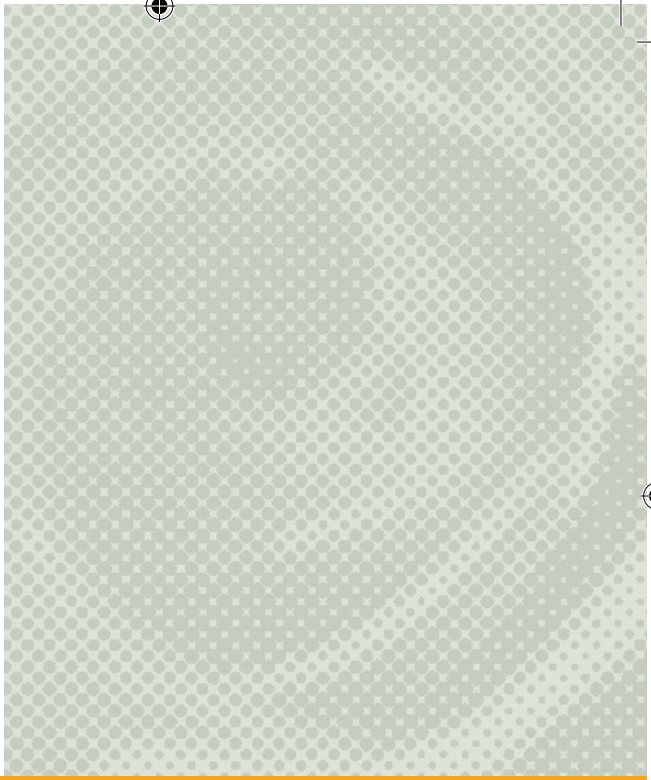

Norwegian University of Life Sciences

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Oslo 15.june 2011

Anastasia Kudryavtseva

Abstract

"Coming together is a beginning. Keeping together is progress. Working together is success."

Henry Ford

Background

The topic of university industry- relationships has been an issue for the studying for the last two decades. It has been conducted practical studies and written a great number of scientific papers which are aimed at analyzing different aspects of U-I relationships. The topic of University-Industry Cooperation (UIC) is an interesting topic for the research for a number of reasons. The two actors have basically significantly different "purposes of existence". While the industry is more aiming at obtaining the commercial results, the universities are more interested in basic research, production and dissemination of knowledge. Industry is being forced to work under strict time limits and is often not interested to announce research results to the public. University researchers are driven by the individual interest in producing new knowledge. The challenge for both actors is to find a junction point where both actors could collaborate with positive outcomes for both parts. General difference in perceptions and incentives for the cooperation often arise problems in gaing a positive outcome from the collaboration. The point of this case study would be obtaining a deeper understanding on how both actors manage to communicate with one another without interest conflicts and what are the reasons of the success of the research collaboration.

The purpose of the study

In this paper it will be taken a closer look at the special case of research cooperation between University of Life Sciences in Ås (Department for chemistry, biotechnology and food science) and the Norwegian dairy company Tine SA, which remains one of the biggest actors on the market in Norway. The paper is an explanative study which will describe the cooperation between academia and industry and find out the reasons for the success of this cooperation. The reason for why especially these two actors were chosen for the study is bacause the cooperation between these two actors has a long and successful history which is quite a unique case. The process of research collaboration between the Department of chemistry, biotechnology and food science (in the following called IKBM) and TINE SA is a successful

case of "win-win" cooperation where both partners gain significant advantages from working together. First of all, I would like to describe the structure of the cooperation: practical organization, main knowledge transfer channels and psychological factors. Secondly, I would like to look closer at the exact courses of the success. I have therefore chosen to work on the following problem:

Qualitative analysis of the successful research cooperation between IKBM at UMB and TINE SA: general description and reasons for success.

Materials and method

In this paper I have used both primary and secondary data materials. Data collections were primarily conducted thorough personal meetings and interviews with both representatives from IKBM and TINE SA. It has been taken 4 semi-structured interviews with one representative form IKBM and the three representatives from TINE SA. The interviews were conducted in norwegian as it was easier for the respondents. The interviews were afterwards translated by me into English. Additionally, I have used scientific papers as secondary information.

Results and conclusion

The paper gives the description of TINE SA –IKBM relationships and the reasons for the success of this cooperation. The explanative study of research cooperation between IKBM and TINE SA has shown interesting results. The study revealed the main reasons for success and these turned out to be the following: historical reasons, good project management, strong personal relationships, strong research base at both actors, clear understating of each others' environment and needs, trust and no hidden agendas, flow of graduates and clear policy on publication and IPRs.

Key words

Knowledge-based economy, research cooperation, industry –university relationship, dairy industry, innovation.

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1.0 Introduction

The purpose if this case study is to get a deeper understanding on how the research cooperation between the Norwegian University of Life Sciences in Ås (Department for chemistry, biotechnology and food science) and the Norwegian dairy company Tine SA is functioning in practice. The main intention is to analyze why the cooperation is as successful as it is and describe how both parts are cooperating on the issues of scientific research: what channels they choose to communicate with each other, how the transfer of knowledge happen between the parts, expectations they have from each other's work, requirements they impose on each other and what are the general experiences form previous research cooperation. Motivation for the election of the research topic came from the informal conversation with UMB senior advisor Colin Murphy. He expressed the idea that UMB "wishes to know" more about its industry partners and that there is a desire to find out best practices on how to collaborate with industry partners in the most effective way. The case of research collaboration with TINE SA came up almost immediately as both actors have been in the research collaboration for a very long time and it is perceived to be rather successful. The primary idea was to look at some specific project. This could potentially bring the following difficulties; firstly, many projects are carried out under confidentiality clauses and this could make it difficult to get access to the necessary information; secondly- this could give information bias in the study. The choice of the topic fell therefore on the analysis of the more general and overall study of the research collaboration between IKMB at UMB and TINE SA.

The case of multi-institutional networks between industry and academia is a set of relationships which often have complications in them. These complications might include differing priorities and perspectives, mistrust, bad project management and so forth. Very few, especially new started relationships work unproblematic and "smoothly".

This case study shows a successful case of cooperation which can serve as a "learning" base for other University-Industry relationships. Though the case can be described as a quite specific one, because of the special environment in which the alliance was formulated. TINE SA is the leading dairy industry in Norway and IKBM has the biggest dairy research base in Norway. It would be rather strange if the only two actors which work in the same field, would not cooperate on the common research issues. It was natural for both of them to search contact

with one another. But there are definitely some reasons which make the successful research cooperation between IKBM and TINE worth studying and we can therefore draw important conclusions for what other actors can learn from this cooperation. These reasons will be closer discussed in chapter 4.

I would like first to give an overview over the general trends on the topic of research collaboration and also particular trends in Norway. Afterwards that there will be given a general overview over UMB and TINE "relationship" today.

1.1 Background

The focus on university –industry cooperation activities has been raised dramatically for the last two decades. The markets are becoming more competitive and the consumers are becoming more demanding. These tendencies foster industry to innovate even faster than before. In order to strengthen its profitability and to protect its competitive advantage, firms often decide to outsource its R&D activities. Industry "understood" that it gains more creativity and innovative products by working together with research institutions. Collaboration gives the companies an opportunity to exploit its capabilities and therefore to be more innovative. Universities today are seen as important actors for the economical development and they got extra pressure as an effect of governmental policies to be more effective, to conduct more market relevant research of high quality and relevance. Universities get the stimuli to conduct applied research, they get governmental economical support and more value on the educational "market".

According to D. Elmuti, M. Abebe and M. Nicolosi (2005) strategic alliances between corporations and academic institutions are worth studying for four key reasons: first, these alliances are growing in significance in terms of producing various patents, prototypes, and licenses through their research projects. They are also important from the standpoint of global competitiveness and increasing demand for innovation in products and processes. The other reason is their increasing vitality in serving as a stepping stone for a more complex collaboration that involves multiple firms, universities and other research centers. These

alliances are also playing an important role in the national R&D policy, and effect the distribution of recourses considerably[1].

My motivation for studying the cooperation between IKBM and TINE SA can be explained by the following factors: the research project is a successful case and it is therefore a good opportunity to analyze the success factors and make it clear what improvements can be made by other U-I relationship. The proximity to the interviewees is profitable and it was easy to get access to the key informants.

In this study I used some theories elaborated by other researchers from their cases, as well as my own –elaborated model and other empirical material. It was interesting to see if their theory was supported by the empirical data found in my research. Each case of UIR is unique and it is important to be critical while analyzing data in relation to theory. This study gave me not only the opportunity to gain new theoretical knowledge through empirical research, but also the opportunity to develop the ability to look at the theory in a critical way.

I really hope that this paper will be of practical use both for IKBM and for TINE SA. This analysis could also be interesting for other actors who wish to explore the case of UIR.

1.2 UMB (IKBM) and TINE- general overview

Today the research cooperation between TINE and IKBM is a solid and complicated system and involves many actors. The cooperation is organized as collaboration between TINE and Food Alliance which includes UMB and research institute –Matforsk (today's name-NOFIMA). A short description of each actor will be given in the following chapter.
TINE BA is a cooperative dairy company with a high profile on research and innovation. The company is highly concentrated on conducting full and advanced research with the intention to obtain innovative, healthy and quality products.

Dairy industry is imposed today under the circumstances when it needs to innovate faster than before. It is in constant search for better, cheaper, more convenient and more natural ingredients with improved functional properties. An optimal use of milk and milk constituents

[1] Elmuti, D., Michael Abebe, M., Marco Nicolosi. 2005. *An overview of strategic alliances between universities and corporations*. Journal of Workplace Learning, Vol. 17 Iss: 1/2, pp.115 - 129

produced in Norway is an ultimate goal for the dairy industry. The company needs to innovate because of following reasons[2];

a) Norway is a high cost country and innovation is a good tool in order to develop attractive products that can command high price;

b) Changing globalization trends impose new challenges on the dairy industry in Norway;

c) Consumers' preferences are changing and their desire for more diversification drives the power of innovation;

d) A stronger focus on health in the modern world creates new challenges for the dairy industry;

These trends may lead to more intensive research and development concerning manipulation of milk fat composition from a nutritional aspect, for instance through more thorough investigation of the influence of pasture of different qualities on the milk fat composition and on the properties of dairy products. The influence of breeding and feeding regimes on the content of various bioactive components in the milk may be studied in more dept, and the development of low fat and low energy products and products categorized as functional foods may gain increased attention. Increased research for optimal use of the various component in milk and by-products from dairy production will take place[3].

TINE itself defines innovation, research and development as main areas in the firm's strategy. TINE focuses sharply on developing and implementing new technologies which increase the utilization of milk. Tine works along with the entire value chain with innovation, value and quality assurance. TINE makes the use of research for further raise the degree of innovation and gives consumers the opportunity to choose a healthy food. The R&D center for TINE is located in two places: TINE dairy Kalbakken in Oslo and Måltidens Hus (MH) in Stavanger.

[2] Abrahamsen R., Johansen A. G., Selmer-Olsen E. 2008. *Cooperation with a university as a component of innovation in a dairy industry. Norwegian experiences.* Warszawa, pp.243-257.
[3] Abrahamsen R., Johansen A. G., Selmer-Olsen E. 2008. *Cooperation with a university as a component of innovation in a dairy industry. Norwegian experiences.* Warszawa, pp.243-257.

Tine's expertise makes the company a key partner for other research companies in Norway. TINE participates in more than 30 research projects with external partners[4].

TINE has collaboration with UMB, NOFIMA, SINTEF (multidisciplinary research group with international expertise in technology, medicine and social sciences), University of Oslo, Akershus University College, University in Stavanger, as well as they do some studies in Tromsø and NTNU and some in Bergen. TINE collaborates with University of Oslo on the area of food science. With Akershus University College TINE works on the area of cost studies. TINE has also done some studies in collaboration with Tromsø, NTNU and Bergen on the area of how the products effect human health. Collaboration with the University of Stavanger has been on the topics related to new processes, especially those not related to the traditional dairy processes, as well as on the consumer area, consumer taste and sensory (data is based on the interview with TINE research chief Johanne Brendehaug).

An important role in TINE's research policy plays the cooperation with Food Alliance. The alliance was established on the 1 of January 2000 and it includes UMB and Matforsk (NOFIMA) which is also partly situated in campus Ås.

NOFIMA is a business –oriented group that conducts research and development activities for aquaculture, fisheries and food industry. NOFIMA includes 4 areas[5]:

1. **Nofima Marin**: Conducts research, development, innovation and knowledge transfer for the national and international fisheries and aquaculture industries. The core areas are breeding and genetics, feed and nutrition, fish health, efficient and sustainable production, process and product of seafood and marine bioprospecting.

2. Nofima Food: Provides research and consulting in food processing. Nofima Food works for better food quality, raw material utilization and nutrition. The core areas are raw material quality and process optimization, safe and sustainable food, consumer research and sensory analysis, food and health, industrial gastronomy and innovation.

3. Nofima Ingredients: Nofima Ingredients is engaged in research and pilot production services of the ingredients, food and pharmaceutical industries. The core areas of knowledge is the raw material, byproduct utilization, diet and nutrition and processing of ingredients and feed.

