

5. Food and bio resources

The food and bio resources sector stronghold in Denmark is characterised by growing opportunities for start-ups and scale-ups, in line with the advancement of the green transition agenda and an increasing consumer appetite for new kinds of food. Despite these sources of opportunity, there are also a number of barriers. This chapter presents policy recommendations that could strengthen start-up and scale-up activity in food and bio resources. It assesses barriers and policy gaps for start-ups and scale-ups in the sector and presents inspiring practice policy initiatives for start-ups and scale-ups in food and bio resources in the Netherlands, Ireland and Finland, including key takeaways that can be applied to the Danish context.

Policy recommendations for Denmark's food and bio resources sector

1. **Provide public sector support for improved physical piloting and testing facilities** for the food and bio resources sector, including state of the art facilities for a variety of tasks, such as handling waste, and access to capital equipment for piloting prototypes. This could include a national test centre.
2. **Address the funding gap faced by scale-ups when they reach medium size.** This includes finding ways to incentivise private investors to provide longer-term patient capital.
3. **Develop processes for public procurement of innovation from start-ups and scale-ups** in food and bio resources. This includes modifying pre-tender processes to make them easier for start-ups and scale-ups and introducing flexibility to procure products involving new types of food and ingredients or produced with innovative technologies. Technical and legal competences for public procurement of food and bio resources innovations should be developed across government. Other public programmes should support start-ups and scale-ups with their procurement capabilities. Targets could be set for SME participation in public procurement for innovation in this sector.
4. **Support start-ups and scale-ups with compliance with food and drug regulations.** The Food and Veterinarian Administration can provide advisory support and materials and consult with the sector to improve regulatory ease for introducing new products to the market.
5. **Promote the internationalisation** of the sector's innovative start-ups and scale-ups, including an initiative to support Danish food and bio start-ups and scale-ups with branding, support for connections with international partners, and provision of internationalisation advice. Business incubators and accelerators can play an important role.
6. **Broker and facilitate closer dialogue between large firms and start-ups and scale-ups** in order to help start-ups and scale-ups to solve their innovation problems and to validate their products.
7. **Introduce a prioritised focus on some specific niche target fields** within food and bio resources, working in collaboration between the public sector and industry players.

Introduction

The food and bio resources sector covers the production, processing and distribution of food, with a focus on biological residuals and environmentally-sustainable alternatives. Shifting consumer priorities represent a sizeable opportunity for this sector. For instance, there is a growing consumer awareness of climate issues, meaning that locally-produced food with smaller environmental footprints can represent much more attractive markets for retailers. Furthermore, efforts to reduce greenhouse gas emissions in the sector are creating opportunities in the development of plant-based foods and other organic alternatives to traditional dairy and meat-based products, such as seaweed, hemp, kale and insects. Other opportunities are provided by alternative/biobased proteins, which are proteins for food produced via fermentation technology that converts biological sidestreams into protein ingredients without the environmental costs associated with animal-protein production. Meanwhile, efforts to reduce waste in the food sector are creating a space for innovations in product development.

Public procurement is also beginning to be used to stimulate the food and bio resources sector in Denmark, for example in organic food (Holmbeck, 2020^[1]). Public procurement represents a potential market for this

sector and can offer many opportunities for start-ups and scale-ups in alternative food production as, for example, procurement of food deliveries to schools and health care facilities can relatively easily be adapted to small-scale producers such as start-ups. A difference between the food and bio resources sector and sectors that are capital-intensive and require long-term patient capital, is that entry barriers are lower, and early stage companies can be agile and responsive to market changes.

Another relevant development for the food and bio resources sector in Denmark is the consortium for biosolutions. Biosolutions includes fermentation techniques for development of new sources of protein for food using biological sources such as algae and biological sidestreams. The consortium was formed in early 2022 following a recommendation from the growth team for the Zealand region as part of proposals to achieve a green restart of business communities at the local level after the Covid-19 pandemic. Food & Bio Cluster Denmark is expected to take a lead role in implementing the growth team's recommendations for supporting biosolutions as a potential new business area.

Despite these opportunities, start-ups and scale-ups in Denmark's food and bio resources face a number of challenges:

1. Access to international markets
2. Limited firm-level innovation capabilities
3. High levels of start-up failure rates
4. Limited testing and piloting infrastructures
5. Slow and burdensome regulation
6. Lack of entrepreneurial finance
7. Skills development
8. University mindsets
9. Lack of branding
10. Lack of innovation engagement of large firms in the cluster
11. Lack of diversity

The remainder of this section describes each of the challenges listed above, before analysing examples of successful policy approaches in the Netherlands, Ireland and Finland.

Box 5.1. A promising food and bio resources start-up in Denmark – Faunaphotonics

This company was born out of technology developed in a Swedish university (Lund University). The company took the intellectual property and made the first prototype. It has raised about USD 18 million and has 35 employees. It makes next generation insect monitoring tools for the agriculture sector, seeking to find new ways of digitising insect data in agriculture. It has its own network of farmers and is now in the scale-up phase. It has just raised USD 6 million and is in the process of hiring more people.

