

6. Conclusions and proposals for Denmark

Conclusions

The analyses in this report shed light on the key challenges that start-ups and scale-ups face in three sector strongholds in Denmark and the lessons that can be drawn from programmes designed to stimulate start-ups and scale-ups in these sectors in other countries.

In Denmark's advanced production sector, start-ups are relatively large in employment and turnover terms. There is also a high share of scale-ups in the business population. However, start-ups and scale-ups face challenges surrounding supply chain entry. Low representation in the national cluster organisation and long development timescales are major issues in this sector stronghold. The cases of Austria's Plattform Industrie 4.0, Canada's Advanced Manufacturing Supercluster, and Sweden's Robotdalen and Automation Region highlight the important role that cluster organisations can play in supporting start-ups and scale-ups in the advanced production sector.

Denmark's energy technology sector has a greater share of start-ups than either the advanced production or food and bio resources sector strongholds. Furthermore, the average revenue of energy technology start-ups is more than four times' higher than the economy-wide average. Moreover, while the number of scale-ups in the energy technology sector is low, those firms that do succeed in scaling up generate significantly higher revenues on average. Start-ups in the energy technology sector come from a wider range of sources than their counterparts in the advanced production sector, with many new firms emanating from universities, outside of the supply chain and from crossovers from other sectors. An example of this would be entrepreneurs in the robotics field moving into the energy technology sector. Extended development timescales and insufficient access to finance are key challenges for start-ups and scale-ups in the sector. The industry structure of the energy technology sector, which is characterised by a small number of very large companies, can also stifle innovation by restricting the role of innovative new businesses. The United States' Small Business Innovation Research programme illustrates how the development and commercialisation of technology can be effectively promoted in the energy technology sector through the provision of grants to competitively selected start-ups. Meanwhile, the three energy clusters and catapult centres in Norway and the United Kingdom's Energy Systems Catapult provide a number of lessons that can be applied in Denmark, such as mapping new technology developments, providing testing and piloting facilities, employing technology managers, and involving start-ups and scale-ups in the design of regulations.

In Denmark's food and bio resources sector, new firms also emanate from a variety of sources. Start-ups and scale-ups in the sector face difficulties navigating the regulatory environment and developing radical innovations. These issues are exacerbated by limited testing and piloting facilities. Foodvalley NL and the Science Foundation Ireland Research Institutes provide a model for how start-ups and scale-ups can be supported in these areas, while Finland's KEINO scheme shows how public procurement for innovation can be an effective tool in the food and bio resources sector.

These sector-specific issues and lessons are reflected in the recommended actions set out in Chapters 3, 4 and 5 of this report. The remainder of this section focuses on a number of cross-cutting issues and policy recommendations that affect the development of start-ups and scale-up in all of the three case study sectors and that may be important in other sectors of the Danish economy.

Cross-sector policy recommendations

1) Develop patient capital

Funding for start-ups and scale-ups is a recurrent problem. A common theme is that there is finance available for software start-ups and scale-ups but far less for deep-tech and hardware firms in the advanced production and energy technology sectors that need larger funding rounds and patient capital, usually for up to a decade.

2) Build collaborations between large firms and start-ups and scale-ups

Large firms in the three case study sector strongholds are not engaging with start-ups and scale-ups to the extent seen in key innovation concentrations in other countries. Policy needs to seek a culture shift in this respect, for example through triggering activities of large firms as first customers for new firms, or through collaboration with large firms in developing incubators and accelerators.

3) Develop public procurement for innovation

The Danish Government, regions and municipalities recently established a new joint unit, CO-PI, which has been formed in order to strengthen public-private innovation and innovation procurement. Rather than focusing on specific public demand, the new unit will be based on market dialogue and focus on developing or adjusting solutions in collaboration with public and private actors. Focus areas are green transition, sustainable construction and technology that improves welfare services.

Public procurement for innovation (PPI) is a key instrument to support start-ups and scale-ups in other countries such as the USA and Finland. There is still a potential in Denmark to develop this area further, in part by learning from other countries' experiences. Actions are recommended to build a vision and strategy for PPI in Denmark, build PPI competences in government, and introduce targets for the participation of start-ups and scale-ups in PPI.

4) Build university-industry collaboration

Knowledge transfers are critical to start-up and scale-up development. Easier co-operation between universities and industry, especially start-ups and scale-ups, could be driven by reform of the IPR systems and the operation of technology transfer offices. More specifically, recommendations in this area are to:

- Address the problems of ownership of intellectual property that is held by the universities, as this is a barrier to commercialisation and working with start-ups and scale-ups. With its professor's privilege concept, Sweden offers a contrasting example in this area.
- Broaden the metrics for evaluation of researchers so that innovation and not just research and teaching are counted.
- Encourage universities to work more strategically with start-ups and scale-ups on innovation, for example by providing more targeted public support for this purpose.
- Complement the public funding system of universities so that facilitating start-ups and scale-ups and not only patents and licences provide earnings for universities. Such reform could make it cheaper for start-ups and scale-ups to exploit patents and licences from universities.
- National policy should encourage and recognise the contribution of university colleges to innovation and entrepreneurship and incentivise closer collaboration with universities and industries in developing talent supply strategies.

