University-Industry Collaboration: The Case of Jammerbugt Municipality

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1 Preface

The 9th semester of my MSc in Innovation, Knowledge and Economic Dynamics was spent as a trainee at Business Centre Jammerbugt - Erhvervscenter Jammerbugt – where primarily I worked on a project of competence development in the organizations in Jammerbugt Municipality, but also I worked on how to facilitate the implementation of strategies in the municipality's minor organizations. After my traineeship I wrote a semester project on how the business centre fulfilled their objectives for the years 2009-2011.

Now, writing my Master Thesis on my 10th semester, once again I have the opportunity, and pleasure, to collaborate with Business Centre Jammerbugt. Among other things the Business Centre has an objective to enhance the local organizations' collaboration with knowledge institutions, including Aalborg University. Therefore it is of importance to the Business Centre to examine the factors that influence this knowledge collaboration positively and negatively so they can adjust the way this issue is addressed. The thesis collaboration will therefore provide insight into university-industry collaboration and the barriers associated with this, by e.g. examining the existing literature's main perceptions of barriers in such collaborations, and compare these to case data from some of the municipality's organizations.

My supervisor on this Master Thesis was Associate Professor Jesper Lindgaard Christensen from the Department of Business and Management at Aalborg University. I would like to express my special gratitude to Jesper for his help and advice during this process.

I would also like to express gratitude to Business Centre Jammebugt for the ongoing collaboration throughout the years, which lead up to this Master Thesis collaboration. Special thanks to the former manager of the Business Centre, Povl Bjarne Jensen, without whose support neither my semester as a trainee at the Business Centre nor this Master Thesis collaboration would have become a reality also his help and advice during the entire thesis process and the process of screening possible case organizations. In addition special thanks to Business Consultant Søren Westergaard for his help in screening possible case organizations.

Last but not least I would like to express my special gratitude to the organizations, which willingly participated as case studies in this Master Thesis. I very much appreciate the time and effort all the organizations put into helping me in collecting data. Special thanks to;
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Table of Contents

Tables, Figure and Graphs:

Table 1: Motivations for, benefits of and barriers to U-I collaboration (Theory), pp. 34
Table 2: Barriers to collaboration from industry's point of view (Theory), pp. 35
Table 3: Costs to university-industry collaboration (Theory), pp. 35
Table 4: Case organizations, facts, pp. 54
Table 5: Case organizations, facts – continued, pp. 56
Table 6: Contact and duration of collaboration, pp. 57
Table 7: Previous collaboration, pp. 57
Table 8: Case data – motivation, pp. 58
Table 9: Case data – benefits, pp. 60
Table 10: Case data – costs, pp. 60
Table 11: Case data – barriers, pp. 62
Table 12: Case data – proximity, pp. 65
Table 13: Case data - type of knowledge, pp. 67
Table 14: Education and unemployment in Jammerbugt Municipality 2010, pp. 68
Table 15: Education and unemployment in Denmark 2010, pp. 69
Table 16: Barriers, also seen in theory, pp. 90
Table 17: Barriers found, could pose problem, pp. 90
Table 18: Barriers found, but did not/not likely to pose a problem, pp. 90

Figure 1: The Triple Helix of university-industry-government, pp. 36

Graph 1: Business Demography 2009, pp. 70
Graph 2: Innovative organizations in Denmark and Northern Jutland in 2010, pp. 71

2 Abstract

Dette speciale er udført i samarbejde med Erhvervscenter Jammerbugt. Formålet er at undersøge Jammerbugt Kommunes virksomheders samarbejde med universiteter. For at fastslå et relevant område indenfor virksomheders samarbejde med universiteter blev den eksisterende litteratur grundigt undersøgt og overvejelserne om specialets retning drøftet med erhvervscentret. Dette ledte til følgende hovedspørgsmål samt to hypoteser:

- *Den eksisterende litteratur giver nogle bud på den generelle opfattelse af barrierer over for virksomheders samarbejde med universiteter. Adskiller de barrierer, man finder i Jammerbugt Kommune, sig fra disse?*
a) Nærhed har indflydelse på typen af barrierer, der findes i Jammerbugt Kommune.
b) Typen af overført viden er forskellig inden for kommunen.

For at komme med et bud på dette blev de generelle opfattelser af barriererne til dette samarbejde, samt motivation, nytte og omkostninger ved samarbejder undersøgt via den eksisterende litteratur. Endvidere er der inddraget teorier om økonomisk geografi, typer af viden, samarbejder mellem virksomheder, universiteter og forskellige politiske niveauer, erhvervsservice, samt by og landområder.

Der er som empiri valgt at udføre ti case studier i virksomheder beliggende i Jammerbugt Kommune, der enten har haft, eller har forsøgt at opnå, samarbejde med et universitet. Resultaterne fra case studierne dækker empiri omkring motivation, nytte, omkostninger og barrierer til samarbejde mellem virksomheder og universiteter, økonomisk geografi og typer af viden. Derudover er der fundet empiri omkring erhvervscentret og Jammerbugt Kommune.

Gennem diskussion af de nævnte teorier og empiriske resultater blev det fundet, at der var en række forskellige barrierer til samarbejdet. Nogle af disse passede ind under den eksisterende litteraturs barrierer til samarbejde, en række indledende barrierer viste sig ikke at udgøre barrierer under virksomhedernes samarbejde med universitetet, og yderligere adskilte en del af barriererne sig fra den eksisterende litteraturs barrierer. Det blev samtidig fundet, at økonomisk geografi godt kunne forklare noget af grunden bag nogle af barriererne, samt at den økonomiske geografi i sammenhæng med andre faktorer kunne være årsag til, at der blev fundet en række barrierer, der alle indeholdt et element af, at case virksomheden mangler viden omkring universitetsverdenen. Desuden blev det fundet, at typen af overført viden måske nok mest var af typen explicit, men at typen tacit viden også blev overført til virksomheder med stor geografisk distance til universitetet, hvilket kunne tyde på, at deres store sociale og organisatoriske nærhed til samarbejdspartneren opvejede den store geografiske distances negative effekt på dette.

3   Introduction/Problem Statement

This chapter will provide a short introduction to Business Centre Jammerbugt and its field of activities, as well as a brief review on some of the literature already published on different aspects concerning university-industry collaboration (U-I collaboration). The idea is to give an overview of some of the aspects which have previously been investigated, with the purpose of finding a new perspective for further investigation in the field of U-I collaboration. Through this, the problem statement will lead to a research question and hypotheses, which will form the foundation for further investigation.

This thesis has, as written in the preface, been made in collaboration with Business Centre Jammerbugt. The business centre is a separate wing of the local authority in Jammerbugt Municipality, therefore they work with all organizations based in the municipality, which could be in need of the services provided by the business centre; this could for instance be strategic development, competence development, entrepreneurship courses and assistance related to export (Business Centre, 2012). One of the objectives of the business centre is to enhance the accessibility of knowledge through collaboration between the organizations based in the municipality and different knowledge institutions, among them Aalborg University (AAU). The idea is that the knowledge transferred will affect the profit and employment in the municipality's organizations positively (Jammerbugt Kommune, 2011:2, 12). This objective will be the main focus for the thesis collaboration with Business Centre Jammerbugt, but to further limit the field of activity, it has been decided that the thesis will focus on U-I collaboration and thereby leave out other knowledge institutions. For further elaboration on this, please study the methodology chapter.

Literature provides some insight into whether it is sufficient to provide industrial services on a national level or whether management from a regional or local level is needed. For instance, Boschma (2004:1004-1005) examines the competitiveness of regions and finds that, just as organizations compete to gain growth, regions in most cases also compete with each other. Although in some cases the growth rate of a given region can depend on the pure luck of having very well performing organizations, which perform better than organizations in other regions, and therefore the region as a whole performs better than other regions, regions do also compete when they are in similar markets as other regions. Boschma says that it could also be claimed that regions always compete on attracting talent and investment to their particular region, just as it is described that regions compete about shares of the national or global economy. Here successful regions will gain a higher share of the total economy at the

expense of less successful regions, which will experience a decrease in their share of the total economy.

During this it is stated that though regions compete against each other over the shares of the national and global economy, this competition must in general have a positive effect on the overall Danish economy, as competition pushes the regions and the organizations in these, to evolve and advance their technologies. Therefore it must also be of interest to have more locally embedded industrial services, which can help develop the organizations in accordance with the business structure and competences available in local areas.

When examining the literature on U-I collaboration it can be seen that it is not a new phenomenon but has existed for quite a long time. Studies have shown that, in the mid-nineteenth century, there was collaboration between university and industry (Valentín, 2000:171). However, since the 1970s the university-industry technology transfer has increased a great deal; amongst other things, the reasons for this increase could be the organizations' need to develop new technologies more rapidly due to global competition (Sanchez et al., 1995:613). So where the organizations in the past focused on in-house activities, restricted resources and expertise, this is more difficult in the current economy e.g. due to rapid changes in technology (Santoro et al., 2002:1163). In the report *"Higher education and regions: Globally competitive, locally engaged",* OECD (2007a:20) drew attention to the existing collaboration between university and industry, where the main focus has been on knowledge creation towards the national/global economy, they see that the focus has widened and now also includes more knowledge creation towards the local/regional economy. In recent years it has been commonly acknowledged that a primary factor for economic growth in an organization is its ability to create and apply new knowledge in its field of work, and as universities are an important source of new knowledge, the focus on U-I collaboration is still an important factor (Petruzzelli, 2011:309).

As stated above, the phenomenon of U-I collaboration has existed for a long time, and therefore the quantity of research articles in this field is also quite extensive, so in order to find a perspective for further study, the following will contain some perspectives from the already existing literature on U-I collaboration. The following will not provide a deep insight into the field, as the literature is also discussed in the theory chapter; therefore further elaboration on the subject can be found in the theory chapter.

In the existing literature the point of departure varies, but it can be concluded that the field of research, when looking at U-I collaboration, has some main areas as point of departure. For instance, a number of research articles focus on the university point of view. In these articles the focus is connected to aspects concerning the university, the faculties and the professors.

For instance Lee (1996) examines different faculties' collaboration with the industry and, among other things, the willingness to receive funding from private organizations to carry out the professors' own research and if this will affect the research in any way, and where the academics will draw the lines when engaging in U-I collaboration. Another article with the university point of view is Azagra-Caro (2007). In this article focus is on the personnel who are involved in U-I collaboration by, for instance, finding out what type of faculty member that interacts in collaboration, and if they interact with specific organizations or every type of firm.

In the existing literature of U-I collaboration, another point of departure in a number of research articles is to investigate both the universities and the industries, with no preference to either one of them. One of the articles with this point of view is Bruneel et al. (2010). In their article they aim at investigating the factors that diminish the barriers of collaboration. Among other things, conflicts in connection to intellectual property are examined and also an organization's prior experience of collaboration with universities during research projects is examined, to see if this has an influence on the further collaboration and the barriers connected to that. Lee (2000) also has the perspective of both university and industry. Here it is examined what the expectations are when engaging in a joint collaboration and what the partners in the end received from such collaboration. Also Sanchez et al. (1995) provides the perspective of both university and industry in their article concerning the peripheral region Aragon in Spain. Some of the aspects examined are the region's Technology Transfer Points and the effects they have had on the extent of collaboration, as well as ways to engage in collaboration and benefits and disadvantages connected to U-I collaboration.

A main focus on the industry seems not to be as common as the above two points of departure, but still, a number of the research articles have the industry as a main focus. One of these articles *"Firm size and technology centrality in industry-university interactions"* (Santoro et al., 2002) investigates, among other things, large and small organizations to examine if they engage in collaboration with universities to build competences in core or non-core technological areas. Also the article looks upon university research centres and the role they have in the collaboration. Riis (2001) provides another article with some focus on the industry. In the article different perspectives on benefits and pitfalls by engaging in U-I collaboration are given.

The above shows that research articles in the field of U-I collaboration are viewed upon from both sides of the collaboration, university and industry, just as a number of articles provide insight into the collaboration with no preference to either one of the collaborating partners, but investigate both the university and the industry. Within these three main areas as points of departure a number of articles focus on barriers connected to U-I collaboration. For instance, Valentín (2000) investigates if, among other aspects, culture, intellectual property, patent and communication create barriers for collaboration. Bruneel et al. (2010) investigate, as

mentioned above, conflicts connected to intellectual property rights (IPR) and prior experience in collaboration. Also the university administration is looked into when the barriers to collaboration are investigated in this article.

During the introduction/problem statement it was briefly shown that Jammerbugt Business Centre provides different services to the municipality's organizations, and that the business centre has as an objective to enhance the collaboration between organizations and knowledge institutions. It was also found that regions compete over shares of the national or global economy, attracting talents, and investments. It was also seen that U-I collaboration is not a new phenomenon, but as the creation of new knowledge is of importance to organizations in a globalised competition, it is still of importance to improve the conditions for, and look upon other aspects concerning, U-I collaboration. Also a short review of the literature of U-I collaboration was provided, from which it was seen that the articles have different points of view for their research, and also that a number of the research articles in this field provide different aspects on which barriers there are to collaboration between university and industry.

4   Research Question

From the above chapter it was seen that the Business Centre in Jammerbugt Municipality had as a objective to enhance the accessibility to knowledge for the organizations based in the municipality by focusing on collaboration with different knowledge institutions, among them AAU. A short review of the existing literature on U-I collaboration was also provided in order to find a perspective for further investigation. It was seen that the field of study is very well documented as U-I collaboration is not a new phenomenon. A number of these articles look into different aspects that might have an influence on whether to engage in U-I collaboration. The most common of these barriers in the existing literature could be categorised as the main perceptions to U-I collaboration.[1] This has lead to the following research question;

- *Existing literature provides some main perceptions on the barriers to university-industry collaboration. Do these barriers differ from those seen in Jammerbugt Municipality?*

Hypotheses;
- Proximity has an influence on the matter of barriers seen in Jammerbugt Municipality.
- The type of knowledge transferred is different within the municipality.

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[1] For further elaboration on the different barriers to university-industry collaboration mentioned in the existing literature, see the theory chapter.

5   Methodology

The primary aim of this chapter is to explain the methodological approach followed to help answer the research question and hypotheses. After explaining the methodological approach, there will be a section presenting the project design; afterwards another section will provide different delimitations to limit the field of research in an effort to involve only the elements of importance to the thesis collaboration and to answer the research question. Finally a section will describe the sources chosen to provide the theory and empirical data used in this master thesis. The chapter on methodology is fairly long, deliberately, as describing the methodological approach chosen and the use of it in accordance with the existing theory on methodology is seen as an important factor in being able to conduct a sound and valid report when using case studies.

5.1   Methodological Approach

During this section the methodological approach will be examined. This is important as the criteria have to be understood when collecting and analyzing data material to be able to provide valid documentation and conclusions on the research topic. Aspects such as the choice of method and lacks related to this method will be described in the first paragraph, while the second paragraph provides insight into the case study design, interview guideline, and the number of cases chosen in this study. The third paragraph discusses some of the preparations needed before collecting the case study evidence, among others, skills of the investigator, protection of respondents, the case study protocol and its use, screening for candidates, and using pilot cases. The fourth paragraph provides views on the approach to collect the case study evidence, while the fifth and last paragraph deals with the analysis of case study evidence. Through these paragraphs, explanations as to why the case study method has been chosen will be provided, and they will also describe the methods used in preparing, executing and analyzing the case studies and tie these to the entire project.

5.1.1   Choice of Methodological Approach

The methodological approach chosen for this master thesis involves the usage of case studies, which have been carried out in a number of organizations located in Jammerbugt Municipality. There are a number of reasons for using this qualitative methodological approach compared to using quantitative methodologies, such as surveys, for analysis of the described problem statement and research question. Yin (2009:19) states that the case study method is not only a qualitative research method, but some case study research uses a mixed method by combining qualitative with quantitative research methods. Yin (2009:2) states that this case

study research method is preferred to other research methods when; the posed question is in the form of *how* or *why*, there is little control over events, a contemporary phenomenon within real-life context is the focus of the research. If the focus is on *what* questions Yin (2009:9) describes that these sometimes are exploratory, and that exploratory studies can take many forms, among others, the research can be conducted by using case study methods or surveys. This master thesis examines real-life context and to some extent is also an explorative study – among other things, what are the motivations and barriers to U-I collaboration seen from the organizational point of view in Jammerbugt Municipality, as compared to those seen in the existing literature. In dealing with real-life context Yin (2009:18-20) states that case studies can handle the complexity of this type of research. This is an advantage compared to using for example survey methods, which are not able to cope with this type of complexity. And during a survey there is also the struggle to limit the number of variables which have to be analysed later, which also limits the number of questions, in an effort to target the respondents who can be surveyed. If the chosen methodology for example was a quantitative approach, such as using surveys, this would require the usage of sampling logic. According to Yin (2009:55-56) statistical procedures would here help select specific respondents, out of a pool of potential respondents. By this, the conclusions drawn from the survey would assumably reflect the entire pool of potential respondents.

The approach chosen is, as stated, to use case studies – a qualitative approach. This choice also has to do with the area of investigation being restricted to a municipality – Jammerbugt Municipality – and therefore cannot reflect the entire population's opinions related to motivations, benefits, costs, and barriers during U-I collaboration. If the sampling logic was applied to the case study this would, due to the necessity of statistics in calculating on the relevant variables, require a considerable number of cases. Another aspect is that a more rigidly built survey would become too superficial, which has to be understood in the way that the limits of a survey would not allow for further immediate elaborating questions on specific statements provided by the respondent. Thus; the quantitative method provides objective and generalizing conditions, which will not be adequate in an effort to answer the research question, while the qualitative method will allow for this further elaboration and thereby, through the case studies, give access to underlying factors for the respondents' views on different aspects.

In dealing with case study research this methodology also has some lacks compared to other methodologies. For instance Yin (2009:14-16) describes how this method might face lacks because of sloppy work by the study investigator. This could for instance be due to the investigator's neglect of following systematic procedures, allowing influence on findings and

conclusions by equivocal evidence, which – Yin states – is less likely to cause problems when other research methods are applied possibly due to their more extensive methodological texts, which provide specific procedures the scientists can follow. Also there is the aspect of securing that all evidence is reported fairly so that nothing is altered to lead the study into a particular direction suited for the researcher's opinion about certain aspects. According to Yin (2009:15) there is also concern that the basis for scientific generalization is too little in doing case studies, i.e. is it possible to generalize from only a single case? To this Yin points out that case studies are generalizable to theoretical propositions, while it is not generalizable to populations. Therefore it is not representing a sample and thereby the goal of case studies is analytic generalization and not statistical generalization. Yin (2009:15) also states that one complaint concerning case studies that might be appropriate is that it takes too long to execute the case studies and that the end result is a substantial amount of unreadable documents. Though this is not necessarily the case in doing case studies nowadays, it was the way of doing case studies in the past. Among other things, Yin states that one does not have to spend long periods of time in the field to do observations and field studies. If done properly they can be executed in a shorter time, and also in some cases it is possible to execute high-quality valid case studies by using telephone or internet. Even though it has been tried to account for these and other lacks and difficulties in doing case studies, these are still difficult and remarkably hard to do (Yin, 2009:16, 21).

During this master thesis some systematic procedures have been followed, in an effort to make sure that the investigator would not negatively influence the findings, for instance a pilot case has been used during the preparation of the case study protocol. As for the duration of the collection and preparation of case study database these took a great deal of time, but this was desired to make sure that all the evidence was reported correctly and without the opinion of the investigator influencing these.

5.1.2 Case Study Design

In this master thesis the number of interviewed organizations is ten and therefore the design of this study is a multiple-case design. In nine of these organizations one case study was conducted, which Yin (2009:46) describes as holistic or a single-unit of analysis. In one of the organizations two case studies were conducted, which by Yin (2009:46) is described as embedded or multiple units of analysis. Besides these ten organizations, which were used as case study organizations to help answering the research question, an additional organization was involved in the master thesis; this organization had the function of being a pilot-case

during the construction of the interview guideline[2]. The guideline was tested on the pilot case organization in an effort to correct possible errors. When dealing with the multiple-case study, this poses both advantages and disadvantages. Yin (2009:53) states that an advantage is that the multiple-case study is being regarded as more robust than a single-case study, but at the same time not all case studies can be executed as multiple-case studies, e.g. rare cases and critical cases most likely involve single-case studies. Also, conducting a multiple-case study as an independent student or researcher is likely to require more time and resources than they are likely to have. In the multiple-case study a replication design must be followed, and not sampling logic as during surveys described earlier in this section. Through the replication design it is important that each case is carefully selected to predict similar results or predict anticipated contrasting results (Yin, 2009:53-54).

When using the multiple-case design one also has to consider the number of cases needed to secure the validity of the study. Eisenhardt (1989:545) states that it is time to stop adding cases when the researcher finds that the theoretical saturation has been reached, i.e. when nothing new is added by the respondents as the observed phenomena have been found in the previous respondents' answers. In practice Eisenhardt states that it is not uncommon that the number of cases is planned in advance, as this is often also dependent on such factors as finances and time. According to Eisenhardt (1989:545) the number of cases could be between four and ten as this usually works well. If more than ten cases are used the volume of data might be overwhelming and complex, while less than four cases is likely to be unconvincing as empirical grounding.

Yin (2009:58) is more liberal in his opinion on the number of cases in a multiple-case design, as he states that when not using sampling logic the sample size is irrelevant. This should be determined by the need or number of case replications one would like to include in the study, for example one might use two or three case replications if the study does not need a high degree of certainty, while a high degree of certainty might induce five or more case replications. This is also relevant if the study is looking for contrasting results on a specific subject. But Yin (2009:100) further states that the investigator should secure data from two or more different sources. As stated before this master thesis has collected case data from ten organizations scattered across Jammerbugt Municipality. Initially the idea was to have approximately six case organizations, and among these contact was made with four who were willing to participate. While conducting these case studies it was found that there was a need of adding more case studies. Therefore an additional six possible case organizations were contacted, which were all willing to participate as cases.

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[2] For further insight into the Interview Guideline see appendix.

5.1.3 Collecting Case Study Evidence, Preparations

In conducting case study research Yin (2009:67) says that the preparations to collect the case study evidence can be a complex and difficult task. It is stated that five topics are of importance in preparation. These are; skills of the investigator, preparation for the specific case study, developing a protocol, screening possible candidate cases, and pilot case study.

According to Yin (2009:67-72) the desired skills of the investigator should include, among other things, the ability to ask good questions, and be a good listener, which means that without bias you can assimilate large quantities of new information, while a poor listener might not be able to find information between the lines. The desired skills also include the ability to be adaptable and flexible, which is a necessity since the investigator must be willing to accept changes in the procedures as only few case studies follow their predetermined path. The investigator should also avoid bias, which can be tested by finding out how open he is to contrary findings.

Yin (2009:73-78) mentions that the preparation and training for a given case study includes human subject protection. Here Yin states that the investigator is responsible for the special care and sensitivity in a case study, e.g. that all participants in the case study know what the study is about and participates voluntarily. Also privacy and confidentiality must be protected, and special precautions to protect vulnerable groups be taken. The purpose of the training period before conducting the case studies is also to see if the case study plan has problem areas as the most common problems are flaws in study design or study question. During the preparation of the case studies in this master thesis all the organizations, which have contributed with their experience in U-I collaboration, were initially made aware that they could decide whether they would have their names in the project preferred confidentiality. In this case all the organizations involved had no objection against having the organization's name in the report. The participating organizations were also, in a few sentences during the initial phone call, made aware of the purpose and goal of the project.

According to Yin (2009:79-82) the case study protocol is an essential tool when doing a multiple-case study, but is also desirable if a single-case study is performed. The reliability of a case study is increased by using a protocol, and the protocol also helps guide the investigator during the data collection. Yin states that the protocol should contain four sections: overview of the case study project, field procedures, case study questions, and a guide for the case study report. It is further described (Yin, 2009:82-83) that the *overview* should include background information, including the purpose of the project so that the case organizations can get an overview of what they contribute knowledge to. Among other things, it is also here

project funding can be presented, if it is funded, and by whom, the reasons why the specific cases have been chosen, and the propositions or hypotheses which are examined in the project. In this master thesis these subjects are mainly covered by elaboration on the elements during the first few minutes of collecting the case study evidence at the case organizations. For example, during the initial phone call to the possible case organizations, a few sentences explained the purpose and goal of the project.

Yin (2009:83-86) explains it is essential that the *field procedures* are properly designed, as events in their real-life context are studied and not in a controlled environment, such as a survey questionnaires structured limitations. This means for instance that you cannot control if and when the interviewee has time for the interview, you must be available when he has time. Also it is possible that the interviewee does not cooperate fully or maybe does not follow your plan of collecting the evidence. It is also a fact that when using the case study method one enters the world of the subject being studied, and therefore one must be aware of his behaviour.

The field procedures also include things such as securing sufficient resources when conducting the case studies, such as having enough paper, writing instruments, and maybe a laptop, as well as being aware of what to do when unanticipated events occur, such as the availability of the interviewee or the motivation of the investigator. During this master thesis the interviewees decided what day and what time of the day they would prefer a meeting. There was never scheduled more than one case per day and preferably there would be one or more days between the case studies. This maintained the investigator's ability to be somewhat flexible if, due to unanticipated events, one of the case organizations later had to move a meeting an hour or two or even to another day.

According to Yin (2009:86-89) the *questions in a case study* are directed at the investigator himself. By this he means that the questions are a tool which functions as a reminder of the essential elements the investigator needs to collect, but may also function as specific questions which are asked during the case study. The main purpose is to keep the investigator on track during the collection of the data in the case organizations.

Yin (2009:89-91) states that the *guide for the case study report* is often neglected by the investigators, but the protocol should contain the basic outline of the case study report. This will for example make the collection of the relevant data easier and reduce the risk of having to return to the case organizations to further elaborate on elements which were neglected in the beginning. During the collection of the case study evidence the case protocol containing the questions to the interviewees was used both as a guideline as to what data had to be collected and as questions posed during the case study.

Another important aspect in preparing to collect the case study evidence is screening the possible candidates for the case study. According to Yin (2009:91-92) the goal here is to identify the cases you wish to use in the study. If these are not properly identified one might find that the case/cases represent nothing related to the field of study when the data collection has begun. Yin states that the screening could consist of talking to people who know the possible case organization or collecting documentation about it. Yin further states that the investigator should establish some qualification criteria the possible case organizations should fulfil. During the preparation of the case studies in this master thesis all the organizations were screened in collaboration with Business Centre Jammerbugt. After deciding on these specific organizations, they were contacted by telephone to see if they would participate with their experience to the project, and if so, a date was found to conduct the case study in the organizations. There were some qualification criteria regarding the possible case organizations, among these were; the organization should be located in Jammerbugt Municipality, the organizations should be scattered across the municipality in an effort to have case organizations both close to a large city and a fairly long way from a large city, the organizations must either have/have had collaboration with a university or they must have tried to find a collaborating partner from a university but due to barriers failed to begin the collaboration.

Yin (2009:92-94) describes that using a pilot case study can be helpful in further development of the questions needed to collect the data in the case organizations. Also it can be helpful in proportion to the procedures in which the data are collected. In this way it may help to try out different approaches before starting the data collection during the case studies. The pilot case is often chosen because of its convenience, access, or geographical proximity. As for this master thesis one organization was used as a pilot case. This was chosen in an effort to improve the interview guideline, both to see if there were some gaps in what data had to be collected and to see if the logistical approach chosen was suitable when conducting the case studies. After this some additional questions were added as well as rearranged a little in the logistical approach of collecting the data.

5.1.4 Collecting Case Study Evidence

In collecting the case study evidence Yin (2009:99) states that many different sources can provide the case study evidence, among these documentation and interviews. Information gained from documentation – e.g. formal studies, progress reports, and news clippings – can, according to Yin (2009:101-103), be relevant to every case study topic, for example it might be possible for the investigator to search the case organization's webpages before the field visit to gain valuable information about the organization. Through documents the investigator

can confirm and increase evidence that has been collected from other sources. In this master thesis documentary information is also used, for example the different case organizations' webpages have been used for background information before field visits. The interview, Yin states (2009:106-109), is the most important source of information when doing case studies. The interview should not be rigid with a structured line of questions, but the investigator will both have to follow the case study protocol questions and ask unbiased conversational questions. Thereby the stream of questions posed during the case study will take a more fluent form. Yin also differs in terms of interview type, for example he states that the in-depth interview might take place over a long period of time and the investigator might ask for the interviewee's point of view in certain aspects to form a further line of questions.

Yin also describes the focused interview. This type of interview might not take more than an hour or so but during this the investigator is more likely to follow the case study protocol. During the focused interview the investigator must choose his words carefully in an effort not to ask leading questions. During the investigator's reporting the responses to the posed questions during a case study interview can become subject to bias, poor recollection, and incorrect articulation. Yin (2009:109) states that recording the interviews on tape may provide a more accurate report than other methods, but this method is often a matter of personal preference, and the investigator must be aware that the method should not be used under certain circumstances such as, if the recording device creates an uncomfortable atmosphere, refused permission by the interviewee, if the recording becomes a substitute for listening during the interview, and if there is no specific plan for transcribing the content.

This master thesis uses interviews as the main source of evidence from the case organizations. The interviews are conducted as focused interviews with a timeframe in each organization of approximately one to one and a half hours. During the interviews, the first couple of minutes were used to further explain the purpose of the project and why the case studies were of importance. Afterwards the case study protocol was followed, first to elaborate on the overall facts of the interviewed organization, and second to collect the case study evidence on the organization's experience with U-I collaboration. The case study protocol was used as a guideline to what evidence needed to be collected, so the protocol questions were all elaborated on, while at the same time the organization's input was further explored by follow-up questions. The questions posed during the interviews were asked as "naive" questions in an effort to avoid leading questions, which might influence the reflections of the interviewee and thereby the responses and the findings in this project. It was chosen not to use recording devices during the case interviews due to the possibility that this could potentially limit some of the interviewee's responses, and not using recording devices creates a more "friendly" environment.

Yin (2009:114-118) further states that the benefits from the above mentioned sources of evidence through three principles can be maximized, for example he states that the use of multiple sources of evidence is a major strength in case studies, as the use of different sources on a topic provides the case study with more convincing and accurate findings or conclusions. Yin (2009:118-122) also describes that the creation of a case study database may increase the entire case study's reliability. Often it is seen that the case study report represents narrative data and maybe not adequate data. Therefore the raw data would provide the reader with the opportunity to further study the data, used in the report, to bring light to the conclusions, but often the raw data are not available for further inspection as a database has not been made. Therefore one should distinguish between the case study report and the case study database and make sure that not only the report is available but that the database is available as well. Often the case study database consists of the investigator's own notes, which may have various forms, for example handwritten, typed, or audiotapes.

The last principle described by Yin (2009:122-124) deals with maintaining a chain of evidence. In this way any reader of the case study report can trace the steps both forwards and backwards in the report. Apart from the fact that this master thesis is using multiple-cases as a source to information, there will also be used other documents in the chapter with empirical data, both to compare the case study results, but also to help in answering the general research question and the hypotheses. There will also be a case database enclosed with this master thesis. This consists of the notes taken during the execution of the case studies in the organizations. In this way the reader of this project has the opportunity to gain further insight into the case data used in the empirical data chapter. Besides the case study database the appendix to the master thesis also consists of the case study protocol containing the questions.

5.1.5 Methodology for Analyzing Case Study Evidence

In analyzing case study evidence Yin (2009:126-127) states that this primarily depends on the investigator's ability to present sufficient evidence, alternative interpretations, and his or her own style of empirical thinking. There are few formulas to guide a person through this process, and therefore priorities about what to analyze and why should be defined thereby following a general analytic strategy.

Yin (2009:130-131) claims that the most preferred general analytic strategy to follow when doing case study analysis is relying on the theoretical propositions that lead to the case study. During this, certain data may become the focus of analysis while other data are ignored. Gaps or topics of interest can be revealed by initial review of literature, which should lead to the ideas for the study framework – a theoretical orientation which guides the case study analysis. Another strategy described by Yin (2009:132-133) is to use both qualitative and quantitative data in the case study analysis, i.e. if the central case study data are qualitative but the study

also includes quantitative data, then this provides a strong analytical strategy. During this type of strategy the investigator not just needs to be able to do case studies well, the investigator may also need the skills to use statistical techniques. The general analytic strategy in this master thesis is to use the initial review of literature concerning U-I collaboration to find a new area of interest within this topic, and thereby also help in the development of the research question. By covering a substantial amount of the existing literature within the area of U-I collaboration and combining this with Business Centre Jammerbugt's objective to enhance the municipality organizations' collaboration with a university, it was found that there was a need to look at motivations, benefits, and barriers to such collaboration seen from the organization's point of view, to examine if these matched the motivations, benefits, and barriers mentioned in the existing literature.