Barriers for start-ups and scale-ups

Access to international markets

Start-ups in this sector stronghold are much less likely to export than more established businesses, which in turn are less likely to export than firms in most other sector strongholds and emerging industries (Statistics Denmark, 2022). Denmark's membership of the Enterprise Europe Network can assist in this

area by providing connections to international partners, support for innovation and advice for international growth. Business incubators can also provide an important contribution in these areas.

There is scope in Denmark for an organisation that focuses on branding new innovations emanating from start-ups and scale-ups in the food and bio resources sector. Some of the existing organisations are dominated by large firms in the dairy, brewing and meat processing industries, and therefore are not providing start-ups with the international visibility they need. Food Nation Denmark is a national branding effort that could focus more on profiling new firms.

Stakeholders have suggested that the food sector as a whole should be promoted by government departments and Food & Bio Cluster Denmark, with the aim of increasing the internationalisation of the sector. In the past, there has been a lot of regional support in food clusters and the small regions want to promote it individually. However, the competitive advantage for Denmark's food and bio firms is international.

Limited firm-level innovation capabilities

A traditional barrier to scaling up in this sector in Denmark is that new companies often focus on developing incremental improvements, such as a new flavour of food, rather than more radical developments. Thus, the sector has only to a limited degree seen the creation of start-ups based on radical technological developments. This is due in part to the sheer scientific complexity of identifying how to operationalise the process of making new materials into functional and nutritious foods. This requires a broad set of competencies in and knowledge of processing, food safety, compliance and the wider market. Many start-ups do not have these competencies. While there is a high number of start-ups in the sector in Denmark compared to advanced production and energy technology, the ecosystem would benefit from more new businesses as this would lead to an increased variety of innovation.

High levels of start-up failure rates

A barrier to the sustainability of the food and bio resources sector is that the majority of start-ups die within the first five years. Stakeholders have suggested that a particular problem in the sector is that 40-45% of those that fail do so because they do not have the right market fit and do not understand the needs and demands of their customers. Therefore, an important part of the very early validation process is to verify that the product fits the market in a way that will generate sales. Food & Bio Cluster Denmark can play a crucial role in helping start-ups and scale-ups to understand their markets because of the cluster organisation's relationships with 300 established companies, some of which are among the largest in the industry with the resources and market access to assist with the validation of products. Another issue is that there are entrepreneurs in incubators in the sector that do not have the ambition of scaling up. In these cases, it is not necessarily advisable to push them in this direction.

Limited testing and piloting infrastructures

Stakeholders have identified that a major barrier to growth for start-ups and for scale-ups, particularly in high technology fields, is the lack of physical piloting and testing facilities in Denmark's food and bio resources sector. Start-ups and scale-ups increasingly need state of the art facilities for a variety of tasks, such as handling waste. For some companies, it is also difficult to find hardware or capital equipment for piloting prototypes when transitioning to the scale-up phase when access to costly stainless steel is required. Moreover, some equipment that is needed for the scaling-up process is required at a larger than laboratory scale, such as that found in universities or research and technology organisations (GTS Institutes).

It is difficult for a private company to achieve the economies of scale necessary to make operating these facilities economically viable for them. Access to this type of infrastructure could be organised by an

integrated body with numerous interconnected functions (see the case of the Netherlands Food Valley described later in this chapter). The endpoint would be to facilitate the development of products that are affordable for customers and profitable for producers. This would be particularly beneficial in the raw material sector because of the high cost of piloting prototypes. A related challenge is making prototypes cheaper and smaller. To this end, Denmark would benefit from a national test centre, which attracts companies of all sizes in order for the sector to compete globally. This could have a focus on sensor technologies.

Some of the incubators run by Food & Bio Cluster Denmark have offered these kinds of facilities. However, this provision is not sustainable without government support. A problem is that many government support schemes for incubators focus on salaries and seldom provide funding for the purchase of materials or for investing in facilities. New schemes that include support for these types of activities would be needed to help with the establishment of facilities that can be used by multiple companies.

Universities, such as the Technical University of Denmark (DTU), also have testing and piloting facilities. However, the difficulty is that firms can only use them on the rare occasions when there is not a scientific project in progress. It would make a significant difference to start-ups and scale-ups if universities were to provide facilities that are exclusively for businesses' use. A next step might be to work with universities to develop specific test and pilot facilities where start-ups and scale-ups can benefit from the knowledge of university researchers and those operating the facilities on a day-to-day basis. GTS Institutes do have facilities for the food sector, although stakeholders report that for some companies, it is still necessary to go to the Netherlands for the piloting and testing stage of the innovation process.

Denmark does have some very good specialist competencies and technical institutes that can support with certification or initial hardware testing for start-ups. For example, the Danish Knowledge Centre for Agriculture (SEGES) is a limited partnership company and the main supplier of professional knowledge for the agricultural professions. The organisation can help with field trial designs for new and growing firms, and works closely with the government, universities and professional and industrial bodies.

