

Industrial clusters and establishment of MIT FabLab at Furufalten, Norway

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Abstract - This paper is based on results from the project “Study of successful innovation and establishment of high-tech industry in Tromsø region”, which identified several innovation clusters. Furufalten in Lyngen is a small community about 100 km from Tromsø where several factories produce a wide range of products. At Solvik Farm near by Furufalten Massachusetts Institute of Technology (MIT) has established MIT-FabLab Norway. The paper gives a short history of the industry and presents the largest factories, their products and markets. Then a description of the collaboration between the businesses, Tromsø University College and other research organizations and innovation infrastructure in Tromsø will be presented. The models used to explain the growth of the industry are clusters, networks and triple helix model. The influence of the national and regional innovation and industrial policy are analyzed (regional funding and tax conditions etc.) The research project “Electronic Shepard” (started 1995) was presented for MIT and resulted in the establishment of MIT-FabLab. The project used telecom equipment to track sheep in the mountains. The rough nature at ca. 70 degree latitude with long winters, high mountains and difficult conditions for communication is excellent for testing new technological equipments. The paper gives a short description of the establishment process. The University College is involved in FabLab in several ways. The Dean is member of the board; the staff is involved in establishing the infrastructure (computer networks etc), research, student projects and arranging courses (in for instance personal fabrication). The paper gives examples of projects (development of new antennas, Internet Zero etc.). MIT-FabLab provides Tromsø University Collage with excellent opportunities for collaboration with MIT and other FabLabs around the world, as well as possible access to international connections.

Index Terms – Furufalten Norway, industrial clusters, MIT FabLab Norway.

INTRODUCTION

This paper is based on results from the project “Study of successful innovation and establishment of high-tech industry in Tromsø region”. The first part of the project identified several innovation clusters in Tromsø [1]. This part is a study of Furufalten in Lyngen, a small community about 100 km

from Tromsø where Furufalten has several factories producing a wide range of products. Massachusetts Institute of Technology (MIT) recently established MIT-FabLab Norway at Solvik Farm close by.

During the last years the industry in Furufalten, Solvik farm and MIT Fablab have been exposed in the media, both local and national papers, technical press, local and national radio and TV. Other research projects are using Furufalten as example in several studies. Politicians from the Norwegian Parliament and members of the Norwegian government have visited Furufalten, Solvik farm and MIT FabLab several times. They use Furufalten as an example of a successful industrial community with high productivity (and result of a successful industrial policy?). Other smaller industrial communities have one or a few industrial companies, often based on the local natural resources (for instances fisheries at the coast).

The questions the paper focuses on are:

- Why are so many industrial companies established at Furufalten?
- What are the strengths and benefits of the companies at Furufalten?
- How do the companies collaborate with each other, with external institutions, in particular with Tromsø University College?
- What is the influence of MIT FabLab on the industry and the collaboration with Tromsø University College?

The models used to explain the strong industrial community is Porters cluster model, networks and triple helix. A short description of the theory is given in [1], referring to [2]. Those models are used to explained successful innovation in the industry in several studies in Norway.

A cluster is defined by Porter ([2], p. 25) as “a geographical concentration of inter-connected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (e.g. universities, standard agencies, trade associations) in a particular field that compete but also cooperate”.

Every company needs relations to customers, suppliers and governmental authorities, they get their competency and competitive ability from the industrial community they belong to. Establishing companies is attracted to areas where the infrastructure and conditions are best, and this is a self-strengthening effect which in turn will attract even more establishments, and new businesses are established as spin-offs from others. Inside the cluster there is both cooperation and competition, strengthened by the exchange of knowledge

and competence driven by for example project cooperation, employees changing jobs, and the selling and buying of products and services.

In the triple helix model there is cooperation between three groups of actors who stimulate each other to extended innovation. The groups are:

- Universities, university colleges and research institutions
- Business organizations and industry
- Governmental and local authorities in innovation and industrial policy

The model emphasizes the importance of knowledge and knowledge production (research) in innovation and the establishment of new industry and that there is close cooperation between the actors in the three groups. Studies have proved that a university is important for innovation and development of new business. An outstanding example is MIT, but the model has both national and regional validity.

The triple helix model is a refinement of the cluster by sorting actors in three groups. We can observe transactions between the groups, and internally in the groups. There are several indicators of collaboration:

- Project collaboration
- Board membership in other businesses in the cluster
- Buying or selling services or products to other businesses
- Ownership (The same shareholders in several businesses)
- Membership in business associations

In a small community like Furuflaten most of the people know each other. There are also social related connections in the network, like family relationship, friends, members of associations (football club etc) and kids in the same class/school.

Methods used are collection of information about the companies, visiting some of the companies, participation in seminars where the companies and projects are presented, and talks (informal interviews) with colleagues at the University College involved in projects in collaboration with companies and MIT FabLab.

FURUFLATEN INDUSTRY

This part shortly describes the central industries (the largest), and some of the smaller to show the diversity and complementary service businesses.