When looking at the analytical techniques used in case study analysis, one technique – according to Yin (2009:156-160) – applies specifically during analysis of multiple cases, i.e. the cross-case synthesis. This analytic method is, compared to using a single case, likely to be more robust and easier. As this technique treats each case as a separate study, the creation of word tables displaying the individual case study data may provide the start of the analysis. The entire collection of word tables enables the investigator to draw cross-case conclusions by analysing the tables. Through this it might be possible to find similarities among certain cases, which might then be considered the same type of general case. This may lead to analyzing if these cases reflect subgroups or categories of general cases. Examining for cross-case patterns by using the word tables relies strongly on argumentative interpretation and therefore the investigator must be able to develop strong, plausible, and fair arguments based on the word table data. In examining cross-case patterns it is not possible to rely on numeric tallies. In this master thesis the cross-case synthesis is the chosen analytical technique; the empirical data chapter will include different word tables containing some of the data evidence from the complete case studies located in the appendix. By using this method the case data can be analysed both individually and together to create cross-case conclusions. Through the data it is possible to examine for example aspects of proximity, types of knowledge, motivations, benefits, and barriers to U-I collaboration. These data will also be examined and held up against relevant theory, such as theory on U-I collaboration, different aspects of proximity, and types of knowledge.
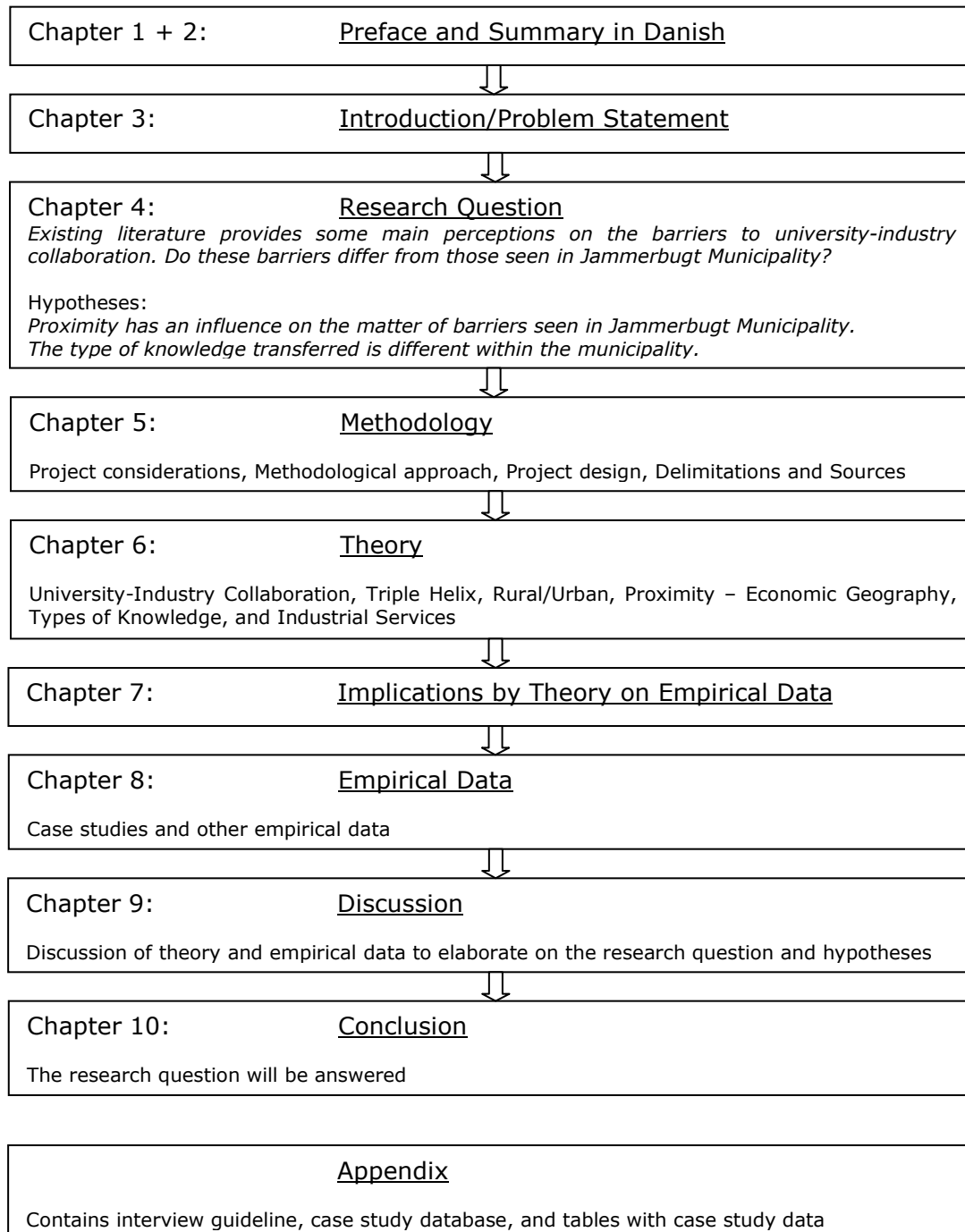
When it comes to the cases used in this master thesis it has been stated that there were 10 case organizations, while 11 case studies were conducted. The initial idea was to conduct two case studies in two to three organizations to further increase the validity of the study, but this would only be relevant if at least two employees in these organizations had been involved in

the majority of the collaboration. This was not the case in any of the organizations, where the normal procedure was that one person in the organization had the main responsibility while others were involved only sporadically. In the case organization where two studies were conducted, it was found during the first case study – Case no.6.1 – that the interviewee had not been directly involved in the collaboration but only in the initial contact with the university, and that the knowledge about the collaboration was received through discussions in the organization and was therefore second or third-hand knowledge. On the other hand the second case study – Case no.6.2 – in the organization was with the interviewee, who was also involved in the major part of the collaboration with the university; therefore he provided first-hand knowledge concerning the collaboration, and therefore more valid data. Because of the above, and because the case organization will be overrepresented during comparison and analysis with the other cases, it has been chosen to focus on Case no.6.2 and therefore remove Case no.6.1 from the tables. A complete list of tables is available in the appendix.

5.1.6 Methodological Approach, Summary

During this section on methodological approach five paragraphs have provided insight into different processes needed to conduct a sound and valid case study. It was, among other things, shown that the methodological approach chosen in this master thesis involves the usage of case studies, as it was found that this method is able to handle the complexity of studying real-life context. Furthermore it was seen that this method allowed further elaboration during the respondents' answers and thereby the ability to explore certain aspects more thoroughly. It was also shown that the number of interviewed organizations during data collection is ten, while an additional organization was involved as a pilot-case to help test the interview guideline. Also Business Centre Jammerbugt was involved in screening the possible case organizations prior to the data collection. It was also seen that the interview guideline contained the questions, which were used to secure that the data needed were collected, and that the timeframe used to collect the data in each organization was approximately one to one and a half hours. It could also be seen from the above paragraphs that a case study database has been made, and is available in full length in the appendix, along with the interview guideline. Furthermore it was seen that the general analytic strategy for this master thesis was to use the initial review on U-I collaboration literature as a means to find an interesting field of activity within this topic, and thereby also help develop the research question. The literature would then be combined with the case study data to examine different aspects of U-I collaboration. In using multiple case studies it was also shown that it is a possibility to analyze individual cases and also make a cross-case analysis.

5.2 Project Design

| Chapter 1 + 2: | Preface and Summary in Danish |

⇓⇓

| Chapter 3: | Introduction/Problem Statement |

⇓⇓

Chapter 4:   Research Question
Existing literature provides some main perceptions on the barriers to university-industry collaboration. Do these barriers differ from those seen in Jammerbugt Municipality?

Hypotheses:
Proximity has an influence on the matter of barriers seen in Jammerbugt Municipality.
The type of knowledge transferred is different within the municipality.

⇓⇓

Chapter 5:   Methodology

Project considerations, Methodological approach, Project design, Delimitations and Sources

⇓⇓

Chapter 6:   Theory

University-Industry Collaboration, Triple Helix, Rural/Urban, Proximity – Economic Geography, Types of Knowledge, and Industrial Services

⇓⇓

| Chapter 7: | Implications by Theory on Empirical Data |

⇓⇓

Chapter 8:   Empirical Data

Case studies and other empirical data

⇓⇓

Chapter 9:   Discussion

Discussion of theory and empirical data to elaborate on the research question and hypotheses

⇓⇓

Chapter 10:   Conclusion

The research question will be answered

Appendix

Contains interview guideline, case study database, and tables with case study data

5.3 Delimitations

In the existing literature on U-I collaboration the majority of the research articles focus primarily on the single university scientist and secondarily on a team of university scientists when providing insight into the university part of the collaboration. In this thesis the interaction between university and industry will not be limited to university scientists, but the collaborating partner from university can be e.g. students or a group of students, who write

their semester project or master thesis in collaboration with an organization, students in traineeship in an organization, university scientists, Ph.D.s, teams of university scientists. The primary factor is that the collaboration involves some sort of innovation for the organization participating in the collaboration, which can be anything from implementing radically new methods – strategy plans where they have never been used before, new ideas for the organization's supply chain, etc. – to the innovation of new products.

In this master thesis the focus is on universities, while other knowledge institutions deliberately have been opted out. There are different reasons for this; e.g. Business Centre Jammerbugt has an objective to enhance local organizations' collaboration with universities, and therefore the thesis collaboration with them could address this matter. By not having to incorporate other knowledge institutions it is also possible to have a deeper focus on universities, and thereby eliminate some of the risk of only scratching the surface due to a too broad field of research. But when leaving out a number of knowledge institutions, to only focus on universities, one should be aware that direct comparison of U-I collaboration in Denmark with U-I collaboration in other countries might not be possible, as there can be differences in the knowledge institutions' profiles in different countries. An example of this is given by Christensen et al. (1999:104-105). Here it is stated that there are differences in the Danish and Norwegian systems, and it was found that Danish organizations had somewhat lower collaboration rates with research institutes – including universities - than Norwegian organizations had. Christensen et al., further states that this could be caused by the fact that the Norwegian research institutes also manage some of the same activities as the Danish GTS-institutes, and these activities are in Denmark placed in another category, and thus not influencing the Danish U-I collaboration data. When mentioning this, the question arises why the Danish GTS-institutions are not included in this master thesis, but this has to do with limiting the field of research.

5.4 Sources

This section will provide a short description of the sources chosen to help elaborate on the research question and the hypotheses. The different types of sources used in this master thesis are; books describing specific topics in detail, scientific articles in a number of different fields, a few web-pages, and the semester project I wrote after my traineeship at Business Centre Jammerbugt. The main source has been the use of a number of scientific articles, within areas such as U-I collaboration, proximity, different types of knowledge, triple helix, rural and urban regions, and methodology. The books that have been used primarily provide insight into triple helix theory and methodological approaches.

During the section on methodology a few sources were used. The main source is the fourth edition of the book *Case Study Research – Design and* Methods by Robert K. Yin. This book was chosen as it provides methodological approaches to case study research in a manner which is very adaptable to use in live case situations. It provides insight into all processes from the initial state of deciding whether to use case study methods or other methods, to the process of dealing with the case study protocol, and to the analysis of the data. Besides this book one article provides insight into the number of case studies chosen. By using only a few sources there is also the risk of missing some aspects in the methodological approach which might not be described by the chosen sources, but still it is believed that the few sources provide a valid ground for the methodology chosen in this master thesis.

During the section on U-I collaboration a number of articles were chosen to provide some insight into this field of research. First the main purpose of these articles was to provide a solid basis of knowledge to be able to identify a field of activity of interest and relevance, and by this find a topic and research question for the master thesis. Afterwards the existing literature was used in the theoretical chapter, which later will be discussed in relation to the findings during the case studies and other empirical data. It is deliberate that the articles chosen on U-I collaboration come from a number of different researchers, cover a time span of a couple of decades, concentrate on different fields of activity, and relate to different areas in the world. By using this procedure the goal was to gain thorough insight into the whole field of activity. The articles were found by using different methods. First a number of articles were found by using the random method of searching for articles on U-I collaboration. After these had been studied new articles were found by semi-random methods by searching for articles within different areas under the topic, authors, and so on than the first time, and also a number of frequently cited articles were found.

In the theory section on triple helix, the main source is *The Triple Helix* by Henry Etzkowitz, as well as other articles by Etzkowitz and a few articles by other authors are used in the section. Etzkowitz is fairly recognised within this subject and also commonly cited, and including other researchers' work in the section further strengthens its validity.

In the theory section on rural and urban areas different articles have been used in an effort to describe the areas. The theory section on economic geography, however, provides insight from only one researcher *Ron A. Boschma*, which could cause validity problems, but it is found that Boschma provides the most thorough material in this field, and therefore this approach was chosen. More or less the same approach was chosen in the section on types of knowledge, where the main articles was by *Bengt-Åke Lundvall*, while Ikujiro Nonaka provided some

insight into tacit/explicit knowledge, and a few other articles provided some insight as well. During the short section on industrial services a couple of different authors provided insight into the structure of the Danish administrative system.

The main source used in the chapter on empirical data is the case study data, which were collected during interviews in ten organizations located in Jammerbugt Municipality. The methodology used in collecting the data is further described in the section *Methodological Approach* in the methodology chapter. During the analysis of the case data it is of importance that the investigator does not let his/her opinions influence the process, but is able to develop strong, plausible, and fair arguments based on the data. Therefore during this process errors would most likely be caused by misinterpretations by the investigator.

During the chapter on empirical data the majority of the data comes from the case studies conducted in the ten case organizations in Jammerbugt Municipality. The first section provides case data on aspects such as background information about the organizations, previous collaboration, motivation, benefit, costs, and barriers to collaboration, as well as data on economic geography and types of knowledge. Afterwards different relevant data on Jammerbugt Municipality will be stated; these are innovation in organizations, educational levels, and business demography. For these statistical data from Statistics Denmark's StatBank have been used in combination with own calculations on some of the statistics. Likewise three reports from The Danish Ministry of Economics and Industry will help provide insight into innovative organizations. Another section provides insight into Business Centre Jammerbugt. Here different web-pages on the business centre have been used to help describe the business centre, just as my trainee project has been used as reference, and some reports from the business centre and Jammerbugt Municipality.

6   Theory

The purpose of this chapter is to provide the relevant theory for answering both the research question and the hypotheses. The first section provides a more detailed insight into the theory on U-I collaboration than the short review given in the introduction/problem statement. Here motivations, benefits, barriers, and costs associated with U-I collaboration will be dealt with in particular. Afterwards two sections provide insight into the triple helix theory and rural and urban areas, as Business Centre Jammerbugt's desire is to bridge the gap between the municipality's organizations and universities. Also it will provide some insight into the advantages and disadvantages of rural areas, and also the areas' ability to innovate. Finally a

section provides insight into three different areas of proximity; these are economic geography, types of knowledge, and industrial services. These subjects are of relevance as different types of proximity will be used to test the hypothesis concerning proximity. The same can be said of the types of knowledge, while the industrial services provide some insight into the current administrative system in Denmark, which is of relevance for the business centre's field of activity.

6.1 University-Industry Collaboration

This section contains a more detailed review on the literature of U-I collaboration. The first paragraph will provide insight into the motivations by university and industry to engage in joint collaboration and after this a paragraph will describe some of the benefits for both parties when engaging in collaboration. This is included to focus on the various benefits that can be reaped if the collaboration is successful. Then a short paragraph will deal with the costs related to U-I collaboration, before the last paragraph will bring attention to the more common barriers found in the existing literature. This will help elaborating on the first part of the research question - *Existing literature provides some main perceptions on the barriers to university-industry collaboration* – and thereby lead to answering the last part of the research question – *Do these barriers differ from those in Jammerbugt Municipality?*

6.1.1 University-Industry Collaboration, Motivations

When looking at the collaboration between university and industry an important factor is what motivations there are for university and industry to engage in joint research collaboration. Therefore this paragraph will be about this.

A number of existing articles mention the motivations for university to collaborate. For example Siegel et al. (2003:115-116) found that one main motivation for the university scientists is that they gain recognition from fellow scientists by publishing articles in some of the top journals, by having new and valid research results to present to their fellow scientists during conferences, and receiving research grants through the collaboration with an industrial partner. Like Siegel et al., Valentín (2000:167) also found that publications and citations are motivational factors. Valentín also found that some scientists see the opportunity to gain financial revenue for themselves as a motivation to join in collaboration. Lee (2000:120) found the main motivation for scientists to engage in collaboration centres around their own research agenda, and was to gain additional funding for assistants and laboratory equipment. This was also found by Valentín (2000:167), as well as funds for their own research, and the scientists' possibility to get clarification within research done by themselves. Valentín (2000:166-167) found that for university scientists one of the main motivations was related to the university's

social function in society, as the university also sees the enhancement of its reputation and prestige as a motivational factor to commit in collaboration. Another motivation for university is the possibility to test the existing theories in practice and the likelihood of creating new hypotheses and paradigms (Valentín, 2000:167; Lee, 2000:120; Lai, 2011:1219).

Valentín (2000:167) and Lai (2011:1219) both found that industry's motivation to engage in collaboration with universities, among other things, includes the possibility to enhance the organizations' reputation, a motivation also found among the university's motivations to collaboration. Siegel et al. (2003:115-116) found that the absolute main motivation for industry to join in collaboration with university is a desire to gain financial value, by commercialization of the technologies developed by scientists. Siegel et al. found that to obtain the highest value of the new technologies the collaborating industry often tries to gain full control of the technology so that competitors do not have easy access to the technologies, i.e. the collaborating organization tries to commercialize the technology before the competing organizations. A part of this is also seen in Valentín (2000:167) where it was found the industry's motivations include the possibility to increase the competitiveness of the organization. Lee (2000:118-119) finds that the primary motive for the industry's technology managers to engage in collaboration with university is help within product development research, and secondary motive was research into new technological areas. While the leading secondary motive is the access to seminars on new research, only 7.1 per cent of the managers had this as a primary motive (Lee, 2000:118-119). From Lai (2011:1219) it is also seen that the industry's motivation factors include the possibility to find new products or technologies, as well as, knowledge transfer from university to industry. In the article (Lee, 2000:118-119) it was also found that the primary motive for collaboration was the industry's need to help design of prototypes and technical problem solving. Valentín (2000:166) finds that one of the main motivations for industry to engage in collaboration is that they need help to carry out technological research, for which they do not have the competences in-house, and therefore it is a motivation to be able to access the university laboratories and scientists and their new knowledge and skills.

To sum up, several motivations for both industry and university to engage in collaboration was shown in the above. Among the most important for the university was the possibility to gain additional funding for laboratory equipment and research assistants, as well as, the possibility to test existing theory in practice and get insight and clarification into the scientists own research. From the industry's side, it was the possibility to gain access to the university's laboratories and scientists' knowledge, and the possibility to receive help on research in

technological areas for which the organization does not possess the necessary in-house competences.

6.1.2 University-Industry Collaboration, Benefits

By examining the existing literature on U-I collaboration it can be seen that the collaboration can benefit both university and industry. This paragraph will prove it, as it is important to remember that collaboration must benefit both parties. Otherwise there is no incentive to collaboration by the party which does not benefit from it. Although they are two different cultures, where university focuses on the creation of new knowledge and educating students, organizations focus on acquiring knowledge which can help the organization to gain competitive advantages in their field of work. Without acknowledging this, the chance of a lasting successful collaboration diminishes (Riis, 2001:386-387; Bruneel, 2010:858).

When looking at the benefits academics gain from their collaboration with industrial partners, Lee (2000:121-122, 130-131) and Valentín (2000:166-167) both found that a high percentage of the academics secured a substantial amount of funds for research assistants and lab equipment in their field of research, and also a large percentage gained insight into their own field of research so that they also get the opportunity to test their own theories and research in practice. Another research article about the benefits gained by collaboration is Mead et al. (1999:161). According to this article some of the benefits university gains, include contact with practical trends in the industry which then again enhanced faculty development by raising resources for lab equipment and research. Bruneel et al. (2010:859) states that interacting with industry on practical problems also provides the researchers with new ideas for their field of research, and also has a positive influence on the education of students.

Riis (2001:387) finds quite a few benefits for the industry involved in the collaboration. Among other things, he has seen several examples where PhD students or a group of students have provided new insight into the interaction between different departments which the company could not see by themselves. He also found that the students could develop radically new solutions because they are unbiased and can put naive and innocent questions, and they can apply the latest theory. Other benefits, according to Riis, involve the transfer of knowledge from the students to employees in the collaborating organization and finding new opportunities through the new solutions pointed out by the students. Balconi et al. (2006:1619) finds that during collaboration, in the engineering field, organizations gain access to professors' know-how, and they have the ability to test engineers who could be potential employees. In Sanchez et al. (1995:620-622) the benefits of collaboration included that approximately 78 per cent of the R&D managers in the organizations believed they gained technical knowledge. Other gains

from collaboration included new technological services and improvement in technological implementation. Sanchez et al. also found that during collaboration with a university on a specific product - either test or development of the product - many organizations consider this a trade mark, which makes them more competitive than other organizations in their field of work. Lee (2000:122-123, 130-131) also found that some of the benefits gained by the collaborating organization was development of new products and access to new research, a large percentage of the organizations also agreed that the collaboration contributed to their research and development of patents.

To sum up, several benefits for both university and industry by engaging in joint collaboration has been showed. Among the more important for industry is the transfer of knowledge and access to university know-how. By this the organizations gain technical knowledge necessary to achieve an advantage over other organizations in the same field of work as well as new solutions to internal development in the organization. It was also seen that the more important benefits for the university was access to new funding, which could provide new lab equipment and research assistants, and the ability to practical tests of theory and research.

6.1.3 University-Industry Collaboration, Costs

In the previous two paragraphs the motivations and benefits to join in U-I collaboration have been examined. As there are also some costs involved in the major part of all collaboration, this paragraph will provide a short insight into the costs of joint collaboration.

Landry et al.'s (1998:903, 910) article describes how it has been tried to increase U-I collaboration as well as purely scientific collaboration by special grant programs for research carried out by teams or institutes. However, research has shown that such large structures efficiency is limited as the costs increase with an increase in the size of structure. Therefore the article predicts that research collaboration will not be carried out in these teams or institutes but that research collaboration primarily will be carried out outside these formal structures. In the article (Landry et al., 1998:903-904) costs are divided into two main groups, ex ante costs and ex post costs. The difference is that the ex ante costs are related to the costs prior to collaboration, e.g. the negotiation of contracts, where as the ex post costs refer to the costs during the collaboration, e.g. enforcing the contractual agreements, preparation of publications, work plans, human resources and equipment necessary for the research.

A factor of great importance in collaborative research is uncertainty, as no one can be fully certain of the partners' goals and information. Also it is uncertain which research results the future will bring, and the full costs of implementing research to a large extent are uncertain

(Landry et al., 1998:904). The costs also differ according to what type of university collaborating partner the organization teams up with, e.g. Riis (2001:387-388) describes some of the different types of interaction common at AAU. Here it can be seen that one type of interaction can be a group of students collaborating with an organization on a semester project or a master thesis. In these situations the cost an organization has is most often the amount of time needed to start the collaboration and guidance of the students. Another type of interaction can be an industrial PhD project. Here the costs of the organization will, among other things, include salary and tuition. Sanchez et al. (1995:620) finds that although collaboration with university scientists bear a cost for the organization, the same research conducted in-house most often has higher costs. This is supported by Barnes et al. (2002:275) where it is found that collaboration provides a way for the organization to share the costs as well as the risks of the research, which might not, otherwise, be justified to conduct in-house.

Summing up, this paragraph has shown that the size of the structure has an effect on the costs, so that if the size increases the costs increase. It could also be seen that there are ex ante costs, referring to costs of negotiating the contracts, and ex post costs, which refer to costs of upholding the agreements in the contracts, human resources and the equipment necessary for the research. Also uncertainty has an effect on the costs, and costs differ depending on which collaborating partner the industry has in the university. Last but not least it was seen that although the collaboration means costs, the research would be more costly if done in-house.

6.1.4 University-Industry Collaboration, Barriers

This paragraph will provide insight into the existing literature's main perception on the barriers to U-I collaboration. This will help elaborate on the first part of the research question - *Existing literature provides some main perceptions on the barriers to university-industry collaboration –* and through this help answering the last part of the research question – *Do these barriers differ from those in Jammerbugt Municipality?*

When examining the existing literature on U-I collaboration different barriers to collaboration can be found. The article *"University-industry cooperation: a framework of benefits and obstacles"* (Valentín, 2000), gives a revision of the advances in U-I collaboration, by examining various studies in this field. Valentín (2000:165), among other things, analyses barriers to U-I collaboration, and finds that studies concerning barriers are divided into two groups; studies that identify barriers and studies that propose solutions to overcome the barriers. In the existing literature (Valentín, 2000:168-169; Bruneel et al., 2010:859) it was found that one of the barriers for collaboration is that industry imposes regulations on universities. This could for

instance include a firm's desire to have the university focus on a specific field of research. Imposing these restrictions may conflict with the university's focus on creating new knowledge and educating students. Another barrier was found to be that industry tries to delay the publication of results because they want time to file a patent application, so they can gain most advantage of the collaboration results, but for the scientists' success and career delays in the publication of research results can be damaging, as the scientist who publishes new knowledge first gains the most (Valentín, 2000:168-169; Bruneel et al., 2010:859; Rohrbeck et al., 2006:4). Valentín (2000:169) also found that the barriers include that some opportunistic scientists use the results from their collaboration with an organization to create a business venture of their own; in many cases this barrier to collaboration can be avoided by the industry through patenting and copyright. The article (Valentín, 2000:169) also finds that a common barrier to U-I collaboration is communication problems that arise from the different values of industry and university. For instance the universities' primary focus is to create new knowledge, while industry has as a primary focus to gain higher revenue from the collaboration. Rohrbeck et al. (2006:4) found that between university and industry there is a conflict of missions as the mission of university is to generate valid scientific research which helps establish and boost the university's reputation, whereas the mission of industry is to generate profit by having products or services available in the marketplace. Bruneel et al. (2010:864-867) also found that one of the more classical barriers to joint collaboration is still substantial, as a fairly large percentage of the organizations, 69 per cent of SME's and 59 per cent of large firms, indicate that the long-term focus in academic research creates barriers, because of the industry's focus on short-term research to solve the problems and challenges of the near future. This barrier was also found by Valentín (2000:169) and Rohrbeck et al. (2006:4-5). Siegel et al. (2003:118-120) states that both university scientists (75 per cent) and industry (90 per cent) find a common barrier to be the mutual lack of understanding the cultural norms and environments in the collaborating partners' organization, so while industry claims that their culture and goals are not understood by university, the opposite is at the same time seen as a barrier by the university. This was also found by Valentín (2000:169-170) who further describes that the university culture sees the knowledge generated through research as a common good, since the academics have the freedom to publish their research results. The industrial culture, on the other hand, focuses on profit making, business planning and the privacy of knowledge which may ultimately enhance the organization's competitiveness. This is also seen in Bruneel et al. (2010:859) and Rohrbeck et al. (2006:4), where it is mentioned that for the universities the creation of public knowledge secures the growth and development of the university, whereas the industry's knowledge creation has the main purpose of providing knowledge which will give the organization competitive advantages. Therefore the knowledge generated in organizations is to a large extent closed to the public, at

least until the organization has patents or rights in other ways over the knowledge. The differences in culture also involve the institutional environment of both the university and the industry, where Valentín (2000:169) describes the university as an inflexible and bureaucratic institution. The dynamic market conditions make it a necessity for organizations to be flexible. Siegel et al. (2003:118-121), also found that both industry (80 per cent) and university scientists (70 per cent) stated that bureaucracy and inflexibility of the university administrators pose a barrier to collaboration. This could for instance be the university's desire to use what scientists and industry believe are rigid and difficult procedures, even though these procedures in the given situation may not fit particularly well.

Bruneel et al. (2010:864) divided the industry into two groups; one of small and medium sized enterprises (SME's) and one of large firms. They found that there is little difference in the barriers to U-I collaboration when investigating the SME's and the large firms. Although there is little difference in the barriers, the literature describes other relevant differences in the research SME's and large organizations conduct in collaboration with universities. E.g. Santoro at al. (2002:1175-1176) states that where large organizations mainly collaborate with universities on research which will give them access to knowledge and new competencies in non-core areas, the SME's mainly collaborate with universities in order to strengthen their knowledge and gain solutions to challenges related to their field of business and core technologies. For both the SME's and the large organizations Bruneel et al. (2010:864) found that approximately one third of all organizations see it as a barrier to collaboration that the research conducted by universities is primarily focused on pure science. In addition one third of the organizations also indicated that there were barriers connected to the expectations and working practice during a joint collaboration. Bruneel et al. (2010:864-867) also found that a relatively high percentage of the organizations point to a couple of other factors which cause barriers to U-I collaboration, e.g. it can be seen from the article that between 53 per cent (large firms) and 58 per cent (SME's) of the organizations state that either university or government imposes different rules and regulations which create barriers for collaboration. This could for example indicate that organizations consider the administrative procedures connected to joining collaboration as overwhelming.

The organizations also point to another fairly important barrier to collaboration, as 54 per cent of the large firms and 57 per cent of the SME's indicate that potential conflicts about IPR and royalty payment from patents create barriers. This may be the case if the university has unrealistic expectations to the commercial potentials of their research, as this may mean that they overvalue the intellectual property they have gained through their research (Bruneel et al., 2010:860, 864-867). This barrier is also found in Hall et al., (2001:89) where it is further described that 32 per cent stated that the barriers related to intellectual property conflicts

were insurmountable. In Siegel et al. (2003:118-120) barriers related to IPR were also found, as 25 per cent of the university scientists and 80 per cent of the industry agree on this barrier. In the article by Siegel et al. (2003:118-120) 25 per cent of the industry agrees on another barrier to collaboration, i.e. the expectations to the values of technologies developed by university are often unrealistically high. This could for instance be because the technologies are still in their early stage and need testing before their true value to the market is known. This is consistent with the findings by Bruneel et al. In the literature (Hall et al. 2001:93) it was also found that when looking at intellectual property short-term U-I collaboration has considerably larger barriers than long-term U-I collaboration. The reason for this is, according to Hall et al., the longer the project the more uncertain the research results will be, meaning that neither the organization nor the university is able to define the characteristics of the research results in advance. Of course conflicts over IPR can become a problem later in the collaboration, but the barriers are most likely so small that they will not hold back the collaboration. It should also be noted that the barriers seen during a particular case of collaboration might not be seen during all other types of collaboration as some of the barriers appear sporadically, among other things depending on the type of collaboration, the firm involved and the field the firm is involved in (Valentín, 2000:168).

Summing up it could be seen in the above paragraph that there are quite a few barriers to U-I collaboration, such as conflicts over patents and IPR, when industry often accuses university of being either too aggressive or having unrealistic expectations to the value of the developed technologies. It was also seen that the university's focus on long-term research collides with the shorter-term focus by industry, and the university is often seen as bureaucratic and inflexible and therefore the administrative procedures related to joint collaboration become a burden to the more flexible industry. A number of research articles also found that the differences in secrecy about research results pose a barrier to collaboration, as the scientists' careers are dependent on publication of valid, as well as novel research results, while industry gains higher benefits by securing the right to new knowledge in the search for competitive advantages over rival organizations. These barriers as well as the other barriers described in this paragraph are the existing literature's main perceptions of barriers to U-I collaboration as described in the beginning of the paragraph.

6.1.5 University-Industry Collaboration, Outline

The function of this paragraph is to provide an outline of the findings during the previous paragraphs concerning U-I collaboration and the motivations, benefits and barriers associated with joint collaboration. To give an overview of these, the different factors are brought together in table 1 below.

Table 1: Motivations for, benefits of and barriers to university-industry collaboration

	Motivations	Benefits	Barriers
University	• Gain recognition from fellow scientists through publications and citations. (Siegel et al., 2003; Valentín, 2000) • New and valid research results to present at conferences. (Siegel et al., 2003) • Research grants. (Siegel et al., 2003; Lee, 2000) • Possibility of financial revenue to the scientist. (Valentín, 2000) • Funding for laboratory equipment and research assistants. (Lee, 2000; Valentín, 2000) • Insight into own research. (Lee, 2000) • Enhancement of the university's prestige and reputation. (Valentín, 2000) • University's social function in society. (Valentín, 2000) • Testing of existing theory in practice. (Valentín, 2000; Lee, 2000; Lai, 2011)	• Funds for laboratory equipment and research assistants. (Lee, 2000; Valentín, 2000; Mead et al., 1999) • Insight into own field of research. (Lee, 2000) • Test of own theory and research in practice. (Lee, 2000; Valentín, 2000) • Insight into practical trends in industry. (Mead et al., 1999) • New ideas to own field of research. (Bruneel et al., 2010) • Positive effect on education of students. (Bruneel et al., 2010)	• Regulations by industry, e.g. in field of research or topic. (Valentín, 2000; Bruneel et al., 2010) • Industry tries to delay publication of results. (Valentín, 2000; Bruneel et al., 2010; Rohrbeck et al., 2006) • Communication problems. (Valentín, 2000) • Industry's short-term focus. (Valentín, 2000; Rohrbeck et al., 2006) • Industry's lack of understanding university's cultural norms and environment. (Siegel et al., 2003; Valentin, 2000)
Industry	• Enhance the organization's reputation. (Valentín, 2000; Lai, 2011) • Possibility of financial revenue through commercialization of technologies developed by scientists. (Siegel et al., 2003) • Possibility of increased competitiveness. (Valentín, 2000) • Help to product development research. (Lee, 2000; Lai, 2011) • Research into new technological areas. (Lee, 2000; Lai, 2011; Valentín, 2000) • Knowledge transfer from university. (Lai, 2011) • Help to design prototypes. (Lee, 2000) • Technical problem solving. (Lee, 2000) • Access to university laboratories and scientists. (Valentín, 2000)	• New insight into interactions between different departments in the organization. (Riis, 2001) • New solutions to problem solving. (Riis, 2001) • Opportunities through new solutions. (Riis, 2001) • Knowledge transfer. (Riis, 2001) • Access to scientist's know-how. (Balconi, 2006) • Testing possible new employees. (Balconi, 2006) • Technical knowledge. (Sanchez et al., 1995) • New technological services. (Sanchez et al., 1995) • Improvement in technological implementation. (Sanchez et al., 1995) • Advanced competitiveness. (Sanchez et al., 1995) • New product development. (Lee, 2000)	• Opportunistic scientists. (Valentín, 2000) • Communication problems. (Valentín, 2000; Rohrbeck et al., 2006) • University's long-term focus. (Valentín, 2000, Rohrbeck et al., 2006; Bruneel et al., 2010) • University's lack of understanding industry's cultural norms and environment. (Siegel et al., 2003; Valentín, 2000) • University's desire to publish results. (Rohrbeck et al., 2006; Valentín, 2000; Bruneel et al., 2010) • University inflexibility and bureaucracy. (Valentín, 2000; Siegel et al., 2003) • University's research primarily focused on pure science. (Bruneel et al., 2010) • Differences in expectations and working practice. (Bruneel et al., 2010) • Rules and regulations imposed by university or government. (Bruneel et al., 2010) • Conflicts over IPR and royalty payments from patents. (Bruneel et al., 2010; Siegel et al., 2003; Hall et al., 2001)

Note: Findings from the section on university-industry collaboration

The above table lists the different motivations, benefits and barriers found during the theory section on U-I collaboration, but with reference to the research question, the barriers to collaboration are of relevance when elaborating on the first part of the research question - *Existing literature provides some main perceptions on the barriers to university-industry collaboration*. Therefore the barriers to collaboration will also be depicted in a separate table below; these will be divided into two groups, the first contains the barriers found in multiple articles, while the last contains the barriers pointed out by single articles.