Slow and burdensome regulation

A key challenge in the food and bio resources sector is compliance, especially for start-ups in the food sector. This is because of the high level of regulation surrounding the operation of a food business, particularly if the business is doing something radically new or different to established practices. There is a regulatory divide in the sector between the traditional way of making foods and the high-tech area where more compliance is needed. For example, there are a lot of regulatory obstacles to using protein-based insects as a basis for food and to the use of new proteins or cell-based food more generally (Danish Veterinary and Food Administration, 2021^[2]). It takes on average two years for a business to receive regulatory approval from the European Union (EFSA) in the sector. Due to the large amount of documentation needed to achieve regulatory compliance, it is essential for new firms to think about compliance from an early stage. The Danish Food and Veterinary Administration provides advice to start-ups on this topic, and is also working to reduce regulatory barriers. However, there is a need to increase awareness of its services among early-stage start-ups. This could be organised for example with support from the cluster organisation and regional business hubs and universities that are in contact with start-ups.

A mapping of regulatory barriers to biosolutions companies in Denmark and other selected European countries conducted by the Danish Business Authority has shown that current European regulation in several areas constitutes a barrier to the development and market introduction of new biosolutions to the market. Furthermore, long case handling times for approval of biosolutions at the national and European level are also a significant barrier. This means that large biosolutions companies look to markets outside the EU and also place their R&D departments outside EU, while smaller companies and start-ups may not succeed.

Lack of entrepreneurial finance

There is a gap in funding for scale-ups when they reach medium size. The most important issue for hardware manufacturers is the length of time taken to reach maturity, which may be 10 years in some cases. Long-term thinking by investors is an essential ingredient that is missing in Denmark, not only in the food and bio resources sector. In traditional food companies, investors expect to see a return within a very short period of time. This means that some start-ups with excellent potential but a slower route to market do not progress further because of lack of long-term funding. While there is a lot of public support in the entrepreneurial finance system, there is a need for longer-term private investment i.e. patient capital. Denmark lacks specialised investors, which means that some firms find it easier to access foreign capital from countries such as the US, France or Germany.

The Danish agriculture sector is characterised by high but declining levels of investment (European Commission and European Investment Bank, 2020^[3]). There are, however, local initiatives that involve EU funding. For example, in Central Jutland, the Future Food Innovation (FFI POP) project has helped participating companies grow through the development of new products, services and processes.

Skills development

Skills shortages are not generally reported to be a barrier in the food and bio resources sector. Some of Denmark's universities, colleges and vocational institutions have excellent teaching programmes in the field and students from related programmes have good job opportunities. It is also possible for businesses to recruit foreign workers, for example from Spain and the Czech Republic. However, it is important for the sector to work with universities to ensure that they nurture the skills needed for future developments in the sector. This is because a diversity of skills and competencies are needed for a start-up or scale-up to succeed.

University mindsets

Firms in the food and bio resources sector have traditionally had close links with research institutions, including through joint projects between SMEs and universities. An obstacle has nonetheless been the lack of an entrepreneurial mind set within universities, where career progression is predominantly related to research and publishing rather than collaborations with companies. With some exceptions, universities have tended not to value the expertise of staff who collaborate with companies, although this appears to be changing. A challenge is to identify a start-up's capacity for co-operation and absorbing knowledge before establishing a collaboration. This external facilitator role is one for Food & Bio Cluster Denmark.

Lack of innovation engagement of large firms in the cluster

There is a pressing need for start-ups and scale-ups to be engaged in a dialogue with the largest companies in the food and bio resources sector. While larger companies are looking at innovations, the process of shifting to new market areas appears slow. The historical context is that the largest companies have a close connection to primary production, both in agriculture and fishing. Food & Bio Cluster Denmark is therefore trying to introduce new forms of co-operation between the large firms and new and small firms, in order to bring more innovation into these traditional markets. One of its measures is a new process whereby it goes to the four largest member firms to identify some of their major innovation and product development issues in a particular area, for example plant-based foods. Food & Bio Cluster Denmark then takes these problems back to start-ups, university students and others who are willing to work with the large firms on the identified issues. A barrier to progress in this area is the need for start-ups to be able to supply the innovations at a large volume. Furthermore, the large firms need time to validate the inputs before commencing production.

Some of the larger food companies in Denmark are looking at new technologies and moving towards an open innovation model. They are working with start-ups in specific areas to create more innovation and new ways of thinking on topics including hardware and software for laboratory analysis, inputs based on alternative proteins and developments in packaging, such as waterproof and oxygen proof layers in cardboard. For example, one of the large firms has invested in a venture company called Rock Start Agrifoods in order to work with start-ups in Denmark and internationally. However, the start-ups need to reach a certain level of maturity so as to be able to demonstrate proof of concept to the larger company, including food safety compliance. There is a need for new policy tools to support this process (see the example of Vista Milk in Ireland later in this chapter).

Lack of diversity

Employment in the food and bio resources sector is not representative of the wider workforce and the industry's consumers. This is due in part to a shortage of women in the sector. Greater diversity could be supported by increased branding on inclusivity, a process that start-ups and scale-ups could be an important part of.