The County of Lyngen has about 3200 inhabitants [3, 4], in an area of 810 km², and the distance from Tromsø is about 100 km. (or 70 km with an additional ferry boat crossing Ulsfjord). Furuflaten is a village of 250 inhabitants where more than 100 are employed in the industrial sector [5]. There are 39 registered companies. The total annual turnover is 130 million NOK.

Traditionally farming and fisheries have been the source of income for the inhabitants in the region. Tourism is also a growing business in Lyngen, because of the high mountains with good conditions for tours both in summer and in winter. Both downhill and cross-country skiing is very popular. There are arrangements for fishing at sea and in fresh water.

The infrastructure is developed to a good standard, with 20-30 km to national (E6) and international (E8 to Finland)

San Juan, PR

high-ways, even though the standard of the transit road is too low. There are also harbors close to the industries and telecommunication services with broadband internet. The nearest airport is in Tromsø.

The history of the industry at Furuflaten started in 1953 when Furstaal was established, and in the 1960ties several new industries was established. In the following sections the largest industries and businesses and their products are presented.

Furstaal as

Furstaal [6] was the first industrial business established (1953). The factory produces a wide range of steel products, and is today a supplier of area security and admittances system. This includes fences, road barriers, stadium gates, and security and surveillance systems.

Haplast TechnologyAS

Haplast was established in 1962 [5] and from 1984 to 2004 it was part of the Finnish business Uponor [7]. In 2004 it was bought back by local owners. The manager Geir Hamnvik has 25 years of experience from the industry. The company still collaborates with Uponor and sells products through their marketing network. The factory is producing a large diversity of plastic products: Pipes and tanks for several purposes, for instance water supply, drain pipes, cleaning of waste water and other environmental installations. The company has 19 employees.

Product development is done within the company and in collaboration with environmental engineering partners.

Ecotech AS

Ecotec AS [8] was founded in 1999 and has local owners (shareholders). The factory produces Cinderella electric burning toilet. The only waste is clean ash, and there is no odor from it. The toilet is used in cottages and other places where water supply and drains are missing. Cinderella has electronic control, platinum catalyses and an electric heating element. Product development focuses on improving existing products and developing new within their competence area. One of the projects is to develop a new model with gas instead of electric heating for use where electricity is not available. Cinderella is marketed and distributed nationally by a wide range of builder's merchants and cottage equipment suppliers. They are also working on international marketing to Sweden and Russia [9].

AluPlast AS

AluPlast AS [10] was founded in 1988 based on the restructuring of a company established in 1974. The company is owned by local shareholders, among them several of the 10 employees. The company produces and assembles doors, windows, roofs of glass and facades of aluminum. They also distribute products from other companies. The market is mainly the northern part of Norway.

July 23 – 28, 2006

Akva Ren AS

Akva-Ren AS [11] was founded in 1992, and has 7 employees. The main office is at Furufalten, but the production and store are in Tromsø. The company collects and store marine byproducts from the fishery industry (gubbins), and install and maintain equipment for storing byproducts in the fishery industry. They also sell and distribute fish meal and oil and other ingredients for fish feeding. They also collaborate with research institutions in Tromsø to better utilization and extraction of new biochemical products.

FabDesign AS

FabDesign AS [12] is a new industrial design business established in close cooperation with MIT FabLab. It consists of a couple (she is Norwegian, he is English-Italian), both newly qualified industrial designers from Ravensbourne College of Design and Communication in London. Their business idea is to design for a national and an international market, from idée to prototype, and to manufacture in local factories. Their first task was to design an antenna for FabLab.

The establishment of FabDesign was funded by Innovation Norway [13] with an establishment scholarship, and a grant from Lyngen municipal. Thereby they have reduced rental of office, workshop and tools. They also have access to the competence and network at MIT FabLab and the industrial cluster at Furufalten. This is an example that confirms the cluster theory: A cluster attracts new business.

Other companies

This includes service providers in ICT, cleaning service, office equipment and requisite, rental of offices and commercial property, consulting in area planning and tourism industry.

Collaboration and relations in the industry cluster

Lyngen municipal has an active policy to stimulate business and industry and to attract new business [3]. As in several municipal in northern Norway there is no payroll tax, reduced income tax, extended family allowance and student loan write off [14]. Lyngen has funds to support innovation and collaboration projects, the establishment of new businesses supplying new competence, collaborations between schools and businesses etc.

In addition Lyngen has access to other governmental authorities in the innovation system in Tromsø (described in [1]). Innovation Norway offer better conditions for establishments in northern Norway, both more in subsidy and investment loans.

Lyngseidet, the municipal centre has several local and governmental services and infrastructure. It is also a center for business, and has factories producing among other things plastic products and aluminum boats.

An important collaboration forum for the industry is Furufalten Industry Association (Furufalten Næringsforum). In April 2006 this association collectively became members of Tromsø Industry Association. They arrange meetings on relevant subjects, and stimulate collaboration and exchange of knowledge.

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Collaboration with Tromsø University College

Tromsø University College has a collaboration agreement with Furufalten Industry Association. The agreement includes collaboration in research and development projects and student projects. Several student projects have been done in various businesses (for instance in Haplast AS, Furstaal AS, Ecotech AS). Students and staff from the university college have visited several companies. Members of the association have participated at seminars at the university college, and the university college has presented the education and other activities at a meeting in the association.