Table 2: Barriers to university-industry collaboration

	Barriers to collaboration from industry's point of view
Multiple articles	• Conflicts over IPR and royalty payments from patents • University inflexibility and bureaucracy • University's desire to publish results • University's lack of understanding industry's cultural norms and environment • University's long-term focus • Communication problems
Single articles	• Rules and regulations imposed by university or government • Differences in expectations and working practice • University's research primarily focused on pure science • Opportunistic scientists

Note: Findings from table 1.

The barriers to U-I collaboration shown in table 2 above are seen as the existing literature's main perception on barriers to collaboration, and therefore help define this in the first part of the research question. They will help answering the last part of the research question - *Do these barriers differ from those seen in Jammerbugt Municipality?*

Table 3 below shows the costs found during the review of U-I literature in the paragraph on U-I collaboration costs. The table shows that there are a number of costs which appear both for university and for industry, but one should be aware that the percentage covered by the two parties might not be equal. The table also shows that there are some differences in the two parties' costs.

Table 3: Costs to university-industry collaboration

	Costs
University	• Ex ante costs - costs prior to collaboration, e.g. negotiation of contracts and time spent • Ex post costs - costs during collaboration, e.g. enforcing contractual agreements, preparation of publications, work plans, human resources, and equipment necessary for research • Time consumption spent on student projects • Industrial PhD's - salary and time
Industry	• Ex ante costs - costs prior to collaboration, e.g. negotiation of contracts and time spent • Ex post costs - costs during collaboration, e.g. enforcing contractual agreements, work plans, human resources, equipment necessary for research, and to some degree preparation of publications • Implementation of research results • Time consumption spent on student projects • Industrial PhD's - salary and tuition • Fees for engaging in certain cases of collaboration with the university

Note: Findings from the section on university-industry collaboration, costs

6.2 Triple Helix

The focus of this section is to provide insight into triple helix theory. This is important as this thesis is made in collaboration with Business Centre Jammerbugt in their effort to strengthen the municipality organizations' collaboration with AAU. Although the primary focus of this thesis is U-I collaboration, which therefore means that Jammerbugt Municipality and Business Centre Jammerbugt in the thesis are reduced to a secondary position, this includes some level of university-industry-government interaction as it is the desire of Business Centre Jammerbugt to bridge the gap between the organizations based in the municipality and AAU.

In the article by Dooley et al. (2007:317) it is stated that the increased focus on universities as the providers of not only human capital but also innovation and being the seed-bed for new firms, means the development of the entrepreneurial university. It is stated that well established university-industry-government links may reduce the time from the discovery to the marketing of a product, and therefore have a higher possibility to gain competitive advantages. In the article by Etzkowitz et al. (2005:244-245) it is described how the change from industrial society to knowledge-based society has brought university into a central position, where as it had more of a supporting role to industry and government when society was industrial. According to Etzkowitz et al., this is the *first* of three basic elements comprising the triple helix model, where the *second* is that innovation policy is now more an outcome of the interactions than something decided by government. The *third* element is that the institutions can take over the role of the others. To elaborate a little on the third basic element, Etzkowitz (2008:9) describes how these three institutions can take the role of the others, e.g. it is seen that university takes on business and government functions, while at the same time maintaining their core missions. Industry takes on functions of the university but they will still produce goods and services, and government provides the rules and finance start-ups, even if none of the institutions abandon their main roles and distinct identities.

Figure 1: The Triple Helix of university-industry-government[3]
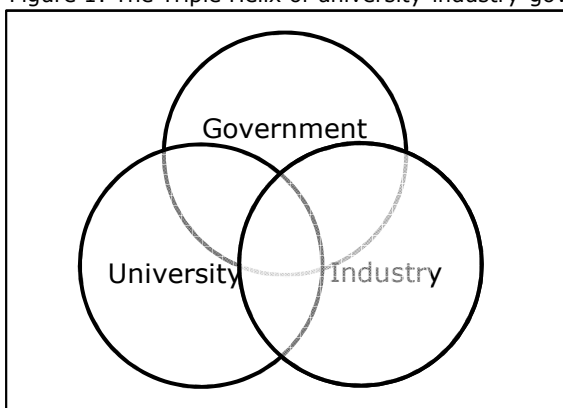
Figure 1 depicted to the left shows the triple helix of university-industry-government with overlapping institutional space. The article by Etzkowitz et al. (2000:111-112) describes how hybrid organizations emerge in the interface of the three institutions. This also emphasizes that the three organizations can take the role of each other if necessary. This way of working with triple helix is the most

[3] Source of idea; Etzkowitz, 2008:15.

common, although there are also other forms of the triple helix which do not include overlapping organizations and therefore do not include the interface among these. These triple helices include a triple helix, where the state encompasses university and industry. This form is often seen in countries where the state is strong and therefore coordinates the interactions between university and industry, which do not encourage innovation. The third model is a triple helix with a laissez-faire approach, where the institutions are separate with strong borders between them. Here the primary factor for economic and social development is seen as the industry (Etzkowitz, 2008:12-13; Etzkowitz et al., 2000:111-112). Triple helix interactions as depicted in figure 1 are as already mentioned, the most common. In this form the objective for university, industry and government is an innovative environment, where government might use incentives, such as financial assistance, to encourage these interactions, but they do not control them (Etzkowitz, 2000:112). This is also seen in Godin et al. (2000:277) where it is found that government has tried to increase the focus on university's collaboration with society, especially businesses, where economic incentives can explain a large part of university-industry and government laboratories' interactions. Another way of this, according to Godin et al., is that industry can indirectly transfer some of the costs on for instance R&D onto government, through collaboration with university. As the university's funding primarily comes from the government they will indirectly fund the industry's research as well. This was also seen in the paragraph on U-I collaboration costs earlier in this project. The role of the government in the triple helix model is, according to Etzkowitz et al. (2005:245), partly to help support the new developments found by university and industry, where some of the instruments government has the ability to use are to provide public venture capital to help commercialize the new development, tax incentives, as well as changes in the regulatory environment. In Etzkowitz et al. (2000:118) it is stated that the interaction by government, no longer needs to be on a national level, but interactions can take place on both national, regional and to a degree also international level.

In the triple helix the entrepreneurial university has an increased role; it no longer plays the supportive role of industry and government, but plays a central role with industry and government. This shift in the university from being a pure research and teaching institution to also including entrepreneurial activities means that the university, from industry's perspective, can also be viewed as a competitor but at the same time also a possible partner, as university has an increased focus on commercialization of their research results, and as university capitalizes on knowledge this will bring the industry, as a user of knowledge, and university into tighter relationships (Etzkowitz, 2008:27-29). According to Etzkowitz (2008:27) there are four prerequisites a university has to fulfil to be considered as an entrepreneurial university. These are; the ability to implement a strategic vision of their own, the entrepreneurial

university also has to have legal control over physical as well as intellectual property, they are also in the need of capacities to transfer the knowledge generated by university scientists through patenting, licensing and incubation, and as a final prerequisite there has to be an attitude towards entrepreneurial activity by the university faculty members, administration and also the students. The university has so far provided the existing organizations with new ideas, but with the emergence of the entrepreneurial university the formation of new organizations through discoveries in advanced areas of science and technology has an increased focus. It is also stated by Etzkowitz that for the entrepreneurial activity to emerge, there has to be an increased focus on results with practical potential and realization of this potential, as well as a realization by university scientists that practical problems posed by industry can bring theoretical potentials through new research questions that emerge during the work process with the practical problem, and not just bring industry solutions to their challenges (Etzkowitz, 2008:28, 35). According to Etzkowitz (2008:38) the most important characteristic of the entrepreneurial university is if the research problem is found in collaboration with both university scientists and external sources.

Though it is still important that small and medium sized organizations and larger organizations upgrade their knowledge and renew themselves, Etzkowitz (2008:43, 57-58) states that knowledge based spin-out firms are increasingly seen as drivers of economic growth, employment and a means to advance technology, as some industrial organizations, which have previously sustained growth through new product development, downsize their innovation strategies and as an alternative rely on acquisition as a means to further growth. Etzkowitz (2008:44-46) describes how knowledge is commercialized in the American model, where there are two strings. The first is where the research group's intellectual output will be connected with the patent system; the second, an organizational network incorporates the research group. In the American model this network, among other things, consists of venture capital firms and transfer offices. It was also found that different combinations of the three spheres were used to assist firm-formation and growth.

In Etzkowitz (2008:74) it is stated that where the U-I relationship can only be developed to a certain extent, the triple helix, by also implementing the role of the government, can bring the relationship even further, especially on a regional level, where the three institutions can create and implement policy initiatives together. At a regional level the initial stage for the three institutional spheres – university, industry and government – most often includes the existing industry; here their performance is sought enhanced in order to improve the local economy (Etzkowitz, 2008:8). The focus of U-I in the learning region lies on human capital and consulting relationships, whereas the focus will be on firm-formation as well as capacities to

achieve this in the innovating region (Etzkowitz et al., 2005:247-248). Regional growth and renewal through the triple helix model can also be encouraged by the European Union, just as this can be a method to diminish boundaries to regional development where national policies would otherwise have meant barriers (Etzkowitz, 2008:76). According to Etzkowitz (2008:77-81) the regional triple helix model emerges from three stages, where the *first* is the creation of a knowledge space, which provides the critical mass, related to R&D activities which will generate technological ideas. This, Etzkowitz states is for the science-based region a necessity to gain economic development. A consensus space is the *second* stage where the relevant actors are brought together on neutral ground to work with strategy and formulating plans as well as finding resources to realize the plans. The *third* stage consists of an innovation space, where attempts are made to realize the goals formulated during the consensus space. Some central elements to obtain this could be to attract a combination of different types of knowledge – business and technical as well as capital. The innovation space will fill a gap in the regional development process, e.g. by creating a new type of incubator facility aimed specific to realize the goals. According to Etzkowitz (2008:87-88) the criteria for success in the creation of a triple helix region are dependent on the ability to create not just one high-tech cluster but the capability of the region to generate additional clusters in the future and by this prevent decreasing economic development when the success in the first high-tech cluster is superseded by new technologies.

Summing up, this section described the triple helix model. It was seen that there are three main models, the triple helix with a strong state which encompasses university and industry and a laissez-faire model of the triple helix with strong borders between the institutions, and the more common triple helix model where the institutions interact with each other and hybrid organizations emerge in the interface of the institutions. It was also described that the institutions can take the role of each other, for instance if the government in a region is weak then university can independently interact with industry to try to increase U-I collaboration, but also that the institutions, although taking the role of each other, maintain their core missions. It was described that the government's role was to support the developments made by university and industry through, e.g. public venture capital and changes in the regulatory environment. Also it was described that the interaction by government can take place on a national, a regional and to a certain degree an international level. When the regional level was examined it was found that the initial stages of the triple helix most often include the existing industry and not new firm-formation. It was seen that the performance of the existing industry was sought enhanced in order to increase the local economy, but eventually the focus will shift from the existing industry to firm-formation.

6.3 Rural and Urban Areas

The distinction between what constitutes a rural area and an urban area is often defined by the number of inhabitants within a given area, when using statistics. Likewise it is often assumed that agriculture is the rural population's main profession, while industrial production and service is assumed to be the urban population's main professions (Tacoli, 1998:147-148). But reality is often more complex Tacoli states, as the measures used by different nations in defining whether an area is urban or rural vary. For example Tacoli (1998:148) describes that if the definition used in many European nations, where settlements with more than 2,000 or 2,500 inhabitants are often considered urban, was also used by China then they would have to reclassify a large percentage of their rural population into urban. Tacoli (1998:149) further states that the assumptions of main professions are deviating, as research has shown that non-agriculture activities are responsible for more of the rural population's income than previously thought, just as it was shown that urban population is more involved in agriculture than previously thought. From the above it is seen that the distinction between what constitutes a rural area and an urban area can be blurry, although the notion used by many European nations is more tangible despite the variety in the number of inhabitants in a settlement which define an urban area. Therefore this fairly short section provides some insight into urban and rural area differences, for example the skills and innovation capacity in the two areas. This is relevant as Jammerbugt Municipality is a large municipality where at least some of the municipality could be classified as rural or peripheral, which could have an influence on the organizations' collaboration ability.

The existing literature also provides more tangible definitions of rural and urban areas. For example Grimes' (2000:13) article on rural areas in the information society defines these rural areas as areas where the population distribution as well as the economic activity is much sparser. Due to the more scattered population some of the inhabitants are more peripherally located, as they have some distance to markets and access to services. Also Malecki (2003:201) and Virkkala (2007:513) state these are common features of the rural areas. Furthermore Virkkala (2007:513) states that these factors mean that even the successful organizations in these peripheral areas face more serious problems than a similar urban-based organization when it comes to exploiting market potential. Also specializations of the peripherally based organizations might be inhibited by the weak local markets. Grimes (2000:13) further state that the urban area's economic development on the contrary is higher, where the spatial pattern of the economic opportunities is reflected by the spatial structure of the urban system. Thereby the more urbanised areas provide better access to opportunities. Virkkala (2007:513) states that the peripheral areas have fewer knowledge flows, which brings fewer opportunities of interaction and connection with both intra and extra-regional networks,

and if these networks are weak then it is unlikely for innovation to be created as well as to be correctly adapted. Shefer (2005:26) describes that high-tech organizations based in urban areas are significantly more innovative than those based in peripheral areas. Grimes (2000:14) claims that the investments in economic activity in large urban areas can gain advantage from the large pool of labour skills accumulated in these areas, well developed transport systems, and IT infrastructure. Therefore the urban areas are often at the forefront with innovation and information, as compared to the rural areas. These advantages are the same disadvantages the rural areas have, which makes the rural areas' competing for investments difficult. Grimes (2000:14) further states that requirements for growth in the global marketplace are defined by accessibility to skilled workforce and sophisticated communications, and while rural areas also have highly skilled users of telecommunications, actually establishing an advanced infrastructure might become a problem in some rural areas due to the low number of these highly skilled users. According to Virkkala (2007:513) the peripheral areas see low and medium levels of qualifications, while the availability of more specialized qualifications is a rare thing here. Virkkala (2007:513) describes the organizations in peripheral areas as working within the traditional sectors. They are often small organizations in the category of SME's, and the economic structure is often fragmented. But Grimes (2000:16) states that the SME's in the small-scale rural economies can be seen as a foundation for promotion of a competitive enterprise culture. This can be done with a focus on competence development to enhance the organizations' skills in an effort to cope with the rapidly changing global environment, for instance upgrading the skills of managers and marketing.

In the article by Malecki (2003:201) five different challenges to the rural economy have been identified, although these are identified for the USA Malecki states that they do apply to other settings as well. The challenges include; exploit digital technology, encourage entrepreneurship, the human capital must improve, new agriculture, and supporting the rural environment. Malecki further states that the three first of these challenges can be connected to digital economy and information and communication technologies, and thereby supports Grimes when it comes to the importance of IT infrastructure in the development of a rural area. According to Malecki (2003:201-202) the rural areas also have some potentials, in that the smaller organizations provide a more flexible manufacturing process and greater possibilities than their much larger competitors, just as IT diminishes some of the space and distance. Virkkala (2007:526) found that local organizations saw outsourcing and competence development as a response to globalization. Virkkala (2007:514-515) also describes that in the innovation process both external and internal knowledge is important, since the external knowledge often comes from networking with e.g. customers, suppliers, and industry associates. While the internal knowledge is the basis of competitiveness the external

knowledge is critical in the actual innovation process. OECD (2007b:2-5) states that for rural areas, due to factors such as globalization, decentralization, and emergence of new products and services, it is fundamental to be innovative. For the rural areas some criteria can help stimulate innovativeness, e.g. it is of relevance to invest in human capital development e.g. through easier access to higher educations or upgrading the adult population's skills and competences, and also the information and communication technology need to be developed to for instance facilitate access to information.

Summing up, different aspects of the urban area and the rural area have been described. It was seen that the rural areas have a more scattered population and have longer distance to the market and services. This posed problems to organizations located in rural areas as compared to the same organization located in an urban area. It was also seen that there are fewer high-skilled inhabitants in rural areas and that rural areas need to focus on development and innovation to help secure the organizations' adaptability to the changing market demands. It was seen that IT could help raise the competence level and competitiveness, but also that the rural areas are less innovative.

6.4 Proximity

This section describes different aspects related to proximity. First economic geography will be described; here the focus is on five different types of proximity, this is interesting because proximity is not just a matter of a distance from object A to object B, but among other things proximity also deals with social and cognitive issues, which might be relevant for some of the organizations located a long way from a university. Besides this, another section provides insight into different types of knowledge; this is of relevance as the type of knowledge can affect the organizations' feeling of obtained benefits from the collaboration, as the ability to implement the new knowledge in the organization is highly relevant. There will also be a fairly short paragraph on the administrative system of the public sector in Denmark, which describes the Danish three-tier system; this is of relevance in relation to the section on Business Centre Jammerbugt.

6.4.1 Economic Geography

In this paragraph insight into different dimensions of proximity will be provided, i.e.; cognitive, organizational, social, institutional, and geographical proximity. Proximity is often only thought of as the distance from object A to object B with no or little thought about the effects of other dimensions of proximity in the equation, and it is often believed that the geographical proximity, if too large, can create barriers to collaboration. Jammerbugt Municipality can be defined as a rural district (Danske Regioner, 2010:68), indicating that there is a certain

distance between universities and the municipality. Therefore it is interesting to see if the existing literature provides a different view on the different dimensions of proximity.

6.4.1.1 Cognitive Proximity

Cognitive proximity is to some degree a necessity in order to process, understand and communicate new knowledge successfully, both within a specific organization, between organizations and among people, i.e.; actors with the same knowledge base and expertise are more likely to learn from each other than actors with no common knowledge base and expertise. Although the cognitive proximity enhances the absorption of new knowledge, it can also be argued that actors with a cognitive proximity which is too much alike, can have a damaging effect on learning and innovation (Boschma, 2005:63). According to Boschma (2005:63-64) some cognitive distance should be maintained for at least three reasons; *first*, it is stated that learning tends to increase if there is a little cognitive distance, although not too much as this will have a negative effect on the absorptive capacity, therefore dissimilar complementary knowledge is often necessary in knowledge building. *Second*, cognitive proximity can lead to a lack of openness and flexibility which affects the view on possibilities in new markets and new technologies negatively. *Third*, in cognitive proximity between actors the risk of involuntary spillovers is increased. This is especially seen between organizations that compete in the same fields or have strongly overlapping technological fields. Therefore these organizations are more reluctant to share their knowledge about their research activities. Consequently to secure effective learning a balance between the cognitive proximity to the other actors – in order to e.g. communicate and process new information – and maintaining a certain degree of cognitive distance must be found, as too little distance gives a lack in novelty and too much distance creates communication problems.

6.4.1.2 Organizational Proximity

In Boschma (2005:65) organizational proximity is described as the extent of relations shared either within an organization or between organizations. The different varieties of the organizational proximity can be anything between low organizational proximity, where there are no ties between the actors, to high organizational proximity, where there are strong ties between the actors; the strong ties could for instance be seen in a hierarchically organized network. In the middle of these there is loosely organizational proximity, providing weak ties between the parties, for instance in a flexible organization. As seen with cognitive proximity, the balance between too much and too little organizational proximity affects the learning and innovation. Too much organizational proximity may result in lack of openness and lack of flexibility, which may then limit the access to information of novelty character, as this information must often be found outside the established relations. Also if there is a lack of

flexibility it will be more difficult to implement innovations as this requires a flexible organization, and too much organizational proximity does not reward new ideas which negatively affect the initiatives taken to be innovative. On the contrary too little organizational proximity increases the lack of control, which opens up to a higher degree of opportunistic behaviour from the counterpart. In between these extremes of organizational proximity is loosely organizational proximity, which provides network both within an organization and between different organizations and therefore secures flexibility and access to each other's information (Boschma, 2005:64-66).

6.4.1.3 Social Proximity

According to Boschma (2005:66) social proximity is defined as social relations where trust between the agents is based on friendship, kinship or experience. The degree of social proximity in an organization may affect the ability to learn and innovate, as social relations built on trust increase the exchange of tacit knowledge, which is otherwise difficult to access through the market. The risk of opportunistic behaviour on behalf of each other is also reduced with social proximity. But the ability to learn and innovate can also be damaged if there is too much social proximity, e.g. when there is too much loyalty and strong emotional bonds between the parties, one might not take advantage of the opportunities as these are underestimated. Also there is the possibility that long-term relationships cause people to engage in the network under pre-existing assumptions on how things should be done, as opposed to engaging in a network with no pre-existing assumptions and therefore to the fullest be able to use one's innovative and learning capacities. (Boschma, 2005:66). On the other hand, the effect on learning and innovation can also be negatively influenced by too little social proximity as trust and commitment can be absent. This indicates that social proximity if the balance is found between too much and too little proximity can have a positive effect on an organization's innovative performance (Boschma, 2005:67).

6.4.1.4 Institutional Proximity

Previously it was seen that social proximity was defined as social relations between agents, e.g. friendship, and therefore is related to a micro-level. When looking at institutional proximity this is more related to a macro-level, which means that it involves norms and values of conduct (Boschma, 2005:66-67). In institutional proximity agents follow the same values, rules and cultural habits, which has a positive effect on how effectively interactive learning can take place in an organization, as this institutional proximity provides stable conditions. However, institutional proximity can also have a negative effect on collective learning and innovation, as too much institutional proximity can create a lack of openness and flexibility, which has a negative effect on fostering new ideas and innovation, while too little institutional

proximity, due to e.g. a lack of common values, also can be damaging to innovation. As a result there needs to be a balance between institutional stability, openness and flexibility to secure the effectiveness of an institutional structure (Boschma, 2005:68).

6.4.1.5 Geographical Proximity

Geographical proximity has to do with both spatial and physical distance, where a spatially concentrated agent is claimed to gain benefits from knowledge externalities, while the physical distance, when it is short, brings people together where they exchange information and tacit knowledge. On the contrary a longer distance will less often bring people together, which therefore also means that the exchange of tacit knowledge becomes more difficult (Boschma, 2005:69). Boschma (2005:69) also describes that this is seen in literature based on empirical studies, where it is often found that organizations located close to knowledge sources are often more innovative than the organizations located further away from knowledge sources. As seen with the other forms of proximity, geographical proximity may affect learning and innovation both negatively and positively. For instance, it may negatively affect interactive learning and innovation if there is too much geographical proximity. This may be the case if a highly specialized region becomes too inward looking, in this situation the local actors might experience a diminishing ability to be innovative, which will hinder proper responses to new developments in the market (Boschma, 2005:70). Boschma further states that for a damaging effect on interactive learning and innovation geographical closeness alone cannot cause this, but if this is combined with an enhancement of the cognitive proximity in the region, e.g. due to lack of openness to the surrounding society, then this could affect interactive learning negatively. But if other dimensions of proximity are stimulated by geographical proximity this might have a positive effect on learning and innovation (Boschma, 2005:71). Boschma further states that inter-organizational learning could be eased by geographical proximity, but at the same time this is not a necessary condition as the coordination problem could be solved by other types of proximities, just as geographical proximity is not a sufficient condition for inter-organizational learning to occur, as cognitive proximity is a necessity to learning processes.

6.4.1.6 The Five Proximities Interference with Each Other

During the above descriptions of the five types of proximity it was found that a balance is needed between too little and too much proximity in all five types of proximity – cognitive, organizational, social, institutional, and geographical – to secure effective learning and innovation. The five dimensions of proximity described above interfere with each other in different ways. For example Boschma (2005:66) describes that the organizational and cognitive proximity might be complements, as a satisfactory cognitive level might be achieved through organizational arrangements either within or between organizations, as this might

bring people with some level of cognitive proximity together. Boschma (2005:67) also found that partners' cognitive distance might decrease over time due to social proximity, while a short geographical distance most likely stimulates social proximity. It was also found (Boschma, 2005:68) that social proximity may compensate for lack of institutional proximity in a society, i.e. one tends to rely on trust-based relationships if there is a lack in e.g. the legal system. Another example of interference between the different types of proximity is that, although geographical proximity might have a lot to do with whether an organization is innovative or not, Boschma (2005:69) states that without some cognitive proximity imitative learning through monitoring can hardly take place, simply because an organization's ability to absorb and process external knowledge is dependent on different knowledge competences within the organization. In light of this Boschma states that theoretically, interactive learning can take place due to geographical proximity and cognitive proximity. If there is strong organizational proximity that can coordinate tasks and the partners have cognitive proximity, the need for geographical proximity decreases. In the case of geographical proximity Boschma (2005:70) states that this may be less important than social and organizational proximity in inter-organizational learning. Furthermore geographical proximity may have influence on the other four types of proximity in building and strengthening these. Boschma (2005:70) also states that geographical openness – access to the outside world – is not enough during transfer of tacit knowledge over a longer distance, but here cognitive proximity has relevance, as the receivers of the tacit knowledge need to be capable to absorb it.

Some level of cognitive proximity is needed to obtain effective interactive learning, while organizational, social, institutional, and geographical proximity bring people together both within organizations and between organizations (Boschma, 2005:71). These four types of proximity are considered mechanisms, which in combination or in their own way can transfer knowledge between agents. By this interactive learning can take place if some level of cognitive proximity is combined with some level of geographical proximity, or one of the other three types of proximity.

6.4.2 Types of Knowledge
In this paragraph different types of knowledge will be described. This is, among other things, relevant in relation to the previous paragraph on proximity, as the knowledge which is transferred from a university to an organization can have different forms, which for example may affect the success rate of implementation of the knowledge in the organization.

In the article by Lundvall et al. (2007:210) it is stated that the meaning of knowledge is difficult to agree on, while managing knowledge is even harder. It is also described that knowledge can be embedded in organizations, networks, people or artefacts, just as it is more

common that knowledge is collective than it is individual. Lundvall (2004:22-23) divides knowledge and information into two perspectives, the *first* is found in the microeconomic system, where individual agents make rational choices. Here the information available and the ability to process this is crucial. In the *second,* knowledge can appear as competence and innovation – input and output –, so here knowledge is seen as an asset during the production process, where the crucial ability is transferability across time, space and people. In the article by Lundvall (2004:24-25) four different types of knowledge are described, which are *know-what, know-why, know-how,* and *know-who*, all of these are described below.

The category *know-what* refers to facts. This type of knowledge is close to information and it is possible to communicate it as data. Examples of this type of knowledge could be, how many people study at AAU, and what are the ingredients in an omelette. This type of knowledge can be stored in databases from where it is available for whoever needs it. One only has to find it and select the information relevant to fill in the knowledge gap. Another way to reach the information could be through using know-who knowledge, and by this finding an expert who can lead you to the specific information. (Lundvall, 2004:24-26).

Another type of knowledge Lundvall (2004:24-25) describes is *know-why*. This type of knowledge refers to principles and laws of motion in nature, human mind and society. Know-why knowledge is for example usable in chemical and electronic industries, where it can be important for the technological development to have access to this knowledge to avoid errors and make advance more rapidly. The know-why type of knowledge can be theoretical models produced by scientists, who in some cases then place the knowledge in the public domain by publishing their findings in journals, and by this making the results accessible. Know-why can be beneficial, as if it is directed towards academia it can play a role in transferring the principles and laws into knowledge that is more comprehensible. Scientific know-why can be gained by an organization if it invests in science or pursues R&D activities. For organizations operating in fields where the technological competition is intense, it is often seen that the academic know-why lacks behind, for these organizations' knowledge involved in solving technical problems often relates to know-how and not know-why. (Lundvall, 2004:26).

The *know-how* type of knowledge refers to the skills of a person, i.e. the ability to do something. Most often this type of knowledge is related to a manual worker's skill, but it is relevant in all economic activities. All sorts of workgroups, besides manual workers, use their know-how in their everyday work life, for example businessmen, managers, and scientists. This type of knowledge is not a completely public good and know-how is often kept within the individual firm or research team, but Lundvall states that if the knowledge complexity increases then organizations tend to co-operate. This is often an important reason for network development among organizations and researchers (Lundvall, 2004:25). This type of

knowledge is more difficult to transfer to other people or organizations than the other types of knowledge described by Lundvall. It is also stated in the article that attempts to transform expert skills into usable information to outsiders through information technology have proved to be costly and difficult, and changes in the know-how knowledge always occur when trying to transform the knowledge. The common way an organization can get access to specific know-how is by employing people with the knowledge or by merging with organizations that possess the knowledge (Lundvall, 2004:26-27).

The last type of knowledge defined by Lundvall is *know-who*. This type has to do with information on who knows what as well as who is able to do what. The know-who type of knowledge also has to do with one's ability to co-operate and communicate. It is also stated in the article that this type of knowledge becomes more and more important, as there is a trend towards more complex knowledge use in new products where many technologies are typically combined (Lundvall, 2004:25). This type of knowledge can to some extent be found by using simple telephone books and search engines. Through these channels all searches for specific knowledge cannot be fulfilled. Therefore in work areas where specialised competences and reliable experts are of significance social and personal relationships are important to secure trustworthy key persons. Dealing with social and personal relationships is an element which is not public, transferrable, and cannot be bought or sold in the market. The know-how knowledge cannot be fully transferred as an organization or a person does things in a way that reflects the personality of the organization or the person, and this is not possible to directly transfer to other organizations or people (Lundvall, 2004:27).

The above four different types of knowledge can to some extent be further divided into two groups of knowledge; tacit and explicit knowledge. For example Smith (2001:314) puts the two types of knowledge know-what and know-how in each their group. In Smith's article know-what is grouped under the term explicit knowledge and know-how is grouped under the term tacit knowledge. Lundvall (2004:28-29) agrees that these two types of knowledge can be put in the categories described by Smith, but Lundvall also states that know-why can be made explicit. By looking at these two groups of knowledge – tacit and explicit – it can be seen that they possess some distinct differences.

If looking at tacit knowledge Smith (2001:314) for example describes it as being master craftsmen's gradually developed skills, which require little or no time or thought when being used as it is the craftsmen's know-how which is being activated in the process. This is also seen in Nonaka et al. (2009:635), but in their article it is further described that tacit knowledge is knowledge which is unarticulated, intuition, rules of thumb, movement skills and physical experiences. Nonaka et al. (2009:636-637) also describes that most tacit knowledge

is something one cannot access through consciousness, as the individual's skills are embodied. Lundvall (2004:28) states that tacit knowledge is knowledge the possessor and user have not made explicit. This is because Lundvall makes a distinction between tacit knowledge which is tacit by nature and cannot be made explicit, and tacit knowledge which due to lack of incentives has not been made explicit, but if the incentives were strong enough this type of tacit knowledge could be made explicit by the possessor and user. Though some tacit knowledge could be made explicit if the incentives were high enough, Lundvall (2004:29) states that there are more limits to documentation of skills and competences embodied in persons and organizations, in these situations only approximations are possible. In Tomlinson (1999:433) it is described why the work process, which generates tacit knowledge, is of great importance not only to the employee but to the organization as well. This is because if the employee leaves the organization, then the tacit knowledge leaves as well, which can be damaging to the organization as it might lose some of its core competences with the employee. As this tacit knowledge has not been codified, the consequences for the organization might not reveal itself in the beginning.

Smith's article (2001:315) describes that the major part of explicit knowledge comes from information, technical or academic data which for example have been transformed into manuals and mathematical expressions. This makes the explicit knowledge transferrable among people or organizations in different ways such as prints and electronic methods. Though the knowledge is now explicit and can be shared, Smith (2001:315) states that for a person to be able to understand and use the knowledge he/she must have some level of academic knowledge or understanding, which can be accumulated during a formal education or structured study. This is also seen in Nonaka et al. (2009:635-636) where it is described that the explicit knowledge can be expressed in writings and drawings. In the article explicit knowledge is also described as something that is accessible through consciousness.

Summing up, this paragraph described how knowledge can take different forms. It was seen that Lundvall divided knowledge into four different types; know-what, know-why, know-how and know-who. This then lead to descriptions of what tacit and explicit knowledge is, and it was seen that Lundvall's know-what and know-why to some extent could be classified as explicit knowledge, and it was seen that know-how could be classified as tacit knowledge.

6.4.3 Industrial Services
This relatively short paragraph will provide literature on the Danish administrative system, of importance as it will describe Business Centre Jammerbugt's relevance when it comes to influence on the development in the municipality, and therefore also a branch of their field of

activity. It will briefly describe the municipalities', regions', and national levels' interference with each other.