International policy experiences

Netherlands – Foodvalley NL

Overview

Foodvalley NL is an independent, international platform for innovation and facilitating the transition of the global food system. Since 2004, Foodvalley NL has been developing and strengthening the Food Valley ecosystem, which is an international ecosystem of organisations that work together to realise this transition. The cluster works closely with corporations, SMEs and governments at every level, as well as with leading educational and research institutions. It currently employs 25 staff and has an international membership of over 280 organisations. The funding model is multi-partner finance, involving local province funding, EU funding and membership fees. Membership fees are structured such that smaller companies pay less than larger ones.

Foodvalley NL started as an innovation cluster focused on accelerating innovation, tech transfer and R&D activities between research providers and businesses. It then moved to stimulating entrepreneurship by helping entrepreneurs to start and grow a business. Its philosophy is that entrepreneurs need to play a key role in the transition to a sustainable food system worldwide, providing tasty, healthy and affordable food for everyone. This approach also necessitates interaction with consumers.

Foodvalley NL is pro-active in seeking out and connecting the most promising businesses and entrepreneurs. It supports entrepreneurs along their innovation journey by providing access to partners, up-to-date information, facilities and capital. Through these activities, Foodvalley NL builds an entrepreneurial community that collaborates both locally and internationally, with the overarching goal of building a global sustainable food system.

Foodvalley NL sets the innovation agenda and then initiates and develops programmes to scale up innovations more quickly and to help member and partner organisations to develop and grow more swiftly. Members have access to potential investors and partnerships worldwide, excellent facilities, and resources across a wide range of industries and disciplines. Specific target fields relate to the Protein Shift, Circular Agrifood and Food and Health.

Issue 1: Shared facilities

Through Foodvalley NL's shared facility finder, members can access a wide range of innovation facilities by finding and sharing research equipment, laboratories, testing facilities and technologies. The facility focuses on four areas: research equipment, demonstration and testing, scale-up and production, and investment and funding.

The approach is to systematically review the facilities that are available in a certain field, for example the protein shift. An inventory is then drawn up of all relevant partners, including those conducting testing, extraction, upscaling, prediction or the development of equipment. The inventory helps to accelerate the process of obtaining information on the availability and accessibility of facilities. There are three staff members working in the area, who act as a point of contact for those with questions that the inventory can address. Through this channel, Foodvalley NL can then offer guidance or consultancy, make connections and refer businesses or entrepreneurs to relevant partners.

Issue 2: Accelerator support for start-ups

Foodvalley NL has two accelerators: StartLife Accelerate and ScaleUpFood. The programmes are organised in partnership with Oost NL, Rabobank, ScaleUp Company, ScaleUpNation, StartLife and Wageningen University & Research and World Food Center Development.

Each programme typically involves companies at different stages of development: early-stage start-ups, late-stage start-ups that are ready to scale, and upstream scale-ups. For instance, StartLife Accelerator is the most effective programme for early-stage start-ups to validate their technology and business model, acquire connections in the food and agriculture ecosystem, and pitch to investors. There are selection criteria for each of the programmes and the selection process involves an intake interview. A formal procedure is followed, which involves a decision tree that analyses the future of the idea and the possibility of failure, the quality of the current business model, and the openness or adaptability of the people in the company. Progress is then continuously monitored and discussed throughout the programme.

Issue 3: Working with corporates in start-up and scale-up programmes

On certain projects, large firms directly define and monitor specific projects for Foodvalley NL. Some large companies have innovation scouts looking for new opportunities and have staff members available and developing expertise in developing new innovation projects with partners. Others are more traditional in their approach. Overall, there is currently a rapid shift towards the increased participation of larger firms in Foodvalley NL networks.

Issue 4: Research and entrepreneurship training with universities

Wageningen University is a key partner for Foodvalley NL, and this link enables the provision of significant amounts of research training for individuals from across the world. Wageningen University is also one of the entry points for entrepreneurship, particularly for student entrepreneurs. Foodvalley NL collaborates with many other universities in the Netherlands and internationally in order to install appropriate teams for specific projects.

Issue 5: Policy on inclusive entrepreneurship objectives

There is no statement about equality, diversity and inclusion on Foodvalley NL's website.

Lessons for Denmark

Foodvalley NL has evolved a way of working that is flexible and adapts to specific needs that exist. Previously, Foodvalley NL spent a lot of time getting the "right" ecosystem in place. Recently, the focus

has shifted, with the current emphasis being on bringing more people and organisations together. As a consequence, the ecosystem is developing organically. The current priority is to steer efforts towards certain topics, which are purpose driven and thereby address the challenges that are out there rather than simply being a response to the needs of a community. Another priority is to evaluate every action undertaken in order to address the question: “how does this action assist in the transformation that Foodvalley is after?”.

In practice, this strategy involves:

1. Establishing dialogue across the entrepreneurship and innovation value chain so that start-ups and scale-ups are involved, partnerships are formed and collaboration is made easier, with a key target being to facilitate partnerships with global reach.
2. Sharing facilities between large and small organisations.
3. Establishing accelerators that address the needs of start-ups and scale-ups at different stages in their development.
4. Developing strong links between corporates and start-ups and scale-ups.

