New Uses of an Agricultural Product?

– A case study of development in an industrial network

Magnar Forbord

Doctoral Thesis
Department of Industrial Economics and Technology Management
Norwegian University of Science and Technology
Trondheim 2003

URN:NBN:no-3404

URN:NBN:no-3404

Preface

Research is not something that you do only by yourself. This is a 'personal' finding from developing this thesis. Although when working alone with a text in your office you may sometimes think that you have made a discovery, you will be very insecure about the value of your discovery before you have discussed the text with other researchers. They may confirm your finding, but they can also discover things in the text that you have not imagined. Or they may simply react with disappointment to what you have written. In each of these cases you become a little more secure regarding your research. Interaction with others makes doing research more meaningful.

This thesis deals with interactive resource development. As with any interactive development the process of developing this thesis has involved several actors, providing products, facilities, business units and relationships in certain combinations along the way. At the same time many of these actors have also been the users and thus have assessed the value of the product as it has emerged.

A central category of actors has been researchers using the 'industrial networks approach.' I have been a doctoral student at the Department of Industrial Economics and Technology Management (IØT) at Norwegian University of Science and Technology (NTNU). Tim Torvatn at IØT was the first person within the industrial networks approach that I came in contact with. He agreed to be my main supervisor and he led my first course in Industrial Network Theory. He has been a friend and controlled the process by letting me know, sometimes very clearly but always fairly, what I should do and what I ought not to do. He was honest in his assessments of my texts and my presentations of them. The most important contribution probably was that he convinced me about the fruitfulness of staying at IØT for a

while. It ended up as one year. Without this sabbatical the thesis might not have been completed.

Regarding the process of developing the thesis, Håkan Håkansson (at IØT and BI, Oslo) has been the master. He read my many sketches and used all of them as a springboard for progress, looking for empirical examples that could serve to extend some part of the industrial network theory and vice versa. He has always been expectant and supportive, linking me up with other researchers and constantly interested in what 'newcomers' had to offer.

Even if she has not been my supervisor Ann-Charlott Pedersen at IØT has followed my work with great interest all the time, very direct in her comments, but always fair. She also did another, less visible, but highly important job – co-ordination of supervising activities. Thank you for your interest and support! Elsebeth Holmen evaluated my first exam in Industrial Network Theory. Since then we have been intellectual friends. Through your example I realized the importance of theoretical depth. Thank you for always being optimistic and your careful comments on large parts of the manuscript! Espen Gressetvold has been my doctoral 'brother' at IØT. Finally we ended up using the same theoretical model and this led to many discussions that, I think, were fruitful for both parties. Especially in the last period of my doctoral thesis it has been good to know that there were 'two of us.'

Via these persons I was introduced to other persons within the industrial networks approach. The first one I will mention is Alexandra Waluszewski at Uppsala University. You provided the prototype description of complex interactive development processes. Most of all, thank you for taking on the job as opponent at my 'end-seminar' in 2002 and your many suggestions for improvements then. I have judged and implemented most of them making the thesis much more valuable. Anna Dubois at Chalmers University of Technology in Göteborg deserves great thanks for clarifying the difference between activity patterns and resource constellations in a frustrating phase of the study and for making me feel welcome in the research community of the industrial networks approach.

It was especially pleasant when other research 'recruits' found something in what I wrote. Here I will especially mention Anna Bengtson at Uppsala University for commenting on parts of the text and for discussions regarding the study of interactive development processes. At

the same university I will mention Torkel Wedin for demonstrating how the ‘four resources’ model can be applied to an economic problem. Furthermore, I appreciated discussions with Enrico Baraldi and comments from Susanne Åberg, both at Uppsala University.

I also benefited from discussions with doctoral students at Chalmers University of Technology; Kajsa Hulthén for her honest and enthusiastic comments, and Daniel Hjelmgren, Frida Wennerström and Fredrik Skarp for discussions of among other things the ‘four resources’ model. I will also thank the participants at the doctoral course ‘The Networking Firm’ at BI, Oslo in 1999, especially Gay Bjercke who unfortunately is not with us any longer, Trond Hammervoll and Terje I. Våland.

Furthermore, I appreciated comments on drafts of this thesis from David Ford at the University of Bath, Geoff Easton from Lancaster University, Debbie Harrison and Marianne Jahre at BI Norwegian Schoool of Management, Oslo, Poul Rind Christensen at the University of Southern Denmark and Ivan Snehota then at Stockholm School of Economics.

I have also benefited from being part of a larger group of researchers and doctoral students under the project ‘Grenseløs Kunnskap.’ I will especially mention the leader of this project, Katarina Grut, the leaders of the doctoral program under this project, Marie-Louise von Bergmann-Winberg, Helge Brattebø, Reidar Almås, Stefan Falk, Per-Åke Vikman and Terje Skjeggedal, and the other doctoral students on the program, Erik Grönlund, Anders Klang, Susanne Lundåsen, Gun Jonsson, Even Bjørnstad, Arne Eik and Hans Wilhelm Thorsen.

Last but not least are the staff at the place where I work, Centre for Rural Research in Trondheim. All the persons here have contributed to a friendly, but demanding and professional research context and in this way influenced the thesis. Three persons deserve special attention. Reidar Almås, founder and director of the centre, showed by his example how sociological thinking can be applied to understanding and developing rural realities and agricultural practices. In 1992 he launched a program aimed at studying the ‘food chain.’ I see this thesis much as a result of this idea of approaching agriculture and food production as a system. Thank you also for giving me the grant that made it possible to become a doctoral student and write this thesis. Gunn-Turid Kvam linked me with the ‘industrial networks group’ at IØT. In addition your research report on goat farming inspired the empirical part of

the thesis. Thank you for our many discussions. Egil Petter Stræte is a friend and always ready for dialogue – even critical dialogue – about 'heavy' milk networks, niche production and agricultural diversity.

All persons contributing empirical material to the study, including the material that for various reasons was never used, deserve recognition, too. Thank you all for spending time with me! Thanks also to dr. Ruth Gasson for controlling grammar and language in the final text. It all became much more readable!

Truly, there are people that I have forgotten here and that also deserve attention in relation to the thesis. I can only apologize for this!