5) Provide long-term, freer cluster funding on a competitive bidding basis

The national cluster organisations can play a central role in start-up and scale-up development in the sector strongholds and emerging industries. However, for them to take roles in strategic actions for promoting start-ups and scale-ups they need access to some longer-term and freer public funding in addition to resources that are tied to delivering particular research project outcomes. The strategic actions funded in this way could include:

- Establishment of programmes for promoting start-ups and scale-ups;
- Pro-active work to find promising start-ups and scale-ups and match them to potential partners and resources;
- Facilitating closer co-operation among universities, larger firms and SMEs in the cluster;
- Initiatives to promote university and corporate spin-offs;
- Searching for extra-cluster (international) knowledge sources on behalf of cluster member firms (especially SMEs and start-ups and scale-ups);
- Supporting the international branding of the cluster and the organisations within it (which will particularly help SMEs, start-ups and scale-ups in accessing international markets and collaboration partners);
- Identifying international funding sources for cluster development.

The award of long-term, freer funding to different cluster organisations should be driven by success in proposing strategic actions in a competitive bidding process. Regular evaluation should also be applied to assess the extent to which stated objectives and targets in the bidding proposals are achieved, and continued funding provided only on condition of meeting success criteria. Cluster programmes in Norway and Sweden could be used as inspiration.

Norway has a stepwise cluster programme with three divisions: Arena with 3-5 years funding, Arena Pro with another five years funding, and Global Centre of Expertise (GCE) with an additional ten years of funding. This means that a cluster can get up to 20 years funding, although the more common funding periods is 10 years (as there are only three GCEs). The progression from one level to another depends on an evaluation of the new application and on the performance of the cluster as assessed by external evaluations. Evaluations are focused on whether the clusters are fulfilling the goals that were presented in the original funded application. In Sweden, the clusters are also rewarded through a competitive process and the normal period of funding is ten years. One half of the funding comes from Vinnova, and the other from regional triple-helix stakeholders. This funding period can be extended, as was the case with Robotdalen, which received funding for 16 years. Sweden's cluster programme is also subject to regular external evaluations, which examine whether the clusters are fulfilling the goals of their original funded applications. If not, the funding of the clusters from Vinnova will be terminated.

The aim of such long-term public funding of clusters is that a relatively small contribution (EUR 1 million per annum in Sweden) can enable the cluster member firms and the cluster management organisation to focus on strategic goals going beyond regular research and collaboration projects among cluster firms and between cluster firms and external organisations (e.g. universities). Cluster policy builds on the view of innovation as interactive learning, which implies that better and more collaboration between different actors in an innovation or entrepreneurial ecosystem promotes innovation and competitiveness. Evaluations show that the building of such collaboration takes time and also improves over time. This is a main reason for having long-term funding.

In Norway, the cluster organisations are tasked with identifying strong synergy effects within the cluster or with external organisations, within and/or across value chains and technologies, which will impact the cluster firms' innovative capacity, value added potential and international competitiveness. The cluster organisations are also tasked with contributing to industrial restructuring and new industry path

development. These goals cannot be fully achieved within a three-year funding period. A concrete example of what can be achieved with longer-term, more flexible, results-driven funding, is the success of two of the GCEs, Blue Maritime and Node (both within the maritime industry), in establishing a Centre for Research Driven Innovation in close co-operation with the universities in their regions. This is a ten-year funded project from Research Council Norway. The same rationales are behind the Swedish initiatives to establish regional clusters. The two cluster cases presented in this report, Robotdalen and Automation Region, provide abundant examples of a wide range of cluster support for internal and external co-operations and how they promote increased innovation and competitiveness among the cluster member firms as well as for the respective regions.

Annex A provides further discussion of strengths and weaknesses and potential development areas for the Danish national cluster organisations in the three case study sector stronghold areas.

6) Build linkages between national cluster organisations and regional entrepreneurial ecosystem actors

National cluster organisations have been established to centralise public support to clusters. However, much cluster activity in the sectors is undertaken at regional level, in local concentrations of cluster activity. A key challenge is therefore to organise systemic relations between the national cluster organisations and regional ecosystem actors such as science parks, regional networks and incubators.

7) Promote diversity in the populations of start-up and scale-up entrepreneurs

It is important to increase the diversity of firm founders in the strongholds in order to tap into wider talent, alleviate skill shortages and secure equal opportunities in entrepreneurship. Universities and university colleges can play a key role in promoting diversity in entrepreneurship by building up the entrepreneurial competencies of graduates and supporting them in start-up and scale-up activities, focusing on all groups of the student population. There is also a need for a broader diversity push to encourage social groups including women and immigrants to start and grow companies.

Timescales

Timescales for the recommended activities vary considerably. Instilling changes in the educational system is typically a long-term undertaking, whether it be to persuade more women to enter relevant disciplines, or changing the perceived role of universities or changing what is taught. However, there are quicker policy wins, even within the creation and retention of talent category. These include creating more powerful incentives for start-ups and scale-ups to work with universities and vice versa, finding ways of retaining talent within Denmark and interworking between clusters. Initiatives that “merely require money” can usually be done faster than those involving mindset changes.

In line with this, institutional changes relating to procurement rules and procedures and help with regulatory compliance can be achieved within a couple of years. Increasing the provision of incubators and accelerators and testing and prototyping facilities may take a little longer but can be started fairly quickly. Changes to IPR systems usually have significant lead times because of the plethora of interested parties and the politics of the area.

Policies for the development of patient capital need to be determined, but once, for instance, patient finance is in place, much can be achieved fairly quickly.

Finally, some actions need to be aimed at changing cultures, for example on the priorities, structures, and attitudes of the cluster organisations as well as those of prominent larger firms within the clusters. Attitudes can take longer to turn around.



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