The current structure of the administrative system of the public sector in Denmark is a three-tier system which includes state, region and municipality (Gjerding, 2005:1). In 2007 a new structural reform became effective, and meant that the previous structure with 14 counties was abandoned. Instead of these counties five new regions were established. The structural reform also meant that the previous 273 municipalities in Denmark were reduced through mergers into 98 municipalities (Regioner.dk, no.1.). The original structures of the Danish administrative systems, from the late 1950[s] and forward, had the primary focus of redistributing economic activity to peripheral regions where, among other things, unemployment was high. The work process was that the state selected the areas that were in need of support and in these areas the organizations could then receive subsidies to invest in production facilities. Under these early structures the regional industrial services were coordinated by the state, which did not involve the counties or local municipalities in the decisions about these support mechanisms (Halkier). In the late 1980[s] regional, national and European efforts were linked together to enhance the industrial services in peripheral areas. This brought some changes in the field of work in the regions, where they were used to receiving subsidies without being actively involved in the work. The region now had to be actively involved in the industrial services, although the conditions were still defined on a national or in some cases European level (Halkier et al., 2008:1-3). Through these later structural changes the regions gained more economic responsibility and development of the industry became a mandatory field of work for the regions. The implementations of these industrial services were now transferred to the municipalities. The direct subsidies to organizations decreased, which indirectly meant that the national role in the regional industrial services also decreased, while focus was moved to areas such as guidance and network formation in the effort to improve the organizations' framework conditions. Although the regions, and also the municipalities, gained more responsibility there are still activities between the levels which have to be coordinated on a national level, for instance policy instruments, but between the region and the municipality the regions could no longer dictate the municipality field of activity. Now the industrial services a given municipality desires are developed through dialogue with the region, and in this way the municipality have influence on the field of activity and how they want their resources distributed (Halkier).

In the introduction/problem statement to this master thesis it was described how regions compete over shares of the national or global economy, and that more successful regions which attract the most talented people and investments gain an advantage over the other regions. From REG LAB (2008:10) it can be seen that a means to gaining competitive

advantage over other regions is being able to use the knowledge produced in the knowledge institutions. It is further described that the awareness on a local level of the possibilities to aim at unique competences can be used as a response to cope with globalization. For instance REG LAB (2008:17) found that the localised business centres' close contact with the local organizations combined with AAU's know-how rather quickly gave results when a cluster initiative was initiated in the iron and metal business in Northern Jutland in 2006. Therefore improving the interaction by university on industry not only provides the local area with competence increase but also positively affects the regions. It was also found by REG LAB (2008:31) that the local business centres in Northern Jutland by mediation with the local organization can undermine some of the more common prejudices concerning university knowledge, e.g. the prejudice that knowledge generated at a university is of no relevance for an organization. Furthermore the local business centres was important as they can facilitate access to knowledge institutions for the local organizations (REG LAB, 2008:45).

To sum up this short paragraph, it was seen that the structural reforms in the Danish administrative system have had the effect that the field of work a business centre provides has grown in importance, as the centre has to provide industrial services to the businesses located in the municipality. Also it was found that the local business centres in Northern Jutland have a positive influence in easing the industry's search for knowledge in knowledge institutions, and that these knowledge institutions are of importance in an area's effort to gain advantages over other areas. Thus the importance of a business centre has increased throughout recent years.

7   Implications by Theory on Empirical Data

The purpose of this chapter is to provide the reader with an overview of the previously described theory, while connecting this with the forthcoming chapter on empirical data, in an effort to secure that the empirical data are constructed in a way that is not detached from the theory, but are the proper empirical data in relation to the theory and research question.

In the theory chapter it was seen that a main section provided theory on U-I collaboration, more specifically on motivations, benefits, costs, and barriers to such collaboration. The main purpose of this section was that the literature on this would provide some main perceptions on barriers to U-I collaboration, which is of relevance to the first part of the research question; the theory also had to provide insight into which case data needed to be collected during the case studies. Furthermore it lead to the question whether these barriers differ from those seen in Jammerbugt Municipality. For this to be answered some data were needed, which meant that a number of case studies on this subject were relevant. Thus it is only natural to start the

chapter on empirical data with a section on the case study data, which were collected in the ten case organizations, providing the data on barriers needed to answer the second part of the research question, and also providing insight into the motivations, benefits, and costs the organizations found during the collaboration.

Theory sections on economic geography and types of knowledge were also provided. This was of relevance in relation to the two hypotheses, but also as proximity is not just a matter of distance between A and B, but also deals with proximities such as social proximity, which might have relevance to the collaboration in an organization located a long way from the collaborating partner. Also the type of knowledge may have relevance in relation to distances and the success rate of implementing the knowledge in the organizations. Conducting case studies to help elaborating on the hypotheses, was also of relevance to these theory sections, thereby leading to the empirical data chapter on case studies also containing case data on economic geography and types of knowledge.

Furthermore the theory chapter provided insight into triple helix, rural and urban areas, and industrial services, which is of relevance mainly due to the collaborating partner – Business Centre Jammerbugt – on this master thesis, thereby also indicating that a section in the empirical data will provide insight into different areas of Business Centre Jammerbugt and different data on Jammerbugt Municipality. This connects Jammerbugt Municipality with the theory on rural and urban areas, while the business centre is connected to the triple helix theory and industrial services.

The theory chapter and the chapter on empirical data will then be further connected and discussed in relation to each other and the case data findings in the discussion later in this project.

8   Empirical Data

The purpose of this chapter is to provide the relevant empirical data for answering both the research question and the hypotheses. The first section provides the findings from the case studies. It will provide case data on different facts and background information about the involved organizations, case data on motivations, barriers, proximity and types of knowledge. After this another section on Jammerbugt Municipality will provide insight into different data about the municipality, e.g. educational level and innovation, which is relevant to e.g. the theory on urban/rural areas and different aspects of the case data. A section will also provide insight into Business Centre Jammerbugt and their field of work, which will later be discussed in relation to e.g. types of knowledge, just as it is relevant with some information about the collaborating partner in this master thesis.

8.1   Case Studies

In this section a number of tables containing different case study data will be provided and elaborated on. After this chapter on empirical data the findings in this section will be discussed further in the *Discussion*, which is the next chapter. The purpose of this is to answer the second part of the research question *"Do these barriers differ from those seen in Jammerbugt Municipality?"* and the two hypotheses *"Proximity has an influence on the matter of barriers seen in Jammerbugt Municipality"* and *"The type of knowledge transferred is different within the municipality"*. The first paragraph will provide the reader with an overview of the case organizations involved, the background data as well as insight into whether they have had prior collaboration with a university. After this a paragraph will provide and describe the case data on motivations, benefits, and costs found during the data collection. Subsequently a paragraph provides case data on different barriers, initial barriers, if initial barriers were found to be real, and barriers not thought of in advance. Besides a table to provide an overview of the findings these will also be described in the paragraph. Then case data on economic geography will be depicted and described in a new paragraph, before the last paragraph in this section provides and describes case data on types of knowledge. As described in the methodological approach case no.6.1 has been removed. For further elaboration on this see page 20-21. One should also be aware of the possibility to see a complete set of tables and a case database containing all case studies in the appendix, if this is desired by the reader.

8.1.1   Case Data on Facts and Background Information about Collaboration

This paragraph will provide the reader with facts about the case organizations involved in this master thesis and it will also provide insight into elements such as initial contact in the latest

collaboration, the collaborating partner from the university, and previous collaboration and barriers in these.

Table 4: Case organizations, facts

	Age of the organization	Field of activity	No. of employees	Physical distance to Aalborg University.	Educational level (- degree from university)
Case no.1	Founded in 1991.	Broker organization in the IT hardware industry.	50-55.	Approx. 32 km.	Technical, on a medium higher level.
Case no.2	Acquired by current owners in 1999.	Holiday Resort.	27-29. On an annual basis.	Approx. 49 km.	Skilled, short higher level and medium higher level.
Case no.3	Founded in 1993.	Developing and producing multifunctional batch mixers for the food industry.	16.	Approx. 27 km.	Skilled and medium higher level.
Case no.4	Founded in 1976. Current owners are second generation and took over in 2003.	Transportation by cab or coach.	15 fulltime (included are 2 in flex jobs). + 10 substitutes.	Approx. 26 km.	Skilled. Short higher level.
Case no.5	Founded in 2007.	Association with the purpose to develop Blokhus and Hune.	5 board members.	Approx. 45 km.	Medium higher level.
Case no.6.2	The owners acquired the remains of an insolvent organization in 2003.	Industrial robotics.	18.	Approx. 32 km.	Short higher level.
Case no.7	Founded in 2006.	Steel Business as subcontractor.	Approx. 50.	Approx. 56 km.	Unskilled (30-35), skilled, and short higher level.
Case no.8	Founded in 2000.	Electronic commerce.	20.	Approx. 26 km.	Longer vocational educations (approx. 4 employees).
Case no.9	Founded in 1935.	Raw material extraction.	Approx. 35.	Approx. 64 km.	Unskilled (60 %). Skilled and medium higher level.
Case no.10	Founded in 1985.	Bricklaying.	9.	Approx. 56 km.	Skilled.

The above table 4 shows different background information on the ten case organizations involved in this master thesis. For example it can be seen that the age of the organizations differs much, starting with the establishment of case organization no.9 in 1935 and ending with the establishment of case organization no.5 in 2007. The majority of the organizations were established in the 90[s] or later, with only three established prior to the 90[s]. The table also provides information about the organizations' distance to AAU, where the shortest distance was approximately 26 km and the longest approximately 64 km. The number of employees varies as a couple of organizations have less than 10 employees, three have between 16 and 20 employees, while five have more than 20 but less than 60 employees. It can also be seen that two of the organizations – Case no.7 and no.9 – with more than 20 employees have their

field of activity within the industrial sector, and both employ approximately 60 per cent unskilled workers. If at the same time looking at the next table (table 5 below) it can be seen that two other organizations – Case no.1 and no.8 – also differ from the rest as they have several employees with a degree from a university. In Case no.8 this accounts for approximately 80 per cent of the employees, but this organization is also involved in a high-tech area within electronic commerce. By looking at both tables containing facts of the organizations one can see that six of the ten organizations involved have one or more employees with a degree from a university, while three do not, and one – Case no.5 – is not sure about this, but it is also seen that the majority of the employees have educational levels ranging from unskilled – e.g. a worker in the steel business – to medium higher level – e.g. a pedagogue in the holiday resort. As for the line of business of the organizations it can be seen from the above table that they vary from holiday resort, trade business, industry, business service, transport business, construction work, and an association working with other services.

Furthermore from table 5 below it can be seen that the majority of the organizations do not have R&D in-house, only Case no.9 has both research and development in-house where one to two employees work fulltime in developing new products, while two organizations – Case no.6.2 and no.8 – have development in-house. This is very contrasting to the fact that all ten organizations stated that they saw themselves as innovative organizations, seven of these on a continuous basis and two ad hoc. Eight of the organizations stated that they were innovative on business development, while four also stated that they were innovative in product development. The most common method of in-sourcing knowledge and information is through different types of networks – private network, collaborating organizations, and suppliers, while also university is high on the list with three organizations stating this as a method of in-sourcing. This is also the case with market knowledge. But also specific trade associations are represented on the list.

Table 5: Case organizations, facts - continued

	Employees with a degree from university	In-house R&D activities	Is the organization innovative – if yes; ad hoc or on a continuous basis	Where is information and knowledge usually in-sourced from
Case no.1	5-10.	No.	Innovative – combine existing technologies.	AAU, Business Centre Jammerbugt. Market contact.
Case no.2	2. + 2 employees who currently study at university.	No.	Innovative – on a continuous basis.	VisitNordjylland.
Case no.3	No.	No.	Innovative – development and optimization of machines. Business development on continuous basis.	Consultants. Networks – e.g. Project Plato. Interaction with collaborating organizations.
Case no.4	No.	No.	Innovative – have to be to survive – strategy and optimization. Continuous basis – in developing the organization.	The Danish Passenger Transport Operators.
Case no.5	÷	No.	Innovative – through developing projects. Continuous basis.	Networks. Visiting other areas. Google.
Case no.6.2	1.	In-house development – software technology for robotics, and construction.	Innovative – both in the area of products and business. Continuous basis.	Business and sub-supplier networks. Market knowledge.
Case no.7	2.	No.	Innovative on continuous basis. Optimizing organization and employees' skills as a means to survive.	AAU. Private consultants. Through collaborating partners and customers.
Case no.8	Approx. 16.	In-house development – on applications.	Innovative – ad hoc, when they see a need in the market. Business development.	Through customers. Through new employees, and employees who have taught at university and thereby bring new knowledge with them.
Case no.9	1.	Yes. 1-2 employees work fulltime in developing new products.	Innovative – ad hoc. Business development and products.	Suppliers, business, and personal networks.
Case no.10	No.	No.	Innovative – continuous basis. On business development.	Suppliers, drawing offices, manufacturers of materials and tools.

From the next table (table 6) it can be seen how the initial contact in the latest collaboration or effort to find collaboration was made. It is relevant to see how the contact was made as it is primarily at this stage of a possible collaboration Business Centre Jammerbugt is brought into play. Furthermore it can be seen what type of collaborating university partner the organizations had. This is mostly to provide the reader with background information about these subjects.

Table 6: Contact and duration of collaboration

	Contact	**Duration of collaboration. (who)**
Case no.1	BCJ brought up the idea of collaboration.	3 months. (Students)
Case no.2	AAU Matchmaking and solution camp.	Approx. 4 months. (3 student groups)
Case no.3	BCJ brought up the idea of collaboration.	Approx. 3 months. (Students)
Case no.4	BCJ brought up the idea of collaboration.	From March 2012 with no scheduled ending. (Researcher)
Case no.5	The association contacted BCJ, which contacted AAU Matchmaking, which helped to put a project description in the AAU job database.	The collaboration was cancelled before it began. (Should have been students)
Case no.6.2	AAU contacted the organization.	3 months. (Researcher)
Case no.7	AAU contacted the organization.	Approx. 1 year. (Researchers from Centre for Logistics)
Case no.8	AAU Matchmaking contacted the organization.	There was no collaboration. (Should have been students)
Case no.9	BCJ brought up the idea of collaboration.	Approx. 2 years. – scheduled to last till the end of 2012. (Researcher)
Case no.10	Contacted BCJ, which arranged a meeting with AAU.	There was no collaboration. (should have been trainee)

Note: AAU = Aalborg University. BCJ = Business Centre Jammerbugt.

The table below will provide insight into whether the case organizations have previously had collaboration with a university or not. This is of relevance as one might assume that the organizations which have had previous collaboration must somehow have benefitted from this and therefore may not experience barriers to the extent the other organizations experience.

Table 7: Previous collaboration

	Previous collaboration and barriers
Case no.1	Several cases of previous collaboration, but no barriers as a number of these have been made by employees, who also study at a university.
Case no.2	No.
Case no.3	No.
Case no.4	No.
Case no.5	No.
Case no.6.2	No.
Case no.7	Two previous cases of collaboration with AAU concerning electronic data processing. Huge cultural barriers between organization's educational level and university researchers, which resulted in difficulties in understanding the researchers' ways of talking, using terms, and English phrases. Another barrier is that collaboration is very time consuming. Collaboration can also become too extensive, when more people are added to help with specific functions.
Case no.8	No.
Case no.9	Previous collaboration, but it has been 5 to 7 years since the last.
Case no.10	No.

Note: No = no previous collaboration with a university. AAU = Aalborg University.

From table 7 it can be seen that the majority of the case organizations do not have experience through previous collaboration, and therefore have a novice approach to collaboration with a university, which means that they have not yet had the opportunity to break down any of the possible barriers to and during collaboration. As for Case no.1, Case no.7, and Case no.9 one could assume that due to prior experience they are able to avoid certain barriers. If looking further into these three cases, it can be seen, however, that Case no.1 states that they have not seen any barriers in the previous cases of collaboration they have had, maybe due to the

fact that a number of these were made by an employee who also studied at a university. In this case it could also be a matter of not being able to remember the different cases of collaboration they have had, and therefore the organization assumes that they have not had barriers. But in using what the organization stated, one must also assume that the latest collaboration experienced no or very few barriers. As for Case no.7 it can be seen that they have experienced several barriers in the two previous cases of collaborations. One must assume that due to this they are able to avoid or bypass some of these in the latest collaboration. For Case no.9 it has been 5 to 7 years since their last collaboration, and they were not able to remember if there were any barriers related to these and therefore it must be assumed that they might have had both initial barriers and barriers not thought of in advance through the latest collaboration.

8.1.2 Case Data on Motivation, Benefit, and Costs

The next tables will provide insight into the case organizations' motivations, benefits, and costs related to the latest collaboration. The purpose of this is to be able to discuss these data in relation to the findings provided in the theory paragraphs of motivation, benefit, and costs. This discussion will take place later in the master thesis. In this paragraph the purpose will be to describe the data depicted in the tables below.

Table 8: Case data - motivation

Motivations	Case
New insight/inspiration into usual routines	no.1, no.2, no.8
New ideas/insight into specific areas	no.2, no.5, no.6.2, no.10
Possibility of insight in/optimizing all processes in the organization	no.7
Insight into new knowledge	no.8
Possibility of raising competence levels	no.9
Help in basic research in new areas	no.9
Social responsibility	no.1
Practical experience for students	no.1
Insight into business strategy	no.1, no.3
New insight into technical fields	no.3
Possibility of optimizing the organization's finances	no.4, no.7
Possibility of insight into the organization's survival rate in case of new owners	no.7

Note: Motives marked in boxes with thick lines differ from those seen in theory, see discussion for further elaboration.

Table 8 shows the case organizations' different motivations to engage in their collaboration with the university, as one would assume all organizations stated some kind of motivation to their involvement in the collaboration, while several organizations also gave more than one motive to their involvement in the collaboration. By looking at the table it can be seen that the two most often stated motivations both have to do with new insight, inspiration, and ideas for either usual routines or more specific areas, thereby hoping that the collaborating partner will

provide something which is directly useful and of advantage in a specific area or to the organization's daily working routines, or maybe provide some insight which will spark off the organization's idea generation in ways they would not else have thought of. Thereby the output of the collaboration will come through viewing things differently. From table 8 it can also be seen that three other motives for collaboration resemble the two previously mentioned motivations in some levels. Two of these motives were related to insight into technical fields and business strategy, so one could argue that these might as well have been under the before mentioned motivations, but they were chosen as individual motivations because the two case organizations – Case no.1 and no.3 – specifically stated that they also sought insight into business strategy and technical fields, whereas the motivation about insight into specific areas is related to e.g. insight into the MTB area, lighting, pre-calculations, and zero-energy buildings. The third motivation related to the two first mentioned motivations in this text, is insight into new knowledge, which case organization no.8 mentions as a motivation to collaboration. Here it was stated that the collaboration with the university would make the latest knowledge within their field of work accessible to the organization; this resembles the motivation on the possibility to raise the organization's competence level that Case no.9 mentions about the collaboration. Only one organization brought up areas which might not directly be beneficial to them as motivations to collaboration. This was Case no.1, which stated that they were also motivated because they could provide practical experience for students, as through collaboration they can apply their theoretical knowledge on practical problems, and the organization was partly motivated by the social responsibility an organization has towards a university, although the social aspect would not be enough to engage in collaboration. Cases no.4 and no.7 were motivated by their hopes of optimizing the organization's finances and, for Case no.7, optimizing the entire production line/processes in the organization e.g. in an effort to avoid bottlenecks in the production line. Case no.7 was motivated by the ability to gain insight into the organization's survival rate in case of new owners. These motivations had to do with the optimization of the organizations both as a means to survive in the market and as a means to making higher profit on every earned DKK and being more competitive. Case no.9 was also highly motivated by the university's ability to help in basic research within a new area, as the university's help with conducting this research would be crucial to the organization's ability to explore this new area of research.

Table 9: Case data - benefits

Benefits	Case
Opportunities through new insight/solutions	no.2, no.4, no.7
New solutions to problem solving	no.1, no.4
Increased competence levels	no.9
Establishment of new laboratory	no.9
No benefits from collaboration	no.3, no.6.2
Organizations with no collaboration, therefore no benefit	no.5, no.8, no.10

Note: Benefits marked in boxes with thick lines differ from those seen in theory, see discussion for further elaboration.

In looking at the case organizations' stated benefits from the collaboration they had with the university one can see from table 9 that three organizations did not benefit as they ended up without collaboration, but also that two organizations – Cases no.3 and no.6.2 – did not benefit from their collaboration with the university. Though they might not have had any benefit in the direction they expected prior to the collaboration, one might wonder if there was no indirect benefit from the collaboration, as it might have opened some discussions in-house and with the collaborating partners, which otherwise would not have been taken up, or the organizations might have learned something which further focuses their initial search for collaboration in the future and by this it might lead to beneficial collaboration in future. But it is certain that somehow they did not have their expectations to their collaboration fulfilled. From the table it can also be seen that the benefits the other organizations had can be divided into four groups. As it can be seen, three organizations – Cases no.2, no.4, and no.7 – found that they benefitted from the collaboration by opportunities through new insight/solutions. Fairly close to this type of benefit is the benefit experienced by Cases no.1 and no.4, which was benefit through new solutions to problem solving, which for instance could be better insight into what positively and negatively affects the profit in case organization no.4, where prior to the collaboration they had difficulties in getting this insight. In Case no.9 two benefits from their collaboration were found, as they have benefitted by having their competence levels increased and also stated that they benefitted from the establishment of new laboratory facilities of relevance for the further experiments in the collaboration.

Table 10: Case data - costs

Costs	Case
DKK 5,000 for participation in collaboration	no.4, no.9
Additional costs of collaboration, but business secret	no.9

As it can be seen from table 10, the case organizations that did talk about the costs of their collaboration, besides the time spend on it were few, as only two organizations provided insight into this area. But for some of the organizations the collaborating partners were students and therefore these collaborations did not have costs directly related to obtaining the

collaboration. For Case no.4 they stated that their cost was DKK 5,000, as this was the price to be in the ViaNord collaboration. As for Case no.9, they also had to pay DKK 5,000 for their first part of the collaboration, but they further stated that during the collaboration, due to the long timeframe, they had to renegotiate the collaboration contract with Centre for Logistics, but the organization was not willing to elaborate on the additional costs of the collaboration as this was a business secret.

In this paragraph the case study data on motivations, benefits, and costs have been described. It was seen that the case organizations had several motives to collaborate with the university, although a number of these centred on gaining new insight, ideas, and inspiration. When looking at the benefits from collaboration, it was seen that two organizations stated that they did not benefit at all from the collaboration, but those which did, benefitted from opportunities through new insight/solutions and new solutions to problem solving. As for the costs of collaboration only two organizations provided some insight into this, stating that their initial costs were DKK 5,000, while one of the organizations also described that they had to renegotiate their agreements with the university, but that this price was a business secret.

8.1.3 Case Data on Barriers

In this paragraph case data on different barriers will be provided, the barriers are divided into three groups; 1) initial barriers, 2) if yes were these real, 3) other barriers not thought of in advance. The different barriers are collected in groups to make the data more useful in cross-case comparison and to secure more precise discussion of the data compared to the theory on this subject later in the project. A table where the barriers are more detailed on the individual case findings can be seen in the appendix, if desired.

Table 11: Case data - barriers

Barriers	Case
Privacy of data	~~no.1~~
Different cultures/environment, e.g. goal oriented vs. not goal oriented	~~no.2~~, (no.3), ~~no.4~~, no.7, [no.6.2], [no.10]
Differences in working practice	no.7, [no.6.2]
Administrative burden	[no.4]
Opportunistic behaviour by university	[no.9]
Small/unknown organization might not be attractive as partner	(no.3), (no.8), (no.10)
How does one benefit from collaboration	no.3, no.6.2
What could organization possibly offer university	~~no.4~~
What can university be for used for	~~no.4~~
What is knowledge from a university	~~no.4~~
How does one locate the right partner at the university	no.6.2
Major educational differences	no.7
Time factor	~~no.2~~, ~~no.3~~, no.7, (no.8)
Concerns about lack in university's motivation	~~no.9~~
Doubt about validity of the idea	no.9
Costs of collaboration	(no.10)
Students do not take collaboration seriously/reluctant to invest time in it	[no.3]
Time and effort in finding a collaborating partner	no.3, no.8
Location of the organization	(no.3), (no.10)
Lack in university desire to take responsibility of collaboration	[no.8]
Time spent on up-dating researcher, not on field of collaboration	[no.6.2]

Notes: No.x = initial barrier. ~~No.x~~ = initial barrier, but not real. (No.x) = initial barrier, but the organization could not answer whether it was found to be a problem. [No.x] = other barriers not thought of in advance.

As seen from the table containing the barriers found during the case studies, the organizations had a number of different barriers, both initial barriers and other barriers not thought of in advance to their collaboration with the university. Other barriers not thought of in advance – [no.x] in the table – are meant as barriers not seen initially by a given organization although other organizations might have had this particular barrier as an initial barrier. By looking at table 11 one can conclude that a number of different barriers to collaboration were found by the case organizations, either as initial barriers which were found to pose a problem during the collaboration or as other barriers not thought of in advance but found during the collaboration – no.x and [no.x] –. These barriers must be seen as real barriers to collaboration from the case organizations' point of view.

When looking at all the barriers in table 11, it can be seen that the majority of the barriers was found by only one case organization, whereas approximately one third of the barriers were found by multiple case organizations. Also it can be seen that only one case organization – Case no.5 – does not have any barriers at all towards the collaboration. This organization's collaboration was cancelled before it began but though this is the case, it still differs from the other case organizations, as all of them including the two other organizations which did not have collaboration – Cases no.8 and no.10 – still found different barriers to the collaboration. It can also be seen that the organizations in general had multiple barriers prior to the

collaboration, and six of the organizations found one or more barriers not thought of in advance during the collaboration, while four organizations found no barriers they had not thought of in advance. It can also be seen from the table that one third of the initial barriers to collaboration were found not to be real – those depicted as: ~~no.x~~ – by the organizations during the collaboration, while in just under one third of the initial barriers – for different reasons, e.g. no collaboration – it was not possible for the organizations to answer whether these actually posed a problem to collaboration or not – those depicted as: (no.x). In 10 out of the 27 barriers the organizations noted as initial barriers it was found by the organizations that those actually posed a problem. As for the barriers not thought of in advance these were both completely new barriers not seen before in any of the cases, and some of them were found to match other organizations' initial barriers.

From table 11 it can be seen that five initial barriers which proved not to be real, all had only one organization in each barrier stating that they could have posed a problem, but during the collaboration the barriers were found not to be real by the organizations – Cases no.1, no.4, and no.9 –. Three of those barriers, all initially thought of by Case no.4, had to do with not knowing the university world. Case no.1 had an initial barrier related to privacy of data; this barrier was found not to be real, as the organization handled it through confidentiality agreements. The table also shows that eight barriers, both initial barriers and barriers not thought of in advance, did pose a problem to collaboration, but for these barriers, just like above, they were only found by one organization each. Some of these are very specific to the particular collaboration, e.g. doubt about the validity of the idea and up-dating researcher, while others had a more overall character, e.g. administrative burden, opportunism by university, and educational differences. A barrier concerning the costs of collaboration, initially thought of by Case no.10, could not be confirmed.

Two barriers related to the location of the organization and the idea that a small/unknown organization might not be an attractive collaborating partner, were initially stated by two or more organizations, but none of these could answer whether the barriers were found to pose a problem or not. Therefore if further analysis on these is made one should remember these uncertainties in the data. This is also the case when looking at the barrier concerning the time factor. This was an initial barrier in four organizations, but two found, during the collaboration, that this was not a problem, while one stuck to it as a barrier; the last organization was not able to answer whether it was a problem.

By looking at the different barriers depicted in table 11, it can be seen that a number of organizations stated that they had initial barriers related to the two different cultures and environments in university and industry, but during the collaboration two of these organizations found that the different cultures did not pose a problem, while one was not able to answer if it posed a problem, leaving only one organization – Case no.7 – to find that the

different cultures actually posed a problem. Furthermore the differences in culture and environment were found to pose problems in two organizations – Cases no.6.2 and no.10 – while in collaboration with the university. By this it must be concluded that the cultural and environmental differences are seen as a real barrier to collaboration. By looking at the table it can also be seen that the initial barrier related to time and effort in finding a collaborating partner, was found to be real by the two organizations – Cases no.3 and no.8 – in their search for the collaborating partner. Therefore one must also conclude that this is seen as a real barrier to collaboration. The table also presents a barrier on how to gain benefit from U-I collaboration, indicating that some organizations struggle with one of the primary elements in joining collaboration, which is that both university and industry must benefit from the collaboration to be fully committed to the collaboration. This barrier was found to be real by two organizations – Cases no.3 and no.6.2 – and must therefore be seen as a real barrier to collaboration. It was also found that differences in working practice were a real barrier to collaboration. Again two organizations, one initially – Case no.7 – and one which had not thought of this in advance – Case no.6.2 – found this as a barrier to collaboration.

In this paragraph different barriers to collaboration have been described and the further analysis in the discussion will compare these to the ones found in the existing literature to see if the barriers found in the organizations in Jammerbugt Municipality differ from these. Also it will be discussed whether these are real barriers to collaboration or not, by analysing the barriers found in relation to the other data and the existing literature.

8.1.4 Case Data on Economic Geography

In this paragraph a table containing case data on economic geography will be depicted and described in an effort to explain the results of the case data. These data are of relevance in relation to the first hypothesis *"Proximity has an influence on the matter of barriers seen in Jammerbugt Municipality"*. Later in the discussion in this master thesis, the data will be analysed in relation to other case data findings and the theory section on proximity.

Table 12: Case data - proximity

	Geographical	Cognitive	Organizational	Social	Institutional
Case no.1	Not seen as a problem.	Relevant – the cognitive proximity enhances the outcomes of collaboration.	÷	Relevant – BCJ. Employees who also study at university.	Some – rules through confidentiality.
Case no.2	Not seen as a problem.	Relevant – cognitive proximity in collaboration field.	÷	Relevant – Aalborg Collaboration and NOMINI help expand the horizon.	÷
Case no.3	Could pose a problem, but organization does not feel that it plays a significant role.	Relevant – cognitive proximity in technical and market research fields.	÷	Relevant – BCJ.	÷
Case no.4	Not seen as a problem.	A little cognitive proximity concerning the day sheets, otherwise none.	No proximity.	Relevant – BCJ.	Some relevance – through time registration.
Case no.5	Not seen as a problem.	No proximity – but not a seen as a problem.	No proximity.	Relevant – BCJ.	Not relevant in this collaboration.
Case no.6.2	Not seen as a problem.	No proximity.	No proximity.	A little relevant – To own networks. A little to BCJ.	Not relevant.
Case no.7	Not seen as a problem in the collaboration they have had. But could pose a problem in other situations of collaboration.	Almost no cognitive proximity.	Relevant – previous success with collaboration made it easier to say yes to new collaboration.	Relevant – The professor and the organization have previously collaborated. Secondary; private networks.	Not relevant.
Case no.8	Not seen as a problem.	Cognitive proximity with university.	Relevant - through teaching at AAU.	Is seen as most important – private network.	Can be a problem.
Case no.9	Not seen as a problem in this collaboration. But could pose a problem in other situations of collaboration.	No cognitive proximity except for common logical scientific approach.	Relevant – previous success with collaboration made it easier to say yes to new collaboration.	Relevant – proximity with AAU, gives access to the right departments.	Relevant – Confidentiality on specific findings. Time registration.
Case no.10	Could pose problem if the collaborating partner is a student.	Some practical knowledge to university's theoretical knowledge.	No proximity.	Relevant – BCJ.	No proximity.

Note: ÷ = no answer. BCJ = Business Centre Jammerbugt. AAU = Aalborg University.

In describing the data depicted in the above table 12, it can be seen that the majority of case organizations have elaborated to all types of proximity, which improves the possibility of finding valid results in the conclusion.

In relation to the geographical proximity it can be seen that the majority of the organizations stated that the geographical proximity they have to the collaborating university was not seen as a problem. Although the proximity did not influence the collaboration, four cases did state

that they could see how proximity might pose a problem in other types of collaboration; this could for instance be the case if the collaborating partner had no access to a vehicle. But overall the organizations do not find that the geographical proximity poses a problem to collaboration.

It can also be seen that the social proximity is seen as relevant by all case organizations, although it differs who the social proximity is relevant to. Six of the involved organizations state that their social proximity with Business Centre Jammerbugt has some level of relevance in establishing the collaboration. Here it should be remembered that the case organizations were found and screened with the help of Business Centre Jammerbugt, which therefore most likely influences the social proximity positively. Thus it may not be representative to all organizations in the municipality which have had collaboration with a university. It can also be seen that two organizations – Cases no.7 and no.9 – state that their social proximity with the university, a department, or a professor is the most relevant social relation in their collaboration, so it must be assumed that they have either had previous collaboration or employees who recently studied at the university. In fact Case no.1 also states that the social proximity to the university is of relevance due to employees who also study there.

As for the cognitive proximity it can be seen that the majority of the organizations state that they have some level of cognitive proximity in the collaboration, although some state that this is only in a very limited and on theoretical area. Only two organizations stated that they had no cognitive proximity at all, and one of these – Case no.5 – stated that this was not seen as a problem for the collaboration to be successful. One might wonder, though, if not only a limited cognitive proximity, as a number of organizations stated that they had, is preferred to not having any cognitive proximity at all, as this could be the foundation upon which additional knowledge can be successfully generated.

Three organizations stated that their organizational proximity with the university is relevant. Two of those – Cases no.7 and no.9 – stated that previous success in collaboration positively affects the organization willingness to engage in further collaboration. Three other organizations did not provide insight into this type of proximity, while four organizations stated that they had no organizational proximity with the university. As it can be seen from the table, the case organizations are also fairly divided when it comes to the institutional proximity. Two did not provide insight into this type of proximity; three organizations stated that this proximity had some relevance during their collaboration in relation to rules of confidentiality and time registration. Furthermore three organizations stated that institutional proximity had no relevance in relation to the field of collaboration. Two of the organization which did not have collaboration – Cases no.8 and no.10 – respectively said that it could pose a problem and that they had no proximity. So it can be seen that the organizations were more differentiated in these two types of proximity, than the first three described here.