This year two student projects are done by automation engineering students. The first is in collaboration with Haplast AS where a group is developing a monitoring system for the production of plastic pipes, the second is in collaboration with Furstaal AS where a group is automating the production of fence pales.

ESTABLISHMENT OF MIT FABLAB

The FabLab program is part of the MIT's Center for Bits and Atoms (CBA) [15]. There are FabLabs in India, Ghana, South Africa (two), Costa Rica, Boston, and now in Norway. Fab Lab is an abbreviation for Fabrication Laboratory.

The background for the establishment of MIT-FabLab at Solvik farm [16] was the research project "Electronic Shepard". The project started in 1995, and Telenor Research and Development joined the project in 2001, and later this year the project was presented for MIT and accepted as their first Norwegian project. During 2002 there were several meetings, the project was presented at MIT and Professor Neil Gershenfeld visited Solvik farm. In October 2002 the establishment of MIT-FabLab Norway was confirmed [17]. MIT FabLab Norway was officially opened August 13th 2005.

The "Electronic Shepard" project [18] used telecom equipment to track sheep in the mountains. The tough nature at about 70 degree latitude with long winters, high mountains and difficult conditions for communication is excellent for testing new technological equipments. In addition to Solvik Farm and Telenor R&D, the University of Tromsø, MIT Media Lab, Rafsec O.Y, and Ideos Finland O.Y have been partners in the project.

Solvik farm and Haakon Karlsen jr. are well known. The farm offers rich variety of businesses in addition to farming: Accommodation, farm holiday, horse riding, bike hire, restaurant etc. Karlsen is known as an entrepreneur with several good ideas.

Organization and infrastructure

MIT FabLab Norway is organized as a foundation. The founders are MIT, Solvik Farm, several Norwegian industry companies, research institutions (Telenor AS, Norut Group), the University College of Tromsø, the University College of Narvik, Lyngen Municipality, NT Program of Northern Norway etc [20]. Members of the foundation board are Haakon Karlsen, Solvik Farm, Neil Gershenfeld, MIT, Hans

July 23 – 28, 2006

CONCLUSION

Petter Kvaal, Tromsø University College, Wiktor Sørensen, Norut Group, Werner Kiil, Lyngen Municipality and Robert Hermansen, Store Norske Spitsbergen Coal Company. They have also received grants from other sources like the Norwegian Government, Innovation Norway etc.

The buildings are raised and laboratory equipment are installed and in use. This includes equipment for design, fabrication, monitoring, and instrumentation testing and sensory equipment. ICT services and network are also installed, and members of the staff at Tromsø University College have participated in the work.

Activities

Even though it has just been months since the opening there have been several activities at FabLab and visitors from Norway and abroad: Politicians, scientist, students and other. There have been several international meetings and seminars, for instance (calendar at [17]):

- “First International FabLab Development Workshop”
- Innovation Norway arrange one day information office
- Course on establishment of new business with participants from Lyngen
- Visitor from several schools in the area
- Several organizations and businesses have seminars and meetings.

Projects

Researchers and student have a standing invitation to propose projects at FabLab. Now (in April 2006) there are five projects [17]:

- Helmet wiper: “The aim of the project is to develop a wiper for cleaning the face shield. During rain the shield is a potential danger to security for drivers. The project is using 3D - technology for design and basic constructional principles.”
- Wideband antenna: “The projects aim is to develop a wideband printed dipole antenna with optimized tapered feeding balun for ISM and FWA. Developed by George Sergiadis (sergiadi@auth.gr) in cooperation with MIT and the FabLab - system.”
- Internet 0: Interdevice Internetworking [21]. Internet zero is a low bandwidth protocol for ip to the leaf node developed at Center for bits and atoms, MIT. It is an open source project where anyone can participate.
- Perfect antenna [22]
- Local position system. The system is based on ultrasonic transmitter/receivers and can be used for positioning of for instance of robots in the lab or boats in the mode tank. [23]

The University College, both members of the staff and students are participants in several of the projects. They are also planning a center for open source software engineering.

MIT FabLab has also extended international collaboration and networks for Tromsø University College. Several members of the staff have visited other MIT FabLabs in USA and other countries.

San Juan, PR

Stimulating conditions for innovation are important for growth in businesses and industries and in establishing new businesses.

The industry cluster at Furuflaten confirms the triple helix conditions. There are strong businesses and industries, there are governmental and local services for the industry, and there are close access to national (in Tromsø) and international educational and research community (MIT FabLab). The rich diversity of businesses, products and fabrication processes demands knowledge from several professions. This can also compensate for variation in market conditions.

The collaboration between the businesses and external partners are strong.

The collaboration with MIT FabLab opens a wide range of opportunities for the companies at Furuflaten and the University Collage (A process for merging the University College with the University of Tromsø is planed). FabLab will be a center for education and development of new ideas and products which hopefully will result in new products and new businesses at Furuflaten. Collaboration with MIT and other FabLabs opens up a rich opportunity for international collaboration.

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July 23 – 28, 2006

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