European Technology Platform (ETP) "Manufuture":

- Eco-design
- Development of added-value products and services;
- Development of new business models;
- Development of advanced manufacturing engineering processes;
- New emerging manufacturing sciences and technologies;
- Transformation of existing research and education infrastructures to support world-class manufacturing.

Whilst supporting the development of new products, services, business models and manufacturing processes, emphasis should be put on sustainability and eco-innovation, with the reduction of resource and energy inefficiencies, maximising positive environmental impacts, but also contributing to strengthening positive economic and social impacts. Concretely, such clean approach will imply energy and material efficient processes and machinery, the use of renewable power sources, and/or the employment of smart energy management, leading thus to significant reductions of waste and emissions. By contributing to the development and deployment of more sustainable, resource-efficient and competitive manufacturing, a KIC would be able to trigger industry and consumers behavioural change and to create systemic impact.

A KIC on added-value manufacturing could also have a very important role and impact at regional level: Fostering the creation of interconnected regional clusters with local transfers and collaboration, developing competences in high- end manufacturing technologies, and developing excellence in manufacturing technologies would be the key missions of a KIC at regional level. In this connection, specific attention could be given to those regions more affected by declining manufacturing capacity as well as to SMEs.

One of the major challenges for reaching the above aims is the availability of a highly qualified workforce which is sufficient in quality as well as in numbers. A KIC would therefore have a very important role to play in re-shaping the education landscape in this field. By creating closer links between skills demanders and education providers, a KIC would promote joint post-graduate degrees, post-graduate professional training and industrial "real-life" courses.

Capacity-building will be also a central element of a KIC in added-value manufacturing. This concerns not only the supply of high qualified work force, but also the possibility of establishing the KIC as a forum for interaction and promotion of cross-disciplinary skills and competences, particularly for the combination of multiple key enabling technologies as proposed by the High-Level Group on Key Enabling Technologies (KETs)[2].

A KIC on this area will have the potential to bring together different actors and stakeholders in this very transdisciplinary sector, including key upstream and downstream parts of the value chain. This includes processing industries (e.g. steel or chemicals) which are immediately linked with the value chain for added-value manufacturing.

3. SYNERGIES AND COMPLEMENTARITIES WITH EXISTING INITIATIVES

A KIC as described above would be complementary to a number of other Union initiatives, as well as at the level of Member States and industry associations.

In addition to the already mentioned ETP "Manufuture", it could also establish links with the ETPs on Smart Systems Integration and the Joint Technology Initiative (JTI) on Embedded Computing Systems. The Public Private Partnership (PPP) on Factories of the Future and others potentially to be launched under Horizon 2020 within this

[2] http://ec.europa.eu/enterprise/sectors/ict/files/kets/hlg_report_final_en.pdf

thematic area as well as a number of Framework Programmes (FP) projects would also be natural co-operation partners. The KIC would take into account the research priorities and action plans defined in the framework of the ETPs and the research work carried out so far by the JTI, PPP and FP projects in this area.

Similarly, it would build on eco-innovation market replication projects, under the Competitiveness and Innovation Programme (CIP), where experience in the area of more sustainable manufacturing has been developed. Such experience will continue with Horizon 2020 namely in the context of the Climate action, environment, resource efficiency and raw materials societal challenges. Synergies may also be considered with the Environmental Technologies Verification (ETV) pilot programme, which aims at promoting high value environmental technologies by providing a third-party validation of their performance.

An added-value manufacturing KIC could be also a connection point for synergy effects with the European Technology Research Council, which the High-Level Group on Key Enabling Technologies recommends for promoting excellence in technological research and innovation.

A KIC in this area would be complementary to these activities since it would focus on transdisciplinary activities within the knowledge triangle with a strong focus on entrepreneurial education.

4. CONCLUSION

A KIC which focuses on the integration of all stakeholders concerned with manufacturing and which puts a strong focus on re-shaping the education agenda in this field would be well-suited to address the challenges outlined above. It also meets the criteria put forward for the selection of KIC themes in the SIA:

- It addresses a major economic and societal relevant challenge Europe is facing (to increase the competitiveness of the Member States on the global market and contribute to the development of a more sustainable and environmentally-friendly manufacturing process), and contributes to the delivery of the Europe 2020 agenda of smart and sustainable growth.
- This KIC focus is aligned with the priorities defined in Horizon 2020 and complementary with other Union activities in the area.
- It can build on a solid industrial sector which will be attracted by a KIC.
- It offers possibilities for various emerging products, services and business models, and – above all – it will be well- suited to address the urgent need for qualified people in this sector.
- It takes a systemic approach and thus requires transdisciplinary work and the development of new education across the boundaries of disciplines.
- It will bring together a critical mass of excellent research, innovation, education and training stakeholders along the value chain, which would otherwise not unite.
- It will address the European paradox, since it will capitalise on the Union's strong research base and find new innovative approaches to ensure a more competitive, sustainable and resource-efficient manufacturing sector.