8.1.5 Case Data on Types of Knowledge

In this paragraph data on the types of knowledge will be shown in a table and described in an effort to explain the results of the case data. This is of relevance to the second hypothesis *"The type of knowledge transferred is different within the municipality"*. The data will later, in the discussion in this master thesis, be analysed in relation to other case data findings and the theory section types of knowledge.

Table 13: Case data - type of knowledge

	Tacit/Explicit	**Know-how, -why, -what, and -who**	**Method of transfer**
Case no.1	Explicit.	Know-what.	÷
Case no.2	Explicit.	÷	Meetings and report.
Case no.3	No knowledge was transferred.	No knowledge was transferred.	No knowledge was transferred.
Case no.4	Explicit.	÷	E-mail, telephone, and meetings.
Case no.5	The collaboration was cancelled before it began.	The collaboration was cancelled before it began.	The collaboration was cancelled before it began.
Case no.6.2	No knowledge was transferred.	No knowledge was transferred.	Face-to-face interactions during the collaboration, but no knowledge transferred.
Case no.7	Both tacit and explicit. Extra time was spent on making tacit knowledge usable.	Know-how and know-what.	E-mail. Telephone. Meetings.
Case no.8	There was no collaboration.	There was no collaboration.	There was no collaboration.
Case no.9	First phase was explicit. Second phase was tacit and scientific. Third stage deals with experiments to make polymer concrete, which makes the knowledge usable.	Know-why and know-what.	Meetings.
Case no.10	There was no collaboration.	There was no collaboration.	There was no collaboration.

Note: ÷ = no answer.

Table 13 shows that for the majority of the organizations it was explicit knowledge which was transferred – Cases no.1, no.2, no.4, no.7, and no.9 –, while only two had tacit knowledge transferred – Cases no.7 and no.9. Three organizations – Cases no.5, no.8, and no.10 - did not have knowledge transferred as the collaboration was never realized. Lastly two organizations – Cases no.3 and no.6.2 – stated that no knowledge was transferred during the collaboration.

In the table, two of the case organizations – no.7 and no.9 – differ from the other cases, as they have experienced that both tacit and explicit knowledge was transferred in their collaboration with the university. For both cases the explicit knowledge was immediately usable, while they both stated that extra time and effort was used on making the tacit knowledge usable. In fact this process is still going on in Case no.9. However, there was another difference in the type of knowledge they had transferred. Where the tacit knowledge transferred in Case no.7 was the know-how type, it was know-why in Case no.9 as it had to do with scientific knowledge. In both cases the method by which the knowledge was transferred

involved face-to-face meetings, although Case no.7 also used e-mail and telephone to have knowledge transferred. Three other case organizations – no.1, no.2, and no.4 – stated that the type of knowledge transferred was explicit, while two of those – no.2 and no.4 – stated that one of the methods of transfer was meetings. That the knowledge transferred was seen as explicit by these case organizations is positive as it most likely implies that they more easily gained benefits from the collaboration, but one may wonder if not at least some of the knowledge was initially tacit and then made explicit throughout the time of collaboration. Two elements could point in this direction; *first*, one must assume that the collaborations have brought some elements of novelty to the organizations and *second*, the method of transfer involved meetings during the collaboration. Here different knowledge of the tacit type may have been discussed and made the knowledge explicit before the end of the collaboration.

8.2 Jammerbugt Municipality

This section provides some information about Jammerbugt Municipality. As this municipality is Business Centre Jammerbugt's working area it is relevant to briefly describe the educational level in the municipality, business demography in Denmark and in Jammerbugt Municipality, and innovation in the organizations.

Below two tables are seen, with data on the educational levels and the unemployment in Jammerbugt Municipality and in Denmark, the purpose being to document that the educational levels in Jammerbugt Municipality in general are lower than generally in Denmark.

Table 14: Education and unemployment in Jammerbugt Municipality 2010

	Employed	Unemployed	Labour force	Unemployment in per cent	Per cent of total labour force
Unskilled	4,823	236	5,059	4.89	28.51
High school	823	29	852	3.52	4.80
Skilled	7,376	263	7,639	3.57	43.05
Short Higher	965	31	996	3.21	5.61
Medium Higher	2,164	26	2,190	1.20	12.34
Long Higher	692	23	715	3.32	4.03
Unknown	271	23	294	8.49	1.66
Total	17,114	631	17,745	3.69	100.00

Source: Statistikbanken.dk; RASU11, and own calculations.[4]

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[4] Note: From the education and unemployment data, I have combined some of the categories. High school is a combination of category 20 and 25, while long higher education is a combination of category 60, 65 and 70.

Table 15: Education and unemployment in Denmark 2010

	Employed	Unemployed	Labour force	Unemployment in per cent	Per cent of total labour force
Unskilled	558,854	29,826	588,680	5.34	22.21
High school	233,731	5,364	239,095	2.29	9.02
Skilled	891,881	38,765	930,646	4.35	35.11
Short Higher	151,613	4,835	156,448	3.19	5.90
Medium Higher	388,340	6,633	394,973	1.71	14.90
Long Higher	272,843	7,965	280,808	2.92	10.59
Unknown	57,555	2,368	59,923	4.11	2.26
Total	2,554,817	95,756	2,650,573	3.75	100.00

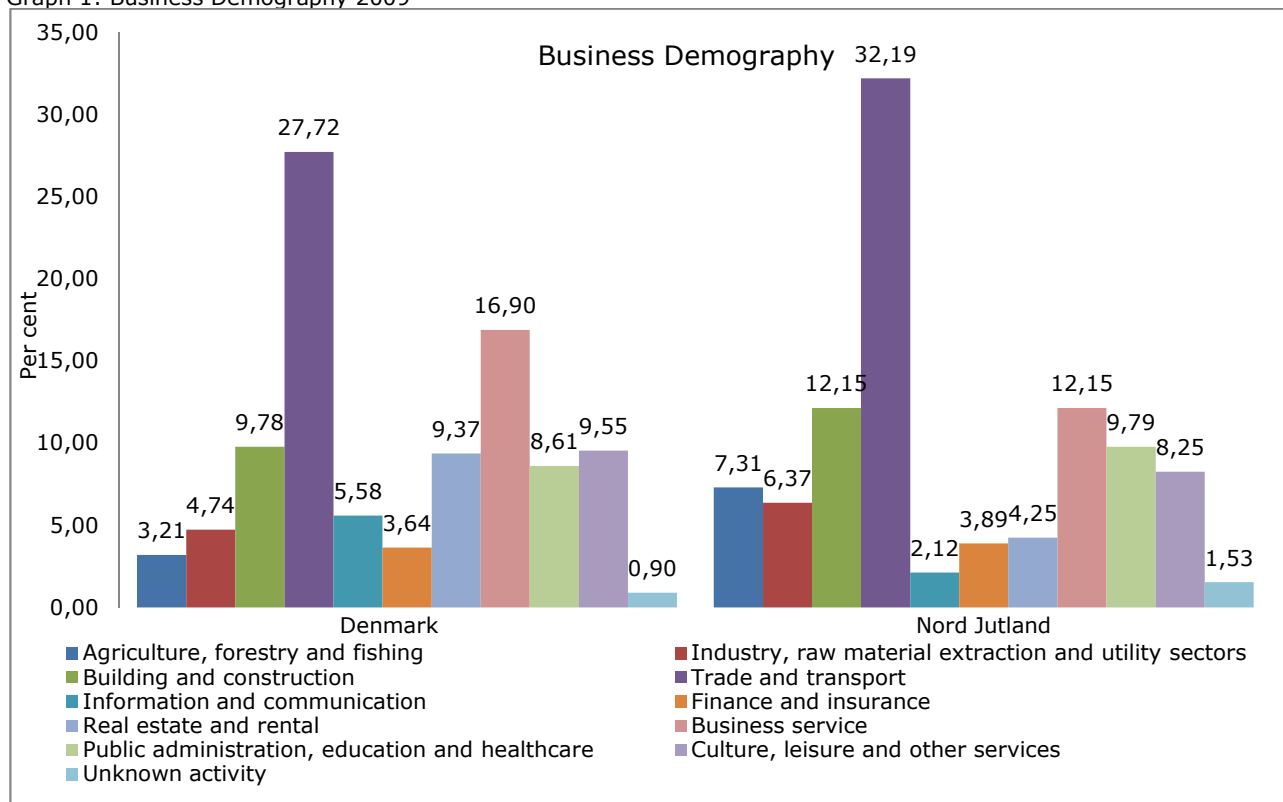Source: Statistikbanken.dk; RASU11, and own calculations.[5]

By looking at table 14 above it can be seen that, in Jammerbugt Municipality, those who are unskilled and without further education than basic school, face a higher unemployment rate than the rest of the population in the municipality, with the exception of the population with unknown educational background. When looking at table 15 it can be seen that the unemployment rate is also higher for the unskilled population than for the rest of the labour force in Denmark in general. Therefore the higher unemployment rate of these workers can be seen as a general trend, indicating that all other levels of education are preferred to being unskilled when it comes to unemployment. By comparison of the two tables it can be seen that a higher share of the population is either unskilled or skilled in Jammerbugt Municipality than generally seen in Denmark, whereas it is the opposite when looking at the population with either a secondary, shorter, medium, or long higher education. The most important differences are in unskilled, skilled and long higher education, where there are just around 6 percentage points more unskilled and 8 percentage points more skilled in Jammerbugt Municipality than it is seen in Denmark, while as there are just above 6.5 percentage points more with a long higher education in Denmark compared with the population in Jammerbugt municipality.

By looking at these two tables it becomes clear that a higher percentage of the population in Denmark in general is better educated than the population in Jammerbugt Municipality, indicating that there is an educational gap which might have a negative effect on the municipality's ability to take advantage of the knowledge intensive opportunities that might present themselves. This points to U-I collaboration as a means to help develop the municipality's organizations in an effort to gain advantage of the possibilities in the organizations and also it can be a means to competence development in the organizations.

Below a graph depicts the business demography in both Denmark and Northern Jutland in 2009; this is relevant in the later discussion, where e.g. it can be used in relation to the case organizations and the theory on rural and urban areas.

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[5] Note: Ibid.

Graph 1: Business Demography 2009

Source: Statistikbanken.dk; DEMO4, and own calculations.

If looking at the statistics from 2009 concerning the business demography in Denmark and Northern Jutland, which includes Jammerbugt Municipality, it can be seen that there is a higher percentage of businesses within agriculture, forestry and fishing, building and construction, and trade and transport in Northern Jutland, than is seen in Denmark in general. It can be seen that the three categories of businesses account for nearly 52 per cent of the businesses in Northern Jutland while the same categories only account for a little more than 40 per cent when looking at the business demography in Denmark. It can also be seen that within industry, raw material extraction and utility sectors there is a higher percentage of businesses in Northern Jutland than it is seen in Denmark in general. For a number of sectors the picture is the opposite as it can be seen that there is a higher percentage of organizations within sectors such as information and communication, real estate and rental, and business services in Denmark as compared to Northern Jutland.

Graph 2 below shows innovation in organizations in Denmark and in Northern Jutland, which includes Jammerbugt Municipality, in 2010. This is of relevance both in relation to the theory on rural and urban areas and to U-I collaboration in general, as this collaboration hopefully brings something new to the organizations.

Graph 2: Innovative organizations in Denmark and Northern Jutland in 2010
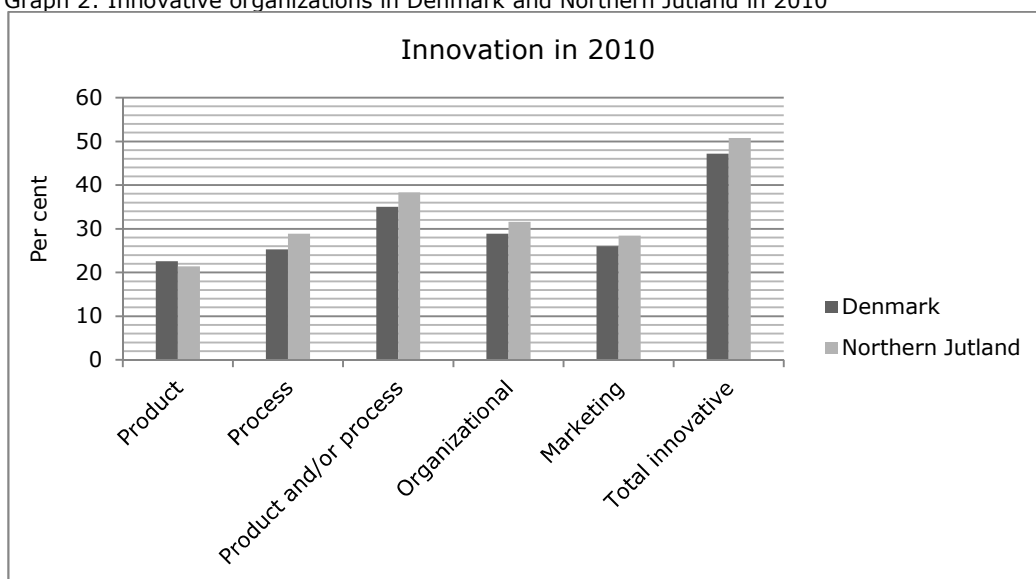
Source: Statistikbanken.dk; INN02.

From graph 2 it can be seen that the organizations in Denmark in 2010 are more product innovative than the organizations in Northern Jutland, while the organization in Northern Jutland is more innovative in the other areas depicted in the graph. It can also be seen that the organizations in Northern Jutland as a whole are more innovative than the organizations in Denmark. This development in Northern Jutland being more innovative than Denmark is quite new, as data show that organizations located in Northern Jutland in the years between 2005 and 2009 were less product and process innovative than Danish organizations in general, while also innovative organizations as a whole were of a higher level in Denmark than in Northern Jutland in the years from 2005 to 2008 (Økonomi- og Erhvervsministeriet, 2010:22; Økonomi- og Erhvervsministeriet, 2011a:17).

In the organizations, innovation is often created in collaboration with an external partner. For instance (Økonomi- og Erhvervsministeriet, 2011b:7-8) it has been described that this is seen in approximately 45 per cent of the organizations, and it is further mentioned that the external partner during the innovation process is most often found among suppliers – approximately 33 per cent of the collaboration – and customers – approximately 25 per cent –, while GTS-institutes and consultants account for a little over 15 per cent of the collaboration, other departments in the business group and rival organizations account for a little under 15 per cent each. Universities account for approximately 15 per cent of the innovation collaboration with the organizations, while a little more than 5 per cent of the collaboration is with other public institutions.

In this short section different data on Jammerbugt Municipality have been provided as a means to provide the reader with some background information about the municipality. The data presented were on innovation in organizations, levels of education, and business demography. It was found that Jammerbugt Municipality's population in general had lower levels of education as compared to the Danish average and it was also seen that there is a higher percentage of the businesses in Northern Jutland which are located in sectors such as, agriculture, forestry and fishing and building and construction than in Denmark in general. Actually innovation in Northern Jutland was in fact seen to be higher in all areas, with the exception of the businesses in Denmark being more product innovative.

8.3 Business Centre Jammerbugt

This section provides a description of Business Centre Jammerbugt. The purpose of this is to provide the reader of this master thesis with some background information about the collaborating institution on this project, its structure, its field of activities, and how and why this master thesis topic is relevant to its future work.

During this master thesis period the business centre has undergone different changes. First, the head of the business centre, who was involved in my 9th semester traineeship, my trainee project, the initial discussions about a possible thesis collaboration, and the major part of this master thesis collaboration, has recently retired. Therefore the last month or so of this project period has seen a new head of the business centre. Second, with the new head of the business centre, its field of activity now also includes tourism, as his job is to be head of business and tourism. In the current state of this project it is still not completely sure how the business centre will implement the tourism field into their field of activity, although it has been made clear that a number of employees working with tourism in the municipality will be relocated to the same building as the business centre is located in. Under the previous head of the business centre, the business centre had few assignments related to the tourism industry; these were business and competence development of the industry (Roed, 2010:18). Whether new assignments will be implemented in the business centre's field of activity has not been made clear, and as the two assignments the business centre already has within the tourism industry are the ones of relevance to the field of research in this master thesis, there will be no further elaboration on the business centre's activities within tourism.

For organizations such as Business Centre Jammerbugt, which provide services from the municipality to the local businesses, there are some basic rules on business promotion they have to oblige to in order to avoid providing anti-competitive services. By this, the business centre will not provide services that private organizations and counsellors provide, but the

business centre can provide services in a range of different areas, for instance they can finance business activities as long as they have no specific target but are open to all entrepreneurs and businesses. They can provide knowledge on how to start, operate, and develop businesses, and also arrange meetings and courses (Erhvervscenter Jammerbugt, 2009:1).

Although the business centre is a unit of the local governmental office, the business centre is located in separate buildings, where they have no daily contact with the rest of the municipality's governmental offices. According to the previous head of the business centre this was a deliberate decision, as they had a desire to create an environment where anyone could have a dialogue with a business consultant without curiosity from colleagues or others with an errand at the governmental office (Roed, 2010:16). The business centre is supported by the business council, which is a group of 16 people from both private and governmental organizations (Jammerbugt Erhvervsråd); for example they assist in developing the municipality's policy on how to develop the organizations located in the municipality, and in general assist the business centre to be more visible, and thus they have close collaboration with the business centre. The employees at the business centre, who are going to use the findings in this project in their daily work, are the head of the business centre and two business consultants. The head of the business centre has the overall responsibility that the business centre performs in accordance with the goals and objectives they have, while the two consultants have individual areas in which they provide specific business services such as guidance to entrepreneurs and export related subjects, while also providing more general business services to the organizations (Roed, 2010:16-17).

Business Centre Jammerbugt's objective is to provide services to the businesses located in Jammerbugt Municipality regardless of their size and field of activity. The services include counselling on entrepreneurial issues, strategy development, competence development, business promotion, and export opportunities (Business Centre, 2012). As it was stated in the introduction/problem statement the business centre has as an objective to enhance the accessibility of knowledge through collaboration between the organizations based in the municipality and different knowledge institutions, among them AAU. The municipality sees this as a means to positively affect earnings and employment in the municipality's organizations, as they believe that the knowledge transferred will improve the organizations' competitiveness (Jammerbugt Kommune, 2011:2, 12). According to Jammerbugt Municipality (Jammerbugt Kommune, 2011:12) already in 2011 the business centre had several ongoing types of collaboration/projects with different knowledge institutions, as their plan of action e.g. describes that two traineeships, 10 projects with students, and 25 examples of research collaboration were in progress during 2011. This, however, does not help in explaining the

amount of actual knowledge collaboration in the municipality, as it has been stated by the business centre, that there are uncertainties in the way these collaboration/projects are counted. E.g. it has been said that these numbers may contain such different measurement as to the actual number of collaborations, the number of hours spent on one case of collaboration, and collaboration which was started but never carried out (Said during meeting at Business Centre Jammerbugt, April 2012). Therefore one cannot be certain that when it is stated that there were 25 examples of research collaboration in 2011, this is the actual number. It might as well be one or two research projects of 25 hours' duration.

Through this section insight into Business Centre Jammerbugt has been provided. It was seen that the primary activity is to provide business services to the organizations based in the municipality and it was also seen that these services were not allowed to interfere with the services provided by private organizations or counsellors, as this is anti-competitive. It was further mentioned that the business centre executes the municipality's business policy, and that this was done in collaboration with a business council. Furthermore it was shown that the main findings in this master thesis will be used by the head of the business centre and two business consultants in their work when they guide the organizations in U-I collaboration. The section has also shown that this topic is of relevance to the business centre, as their objective is to enhance the accessibility to knowledge through collaboration with knowledge institutions. As written in the delimitation in the chapter on methodology, the focus in this master thesis will be on U-I collaboration. The goal is that the finding in this project will provide insight into this field, and thereby ease and improve the business centre's working routines when discussing this subject with the organizations, and hopefully more organizations will engage in such collaboration in the future.

9 Discussion

This chapter has as a purpose to subject the findings in the theory chapter and the empirical data to a critical examination in an effort to answer the research question;

- *Existing literature provides some main perceptions on the barriers to university-industry collaboration. Do these barriers differ from those seen in Jammerbugt Municipality?*

and examine the two hypotheses;

- Proximity has an influence on the matter of barriers seen in Jammerbugt Municipality.
- The type of knowledge transferred is different within the municipality.

Through this critical examination it will be possible to provide concluding remarks on the research question and the two hypotheses in the conclusion in the next chapter. The discussion

will be divided into sections each discussing different subjects. Therefore before discussing elements with direct relation to the research question and the hypotheses, a section will discuss the empirical data of Jammerbugt Municipality and Business Centre Jammerbugt, with the relevant theory.

9.1 Jammerbugt Municipality and Business Centre Jammerbugt

This section is divided into two paragraphs, the first discussing the empirical findings about Jammerbugt Municipality with the relevant theory, the second discussing the empirical data about Business Centre Jammerbugt with relevant theory.

9.1.1 Jammerbugt Municipality

During the theory section on rural and urban areas it was seen that Tacoli (1998:148) described the definition of urban areas used in many European nations as areas where the settlement included more than 2,000 or 2,500 inhabitants. If this definition is also used on Jammerbugt Municipality it is possible to see, by using Statistics Denmark's StatBank (see appendix with table of the population in Jammerbugt Municipality) that only five cities in the municipality can consider themselves as urban, the largest being Aabybro housing 5,435 inhabitants, but from the statistics it can also be seen that the vast majority of the cities or villages have less than 1,000 inhabitants. It was also seen from the theory section that the inhabitants in rural areas were more scattered leaving some of the population with a distance to market and services (Grimes, 2000:13; Virkkala 2007:513; Malecki, 2003:201). In the previously mentioned statistics on the population in Jammerbugt Municipality it is possible to see that a number of the of the municipality's villages have less than 500 inhabitants, while also the locations of the case organizations in the empirical data section, seen from table 4 on the distance to the nearest university, indicate that this is the case in Jammerbugt Municipality. Although it is not the entire municipality that can be proclaimed to be a rural or peripheral area, the overall demography of the municipality and the above definitions indicate that a large part of the municipality belongs in this category, furthermore others (Danske Regioner, 2010:68) have defined Jammerbugt Municipality as a rural district. Therefore the municipality is also defined as being a rural area in this master thesis.

From the empirical section on Jammerbugt Municipality it could be seen that the educational level in the municipality is lower than the general Danish educational level, having approximately 6 percentage point more unskilled and approximately 6.5 percentage point less with long higher education than the general Danish level. When comparing this to the case data on educational levels (Tables 4 and 5) in the case organizations it can be seen that two of the organizations – Cases no.7 and no.9 – employ several unskilled workers, and that in general the majority of the organizations employ people with educational levels between

skilled and medium higher level. Six organizations employ people with long higher educations, one organization – Case no.1 – employing between five and ten, another – Case no.8 – employing approximately 16 people with long higher educations, which is 80 per cent of the employees in this particular organization. So in comparing the general statistics of the educational level in Jammerbugt Municipality (Table 14) with the educational levels in the case studies it can be seen that the case organization represents the general picture of the municipality's educational levels. This picture is also seen from the literature on rural areas, as this (Virkkala, 2007:513) finds that the rural areas see low and medium level qualifications, while the availability of higher and specialized qualifications is limited. Furthermore it was seen that Virkkala (2007:513) found that the organizations in rural areas were often small in the category of SME's, and that they worked within traditional sectors. By using the European definition (Europa-Kommissionen, 2006:14) on SME's, where small organizations have less than 50 employees and micro-organizations have less than 10 employees, it can be seen by comparison with the case data in table 4 that two organizations – Cases no.1 and no.7 – balance between being small or medium sized organizations, as they have approximately 50 employees each. It can also be seen that only two organizations – Cases no.10 and no.5 – belong in the micro-organization category, thereby leaving the last six organizations to belong in the category of small organizations. Thus the findings during the case studies are consistent with the theory on rural areas.

When looking at business demography, it was seen in the theory section on urban and rural areas that some theory (Virkkala, 2007:513) claims that the organizations in rural areas often work within the traditional sectors, while other theory (Tacoli, 1998:147-149) calls it a common assumption that the rural areas mainly have professions within agriculture, while urban areas have professions within industry and services, but that the reality is more complex as these assumptions are deviating. However, it could be seen (Graph 1) that the business demography in Northern Jutland does have some of these features, as the agriculture, forestry, and fishing sector is a little more than 4 percentage points larger than the general picture of Denmark, while if also adding the sectors of building and construction, trade and transport, and industry, raw material extraction and utility services, these four sectors account for approximately 58 per cent in Northern Jutland, while the general picture in Denmark is approximately 45 per cent. This indicates that some of these traditional sectors are more deeply rooted in the culture in Northern Jutland. If comparing this with the case organizations' field of activities (Table 14) it can be seen that a number of these work within the sectors of industry, raw material extraction and utility services – Cases no.3, no.6.2, no.7, and no.9 – and two organizations work within trade and transport – Cases no.1 and no.4 – and one organization – Case no.9 – works in building and construction. This indicates that the case organizations fit well within the theoretical assumptions and the overall picture of the

organizations located in Northern Jutland. Two organizations – Cases no.2 and no.5 – work within sectors which can be defined as culture, leisure and other services, and the last organization – Case no.8 – works within business services. Both these sectors are below the general level in Denmark, and especially business services which are below by approximately 4.5 percent points, but this is also the organization in which 80 per cent of the employees have a degree from a university.

It was also seen from the theory section on urban and rural areas that OECD (2007b:2-5) stated that for rural areas it is fundamental to be innovative, and that rural areas can stimulate innovativeness by e.g. competence development, while Virkkala (2007:514-515) found that external knowledge is critical in the actual innovation process. In the section on Jammerbugt Municipality it was seen that (Graph 2) the organizations in Northern Jutland in general are more innovative than the organizations in Denmark, except on product innovation. Approximately 45 per cent of the innovative organizations are innovative with an external partner, thereby using external knowledge, and that the most preferred external partners were suppliers – approximately 33 per cent – and customers – approximately 25 per cent –, while only a little less than 15 per cent used universities as an external partner (Økonomi- og Erhvervsministeriet, 2011b:7-8). When comparing this to the case organizations' usual channels to in-source knowledge (Table 5), it can be seen that the majority of the organizations normally use suppliers, customers, and other collaborating organizations to in-source external knowledge, whereas only two organizations state that they also use universities for this, thereby fitting the, above general findings about this. For the businesses in Northern Jutland the per cent of organizations that collaborate with a university or other higher knowledge institutions in 2006-2008 was approximately 23, which is higher than the general average of a little less than 15 per cent (Økonomi- og Erhvervsministeriet, 2010:23). One should consider, though, that prior research (Christensen et al., 1999:98-104) indicates that the general level of Danish organizations' innovative collaboration with universities and other research institutes is lower than in other European countries. For instance their research indicates that while only 14 per cent of the Danish organizations' domestic knowledge collaboration was with this group, Norwegian organizations' domestic knowledge collaboration with universities alone was 25 per cent, and for Austrian organizations 33 per cent. If also including other research institutes the Norwegian percentage is 66 and the Austrian is 57. However, it was anticipated in the delimitation of this project that the foreign numbers could be encumbered with errors, as these numbers could include activities which in Denmark lie within the GTS-institutes' working area, thereby increasing the percentages in the foreign countries as compared to the Danish ones. Although this could be the case the Danish levels are still fairly low, perhaps indicating that although the level in Northern Jutland is higher, with its 23 per cent, efforts to enhance U-I collaboration must be taken. From this it can be seen

that some of the organizations in Northern Jutland, and also Jammerbugt Municipality, follow the general theory in an effort to cope with the challenges of e.g. globalization by being innovative and using external knowledge in the process. It could also be seen from the case data (Table 5) that all the case organization at some level view themselves as innovative within their field of work and many also in general to their business development, and the majority use external knowledge as inspiration. Likewise seven of the case organizations have now had some kind of collaboration with a university, during which many have received usable external knowledge.

9.1.2 Business Centre Jammerbugt

In relation to Business Centre Jammerbugt's objective of increasing the local organizations' collaboration with a university partner, and as this is a master thesis collaboration with the business centre, it is relevant to also have a short glance at the triple helix theory, as it includes some level of university-industry-government interaction. This is supported by the findings in the theory section on triple helix. For instance it was seen that there is an increased focus on the university as also being providers of innovation and that well established university-industry-government links are likely to reduce a product's time from discovery to market, thereby increasing the opportunity of competitive advantages (Dooley et al., 2007:317). It was also seen that the most common triple helix method was with overlapping institutions, with the objective to create an innovative environment where the government – in this case the business centre – may encourage interactions but not control them (Etzkowitz, 2000:112; Godin et al., 2000:277). Furthermore interactions by government can be on other levels than national, for instance on the regional level where interactions most often include the existing industry, whose performance is sought enhanced to improve the local economy (Etzkowitz et al., 2000:118; Etzkowitz, 2008:8). Again this is just the type of interaction Business Centre Jammerbugt is trying to further develop in the municipality, as they have a desire to enhance the organizations' performance. It was already seen in 2011 that there were several ongoing cases of knowledge collaboration and projects in the municipality, though the actual number of these could not be accounted for. Although the triple helix interaction is not the focus in this master thesis, it was still relevant to have some insight into this, as it is some kind of triple helix interaction the business centre will engage in when they desire to close the gap between local organizations and university, by being the middleman. Furthermore it can be seen that the approach to triple helix theory fits well into the current Danish administrative system described in the section on industrial services. Here it is for instance stated that the development of industry became mandatory for the regions, and that the implementation of these industrial services was transferred to the municipalities. Therefore the interaction by the local government in the triple helix becomes more relevant, and the local business centres

facilitate the local organizations' access to knowledge institutions (Halkier; REG LAB, 2008:45). This also indicates that Business Centre Jammerbugt's objective to enhance the U-I collaboration by acting as middleman, in general is the desired approach.

During the section on Business Centre Jammerbugt it was seen that their purpose is to provide different business services, e.g. counselling on strategy and competence development, to the organizations located in Jammerbugt Municipality, but it was also seen (Erhvervscenter Jammerbugt, 2009:1) that the business centre had to follow some rules and regulations securing that they do not provide anti-competitive services. Consequently the business centre consultants most often act as connecting link between an organization and the knowledge they need, or provide general information. Therefore the knowledge the consultants most often use is the type of knowledge Lundvall (2004:24-27) describes as know-who, i.e. the consultants know who knows what as well as who is able to do what, and as knowledge use in e.g. product development becomes more complex, know-who becomes more and more important. This can also be seen from table 6 where it was shown that in the ten case organizations, the business centre used their know-who knowledge to initiate the contact between six of the case organizations and the collaborating partner from university, thereby facilitating the organizations' access to the university. The consultants also possess some know-what knowledge in the form of information e.g. of certain programmes to help finance business development. This is furthermore relevant in trying to fulfil their objective of bridging the gap between the local organizations and university, as knowledge about the university and also knowledge about barriers to collaboration is important in the effort to have more organizations collaborate with a university partner.

9.2 University-Industry Collaboration: Motivation, Benefits, and Costs

Starting with the motivations to collaboration, it was seen from the empirical chapter (Table 8) that the two main motivations by the case organizations to collaboration with the university partner were new insight, inspiration, and ideas into either usual routines or specific areas within the organization. It was seen that these motivations were found by Cases no.1, no.2, no.5, no.6.2, no.8, and no.10. This indicates that the organizations see the collaboration as a possible way to shake up the way things are usually done in the organization, by having an "outsider", who is not blinded by the normal routines and unwritten rules, putting naive questions. When comparing this to the findings in the existing literature (Table 1) none of the articles found these motivations, but this could be because of differences in the definitions used. For instance one could argue that these motivations simply have to do with some level of knowledge transferred from the university, by this it can be seen that the case motivations now fit the findings by Lai (2011:1219), who have knowledge transfer from university as a

motive for industry. This was also a motive – insight into new knowledge – for Case no.8; one could state that this fits under the insight, inspirations, and ideas to specific areas within the organization, as the case organization is interested in new knowledge within their field of work, and as Case no.9 had the possibility of raising competence levels as a motivation, this must also fit in with Lai's motivation. Furthermore Case no.9 had as a motivation to have help in basic research in new areas; this motivation was also found by theory (Lee, 2000:118-119; Valentín, 2000:166; Lai, 2011:1219). It was also seen in theory that Valentín found the possibility of increased competitiveness as a motivation by industry. This matches well with the motivation posed by Case no.7 on the possibility of insight in/optimizing all processes in the organization. From this it can be seen that the first six different motivations in table 8 somewhat match the findings in table 1 in the theory section.

The last six different motivations the case organizations had for collaboration were not directly transferrable to the findings in the existing theory. Two of those – social responsibility and practical experience for students, both found by Case no.1 – are both very noble motives for collaboration, though the organization did state that there had to be something in it for them as well. Two motivations had to do with either insight into business strategy – Cases no.1 and no.3 – or new insight into technical fields – Case no.3 –. These, however, could have been placed under the previously mentioned motivation by Lai (2011:1219) on knowledge transfer from university, but as these were specifically stated by the two organizations it has been decided that they belong here. A motivation on optimizing the organization's finances – Cases no.4 and no.7 – could be seen as a general motive for collaboration, as one must assume that this is always a motive for an organization, but in this case the motives were directed at specific areas of optimization. The last motivation on the organization's survival rate if they were bought is a very specific motive for collaboration, though one could imagine that a number of organizations, which might approach a generational change, would find this interesting.