[4] http://ny.sunniva.no/site/41/om-tine/innovasjon/256383.cms?var-tradisjon-er-a-fornye-oss

[5] http://www.nofima.no/om-nofima

4. Nofima Market: Provides economic analysis, perspective and foresight analysis, consumer research, market analysis and strategic consulting. It also works with information logistics.

The group has its head office in Tromsø, while the research activities are conducted in six different locations: Ås, Stavanger, Bergen, Sunndal, Averøy and Tromsø. NOFIMA in cooperation with industry partners and their trade organizations is delivering internationally recognized research and solutions that provides competitive advantage along the entire value chain[6].

TINE had some projects with NOFIMA in marine as well they had some studies on fruits, berries and antioxidants. TINE had some projects with NOFIMA on the area of process methods, consumer testing methods, statistical treatments of projects which the focus on the management of dairy processes (data based on the interview with TINE research chief Johanne Brendehaug).

The purpose of the strategic alliance (TINE and Food alliance) is to increase the quality and scope of the research, raising the level of education and better education in the food area. In turn this will contribute to a competitive Norwegian food industry. The parties in the alliance shall be responsible for candidate and doctoral education in the food area and to promote and sell commissions and consulting business focused on the food industry[7].

For Food Alliance the cooperation is essential in order to ensure the best possible transfer of expertise from the academic activities and research to TINE. It is essential that the NHL (UMB) and Matforsk (NOFIMA) get a quick and specific feedback from the dairy industry on how they should evolve in order to be useful for TINE. This applies both the development of candidates for higher education. It is about signalizing clearly what areas of expertise are important to them and about that TINE helps to develop them[8].

UMB claims that through Food alliance UMB gets for their clients technical resources and infrastructure institutional boundaries. Alliance means that the food environment at UMB will be a major player in the international context of research and UMB hope therefore that they can become an even more attractive project partner. The collaboration is helping to coordinate

[6] http://www.nofima.no/om-nofima
[7] http://www.umb.no/matalliansen/artikkel/strategisk-allianse

[8] http://www.umb.no/forsiden/artikkel/utvikler-forskningssamarbeidet-med-tine

and strengthen efforts in both research and education in the food area. Now the alliance includes 350 specific scientists and technical personnel. Food alliance is one of the largest research institutions in Europe within foodstuffs[9].

1.3 The structure of the paper

In the first part of the paper the research topic was presented. The main purpose of the study is to describe the scientific research cooperation between IKBM (Dairy Department) and TINE SA and answer on the following questions: how the cooperation is organized and what are the reasons for the success of this research cooperation. The first part of the paper gave also a description of the background for the choice of the topic and the general description of TINE's research strategy and Food Alliance.

In the second part of the paper the description of the theoretical framework will be given. A theory on the topic of knowledge-based economy, innovation policy in Norway, as well as an own-created model called University-Industry Relationship Schema will be described. The model University-Industry Relationship Schema will be used in order to describe the relationship between IKBM and TINE SA.

In the third part the description of the method used for the data collection will be presented. This paper presents an explanative case study. The data were collected by the use of qualitative method. The data was gathered through 4 semi-structured interviews. Challenges and lessons learned from the interviews will also be discussed in this part.

The forth part will present the results of the explanative case study, as well as analysis of the presented results. The analysis of the results will be related to the University-Industry Relationship Schema which will be presented in the second part.

In the fifth part the conclusion of the material discussed in part four will be presented.

[9] http://www.umb.no/matalliansen/artikkel/strategisk-alliansen

2.0 Theoretical framework

2.1 Introduction of the theoretical framework

This part of the paper will give the description of the theoretical framework which will be used in order to get an overview over both how the research cooperation between TINE SA and IKBM functions and what are the success factors of this cooperation. First, the description of the term"Knowledge-based economy" will be given, as well as the role of knowledge based economy in OECD countries will be discussed. Norwegian innovation policy will be also shortly described. Afterwards, the following model will be used for the explanation of the problem: own –created model "University-Industry Relationship Schema" which is based on the University –Industry Evolutionary Schema elaborated by M. Feldman and A. Link in their article "Innovation policy in the knowledge-based economy."

2.2. The subject of knowledge-based economy and its characteristics

Capitalism is undergoing an epochal transformation from a mass production system where the principal source of value was human labor to a new era of 'innovation-mediated production' where the principal component of value creation, productivity and economic growth is knowledge [10].

The knowledge economy emerges from two different forces: the rise of knowledge intensity of economic activities, and the increasing globalization of economic affairs. The rise in knowledge intensity is being driven by the combined forces of the information technology revolution and the increasing pace of technological change. Globalization is being driven by national and international deregulation and by the IT related communications revolution[11].

[10]Muntean M., Manea L. 2009. *The knowledge economy*. Munich Personal RePec Archieve
[11] Muntean M., Manea L. 2009. *The knowledge economy*. Munich Personal RePec Archieve

Knowledge –based economy can be characterized by the following tendencies[12]:

IT revolution. Digitalization, open system standards, and the development software and supporting technologies for the application of new computing and new communications systems, memory and storage technologies, display systems and copying technologies-are now helping users to realize the potential of the IT revolution. In economic terms, the central feature of the IT revolution, is the ability to manipulate, store and transmit large quantities of information at very low cost. Because of the marginal cost of manipulating, storing and transmitting information is virtually zero, the application of knowledge to all aspects of economy is being greatly facilitated, and the knowledge intensity of economic activities greatly increased. The diffusion of knowledge is accelerated at a lower cost.

Flexible organization. Flexible organizations increase the productivity of both labor and capital by integrating "thinking" and "doing" at all levels of their operation. In doing so, they eliminate many layers of middle management, which are dysfunctional in terms of information flow. Flexible organizations also avoid excessive specialization by defining multi tasks responsibilities and by using team work and job rotation.

Knowledge, skills and learning. Information and communication have reduced the cost and increased the capacity of organizations to codify knowledge. As access to information becomes easier and less expensive, the skills and competencies relating to the selection and use of information becomes more crucial, and tacit knowledge in the form of skills needed to handle codified knowledge becomes more important than before.

Innovation and knowledge network. The knowledge economy relies on the diffusion and use of knowledge, as well as its creation. Hence the success of enterprises, and of national economies as a whole, will become more reliant upon their effectiveness in gathering, absorbing and utilizing knowledge, as well as its creation. Firms must become learning organizations, continuously adapting management, and skills to accommodate new technologies and grasp new opportunities. They will be increasingly jointed in networks, where interactive learning involving creators, producers and users in experimentation and exchange of information drives innovation.

[12]Muntean M., Manea L. 2009. *The knowledge economy.* Munich Personal RePec Archieve

Learning organizations and innovation systems. In the knowledge –based economy, the firms seek linkages to promote inter-firm interactive learning, and for outside partners and networks to provide complementary assets. As the firms develop new products and processes, firm determine which activities they will undertake individually, which in collaboration with other firms, which in collaboration with universities and research institutions, and which in the support with government. Innovation is thus the result of numerous interactions between actors and institutions, which together form innovation system.

Clustering in the knowledge-based economy. Networks and geographical clusters of firms are a particularly important feature of the knowledge economy. Firms find it increasingly necessary to work with other and institutions in technology-based alliances, because of the rising cost, increasing complexity and widening scope of technology.

2.2.1 Knowledge economy and OECD countries

The term "*knowledge-based economy*" results from a fuller recognition of the role of knowledge and technology in economic growth. Knowledge, as embodied in human beings (as *"human capital"*) and in technology, has always been central to economic development. But only over the last few years has its relative importance been recognized, just as that importance is growing. The OECD economies are more strongly dependent on the production, distribution and use of knowledge than ever before[13].

Countries, which are members of OECD (Organization for the economic cooperation and development) have acknowledged the importance of the "production" of new knowledge for the future economic growth. In their innovation policies a great role is devoted to the maintenance and development of the national innovation systems. OECD economies are increasingly based on knowledge and information. Knowledge is now recognised as the driver of productivity and economic growth. As a result, there is a new focus on the role of information, technology and learning in economic performance[14].

In the knowledge-based economy, firms search for linkages to promote inter-firm interactive learning and for outside partners and networks to provide complementary assets. These relationships help firms to spread the costs and risk associated with innovation among a

[13]*The knowledge-based economy*. Organization for economic co-operation and development, Paris 1996.

[14]*The knowledge-based economy*. Organization for economic co-operation and development, Paris 1996.

greater number of organizations, to gain access to new research results, to acquire key technological components of a new product or process, and to share assets in manufacturing, marketing and distribution. As they develop new products and processes, firms determine which activities they will undertake individually, in collaboration with other firms, in collaboration with universities or research institutions, and with the support of government[15].

In the knowledge-based economy, the science system must balance not only its roles of knowledge production (research) and knowledge transmission (education and training) but also the third function of transferring knowledge to economic and social actors, especially enterprises, whose role is to exploit such knowledge. All OECD countries are placing emphasis on developing linkages between the science system and the private sector in order to speed knowledge diffusion. As a result, incentives are being given by governments for universities and laboratories to involve industrial partners in the selection and conduct of their research activities[16].

In the case of higher education, university-industry collaborations bring with them opportunities to increase the relevance of the university's educational mission and to stimulate new research directions. They provide a means both for the efficient transfer of economically useful knowledge and for advanced training in skills required by industry. Traditionally, much of the knowledge produced in public facilities and universities has been prohibited from being patented by the private individuals involved in creating it, and salaries and equipment have been paid out of public funds. Now, joint research projects and other linkages are calling heightened attention to economic issues such as exclusive licensing, intellectual property rights, equity ownership, conflict of interest, length of publication delays and commingling of funds[17].

[15] *The knowledge-based economy*, Organization for economic co-operation and development, Paris 1996.

[15] http://www.oecd.org/dataoecd/51/8/1913021.pdf

2.2.2 Short overview over the innovation policy in Norway

When it comes to university-industry issues in Norway, the Norwegian Parliament statement number 7 (2008-2009) called "An innovative and sustainable Norway" gives the description of the main guidelines for innovative policy in Norway. The statement includes the desirable description on how the interaction between the academy and industry actors should be realized in a best effective way.

It is only when businesses or government agencies are using research results that it becomes important for the process of value creation. Business collaboration with universities, colleges, research institutes and health authorities is important in order to promote innovation in business. Business sector can be a demanding customer while facing the research environments. The quality and extent of the interaction is of great significance for the innovation in Norway[18].

Universities and colleges play an important role in the innovation system in Norway. The institutes contribute to a link between academic knowledge and business communities and to the development, transfer and dissemination of new knowledge. Basic research is one of the universities' primary tasks. Another primary role for the Norwegian universities and colleges is to educate candidates for the relevant businesses and management. Universities and some colleges conduct research on the international level and contributing to innovation and value creation in a number of ways, for example through contract research. In addition, the dissemination of research findings is their primary task. The social mission of institutions of higher education and their primary tasks have received increasing attention in the recent years. The restricting of the funding in 2002, where the performance –based component has been introduced, premieres the effective education of graduates and the research on high level. Indirectly, this has significance for the institutions' interaction with private sector and their contribution to innovation and value creation. Institutions are those who do the most of publishing and who have most connections with business. In the recent years there also has been placed an importance on encouraging state colleges to increase their research activities and role as a regional innovation actors. Then management of institutions and goal structure

[18] St.meld. nr.7 (2008-2009).*Et nyskapende og bærekraftig Norge*.

changed to emphasize knowledge institutions' social mission and encourage more efficient commercialization of research. Knowledge environment in and around universities and colleges are central for the development of joint projects[19].

There are several political mechanisms which support university –industry relationships in Norway. Those are the following[20]:

1. Programs in the Research Council of Norway (Forskningsrådet). Its main task is to serve as an advisory body on the research issues, give recommendations on national priorities, funding of the projects in relation to the needs for innovative policy.
2. The organization Innovation Norway includes expertise and other "cluster" support mechanisms, innovation projects and various initiatives oriented towards SMEs.
3. Infrastructure support in the industrial development agency SIVA, which supports 18 incubators, 18 regional "knowledge parks", 9 investment companies, 8 research parks and more.
4. Industrial and public development contracts, which is support for R&D in SMS's related to the procurement by public agencies or large companies.
5. Tax deduction for private actors who work with R&D. The deduction is doubled if the enterprise works with an "approved research institution" – including all Norwegian, some foreign universities, colleges and research institutes.
6. Other support mechanisms include EU support of the research programs in Norway.

It is known that the two sectors experience from time to time difficulties on collaborating with each other. It is difficult to get an official statistics over what exactly doesn't not function well in the specific collaboration projects between universities/colleges in Norway and their industry partners, because each case needs to be scrutinized in order to find out positive and negative sides of the relationship between academia and industry.

Based on the Report from the seminar about research-driven innovation in Bergen (desember 2009) –called "Bridge over troubled water" we can get an overview over what challenges both sectors have in the research-driven innovation seen from both sides, also in the international perspective. There were in all 90 participants: 20% were from industry, 15%

[19] St.meld. nr.7 (2008-2009).*Et nyskapende og bærekraftig Norge.*

[20] Gulbrandsen, M. and Nerdrum, L. *University-Industry Relation in Norway.* NIFU STEP, Oslo. Version of 23.07.2007

were from research institutes, 30 % were from college institutions and the rest of participants were from public sector and other agencies. There were representatives both from Norway, USA and England. On the seminar the differences of "interests" in the collaboration were discussed. It is a known fact that the industry has focus on earning profits, while universities are having more long term perspective especially when it comes to basic research and which is a driver in the research –based innovation. The point of the discussion was to bring to the audience the problematic aspects of the relationship between academia and industry.