Recommendations for Denmark based on the Netherlands case

- Food & Bio Cluster Denmark needs to be proactive in finding promising start-ups and scale-ups, matching them to potential partners and connecting them to resources. More long term and free funding would be instrumental in achieving this.
- Food & Bio Cluster Denmark’s strategy needs to be one of setting the innovation agenda, including the identification of specific target fields.
- Of crucial importance to start-ups and scale-ups is access to piloting and testing facilities. This means developing a co-ordinated approach to carrying out an inventory check that identifies the location and availability of relevant facilities and facilitates the sharing of knowledge and access.

Ireland – Science Foundation Ireland Research Institutes (BioOrbic and Vista Milk)

Overview

Similar to Denmark, Ireland is a leading producer of food and agricultural products and its agricultural research is world leading. The food and bio resources sector in Ireland provides peer learning and support at an advanced level. Of particular interest to Denmark is the close co-operation between universities, industry and research institutes, with this co-operation intermediated by Science Foundation Ireland’s (SFI) research institutes. SMEs as well as large firms, both national and international, participate in these networks. Key features include coherent planning, technology transfer from universities, national branding efforts, cluster development, public-private partnerships and business promotion.

SFI funds research at industry-themed research institutes. They are university based, with universities as lead actors. However, the research activities are conducted in close co-operation with SMEs and large firms in selected industrial strongholds. The research promotes and assists the development and competitiveness of industry, enterprise and employment in Ireland.

SFI funds both oriented basic research and applied research. Oriented basic research is research that is carried out with the expectation that it will produce a broad base of knowledge that is likely to form the background to the solution of recognised or anticipated problems or possibilities. Applied research is an original investigation undertaken to acquire new knowledge directed primarily towards a specific practical objective. The results of applied research are intended primarily to be applicable to a single or limited number of products, operations, methods or systems.

In the field of food and bio resources, the relevant SFI research institutes are:

- The SFI Bioeconomy Research Centre (BiOrbic), which was founded in 2017. BiOrbic undertakes research projects to use biological resources sustainably in order to produce goods such as bioactive molecules, chemical building blocks, plastics, fuels and energy. It has a particular emphasis on converting the residues from the agri-food and marine sectors to create new business opportunities for high-value products. The development of new value chains will allow these industries to diversify and add value to the sector, increase resource efficiency and complement food production activities. BiOrbic also considers how consumers will react to these new products.

A primary function of BiOrbic is to bring small and large companies together, so that the former have access to knowledge and can engage with a variety of stakeholders. BiOrbic also works closely with policy makers to establish priorities for the industry that reflect its needs and wants. It has a prominent position in the National Bioeconomy Forum, which was established for industry to come together to identify priorities, sources of investment, methods for bringing research to market, and market challenges and solutions.

BiOrbic has a strategy of encouraging spin-out companies. So far there are two. One spun-out from a large firm and has maintained a close relationship with the parent company, which is now considering buying shares in the spin-out.

- The SFI Research Centre for Digitalising Dairy Production and Processing (Vista Milk) is funded by SFI and the Department of Agriculture, Food and the Marine (DAFM). The research centre represents a sectoral collaboration between research institutes and leading Irish and multinational companies in the food and information communication technology (ICT) sectors. The centre is hosted by the Teagasc Food Research Centre, in partnership with the Tyndall National Institute, Ireland's national microelectronics institute, the Telecommunications Software & Systems Group (TSSG) at the Waterford Institute of Technology, the Insight Centre for Data Analytics and the Irish Cattle Breeding Federation (ICBF). Vista Milk aims to develop electronic monitoring and actuation technologies to transform the dairy production chain. It specifically addresses pasture-based dairy production, improved processability and the generation of novel, higher-value-added products. Particular focus is given to developing state-of-the-art analytical techniques applied to large-scale sensor datasets, using advanced network and communication technologies.

SFI research institutes' support for start-ups and scale-ups is complemented by a range of national enterprise development programmes, principally through Enterprise Ireland. Enterprise Ireland offers a comprehensive range of support measures to high potential, export-focused entrepreneurs and companies. This includes the provision of business funding, advice, mentoring, introductions, and practical help to enter overseas markets. Additional policy tools to support start-ups and scale-ups in the food and bio resources sector include research and development tax credits. A new initiative is Knowledge Box, which offers a preferential tax rate on certain types of assets, including patents, which are located and managed in Ireland.

Issue 1: Overcoming fragmentation

A major issue is the fragmentation of the food and bio resources sector, which includes many small firms spread across farming, forestry and fishing. This fragmentation can make engagement a challenge. A key role of BiOrbic is to guide small players through the policies that are going to impact their businesses, an example of which is the carbon tax. Start-ups and scale-ups account for around half of the approximately 20 companies that BiOrbic works with, and there is a push to engage with more of these types of companies.

Another area of focus is waste streams. Larger companies are now more open to working with smaller companies with new ideas that promote sustainability. For instance, one of BiOrbic's spin-off companies is working with a large dairy company in developing a net zero approach. This promises to deliver benefits

both for the project partners and for the farming industry more broadly. As well as contributing to the green transition, the innovative ideas that are generated create opportunities for new high-value products.

Vista Milk also acts as a broker and intermediary between large and smaller companies. A key feature is the independence of the organisation, which gives it legitimacy and credibility. All companies are treated equally, often through personal relations.