Last but not least I will mention my family; my wife Jorunn, our wonderful children Erlend, Kristin and Magnus, and my parents Eldbjørg and Oddmund. Thank you for being there and for your interest, but also for not asking too much about the thesis along the way!

Trondheim, March 2003

Magnar Forbord

Acknowledgement

The programs Interreg II (for the period 1998-2000) and Interreg III (for the period 2001-2003) in the border region Trøndelag and Jämtland funded this thesis and the doctoral project in which it emerged. The fund was given through the doctoral program in the project 'Grenseløs Kunnskap' carried out jointly by Mid Sweden University, North Trondelag Research Institute, North Trondelag University College, NTNU – The Industrial Ecology Programme, and Centre for Rural Research. The two Interreg-programs were co-financed by EU, the Swedish State, the Norwegian State and by authorities in North- and South Trøndelag (Sør-Trøndelag Fylkeskommune, Nord-Trøndelag Fylkeskommune, Fylkesmannens Landbruksavdeling i Sør-Trøndelag and Fylkesmannens Landbruksavdeling i Nord-Trøndelag).

URN:NBN:no-3404

Summary

Use influences the value of a resource. An element that is not used has no value and is no resource. However, the use can change. In the study the point of departure (chapter 1) is an observation of three actors' view of the use of a certain resource – goat milk produced in Norway. We refer to this resource as the focal resource. The three actors are a farmer (provider of the resource), a dairy company (user) and a food (technical) researcher. Common to them all is the fact that they are dissatisfied with how the resource is being used at a certain time. Only one, 'easy' component of the resource is 'really' used and then for making one, rather 'simple' product.

In chapter 2 we put this 'resource-use' problem into theoretical perspective. We take it that the use is related both to the resource 'itself' and the 'structure' in which it is embedded. On these grounds we find a network perspective interesting. More precisely, we employ a model of *business* networks developed within the 'industrial networks approach.' The view is that interaction among actors builds and sustains three dimensions in business network structures; linkage of activities results in certain *activity patterns*, tying of resources gives particular *resource constellations* and bonding of actors leads to specific *webs of actors*. Applying this perspective to our problem we conclude that the focal resource is used 'poorly' mainly because it is part of a network structure built around another very similar, but – in terms of volume – much 'larger' resource (cow milk). We call this structure 'the Norwegian milk network.'

As with any business network, a certain activity pattern, a particular resource constellation and a specific web of actors characterize the Norwegian milk network at the actual point in time (1980s). This network was quite efficient and effective for cow milk, while it was less so for goat milk because this resource was somehow subordinated in the network. This

interpretation of the problem leads us to two sets of questions. The first is theoretical; what can actors do to improve the use of a resource that is subordinate in a business network? Here a conceptualizing of the dynamic element in business networks is crucial. The other set of questions is empirical; how can concrete actors facing the actual resource use it 'better'? E.g. should the resource still be part of the actual network or would it be better to detach it from the prevailing network?

In chapter 3 we address the latter (empirical) set of questions. We start with a description of some structural characteristics of the 'big' actor in the network (Tine – a consortium of regional dairy companies). We also give a short account of features of the focal resource. The rest of the chapter is divided in two parts. In part A we tell (in case 1) the story of the provider (the farmer mentioned above) and how he and his spouse through conflicts and co-operation with other actors (e.g. Tine, public agencies, other farmers and an education centre) are successively able to detach their 'portion' of the focal resource from the prevailing network. Then the resource can be tied to other resources. In particular, the couple becomes able to exploit the component of the resource that in many ways is the most valuable but also 'demanding' (casein) through making and selling various white (real) cheeses. A traditional regional goat cheese, which the mother of the farmer knew how to make, provides the start of the product development. In many ways this existing product also served as inspiration for establishing the farm dairy in the first place. Later the wife on the farm joins a course in small-scale production of cheese and learns about recipes and how to make some other types of white goat cheeses. In a smaller case (2) we describe among other things how the earlier user of this 'portion' of the focal resource 'reduces' the use of it still more. Hence, part A concerns mainly development of the focal resource from the use side.

Part B of chapter 3 consists of five case stories; one main case (5) and four smaller ones (3, 4, 6 and 7). Each of them is organized around a product made from the focal resource. Compared to part A the emphasis is on the focal resource 'itself;' how its specific features (especially those of the casein component) are used and not used by the 'big' actor by applying resources that by and large are made for the 'big' resource. In the main case we learn about how one of these features (taste) is altered. The background is that the 'big' actor (Tine) becomes provider of an existing, but for Tine new product for a specialized goat cheese maker localized abroad. To its 'surprise' Tine finds that the customer does not like the product; it

tastes too strong. After some rounds of 'trial and error' in co-operation in order to identify the source of the problem the two actors conclude that the problem has to be sought in the focal resource. Then Tine orchestrates a project to which some 'technical' researchers are attached – some from departments within Tine, others working at departments at the national university of agriculture. Tine also uses its relationship to the national organization responsible for goat breeding in order to influence the resource. To make a long story short, the persons from different organizations involved in the project find out that the problematic feature of the resource is due mainly to three 'factors;' feed, breeding and storing/transportation. On these grounds another actor (a feed provider) develops a new concentrated fodder especially designed for milking goats. The breeding organization changes its breeding goals. Technicians in Tine experiment with prototypes for adjusted storing and transportation equipment. In this way a request for an existing product from a demanding, foreign customer leads to questioning of the resource 'Norwegian goat milk.' Features of the resource become a topic. Moreover, a feature that the 'big' actor previously regarded as less good ('weak' taste) turns into something good ('mild' taste).

The stories told in chapter 3 evoke the theoretical question posed in chapter 2. Hence, in chapter 4 we discuss on a more abstract level development in a business network. The cases make it clear that we must distinguish between a resource and the actual use of it. Moreover, actual use requires combination of the resource with other resources. Combined with other resources or in other ways the resource can 'obtain' other uses. Thus, resources are heterogeneous. Hence, the value of a resource is a question of combination. This can in principle be done in two ways, 1) search for new ways in which *existing* features of the resource can be combined with those of other resources and 2) search for *new or different* features of the resource.

