

## VISION FOR INNOVATION IN FOOD AND DRINK MANUFACTURING

This document represents key issues regarding the status and the research and innovation needs of the UK Food Manufacturing industry. It has the support of the members of the National Technology Platform (NTP) and was developed with the Food and Drink Federation (FDF).

The Food Manufacturing industry is the largest manufacturing sector in the UK, with a turnover of £76.6bn and £20.4bn Gross Value Added (GVA). It has a major role to play in the realisation of Government priorities on economic growth, exports, employment, environmental sustainability and public health through the provision of safe, nutritious, affordable and sustainable food.

The sector, unlike many other manufacturing industries, is highly fragmented, with a very broad diversity of businesses which, regardless of size, are often characterised by relatively low margins, making investment and development difficult.

The Food Industry urgently requires support to stimulate and facilitate R&D activities and knowledge transfer to help meet the Government priorities and to ensure it remains a viable and sustainable national industry, and a significant innovator in competition with other EU and international states. If the innovation environment remains difficult for manufacturers to tap into and there is limited support then businesses may look to reposition their facilities elsewhere impacting massively on the UK's trade balance.

The sector acknowledges existing funding already available from Government in support of innovation. For example, the Technology Strategy Board (TSB) Sustainable Manufacturing and Food Processing Efficiency competition (SAF-IP programme) and the inclusion of food manufacturing within the TSB's High Value Manufacturing programme. We also welcome the Research Councils' decision, led by BBSRC to launch a second round of funding for the Diet and Health Industry Club (DRINC).

However, further support is required and more specifically:

1. An Agri/Food Science strategy is required, covering food production, processing and distribution - well beyond the farm gate. Joined up support across government departments along the entire food supply chain including food and drink manufacturing should be achieved.
2. Research Councils and Government Departments should improve their understanding of the Food and Drink sector and its research needs and place food innovation at the heart of their strategy. For example:

- EPSRC to support Food Research through Centres for Innovative Manufacturing, to set up a Strategy Board for food engineering and to participate in the DRINC programme
  - Defra to restore its Link programmes in Food Quality and Advance Manufacture
  - MRC to increase its funding of research on the preventive benefits of a healthy diet
3. TSB/Biosciences KTN should provide a search facility for research funding opportunities through connect
  4. Funding models for collaborative research and innovation should include as well as matched funding (50% public and 50% private) other models with higher contribution from government (e.g. 90% public and 10% private or 80% public and 20% private) to reflect support to high risk ventures and the low margins of the food industry sector
  5. The R&D Tax Credit system should be made to work better for the sector through simplification, better dissemination of information, and through the revision of current definitions
  6. Government should provide incentives to attract high calibre academics and technical staff to improve the knowledge-based community in support of future innovation in the UK Food Supply Chain, for example through visiting scientists grants and student placements in industry
  7. Government and government scientists should promote an evidence-based approach to communication and regulation to build confidence in novel Food Technologies and their applications in Food Production and Manufacture

## Vision for Innovation in Food and Drink Manufacturing – Supporting Information

### Importance of the UK Food and Drink Manufacturing industry

Key industry statistics:

- Largest UK manufacturing sector
- Turnover **£76.7bn** (2010 ABS ONS)
- GVA **£20.4bn** (2010 ABS ONS)
- Exports **£12.2bn** (2011 HMRC Trade Info)
- R&D **£305m** in 2010 (ONS BERD total intramural R&D)
- No. of enterprises **6,600** (2010 ABS ONS)
- No. of employees **up to 400,000**

[FDF's Sustainable Growth report<sup>1</sup>](#) concluded that the UK Food and Soft Drink Manufacturing Industry (FDM) can generate sustainable growth and contribute to the UK economic recovery by building on its strengths which include exporting, developing new products and branding, increasing resource efficiency and improving productivity. Its weaknesses, such as limited access to finance, lack of relevant food industry skills amongst young people and a difficult regulatory environment need national attention. The industry will only be able to grow if it operates in a supportive, evidence-based regulatory environment which incentivises business investment and nurtures British Food and Drink Manufacturers.