The seminar has summed up that the barriers for the industry on the communication with academia are the following[21]:

Time aspect in the industry: short time horizons, the ability for quicker changes is getting more important, the projects are terminated as they begin to give positive results

Financing: The industry doesn't longer have "deep" pockets

Resources: There are few researchers and engineers for the cooperation with partners and few personnel for implementing new results.

IPR: immaterial property rights

Conflicting aims: the industry focuses on fixing the specific problems and is satisfied with "just fix it". Academia is getting easily captivated into the "curiosity-driven" research.

Academia should take into consideration the following points while interacting with industry:

- They should be understood by another part that "it is a long canvas to bleach"
- They should deliver the results according to schedule, and review and revise the plan and report in case of deviations from the milestones
- They should recognize that is it problematic to implement tasks on short notice
- They should know that is a great advantage to know technical terms and terminology of the industrial partner the academia work with
- They should be able to say no
- They should understand that if you want to be rich, than you have probably chosen a wrong carrier.

[21] *http://www.michelsencentre.com/doc//PDF%20dokumenter/CMR-10-A11011-RA-01-MIMT_Seminar_Industry_Science_2009-12-08.pdf* downloaded 06.04.11

Report from the seminar "Bridge over the troubled water" about the research- driven innovation in Bergen, 2009.

These conclusions help us to get a good overview over academia-industry relationship. Both parts need to find a common language and should adjust to each other's cultures in order to obtain positive results.

2.3 Strategic alliance between industry and academy and its characteristics (University-Industry Relationship Schema)

The concept of the strategic alliance is a relatively new concept in Europe in terms of the relationship between universities and industrial partners. The characteristics of such an alliance are that it will be a long-term relationship across a number of the university departments or disciplines, usually beyond the life of single research project. The alliances are open ended with no limitations on what sort of interaction might be involved so that it can include staff exchange, undergraduate recruitment, and student prices or endowments. An open negotiation is fundamental in getting an alliance to work and must proceed from a position of mutual trust toward an agreement for mutual benefit. Such mutually beneficial agreements do not follow automatically from the signature on an agreement. Rather, they take a considerable amount of work on both sides to stimulate and refresh the interaction. When they work, the benefits are substantial to both sides because the process builds a relationship that has a broad base within both the industrial organization and the higher education institution and a degree of interdependence founded on respect for what each party brings to the relationship, which makes it more than the relationship of a provider and a customer[22].

In order to describe the strategic alliance between IKBM and TINE SA I have chosen to elaborate my own model based on the model University –Industry Relationship Evolutionary Schema elaborated by M. Feldman and A. Link in their article "Innovation policy in the knowledge-based economy." Each case of the cooperation is unique and it was therefore difficult to find a universal model which could suit to my specific case of study. I had to elaborate my own model which could show how the cooperation between IKBM and TINE SA is organized and what are consequently the success factors of this research alliance. The model will be presented below as Figure 1: University-Industry Relationship Schema. The original model created by M. Feldman and A. Link describes shortly University environment and Industry environment and the "transactions" between them. The transactions named in

[22] http://www.ncbi.nlm.nih.gov/books/NBK45046/

their article are the following: sponsored research, licences, spin-off firms, hiring students and serendipity.

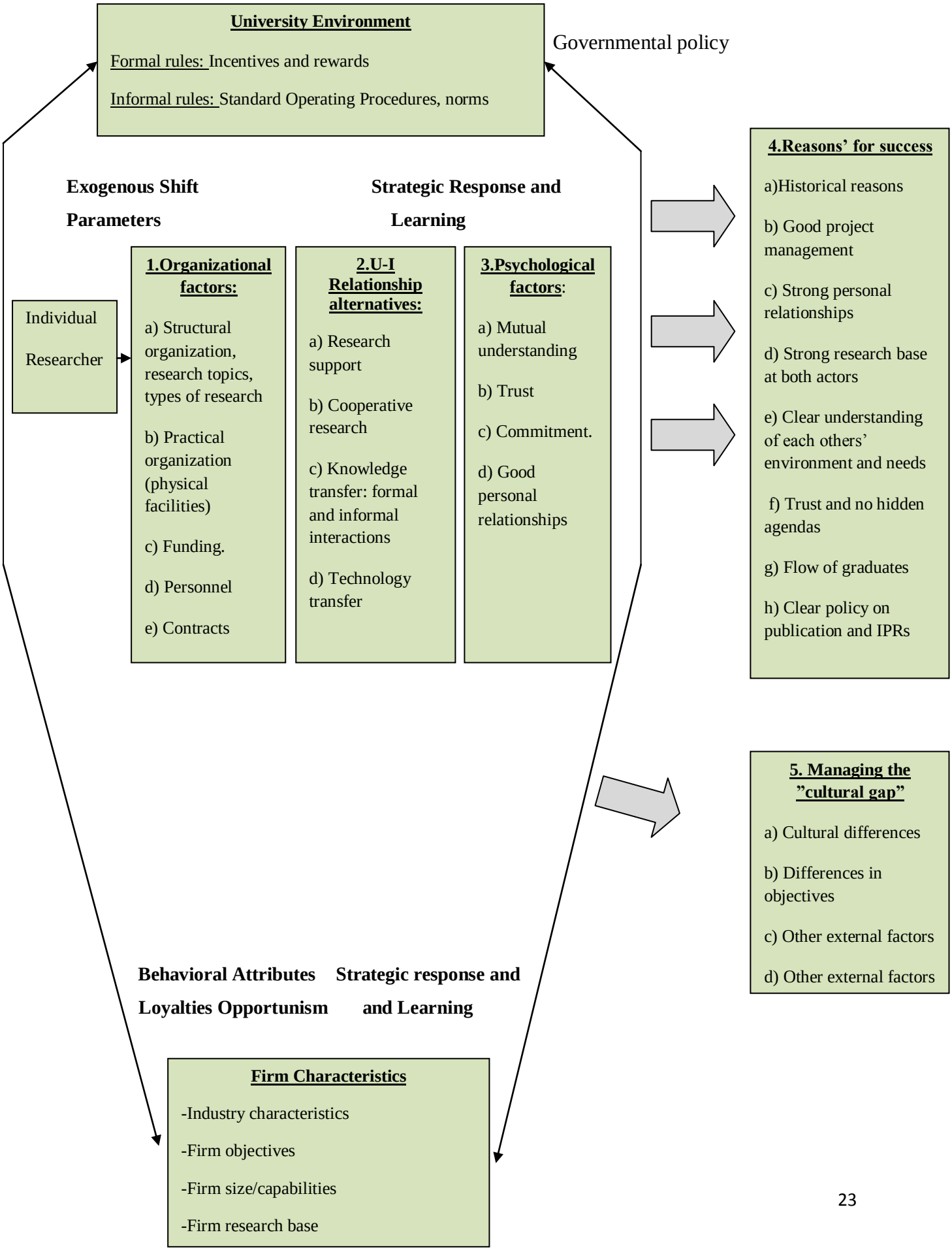
After I studied a number of papers which describe different aspects of University- Industry cooperation, I felt that there is a need for adding to the model some significant "boxes" which would fulfill the model for UIC. I felt that the transactions mentioned in the original model of M. Feldman and A. Link were not complete and I therefore added an extra number of "transactions" to the model.

The first box added to the model is called organizational factors and it describes practical organization of the research collaboration. The second "box" is called University –Industry Relationship Alternatives and it describes different types of knowledge transfer channels between the two partners. The third box added to the model is called psychological factors and it gives the description of the psychological aspects which play a significant role in the research collaboration. I felt that in order to get a complete picture of the IUC these three "boxes" are of significant importance. Organizational factors represent such aspects as structural organization (description of the departments involved in the cooperation from both sides), practical organization (physical facilities), funding (different sources of funding), personnel (people involved in the cooperation) and contracts. University Industry Relationship Alternatives are needed in the model as they describe multiple channels of interactions between the actors, such as for example formal and informal channels of communication. Psychological factors are of extreme importance, especially for my case study, as these are the underground of the reasons for success in the research cooperation between IKBM and TINE SA. Psychological factors include mutual understanding, trust, commitment and good personal relationships.

Additionally, I added to the original model two "boxes" -managing the "cultural" gap and the description of the reasons for success. The first one is not particularly significant for my case study, as the two actors are known for having little "trouble" with understanding each other. Anyway, it is important to pay some attention to the description of the cultural gaps as it is something other UIC actors do not always manage in their relationships. The reasons for success, on the contrary, is the "box" which depicts the second part of the research question of this paper. The reasons listed in the "box" came up as the result of the analysis of the historical papers and interviews. The reasons for success are the consequences of the specific

mix of organizational and psychological factors. The model gives the description of multiple factors which influence the research cooperation between academia and industry, but I chose to concentrate my research around the University Industry Relationship Alternatives, organizational and psychological factors, as well as on the analysis of the reasons for success. The model University –Industry Relationships Schema will be presented on the next page.

Figure 1: University –Industry Relationships Schema



In the following a more detailed description of the model will be given.

1.Organizational factors

By organizational factors is meant a practical organization of the cooperation: a) structural organization (departments involved in the cooperation from both sides) b) practical organization (the use of physical facilities) c) funding of the projects, d) personnel exchange and e) contracts between the partners.

2. University-industry relationship alternatives

University Industry Relationship Alternatives encompass 4 types of U-I interactions: research support, cooperative research, knowledge transfer and technology transfer. These four types of interactions can characterized as following[23]:

a) Research support

Research support is the least interactive of the four I/U relationship components since research support embodies financial and equipment contributions made to universities by industry. Financial and equipment contributions can be unrestricted gifts or endowment trust funds that the university uses to upgrade laboratories, provide fellowships to graduate students, or provide seed money for promising new projects. In the past, industry often contributed large amounts of unrestricted funds and equipment for university research . Industry support for university research is now more targeted and often tied to specific research projects that pay dividends by providing industry with knowledge and new technologies for the long-term.

b)Cooperative support

Cooperative research relationships are more interactive than research support and include contract research with individual investigators, consulting by faculty, and certain group arrangements specifically for addressing immediate industry problems. Contract research with individual investigators and consulting are the most frequently used types of cooperative research and usually involve one faculty member working with a single firm on a targeted

[23] Santoro, M., Chakrabarti, K.. *Firm size and technology centrality in industry –university interactions.* Research Policy 31 (2002) 1163-1180

research project. Group arrangements involve more than just one faculty member and more than just one industrial firm. Here, the firm works with the university research center's faculty and staff through industry advisory boards and center-sponsored research seminars so the firm can pursue a specific initiative through a formal network with a coordinated research agenda.

c) Knowledge transfer

Knowledge transfer encompass a much broader array of highly interactive activities that include on-going formal and informal personal interactions, cooperative education, curriculum development, and personnel exchanges. Formal and informal channels of interaction will be described more detailed in the next chapter. The division into informal and formal channels is based on the material from the article written by F. Romero "University-Industry Relations and Technological Convergence." The majority of UIR interaction mechanisms are established through the informal channels. Those are the following: joint publications (IPR issues), conferences, informal meetings, personal interactions, flow of graduates to the business sector, joint supervision of Master degree dissertations and lectures by industry members at universities. The formal channels include: R&D contracts, licenses, spin-offs and joint labs. The model describes how formal and informal mechanisms function and demonstrates the following tendency: the more formal is the channel of communication, the higher is the tacitness and novelty of knowledge and the effectiveness of technological convergence. Tacit knowledge is the knowledge that is not clearly articulated. It resides in the peoples' skills and actions. Another word for tacit knowledge is know-how.

This continuum of collaboration mechanisms can be conceptualized in terms of the degree of novelty in the knowledge that is being transferred. On one extreme, the mechanism of graduate flows can be interpreted as the transfer of mature, codified knowledge. In the other extreme the research joint labs encompass the transfer and the creation of knowledge with a high degree of tacitness. These mechanisms can be related to technological convergence and integration. Convergence and integration are, by nature, activities that require a high degree of novel knowledge and noel approaches. As such, in principle, the forms of industry-university relations more conducive or more appropriate in terms of effectiveness of convergence and integration would those that involve a high degree of tacitness and knowledge novelty[24].

[24] Romero, F. *University-Industry Relations and Technological Convergence*". PICMET 2007,pp.233-240

d)Technology transfer

Technology transfer is the fourth I/U relationship component and like knowledge transfer also involves a number of highly interactive activities. Compared to knowledge transfer the focus here is on addressing immediate and more specific industry issues by leveraging university driven research with industry expertise and parlaying these complementary contributions into commercialized technologies needed by the marketplace. Often the university research center provides both basic and technical knowledge along with technology patent and/or licensing services while the industrial community provides knowledge in a specific applied area along with a clear problem statement related to market demand .Technology transfer occurs in many ways such as through technological consulting arrangements, the firm's use of center sponsored extension services, and jointly owned or operated ventures. Joint ventures usually represent large-scale commitments by both the firm and university to transfer technologies and are often based on successful prior relationships between the firm and the university research center.