The cases show that *interaction* between actors plays a crucial role when it comes to identifying and implementing new uses of a resource. One reason for this is the 'double faced' (relational) nature of resources; they have both a provision side and a use side. Hence, looking at the resource from one side only can restrict actors' imagination of potential uses. In other words, interaction can facilitate *knowledge* creation, which is necessary for discovering new economic uses. When the provision of a resource is confronted with the way it is used unexpected things can 'start to happen.' A former provider may start to use a resource and

find new ways to combine it (cf. case 1). A user may complain to the provider, who starts to search for possibilities for changing the features of the resource (cf. case 5). Hence, it is actors that set resources in motion. That this motion takes place within the context of a network will mean that actors face hindrances as well as opportunities for finding new uses. Moreover, what are regarded as hindrances and opportunities is a question of 'the eye that sees,' that is the actor. One actor may view a certain resource combination as uninteresting, while another may look upon it as interesting. Hence, it is important not to forget that there are actors 'behind' any activity pattern and resource constellation and, moreover, that actors relating to the same resource may have bonds to different (other) actors.

In order to be able to analyse the ties and development in relation to the focal resource we apply a more detailed scheme developed by Håkansson & Waluszewski (1999, 2000, 2001). Here development is seen as a question of interactive, systematic relating of resources of different kinds; resources that are mainly technical (products and facilities) and resources that are by and large social (business units and business relationships). Hence, a certain use of a resource presupposes that a complex of interfaces between different resources – products, facilities, business units and business relationships – are 'correct' across firm boundaries. As a consequence, to arrive at a new use may require change in several interfaces involving many actors. To draw a 'definite' map of relevant interfaces before acting is thus impossible. Hence, when there has been at least *some* acting *some* relevant interfaces may come to the surface.

In chapter 5 we map, based on the empirical material (chapter 1 and 3), resource constellations at 'the beginning' (1980s) and at 'the end' (2001). We are 'stunned' by the richness and complexity within the constellations. But the mapping also reveals the extent to which the resources (especially at 'the beginning') are directed towards the 'big' resource (cow milk). Almost all other products, facilities, business units and business relationships are adjusted to this resource. In other words, there is 'heaviness' in the resource constellations that we are studying and in which our focal resource is embedded. However, at the end it seems that the focal resource has got some resources 'of its own;' not only outside the sphere of the 'big' actor (Tine) but also within, in the form of some new products, a new facility and some new business relationships. We then analyse more thoroughly certain interfaces that we find especially relevant for the focal resource and how these differ at 'the beginning' compared to at 'the end.'

However, in a business network new resource combinations and features are not 'sufficient' in themselves. There have to be economic effects (economics) tied to them. In chapter 6 we discuss economic effects and how they can be assessed in a business network context. We identify the importance of calculations. Actors in a business network calculate. These calculations will always be relative in the sense that they will include *some* resources in a constellation and not others. Moreover, some resources may be regarded as important and hence receive a central position in the calculation, while others may be located at 'the fringe.' E.g. case 1 demonstrates that one of the actors (Namdalsmeieriet) views the focal resource as marginal and hence lets it enter their calculation as a cost, while another actor (Skånaliseter) gives prominence to the resource and lets it enter into their calculation as a value. On these grounds we assert that economics is not only an effect of resources being developed; development of resources is in very direct ways also affected by economic calculations.

Based on these findings we conclude the thesis with some remarks (chapter 7). Here we also briefly present a theme for further research – interaction between business actors and public institutions regarding improved use of agricultural resources.

In chapter 8 we describe and reflect upon the research process; how we interacted with researchers belonging to different research networks and how cases were successively developed in reciprocal influence with theory. We also give an account of sources and types of data, which mainly have been interviews and documents. In other words, the thesis is a qualitative study. On these grounds we assess the trustworthiness of the study by applying a scheme especially designed for judging qualitative research. Credibility, transferability, dependability and confirmability are key concepts in this scheme. We conclude that the study is trustworthy but that the trustworthiness could have been improved in certain ways.

Contents

List of Figures

List of Tables

Chapter 1 A Resource and Its Use

A Norwegian goat farmer, Ola, described his customer's view of the resource he was selling:

> But then it was, that we heard a little bit, that the goat milk was not so very popular in the Tine system. We felt it was regarded somehow as a bit of rubbish in the machinery.

Ola's view concerned experiences he had in the early 1980s.

In 1998, at another location, a food researcher writes in an article published in a popular Norwegian dairy periodical:

> Knowledge about the composition and features of goat milk as a raw material for different products is far more limited than for cow milk. Some research has, however, been done… One may … ask if we in Norway have been clever enough to *capitalize on the knowledge that nevertheless exists* about goat milk in the manufacture of different goat milk products. The reason for this may of course be that goat milk in Norway so far for the most part has been used in the making of brown cheese. There is … reason to believe… that *one not has to the same extent demanded knowledge about the character of the raw material when making brown cheese compared to when making white cheese*. (Author's italics and translation from Skeie (1998)).

Both these statements point to a problem: poor exploitation – or poorer exploitation than could have been the case – regarding a specific resource, goat milk. Each of the utterances also points to one specific aspect of resources and their use. Ola's utterance shows that a resource that is sold is not something that is determined solely by the seller or solely by the buyer. There are two parties, and both have interests and opinions regarding the resource.

Hence, a resource seems to be a *relational* question. Contrary to the researcher Ola refers to 'a limited' and more specific goat milk, that which he is producing himself on his farm. He is worried about his customer's (at the time his only customer's) lack of interest regarding continuing use of the resource. Ola's worry is understandable, since he has recently bought the farm he is running and has planned to make a living from producing goat milk. Moreover, we notice that Ola terms the customer a system – 'the Tine system,' which suggests that the customer is more complex than a 'simple' firm.