Issue 2: Working with different kinds of start-ups

Start-ups involved with BiOrbic fall into two main groups. Firstly, there are the classic start-ups in biotechnology that develop products that improve human or animal health. Secondly, there are start-ups that focus on sustainability, essentially acting as service companies to help farmers and others understand their environmental impact through an analysis of factors such as biodiversity, carbon footprint, and impacts on air and water quality.

Vista Milk has 50 partners in the milk industry, including seven very early stage start-ups. However, start-ups are not a key priority as they do not bring money into the organisation. Vista Milk has two models of engagement. The first is a new model, where people sign-up and receive a free monthly newsletter and invitations to industry meetings. The second is a more traditional and targeted model, where Vista Milk analyses companies' activities and their usefulness for Irish farming. Promising companies are then provided with experts who work with the firm for free.

Issue 3: Testing infrastructure and help with regulatory compliance

BiOrbic provides key access to testing facilities and help with compliance with food and safety regulations, particularly for smaller start-ups. This support is provided through the skills and expertise of researchers, as well as the facilities, infrastructure and experts at the research centre. The firms benefit from a fast track because they are advised on whether their products need to go through regulatory approval.

In situations where BiOrbic does not have suitable facilities, the SMEs are guided elsewhere. For instance, if pilot scale facilities are available at another institution, BiOrbic will reach out and encourage a collaboration. In some cases, a memorandum of understanding is designed and agreed. Some key facilities are housed within universities. A challenge faced by those working in rural areas and/or are starting a company for the first time is that they may not have experience interacting with universities. In these situations, facilitation by BiOrbic is needed to connect the entrepreneur with the research institution.

Vista Milk also provides support for start-ups and scale-ups through access to infrastructure, which enables field trials and the use of specialised equipment. The firms can consult subject matter experts and can utilise the infrastructure at considerably lower costs than they would otherwise have access to. An experimental system is rented out for EUR 70 000 plus up to 40% in overhead costs. However, the firm retains ownership of the IP and the data. The firms give Vista Milk their product for testing and engage with them on the experimental design. Vista Milk then generates the results, typically over a six-week period, and may analyse results and or provide the firm with the data. Through this, start-ups are provided with the infrastructure at a considerably reduced cost. If the product is successful, then a two-year period of infrastructure access can be discussed. Management of intellectual property is much more complicated when the firms have to deal with universities. Vista Milk has also run workshops on R&D tax credits, which start-ups have attended.

Issue 4: Regulation and food standards

Vista Milk has a representative of the food safety authority on its Industry Advisory Committee. Thus, when, for example, new dairy products are being developed by a firm, the firm is introduced to the food authority for early discussions.

Issue 5: Intellectual Property Rights (IPR)

In Ireland, IPR can be a considerable barrier to collaboration between start-ups and scale-ups and universities and research institutes. This is because universities wish to profit from patents and licences, which can often make them prohibitively expensive for start-ups or scale-ups to obtain. However, Vista Milk appears to allow their researchers some discretion and flexibility in this area in their collaborations with start-ups. For example, they may not charge the start-up for their initial involvement in a project, allowing intellectual property to flow freely.

Issue 6: Policy for inclusive entrepreneurship

There is an inclusive approach and an effort to bring all sections of society together within BiOrbic and Vista Milk. BiOrbic formed its Equality, Diversity and Inclusion Working Group in 2020, but it is recognised that a broader, more intersectional approach would be beneficial. Vista Milk has an equality, diversity and inclusion policy. It also recently introduced a new key performance indicator, namely that women should have at least 40% representation in its leadership. Female representation in Vista Milk's leadership currently stands at 38% and it is one of the best SFIs with respect to gender equality. Staff originate from 28 different countries, so there is also good cultural diversity. In recognition of the importance of diversity, equal opportunities and transparent decision-making, a current recommendation is to undertake a cultural audit.

Lessons for Denmark

The main messages from BiOrbic relate to:

- Helping SMEs that do not traditionally work with universities to overcome barriers to university collaboration. Support for collaboration ensures more up-to-date product development portfolios for SMEs and universities.
- Supporting links between start-ups and scale-ups and larger companies helps these larger companies to diversify into new product areas, for instance when they are compelled to address green transition issues.
- Facilitation of access to facilities in Ireland.
- Providing help for start-ups and scale-ups with regulatory issues, particularly associated with novel foods.
- Ensuring inclusivity in the approach to working with start-ups and scale-ups, to allow the voices of all sections of industry, society and policy to be brought together so that innovation processes are fully informed of opportunities and challenges. Social enterprise represents one of the opportunities for start-ups and scale-ups.

For Vista Milk, a key message is that start-ups should be invited into the research process, “have coffee with the researchers” and be facilitated in deploying their technologies on the farm.

Recommendations for Denmark based on the Irish case

- Food & Bio Cluster Denmark should work with policy makers to establish priorities for what new products and services industry wants to develop
- Food & Bio Cluster Denmark should develop the capacity to guide small players through the policies that are going to impact their businesses, such as carbon tax.
- The cluster organisation should work closely with government enterprise support agencies to identify which enterprise and innovation programmes are relevant for the food and bio resources sector.