The UK Food Industry is a prominent sector, with a turnover of £76.6bn and £20.4bn GVA, and is currently not adequately recognised in much of Government policy. It has a major role to play in the realisation of Government priorities on economic growth, exports, employment, environmental sustainability and public health through the provision of safe, nutritious, affordable and sustainable food.

The sector, unlike many other manufacturing industries, is highly fragmented, with a very broad diversity of businesses which, regardless of size, are often characterised by relatively low margins, making investment and development difficult.

The sector urgently requires support to stimulate and facilitate R&D activities and knowledge transfer to help meet the Government priorities and to ensure it remains a viable and sustainable national and international industry.

[The Future of Food and Farming report<sup>2</sup>](#) outlines the key challenges for all food chain players but concludes that between 2030 and 2050 new knowledge and technology need to be developed as a slowdown in productivity has been seen across the world. Production will need to become more sustainable and waste must be reduced. The industry will need to produce more, from less and with less environmental impact to meet the twin challenges of food security and climate change. It will also be essential to minimise waste, both pre and

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<sup>1</sup> [http://www.fdf.org.uk/sustainable\\_growth.aspx](http://www.fdf.org.uk/sustainable_growth.aspx)

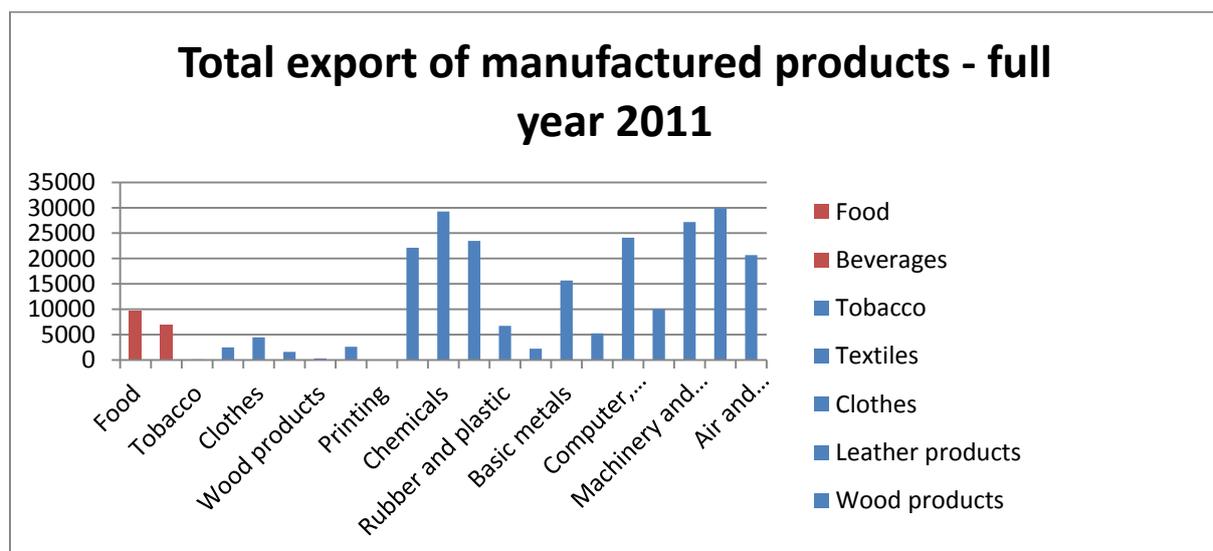
<sup>2</sup> <http://www.bis.gov.uk/assets/foresight/docs/food-and-farming/11-546-future-of-food-and-farming-report.pdf>

post-harvest and to optimise outputs from inputs at all levels of production through sustainable intensification.

FDF members are already working with the Department for Business, Innovation and Skills (BIS) and the Department for the Environment, Food and Rural Affairs (Defra) to generate 20% sustainable growth by 2020. However, to achieve this there must be a more supportive regulatory environment which incentivises business investment in innovation and nurtures UK Food and Drink Manufacturers.