3. Psychological factors

Psychological factors include a) mutual understating between the partners b) good personal relationships c) trust and d) commitment. Good communication between the partners is a key factor when it comes to the effectiveness of the cooperation. If the partners have the atmosphere of mistrust and doubt, the cooperation might dissolve without giving any positive results.

Communication is the process through which the information is transmitted, participatory decision-making is prompted, activities are coordinated, power is executed and the existence of commitment and loyalty between the organizations involved in the cooperative agreement is encouraged. Commitment can be defined as the extent to which the partners get involved in the inter organizational relationship. The higher the contribution of resources, the managerial support and the involvement of the rest of the stuff, the higher is the partner's degree of commitment. Commitment means also emotional involvement in the cooperation and is derived from the satisfaction from the relationship. Trust can be defined as the willingness to believe in other part within a context where the actions taken by one part make the other

vulnerable. Trust is a very important factor in the cooperation and is a matter of vital importance in the future development of the relationship and contributes to its success[25].

Trust, commitment and good personal communication can be covered by one concept called social capital. Social capital can be defined as "the features of social organization, such as trust, norms and networks, that can improve the efficiency of society by facilitating coordinated actions[26]." In order for trust to be developed between the partners, social capital need to be developed and regular communications that are open and honest and are based on social interactions are essential in this regard. Social capital between the collaboration partners can be built through a number of different activities, such as regular dialogue and meetings as well as attendance of collaborators at events that are hosted by the other partner, e.g. lectures, seminars. Social capital extends beyond the need for social interactions and building of trust; it also pertains to the need for the collaborators to essentially "speak the same language"[27].

4. Success factors

Success factors described in the model are specific for this case study. They came up as a result of the analysis of U-I Relationship Alternatives, as well as of organizational and psychological factors. After the ground analysis the success factors of this research cooperation was defined as following: a) historical reasons, b)good project management, c)strong personal relationships, d) strong research base at both actors, e)clear understanding of each others' environment and needs, f) trust and no hidden agendas, g) flow of graduates from the university to the firm, h) clear policy on publication and IPRs.

5. Managing the "cultural "gap

There are numerous situations where a university and a firm have formed an alliance to solve a problem that was important to the company and interesting to work with for the researchers.

[25] Mora-Valentin, E., Montoro-Samchez, A., Guerras-Martin, L. *Determining factors in the success of R & D cooperative agreements between firms and research organizations*.28th EIBA CONFERENCE, December 8-10,2002, Athens, Greece

[26] http://www.caledonia.org.uk/soc_cap.htm downloaded 13.04.11

[27] Philbin, S. 2008. *Process model for university-industry research collaboration*. European Journal of Innovation Management, Vol. 11 Iss: 4, pp.488 - 521

However, these alliances don not always achieve the desired objectives because of some reasons discussed below.

a) Cultural differences

The two partners have essentially different goals, time approaches, languages and assumptions. Institutions of higher education are involved in creating and spreading knowledge, while companies produce products and services in a highly competent business environment. Companies do not typically comprehend how work is allocated in universities and how university budgets are handled. University partners, on the other hand, do not understand the real market forces, time demands, and the incentive structure of the firm.

b) Differences in objectives

The very nature of the final objectives of these two institutions is dissimilar. Most companies insist on applied research that results in a marketable product or service along with new innovative processes or approaches to problem solving. The university or faculty member uses basic research more often to work towards contributions to knowledge in the form of new concepts, models, empirical findings, measurement techniques and other related objectives.

c) Other external factors

Organizations operate under a variety of external unexpected changes and internal readjustments like reorganizations and corporate downsizing. Since many alliances between higher educational institutions and corporations are involved in researching fundamental problems that are expected not be resolved in the very short term, projects are undertaken within a long –term research. Alliances need a long timeframe and commitment in order to ensure stability to support work in long –term research.

d) Other problems in strategic alliances

Several reasons are also given for the under-performance and failure of strategic alliances. The most common reasons include a break down in trust, a change in strategy, the value did not materialize, the cultures did not mesh very well and the systems were not integrated. Other reasons might be lack of knowledge about the partner and his processes, insufficient project management, lack of acceptance of results from the cooperation partner. While there are natural synergies in corporate-university alliances, there are also areas of likely conflict.

Universities have their own public roles and expectations (i.e. they are mandated to create and disseminate knowledge for the broad benefit of society). They are also expected to make knowledge freely and widely available through education and publication as they enjoy non-profit, tax free status and receive public funding. On the other hand, corporations survive in contested market places where they compete for customers and other investors. They need advantages over their competitors in order to provide growth and profits to their owners and employees. The need for competitive advantage extends to the corporation's requirement for a relevant return from university research investments that can, for instance, be effectively commercialized in the market place[28].

2.4. Summary of the theoretical framework

As it was said before, the topic of university –industry relationships is yet not very well studied, and it was therefore problematic to find a model and a theory generally which could suit to my specific case. I had to make my own model which could best suit to my specific case of study. I have based on the model of F. Romero "University-Industry Evolutionary" and have added extra elements which were important for the explanation of the research collaboration between TINE SA and IKBM.

[28] Elmuti, D., Michael Abebe, M., Marco Nicolosi. 2005. *An overview of strategic alliances between universities and corporations*. Journal of Workplace Learning, Vol. 17 Iss: 1/2, pp.115 - 129

3.0 Method

In this chapter a method used for answering the research question of the paper will be presented. In the following chapter the arguments on why exactly the qualitative analysis was chosen for the research topic will be given.

The choice of the method depends on the type of the research question. The choice of the research design was not a complicated question, because the research question itself "dictated" the choice of the design. The research question of this paper is the following:

Qualitative analysis of the successful research cooperation between IKBM and TINE SA: general description and reasons for success.

The literature describes two types of paradigms a researcher can work with: positivism and interpretivism**.** The fist one is used to describe casual –effect relationship. The second one is used to explain peoples' actions based on their ideas. Those two can be related to quantitative and qualitative approach. The second one is used when a researcher wants to get deeper understanding of the phenomena. It is also usual to use it when the topic is not well researched and the researcher needs to explore more or bring a new theory. This research paper is aimed at getting an understanding on how the collaboration between the two actors is functioning, as well as at analyzing the success factors of this cooperation. This research is not aimed at getting a quantitative data on the phenomena, but is aimed at exploring how the cooperation functions. As it was mentioned before, the topic if UIC is yet not very well researched and qualitative approach would therefore be best appropriate for my research topic.

According to Mehmet Mehmetoglu (2004) qualitative method is best appropriate for the following research approach;

a) The research question is about "how and what" and is based upon the assumption that it is interesting to find out what is going on.

b)The research question is little explored from before and the researcher wants to know more about the phenomena and generate new theories.

c) The researcher is willing to present a detailed picture of the phenomena.

d) Physical proximity to the research unit.

e) Explorative study which is based on the text data.

f) Use of "informal analysis techniques" which are different from statistical analysis techniques.

g) Use of one or more cases[29].

All these characteristics of the qualitative design are suitable for my research topic as the point of the paper is to explore how the cooperation between the two parts is happening both formally and informally. The other part of the research topic is to find out by using the interview data what are the reasons for the success in IKBM –TINE SA cooperation. This can only be done by taking semi-structured interviews with key persons, who are directly involved in the cooperation. The research topic is not measurable quantitatively and is therefore of qualitative art.

3.1 Research design

The design is the logical sequence that connects the empirical data to a study's initial research design questions and, ultimately, to its conclusions (Yin 1994, p: 19).

According to Yin (1994) there are three types of case studies: exploratory case studies, descriptive case studies and explanatory case studies. It is not always clear where the boundaries between the three strategies lie. Explorative case studies are mostly used when the type of "what" question is been researched on. With other words, a researcher tries to find out what is going on in a particular case. Descriptive case studies are used when a researcher has an intention to describe a particular phenomenon. "How" and "why" questions are more **explanatory** and likely to lead to the use of case studies, histories, and experiments as the preferred research strategies (Yin 1994: p.6).

In my case the most appropriate method would be to use explanative case study approach as the main question of the paper is to explore how the research cooperation between the two parts is functioning and why is the cooperation as successful as it is.

[29] http://www.sv.ntnu.no/iss/Robert.Wiik/SOS1002-V04/SOS1002F4.pdf

3.1.1 Qualitative analysis

One of the definitions of the qualitative method is: a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that the qualitative researches study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them (Denzin and Lincoln 2008, p: 4).

My research problem is based on the qualitative approach. The phenomena of University-Industry collaboration is studied thorough the personal experiences of the people who are involved in this collaboration. The research problem is studied through the oral explanations from the interviewees, as well as with the use of historical documents. All in all, it was conducted 4 semi-structured interviews with the representatives both from IKMB and TINE. The interviews were conducted with IKBM Professor in dairy technology-Roger K. Abrahamsen, researcher at TINE-Anne-Grethe Johansen, research director at TINE-Erik-Selmer Olsen, research chief at TINE- Johanne Brendehaug. The interviews are variable when it comes to length: some of them took one hour, while others took around half an hour. Personal interviews took place at TINE's main office in Oslo (Oslo Atrium), at UMB, and one interview was conducted by phone. In addition, it was done some "after-interviews" and some extra mail correspondence with some of the respondents. The interviewees are the main information sources while they are key actors involved in the collaboration between TINE SA and IKBM. They have a long experience working with each other and the information I got form them is of extreme importance when it comes to explore the research topic. The respondents were chosen with the help of snowball method, which means that the first respondent gave the coordinates of the next person who could be interviewed and so forth. This method helped me to get access to the right respondents who possessed valuable information for my research problem.

3.1.2 Case study

There are several types of research methods, each suitable for the particular research question or situation. According to Yin (1994:p. 1), each strategy has peculiar advantages and disadvantages, depending on three conditions;

a) The type of research question

b) The control an investigator has over actual behavioral events

c) The focus on contemporary as opposed to historical phenomena

In this paper I studied the research collaboration between TINE SA and IKBM and the reasons for success in this cooperation. According to Yin (1994) case studies are most pertinent when types of questions "how" and "why" are posed, when the investigator has little control over events and when then the focus is on a contemporary phenomenon within the real –life context.

The first part of the research question I study is the type of "how" research question and is aimed at the description of the collaboration between the two partners. The second part of the research question is a type of "why" question and is intended at finding out the reasons for the success in the collaboration. Therefore, I find that case study design is suitable for my research topic as the criteria for the case study is fulfilled.

3.2 Data collection

Data used in the following study is categorized as either primary or secondary data. One of the advantages with case study is that it uses several different information sources (Yin, 1994:8). I have therefore used in my case both primary and secondary data sources, as these mostly fulfill each other. Primary data sources are the most significant for my case while these are primarily used in order to answer the research question.

3.2.1 Primary data

My study is mostly based upon the primary data sources. The interview process was designed after the description of the seven interview stages by Kvale og Brinkmann (2009, p:118).

These seven stages describe interview phases gradually from the determination of the research topic to the final reporting of the results.

Those stages are the following;

1. **Tematisering**. On this stage the formulation of the research goals must be done.

2. **Planering**. On this stage the research plan should be ready including all the 7 stages.

3. Intervju. This stage includes the performance of the interviews.

4. Utskrift. This stage includes the preparation of the interview data for analysis and "rewriting" data from oral speech to written text.

5. Analyse. This stage includes the analysis of the collected data in relation to the research topic.

6. Verifisering. This stage includes assessment of data's validity and reliability.

7. Rapportering. This stage includes the report of the final results from the research.

Table 1: Stages in the interview process

On the first step (Tematisering) I have worked with the right formulation of the research problem. On the second step (Planering) the interview guides were written before each interview. On the third step (Intervju) 4 interviews were taken and recorded on the tape. On the forth step (Utskrift) the interviews were written down word by word, while the tape recorder was used. On the fifth step (Analyse) the data collected were analyzed in relation to the theory. On the sixth step (Verifiseing) some mail correspondence with several respondents was taken. On the seventh step (Rapportering) the main results from the research study were presented.

The seven steps described by Kvale and Birkmann has served as a guideline for me to keep an overview over the entire interview process. It gave a significant support when it comes to the organization of the interviews.

While making the interviews all of them were recorded on tape. Additionally, I was taking notes while the respondents were answering the questions. Making the record of the

interviews was done in order to secure most full and detailed information from the interviewees. There were later taken "extra --interviews" in order to clear up some misunderstands and get a more detailed information on some of the questions.

According to Holme and Solvang (1996) the qualitative method is not using the standardized questionnaire. This is because the researcher doesn't want to control the research situation. The researcher might give the interview a "direction", while letting the interviewee talk freely about his/her ideas. The researcher has always certain predetermined topics he wants to exploit. These are often written down in the interview guide. I had all the four interview guides ready before each interview. They included different aspects on the characteristics of the research collaboration and detailed questions on each of the aspect. Some extra questions did appear during the conversations with the interviewees.

My intention was to get as full and detailed information on the research topic as possible, which is why I chose to use semi-structured type of interview. This type of interview describes the type when the researcher is asking open-ended questions, some suggested by the researcher and some arise naturally during the interview. Semi-structured type of interview is relevant for my research topic because it does not force the informants to talk in the particular "direction" but make them free to choose, change or get deeper into some specific issues. The overall focus of the interview was decided by me, but I still tried to give the informants enough "space" to talk freely about the research issues. The objective was to understand the respondent's point of view.