- Food & Bio Cluster Denmark should engage with larger companies to encourage them to work with smaller and newer firms in order to help solve their innovation problems, especially with respect to sustainability.
- Provide access to infrastructure, in particular testing facilities and help with compliance with food and safety regulation.
- Food & Bio Cluster Denmark should develop an equality, diversity and inclusion working group.

Finland – Public Procurement for Innovation : KEINO

Overview

Public procurement for innovation

Public procurement for innovation (PPI) is a demand-side policy that plays an important role in mission-oriented policies, leveraging public-private co-operation to co-create and shape markets for new sustainable products and services. It is a powerful instrument with the potential both to drive new innovations and precipitate the faster adoption of innovation among public sector users. PPI can boost economic growth by providing innovative companies, in particular start-ups and scale-ups, with the opportunity to obtain first user references.

PPI requires a shift from a purely administrative approach to public procurement to a strategic and needs-driven approach. This involves moving away from the traditional, two-dimensional rationale of focusing almost exclusively on final cost and additional services offered, with rigid definitions for the products or solutions to be provided. Instead, PPI uses more differentiated parameters and criteria that enhance quality-oriented, sustainable and long-term economic, societal and environmental outcomes. Instead of pre-defining the solutions to a given situation, PPI describes the needs or problems to be solved, allowing for a greater range of potential solutions. This is known as functional PPI. This is also a focus for CO-PI, the new unit for public-private innovation in Denmark¹.

The strategic use of public procurement is intended to harness the purchasing power of the public sector to stimulate the development of new products and solutions. Even though PPI is a strategic instrument that can drive growth and bring multiple benefits to public authorities, industries, consumers and society as a whole, its widespread adoption is only taking place slowly and is hampered by a number of challenges that need to be addressed. These include a lack of awareness, knowledge, experience and capabilities related to new technologies and market developments, as well as a lack of incentives and motivation to purchase innovative solutions from new companies rather than purchasing established products from long-standing suppliers.

PPI tenders that only specify problems to be solved will often require innovative solutions. This lends a competitive advantage to start-ups that are based on new knowledge and technologies over less innovative incumbent firms. If PPI is supported by funding for developing new solutions, it can represent a large growth market for start-ups and scale-ups. Such PPI models can be found in countries such as the USA, Canada and Sweden.

KEINO

KEINO was established in 2018, funded by the Ministry of Economic Affairs and Employment for the period 2018-2021. It is a network-based competence centre for sustainable and innovative public procurement in Finland, building on and exploiting expertise in existing public agencies. Public procurement spending in Finland is EUR 47 billion each year. EUR 31 billion of this amount is sourced from competitive markets with the remaining purchases being contracts between public bodies. The innovation procurement programme in 2021 is targeted at 10% of national spend. The government grant programme for preparing

the tender is overseen by Business Finland, and is usually targeted at larger procurements such as IT systems. Typically, funding is provided to cover 50% of the procurement design and innovation costs. The intention is to increase the number of innovative and sustainable procurements in Finland by recognising and actively using public procurement as a management tool, with contracting entities openly disseminating information on their experiences and learning from one another.

The founding members of KEINO responsible for its operation and development are Motiva, the Association of Finnish Local and Regional Authorities, VTT Technical Research Centre of Finland Ltd., the Finnish Funding Agency (Business Finland), the Finnish Environment Institute (SYKE), Hansel Ltd, KL-Kuntahankinnat Ltd and the Finnish Innovation Fund (Sitra). Hansel and KL-Kuntahankinnat have been merged and are currently operating jointly as Hansel Ltd., and Sitra is not any longer involved with KEINO. Core competencies of KEINO include public procurement, business and innovation, sustainable development, technology and innovation procurement, environmental research and assessment methods, municipal and city management, and service domains.

KEINO seeks to increase contracting entities' awareness of strategic procurement management and influence thinking. It aims to assist contracting entities in management tool development and measurement and set up impactful and efficient buyer groups for procurement in the fields of social welfare and health services, construction and energy use, mobility and logistics, and the bio- and circular economy. KEINO also supports the development of procurement competencies through advisory services, events and KEINO-agent activities. Through the KEINO Academy training programme, it also seeks to strengthen international networks and peer-to-peer learning for procurers. KEINO also has regional activities including an innovation broker service and a network of 12 regional change agents. Procurement strategies are designed to encourage environmental awareness and social considerations. Calls for tender reflect those priorities.

An example that illustrates the potential of PPI to trigger the emergence of successful start-ups is the experience of a start-up that won a contract to develop a medical dispensing system for hospitals. Through the resulting programme, the start-up has been growing by 25% per year, and is now the market leader in Finland with large contracts for the major hospitals. The start-up is currently customising its product to target overseas markets.

Issue 1: Legal hurdles to supporting start-ups and scale-ups

While there is a strong consensus within KEINO that PPI is a potential pathway for supporting start-ups and scale-ups, procurement laws are very strict about not favouring any specific type of company. Accordingly, even if regions or cities are eager to make it easy for small companies to enter into public procurements, they sometimes lack the means to do so because of legal issues surrounding neutrality and confidentiality. However, solutions can be developed in a collaborative way by creating links between public procurement and other policy instruments. For example, there is an extensive discussion around test beds, innovation environments or different types of funding modalities that could bring things together more efficiently. To help, advice is regularly given to procurers to split larger tenders into smaller chunks to enable smaller companies to participate. This does occur in certain instances but is not always a feasible option.