As for the case organizations' benefits from the collaborations, it could be seen from table 9 that the main benefits had to do with opportunities through new insight/solutions – Cases no.2, no.4, and no.7 – as well as new solutions to problem solving – Cases no.1 and no.4 –. Both these can also be found in the existing literature, where these are also described as benefits by Riis (2001:387). One could have the idea that these benefits are of a more general type, as they are found by multiple case organizations as well as in the existing theory, but one should also be aware that Riis's data also come from Northern Jutland, as the article is about AAU's interaction with industry, thereby indicating that it might be more localised benefits. Of a more general character is the benefit of increased competence level – Case no.9 – as one would hope that if not all, then at least the majority, of university collaboration will

increase the competence level in the organizations, but in Case no.9 this most likely has to do with the knowledge they have gained through their collaboration with university scientists within the research area of polymer concrete (Appendix, Case no.9). Therefore this benefit also matches one found in theory by Balconi (2006:1619). The only benefit found by the case organizations which does not match the ones found in theory was: establishment of a new laboratory by Case no.9. One could see this as a strange benefit, but by looking at table 5 it can be seen that this organization has in-house R&D activities, with 1 to 2 employees working fulltime in developing new products. Therefore to see this as a benefit, that the organization needs to invest in establishing a new laboratory, could indicate that this organization is very much aware that to compete and hopefully have advantages in the globalized market they need to continuously develop their existing products to become even better and – as in the case of this collaboration – do basic research to hopefully find an entirely new type of product with other possibilities.

During the case studies few organizations mentioned anything about costs, apart from time needed in the collaboration. It was only found (Table 10) that two organizations – Cases no.4 and no.9 – had initial payments of DKK 5,000 to participate through ViaNord collaboration with the university. In theory (Table 3) this is described as ex ante costs, i.e. costs prior to collaboration, which must also be the case here as the collaboration contracts are most likely signed before collaboration begins. Furthermore Case no.9 also had extra costs as they had to renegotiate the contract, due to the long timeframe on their collaboration, but these costs were a business secret.

According to theory there can also be costs associated with the implementation of the research results gained through the collaboration. Therefore one could argue that also Case no.7 (Appendix, Case no.7) had costs on the collaboration. As they found that they did not have the resources to implement the processes in the daily routines, they had to employ two extra persons to help implement the processes.

9.3 University-Industry Collaboration: Barriers

This section will be divided into two paragraphs, one discussing the case organizations' previous collaboration, and one discussing the barriers found during the case studies.

9.3.1 Previous Collaboration

During the case studies the case organizations were asked whether they had had previous collaboration (Table 7) with a university or not. The purpose of this was, among other things, to establish an idea of which organizations might benefit from the advantage of knowing some barriers they might have encountered before and consequently now had fewer barriers to

collaboration than organizations to which U-I collaboration is a novelty. The first thing noticed is that the majority of the case organizations have had no prior collaboration with a university, thereby making it a novel experience to have collaboration with a university. Three of these organizations – Cases no.5, no.8 and no.10 – did not obtain collaboration with the university during the preparation of this master thesis. There were different reasons for them not to obtain the collaboration they wanted. Case no.5 (Appendix, Case no.5) did find a group of students to collaborate with and had been talking to them about the ideas they had for the collaboration field of activity, but the organization found that their idea was overruled by rapid political decisions on how the lighting should be and subsequent installation. Thereby the field of collaboration was no longer of relevance and ended. One can hardly state that the cause for this collaboration not to evolve has anything to do with the organizations' lack of prior experience with university collaboration. For Case no.8 (Appendix, Case no.8) the collaboration never began. The organization was initially contacted by AAU Matchmaking (Table 6) which believed that the organization was of interest to students. Therefore the organization provided different subjects for students to work with in collaboration with the organization. However, no students contacted the organization about collaboration and furthermore there was no follow up on this by the university. One could state that prior collaboration would have made the organization aware of this as a possible outcome and they might themselves have contacted Matchmaking a little while after they provided the subjects, instead of relying on Matchmaking to make sure that something happened. Though, as Matchmaking contacted the organization with the idea of having U-I collaboration, this does not excuse them for not contacting the organization to hear if they found a collaborating partner. For Case no.10 different factors are believed to have played a role, the most obvious being that the possible candidates for traineeship in the organization all found other organizations to have their traineeship in (Appendix, Case.no.10). But the organization also states that they believe that their small size and that they are an unknown organization might have affected some of the students to seek traineeship elsewhere. It could have been a factor that the organization has not previously had collaboration, as this could have affected the way they used to find a collaborating partner.

As for the three organizations – Cases no.1, no.7, and no.9 –, which had prior experience in collaborating with a university (Table 7), it could be seen that Case no.1, which has participated in collaboration several times in the past but had no barriers to these, only found one initial barrier to the latest collaboration (Table 11) concerning privacy of data. However, this was solved by having the students sign confidentiality agreements and only working with some of the organization's data in-house (Appendix, Case no.1). In addition the organization has also had some advantages from the prior collaboration, as some of these have been made by employees who also studied at the university. Thereby one must assume that this alone

would eliminate the majority of possible barriers to and in the collaboration, and thus they must have been able to avoid barriers in collaboration with other partners from a university. As for Case no.7, it was found that they had previously had collaboration with AAU twice (Table 7) and that this takes place within a few years as the organization was founded in 2006 (Table 4). Through this the organization found numerous barriers including cultural and educational differences, time used on collaboration, and the extent of the collaboration. Due to the previous collaboration within a few years and the number of barriers the organization had to this, one would assume that they could avoid or bypass some barriers in the last collaboration. However, if looking at the organization's initial barriers to the last collaboration (Table 11) it can be seen that also this time they expected barriers related to the time factor, educational levels, and differences in culture, and therefore assumed that these factors once again would pose some level of barriers in the collaboration, though not enough to quit collaboration. In table 7 it was also shown that Case no.9 had previous collaboration with the university, but this happened 5 to 7 years ago and the organization could not remember whether there were barriers or not. Therefore it can be assumed that they will find some barriers to collaboration.

9.3.2 Case Study Barriers

From the empirical data section on case study barriers it was seen that a number of barriers were found in the case organizations, both initial barriers and barriers not thought of in advance, leaving quite a list of barriers to be dealt with in the discussion. According to the research question the purpose of this is to find if any of these differs from the barriers seen in the existing theory. However, whether these actually pose a problem to collaboration will be discussed here, in an effort to find the barriers of relevance when trying to bridge the gap between university and industry, as well as whether the barriers posed by the case organizations in fact can be seen as main barriers to collaboration. One should also be aware that the barriers found to match theory findings could still be of relevance in bridging the gap.

Privacy of data: This barrier was initially found by one case organization, which later found that this did not pose a problem to collaboration as the students from university signed a confidentiality agreement; thus institutional proximity mattered in this case (Table 12). In six of the ten case organizations students were supposed to (Table 6) collaborating partners. As many of the organizations chose to collaborate with students this barrier in general could easily be overcome as it is as common procedure to use confidentiality agreements in collaboration with students. In theory it was found that researchers have high incentives to publish their results in academic journals, as this is a means for success and career opportunities (Valentín, 2000:168-169; Bruneel et al., 2010:859; Rohrbeck et al., 2006:4). By having students as collaborating partners this is overcome, as their main purpose is a project

which can give them a good grade at the exam (Nielsen et al., 2011:30). Though this barrier was also found in theory (Table 1) it does not seem to pose a problem to the organizations located in Jammerbugt Municipality.

Different cultures/environment: This barrier was found in the existing theory (Siegel et al., 2003:118-120; Valentín, 2000:169-170). The barrier was initially (Table 11) found by four organizations, of which two later found it not to pose a problem, one was not sure and one stated that it posed a problem. Also two organizations found this barrier during collaboration, considering the barrier to lean slightly towards being a problem. However, this barrier has also been found in other studies (DEA, 2007:16) where 57 per cent of the organizations answered that to some extent this posed a problem to collaboration, and the differences in environment were also found to pose a problem by Hansen et al., (2011:54). This barrier could also be further enhanced by the lack of the case organizations' social and organizational proximity (Table 12) with the university. Only one case organization had proximity, indicating that they are not used to merging the two cultures and environments. Though there is a little uncertainty about some of the case data, due to the above this barrier is found to pose a problem to the organizations in collaboration with university.

Differences in working practice: The barrier was initially found by one organization (Table 11), which also found it to be a problem during collaboration, while another organization found it during the collaboration. Furthermore the barrier was also found in the existing theory (Bruneel et al., 2010:864). In addition the barrier was also found in another study (DAMVAD, 2012:61-63). Both organizations (Table 4) work within the industrial sector and both have mainly employees with none or lower educational levels. Furthermore one of the organizations had no social proximity (Table 12) while both had none or almost no cognitive proximity with the university, indicating that could have negatively influenced this barrier. This barrier could thus pose a problem to collaboration.

Administrative burden: One organization found that a lot of time was spent on administrative duties in the collaboration, through ViaNord, and that this posed a problem (Appendix, Case no.4). Though another organization had collaboration through ViaNord, this did not seem to pose a problem to them. Theory (Bruneel et al., 2010:864-867) also found that the administrative duties posed a problem to collaboration, and also this barrier is found in two other studies (DAMVAD, 2012:62; Nielsen et al., 2011:31). It could indicate that this barrier is usually found in studies, but it seems that a U-I collaboration which is co-financed by e.g. the EU could in some cases increase the administrative tasks to a level where they become a burden. Therefore this could become a barrier in collaboration which is co-financed.

Opportunistic behaviour by university: The barrier was found by one organization during their contractual renegotiations with Centre for Logistics at AAU (Appendix, Case no.9). This may indicate that if an organization begins what might become a long collaboration, then a possible renegotiation could cause some scientists to become opportunistic as the organization has higher incentives to further collaborate on the subject. Furthermore the organization did not have cognitive proximity (Table 12) with the university, apart from common logical scientific approach; therefore the university possessed some knowledge which is highly relevant to the success within its field of activity. This barrier is also found in theory (Valentín, 2000:169). This could indicate that in collaboration where the incentives for industry to collaborate with university are high, some universities become opportunistic, which could subsequently become a barrier to further collaboration.

Time factor: This barrier was initially found (Table 11) by four organizations, but two of those found during the collaboration that this did not pose a problem, while one found that is did pose a problem and the last was not able to answer whether it did or not. Therefore there is some uncertainty in the data. The organizations which did not find that it was a problem had "simpler" collaboration with students and the organization who could not answer if it was a problem was supposed to collaborate with students, while the organization where it did pose a problem collaborated with researchers from Centre for Logistics (Table 6). This indicates that collaboration with researchers is more time consuming than collaboration with students, and the former could give some problems during collaboration. However, it does not seem that this barrier could become a real barrier to collaboration, as the organization, which found this to be a barrier also found this barrier in their previous collaboration (Table 7).

Location of the organization: Was initially found a barrier by two organizations (Table 11), but none of these was able to answer if it actually was a barrier, though one organization stated that it might have posed a problem to students, but was not entirely sure (Appendix, additional table on barriers). Furthermore both organizations did find that their geographical proximity to the nearest university could pose a problem (Table 12), as well as it was seen in table 4 that for one organization the distance was 27 kilometres, while the other had 56 kilometres to the nearest university, and public transportation to the organizations was limited (Appendix, Case no.3 and no.10). One must assume that in fact this may become a barrier to collaboration to some remote organizations, if the collaborating partner does not have access to a vehicle.

Time and effort in finding a collaborating partner: This was found to be a barrier by two organizations (Table 11), which have both tried to find a collaborating partner several times

(Appendix, Case no.3 and no.8). They both state that as a small organization they cannot continue to find time to spend on chasing collaboration. One of those have now had their first collaboration, the other did not succeed in finding a collaborating partner. Though this barrier might have something to do with the next barrier as well, this indicates that it could be a barrier for small organizations.

Small/unknown organization might not be an attractive as partner: This was an initial barrier mentioned by three organizations; unfortunately none of those could answer whether it actually posed a problem or not (Table 11). Consequently the case data on this barrier are uncertain. However, two of the organizations have stated that their geographical proximity to the nearest university could pose a problem (Table 12), both have no social proximity with the university, and one of them has no organizational proximity as well. These lacks in proximity could all have a negative effect on this barrier, thereby indicating that a small and unknown organization might not in itself become a barrier to collaboration. Furthermore the third organization is a highly skilled organization with approximately 80 per cent employees with a degree from university (Table 5), which indicates that they could be very relevant for students with competences within their field of activity. This may indicate that the organization has not been able to specify their needs in collaboration. Furthermore the economic crisis has enhanced the focus on SME's as possible places of work for people with long higher educational levels, which must also have increased the focus on these as potential collaborating partners for university.

How does one benefit from collaboration: This initial barrier was found by two organizations, which also stated that it posed a problem to collaboration (Table 11). Both organizations had no previous collaboration (Table 7), but both have recently had their first collaboration, and both have no social proximity with a university (Table 12). Furthermore one of the organizations has tried several times to find a collaborating partner, but without prior success (Appendix, Case no.3). Other studies (Nielsen et al., 2012:31-33) have found that the knowledge is often transferred by the submission of a project report at the end of collaboration, which is often too academic to be useful in an organization. Thereby the organization does not gain advantages from the collaboration unless the university partner understands to transfer knowledge throughout the entire period of collaboration or maybe write two reports, one academic and one for the organization. This indicates that the university partner must be more aware to also submit something of relevance in collaboration, just as the organization may need help in specifying their desires in collaboration. One must assume that this could become a barrier to collaboration and it must be assumed that the incentive to collaboration will be limited if the organization cannot see a potential benefit from.

What could organization possibly offer university; what can we use university for; what is knowledge from university: All three barriers were mentioned by the same organization prior to their collaboration, but during the collaboration all three were found not to be real barriers to collaboration (Table 11). These barriers have a character of being related to lacks in knowledge about the university world, and it can also see from table 7 that the organization has had no prior collaboration with a university, no organizational and social proximity with a university (Table 12), and no employees with a degree from university and is located in the transport business (Table 4). All three barriers have been found in one of two other studies (Hansen et al., 2011:54; DEA, 2007:16-18). The different factors mentioned could negatively affect each of the three possible barriers, but somehow they did not in this collaboration. Stating that this does not in general pose barriers to collaboration is difficult as the finding is disproved by other studies. However, they did not pose a problem in the case organizations' collaboration.

How does one locate the right partner at the university: This initial barrier was found by one organization, which also found it to pose a problem (Table 11). The organization has no social proximity to a university and no cognitive and organizational proximity (Table 12). This indicates two things; first, the organizations which have not contacts or previous collaboration have problems in finding their way through the university system. This indicates that the university might need to improve the accessibility to the university. Second, the organizations might need help in specifying their desires to collaboration or they must at least be more thorough in their search for a collaborating partner. For organizations with lacks in the above mentioned this could become a barrier to collaboration.

Major educational differences: This initial barrier was found by one organization, which also stated that it posed a problem to collaboration (Table 11). The organization has previously had collaborations where this also was a barrier (Table 7). It could also be seen from table 4 that out of the approximately 50 employees in the organization 30 to 35 are unskilled. The organization also states that they have almost no cognitive proximity with the university, whereas they do have social proximity with the researcher, as they have previously worked together, and the geographical proximity is not seen as a problem (Table 12). The barrier is also found in another study (Nielsen et al., 2011:30) where the differences in educational levels affect the ability to understand the university communication in organizations with lower level educations. This indicates that major educational differences may become a barrier to collaboration, though it seems that a strong social proximity with the collaborating partner to some extent may overcome this barrier.

Concerns about lack in university's motivation: One organization had this as an initial barrier, but during the collaboration they found that it did not pose a problem (Table 11). The organization had the idea that the university would not be as motivated as the organization as the collaboration had to do with basic research in a new field (Appendix, Case no.9). The organization found that it was quite the opposite as the university was very motivated. When comparing this with theory (Valentín, 2000:168-169; Bruneel et al., 2010:859; Rohrbeck et al., 2006:4) it was seen that the researcher who publishes new knowledge first gains the most. One would then assume that researchers will be very motivated by possible advantages during basic research in new fields. This seems to also be the possibility in this collaboration, as the organization and university only have confidentiality agreements over specific findings; the researcher is, however, allowed to publish some of the knowledge. This is to some extent also seen from another study (Nielsen et al., 2011:32) where they found that organizations paradoxically believe that researchers choose not to get involved in complex collaboration. From the above this possible barrier should not be seen as a real barrier to collaboration when it involves university researchers.

Doubt about validity of the idea: One organization – the same as mentioned above – had this as an initial barrier and found that it did pose a problem (Table 11). This could be a barrier to collaboration. However, this will always be the case when conducting basic research in new fields and therefore it is not something which can be eliminated prior to the collaboration, but will on the contrary be a possible problem until the research finds some kind of application of the new developed research. It will be a constant counterbalance on whether the time and finances invested in the collaboration and development becomes too high in relation to the expected output or not.

Costs of collaboration: One organization had this as an initial barrier, but was unfortunately not able to answer if it actually posed a problem as they did not find collaboration (Table 11). Although it would be assumed that the type of collaboration the organization sought only costs the time consumption they have to spend on the trainee (Table 6). But as this cannot in other ways be verified, the uncertainty in this barrier makes it difficult to conclude any specific finding on this possible barrier. But before one knows what the possible costs are to the collaboration, this barrier alone will most likely not become a problem to collaboration. However, if the costs of the collaboration are known to the organization, like for instance in Case no.9 (Appendix, Case no.9) during their renegotiation of their agreements with the university, this can become a barrier to collaboration.

Students do not take collaboration seriously/reluctant to invest time in it: These barriers were found during one case organization's collaboration with a group of students from AAU (Table 11). As this was experienced during the organization's first U-I collaboration, this could pose a severe threat to the organization's further desire to collaborate with students (Appendix, table on further collaboration). The organization does not have social proximity with the university (Table 12); this could thus also negatively affect this barrier. This is to some extent also seen in another study (Nielsen et al., 2011:29) where they found that the expectations to students on their bachelor was low, while expectations to students on their master was higher. This indicates that there could be a barrier and this must be seen as a possible barrier to collaboration.

Lack in university desire to take responsibility of collaboration: This barrier was experienced by one organization during the process of finding a possible collaborating partner (Table 11). The organization was initially contacted by AAU Matchmaking and asked if they would be interested in collaborating with students, but after submitting different subjects for student projects the organization did not hear more from the university (Appendix, Case no.8). The organization feels that Matchmaking should at least have contacted the organization to ask whether they found students for collaboration or not. One of Matchmaking's own reports (2011:61) also finds that some organizations would like more interference by Matchmaking during the collaboration. This indicates that some organizations need more response from university in order to feel satisfied, and that this could be a barrier to collaboration, as the organization itself does not push on to have collaboration after their initial contact with university.

Time spent on up-dating researcher, not on field of collaboration: This barrier to further collaboration was found during one of the case organization's collaboration with researchers from university (Table 11). The organization had no cognitive, social, and organizational proximity with the university, and the organization was initially contacted by university (Table 12; Table 6). This barrier is rather special though, as it seems that somewhere during the collaboration the organization and university went off track and spent more time on up-dating the researcher on the latest technologies within industrial robotics, than on the actual purpose of the collaboration. This may indicate that the field of collaboration was not sufficiently specified from the beginning, leaving the organization and the university with different ideas of the purpose of collaboration. This problem in an organization's first collaboration could therefore cause a barrier to further collaboration.

In the table below the barriers both seen in the existing theory on U-I collaboration as well as stated by the case organizations some time prior to or during the collaboration.

Table 16: Barriers, both found in theory and during case studies

Barriers, also seen in theory	Case
Privacy of data	~~no.1~~
Different cultures/environment, e.g. goal oriented vs. not goal oriented	~~no.2~~, (no.3), ~~no.4~~, no.7, [no.6.2], [no.10]
Differences in working practice	no.7, [no.6.2]
Administrative burden	[no.4]
Opportunistic behaviour by university	[no.9]

Notes: No.x = initial barrier. ~~No.x~~ = initial barrier, but not real. (No.x) = initial barrier, but the organization could not answer whether or not it was found to be problem. [No.x] = other barriers not thought of in advance.

In table 16 all five barriers are depicted, though it can be seen that the barrier on privacy of data was not found to pose a problem. Barriers two and three in the table were seen during the discussion to pose a problem to the case organizations and it was seen that the last two barriers could pose a problem in certain cases.

Table 17: Barriers found during case studies

Barriers found, could pose problem	Case
Location of the organization	(no.3), (no.10)
Time and effort in finding a collaborating partner	no.3, no.8
How does one benefit from collaboration	no.3, no.6.2
How does one locate the right partner at the university	no.6.2
Major educational differences	no.7
Doubt about validity of the idea	no.9
Costs of collaboration	(no.10)
Students do not take collaboration seriously/reluctant to invest time in it	[no.3]
Lack in university desire to take responsibility of collaboration	[no.8]
Time spent on up-dating researcher, not on field of collaboration	[no.6.2]

Notes: No.x = initial barrier. (No.x) = initial barrier, but the organization could not answer whether or not it was found to be problem. [No.x] = other barriers not thought of in advance.

Table 17 shows the barriers found during the case studies. During the discussion these were found to likely pose a problem to collaboration, and are therefore placed in their own table. For further elaboration on these, see previous discussion.

Table 18: Barriers found during case studies

Barriers found, but did not/not likely to pose a problem	Case
Time factor	~~no.2~~, ~~no.3~~, no.7, (no.8)
Small/unknown organization might not be attractive as partner	(no.3), (no.8), (no.10)
Concerns about lack in university's motivation	~~no.9~~
What could organization possibly offer university	~~no.4~~
What can we use university for	~~no.4~~
What is knowledge from a university	~~no.4~~

Notes: No.x = initial barrier. ~~No.x~~ = initial barrier, but not real. (No.x) = initial barrier, but the organization could not answer whether or not it was found to be problem.

The barriers depicted in the table above also show barriers found during the case studies. During the discussion they were found not to have posed a problem in the case organizations

or found not to be likely to pose a problem. For further elaboration see the discussion. However, one should be aware that these might still be relevant for Business Centre Jammerbugt, when they visit the local organizations that could be interesting for U-I collaboration, but this – as in all cases – of course differs in relevance to organizations they visit, just as other possible barriers do not necessarily fit all organizations.

9.4 Proximity

This section is divided into two paragraphs, the first discussing the empirical findings on economic geography with the relevant theory, the second discussing the empirical data about types of knowledge with relevant theory.

9.4.1 Economic Geography

From the theory section on economic geography it was seen that it includes different types of proximity, which somehow influence each other, but it is often only the geographical proximity, i.e. the distance between A and B which is thought to be relevant. If this is the truth one could assume that many organizations in Jammerbugt Municipality would have problems in attracting collaboration. Furthermore Boschma (2005:63-71) found that there needs to be a balance between too little and too much proximity to secure effective learning and innovation. Boschma (2005:67) further found that a short geographical distance is likely to stimulate social proximity. To some extent this can be seen in the case study findings (Table 12) where it was seen that a number of the case organizations have some level of social proximity with Business Centre Jammerbugt, especially those – Cases no.1, no.3, no.4, and no.6.2 (Appendix on those cases) – with limited distance to the business centre. From the theory it was also seen (Boschma, 2005:71) that some level of cognitive proximity is needed in order to secure effective learning, while the other four types of proximity can be considered mechanisms to transfer knowledge between agents. Combining cognitive proximity with any of the other four proximities may secure that learning takes place. When looking at Case no.6.2 (Table 12) it can be seen they did not have cognitive proximity in their collaboration, and they did not have any other proximity to help secure learning, and as seen from the Appendix (Case no.6.2) they did not benefit and the collaboration was not considered a success. However, Cases no.7 and no.9 (Table 12) both had almost no cognitive proximity in their collaboration, but the organizations both had several other proximities as their advantage, which could have had an influence on their successes during collaboration. Furthermore it could be seen from the empirical data on proximity (Table 12) that the majority of the organizations had some level of cognitive proximity with the university in their collaboration.

The different types of proximity have already been described in the discussion on case study barriers. Here it could be seen that in approximately half the barriers lacks in different types of proximity might have had an influence on these barriers. Therefore these are not going to be discussed again here. If combining the case data on different types of proximity (Table 12) with the barriers found, and the organizations which found them (Tables 16, 17, and 18) a number of different influences of proximity on the barriers can be seen. It can be seen that lacks in social, organizational, and cognitive proximity have some level of negative effect in a number of different barriers. They have influence on seven different barriers each from a number of different case organizations. Likewise geographical proximity has a negative influence on two barriers both in two case organizations. To see which barriers they are, the reader is referred to the discussion on case study barriers. Consequently it is certain that different types of proximity matters on some of the barriers seen in Jammerbugt Municipality.

9.4.2 Types of Knowledge

It was seen in the theory chapter that the type of knowledge transferred may depend on certain aspects. For instance Boschma (2005:69) states that a short geographical distance facilitates the exchange of tacit knowledge as it is easier for people to get together, while a longer geographical distance makes this exchange more difficult. When looking at the empirical data for those case organizations, which have had knowledge transferred, it could be seen that they had a geographical distance from the organization to AAU – the collaborating university in all cases – of approximately 26 to 64 kilometres (Table 4), while the most common transferred type of knowledge was explicit knowledge (Table 13). This could to some extent indicate that the distance makes it more suitable to have explicit knowledge transferred than tacit knowledge. Although this could also indicate that the collaborating partner from the university has successfully elaborated on the transferred knowledge to such an extent that the case organizations find the knowledge transferred to resemble explicit knowledge, it might have been otherwise during the collaboration. This could be supported by the methods of the knowledge transfer as four of the five organizations which had knowledge transferred received it at e.g. meetings (Table 13). This is supported by Nielsen et al. (2011:31) who find that during collaboration with students, it is throughout the duration of the composition of the project and presentation or conference the results are transmitted to the organization. This could indicate that face-to-face interaction helps make some of the knowledge more usable in the organization.

It was also shown (Table 13) that two organizations – Cases no.7 and no.9 –, which both collaborated with researchers from the university, have had both explicit and tacit knowledge transferred. For both organizations the explicit knowledge was directly usable without further adaptation, whereas both organizations had to use extra time in making the tacit knowledge

usable, a process Case no.9 still works on, partly in their own laboratory and partly at AAU 64 kilometres from the location of the organization (Table 4). Furthermore both these organizations stated that they had social proximity with AAU, one with the professor they collaborated with, the other with the department of relevance for the collaboration. This could be relevant for their success in having transferred tacit knowledge, as theory (Boschma, 2005:66) states that social relations built on trust increase the exchange of tacit knowledge, which is otherwise difficult to access through the market.

10 Conclusion

The aim of this master thesis was to examine U-I collaboration. In an effort to add further perspective on this, a thesis collaboration was initiated with Business Centre Jammerbugt, as the author was aware of their desire to create further attention to this subject for the organizations located in Jammerbugt Municipality. Through dialogues with the business centre, different subjects of interest to them, within the field of U-I collaboration, were found. This was combined with a review of the existing literature to provide a perspective for further investigation, and it lead to the following research question:

- *Existing literature provides some main perceptions on the barriers to university-industry collaboration. Do these barriers differ from those seen in Jammerbugt Municipality?*

and the two hypotheses:
- Proximity has an influence on the matter of barriers seen in Jammerbugt Municipality.
- The type of knowledge transferred is different within the municipality.

During the investigation of U-I collaboration in the context of Jammerbugt Municipality, relevant theories and empirical data have been examined and elaborated on. The findings showed that Jammerbugt Municipality could be defined as a rural district which, according to the theory on rural and urban areas, indicated that the municipality had some challenges as the availability of high skilled workers is more limited than in urban areas and external knowledge flows, which are critical for the innovation process, are less likely to take place here than in urban areas. Though the examination found that in fact there were fewer persons in Jammerbugt Municipality with a long higher education than compared with the Danish average, and that a higher percentage of the organizations in Northern Jutland work within more traditional sectors, e.g. agriculture and industry, than compared with the Danish average, it was found on the contrary that the general picture of innovative organizations was actually higher in Northern Jutland than in general in Denmark if the latest available data were used. Furthermore it was shown that regions compete against other regions to attract the most talented persons and investments to the area as this will improve the overall economy not only for the country but also for the given region. It was also assumed that this was the case for municipalities. Though it was seen that there was a higher percentage of innovative organizations in Northern Jutland than in general in Denmark, Business Centre Jammerbugt sees more interaction between universities and the local organizations as a means to positively affect the earnings and employment in the municipality's organizations. Therefore the hope is

that their know-who and new knowledge about e.g. barriers to collaboration can help bridge the gap between the local organizations and university, thereby putting more focus on triple helix interaction to secure this.

To help provide a perspective from the point of view of the organizations in Jammerbugt Municipality, eleven organizations located in the municipality agreed on acting as case organizations. One of these was selected to have the function of pilot case to test the interview guideline and adjust it before conducting the remaining case studies. While case studies were conducted in the remaining ten organizations, this provided case data on a number of different areas within U-I collaboration, economic geography and types of knowledge, thereby providing empirical perspectives on the theoretical findings on these subjects. The findings, among other things, showed that the case organizations were mainly motivated by the possibility to gain new insight, inspirations, and ideas into either usual routines or specific areas of interest. Though this was not directly comparable with findings in literature it could, however, indirectly be compared to general knowledge transfer which was a motivation found in theory. It was also found that a number of more specified motivations for the case organizations were not directly comparable with the theoretical findings, though one could state that insight into business strategy and technical fields is covered by the above mentioned motivations. The main benefits experienced by the case organizations were directly referable to the main motivations, i.e. opportunities through new solutions/insight and new solutions to problem solving. Further these benefits were directly comparable with the theoretical findings. The empirical findings on costs of U-I collaboration were so limited that generalization from these is encumbered with uncertainty, although it could be seen that the costs were related to ex ante costs, i.e. costs prior to collaboration.

10.1 Research Question, Conclusion

In investigating the specific research question several research articles were examined to find what can be perceived as the main perceptions on barriers to U-I collaboration. Through this several barriers to collaboration were found as an elaboration on the first part of the research question. To help answer the second part of the research question, data from the ten case studies were used.

The case study findings on barriers showed that three organizations have had prior collaboration with a university, but only one has had or could remember previous barriers. In this case several barriers were experienced in the past, however, and the organization had almost similar expectations to the barriers in the latest collaboration, and found these to once again be real. Though generalization on only one case is encumbered with uncertainties this

could, however, indicate that if organizations have seen previous successful and beneficial situations of collaboration, they are willing to engage in new ones although they know they will also be subjected to problems of different barriers.

Furthermore the case study data showed that numerous barriers, both initial barriers and barriers not thought of in advance, were found and experienced by the case organizations. Throughout the discussion of these it was found though that some of the case barriers were also seen in the exiting theory (Table 16).

However, a number of different barriers not seen in the existing theory, which could pose a problem, were also found (Table 17) during the case studies. Furthermore some of these were found by other studies on barriers to U-I collaboration. It could be seen that some of the barriers not consistent with the theoretical findings are most likely caused by the organization lack of knowledge concerning the university world, as the majority of the organizations with these barriers have none or only one or two employees with a degree from university, and they are small organizations with no tradition of using universities as external knowledge partners. Two of the barriers not consistent with the theoretical findings, were shown to have direct connection to negligence by university/students during the process and/or collaboration. These are seen as serious barriers to further collaboration as it was also found that two of the organizations which have had multiple examples of collaboration, stated that prior success in collaboration makes it more likely to engage in collaboration again.

Furthermore a number of initial barriers, not consistent with the theoretical findings, were found not to or were not likely to pose a problem to collaboration (Table 18). Although they might not be seen as barriers to collaboration, it might still be relevant for the business centre to be aware of these during their interaction with the local organizations.

10.2 Hypothesis, A

During the investigation on whether proximity has an influence on the matter of barriers seen in Jammerbugt Municipality, it was theoretically found that the different types of proximity have an influence on each other. It was seen that if only relying on geographical proximity to have importance for interactions, it would be easy to assume that organizations located in Jammerbugt Municipality have trouble in attracting collaborating partners from a university, although only four case organizations stated that they could see their geographical proximity to the nearest university could be a problem in certain cases. However, it was found in the theory that geographical proximity, as well as three other types of proximity, was seen as a mechanism which can transfer knowledge between agents, and it was seen that the most important type of proximity to secure effective interactive learning was cognitive proximity. This indicates that the organizations in Jammerbugt Municipality have good foundations for effective learning, as eight of the case organizations stated that they did have some level of

cognitive proximity with the collaborating partner. Further the case data showed that lacks in social, organizational, and cognitive proximity had some level of negative effect on a number of barriers, while also barriers were negatively affected by lacks in geographical proximity. This, however, was not seen to the same extent as the above mentioned. This indicates that some barriers become real when some lack in proximity is combined with other factors, thus influencing the matter of barriers seen in the municipality.

It was found that geographical proximity, if too long distance between organizations and university, meant that some organizations saw their locations as a barrier to finding a collaborating partner.

Moreover, it could be seen that in some cases a combination of lack in social and organizational proximity and some or no cognitive proximity with the collaborating partner may result in no beneficial output as the partners might work in different directions.

In general, the lack of social and organizational proximity with the university means that a number of barriers are related to lack of knowledge about the university world, i.e. what the students/researcher can or cannot do, how knowledge from the university can be used to benefit the organization, what knowledge from university is, how to find the right partner, time spent to find a partner, etc. All barriers of somewhat initial character, indicating that this could simply make some organizations give up before trying to find collaboration.

10.3 Hypothesis, B

In relation to the type of knowledge transferred within the municipality, it was found that the geographical distance seemed to make it more likely to have explicit knowledge transferred than tacit knowledge, although it seems that social and organizational proximity to the collaborating partner or department facilitates tacit knowledge transferred to the organization. This indicates that the type of knowledge transferred does not differ within the municipality but is dependent on the types of proximity existing in the collaboration.

Summing up it could be seen that the barriers to collaboration in Jammerbugt Municipality to some extent differed from those seen in the theoretical literature; many of those barriers had to do with some level of lacking knowledge about the university world, and are therefore also affected by different types of proximity. While it was seen that the knowledge most often transferred was explicit, it seemed that strong social and some level of organizational proximity could to some extent eliminate the negative effect of distance. Though further investigation would be relevant to verify the findings in this master thesis, it is indicated that the existing theory on U-I collaboration needs to be supplemented to fit rural areas.