There are certain strengths about using semi-structured type of interview. Those are the following[30];

1. **Positive rapport** between interviewer and interviewee. Very simple, efficient and practical way of getting data about things that can't be easily observed.

2. **High validity**. People are able to talk in depth and detail. The meanings may be revealed as interviewee is able to speak with little direction from the researcher.

3. **Complex questions** can be discussed. The interviewer can probe areas suggested by the respondent's answers.

[30] http://www.sociology.org.uk/methfi.pdf

4. **Pre-judgment**. With few "pre-judgment" questions involved, the researcher is not "pre-judging" what is and is not important information.

5. **Easy to record** interview.

Weaknesses of the semi-structured interview method are the following;

1. Depends on the **skills of the interviewer** (the ability to think questions during the interview).

2. The researcher can give the **unconscious signals** that guide the respondent to give answers expected by the interviewer.

3. **Time consuming**.

4. **Not very reliable**. Difficult for others to exactly repeat.

5. Depth of the qualitative information may be difficult to analyze.

6. Personal nature of interview may make things **difficult to analyze**.

8. **Validity**:

a) The researcher has no real way of knowing if the respondent is lying.

b) The respondent may not consciously lie but may have imperfect recall.

c) While trying to recall something done in the past, the respondents may try to rationalize their actions.

While conducting the interviews I experienced both positive and negative sides of this type of interview organization.

In the following Table 2 a detailed information about the interviewees will be presented. It will be given an information on who was interviewed, what was the length of each interview, date and place of each interview.

Date	Respondent	Position	Discussion topic	Place	Interview length	Interview form
13.04.11	Anne-Grethe Johansen	Researcher at TINE	Research "relationship" between TINE and IKBM	UMB	24 min 52 s	Personal meeting
13.04.11	Roger K. Abrahamsen	Professor of dairy technology at IKBM	TINE and its research collaboration with IKBM	UMB	1 hour 15 min 25 s	Personal meeting
14.04.11	Eirik-Selmer Olsen	FoU director at TINE	UMB and its research collaboration with TINE	Tine main office	31 min 48 s	Personal meeting
31.05.11	Johanne Brendehaug	FoU chief at TINE	TINE and its research group	UiO	28 min 18 s	Telephone interview

Table 2: List over interviewees

3.2.2 Secondary data

Secondary data is the information which already exists in one form or another and which is more or less available (Halvorsen 2003, p.71). In order to study this particular case of research collaboration between IKMB and TINE I did a ground search on the information available on this topic. Secondary data which was used for the research were mostly scientific articles, historical sources and internet resources.

3.3 Data coding

Coding represents the operations by which data are broken down, conceptualized, and put back together in new ways. It is the central process by which theories are built from data (Strauss and Corbin 1990: p.57). With other words, coding is the way for analyzing data and building concepts from this data.

According to Strauss and Corbin (1990) there are three types of coding: open coding, axial coding, and selective coding. The researcher does not necessarily moves from open through axial to selective coding in a strict, consecutive manner. These three types of coding can be described as following:

Open coding: Open coding is the process of selecting and determining categories from the analysis of the data. It is the first stage in data acquisition, variables involved in the phenomenon are identified, named, categorized and related together. The properties of the category is described at this stage.

Axial coding: Axial coding is the next stage after open coding. On this step of coding the data are set together by identifying casual relationships between categories. This stage involves explaining and understating relationships between categories in order to understand the phenomenon to which they relate.

Selective coding: Selective coding is the process of identifying the core category and systematically relate it to other categories.

In this work I have mostly used the type of selective coding. The paper is aimed at answering the two questions: how the relationship between IKBM and TINE SA is functioning in practice and what are the success reasons of this research collaboration. The data collected on interviews were not all related to the two research questions (categories) and I needed to sort and pick out the exact information from the interviews specially related to the research questions.

3.4 Data's validity and reliability

The terms of validity and reliability are used in order to access the results of the conducted research. The literature defines two types of validity: internal and external validity. Internal validity is a concept which is about whether the results we got are perceived as the right ones. Internal validity can be checked in a number of different ways. The more number of persons perceive the results of the survey as "close to the truth", the better validity we obtain. Another way of checking the validity is to consider other data sources and to compare the results. The more scientists have come to the same conclusions, the more validity the data have.

It is also very important to remain critical while conducting the survey, because the critical attitude to the data will influence the validity of the results. The researcher should always consider whether he gets an access to the "right" respondents, who can actually give the true

information about the phenomena. I perceive that there is a clear connection between the research question and the selected informants as they are the key persons involved in the research collaboration between the two parts. The informants are perceived to possess important and relevant information for my research question.

External validity is a concept which tells us at what grade the results of the survey can be generalized, which means that we can state that the results can be used to make the same assessment about the similar phenomena. In my case of explanatory study it is difficult to generalize the results as each case is characterized by specific circumstances and factors which are particular special for this case.

The concept of reliability is about if the results of the survey are repeatable in other contexts. High reliability means that independent measurements will give approximately same result (Halvorsen 2004: p. 41). In other words, it is expected that others will obtain the same results while making the same experiment. In order to obtain a sufficient reliability of data it is also quite crucial that the researcher is good at making notes with all the details in them. If the notes are incomplete, than the analysis of data might also be incorrect and the results would not be reliable. I tried to be quite precise while making the data collection in order to secure the highest reliability. As it was mentioned before, I recorded the interviews and took notes during all the interviews. I also asked different respondents some of the same questions especially those about success factors in order to secure higher validity.

It is still remains difficult to access the validity of this my research because other researchers might analyze the material from a different angle and come to another conclusions.

3.5 Analysis of the interviews

Analysis of the qualitative data is time-consuming and comprehensive process. This is because the qualitative data is presented in the form of unstructured information (Halvorsen 2004:p.134). I needed to analyze lots of "fresh" data which I got from the interviewees. The most time consuming part was to "covert" the interviews from the oral speech to the written, structured text and then pick out the necessary information for my research. Some data was less important for my case study and one of the challenges was to sort out the necessary information from the interviews.

3.6 Challenges and lessons learned from the interviews

During the interviews there was some challenging moments. Firstly, my original intention was to conduct the interviews in English, but it turned out the it was more comfortable for the respondents to talk in norwegian instead. That's why I needed to translate the questionnaire during the interviews and it was a little bit challenging. Secondly, it was often that while answering one question the respondents automatically "touch" other issues and the challenge was to orientate quickly about which question should I ask next. On the whole, I perceived the interview process as very interesting. The respondents were very excited talking about their jobs and about the topic of research of collaboration between IKBM and TINE SA.

4.0 Results and analysis

This part includes both results and analysis of the main "discoveries" form my study. First of all, some historical facts about the research alliance between TINE and IKBM will be presented. Those will show how the collaboration has started and what was the background for the initiation of the relationship between the two actors. Afterwards, there will be given the description of the research cooperation the way it is organized today and it will be based on the University-Industry Relationship Schema (Figure 1) described in chapter 2. In the end of this part the reasons for the success of the alliance will be discussed. The data is based in the material gathered through personal interviews, as well as through books and online documents.

4.1 IKBM and TINE SA-an old "friendship" story

The cooperation between UMB (IKBM) and TINE SA has its roots back in 1955 when Jarlsberg cheese was "born" at The Dairy Institute at the Agricultural University of Norway. Jarlsberg was a new type of cheese and a big part of work over the creation of this cheese took place at the Dairy Institute and Research Dairy at the Agricultural University of Norway (modern name-UMB). The case of Jarlsberg is an interesting case which shows how a pure scientific basic research turned into an applied research and into the real market product. The cheese became a famous product both in Norway and outside the country as well. The case of Jarlberg has laid the foundations for the successful future cooperations between IKBM and TINE SA. The way TINE got the propionbacteria, the one which gave a foundation for the creation of Jarlsberg, shows that there was no "money" interest from the very start of the cooperation, but the genuine interest for the subject and the desire to create something new. IKBM kept the bacteria in their laboratories until they gave it away to TINE without any economic compensation. In addition, TINE have got a professional help from the stuff at IKBM on how to treat a bacteria. It shows that close interactions between IKBM and dairy industry in Norway were formulated long time ago and are still flourishing today. A more detailed story about the foundation of Jarlsberg and about the interaction between TINE and IKBM will be given on the following pages.

Case about Jarlsberg cheese

The Agricultural University of Norway was established in 1897 in Ås and right after the establishment the study of milk and milk processing was an active area. In 1900 the University has established its own diary. It was modern according to the standards of that time, but eventually a more advanced scientific research was needed on the area of cheese making technology. In 1933 Statens Meieriforsøk was established. It was important to built a dairy research station and Ås was considered for this purposes. But for some reasons the station were not located there and research was conducted other places around the country. As the research activity at Statens Meieriforsøk increased, the discussion about a formal collaboration with the Department of Dairy Science and Technology at the Agricultural University became relevant. There was need for the research diary with modern facilities. The committee began evaluating possibilities in 1940 while recommending moving all the research activities to the Agricultural University. It happened eventually in 1942. In 1941 The same committee proposed that Statens Meieriforsøk would be totally amalgamated with the Department of Dairy Science and Technology and recommended the establishment of the new Department, the Dairy Institute with its own Dairy. The new conditions and facilities were ideal for working with research on the milk – based products, especially cheese. The developing of Jarlsberg cheese was led by Professor Ole Martin Ystgaard. In 1955 a master student, Per Sagshaug under the supervision of Professor O. M. Ystgaard was making experiments for the master thesis ”Addition of propionbacteria culture to cheese milk” and he gained interesting results. Those gave a platform for developing modern Jarlsberg cheese. The stuff at Dairy Institute continued to study propionbacteria and the culture was maintained in the laboratories and was propagated for use in commercial cheese making. The Research Dairy at the Institute functioned as a “control dairy” for the culture until 1990s. Propionbacteria culture was closely regarded. The institute continued with these “control productions” until June 1993, by which TINE SA has taken over responsibility for production of the culture and the production of Jarlsberg cheese in the Research Dairy was therefore no longer necessary. Tine’s R&D Center at Voll took over production and delivery of mother culture to the dairies. (Abrahamsen R., Byre O., Steinsholt K., Strand H. 2006)

After a personal talk with Professor R. Abrahamsen (Professor for food technology with dairy technology as a specific area of responsibility) I have got the following interesting information: the production of Jarlsberg cheese has already started in 1957 at TINE dairies.

The further development of Jarlsberg continued together with Dairy Institute many years after the practical production was established at TINE dairies. Propionbacteria was until 1991 kept in the laboratory at IKBM and was distributed to all dairies which used it for the production of Jarlsberg. Dairy Institute sent out "use doses" of the culture once a week, while keeping control over the propionbacteria. Until 1991 The Dairy Institute had been producing a small so -called "control output" of Jarlsberg in its Research Dairy. The Institute was keeping an eye on the propionbacteria in order to be sure that it was kept in order. The department had some income from selling the culture to TINE. Until 1991, there had been going discussions between the Institute and TINE about if there any reasons to proceed with the "control output" of Jarlsberg and with the maintenance and distribution of propionbacteria culture. The Institute came up to the decision that they could not for some reasons sustain the regular dairy operation on the Research Dairy and was not longer able to continue working with propionbacteria culture.

R. Abrahamsen did not name the exact reasons for what specifically went wrong with the culture so that they could not keep producing the cheese, but he mentioned that the worst scenario could be, for example, that the Institute would sent out infected propionbacteria culture and this could course errors in all the production of Jarlberg. If this would happen, the Institute would have no opportunity to cover the loss costs. Therefore the decision was made about the transformation of the responsibility for the culture to TINE. The process was done in an orderly manner and the personnel from TINE got professional training from the Institutes' stuff on how to treat a bacteria. Later Tine has developed a special technology for the production of concentrated culture of propionbacteria. This was also done with the collaboration with the Dairy Institute before TINE started to do it themselves. In retrospect, many were wondering what did the Institute gain for the transferring of the culture to TINE. At that time it happened there were not entered any official agreement on specific financial compensation for this. It was simply agreed that it was the best solution for both parts that TINE would overtake the responsibility for the culture.

The history shows that the two actors have always been interacting with one another on the research issues and the culture of working together has been developed over time.

4.2 The organization of the research cooperation today

In the following part the two research questions will be discussed: a practical organization of the research cooperation between IKBM and TINE SA and the reason for success. The description of both research questions will be based on Figure 1 (detailed description is given in Chapter 2).

4.2.1Organizational factors

a) Structural organization

1.Organizational factors:

a) Structural organization, research topics and tasks

b) Practical organization (physical facilities)

c) Funding.

d) Personnel

e) Contracts

In this part of the paper a description of concrete departments and persons who are involved in the cooperation from both sides will be given. Institute for Chemistry, biology and food science is organized as 12 research groups. These groups are the following: biostatistics, molecular cell biology, environmental microbiology, dairy technology and food quality, protein engineering and proteomics, natural product and organic analysis, processing of muscle foods: meat and fish, integrative neuroscience and biological function, microbial gene technology and food microbiology. Milk and dairy science is covered by several research groups, but the most prominent of them are: Dairy technology and food quality, Microbial gene technology and food microbiology, Food proteins: Structure and biological function. All these groups are involved in the research collaboration with TINE. In addition to IKBM, TINE SA has research cooperation with Institute of Animal and Aqua cultural Sciences, but this is not a part of the analysis in this paper. Professor Roger Abrahamsen (Professor in food science technology with a specialty in dairy technology) is a mentor for the group "Dairy technology and food quality" and is also a front line contact person in the research collaboration with TINE SA. It is him TINE has mostly contact with and the biggest amount of projects were conducted in a collaboration with his research group. His role in the research collaboration today can be described as a research "adviser" and as a "manger" who is responsible for the organization of the research projects. Roger K. Abrahamsen himself defines his role as the following:

I would say it is kind of two roles; the first one is to be able to conduct what we have agreed about to cooperate on and the second one is to be "academical driver" and a discussion partner about future dimensions of the cooperation.