Issue 2: Climate-friendly procurement of milk and dairy products - Case City of Helsinki²

An example of PPI in Finland is the City of Helsinki's procurement of the milk, dairy products and plant-based products used by schools and day care centres in the city, Service Centre Helsinki, foundations and the facilities of the Social Services and Health Care Division. The procurement value is approximately EUR 14 million and the procurement procedure is an open one. The procurement aims to reduce emissions and increase responsibility and involves multi-disciplinary co-operation. Procurement criteria steer companies' provision and companies are consulted in an ongoing dialogue.

Issue 3: Using sustainability criteria in competitive bidding for food procurement – Case City of Salo

Every day, the City of Salo serves and home-delivers 14 000 meals in schools, day care centres, hospitals and senior citizens' assisted living facilities. The object of procurement in this example is therefore food products. A competitive bidding process guided the City's food procurement, underpinned by a procurement policy programme for 2016–2019. The objective was to procure sustainably-produced, high-quality food products. A further aim was to enable small local producers to participate in the bidding. The four strategic guidelines were:

- A systematic, economical approach
- Business-friendliness and vitality
- Innovation and experimentation
- Responsibility

These guidelines were implemented by monitoring procurement, increasing market dialogue, adopting new procurement methods and procuring responsibly. All of the guidelines were implemented in the competitive bidding process for food procurement, reflecting a specific programme goal of responsible food procurement. The procurement was implemented in co-operation with catering and procurement service companies. Extensive market dialogue was carried out during the pre-tendering phase. Specifically, small producers' opportunities to participate in the competitive bidding were facilitated. The consultancy Yrityssalo organised a separate event to provide companies with guidance on responding to the public invitation to tender. Sustainability criteria that were used in the evaluation of bids included the promotion of animal welfare and health, food safety, environmental impacts, and social responsibility. Overall, the selection criteria were divided between price and quality, with the former receiving a weighting of 70% and the latter receiving a weighting of 30%.

As a result of the process, all of the unprocessed meat products used by the City of Salo's food service units are now of Finnish origin and the overall degree of Finnish origin of food products has increased. However, local producers did not submit bids, despite the special efforts that were taken to ensure that small producers had the opportunity to participate.

Lessons for Denmark

There is great potential for using public procurement resources to shape and co-create new markets in partnership with the private sector, stimulating the development of new products and solutions provided by start-ups and scale-ups that are socially sustainable and contribute to the green transition of the economy. The rationale for PPI is to address social, sustainability and service challenges where there are no existing products and solutions in the marketplace and there is clear room for productivity improvements. If successful, innovative suppliers obtain a good reference case, demonstrating that they have truly made a difference for their public client, for example by increasing productivity or raising living standards. This helps them to attract further clients. Although Denmark is among the EU's good performers on PPI, it underinvests in PPI when compared to Finland, which ranks first in the EU (European Commission, 2016).

One of the lessons of the Finnish experience is that it took a long time to build support for PPI across the Finnish government. For Denmark, it will be important that all involved parties share a common aim of deploying public procurement as a strategic tool to meet goals, especially those related to solving societal challenges.

KEINO's experience also shows that a competence gap PPI in legal and technical areas will need to be overcome before more complex issues about favouring innovation in the best possible way can be addressed.

KEINO has built procurement strategies that embrace start-ups and scale-ups. KEINO also encourages procurement units to find new ways of implementing procurements, which has fostered an experimental culture.

It should be noted that from 2022, the Danish government, municipalities and regions agreed to strengthen public-private innovation and innovation procurement and established a new joint unit, CO-PI, dedicated to support this purpose. This is expected to benefit SMEs' participation in public procurement. However, Denmark does not have a target for innovation procurement or a target for SME participation. Hence, incentives need to be built into the actions by CO-PI.

Recommendations for Denmark based on the Finnish case

- Promote PPI across government as a strategic way of promoting innovation in food and bio resources.
- Build PPI competences with respect to food and bio resources across government.
- Set targets for the level of innovation procurement and the participation of SMEs.

References

- Danish Veterinary and Food Administration (2021), *Insects — farming and use as feed and food in Denmark and the EU — what's allowed and what is not?* [2]
- European Commission and European Investment Bank (2020), *Financial needs in the agriculture and agri-food sectors in Denmark.* [3]
- Holmbeck, P. (2020), *Best practice in Organic Public Procurement: The case of Denmark*, IFOAM Organics Europe. [1]

Notes

¹ <https://co-pi.dk/>

² The two food procurement examples are good examples of sustainable and green procurement but they are not the most innovative cases of Finnish procurement. Procurement of more innovative solutions can be found e.g. in these cases: (1) [Modern ERP system for waste management](#) (2) [Pre-Commercial Procurement for developing self-driving buses](#) (3) [Digitalization of Field Inspections](#)



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