The researcher – whom we will name Anne – refers to a 'broader' concept of goat milk; Norwegian goat milk in general. We will simply term this goat milk Norwegian goat milk. The most important element in Anne's utterance is, in our view, that the resource is related to knowledge; it seems that a resource is a question of *knowledge*. Moreover, she links knowledge to the use of the resource. In her opinion a less 'demanding' use has over the years meant that less knowledge has been associated with the resource. She claims that knowledge about the resource exists. Hence, the reason for poor exploitation is not lack of knowledge, but lack of use of knowledge. Ola's customer uses goat milk to produce the 'less demanding' product that the researcher refers to – brown cheese. Hence Anne's critique also relates to the goat milk Ola is producing and selling and the use of this goat milk; Ola's goat milk is part of the entity Norwegian goat milk.

A *managerial* question emerges from the two statements referred to above:

Is the problem that the resource is poor or is the problem that the resource is poorly used?

If we perceive the problem to be *poor resource,* then there is no sense in doing anything nor researching the problem. If, on the other hand, we think that the problem we are facing is not a poor resource *per se*, but instead that the question regards poor *use*, then there is every reason to study it. It should be no surprise that we take the latter interpretation of the problem and therefore choose to go on investigating it.

According to standard textbooks in marketing, the goat milk could be better used, either:
By selling more of existing products made from it; that is, find new *markets*, or:
By developing goat milk based *products;* new or improved ones.

URN:NBN:no-3404

Statements from personnel in Tine in the year 2001 can illustrate each of these options, first about finding new markets:

> There has always been too much goat milk casein in the Tine system. The Norwegian market for products based on goat milk casein is limited, the quantum is small and consequently it is difficult for Tine to obtain scale economy in the production of such products. One has to export at least some of the production. (David, development consultant in Tine Norske Meierier).

And then one about developing products:

> Goat milk casein has been a 'loss product'. Although it never will be a volume product like brown cheese, goat milk casein can be utilized much better than it has been, but we have to think of it as a niche product. (Even, project co-ordinator in a regional Tine company).

Notice that these two expressions primarily concern a certain *component* in Norwegian goat milk; via better use of this component Norwegian goat milk itself could be better used and hence gain value. In this thesis we will *concentrate* on the latter option – development. Here we shall look into components of our resource – and not only casein. However, we shall also realize that resource development does not and cannot 'occur' in isolation from some 'market.' But as we shall see, 'market' can be conceptualized in more than one way; we shall apply *one specific conceptualization* of 'market' in this thesis. Our main hypothesis will be that resources and their value are a question of relations and that knowledge of resources – including use of knowledge – can be understood in a context of relations. In other words, development of resources is a question of knowledge, which again is dependent upon relations. This is the statement we now set out to investigate empirically and theoretically.

We will continue by first returning to the 'empirical scene' – the focal resource and its 'world' that we glimpsed via the two quotations cited at the beginning of this chapter. This 'resource world' we can imagine as an 'economic landscape.' Goat milk, together with other resources, is part of this landscape. In this chapter we provide the reader with information concerning the

'starting conditions' for the resource, within the landscape that we choose to focus on and thus refer to as our focal resource. We begin the journey with the situation regarding the goat milk Ola is producing at the time his statement refers to. Thereafter we get an impression of the use of the goat milk that Anne refers to; Norwegian goat milk. Norwegian goat milk was at the time almost identical to the goat milk that dairy companies within Norske Meierier[1] used. In both cases we are dealing with the situation sometime in the 1980s. This 'sometime in the 1980s' signifies in our case 'the beginning.' The time of 'beginning' has not been provided to us by some outside, objective referee. Neither is it chosen arbitrarily. Rather 'sometime in the 1980s' has emerged as a result of a long 'struggle' with our empirical material.[2] As a result we have become quite convinced that 'something new started to happen' with Norwegian goat milk and use of it towards the late 1980s and that therefore a description of the situation in the years *before* this in our case forms a logical starting point.

Description of the 'starting conditions' regarding the resource in question will occupy us in the rest of this chapter. In the following chapters, we will develop concepts and theory and provide more empirical data that can enable us to answer the two questions more precisely.

Part A: Use of goat milk produced at Skånaliseter at 'the beginning'

Ola took over the goat milk farm Skånaliseter from his uncle in 1981. Ola had then newly finished agricultural school and was full of inspiration. Much of this inspiration was due to the considerably improved conditions for Norwegian farmers following the Parliament's (Stortinget's) decision in 1975 to escalate farmer's income via increased state subsidies.[3] In 1981 Skånaliseter delivered its goat milk to Namdalsmeieriet (literally 'The Namdal Dairy'), which at that time was a regional dairy company.[4] Ola married Kari[5] in 1985. Kari was qualified as nursery nurse.

In the region of Trøndelag goat milk has, since the beginning of 'modern' industrialization of milk processing in the second half of the nineteenth century (Pettersen 1984), never been the

[1] Literally 'Norske Meierier' means 'Norwegian Dairies.'
[2] If one *insists* on locating the beginning to one specific year, we think 1987 could – in our case – be an appropriate year. See the analysis chapter on this point.
[3] In Norwegian literature this decision is referred to as "Opptrappingsvedtaket" ("The escalation decision").
[4] Together with other regional dairy companies it merged into Tine Midt-Norge 1.1.1996 (Erland 1996).
[5] Both names are fictitious.

basis for more than a very limited dairy activity. This contrasts with the situation in some other Norwegian regions, such as Troms and the mountainous areas of Southern/Western Norway, where the production of goat milk always has been much larger and therefore better 'suited' to 'modern' industrial dairying. Røyrvik is a municipality in Indre (Inner) Namdal on the border with Sweden and the county of Nordland. In 1980 Røyrvik was one of the few places in Trøndelag, and the only place in Namdal (the northernmost region in Trøndelag), with a continuous tradition of goat milk production and – up to 1979 – processing.