Interview Professor R. Abrahamsen, 13.04.11

The description of TINE's R&D Center was partly given in the introduction part of the paper (Chapter 1.2). The main task for TINE FoU Center is to develop new products, to obtain new knowledge, to develop new packaging solutions and create new processes and technologies that are profitable and safe. There are totally around 90 persons working in TINE FoU department. One part of the research center is located on Oslo (Kalbakken), while another part is located in Stavanger at Måltidenshus. A detailed picture of Tine FoU Center is the following[31];

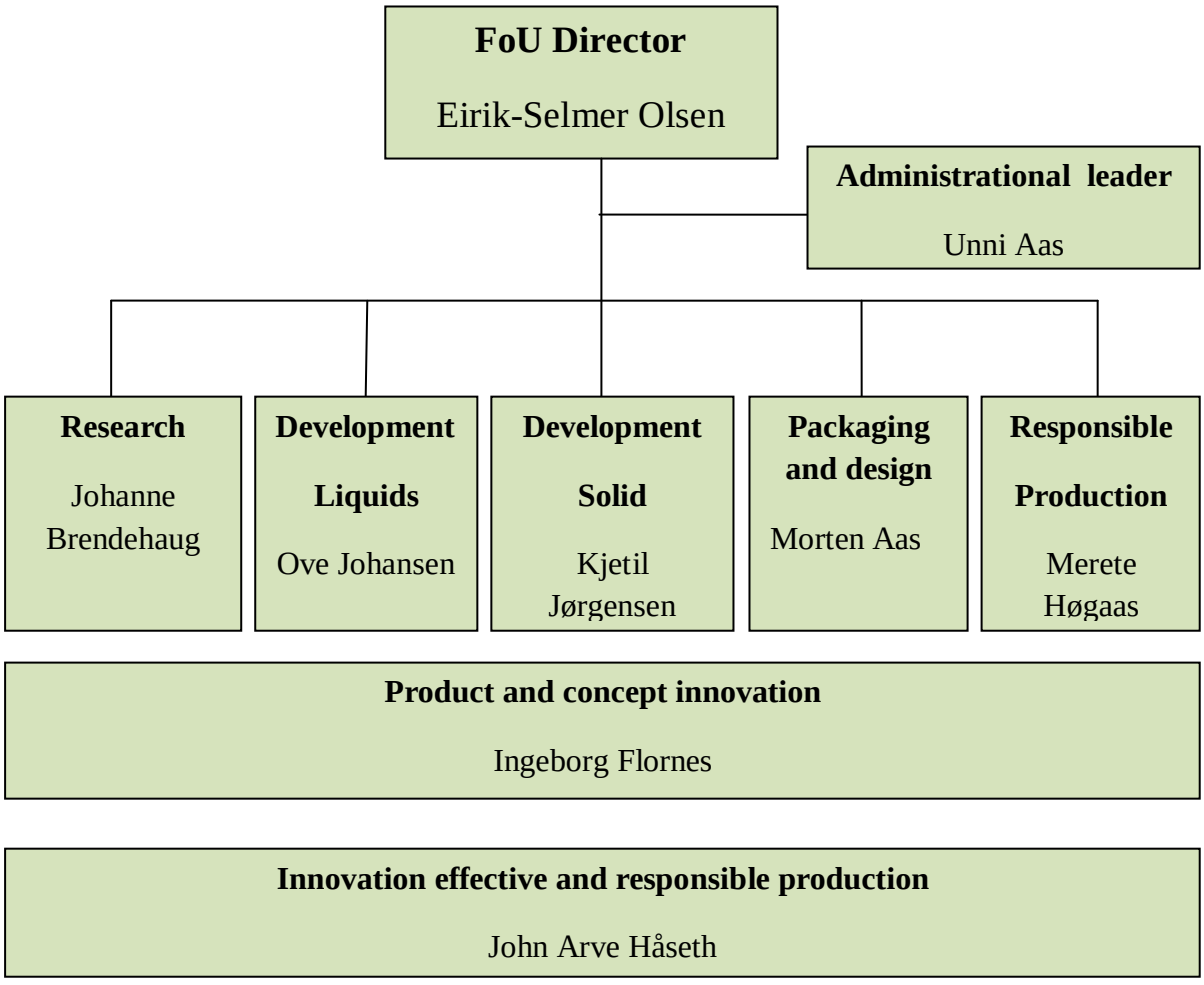


Table 3: Tine's FoU department

[31] http://www.nofima.no/filearchive/maalrettetbruk-tine.pdf

The table explains the organization of FoU Center at TINE SA and it shows that research organization in the company is a multiple system which involves 7 different departments which are closely integrated in each other. The Research department includes 35 professionals. The researchers from the Research Department are directly involved in the research projects with IKBM, but they automatically "draw" with them also personnel form other FoU departments who also become indirectly involved in the research cooperation.

TINE's FoU Center is concentrated on the following areas: consumer-directed innovation and availability; taste and sensory; nutrition, food and health; test operation, piloting and analysis; packaging and design; raw material and ingredients; environment and climate; food security; innovation and innovation skills.

Research topics in the cooperation

In recent years, projects concerning a more optimal use of dairy by-products such as whey and buttermilk have been given priority by the industry as well as the university researchers. The use of different processes, processing parameters has been investigated in order to develop new ingredients based on these by-products. The application of the by-product as such, alternatively as an ingredient in various dairy-and non-dairy products has been studied. Another avenue of cooperation related to the use of the by-products, has been the investigation of factors influencing the quality properties of dairy products with reduced fat and /or carbohydrate[32]. The topics for the research generally come up as a result of the academic discussions between the partners and new ideas for the future projects often "are born" from the dialogs and common projects between the partners. All in all, the research topics can be characterized as very innovative and advanced.

> *It is often so many new, innovative elements. It is a lot of innovation, it is very many topics in our cooperation which are advanced academically that we can not, we can not go into the textbook and so find out how things should be done because it is a lot of innovativeness and to some extent creative thinking.*

Interview Professor R. Abrahamsen, 13.04.11

[32] Abrahamsen R., Johansen A. G., Selmer-Olsen E. 2008. *Cooperation with a university as a component of innovation in a dairy industry. Norwegian experiences.* Warszawa, pp.243-257.

Types of research tasks

According to M.Gulbrandsen and J. Smeby (2005 p: 128) there are three types of research:

a) basic research: experimental or theoretical research which is primarily performed in order to obtain new knowledge about the underlying basis of phenomena and observed facts without particular application or use.

b) applied research: research where the original aim is undertaken in order to acquire new knowledge. Applied research is primarily directed a specific targets or applications.

c) development work:. systematic research which uses both existing knowledge from research and practical experience, and is aimed at producing new or sustainably improved materials, products or facilities, or to introduce new and significantly improved processes, systems and services.

There are different types of research tasks IKBM and TINE SA cooperate on. Some of them imply special new analyses and are quite concrete tasks, which means that TINE "order" concrete tasks from IKBM. This type of research can be related to applied research. Some other research projects are more of type comprehensive research and is more of a long-term character. This type of work can be related to the development work.

> *We have very much, we have many interesting discussions about what we should do next, spinn-offs issues, and it is clear that it in itself accumulates a number of possible ideas. Some of the ideas we reserve for the further cooperation with TINE , other ideas are of such nature that we as a university employee say: Here are things that we should study in basics and search the Norwegian Council for Research for funding, or raise funds in any other way in order to do a completely independent research.*

Interview Professor R. Abrahamsen 13.04.11

Development work implies that the researchers form IKBM do use the knowledge base they already have and combine it with existing experience in order to work with innovative issues in the future.

In addition, such tasks is as helping TINE SA with specific literature on the research topic are also in practice in the research cooperation research between TINE SA and IKBM.

All in all, the research cooperation is characterized by the long –term perspective and both parts are interested in finding interesting topics for research and develop new knowledge.

> *I can say that we have the same interests in the cooperation, which are to obtain good data for the research issue that we study and learn more or it is about the accumulation of knowledge for both partners.*

Interview Professor R. Abrahamsen, 13.04.11

b) Practical organization

IKBM has a lot of practical equipment which is used in order to conduct a research for their industry partner. IKBM has got Pilot Plant which has an equipment for the production of food in small scale and laboratories with analytical equipment. Pilot plant include following equipment: extruder, spray drying filtering, ultra filtration, hyper filtration and micro filtration, cheese presses, brown cheese pots, equipment for milk processing, tanks for fermentation, vacuum damper, UHT (direct and indirect heating), ice cream freezer and their own workshop. Laboratory equipment include: chromatography, electrophoresis, particle measuring, biotechnology, rheology, non-destructive measurement methods, fermenter. The equipment in the Pilot Plant is very flexible and in many cases can be used for the other experiments than it was intended originally[33]. The analyses which are done for TINE SA in the Pilot Plant is an important contribution for TINE's knowledge base. It is also important to notice that both IKBM and TINE have such Pilot Plants which complete one another.

> *The Pilot Plant is unique. TINE has also a Pilot Plant, they have their own Pilot Plant both in Oslo and in Stavanger. But the supplement when we use the Pilot Plant at IKBM, it makes the totality. The operation of the Pilot Plant at IKBM is very rich in experience. There it has been worked a lot, there is much knowledge and it is used in teaching, so it is very real. Analyses, analyses at IKBM park are very good. It is an ambulatory lab, a lab in motion, where you approach new things all the time, you get quality-assured results , and they can be used in teaching and research, and TINE assist the operation of new analysis, it feels exciting.*

Interview researcher Anne –Grethe Johansen 13.04.11

[33] http://www.umb.no/ikbm/artikkel/vi-tar-oppdrag-for-sma-og-store-kunder

c) Funding

Principally, it is TINE who covers all the expenses for the research work at IKBM. TINE's research budget is around 6 mill. a year, but in some projects there are other external actors who take part on the cooperation so the total sum of the research expenses against UMB and NOFIMA is around 20-25 mill. When the research project involves only TINE and IKBM, than TINE pays "working hours" to the IKBM researchers. The price per hour work is quite high. The price for the research hour at IKBM is high enough that TINE does not pay extra for the use of IKBM's equipment. IKBM sends quartile bills to TINE for the work performed. In addition, TINE supply IKBM with free work materials like for example milk. IKBM has therefore a good economic "help" and gets advantage from the research cooperation with TINE. There are also few projects at IKBM which are funded by the Norwegian Research Council (Forskningsråd) and IKBM is totally responsible for the management, but where TINE is an industrial partner. There are certain types of projects where there are requirements about that the industrial partner should be in this type of project. In this case TINE does not sponsor the research, but the research is conducted with the available sum from the Norwegian Research Council. (Data is based on the interview with Professor R. Abrahamsen)

d) Personnel

Researchers at both IKBM and TINE have strong academic skills which they exchange during the research collaboration. The skills of the industrial partner and the knowledge at the university complements each other. Personnel involved in the projects have been in contact for along time and personal ties between the industry and university are very strong. As it was mentioned before, IKMB is the only Institute which has education offer in dairy technology and many candidates finish their education at IKBM and get a career at TINE. Personal contacts remain a strong factor for the success of the research cooperation.

The role of intermediary-unique "double" position

In the research cooperation between TINE and IKBM there is one particular person who has a very special position in this cooperation, which gives both parts big advantages. A researcher, Anne -Grethe Johansen is working part time at the section for Food technology at IKBM and as a researcher at TINE. She took her Master and Doctor at IKBM and therefore she knows both industry and university environment very well. At TINE she works with the development of new analyses and at IKBM she does these analyses together with researchers from IKBM. The way she works both places shows how close are the ties between the two actors. Her position is very special and it makes the research work between the partners more effective. Anne-Grethe herself says about her position the following;

> *It is unique. It is very special, it is very, I recommend it. I have a very lucky way to work. TINE has lots of, we are many researchers and some of them are in Stavanger, some in Oslo, and some single researchers like me. But it is only me who works in crossing point in the project context. And I wish there were several because it can quickly become alienation of you sit in one end and is not contributing to the implementation.*

Interview researcher Anne-Grethe Johansen 13.04.11

Her knowledge, skills and competence are easily available for the university-researchers, in the same way as they are sharing their competence and knowledge with her. Her participation in the daily professional cooperation and environment and discussions is very useful for both partners. She has open access to infrastructural activities at IKBM like Pilot Plant and laboratories and to computer base search facilities. She also participates in teaching activities. By regularly using the Pilot Plant and carrying out a substantial number of analyses, she establishes interesting activity at IKBM. This creates several spin-offs that have positive influence on the other research activities at IKBM[34]. The concept of spin-off will be discussed later.