### The Food and Drink Industry is unique

Food and Drink Manufacturers are of key importance to the UK, being the largest and biggest economic contributor with many businesses using high value manufacturing techniques to develop products. However, the industry differs considerably to other manufacturing sectors.



**Fig.1** – Food and Drink Manufacturing companies contribute £12.2bn to UK exports with potential for further growth.

- 86% of companies in the food industry have less than 20 employees (BIS Business Population Stats)
- Food and Drink Manufacturing relies on very complex, often global, supply chains and depends on a sophisticated and demanding retail environment
- There are clear technological challenges associated with the production of food, e.g. food safety, freshness, reformulation for healthier input, waste minimisation, environmental responsibility
- There are many different Food Manufacturing industries. According to Standard Industrial Classification (SIC) codes, there are ten main sub-sectors for food and drink manufacturing, including dairy products, ice creams and desserts, canned fruit and vegetables, frozen fish, fats and oils, etc., each with specific technological challenges, compared to only one for the aerospace industry
- R&D government investment into the sector was £1M in 2010 (compared to £17M for pharmaceutical, 12M for motor vehicles and parts and £160M for aerospace) (Office for National **Statistics** (ONS) Business Enterprise Research and Development (**BERD**) survey)
- There is limited coordination between the activities of food-related R&D centres and universities. This is a key improvement target for the NTP and the KTN

## Where is the industry going? Trends over the past few years

Following the launch of the IChemE and RSC review *The Vital Ingredient* ([http://www.rsc.org/images/FoodReport\\_tcm18-142397.pdf](http://www.rsc.org/images/FoodReport_tcm18-142397.pdf)) in 2009, manufacturers and retailers discussed their R&D interests for the future. Virtual Centres of Excellence in the following disciplines were recommended:

- Primary crop production and protection
- Process engineering relating to biomass refining
- Process and materials science of food product design and fabrication
- Factory and Distribution design and logistics
- Food Safety
- Diet and Health
- Consumer Attitude, Choice and Behaviour

## What has happened between 2009 and 2012?

### UK Initiatives

1. The UK Science and Technology base has maintained or increased its capabilities in **Primary Crop Production and Protection**. This is vital for sustainability of raw materials.
2. **Diet and Health** is very high on the agenda of the public sector, and relates primarily to the impact of diet or food components on human biology. The manufacturing industry will use the outcomes of current research to reformulate products. Much of the work will be confidential, since benefits will create competitive edge.
3. **Consumer Attitude, Choice and Behaviour** should be fully studied and understood as innovations will only be successful if accepted and valued by consumers. This capability appears to be declining in the UK and global companies are increasingly collaborating with other EU states where social sciences and sensory studies are better supported.
4. **Food Safety** is an area where pre-competitive research is possible. Public sector capability has been maintained but not strengthened.
5. **Process Engineering relating to biomass refining** has grown in the public sector, in support of Sustainability and Waste Reduction. This is welcomed, and industry is likely to share in precompetitive R&D.
6. **Process and Materials Science of Food Product Design and Fabrication**. This is a core capability of the manufacturing industry and is perceived to have weakened significantly in the public sector. There appears to be little intention within the UK to build or maintain this capability. Since it so crucial to the manufacturing sector, unless this is remedied, global companies are likely to take their collaborations offshore, to the detriment of innovation and wealth creation in the UK.
7. **Factory and Distribution Design and Logistics**. This concerns the process equipment within factories, the logistics of process scheduling and the distribution to retailers. It is unfortunate that there is no strength within the UK on equipment design and little on process control for the high speed, multiproduct manufacturing processes of food. Global food manufacturers have not relied on, and see little improvement on the UK's capabilities to innovate in this area. They do not plan future investment for innovation within the UK, and this will not change unless significant signs of public sector investment are seen.

Some aspects of scheduling and distribution logistics are common to the food and other manufacturing industries. Where initiatives focussed on other industries are seen to be relevant, food manufacturers will collaborate.