Ola and Kari's farm – Skånaliseter – was located in the municipality of Røyrvik, about 500 meters above sea level at the entrance of Børgefjell National Park. Goat milk had for long been the main production on this farm. In 1981 Namdalsmeieriet processed all milk produced by farmers in Namdal. Skånaliseter's goat milk, together with the other goat milk produced in Indre Namdal,[6] was sent to Namdalsmeieriet's dairy in Namsos, about 150 km south-west of Røyrvik.[7]

Little volume in an 'industrial' setting

Some time after Ola had taken over the farm he received comments from persons handling the goat milk at the dairy in Namsos, which indicated that the goat milk he delivered was not so popular in Namdalsmeieriet. As Ola explains it:

> But then it was, that we heard a little bit, that the goat milk was not so very popular in the Tine[8] system. It was regarded somehow as a bit of rubbish in the machinery. It was a dairyman in Namsos, he said something like: 'This is some junk.' And we were struggling with milk pails. While the cow farmers got their milk collected from the farm by the dairy's tank lorries, we had to fill milk pails and transport them ourselves to the main road a little distance from here and take them back again… and with

[6] Indre Namdal consists of the municipalities Grong, Namsskogan and Lierne in addition to Røyrvik. Goat farming goes on in the three latter municipalities.

[7] Before 1952 Skånaliseter processed both milk and goat milk on the farm. Skånaliseter had existed as an independent farm since around 1900. Before that it was a mountain pasture for one of the large "Namsvatn" farms. Following an initiative taken by Røyrvik Municipality, a small co-operative dairy was established in Røyrvik in 1951. This dairy produced brown cheese (pure goat cheese and mixed brown cheese) based on milk from 20-40 cow and goat farmers in Røyrvik (Erland 1996: 222-225). Deliveries to the dairy declined, and it was shut down in 1979. From then on all goat milk from Indre Namdal was transported for processing to Namdalsmeieriet's dairy in Namsos.

[8] Tine as company and brand name was introduced in 1992. Before this the name was Norske Meierier. But Ola uses Tine also when referring to the situation before 1992.

> trouble in some ways. … I felt that we were in a way 'a ball and chain' for the Tine system.

According to the director of Namdalsmeieriet from 1981 to 1992, it was never official policy in the company to advise the goat milk suppliers to terminate their production. He is confident that officials in the company never gave such advice to any of the goat milk suppliers. In addition to Skånaliseter there were around ten other farmers that delivered goat milk to Namdalsmeieriet. In 1980 they supplied 109.565 litres of goat milk. This was very little compared to 47 million litres of cow milk supplied from around 800 cow farmers (Erland 1996: 262). With hindsight the director of Namdalsmeieriet from 1981 to 1992[9] regards *small volume* as a main source of the problem:

> I must say that we did not exhibit the most outstanding creativity in finding a solution to the problem of using the goat milk that we purchased. The company had severe problems in finding an economical utilization of this small amount of goat milk given the company's industrial – as opposed to craftsmanlike – operations, although the company within the context of Norske Meierier was not totally hindered from developing, producing and marketing its own products. (Director 1981-92 Namdalsmeieriet).

Whey (the carbohydrate fraction of milk) was the only component of the goat milk that Namdalsmeieriet used to produce food products at the actual time. There were two products, pure brown goat cheese and mixed brown goat cheese. (The latter consists of about 90% cow milk whey and 10% goat milk.) Nevertheless, Namdalsmeieriet had some years before – in the 1970s – made an effort to make a special casein based product from the goat milk; goat milk gum. It was developed, produced and marketed by the company. However, the sales of the product never became sufficient to make it profitable and it was terminated after a few years. After that Namdalsmeieriet made no more efforts to find uses for goat milk 'beyond' brown cheese.

Satisfactory quality of 'input' given a less demanding product

The *quality* of the goat milk that the suppliers of Namdalsmeieriet produced constituted little or no problem:

[9] We had two interviews with this person in 2002.

> My overall impression is that the quality of the goat milk that we purchased was more than good enough. To the degree that the goat milk was not satisfactory it was due to our handling subsequent to the farmer's handling of it; I think of the filling of milk cans, transportation of the cans, emptying them in the dairy and so forth. As most of the goat milk was produced between spring and autumn, much of this 'non-cooled' handling would take place in warm weather, something that made it even more difficult to maintain high quality. Nevertheless, I will say that the quality of the goat milk was not a problem. But then you have to remember that the product that we made of this goat milk [brown cheese] did not demand as high a milk quality as the making of real (white) cheese would demand. So you can say that there was some logic in the use of this resource from our side. We had a resource in small amounts, hence transportation on cooling tank lorries would be too expensive. We knew that transportation in non-cooled milk cans would lower the quality of the goat milk and hence we did not use it to produce demanding products, but instead less demanding products. Brown cheese demands less of the milk than white cheese does. (Director 1981-92 Namdalsmeieriet).

This opinion is confirmed by Erland (1996: 267):

> At the turn of the year 1984-85 the quality within all groups of products [made in Namdalsmeieriet] was satisfactory; *no area had significant quality problems*. (Our translation and emphasis)

'Quasi'-organizing and price compensation

But there is an additional factor that helps to make sense of Namdalsmeieriet's use of Skånaliseter's goat milk in this period. As already said, Namdalsmeieriet was not an independent company. A main part of this independence was Namdalsmeieriet's membership in Norske Meierier. One of the effects of this membership stemmed from an 'instrument' called *price compensation*. The idea behind this instrument was economic equality among the member companies.

The member companies made dozens of products. However, the profitability of the different products varied, and the distribution of profitable products was not even across the companies. Hence some companies produced less profitable products, while others made highly profitable ones. This situation was regarded as unfair by the members of Norske

Meierier (and also by state authorities and farmers' organizations[10]) and hence the practice of price compensation.[11] Each company's income from sales of products was therefore transferred to Norske Meierier.[12] Based on *standardized calculations* of cost and revenue for each product Norske Meierier compensated each company every year. For companies making profitable products this meant 'giving away' income, while for companies producing less profitable products this meant 'extra' money.

In itself this price compensation instrument probably favoured goat milk at the expense of cow milk since goat milk products on average were less profitable than cow milk products within the system of Norske Meierier. Nevertheless, the instrument may also have *hindered* use of the goat milk since:

> to the extent that a dairy company like Namdalsmeieriet used some of their resources to develop a goat milk product, eventual profit from this product had in any case to be 'paid back' to the fellowship [Norske Meierier]. In other words, there was no economic incentive for us in Namdalsmeieriet to try to develop some new product from the goat milk that we purchased. Price compensation within the dairy sector was common practice in other countries also, but the Norwegian 'variant' of it was extremely detailed and sophisticated. All in all, in my opinion in those days most development efforts within Norske Meierier and its member companies were centred on technology and little on products. (Director 1981-92 Namdalsmeieriet).