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University-Industry Collaboration:
The Case of Jammerbugt Municipality

Appendix

Master Thesis

MSc in Innovation, Knowledge and
Economic Dynamics

Casper Donneborg Roed

Table of Contents

12 Interview Guidelines for Case Studies

- The number of case organizations is ten. Some have completed their collaboration with a university or are currently active in the process, and some have tried to obtain collaboration without success.
- The organizations are all located in Jammerbugt Municipality.
- The duration of each interview was typically one to one and a half hours.
- Before the interview with the organization, facts and profile of the organization have been examined through the organization's web-pages if these are accessible.
- The initial contact with the organizations was made in collaboration with Business Centre Jammerbugt, after which the meetings with the organizations took place.

Overall facts of the organization:
- Age of the organization
- Field of activity/high-tech/low-tech
- Number of employees
- Most common educational level among employees
- Employees if any, with a bachelor/master degree from a university
- In-house R&D activities, and possible innovative organization
- Innovative on a continuous basis or ad hoc
- Usually in-source information/knowledge from where

Questions to the organization about previous collaboration
- The first collaboration you had and the barriers to this, if any?
- How did the contact with the university emerge?
- What was your motivation to engage in the collaboration with the university?
- Did you have initial barriers to this collaboration – if yes, which ones?
- When did the collaboration with the university end, and for how long did you collaborate?
- What was your university-industry collaboration about?
- Were you satisfied with the collaboration? – were your expectations to this collaboration fulfilled?
- Did you benefit from the collaboration – if yes, what were the benefits?
- If case of initial barriers, were these real?
- Did you experience barriers you had not thought about in advance – if yes, which ones?

- Did geographical distance matter in the collaboration – why/why not?
- Did other distances matter in the collaboration – cognitive, organizational, social, institutional?
- What type of knowledge was transferred - tacit/explicit/know-how/know-why/know-who/know-what – how was it transferred (mail, fact-to-face, etc.)?
- Why did you choose this particular university – why not another?
- Do you think the university gained from the collaboration?
- Can you see your organization in further collaboration with a university?

13 Case no.1

The organization is located in Jammerbugt Municipality, approximately 32 kilometres from the nearest university - Aalborg University - where it was founded in 1991. The organization's area of business is the IT hardware industry, where they buy and sell network, storage and servers. The organization currently has 50 to 55 employees.

The organization's field of activity is a broker organization, with the special touch that they also have an in-house technical department where they refurbish the existing technology resources to increase the value and lifetime of these products. They do not only buy and sell used equipment, but also sell new products. Of the 50 to 55 employees the 10 are employed in the technical department, where they improve and refurbish the existing equipment.

The educational levels in the organization vary, but the technical personnel have technical educations on a medium high level, and have often held previous jobs as technicians with the manufacturers of the products the organization trades in. The organization also has approximately 5 to 10 employees who either are bachelors or graduates from a university. They primarily work in the sales department and as area managers.

The organization does not have R&D activities, and is only innovative in the way that they combine used components from existing products to enhance the effects of another product in an effort to increase the lifetime and value of this product to the organization's clients. Otherwise the organization does not see itself as innovative.

The organization in-sources knowledge in a few selected areas. They use Aalborg University to in-source employees as well as knowledge on strategy and business development, primarily to enhance their own knowledge on this subject and to have a new set of eyes examining their existing strategy plan.

Besides the university collaboration other knowledge in-sourced is often a matter of dialogue with Business Centre Jammerbugt, in which the business centre provides information on different programmes which give e.g. growth subsidies from government to industry. For instance the organization has made use of this to further educate the personnel in the sales department, and to upgrade their technical functions.

Besides that, their knowledge on market conditions is enhanced through their contact with the market, and for instance they employ area managers with a great deal of knowledge of the market they are managers of.

The organization has previously collaborated with a university as students have done their semester projects or thesis in fields relevant to the organization. This collaboration took place in a number of cases where the organization's own employees who also study at a university use the organization as case material and inspiration in their projects. Therefore in these collaboration there have been no barriers to collaboration.

In the current collaboration, contact between the university and the organization was made through Business Centre Jammerbugt.

The organization has different motives to engage in collaboration with a university. First they see it as an opportunity to have new eyes and insight into their usual routines and business strategies. But the organization is also motivated by the fact that they can contribute positively to the students' education, in the way that they can test theory in practice and write projects with the perspective of both theoretical and practical problems. Some social responsibility towards university, but the social aspect is not sufficient in itself – there should also be an opportunity of obtaining advantages for the organization through the collaboration.

In this project the organization had initial barriers related to privacy. Here the organization has different data and knowledge about customers and markets, which they want to secure so this information does not become published. This barrier was eventually solved by confidentiality agreements signed by the university and by allowing their data to be accessed in-house only. Although the students had a desire to use university lab equipment when working with the data, this potential barrier was coped with as they agreed on only working with the data in-house.

The current collaboration has a time frame of three months, and is a collaboration between the organization and a group of students from Aalborg University. The theme of the collaboration is balance scorecard – strategy development -, in which the students evaluate the organization's current strategies and goals, and examine the validity of these by using simulations to see if there is correlation between the strategy and the goals, and then breaking the goals into manageable processes in the different departments, in an effort to reach the goals.

So far the organization is satisfied with the collaboration as they can see that their expectations are fulfilled, through the benefit from the simulations made by the students. Other barriers than the ones mentioned earlier have not been experienced.

In relation to the geographical proximity, the organization says that in general this is not a problem when collaborating with Aalborg University and it is also not a problem in this collaboration, as the students often have access to a vehicle or find public transportation. Also the organization is flexible and can take part in meetings in the university if this is necessary. The social proximity is relevant when the organization's own employees also study at a university, and use the organization as a case for their projects. But to some extent the social relations with Business Centre Jammerbugt is also something the organization gains advantage from. To some extent the organization is also aware of cognitive proximity as the students who enter into collaboration have some knowledge closeness with the organization and this enhances the outcome of the collaboration according to the organization. The organization has some institutional proximity with the group of students as well; in this case it is more related to the formal institutions, which are laws and rules, as they have signed confidentially agreements.

The type of knowledge transferred to the organization through the collaboration is regarded as explicit – know-what –, as the organization can apply some of the findings as well as the simulations into their normal working routines immediately.

Aalborg University is the only university the organization has collaborated with. One reason for that is that those employees at the organization who also study do so at Aalborg University, but another main factor is that the business centre makes it more personal when they contact the organization to ask whether they might be interested in collaboration with e.g. a group of students. Another factor is that the organization also sees the direct contact to Aalborg University as more serious and personal, whereas the other universities who have contacted the organization have been more impersonal.

The organization believes that also the students gain from the collaboration. The more tangible proof is that they make a semester report, but they also gain new knowledge and practical experience.

Although there are limits to the extent of the organization's willingness to collaborate with a university, they are still open to further collaboration. This could for instance be in a collaboration within the area of logistics and with a view to more technical applications.

14 Case no.2

The organization is a holiday resort located on the outskirts of Jammerbugt Municipality, approximately 49 kilometres from the nearest university - Aalborg University, located in Aalborg East. The current owners bought the organization in 1999.

The organization has different fields of activity, but the primary one is the running and development of the holiday resort, which also includes a restaurant. Besides this, the holiday resort includes a number of activities, for instance horse riding facilities, a fitness centre, a heated pool with different exercise classes, outdoor fitness and playfield and mountain bike (MTB) facilities. There is intense focus on the MTB facilities with tracks from 150 meters to 20 kilometres, they hold courses both for rookies and for professionals, and they sell their knowledge about tracks, as they help develop new tracks if an organization or a municipality wants help with this. The goal is that the holiday resort will become Scandinavia's MTB centre, and develop it into having a high international status. Furthermore the holiday resort can also be used as a conference centre. The holiday resort is unique in the way that there is also a housing development (Boenheden Delfinen) connected to the holiday resort. The current nine users all have jobs in the holiday resort, their own apartments and are part of the social network at the place. The organization has 27 to 29 fulltime employees on an annual basis. As the field of activity is seasonally sensitive, there are fewer in winter and several more employees in summer. The organization sees its fields of activity as low-tech.

The educational level in the organization varies from teachers of special education, pedagogues, ordinary teachers, cooks, waiters and craftsmen. Besides that, the organization has two employees, who have bachelor degrees in tourism and information technology, one of the owner's children, who also work in the organization and studies at a university, and one employee who studies at a university and works at the same time.

The organization sees itself as innovative on a continuous basis, both in relation to the pedagogy related to the work in the housing development and in relation to the activities in the holiday resort. The organization is a green organization and has the European Union Ecolabel. They also use co^2-accounting, have focus on animal ethics and optimize their healthcare offers for their employees, such as courses to give up smoking and in healthy diet.

The organization usually in-sources knowledge through VisitNordjylland. The organization has no previous collaboration with a university, but for a long time the organization has had a desire to engage in such a collaboration.

In the current collaboration contact was made through Matchmaking at Aalborg University and a solution camp, where the organization made a presentation for the students, who then chose if they would like to write their project with the organization. Through this, three different groups at Aalborg University are now writing their projects in collaboration with the organization.

The organization's motivation to engage in collaboration with a university was that the MTB area has great potential, but the organization feels they need new inspiration in this area as they wish to create attention to their MTB facilities, and fresh eyes will hopefully provide new ideas. Also the organization has a desire to raise the MTB facilities to an international level. In addition the organization believes that collaboration may be inspirational and beneficial in general during to development of the organization. Furthermore the hope is that the projects can help in search for external funding to develop the MTB area.

The organization had different initial barriers prior to the collaboration. For instance there was a belief that an organization and a university have two different cultures, as the industry is goal-oriented and the university provides different models and is not that goal-oriented. Also the organization believed that there might be a barrier in how much time a collaboration takes, so there might be a time factor in how many resources you need to pull away from the daily work to use in the project.

All the collaborating groups worked over a period of approximately 4 months. For all three groups the project subject is the MTB area, but they all have different research focus within the area. The idea is that all three projects can contribute, with the organization's own project, in the search for funding, through Real Dania, to develop the MTB activities. Here the organization is competing with 24 other organizations on funding to develop specific projects, 13 of which will in the end receive funding from Real Dania.

The organization is satisfied with the collaboration. The organization thinks that the groups have found some very interesting aspects they wish to examine in the MTB area, and all the projects complement each other. Although the groups do report to and have meetings with the organization, this could be better as the organization feels that the groups should involve the organization more through dialogues.

For the organization the collaboration has brought additional insight into the MTB area, which is useful for the organization both in relation to the search for funds through Real Dania and in their own development and focus on the field.

The organization had an initial barrier related to the two different cultures in the university and the industry environment. The organization has found, however, that this is not a problem as the university is also goal-oriented. The time factor was also something the organization was worried about, but also this has not proved to be a problem as the organization spends less time than expected, and state that they could use a little more dialogue with the students.

The organization has not seen any other barriers in the process.

As for the geographical proximity the organization does not see it as a problem that the distance between their location and Aalborg University is approximately 49 kilometres. The organization finds that Aalborg University is very open and forthcoming when it comes to the local area. The organization states that the social proximity is relevant. For instance they have had interaction through the Aalborg Collaboration (Aalborg Samarbejdet) and through NOMINI (Nordjyske Minidestinationer i Udvikling). These social relations help the organization to expand the horizon to new interaction. The organization also states that they do have some cognitive proximity with the university in the field of activity of the collaboration.

The knowledge transferred to the organization through the collaboration is regarded as explicit as, due to their prior knowledge, the organization states they can understand, use and apply the relevant elements from the students' findings in their everyday working routines. The knowledge was transferred through meetings and reports.

The reason for collaboration with Aalborg University and not another university is, among other things, that Aalborg University has a positive reputation when it comes to collaboration with organizations in the nearby society. It was also a factor that Aalborg University contacted the organization to talk about possible collaboration, just as they were effective in arranging meetings and answering questions concerning the possible collaboration. The organization also finds Matchmaking at Aalborg University reliable when it comes to finding the right people for collaboration and finding them relatively fast. The organization has no intention to collaborate with other universities.

The organization is sure that the university will also receive benefits from the collaboration. For instance the students will get practical experience and a project out of the collaboration while the solution camp will gain experience in how to practically arrange the camps, while the professors who research in tourism will also benefit from the collaboration.

The organization is highly motivated to engage in collaboration with Aalborg University on other projects in the future. The organization is aware of the fact, though, that a potential collaboration must have potential for both the organization and the students/researchers.

15 Case no.3

The organization is located in Jammerbugt Municipality just outside Aabybro, approximately 27 kilometres from the nearest university - Aalborg University, located in Aalborg East. The organization was founded in 1993 and currently has 16 employees.

The organization develops and produces multifunctional batch mixers, for liquid and semi-liquid products, and cookers for the food industry. They are capable of supplying both stand-alone machines as well as a full process line custom-built for the individual company's processes. The electrical components needed to operate the machines are supplied by other companies while all other parts of the machines are manufactured in-house.

At the moment the organization has no employees with a bachelor or masters degree from a university, but has previously had an engineer employed. The educational level varies as the majority are metal workers and machine technicians, but there is also an academy economist (akademiøkonom) and a bachelor of commerce (merkonom) which are both short-cycle higher educations.

The organization does not have in-house R&D activities, but considers itself to be an innovative organization. This is due to the fact that they focus on developing and optimizing machines for the food industry. The development is based on market knowledge and market needs, where barriers found for the existing machines are the most frequent reasons for development. Another way the organization see itself as innovative on a continuous basis is through business development, more precisely in its efforts to enter new markets and find other segments for their existing machines.

The organization uses different sources to in-source knowledge. They have previously in-sourced knowledge by using consultants. This way is primarily used when the organization needs new insight into business development. The most common type of in-sourced knowledge is found through interaction with the organizations they collaborate with. But also networking plays a role during in-sourcing knowledge, for instance through Project Plato where large organizations help small organizations to obtain growth and development through inspiration and knowledge.

The organization has not previously in-sourced knowledge from knowledge institutions, such as universities, although in the past, on several occasions and in different ways, the organization

has tried to get into collaboration with Aalborg University. Business Centre Jammerbugt has also been involved in the effort to create collaboration with a university. They have sent a consultant from Aalborg University (AAU Matchmaking) to the organization to try to find collaborating partners from the university, both in technical areas and to do market research.

The organization was currently involved in collaboration with a group of students from Aalborg University. The contact with the students was made through Business Centre Jammerbugt. The collaboration lasted for approximately 3 months.

For the organization the motivation to take point in collaboration with a university is seen as very high, as they believe collaboration can bring positive aspects to the organization, both in technical fields and in the overall business strategy. The purpose for the collaboration is to do market research for one of the organization's products.

The organization has some initial barriers to collaborating with a university. The location of the organization could be a barrier as there is no public transport direct to the location, but this could be overcome as the organization is willing to pick up the collaborating partner either at the university or at the nearest bus-stop. There is also the aspect of how time consuming the collaboration is, there is concerns that it might be too time consuming, therefore the organization would prefer that the collaborating partner also leads the project. Several times the organization has already tried to find collaborating partners in the university, as described earlier. Therefore they also consider this a potential barrier to collaboration, as an organization only has so much time they are willing to spend in the effort. Also the organization has the idea that as the organization might be a quite unknown organization outside their own field of activity; this might affect the willingness to collaborate from the student's point of view. The organization also believes that the different cultures in a university environment and in an organization can be a barrier to collaboration, as the organization might be more focused on revenue than the university. The organization also has to deal with the question of how one gets access to the knowledge in a university and also how the organization can benefit from this knowledge. This is also seen as a barrier.

Although the organization in general is satisfied with the way the university handles the collaboration, the organization is not entirely satisfied with way the collaboration is handled by the students. The organization has had almost no contact with the group, which means that the organization does not have any insight into what the group is doing, and the students take no initiative towards collaborating. For instance the organization feels it is a little strange that the students have no desire to visit the organization with whom they collaborate.

The organization did not benefit from the collaboration. The organization did not have high expectations to the results of the collaboration, due to e.g. the students who were very young and had no experience in collaborating with industry, and the approach chosen by the students was most useful to their own project, not to the organization.

Prior to the collaboration the organization had a barrier concerning the time they needed to spend during the collaboration. This has not been a problem; in fact the organization is concerned about the collaboration for the above reasons. The organization still believes that too much time is spent on pursuing this collaboration.

As the organization lacks feedback from the students during the current collaboration, the organization feels that the students do not take the collaboration seriously enough and that the students do not want to invest time in it. The organization sees this as a barrier, both in the current collaboration and as a potential barrier to future collaboration.

As mentioned the geographical location of the organization might pose problems to collaboration as there is no public transportation to the organization, but in spite of this the organization does not feel that the geographical distance to the university plays a significant role as they are willing to either pick up the students at the university or at the nearest bus-stop.

The social proximity is seen as relevant in relation to Business Centre Jammerbugt, as this provides insight and ideas into which opportunities the organization has in relation to financial subsidies and opportunities of collaboration. To some extent the organization feels that they have some cognitive proximity with a university, for instance in technical and market research fields.

When asked why it is Aalborg University the organization has chosen as collaborating partner, they state that it might as well have been the universities in Aarhus or Copenhagen, as long as the university brings attention to the right subjects, the location of the university does not matter. But Aalborg University is the first university which comes into mind because this is the "local" university.

The organization hopes that the students involved in collaboration with an organization gain some insight in the practical use of their theoretical knowledge, and last but not least they write a project.

As the organization has tried several times to take part in collaboration, and as the current collaboration has not provided a positive view on the students' motivation to collaborate, the organization finds it less likely that they are willing to engage in future collaboration. The organization feels that it requires too much time, first to find a collaborating partner at the university and then also to be the main driving force during the collaboration. The organization is willing, though, to engage in new collaboration attempts as long as the collaborating partner promises to be the main driving force.

16 Case no.4

The organization is located in Aabybro in Jammerbugt Municipality, approximately 26 kilometres from the nearest university - Aalborg University located in Aalborg East. It is a family business which was founded in 1976 and passed on to the next generation in 2003.

The organization's field of activity is within transportation by cab or coach. By their cabs the organization drives patients for the region, delivers ordinary cab service and demand responsive services, whereas some of the coaches take tourists and demand responsive services and other coaches performs regular services on the local and regional levels. The organization has approximately 25 employees, 15 of those are fulltime employees (included are 2 employees in flex jobs) while the other 10 employees are substitutes.

Among the employees one has an education as a professional driver, while the others include a mix of educations, such as a former driving instructor, a Falck employee, a technician, and a couple of mechanics, one of whom repairs the cabs and coaches. None of the employees has a degree from a university. Also it is not known which education a number of the employees have, if any.

The organization has not previously been innovative in any area, but as the conditions in the transport business change and it has become difficult to make profit in this line of business, the organization has to change if they wish to survive. Therefore the organization has begun to work with strategies and optimization, which are new processes in the organization. Therefore they now see themselves as being innovative in these areas. Also the organization realizes that they have to be innovative on a continuing basis if they want to survive and maximize profit, which makes the organization open to new initiatives.

The organization has not previously in-sourced knowledge from others than The Danish Passenger Transport Operators (De Danske Busvognmænd). Thus they have not had any previous collaboration with a university.

The organization is currently collaborating with Centre for Logistics (CELOG) at Aalborg University, which is an engineering research and knowledge centre. The collaboration was made possible of a meeting where the organization, a private consultancy and Business Centre Jammerbugt participated. In the initial stage it was the idea that the organization was to use

the private consultancy, but due to a fairly high price of this collaboration, the business centre suggested that the organization should use the university through ViaNord.

The main motivation for the collaboration with the university is the financial status of the company; they simply have to be better to profit within their field of activity. The main reason that it became a university-industry collaboration and not a collaboration with the private consultancy was the price, where collaboration with the private consultancy would cost a couple of hundred thousand DKK the price for the ViaNord collaboration is only DKK 5,000. The organization simply found the private consultancy too expensive while the university collaboration was manageable for an organization of their size.

The organization had some initial barriers to collaboration. These were that the different cultures in the university and the industry would be a barrier in collaboration as the university might not understand industry's culture. Also the organization had difficulties in seeing what they had to offer a university as well as what they could use the university for. They also had a barrier concerning the knowledge of the university as they do not know the university community.

The collaboration was begun in early March 2012 and has no scheduled ending, but the collaboration is subject to time registration. The theme of the collaboration is optimization of the whole organization, which is done through optimizing the day sheets. By this the organization has the possibility to see in which areas they make profit and in which they do not. The objective is to have statistics which may show if some areas always cost money while others make money and which areas vary. By this they hope to eliminate the majority of the areas which cost the organization profit. This tool also makes it possible for the organization to see how much it costs to have the individual cabs and coaches running, and therefore they hope this may optimize the way the employees drive and treat the vehicles.

The organization is satisfied with the collaboration in the current state as they can see that what they receive from the collaboration is positive, and it is an ongoing changing process. It also provides insight for the individual employee, as they gain a better understanding of what is effective and what is not. The collaboration provides a current profit; therefore the organization already now knows that they will receive some benefits from the collaboration although the full extent of this is not known yet.

In relation to the initial barriers the organization has realized that although they are in the transport business they do have something to contribute to the university-industry

collaboration. They have also found that they could use some of the knowledge the university possess. The organization has also learned that the university is very capable of making special knowledge accessible and usable in the industry.

During the collaboration the organization has experienced that the administration of time registration could pose a potential barrier. This is a time consuming task, as much time must be invested in getting to know the system of time registration. But the organization states that they are willing to spend the time needed as it is a necessity for the collaboration to continue.

The organization has not had any problems in relation to the geographical proximity as it has not been a problem for the researchers to visit the organization. The organization's social proximity with Business Centre Jammerbugt was essential to the collaboration as without this there would be no collaboration. The organization has some level of cognitive proximity with the university, which is knowledge of the day sheets, but it also states that they have not much knowledge concerning the underlying aspects of calculation to make statistics and equations to help provide solutions for the organization. Institutional proximity was only relevant through time registration, while there was no organizational proximity.

The knowledge the organization has received so far has been assessable and usable. They also believe this will be the case for the rest of the collaboration. The knowledge has been transferred in many ways, by telephone, mail and at personal meetings where the researchers have visited the organization.

The only reason for Aalborg University to take part in the collaboration was the reference made by Business Centre Jammerbugt to the ViaNord collaboration.

The organization also believes that the Centre for Logistics receives knowledge during the collaboration. They believe that the practical knowledge is usable in the university's teaching and the university's own research.

The organization is open to further collaboration with a university if an opportunity arises which will benefit the organization and also is manageable in size.

17 Case no.5

The organization is a local association which operates in Blokhus and Hune, approximately 45 kilometres from the nearest university – Aalborg University. The association was formed in 2007, and has five board members.

The association's primary target is to develop the Blokhus Hune area. The association works in different ways, for instance it can function as an intermediary between Jammerbugt Municipality and other local associations. The association also helps to find funding for different projects. For instance they have helped with the search for funding to rebuild an old rescue station in Blokhus. The association is also behind the development of the local business association and through this they are trying to create unity among the different organizations in the area. The association tries to unite the different associations in the area, for instance the citizens' association, the homeowners' association and the retired persons' association. The common denominator for the projects the association starts is that they withdraw from these when the projects are stable and well functioning.

As mentioned the association has five board members; the board members have different backgrounds, i.e. one is self-employed, one is an author, one is a bureau manager, one is employed in the school system and one is president of the Hune (Hune Sogn) parochial church council.

The association is innovative through developing projects, which are of relevance to the area. This innovative approach is on a continuous basis, as this is the whole purpose of the association.

The association usually in-sources knowledge through different networks where they find inspiration for new subjects. They also find inspiration when looking at other areas and what they do to develop their areas. Google has also been of use in the search for inspiration.

The association has no prior collaboration with a university.

Through a newspaper article one of the board members learned about Matchmaking at Aalborg University. After this the association contacted Business Centre Jammerbugt, which then established the contact to a Matchmaking consultant. With the help of the Matchmaking consultant the association had their project description adjusted to fit the student profile they

were searching for after which they put the project description into Aalborg University's job database. In this way they found a group of students to collaborate with.

The motivation to engage in collaboration with a university was that the association would like some new insight into how the lighting could be between the two villages Blokhus and Hune, as they had an idea of making this light different, e.g. putting light at the treetops, and using new materials to improve the durability and to minimize the electricity needed for the lights.

The association had no initial barriers to the collaboration.

In the end, the collaboration did not start as politicians rapidly decided how the lighting should be, and thereby overruled the ideas the association had.

As the project actually ended before it started, the association did not find any other barriers.

In relation to the geographical proximity, the association found that the distance between themselves and the university did not matter, as they had the opportunity to have meetings in places close to the university. The social proximity is relevant in relation to Business Centre Jammerbugt, as the association has a good relationship with the business centre. No cognitive proximity, but this is not seen as a barrier to collaboration. Institutional proximity was not relevant in this collaboration, and there is no organizational proximity between the two organizations.

Why it was Aalborg University which was chosen as the collaborating partner, the association stated that it was natural as this is the university of the local area.

The association is willing to engage in collaboration with the university in the future.

18 Case no.6.1

The organization is located in Jammerbugt Municipality, approximately 32 kilometres from the nearest university - Aalborg University. The organization was acquired by the present owners in 2003 when they bought the remains of the previous organization, which had become insolvent. The owners of the organization worked in the previous organization as well, and the products originate at the beginning of the 1990^s.

The organization's field of activity is industrial robotics in the field of palletizing solutions, stretch wrapping units, bag-filling systems and internal transport equipment. The organization provides complete solutions to their customers. The organization buys basic robots and then they build all the necessary tools for the robot's purpose. They collaborate with sub-suppliers, among whom two are located in the same building as the organization itself.

The organization currently has 18 employees; one of these is a salesman with a university degree in sales and marketing, the other employees are mostly workers who have 1½ years of additional education, which makes them technicians in the field of machines and electronics, and one has completed a 2-year part-time academy education.

The organization states that they have in-house development in the areas of software technology for the robots as well as construction. The organization combines existing tested techniques in new ways. At the moment the organization is the best in the market in their field of activity. The organization also sees itself as innovative, not just in the development of their products, but also in how to conduct their business. The organization is innovative on a continuous basis; it is often the customers who need new or better use of the products, which makes the organization innovative.

The organization relies on market knowledge when they need external knowledge in-sourced, but they also use their networks, both the more formal business network and their sub-supplier network when knowledge in-sourcing is necessary. The organization has Italian agencies, which are not innovative, so the organization needs to in-source solutions for these.

The organization has no previous collaboration with a university.

Aalborg University has contacted the organization several times in an effort to establish collaboration with the organization, but the organization has not been able to find time for this

in the past. When AAU once again contacted the organization, this time suggesting that Centre for Logistics – CELOG – work on problem areas, the organization found that they could use some focus on their pre-calculations to better determine the costs of their products and the collaboration was established.

The organization's motivation for collaboration with AAU was the organization's desire to find better methods in their pre-calculations, and to this the CELOG programme could help.

The organization had different initial barriers to collaboration with a university. For instance the organization had the idea that a university could not react fast enough to market demands, - i.e. the university would be too inflexible, and the organization also wondered if it would have an effect on the employees' motivation that the university had contacted the organization with the collaboration idea and not the other way around. The organization wondered if the lack of previous successful collaboration would affect the success of the new collaboration. The organization also had initial barriers related to the level of administration required during the collaboration; the time perspective was also something the organization thought about, just as the organization had the idea that the practical and theoretical worlds would be difficult to merge.

The collaboration lasted for three months. The theme of the collaboration was to work with the organization's foundation for calculations, as the organization wishes to have better calculations on their products. They needed to know about the organization's time consumption, the sub-suppliers' time consumption, and so on. Therefore the collaboration also involved gathering data, views on logistics, part numbers, and systems and so on.

The organization did not get their expectations to the collaboration fulfilled. Some of the reasons for this are stated as the university consultant not being up-to-date with the organization's field of activity, just as the university consultant did not manage to create a clear picture of the possibilities the university knowledge could provide for the organization. The organization also felt that the university consultant could not communicate clearly in the culture of organizations, and tried to talk the collaboration in the direction of his project, which was not beneficial to the organization. Therefore the organization did not feel they received any benefits from the collaboration.

As for the organization's initial barriers to collaboration, the organization says that the level of administration within documentation to the university is high. They also felt that the university consultant did not have enough practical experience and therefore they felt they had to up-

date the university consultant on their field of activity. Interviewee did not know about the other initial barriers.

The organization did find other barriers to collaboration during the collaboration.

The geographical proximity was not a problem in the university-industry collaboration, the organization states. The social proximity is mostly relevant in relation to the organization's own network, where they find new ideas and input to working routines and products. The organization has little contact to Business Centre Jammerbugt, but when there is contact this is often about ideas to optimize the organization in different ways and sometimes about possible collaboration, therefore this relation may also have had an indirect effect on the collaboration. As for cognitive, organizational, and institutional proximity the organization states that these factors had no influence and were not of relevance in establishing the collaboration.

There was no knowledge transfer to the organization from the university.

The organization has no network to other universities, but has some knowledge of Aalborg University; therefore this university is seen as more easily accessible. Also the organization sees this university as the local university, but the organization states that another university could also be of interest in collaboration, as long as the subject of the collaboration is relevant.

The organization is insecure as to whether or not the collaboration has been a benefit to the university.

The organization could see itself in future collaboration with a university. The organization is fairly sure, though, that the subject of and the contact about collaboration have to come from themselves and not the university, if they want to benefit from the collaboration. So collaboration will only be established if the organization thinks they have a subject about which university knowledge is useful and only if the university is the best partner, otherwise the organization might as well use other partners.

Note: The interviewee in this case was not directly involved in the actual collaboration, but was only involved in the initial contact with the university. The knowledge about the collaboration was gained through discussions in the organization, and is therefore second or third-hand knowledge.

Case no.6.2   (Different interviewee)

The organization is located in Jammerbugt Municipality, approximately 32 kilometres from the nearest university - Aalborg University. The organization was acquired by the present owners in 2003 when they bought the remains of the previous organization, which had become insolvent. The owners of the organization worked in the previous organization as well, and the products originate at the beginning of the 1990ˢ.

The organization's field of activity is industrial robotics in the field of palletizing solutions, stretch wrapping units, bag-filling systems and internal transport equipment. The organization provides complete solutions to their customers. The organization buys basic robots and then they build all the necessary tools for the robot's purpose. They collaborate with sub-suppliers, among whom two are located in the same building as the organization itself.

The organization currently has 18 employees; one of these is a salesman with a university degree in sales and marketing, the other employees are mostly workers who have 1½ years of additional education, which makes them technicians in the field of machines and electronics, and one has completed a 2-year part-time academy education.

The organization states that they have in-house development in the areas of software technology for the robots as well as construction. The organization combines existing tested techniques in new ways. At the moment the organization is the best in the market in their field of activity. The organization also sees itself as innovative, not just in the development of their products, but also in how to conduct their business. The organization is innovative on a continuous basis; it is often the customers who need new or better use of the products, which makes the organization innovative.

The organization relies on market knowledge when they need external knowledge in-sourced, but they also use their networks, both the more formal business network and their sub-supplier network when knowledge in-sourcing is necessary. The organization has Italian agencies, which are not innovative, so the organization needs to in-source solutions for these.

The organization has no previous collaboration with a university.

In the organization's first collaboration with a university, it was AAU which contacted the organization to discuss a possible collaboration as they had a programme the organization

might be interested in joining. The organization and AAU joined in collaboration through the Centre for Logistics (CELOG).

The motivation for collaborating with the university was primarily that the CELOG programme could allegedly help the organization with a number of elements which might be of benefit for the organization in their working environment e.g. during pre-calculations.

The organization had different initial barriers to the collaboration with the university. For instance the organization wondered if they could gain benefit from the collaboration or if it would provide nothing for the organization. The organization is in a niche market; therefore they thought it could be difficult to find the right person at the university to collaborate with.

The collaboration lasted for three months and ended in May 2012. The theme of the collaboration was to work with the organization's foundation for calculations, as the organization wishes to have better calculations on their products. They needed to know about the organization's time consumption, the sub-suppliers' time consumption, and so on. The desire to have better calculations stems from experiencing situations when the organization could not say yes to a contract with a customer as they did not know whether they would profit on the product. The organization needed a way to make the calculations easily accessible and, if possible, with automatic update.

Although the organization had an initial barrier concerning possible lack of benefit from the collaboration, they had expected more of the collaboration than they experienced. The organization is not satisfied with the collaboration; in general they felt they had to provide knowledge to the university as the "consultant" from the university was not up-to-date with the organization's field of activity and consequently had trouble with how to handle the field of collaboration.

The organization did not gain any other benefit from the collaboration than the employees in the organization discussing topics they already had knowledge about. Therefore they felt they were discussing elements they had already discussed before.

The organization's initial barriers to collaboration with the university proved right, which was also seen during the collaboration. The organization has the feeling that the university is not up-to-date with industry, which has also shown earlier when years ago the organization participated in conference at AAU, where the university introduced to their latest robot

technologies, which were already then years behind what the organization could do with their robots.

During the collaboration the organization found another barrier that had to do with the two different cultures – organization vs. university. The organization did not feel that the university was as targeted and goal-oriented as the organization is. They also found that the university was several years behind the organization in their field of activity, so they spent a great amount of time on bringing the university consultant up-to-date, and not on the collaboration's field of activity. The organization expected the university to be far ahead of the organization. The organization found that the university lacked insight into the working environment in private organizations, and the university should be better in their dialogue and interaction with organizations, in order for it not to become a barrier.