The way Anne-Grethe Johansen is working at IKBM shows that TINE as partner has a unique opportunity to use all the advanced equipment which IKBM has. Such a close contact with the

[34] Abrahamsen R., Johansen A. G., Selmer-Olsen E. 2008. *Cooperation with a university as a component of innovation in a dairy industry. Norwegian experiences.* Warszawa, pp.243-257.

university's research base can be regarded as an asset by TINE. It also shows that the partners are in a very good dialog, trusting each other and are in close contact while working on the research projects.

e) Contracts

There is one main contract between TINE SA and Food Alliance and it is confidential. It reviews what type of research projects TINE and IKBM are working on, as well as what kind of master and doctor education programs IKBM and TINE are collaborating on and some other issues as well. This contract is being renewed every fourth year. The contract has now been valid for15 years. From year 2000 NOFIMA also joined the contract. In addition, there is a special contact for each single project which regulates different aspects of the cooperation between IKBM and TINE.

4.2.2 U-I Relationship alternatives

In this part of the paper different interaction channels between IKBM and TINE will be described. University –industry relationship alternatives describe multiple interaction channels which can be used by both partners. Those are the following: research support, cooperative research, knowledge transfer and technology transfer. The four types of interaction channels differ from each other in the grade of interaction intensity between the partners. All the four types of interactions channels are described indetails in part 2 (p. 21).

2. U-I Relationship alternatives:

a) Research support

b) Cooperative research

c) Knowledge transfer: formal and informal interactions

d) Technology transfer

The interactions between IKBM and TINE can to some extent be related to all the four categories of relationships described in part 2. Historical development of the relationships between the partners indicates that they have a very well and close dialog and the cooperation is therefore fruitful and successful. This means that their relationships are characterized by a high intensity of interactions and with an atmosphere full of trust and mutual understanding.

In the following all the four types of U-I Relationship alternatives will be discussed.

a) Research support: Research support embodies financial and equipment contributions from industry to university on a general basis. This type of relationship does not imply specific research issues the actors cooperate on, but it describes an interaction which is based on sponsoring activity from industry to university. This type of U –I Relationship Alternative is less suitable for the description of IKBM and TINE relationship. The two actors are having a long story of cooperation with each other on specific issues and it is not only based on the "distant" financial support and some contributions from TINE to IKBM. The relationship between the parts is characterized by more advanced channels of interaction.

When it comes to cooperative research and knowledge transfer, these channels are more suitable for the description of interaction channels between IKBM and TINE. The way the interactions are organized and are functioning shows also what are the reasons for success in this cooperation.

b) Cooperative support: Cooperative support is characterized by a higher and closer degree of interactions and include contract research, consulting by faculty and different arrangements for discussing immediate industry problems. These activities are a part of interaction channels between IKBM and TINE. As it was described before, the research tasks IKBM conduct for TINE are often concrete analyses. Each research task is manifested by a contract which regulates under what conditions, rules, obligations both parts are supposed to conduct the research. When it comes to consulting by faculty, it also happens often that representatives from IKBM give academic expertise to their industry partners and vice versa. The representatives from TINE and IKBM also work often in project groups where they discuss current collaboration issues.

c) Knowledge transfer: Knowledge transfer is an active process that includes reading the context and culture, and modifying practices to fit the new context[35]. Knowledge transfer implies a broader activity in terms of on-going formal and informal personal interactions. Informal channels include the following modes of interaction: joint publications (IPR issues), conferences, informal meetings, personnel interactions, flow of graduates to the business sector, joint supervision of Master degree dissertations and lectures by industry members at universities. The formal channels include R&D contracts, licenses, spin-offs and joint labs.

When it comes to the knowledge transfer activities between IKBM and TINE all the channels described above are used by the partners to a greater or less degree. The "quality" of the channel for the knowledge transfer plays an important role for the success of the cooperation. The more channels are used and the better the knowledge transfer is functioning in practice, the more innovative and fruitful will be the results of the research alliance.

Informal channels of knowledge transfer

In the following the description of the informal of interaction between IKBM and TINE will be discussed. Informal ties play a significant role in the interactions between the two actors. Partners meet very often with the project research leader at IKBM and have project-related discussions.

[35] *Knowledge transfer. Sharing learning in public service organizations*. Renew Nothwest Intelligence Report, April, 2008.

When we are in it and doing a project so it is more informal, you could almost say daily communication that counts.

Interview Professor R. Abrahamsen 13.04.11

Both partners use a great amount of time on common discussions about how the particular project is advancing, what knowledge they obtain together and what new challenges might be generated from the on-going projects for the future research.

And when we run a project together, so we sit in the project teams and sharing knowledge and ideas in the project work together with IKBM and TINE. So at the project meetings there are always representatives from IKBM and TINE, so we exchange on what we have learned and what we should go on with.

Interview researcher Anne –Grethe Johansen, 13.04.11

In addition to these meetings, TINE does regularly organize internal seminars where the representatives both from TINE and IKBM take part. These daily seminars are often related to the topic of the research project the partners are working on.

Joint publication of the results is also considered to be a knowledge transfer activity with some interesting underlying issues in it. Those are related to such subjects as intellectual property rights and confidentiality between the partners.

Intellectual property rights (IPR) are legal exclusive rights which are protecting intellectual property. IPR gives the licensee the right to exploit their own intellectual inventions. The rights are crucial for innovation because they provide a financial incentive to creativity, as companies can take advantage of new inventions and thus will be more willing to invest in research and development[36].

As it was described before, the differences in objectives between academia and industry is a common issue which often leads to the conflicts between the two actors. Industry is often driven by the desire to gain profit and is not interested in publishing the results immediately. Researchers in the university are driven by the desire to create new knowledge, publish the

[36] http://www.nofima.no/mat/artikkel/hva-er-immaterielle-rettigheter

obtained results and enhance the prestige of their institution. The industrial partner's need to secure a competitive business position makes it highly desirable that university developed inventions and technologies can be protected through patenting. As a result, industrial partners are more interested in working with university researchers who have kept their work confidential and who are willing and able to assist the industrial partner obtain patent protection on commercially viable technologies. When research is done in collaboration with industry, it is industry that generally wants to dictate how intellectual property rights will be handled and shared with the researcher and the university. As a condition of providing research funding, researchers are often required to keep their work confidential in order to create a business advantage[37].

The term patenting means the protection of inventions like new products, processes for producing the product, the use of product and equipment to manufacture the product. A patent is a monopoly which is given by the government of the specific country to the commercial exploitation of the invention, in return for full disclosure of the invention. The patent prohibits others from producing, selling, processing, use, import or own invention for commercial purposes[38].

When it comes to the question of IPR in the cooperation between TINE and IKBM, the partners have clear lines about whom the results of the research belong to. When TINE "owns" the project and does the sponsoring, the results of these cooperation projects are belonging to TINE. IKBM have never tried to get a patent from this type of projects. If IKBM had a desire to get a patent on the results of the research, it might have been possible through the negotiations with TINE to apply for patent. In other types of projects, when IKBM is sponsored by the Norwegian Research Council and TINE is just an industrial partner, the results of the research are belonging to IKBM/UMB and the Institute/University is free to use these results, also for getting a patent. But even in this case IKBM "thinks" it is important to negotiate its decisions with the industrial partner, TINE[39].

When it comes to the question of publication of the research results from the cooperation between TINE and IKBM, the compromise has been found. It was not problematic for the

[37] http://www.wipo.int/freepublications/en/intproperty/928/wipo_pub_928.pdf

[38] http://www.wipo.int/freepublications/en/intproperty/928/wipo_pub_928.pdf

[39] Interview with Professor Roger K. Abrahamsen 13.04.11

partners to find an agreement on this kind of issues. Both partners "understand " each other's standing points in this research cooperation and find the right "attitude" to each other's views. IKBM has "understood" that they cannot publish all the results and that they sometimes have to wait a while in order to open results for the public. TINE, in contrast to other companies, which are preferring to keep the results of the research collaborations confidential, is willing to "hold" the academic line in its research policy and is also willing to publish the new knowledge in for example scientific magazines. This fact shows that the partners both have a "positive" attitude to the question of publishing of the results from the cooperation and it leads to the positive outcomes for both. Clear policy on the IPR issues is considered to be one of the reasons for success in the research alliance between IKBM and TINE.

Of course, the challenge for the industry is to find the balance between being a market actor and being a good cooperation partner. The representative from the IKBM says the following:

> *TINE of course wishes to own as much as possible, but if we have some different inputs or attitudes to it, so it is very easy to discuss at and agree on what should be published and what is of such nature that it would be incorrect to publish it now, but it can be published in 5 years or something like that. I think it is very important for the industrial partner that the university partner is to be trusted when it comes to confidentiality. However, one should discuss what should be mediated form the cooperation and that one is open that something is to be mediated. If we had, if TINE had been a partner who was never willing to participate in any mediation and if we only produced results for TINE in a closed room, we would not probably have worked with this type of cooperation.*

Interview Professor R. Abrahamsen, 13.04.11

The representative from TINE says the following:

> *We have a really focus on this with intellectual property rights and how we should do thing correctly, both protect our own interests, but as well do not trample over others' boundaries.*

Interview FoU director Eirik-Selmer Olsen, 14.04.11

These words show that both parts are respecting each others' point on the subject of IPR and confidentiality.

Even though the compromise between the partners has been found and both parts try their best to "adjust " to each others needs in terms of publication of the results, TINE still keeps some information which is not useful to "open up", because of its industrial interest. It does not lead to the conflict between the partners, but the publications might have less value, because some research results are chosen to be kept out of public.

> *I know that sometimes certain information is withheld perhaps, publications might loose some spread.*

Interview researcher Anne-Grethe Johansen, 13.04.11

Another channel of knowledge transfer is the flow of graduates from the university to the industry. Students from IKBM is an important sources of well-skilled academic personnel for TINE. Many persons who work with research at TINE has been studied at IKBM before. Many Master students at IKBM are choosing to work with the topics for their Master thesis which are connected with the areas TINE is interested in. The students work with their Master thesis either at Ås and have a second supervisor at TINE, or they might choose to sit at R & D department in Kalbakken or Måltidetshus. Most part of the student are working with their thesis in Ås. It has also come an arrangement on that the students who work with the topics which are relevant for TINE, are getting an operational support-10000 crones. The sum is given as a financial support on order to help with the expenses at the Institute. Many students who cooperate with TINE on their Master thesis, are getting employed by TINE in the after time. Some students are getting a job at TINE as Trainee, which lasts for 2 years[40].

Formal channels of knowledge transfer

The formal channels of knowledge transfer include R&D contracts, licenses, spin-offs and joint labs. R&D contracts is the usual form for knowledge interaction and is described above. Spin –offs and joint labs are both two channels of knowledge exchange between TINE and IKBM. The concept of spin-off can mean many different activities. The official meaning of the spin-off concept is the research –based innovations or the activity of exploiting knowledge developed by the universities for the commercial use. It was mentioned before that the research cooperation between the partners creates several spin- offs at the IKBM. In the

[40] Interview with Johanne Brendehaug, Research chef at TINE, 31.05.11

context of research collaboration between IKBM and TINE the concept of spin –offs is used to define for example a new method on the instrument or new idea for future research projects. Another form for spin-offs might be that the Institute define a new research topic for Master thesis.

When it comes to joint labs, it is not often that the researchers work together in the same labs, but it happens on some projects and the stuff from TINE is using the labs at IKBM. The researcher Anne-Grethe Johansen, as it was mentioned before, is working both places and the knowledge exchange process is therefore effective between the partners.

d) Technology transfer: Technology transfer is the last component and is also highly interactive activity. This type of knowledge exchange activity is characterized by that the university provides patens or license to the industry while the industry addresses a special problem to the university and uses their own knowledge base together with the technology from the university. In the case of TINE and IKBM research cooperation it is TINE who "orders" research tasks at IKBM and they work on the research problems together, so this type of knowledge transfer is not used in this cooperation.

4.2.3 Psychological factors

There are multiple factors which are valuable for the success in the research collaboration, but the key factors are psychological factors. Psychological factors include mutual understating between the partners, good personal relationships, trust and commitment. All these four factors are key factors when it comes to the effectiveness of the cooperation and its success.

3.Psychological factors:

a) Mutual understanding

b)Trust

c)Commitment.

d)Good personal relationships

As it was described in part 2, these four factors can be described with one word-social capital. Social capital is developed though personal meetings and often interactions between the partners. Representatives from IKBM and TINE meet very often while working on some specific project and discuss the issues. They also have internal seminars, courses where the

partners exchange the experience gained from the projects. Representatives from IKBM give specific courses to TINE and representatives from TINE like for example the researcher Anne-Grethe Johansen sometimes gives courses to the students at UMB. The interactions take multiple forms. It explains why the cooperation functions as good as it does.

Another factor which shows the grade of trust between the partners is the absence of hidden agendas. The partners don not conduct any activities like presentations of the materials connected to the research projects, any seminars or publication work without another part being updated about it. Every activity connected to the research collaboration is done through mutual agreement. They both express the same idea that this research cooperation is characterized by good personal contacts and trust.

The confidence in the atmosphere that we have in the projects now is largely based on personal networks and trust from TINE and of course vice versa.