As a consequence dairies were shut down,[13] new dairy equipment put to use in the remaining ones, and changes made in the allocation of the production of the different products between dairies and between companies.

Thus, the price compensation system:

---

[10] There were (and still are) two farmers' organizations in Norway; Norwegian Farmers' Union and Norwegian Smallholders' Union.

[11] The system of price compensation for milk ("riksoppgjøret") was introduced in Norway in 1943 as a decree during the war 1940-45 (Rovde 1995: 401). It was a result of a deal between the state and Norske Melkeprodusenters Landsforbund (NML – later to merge into Norske Meierier). The purpose was to increase and even out the incomes between dairy companies and dairy regions. This was accomplished by the state increasing the subsidies under the premise that a common, nation-wide *basic price* was established. This presupposed a system of price compensation. Already from the start NML was responsible for operating and administering the system. The system was not stopped when the war ended, but was continued.

[12] More precisely the board – 'Riksoppgjøret.'

[13] In 1905 there were 810 dairy companies in Norway, in 2000 there were 10. In Trøndelag in 1931 63 dairy companies existed, in 2000 there were one, even covering a larger region than Trøndelag (Sørensen 1980: 154-155, Pettersen 1984: 115).

> did not give the dairy companies incentives to do product development of their own. (Director 1981-92 Namdalsmeieriet)

This did not mean that Namdalsmeieriet had no opportunities to develop, produce and market own products, rather that such opportunities were very restricted. The price compensation system made it rather uninteresting for any member-company to develop and produce own products. Then:

> we would probably jeopardize our own economy. We would bear the costs [of product development] ourselves while the income would go to Riksoppgjøret – and such efforts leads to poor profitability for the one who exercises the creativity. (Director 1981-92 Namdalsmeieriet)

The product part of the price compensation system was implemented via production quotas. Each product within Norske Meierier had its specific quota. This quota was distributed among the member-companies' dairies. Regarding goat milk Namdalsmeieriet had production quotas for pure goat brown cheese and mixed brown cheese and nothing else (Erland 1996: 265).[14] Hence the dairy did not use the casein in the goat milk, but delivered this fraction to another factory in Norske Meierier (where it was transformed into dried casein). In 1984 the dairy produced around 25.000 kg of pure goat brown cheese and around 75.000 kg of mixed brown cheese. In addition was produced nearly 80.000 kg of pure cow milk brown cheese. However, altogether brown cheese represented a small amount (ca. 5%) of the other products in the company: (white) cheese, butter and drinking milk. All these products were made from cow milk only.

The 'problem' was that pure goat brown cheese as well as mixed brown cheese were produced by many other member-companies in Norske Meierier also and for the most part on a significantly larger scale than in Namdalsmeieriet. This meant that the cost efficiency of the brown cheese production in Namdalsmeieriet was low relative to the production in most of the other member-companies. Low cost efficiency was *not* compensated for by the price compensation instrument, but was something that the members of Namdalsmeieriet had to 'pay' for.

[14] Also in the former Røyrvik Dairy, which existed from 1951 to 1979 (Erland 1996: 222, 231) and to which Skånaliseter had been a supplier, only brown cheese was made of the goat milk.

Goat milk becoming feed

However, as members the goat farmers had a right to deliver goat milk to Namdalsmeieriet at a certain price regardless of what use Namdalsmeieriet made of this milk.[15] By 1985 the brown cheese boiler, where all the brown cheese was made and hence all the goat milk was processed, had become 'worn out' and had to be renewed. Given the small amount of brown cheese, Namdalsmeieriet hesitated to renew it.

In April 1986 one of the reactors at the nuclear power station in Chernobyl exploded. As a result the grazing on the pastures in Indre Namdal became radioactive. Since the goats during the summer got most of their feed from grazing, the goat milk soon became so radioactive that it became illegal to make food products of it. Moreover, brown cheese is especially sensitive to radioactivity in the milk. The radioactive goat milk could, however, be utilized as feed. This led Namdalsmeieriet, in co-operation with Norske Meierier, to make the decision not to renew the brown cheese boiler that was used to process goat milk.[16] Yet, all the goat farmers continued to deliver goat milk to Namdalsmeieriet. From now on the company mixed the goat milk with 'cow buttermilk' – a by-product from butter-making – and eventually superfluous cow milk. This mixed product was sold to animal farmers that used it to feed pigs and calves. At this moment this was the most profitable use of goat milk produced in Indre Namdal.

Part B: Use of 'Norwegian goat milk' at 'the beginning'

Dairies in Norske Meierier – main user of 'Norwegian goat milk'

Around 1980 only small amounts of goat milk produced in Norway were processed on farms. To the extent that goat milk was processed on farms, this mainly took place in summer when the goats stayed on mountain pasture. The change from farm processing to specialized processing of goat milk started many years before 1980, but was yet not as all-embracing as for cow milk.

[15] Norwegian goat farmers were – and still are – paid full price for their milk, even if it is sold as feed and obtains a lower price. The difference in price, which in 1999 all in all amounted to about 8,75 million kroner, is compensated from a central, semi-public fund managed by Omsetningsrådet (Agricultural Distribution Board). From 2000 Statens Landbruksforvaltning manages the fund. The fund is financed from a fee ('omsetningsavgift') on sold milk that every milk producer in Norway is obliged to pay. In addition to ease sale the fund also finances professional initiatives and educational work (Omsetningsrådet 1999).

[16] The rest of the brown cheese production in Namdalsmeieriet was discontinued by the turn of 1991-1992 (Erland 1996: 266).

In general milk is an opaque white or bluish-white liquid secreted by the mammary glands of female mammals, serving for the nourishment of their young.[17] In relation to humans' use of milk for producing for example food:

> milk is the normal mammary secretion of milking animals, obtained from one or more milkings without either addition to it or extraction from it, intended for consumption as liquid milk or for further processing (FAO 1999).