In relation to the geographical proximity the organization found no problem in the distance between the organization and the university. The social proximity is mostly relevant in relation to the organization's own network. Even if Business Centre Jammerbugt does not visit the organization often, it is always relevant when they do pay a visit and bring ideas on to the table. Therefore the social proximity with the business centre is also relevant, and it was also the business centre which indirectly established CELOG's contact to the organization. The organization states that there was no cognitive proximity. As for organizational and institutional proximity the organization states that these factors had no influence and were not of relevance in establishing the collaboration.

The knowledge transfer to the organization was missing, as the organization states that they had no knowledge transferred from the university but it was more a matter of transfer the other way round. During the collaboration it was face-to-face interaction which was mostly used and it was the university which came to the organization for these meetings.

The reason for the organization to collaborate with AAU was that the university contacted them with the idea that university knowledge could help the organization in their effort to improve their calculations. But there is no reason why another university could not have collaborated with the organization on this topic.

The organization is sure that the collaboration has provided knowledge to the university as it has given the university's consultant insight into practical problems in a private organization and the data might be of use in university research.

The organization could see itself in future collaboration with a university, but it will depend on the conditions of the collaboration. The organization feels that the EU funding used in the collaboration is wasted to a high degree, as it seems that the funding is more targeted at matching the consultants and not providing the best conditions for organizations. Therefore the organization is sceptical of future collaboration having to fit into an EU-programme description. Also the organization will look upon the person they should collaborate with as they prefer a person with practical experience.

19 Case no.7

The organization is located in Jammerbugt Municipality, approximately 56 kilometres from the nearest university - Aalborg University. The organization was established in 2006, but the employees come from two organizations – RBM A/S and Fjerritslev Karrosseridele (Fjerritslev Body parts) - that were also behind the creation of the organization. The organization therefore possesses many years of knowledge in their field of activity.

The organization works in the steel business and functions as a subcontractor for other organizations, which place their steel production in the organization instead of placing their steel production in e.g. Ukraine, the Czech Republic, China, etc. The steel products could for instance be products for chairs, wheelchairs, etc. The organization has approximately 50 employees.

There are two employees with degrees from a university, both in engineering. The majority (30 to 35 employees) of the employees are unskilled workers; besides there are a number of employees who are skilled workers, auto mechanics and metalworkers, office personnel and industrial technicians. In addition to this, a number of the key employees have completed further education in business management, leadership, etc.

The organization does not have in-house R&D activities, but perform occasional simple development projects for customers. The organization sees itself as an innovative organization on a continuous basis, as a means to survive in the market. For instance the organization tries to optimize through the use of robot techniques in an effort to save costs, and the organization also develops the employees' skills through e.g. courses. The organization has developed their ability to be innovative on a continuous basis through a CELOG project – Centre for Logistics – where they dealt with the possibility to analyze production data and thereby improving the processes that lack behind through plans of action.

The organization has in-sourced knowledge about production and logistics through Aalborg University and has also used private consultants to help with the organization's balance sheet. Otherwise the organization receives external knowledge through their collaborating partners and customers.

The organization has previously collaborated twice, mainly concerning electronic data processing, to help create an overview of their orders and deliveries. On these two occasions

the organization stated that there were some barriers between the university and the organization, as for instance the organization found that there were huge cultural barriers since most of the organization's employees have trouble in understanding the university world, their way to talk and use specific terms, and also a group of employees have trouble in understanding English. This brought about barriers in understanding some of the terms used and the organization states that the worlds of universities and organizations are different. The organization also found that the time spent on collaboration could pose a barrier, as it is very time consuming for the organization. The organization also states that the collaboration with a university can become too extensive, as there are a number of things a university may not do, they need to add additional personal on the project, and therefore it can easily become overcrowded with people who have specific functions in the project. The organization feels that the funding from the European Union is spent wrongly, as the organization does not receive enough compared to the amount of money in a given project.

In this latest collaboration the contact between the organization and the university was made by Aalborg University which was developing a new analytic tool and needed an organization to test this on, and as this was also relevant for the organization the collaboration became a reality.

The organization had different motivations to join the collaboration with the university. For instance they believe that the organization's economy can be optimized in an effort to save costs and thereby make higher profit. Also the organization needs focus on which processes and products they profit from, in an effort to repeat those and eliminate or improve the processes and products they do not profit from. Another motive was that the organization wants to know whether or not they could survive if they get new owners some day.

The organization had different initial barriers to the collaboration. For instance they believe that the previously experienced barrier concerning the time factor will once again become relevant, since the university as a public institution can afford to use a day more on semi relevant aspects in the collaboration, whereas an organization cannot afford to spend time and costs on something which is not relevant. Also the organization believes that a private organization needs to have the product now to get to the market, hopefully before the competitors, while the university can wait longer. Also the organization believes that there will be some barriers related to the large differences in educational level.

The latest collaboration had a timeframe of approximately one year. The collaboration was with CELOG at Aalborg University and it had to do with the organization's calculations. The goal was

to develop a method for the organization to analyse production data and thereby finding and improving the processes that lack behind through plans of action; for instance if the production line had some bottlenecks where the process backed up and delayed the entire process of the product, or if the delivery time was too long. Through this process, the organization would be aware of where they make their profit. Also it is important that through this process the organization document both before and after a process that it is profitable. In this way they would be even more aware of what to do and what not to do during the processes of production.

The organization was satisfied with the collaboration with Aalborg University. The organization states that the university fulfilled their expectations to the outcome of the collaboration, but internally the organization faced a lack of resources to have the processes implemented in the daily routines, and recently they have thus hired two extra employees to help implement the processes.

The outcome of the collaboration is that the organization now has the tools to carry out a plan of action for the processes and thereby see where the organization loses money and where they can gain a better profit. Through the collaboration the organization has managed to find the single processes in the production that backed up and delayed the entire process. The organization now analyses where they make profit and thereby they are able to repeat this to make more profit. The organization also has a better knowledge of the pre-calculations and therefore they match to a higher degree the after-calculation. Another benefit from this is that the calculations make problem areas more visible to all the employees, and therefore it makes them more aware of what they do, why they do it and why they might have to change their routines.

During the collaboration all the organization's initial barriers were proved correct as they experienced them all. But the organization did not find other barriers during the collaboration.

As for the geographical proximity the organization states that it was not a problem in this collaboration, but that they are also aware that it could pose a problem, e.g. if no prior collaboration have taken place. As for the social proximity, the organization states that this played a role in this particular collaboration, as they knew the professor from Aalborg University who made the initial contact to this collaboration from the previous project Plato. Also the organization's private networks – managerial networks, business forum, Plato, etc. - are of relevance in the organization's effort to find new knowledge for improvement. The organization states that there was almost no cognitive proximity with the university, but the

university had the knowledge needed to solve a specific problem. The organization also says that the organizational proximity did matter, as there is a higher willingness to accept a new collaboration if you already had a successful one. The organization and the university did not have any institutional proximity during this collaboration.

The knowledge that was transferred from CELOG to the organization was both tacit and explicit, and the explicit knowledge was directly usable; the organization had to spend extra time on making the tacit knowledge accessible and usable, thereby slowly implementing new know-how in the processes. The types of knowledge were know-how and know-what. The knowledge was transferred to the organization through e-mail, telephone and face-to-face meetings.

There were different reasons why it was Aalborg University the organization collaborated with. For instance, during this collaboration it was Aalborg University which contacted the organization; also the organization says it has to do with the local community, as Aalborg University is the local university. The private networks play a role in this as well as it is mostly Aalborg University which is mentioned during dialogues where university knowledge is discussed. Besides this, different people in the organization know people who have graduated from this university and now hold good jobs. For all these reasons the organization could not see itself collaborating with other universities.

The organization is sure that the university benefitted from the collaboration, as they could test and fine-tune their new analytic tool during the collaboration, which was a goal for the university. The university can also use the data collected during the collaboration in their future research.

The organization is sure that they will collaborate with Aalborg University in the future; in fact they are sure that they will start cooperating this year.

20 Case no.8

The organization is located in Jammerbugt Municipality, approximately 26 kilometres from the nearest university - Aalborg University -. The organization was founded on the first of January 2000. The organization currently has 20 employees.

The organization's field of activity is business within the area of electronic commerce. Within this the organization's activities are divided into three areas; the *first* is the implementation, counselling and installation of SAP systems. The *second* is counselling to organizations on the implementation of electronic commerce. The *third* is the development for applications to electronic commerce, in which the organization combines existing knowledge in new ways to create new/better applications.

The educational level in the organization is high; approximately 80 percent of the employees have a degree from a university. These are for instance engineers, software developers, computer scientists and Masters of Science in Public Administration. The remaining approximately 20 percent of the employees all have longer vocational educations.

The organization sees itself as an innovative organization as it develops applications in-house. It does not do basic research, but considers their developments to be business development. They develop when they see a need in the market.

The organization in-sources new information and knowledge through customers, mostly where the organization finds possibilities but the customers also bring ideas to the organization. The organization does not directly in-source knowledge through university collaboration, but the employees who have university degrees bring the university knowledge into play in the organization. Besides this the organization has a couple of employees who have taught at Aalborg University. This also brings new knowledge to the organization, as these employees interact with the students and staff at the university.

The organization has not previously had any joint collaboration with a university. But the organization has unsuccessfully tried to engage in collaboration with students previously but these efforts to engage in collaboration have not yet succeeded. According to the organization this is due to two things: *first* no students have contacted the organization. *Second*, the organization has not invested enough time into trying to find the right students.

In the previous attempt to collaborate with a university, the organization was phoned by Aalborg University Matchmaking. Through this contact the organization provided different subjects for projects, the students could work on in the organization. But there was no follow up on this; therefore the collaboration never became a reality.

The organization had different motives to collaborate with a university. For instance the organization states that the employees gain benefit from collaboration as it will create new dynamics among them. It will also make new knowledge accessible for the organization as well as collaboration most likely will provide new insight into the organization's field of activity and new input about existing working routines.

As for initial barriers to collaboration the organization had; the factor of time, the organization finds that the time spent on the attempts to engage in collaboration should be more beneficial for the organization than if the time was spent on a customer meeting. The organization also finds it more difficult for small organizations to use resources on collaboration, whereas large organizations most likely can use the resources needed in the effort to engage in and conduct collaboration, this is by the organization found to be a barrier. Also the organization believes that as a small organization they have more difficulties in attracting the collaboration than large organizations.

The organization still has not had collaboration with a university. But the previous attempt to engage in collaboration was to have dealt with new technologies, amongst others encryption technology.

The organization found one other barrier to collaboration during the process, this was; that the university needs to take responsibility for the collaboration, as the organization finds this is problematic. The organization has experienced that the university tried to start collaboration, but never followed up on this, and perhaps therefore nothing happened.

As for the geographical proximity the organization finds that the distance between its own adress and Aalborg University is not a problem. The social proximity is seen as important by the organization, as this is where opportunities and contacts are found, but this is mostly achieved through private networking. The organization feels that they have a cognitive proximity with a university as they feel they can match the knowledge at a university, although the organization's knowledge, most likely aims more at practise whereas the university's knowledge is more focused on theory. The organizational proximity matters, as the

organization have had interaction with Aalborg University through the employees who have taught there. Institutional proximity can be a problem.

As the organization has not yet had collaboration with a university, they cannot say anything about the type of knowledge which was transferred. But the organization also states that during university-industry collaboration it is important that the organization understands that it will most likely not benefit from all aspects of the collaboration, but has to accept that only a certain amount of these might be beneficial and then use that. The organization feels that the most important thing is to create a good relationship to the collaborating partner so the organization will e affected in one way or another.

When asked why it is Aalborg University the organization has tried to collaborate with, they state that this has to do with the proximity. They feel they know what Aalborg University represents. Also the employees who have studied at Aalborg University still have contacts at the university and are in touch with the people they studied with, whereas the employees who studied at other universities have no contacts there and not much contact with the people they studied with. Therefore it is more natural to use Aalborg University than other universities if collaboration is sought.

The organization may be interested in collaboration if the right subject emerges. And it does not matter if it is the organization itself which contacts the university or it is the other way around.

21 Case no.9

The organization is located in Jammerbugt Municipality, approximately 64 kilometres from the nearest university - Aalborg University -, and the organization was founded in 1935.

The organization's field of activity is within raw material extraction. They manufacture high quality products for the concrete and asphalt industry. The concrete products are dry concrete and dry mortar, the organization also supplies sand, gravel and pebble for playgrounds, cattle sheds and construction work. The organization owns 4 gravel pits, 3 port docks and 1 ship, from where they extract the sand and gravel. The organization has approximately 35 employees.

The organization has one employee with a university degree, who is an engineer. The majority (approximately 60 per cent) of the employees have no formal education – unskilled workers - whereas the rest are a mixture of differently skilled workers, accounting and administration staff, and two laboratory technicians.

The organization both has in-house research and development and is innovative on an ad hoc basis. One to two employees work fulltime on developing new products, but the organization is also innovative in their business development, which often starts when business opportunities occur, and the organization is very willing to change if they see new opportunities.

Suppliers, business and personal networks are the usual means for the organization to in-source knowledge.

The organization has previously had collaboration with a university in the form of student projects and thesis collaboration, but it has been at least 5 to 7 years since the last collaboration. The challenge is to come up with a problem formulation which will attract the students and is also suitable for a project; this can be a barrier to collaboration.

In the new project, the contact to the university was made through dialogue with Business Centre Jammerbugt, where the business centre brought up the idea of collaborating with a university. The collaboration was made a reality through ViaNord.

The motivation for collaboration with a university was the organization's desire to raise competence levels and try to develop a new type of concrete. The organization also states that it is a way to help secure the organization in the future and secure future income.

The organization had some initial barriers to the collaboration. The organization thought e.g. that the university would lack motivation during the collaboration, as the area of collaboration is new. The organization contributed with knowledge about concrete while the university would contribute with knowledge about polymer techniques. Besides this there was doubt about the viability of the idea.

The collaboration started approximately two years ago – in February 2010 - and is scheduled to last till the end of 2012. The collaboration is with researchers from Aalborg University.

The subject of collaboration is basic research within the field of polymer concrete, which is a completely new area within concrete manufacturing and therefore the organization hopes that the collaboration may result in useful findings, which later can be transferred into new materials and products they can introduce to the market. The collaboration has three stages; the *first* is introducing the organization to the world of polychrome techniques, methods, etc. Here the university brought the organization through lectures, data and literature concerning this subject. The *second* stage was a literature study in polymer modified concrete. The *third* stage is where the collaboration is at the moment. In this stage scientific experiments in polymer concrete are made, these experiments take place in the organization's own laboratory.

The organization is very satisfied with the collaboration. The subject is very interesting and the university is open-minded. The organization realize that their competence levels have developed positively. The organization has also established a new laboratory and new methods.

The organization has, as seen above, already raised their competence levels.

As for the initial barriers, the organization has realised that they were wrong in thinking that the university might lack motivation as the research field is new; in fact the organization finds it just the opposite. That the university is very motivated in the collaboration. There is still some doubt whether the idea can produce something useful for the market.

During the collaboration the organization found another barrier. As the collaboration stretches over a long period, the collaboration agreements have had to be renegotiated, as the original timeframe of collaboration expired. During this the organization found that there were problems in negotiating the new terms of the agreement, and therefore the collaboration went to a standstill for a little while. The organization was not impressed by CELOG during the renegotiations as the organization felt they became too opportunistic in their effort to maximize their income. This may have become a barrier that would have ended the collaboration.

During this collaboration the geographical proximity does not pose a problem. But the organization is aware that it might pose a problem if it was another collaborating partner, for instance students, as the location of the organization means that the collaborating partner needs access to a vehicle. The organization states that their social proximity with the university plays a role in the collaboration with the university, as they have access to the right departments at the university. During this collaboration the cognitive proximity does not play a role, as it is two different knowledge areas – polymer and concrete – which are put together in an effort to develop a new type of concrete. But they do have some cognitive proximity in the form of a common logical scientific approach to solving problems. As the organization has previously had collaboration with the university they believe that this organizational proximity is an advantage, as it was trusted that the collaboration would bring benefits. There is also some institutional proximity in this collaboration, as the university has to keep some of the findings confidential, and the collaboration is based on time registration.

The type of knowledge transferred differs. During the first stage of the collaboration the knowledge was usable right away in the further process of the collaboration, as this had to do with acceptance of existing polymer knowledge. This type of knowledge was know-why and know-what. During the last two stages the knowledge was more difficult to use as it was more tacit and scientific. Therefore the third stage has to do with experiments in making the polymer concrete, to make it usable in the organization in the future and hopefully enable the organization to develop new products for the market. The knowledge is transferred through face-to-face interaction, and the entire collaboration take place in English, which makes the learning process harder.

The organization chose to collaborate with Aalborg University for practical reasons since the organization knows Aalborg University, and people who studied there, and it was through this university the ViaNord project was available. But the organization states that they would have

collaborated with another university if there had been any who possessed the knowledge the organization needs.

The organization is sure that the university will benefit from the collaboration, both financial and through entirely new knowledge. The collaborating partners have also involved a senior lecturer from the institute working with concrete; in the process he will also receive knowledge concerning polymer concrete.

The organization is sure that they will participate in collaboration in the future. It is hoped that the current collaboration will end with the findings of new processes in polymer concrete, which then could bring new collaboration in 2013 concerning the usage of these processes and how to make new products for the market. The organization hopes that there will be relevant schemes which may be beneficial in establishing collaboration, as the amount of money the organization can spend on this is limited. The organization also hopes to attract students in the future, both to student projects and maybe traineeships, within the field of concrete and polymer.

22 Case no.10

The organization is located in Jammerbugt Municipality, approximately 56 kilometres from the nearest university - Aalborg University -, and the organization was founded in 1985. The organization has never been insolvent and is not dependent on a bank for finances if they desire to purchase new materials, tools, etc.

The organization's field of activity is in bricklaying in new buildings, renovations and extensions. The organization also performs facade renovation and sewerage work. Before the financial crisis in 2008, the organization had 20 employees, but as a result of the crisis it has had to trim the organization. As a result of this, there are now 9 employees working in the organization. This is not seen as a negative side of the crisis as it has given a more stable and optimal organization, states the owner.

The organization has no employees with a university degree. The employees' educations are; 3 are skilled bricklayers, 4 are skilled in the field of concrete, and 2 are skilled to handle sewerage work.

The organization sees itself as innovative to some extent; this is a necessity to stay in business. Today there are many restrictions in this industry when it comes to reducing energy consumption in new buildings and after renovating a building the organization thus needs to develop and be innovative in these areas. The organization also states that they use innovative ideas when optimizing the organization, or at least innovative to itself. For instance the organization has saved much time and money by letting the employees drive directly to the customers in the morning rather than clocking in at the organization's offices, and the organization has bought new equipment for damage solutions in the sewerage area. By doing this they can now work for insurance companies. The organization sees itself as innovative on a continuous basis.

The organization normally in-sources knowledge from their suppliers, drawing offices and manufacturers of building materials and tools. From the manufacturers it can both be small presentations of new products and it can be shorter courses.

The organization has not had previous collaboration with a university.

The organization took the initiative to obtain collaboration with a university. The owner read that Finn Kjærsdam, Principal at Aalborg University, was visiting North Jutland MediaCentre in Jammerbugt Municipality and having a debate with the chairman of the Business Council in the municipality; this gave the idea to contact Business Centre Jammerbugt which then arranged the initial meeting with Aalborg University.

The motivation to engage in collaboration with a university was that the organization would like to put extra focus and receive new knowledge on initiatives in zero-energy buildings and energy efficient solutions. The organization also thought of having a trainee from the university for a period of 4 to 6 month6, who could work with these areas in the organization.

The organization had different initial barriers to collaboration. For instance the organization had concerns about the costs of such collaboration and if these were too high in proportion to the possible benefits. The organization also thought that the fact that it is a small and fairly unknown organization could become a problem in attracting a collaborating partner. The organization also thought that the distance from the university to the organization might pose a barrier.

The collaboration's field of activity should be energy efficient solutions in buildings and ideas, proposals, calculations, drawings, etc. of how to create zero-energy buildings.
Unfortunately, for different reasons, the collaboration failed to start. Eventually the organization was told by the university that the possible candidates for the traineeship had all found traineeships in other firms. But the organization also states that they did not push on to get a student for traineeship in the organization, as it would be better that the trainee selected the organization because he/she found the subject exciting.

As for the initial barriers, the organization does not know about the possible costs. But the organization states that they believe the small size and fairly unknown name of the organization might have been an obstacle to some of the possible trainees. The organization bases this on their dialogues with the university and the students. But the organization is also aware that the distance from the university might have been an obstacle for some students.

The organization found another barrier they had not seen in the initial stages of the possible collaboration. They found that the conditions in the university system made it hard to find new students for the traineeship; they were told that it would be at least 6 months before new trainees could be found for a traineeship.

As for the geographical proximity the organization states that in relation to having students in traineeship and student project groups this could become a problem. Although the public transportation stops only 500 metres from the organization and the organization might be willing to pick the students up at the bus-stop, it is still a long trip. But the organization does not see the distance as a problem if they are scientists or other collaborating partners. As for the social proximity the organization has social proximity with Business Centre Jammerbugt. This contact was used in the initial approach to the university. As for a cognitive proximity the organization sees itself as holders of the practical knowledge related to the collaboration subject while the university would provide a more theoretical knowledge to this, and therefore the organization believes that this would not become a major problem. The organization and the university have no organizational proximity and no institutional proximity.

The organization chose Aalborg University as it has contact to the local organizations. The university is positively portrayed in the media and among people. Also it is the local university and therefore this university is more obvious as a collaborating partner.

The organization would very much like to engage in collaboration with a university in the future. If possible, the organization would once again try to find a trainee for a traineeship in the areas of energy efficiency in buildings. Other subjects, project groups, researchers, etc. are also very welcome as long as the subject of collaboration is of relevance to the organization.

23 Table on Case Organization's Level of Satisfaction with the Collaboration

Table X: Organization's level of satisfaction with the collaboration

	Satisfied with the collaboration?
Case no.1	Satisfied – their expectations will be fulfilled.
Case no.2	Satisfied – projects complement each other and had very interesting fields of research. But, think students could involve the organization a little more through more dialogues.
Case no.3	Satisfied with the university. But not satisfied with the way students handle the collaboration. Almost no contact with the students. Lack of initiative by the students. No insight into what the students do. Students have not visited the organization.
Case no.4	Satisfied.
Case no.5	The collaboration was cancelled before it began.
Case no.6.1	Not satisfied – expectations were not fulfilled. Researcher was not up-to-date with the organization's field of activity, and could not provide a picture of the possibilities Aalborg University could provide the organization with.
Case no.6.2	Not satisfied –had to provide knowledge to the researcher, who was not up-to-date. The organization expected more from a university.
Case no.7	Satisfied. Aalborg University fulfilled their expectations.
Case no.8	There was no collaboration.
Case no.9	Very satisfied – Aalborg University is open-minded.
Case no.10	There was no collaboration.

24 Table on Case Study Contact, Field, and Duration of Collaboration

Table X: Contact, field, and duration of collaboration.

	Contact	Field of collaboration	Duration of collaboration. (who)
Case no.1	BCJ brought up the idea of collaboration.	Balance scorecard (strategy development) – using simulations to test strategy to see if this matches the goals.	3 months. (Students)
Case no.2	AAU Matchmaking and solution camp.	3 projects on the development of the MTB activities, but with different research areas within the MTB area.	Approx. 4 months. (3 student groups)
Case no.3	Through BCJ, based on idea from the organization.	Market research for a specific product.	Approx. 3 months. (Students)
Case no.4	BCJ brought up the idea of collaboration.	Optimization through improved day sheets, with help from collaborating partner at Centre for Logistics.	From March 2012 with no scheduled ending. (Researcher)
Case no.5	The association contacted BCJ, which contacted AAU Matchmaking, which helped to put a project description into the AAU job database.	Innovative approach on different ways to make the lighting between Blokhus and Hune.	The collaboration was cancelled before it began. (Should have been students)
Case no.6.1	AAU contacted the organization.	Optimization of calculations with help from Centre of Logistics.	3 months. (Researcher)
Case no.6.2	AAU contacted the organization.	Optimization of calculations with help from Centre of Logistics.	3 months. (Researcher)
Case no.7	AAU contacted the organization.	Developing a method to analyse production data, to find and improve processes that lack behind.	Approx. 1 year. (Researchers from Centre for Logistics)
Case no.8	AAU Matchmaking contacted the organization.	The organization provided different subjects - e.g. encryption technology - to student projects. But there was no follow up on this, and therefore no collaboration.	There was no collaboration. (Should have been students)
Case no.9	BCJ brought up the idea of collaboration.	Basic research within the field of polymer concrete, which is a new area not explored before. At the current stage of collaboration scientific experiments in polymer concrete take place.	Approx. 2 years. – scheduled to last till the end of 2012. (Researcher)
Case no.10	Contacted BCJ, which arranged a meeting with AAU.	Energy efficient solutions in buildings and ideas, proposals, calculations, drawings, etc., of how to create zero-energy buildings.	There was no collaboration. (should have been trainee)

Note: AAU = Aalborg University. BCJ = Business Centre Jammerbugt.

25 Table on Case Study Motivation, Benefits and Costs

Table X: Motivation, benefits, and costs.

	Motivation	Benefit	Costs
Case no.1	New insight into usual routines and business strategy. Social responsibility. Practical challenges for students.	Benefits from the simulations.	
Case no.2	New set of eyes and new ideas in MTB area. General inspiration to usual routines.	Additional insight in the MTB area, which is useful in search for external funds, and their own development and focus in this area.	
Case no.3	Possibility of additional insight into technical fields and business strategy.	No expectations as to the result. No benefit from collaboration.	
Case no.4	Possibility of improving the organization's finances.	Better insight into what affects the profit positively and negatively. Can see what every cap or coach costs. Better insight for the employees into effectiveness from their side.	DKK 5,000 for participation through ViaNord.
Case no.5	New insight into specific field.	The collaboration was cancelled before it began.	The collaboration was cancelled before it began.
Case no.6.1	Desire to improve pre-calculations.	No benefit from collaboration.	
Case no.6.2	Centre for Logistics had specific idea which could benefit the organization's pre-calculations.	No benefit from collaboration.	
Case no.7	Possibility of optimizing the organization's economy. Insight into every process in the organization to see where they make and lose money. To see if organization can survive if they get new owners.	Developed tool by which they can get insight into every process and see where they make and lose money, and thereby target problem areas. Better pre-calculations. Problem areas become visible.	
Case no.8	New insight is beneficial. Insight into new knowledge. Insight into and input on daily routines.	There was no collaboration.	There was no collaboration.
Case no.9	Raise the competence levels. Basic research into new area - polymer concrete.	Competence levels have risen. The organization has established a new laboratory.	Initial price was DKK 5,000 for participation through ViaNord. The renegotiation price is a business secret.
Case no.10	Extra focus on initiatives within zero-energy buildings and energy efficient solutions.	There was no collaboration.	There was no collaboration.

26 Table on Case Study Barriers

Table X: Barriers (Full text)

	Initial barriers	If initial barriers, were these real	Other barriers not thought of in advance
Case no.1	Privacy of data.	Solved by confidentiality clauses.	No.
Case no.2	Idea of two different cultures, e.g. industry = goal oriented, university = not goal oriented. Time factor.	None of the initial barriers proved to be a problem. The different cultures were not a problem, as the university was also goal oriented, and the organization spent less time than expected.	No.
Case no.3	Location of the organization. Time factor. Time and effort in finding a collaborating partner. Unknown organization = less willingness to collaborate for student. Difference in cultures. How does one benefit from collaboration.	Time factor is not a problem. Time and effort in finding a collaboration partner is a problem. How to benefit from collaboration is a problem. Does not know if location, the fact that it is an unknown organization, or culture pose problems.	Students do not take collaboration seriously. Students do not seem to be willing to invest time in the collaboration.
Case no.4	Difference in cultures – university might not understand industry's culture. What could the organization possibly offer the university, and what could they use university for. Barrier concerning the knowledge from university.	Differences in culture are not a problem. The organization found that they could contribute with something to the collaboration. They also found that they could use some of the university's knowledge, and that university is very capable of making the knowledge accessible and usable.	Administrative burden in registration to the collaboration.
Case no.5	No initial barriers.	No initial barriers.	The collaboration was cancelled before it began.
Case no.6.1	University is inflexible. Could the fact that AAU contacted the organization affect the employees' motivation. Will lack of previous collaboration influence the success rate of this collaboration? Level of administration. Time factor. Will the practical and theoretical worlds be difficult to combine?	Level of administration was high. Interviewee did not know, about the other initial barriers.	Researcher's lack of understanding organization's culture. Researcher lacks practical experience. The researcher was not up-to-date with the organization's field of activity.
Case no.6.2	Concerned if they could gain any benefit from collaboration. Due to organization being on a niche market it might be difficult to find the right collaborating partner from the university.	Initial concerns over benefit proved to be right. The researcher was not up-to-date with the organization's field of activity.	Cultural differences – university was not as targeted and goal-oriented as the organization. University several years behind the organization in robotics, therefore they spent time in up-dating the researcher on this, and not time on the collaboration's field of activity. University lacks insight into working life in organizations.
Case no.7	Time factor. Major educational differences. Differences in working practice. Organization needs product now; university not as targeted and can wait a day or two.	Time factor was a problem. Differences in educational level were a problem. Differences in working practice and university's lack in being targeted were a problem.	No.

Case no.8	Time factor. As a small organization they have fewer resources to use to find collaboration. Small organizations might not be as attractive as large organizations.	Does not know about the time factor and attractiveness. Too resource demanding to find a collaboration.	Lack in university's desire to take responsibility for the collaboration.
Case no.9	There was concern about whether or not the university would lack motivation, as the field of activity is new. Doubt about the viability of the idea.	The concern about university's motivation was not a problem – in fact university is very motivated. Still doubt about the viability of the idea.	Centre for Logistics became too opportunistic during renegotiation of the collaboration agreement, therefore the collaboration stopped for a time until a more reasonable level was negotiated. This could have stopped the collaboration entirely.
Case no.10	Costs of collaboration. Small and unknown organization could pose a problem in attracting a collaborating partner. Distance to university.	Does not know about costs of collaboration. The small and unknown organization was possibly a problem to some students. Distance might have posed a problem to some students.	Different environment and culture cause problems, due to the structure of the university system it would be at least 6 months before a new trainee could be found.

27 Table on Additional Case Study Data

Table X: University, university benefits, and further collaboration.

	Why this university - why not another	Did university benefit	Further collaboration
Case no.1	Employees study there. AAU seems more serious and personal when they contact the organization, than other universities. The business centre also makes it more personal.	Students gained new knowledge, practical experience, and made a semester project.	Open to further collaboration.
Case no.2	AAU has a positive reputation when it comes to collaborating with organizations. AAU contacted the organization. AAU effective in arranging meetings and answering questions. AAU Matchmaking is found to be reliable.	Students get practical experience and a project. Solution camp gains experience in holding the camps. Professors who research in tourism also benefit from the collaboration.	Highly motivated to further collaborations.
Case no.3	AAU is the local university, and therefore the first to think about. But could just as well have been another university – the subject of the collaboration matters, not the location of the university.	It is hoped students get practical orientations on their theoretical knowledge, and a project.	The students' lack of taking the current collaboration seriously could affect the organization's willingness to collaborate in the future. Collaborating partner must be driving force, or else collaboration is not likely.
Case no.4	The ViaNord collaboration was through AAU. No other reason than this.	Centre for Logistics can use the collected data in research and teaching.	Open to further collaboration.
Case no.5	AAU is the local university.	The collaboration was cancelled before it began.	Open to collaboration.
Case no.6.1	AAU is the local university. Have some knowledge about AAU, and not about other universities. But another university could be of interest if the subject was right.	Not known.	Open to collaboration. But only if the organization thinks they have a subject fitted for university knowledge.
Case no.6.2	AAU contacted the organization with ideas which could help the organization. Other universities could just as well have been collaborating partner.	Data collected can be used in research. provided insight into practical problems.	Open to further collaboration, but it will depend on the conditions of the collaboration.
Case no.7	AAU contacted the organization. AAU is the local university. Private networks most often mention AAU in dialogues. Know people who studied at AAU. The organization could not see itself collaborate with another university.	They could test their new analytical tool, which was a goal for the university. The collected data can be used in future research.	They are sure that they will collaborate with AAU in the future.
Case no.8	Feel they know AAU. Employees have studied there, and still have contacts there and to people they studied with, while this is not the case with employees who studied elsewhere. More natural to use AAU.	There was no collaboration.	Could be interested, if subject is relevant.
Case no.9	Know AAU and people who studied there. ViaNord project was with AAU. But if another university possessed the knowledge they would have collaboration with them instead.	Basic research within polymer concrete also benefits the university. Economic benefit.	They are sure that they will collaborate with AAU in the future. Both with scientists and students.
Case no.10	AAU is the local university. AAU is positively portrayed in the media and among people, and has contact to the local organizations.	There was no collaboration.	Open to collaboration.

Note: AAU = Aalborg University.

28 Table on Population in Jammerbugt Municipality

Population Jammerbugt Municipality, as per January 1st 2012

Jammerbugt Municipality	38611
Blokhus	420
Hune	610
Biersted	1716
Nørhalne	1257
Kås	2638
Pandrup	2815
Fjerritslev	3402
Ingstrup	408
Gjøl	938
Halvrimmen	691
Birkelse	716
Bonderup	225
Tranum	455
Aabybro	5435
Vester Torup	271
Klim	481
Arentsminde	450
Skovsgård	872
Østerby	392
Saltum	713
Moseby	0
Gøttrup	205
Brovst	2804
Vester Hjermitslev	446
Ny Skovsgård	240
No fixed address	13
Rural districts	9998

Source: Statistikbanken.dk; BEF44