### European initiatives

1. The European Technology Platform “Food for Life”, encourages enhanced co-operation in the R&D area to ensure food is safer, healthier and produced sustainably and ethically. This body makes recommendations to the Commission for R&D, but does not itself fund Research. The Board has representatives of Multinational Companies, and the UK makes input via the Institute of Food Research (IFR).

2. A Joint Programming Initiative “Healthy Diet for a Healthy Life”, is a broad programme of Research.

3. A proposal for a Knowledge Innovation Community (KIC) is proposed. This is currently led by a Danish/ Swedish coordination (Food Best). The UK and Ireland have established a regional hub, which is a Virtual Centre engaging national Centres of Excellence in Training (Universities), Research (Universities, Institutes and Industry) and Innovation (private sector, large and small companies).

4. The new Framework for R&D is currently under development. Known as “Horizon 2020”, it includes key themes for future research. Whilst Food interests are visible under Sustainability and Health, food production and manufacturing is not well represented.

## **Key Innovation Challenges for the Food and Drink Industry**

### Sustainability, Health and Efficiency

To ensure the UK Food and Drink Manufacturing industry can make available, affordable and nutritious food to a growing global population, a greater investment in innovation is needed, not just to ensure a plentiful sustainable supply of ingredients, but also to make sure shelf products are healthier and produced more efficiently with less impact on the environment. The UK should remain a world leader in developing new products, processes and technologies and rise to the challenges and opportunities of feeding a growing global population despite limited availability of resources.

Whilst the industry continues to grow in the UK, there are signs that the innovation environment is becoming less attractive to multinationals and that the UK could lose its competitive edge. There is mounting pressure on companies to reduce fat, salt and calories whilst ensuring consumers can continue to enjoy products. The cost of raw materials and energy requires manufacturers to be more efficient, producing more with less, and to reduce environmental impact. Whilst some of the largest manufacturers might have the resource to respond, even within these companies progress has been constrained.

### Innovation Environment

Businesses in the Food and Drink Manufacturing Sector are finding it difficult to navigate the research and innovation environment, and it is not immediately apparent where to go for support to improve sustainability, process innovation, food chemical engineering etc. There are pockets of funding available in different areas, but no one funding body provides support for the Food and Drink Industry.

## Process Innovation and Engineering

The challenges of reformulation, brought on by a need for more efficiency, incorporation of new ingredients and the production of less calorie dense foods, will require greater understanding of process and material integration.

According to a report by the International Federation of Robotics (IFR) (2011), the UK is far behind EU competitors in automation, with only 779 robot installations in the food and drink industry compared to 5708 in Germany.

## Market share/exports

Export statistics show that all food and drink exports and highly processed food exports are growing. However, the trade balance of highly processed foods is in decline and other markets are growing exports at a faster rate compared to the UK.

Routes to export markets and trade barriers need to be addressed, but to ensure cutting edge food and drink products are produced and exported from the UK it is vital that investment in R&D facilities and processing technology grows. If the innovation environment remains difficult for manufacturers to tap into and support is limited then businesses may look to reposition their facilities elsewhere impacting massively on the UK's trade balance.

## UK Skills System – Knowledge Based Economy

There are not sufficient young talented scientists entering the food and drink sector. Even the largest manufacturers struggle to secure food scientists and many recruit from overseas leaving SMEs with significant difficulties. These issues partly relate to the image of food and drink manufacturing, which is being addressed through the FDF Taste Success – A Future in Food Campaign [<http://www.fdf.org.uk/campaigns/careers.aspx>]. However, the main issue is that less students study food science and engineering and Science Technology Engineering and Mathematics (STEM) generally as Universities have focused less on these areas of research and academics have migrated to other countries where more research opportunities exist. With the introduction of higher university fees our sector has an opportunity to attract an increasing number of students looking to study subjects that offer strong employment prospects such as food science and engineering. We must therefore ensure there are significant innovation opportunities for food and drink manufacturers to grow their R&D capability which in turn will attract the best young scientists and engineers into the sector.