Interview Professor R. Abrahamsen, 13.04.11

4.3 Reasons for success

The second research question of this paper was to reveal the reasons for success of the research collaboration between TINE an IKBM. Many of the reasons were already directly and indirectly mentioned above. After analyzing organizational factors,

U-I Relationships Alternatives and psychological factors

the following reasons for success of the research collaboration between TINE and IKBM have been identified: historical reasons, good project management, strong personal relationships, strong research base at both actors, clear understating of each others' environment, needs and goals, trust and no hidden agendas,

4.Reasons' for success

a)Historical reasons

b) Good project management

c) Strong personal relationships

d) Strong research base at both actors

e) Clear understanding of each others' environment and needs

f) Trust and no hidden agendas

g) Flow of graduates

h) Clear policy on publication and IPRs

flow of graduates and clear policy on publication and IPRs.

Such factors as strong personal relationships, trust and no hidden agendas, flow of graduates and clear policy on publication and IPRs were already described in parts 4.2 and 4.3.

This factors are playing a crucial role for the success in the research collaboration between TINE and IKBM. Other factors like historical reasons, good project management, strong research base at both actors and clear understanding of each others' environment, needs and goals will be closer discussed here.

Historical reasons

Norway is not a very big country and there are few actors operating within the dairy industry. As it was said before, TINE is practically a monopolist actor in the dairy industry in Norway. IKBM is the only Institute with a specialty within dairy and dairy technology. Dairy technology means the production of different products made of milk. Dairy technology is closely connected to the activity at the dairy firm. It was "natural" for the two actors to start working together on the research issues as they understood the need for each other's qualifications. The university could give the industry advanced scientific results which would help the industry with innovation practices. The Industry could give the university new tasks and challenges which are related to the real market needs, so that the university could get an interesting platform to work with the up-to date tasks.

The dairy part of IKBM has always been involved in the cooperation with dairy industry. Professor R. Abrahamsen from the research group "Dairy Technology and Food quality" at IKBM is saying the following about the cooperation with the industry:

> *So it has always been like that. As long as anyone can remember before my time that they were cooperating with the dairy industry. Also for my predecessor and the predecessor of my predecessor, so everyone who was before me.*

Interview Professor R. Abrahamsen, 13.04.11

Good project management

By project management is meant the activity of planning, organizing and distributing the right resources to obtain successful results and achieve goals in the project. Despite of the type of project, project management typically follows the same pattern[41]:

a) Definition: defining of the goals and expectations from the project

b) Planning: planning of all the activities in the project and their deadlines time

c) Execution: defining how many resources and how much budget is supposed to be used in the specific project

d) Control: updating the project plans to reflect actual time elapsed for each task

e) Closure: analyzing the final product of the project

The project management in the research collaboration between TINE and IKBM seems to be functioning very well. The partners have clear goals about what they want to achieve in their work. Although in the research cooperation it is difficult to predict the end results, the partners should have clearly defined directions and goals. All the activities at IKBM are planned clearly in terms of goals, deadlines, budgets, use of equipment, analysis of final results. One of the most important phase of the project management is the first one –defining of goals and expectations. It is the phase which mainly defines the success of the project. Here the partners in the research cooperation are very careful and devote a good time to the preparatory work before the project start date. The partners discuss all possible scenarios and try to predict various conflict situations. That fact that the partners has almost no conflicts in the research collaboration is also due to the good planning work which is done in advance.

The role of "project manager" at IKBM is taken by the Professor Roger K. Abrahamsen. He is the front contact person between IKBM and TINE. The personal qualities of being a project manager is also important for the success of the cooperation. He plays a crucial role in the organizational work for both parts. His skills including both good academic skills of the

[41] Project Management Basics http://www.mpug.com/Pages/WhatisProjectManagement.aspx

subject and good managerial skills put him in a significant position which is valuable for both parts.

Strong research base at both actors

A very crucial reason for the success in the research cooperation between IKBM and TINE is the fact that the industry partner, TINE, has a very strong research base. It was mentioned before that the company is very focused on conducting advanced research in order to innovate. It is often the case that the industry "comes" to the university with "just fix it"-attitude without having any ideas about the problem or any deep insight in how the things work. In the case of TINE and IKBM cooperation, both parts "talk" the same language, partners understand the technical side of the problems and what are the possible solutions for these problems are. They also manage to divide the tasks between each other, so that an actor with best suitable skills conduct the type of task "he" can do best.

The representative from IKBM gives the following comments on this issue:

> *In cooperation with TINE so it is obvious success factor that TINE themselves academically, are academically strong. TINE is research and knowledge –oriented so that when they discuss with us, they are able to evaluate our views.*

Interview Professor R. Abrahamsen, 13.04.11

Clear understating of each others' environment and needs

Cultural "gap" between academia and industry includes differences in goals, assumptions, final objectives, needs and other issues. IKBM and TINE know each other's needs and have adjusted to each other's needs and expectations.

> *We have an ongoing good relationship, so that we develop the ideas together. But at the same time in the way that we understand that the industry has one need and the industry understand that we may have slightly different need from the results of the collaboration.*

Interview Professor R. Abrahamsen, 13.04.11

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4.4 Short summary

In the first part of this chapter the results and analysis of the study has been presented. IKBM and TINE relationship was described with the help of University –Industry Relationship Schema (Figure 2). The organizational factors represent the description of the practical issues, U-I Relationship Alternatives describe different channels of interaction between the two actors and psychological factors indicate the main reasons for success of the research collaboration. In the second part of this chapter the reasons for success of the collaboration were described in details. The data from the interviews were presented in the way which could best reveal the views of both collaborators.

5.0 Conclusion

In this paper I have tried to answer the two research questions: to give the description of the research collaboration between IKBM and TINE and to define the reasons of the collaboration's success.

The topic of university-industry collaboration is not very well researched and there is no standard model which could be applied for the studying of U-I relationships. I elaborated by own model based on the model University –Industry Evolutionary Schema previously elaborated by M. Feldman and A. Link in their article "Innovation policy in the knowledge-based economy." It was very challenging to combine in one model all the factors which I found were significant for the description of the U-I cooperation, but I hope that I identified the most important ones in order to make the description complete.

The key reasons for the success of the research cooperation between IKBM and TINE are identified to be the following: historical reasons, good project management, strong personal relationships, strong research base at both actors, clear understating of each others' environment and needs, trust and no hidden agendas, flow of graduates and clear policy on publication and IPRs. Human factor seems to be the most important for the success of this collaboration.

The success moments of IKBM-TINE research collaboration can be used as the guidelines by the other collaborative research partners, as a means of systematically improving research collaboration practices.

Limitations of this research

In the process of studying the research collaboration between TINE and IKBM I have found out that the external factors like governmental policy play a significant role for the successful functioning of the U-I collaborations. This fact can be a basis for the future research of the University-Industry cooperations.

On the whole, the work with the research topic was very exciting, as well as rather demanding.

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Appendix:

Appendix 1

Interview guide for TINE researcher Anne-Grethe Johansen

Date and time: 13.04.11 at 11 p.m.

Background

- Can you tell about your background.
- How long have you been working at TINE since you graduated from UMB?

Work tasks

- Can you specify your work tasks at TINE SA?
- What does your job at IKBM include?
- What do you find most interesting about your job?

Collaboration

- How does the knowledge exchange between the two actors happen?
- How do you access your role in the collaboration between TINE and IKBM? Your role encompasses both the role of industry and university researcher. Is your position unique in the cooperation?
- Is it usual to organize the cooperation between industry and university this way?
- Do you feel that the cooperation functions well in the way it is organized?
- Why is this cooperation positive both for TINE BA and for UMB?
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TINE BA AT UMB

- Can you describe the science park at UMB?
- What facilities do you have available at UMB?
- What is Pilot Plant?
- How is the research being conducted practically? Do the researches work together all the time or do they divide some tasks?

Research conduct

- What is your role when it comes to the establishment of contacts between UMB students and dairy industry?
- Are there many confidential issues in your work?
- Do you take part in the joint publication of the research results?
- Do you feel that there is interest conflict between the partners?
- What improvements have to be made in order to make the collaboration more productive form your point of view?

Appendix 2

Interview guide for Professor Roger K. Abrahamsen

Date and time: 13.04.11 9 p.m.

General "attitude" on the cooperation between TINE and UMB.

- Can you tell a little bit about your background and how did you got involved in the research cooperation with TINE?
- What is your role in this collaboration?
- When did a close collaboration actually start?
- Do you feel that UMB is an important contributor in this cooperation?
- Are you free to try new ideas (university) or is it more like you get clear directions form Tine on what work to perform?
- Do you feel that you have the same interests in this cooperation or do partners often have different expectations in this research collaboration?
- What do you think are success factors in this collaboration?
- Do you feel that you have a good communication with your partner?
- Do you feel that you get a good feedback on the work done?
- How is it when it comes to punctuality in this collaboration?
- The importance of confidence between the partners.
- Do you perceive this collaboration as challenging?
- What challenges does UMB see in this cooperation? Are there any issues that UMB finds difficult to cooperate on?

The administrative organization of the cooperation

- Is there any special university/faculty policy which forces you to commercialize the research results?
- Is there any formal agreement between the partners on how they work on the projects?
- What kind of research tasks do you perform for Tine ? Is it the same types of tasks you perform for TINE or is it always quite innovative and different tasks?
- Is it like small research tasks or the comprehensive research of the whole new product which TINE BA producing?
- Is it more formal or informal guidelines for the research cooperation?
- How does the transfer of knowledge happen?
- What role play personal networks in the collaboration? You mentioned before that many of TINE workers are your former students?
- Where lay physical laboratories at UMB? Does it have enough capacity for the research?
- How would you describe the relationship between the basic research and applied research at IKBM? Are there many ideas which were commercialized?

- Where do the ideas for the projects come from and who makes the decision about which issue is it going to be researched on?
- How does the funding of the projects happen? Does UMB sponsor a big part of the projects or is it TINE who makes the most of the contributions?
- Who provides technological equipment for the research?
- How does the cooperation influence the scientific publishing at IKBM and eventual patenting?
- How is the co-publication of the scientific results organized?
- Is most of it confidential?
- Do you perform the consulting practice for TINE or other actors?

Results and implications for the future research cooperation between IKBM and TINE

- What are the main positive results of this collaboration seen from the side of UMB?
- What do you think your work gives to TINE SA (new knowledge, qualified work force)?

- What specific actions should each of the research partners take in order to improve current and future collaborations?

Appendix 3

Interview guide for TINE FoU director Eirik-Selmer Olsen

Date and time: 14.04.11 9 p.m.

Background

- Can you tell a little bit about your background?
- Can you tell about your main work tasks at TINE BA?

TINE BA-UMB cooperation

- How long have you been involved in the cooperation between TINE and UMB/IKBM?

Decision making

- TINE BA has its own research laboratory, but the company chooses anyway to outsource its research activities to UMB/IKBM. What motives lie behind this decision?

TINE –UMB/IKBM cooperation

- Why was UMB chosen by TINE as a collaboration partner?
- Do you feel that you have a good communication with your partners at IKBM?
- The importance of trust and commitment in the cooperation.
- The importance of confidence between the partners.
- Do you perceive this collaboration as challenging?
- What challenges does TINE see in this cooperation?
- Are there any issues which TINE finds difficult to cooperate on?

Source of ideas

- Is UMB an important source of information for innovation in TINE?
- Do you feel that partners often have different expectations in this research collaboration?

Success factors

- From your point of view, what are the success factors in this cooperation?
- If the conflict happen:
    1. How often do they happen?
    2. How do both partners handle this issues?

Scale of engagement

- How big part of R and D activities you outsourcing to UMB in relation to in-house R and D activities?

Communication

- How often do you contact IKBM?
- In what way du you typically communicate with your partner? (via telephone, meetings, communication at informal events)
- Informal channels of communication. Can you tell about it?
- What do results from UMB/IKBM give to Tine? (better quality, cheaper products, cost reduction)
- Is the cooperation aiming at special results or is it more like for maintaining academic activities within industrially relevant topics for TINE?

Performance

- How important is it for TINE to fund master students from UMB?
- How does the funding of the projects happen?
- How is the co-publication of the scientific results organized?

Evaluation

- All in all, how would you describe the research cooperation between TINE and UMB/IKBM?
- What are the main positive results of this collaboration seen from the side of TINE?
- What do you think your work gives to UMB/IKBM?
- What specific actions should each of the research partners take in order to improve current and future collaborations?

Appendix 4

Interview guide for TINE FoU chief Johanne Brendehaug

Date and time: 31.05.11 13 p.m

- Can you shortly describe your position and specify your tasks at TINE?
- What institutes at UMB does TINE have research collaboration with?
- What parts of IKBM institute does TINE have collaboration with?
- Can you describe the organizational structure at TINE's research department, I am especially interested in the department (contact persons) who work with dairy department at IKBM (Matvitenskapsvirksomhet at IKBM)?
- Can you tell what is a project group and how do they relate to IKBM?
- Can you tell about the financing of mater projects at IKBM?
- What kind of tasks does TINE outsource to IKBM (Matvitenskapsvirksomhet I IKBM)?
- Why do you think the cooperation between TINE and IKBM functions as good as it does?
- How would you describe the overall research collaboration with IKBM?
- Are there any issues which you find it difficult to work on?
- What potential opportunities do you see in order to improve this collaboration?