In everyday use in Norway, without qualification the word milk denotes cow milk. This use is also allowed publicly in Norway (Aschehoug & Gyldendal 1995-1998). In this thesis, however, such wording may lead to confusion. We will therefore consequently let the concept *milk refer to milk in general* as in the definition quoted above. When referring to *milk from specific mammals we will always put the name of the mammal in front,* unless this information is given in other parts of the text. Thus we will denote milk from female goats as goat milk. Also milk from cows will be referred to in the same way, as cow milk.[18]

In 1980 several specialized plants – dairies – took hold of the goat milk that was not processed on the farms. Most of these dairies also processed cow milk, and cow milk represented much more volume than goat milk in these dairies. In 1990 dairies within Norske Meierier processed 26,5 million litres of goat milk (Kvam 1999: 14) and around 1.700 million litres of cow milk. Hence, goat milk represented in volume around 1,5 % of all milk handled by Tine. Individual dairies were owned by one of the various dairy companies that again were owned co-operatively by cow milk and goat milk producing farmers in a specific geographical area. Most of the goat milk was produced by farmers and processed by dairy companies located in Troms and the mountainous areas of Southern Norway (Kvam 1999: 7).

Now, all these dairy companies, each covering 'their' part of Norway, had for many years had a common organization, Norske Meierier. This organization carried out different tasks which

[17] Webster's (1989)
[18] To refer to cow milk as milk is reasonable in Europe and North America since cow milk here is produced and used in far larger amounts than all other animal milk together. However, this is not the situation in most other parts of the world. More people consume milk and milk products from goats world-wide than from any other animal (Haenlein & Ace 1984: A-2: 1).

the dairies regarded as common, among other things; product development, allocation of tasks between different dairies (that is, which dairy that should produce which products), logistics, quality control, marketing and export. Each dairy company purchased milk from its farmer members and only from them. Dairies within these companies processed the milk into various products defined and marketed on a national – and, for some products, international – level by Norske Meierier. Each dairy and dairy company must therefore be regarded semi-independent, as they could decide on some topics, while Norske Meierier decided upon other topics on the behalf of all the dairy companies. In Norway there existed at this time no dairy or dairy company beyond the companies that formed Norske Meierier.

Products and production quotas among dairies within Norske Meierier

One central task for Norske Meierier, then, was to assess and decide how much of each product should be produced. Thus, each product was given a specific quota. Each quota was then distributed among the different member dairies. Hence, no single dairy or dairy company could independently decide what products to produce and in what amounts. This had been the situation from the 1930s (Gjerdåker 1995).

Brown cheese – the main use of goat milk

Dairies within Norske Meierier had for long used the goat milk to produce brown cheese. For example, in 1990, 68% of the goat milk was used for brown cheese (Kvam 1999). This use of goat milk differs from the use in almost all other countries, where white cheese unquestionably is the main product made from goat milk. In France, for example, goat milk is a more important resource in terms of volume, and there with few exceptions only white cheeses are made from goat milk (Alme 1999, Masui & Yamada 2000). The production takes place partly in large, 'industrial' or co-operative cheese dairies and partly in around 5000 farm dairies and artisan dairies. Cheeses produced in the latter dairies especially represent a huge variation in form and taste.

In Norway cow milk is also used for making brown cheese. But for cow milk this special application is clearly minor compared to other uses; liquid products (including drinking milk), cheese and butter.

Brown cheese is not a 'real' cheese. According to World Health Organization (WHO) and Food and Agriculture Organization (FAO) only cheese made of casein, from which whey[19] is separated, can be termed cheese (Aschehoug & Gyldendal 1995-1998).[20] Curd is the usual English word for casein separated from whey and from which 'real' cheese can be made (Webster's 1989). Thus whey can be looked upon as waste from cheese making. As a consequence brown cheese can technically in a way be seen as a secondary product to cheese. Norway and some districts in Sweden east of Trøndelag is nearly the only part of the world where there is a significant tradition for producing and consuming whey-based products:

> A lunch packet consisting of slices of bread with slices of brown cheese is itself the symbol of the everyday and sober life [in Norway]. (Aschehoug & Gyldendal 1995-1998). (Our translation)

According to FAO and WHO brown cheese is 'a caramelized concentrate of whey, where milk and cream is added to the whey'. Nearly half of the dried matter in brown cheese is milk sugar (lactose). The rest is fat, proteins, minerals and vitamins. The brown colour develops when the milk is heated and the lactose is isolated and caramelizes. In older times only whey was used to make brown cheese. But by adding milk and cream one is able to adjust and standardize the fat content and increase the content of protein. More fat also means 'more' taste. Both soft and hard brown goat cheeses are made from whey.

The dairies in Norske Meierier that processed goat milk used it in the production of two types of brown cheese: pure goat brown cheese (FG33) and mixed brown cheese (G35). The first was made of whey from goat milk, where goat milk and cream from goat milk was added (Kielland 1976: 120-121). The latter was produced of whey from cow milk, where cow milk, cream from cow milk and around 10% goat milk was added. This cheese has gone under the popular name Gudbrandsdalsost ('Cheese from the Gudbrandsdal Valley'), since it was in this valley they first started to add milk and cream to the whey when making brown cheese. In addition was produced a pure cow milk brown cheese (F33) ('Fløtemysost').

[19] Whey is the carbohydrate fraction in milk, scientifically termed lactose, popularly called "milk sugar."
[20] As a consequence we let cheese denote casein based cheese, while we will consistently refer to brown cheese as brown cheese.

In the late 1980s around two-thirds of all brown cheese produced in Norway was mixed brown cheese. 30% of all goat milk handled by Norske Meierier was used in the manufacture of this cheese (Kvam 1999). Around 40% of the goat milk processed by dairies within Norske Meierier was used to make pure goat brown cheese. One difference between these two brown cheeses is that production of pure goat brown cheese results in casein as by-product, while in mixed brown cheese all the components (except some water) in goat milk are used. Gudbrandsdalsost therefore represented the 'easiest' way of utilizing goat milk in the dairies of Norske Meierier, or as a development consultant in Tine[21] Norske Meierier expresses it in the year 2001:

> Gudbrandsdalsost represents a very good utilization of goat milk.

Making brown cheese can be regarded as less complicated than making cheese. It involves one input product only and less equipment. No microbes and no ripening store are for example necessary. Moreover lactose in cow milk and goat milk is by and large similar; hence equipment and skills developed for making brown cheese from cow milk can easily be used in the making of brown cheese from goat milk. In addition there were stable customers that seemingly demanded few changes regarding the brown cheeses produced under the umbrella of Norske Meierier. For example they seemed to regard the relatively strong taste of pure goat brown cheese as a special – and positive – quality of this cheese.[22] The market for the brown cheeses was stable; in a way brown cheese 'sold itself'. On the other side this meant that Norske Meierier did not foresee any increase in the market for brown cheese either, hence they were very restrictive in giving dairies larger quotas or new quotas for brown cheese of any kind. Rather Norske Meierier was more interested in withdrawing quotas from dairies that had small quotas and giving them to dairies with larger quotas.

[21] Norske Meierier started using the brand name Tine in relation to all its products, companies and factories in 1992.

[22] The only change related to Norwegian brown cheese over the years has been that the main types are produced in different fat variants (low, medium, high), colour variants (light, dark), form and – from 1972 – adding of iron (10 mg per 100 grams of cheese) (Kielland 1976: 120). But the three main types of brown cheese – goat milk, mixed and milk – have remained the same for decades.

Brown cheese: less demanding – less knowledge?

One consequence of the major part of goat milk being used to make 'uncomplicated', standard brown cheese was that little effort was made to influence the quality of goat milk (Skeie 1998). In comparison, for cow milk other and more complicated and vulnerable products represented the major application. Products like cheese and drinking milk demanded a higher quality of cow milk as raw material. Thus the dairy companies and Norske Meierier used considerable resources in developing and securing the quality of cow milk as raw material compared to goat milk. For instance, taste became an element in setting the price of cow milk in the early 1970s, while for goat milk this practice was not introduced until 2001. Norske Meierier also used many resources communicating information to cow milk farmers about milking routines and environment in the barn. In addition Norske Meierier used few resources to seek new features and other uses of lactose, for either cow milk or goat milk.

Another consequence of the long reliance on brown cheese was that the knowledge about goat milk was limited compared to the knowledge about cow milk. This was the main message in the researcher's statement cited in the beginning.

Exploitation of 'surplus' goat milk

Still, brown cheese could not 'absorb' all goat milk that Norske Meierier handled at the end of the 1980s. From the 40% or so of the goat milk that was used to make pure goat brown cheese, most of the casein was left over. The rest of the goat milk, around 30 % when the quantity used in mixed brown cheese (30%) is subtracted, found entirely other applications, which we describe below.

Two white goat cheeses: Rosendal and Balsfjord

Around 1970 Norske Meierier's department of Product Engineering developed a semi-hard goat cheese called Rosendal.[23] The dairy in Syvde in Sunnmøre produced this cheese. Rosendal was sold in Norway and exported to Germany and Australia among other countries,

[23] We have no documentation about it, but we suspect that the name Rosendal was chosen to give associations to Jarlsberg. Jarlsberg is a milk-based cheese developed by Department of Dairy Science at Norwegian University of Agriculture in the 1950s and later taken over by Norske Meierier. Jarlsberg soon became very popular both in Norway and abroad. The name Jarlsberg was taken from the former and last noble county in Norway Jarlsberg in the county of Vestfold. Rosendal is the name of a former and the only barony in Norway located in Hardanger in the county of Hordaland.

but the sales never took off. According to one consultant in Tine in the year 2001 the cheese was too loose. The cause of this is probably, according to Anne, an assistant professor at Department of Food Science at the Norwegian University of Agriculture, that goat milk casein has a different composition from cow milk casein. This easily results in a looser curd.

However, according to the consultant, it is not impossible to make a satisfactory hard goat cheese, provided that one has special skills and knowledge, particularly regarding control of temperature and pH during the cheese making process. The dairy in Storsteinnes in Troms produced a mixed white cheese of 75% cow milk and 25% goat milk. This cheese was for the most part sold locally. In the years 1986 to 1992 the same dairy also made another cheese called Balsfjord. This was a fat cheese ('Gräddost') with weak goat taste made of 50% cow milk and 50% goat milk. At most (in 1988) the dairy made 135 tons of Balsfjord annually. This cheese was also for the most part sold locally and regionally. In other words, neither of these two cheeses was launched as 'national' products like brown goat cheese. The sales never 'took off.' Thus, in the late 1980s real cheeses 'absorbed' only 5% of goat milk delivered to dairies within Norske Meierier.

Mixing goat milk casein with cow milk casein making dried casein

The rest of the goat milk, 25%, was used to produce products with rather low value. According to its by-laws no dairy company in Norske Meierier could refuse to purchase milk produced by its members. At that time all milk farmers in Norway were members of a dairy company that was a member of Norske Meierier. Hence, goat farmers, like any member, had the right to deliver all the milk that they produced to 'their' company. Thus, the dairy companies and Norske Meierier had to 'make the best out of' the goat milk casein left over from the production of brown cheese and the surplus goat milk. Altogether around 65% of the goat milk casein handled by the companies within Norske Meierier was left over. And of the rest, 30% was not used to produce real, fermented cheese, but to make (mixed) brown cheese. The solution was to mix the goat milk casein left over with cow milk casein left over[24] and dry it. One of the reasons for drying a mix of cow milk casein and goat milk casein is that it was – and still is – technologically very difficult to dry pure goat milk casein. Norske Meierier

[24] The milk casein left over represented a significant amount in relation to goat milk casein left over, but a very small amount in relation to the total amount of milk that the dairy companies handled.

sold dry casein at rather low prices to Norwegian and foreign food companies, which used it as water-binding agent in, among other things, meat stuffing and fish stuffing.

Dried goat milk and goat milk as feed

Surplus of 'whole' goat milk – and not only the casein fraction – in Norske Meierier came into being in areas of the country where there was no dairy company with equipment to process goat milk (Kvam 1999). In addition all goat milk that lacked sufficient quality to be used in the production of food products, ended up as surplus. Both these types of surplus goat milk were sold to animal farmers as feed. Surplus goat milk also emerged at times of the year when the production of goat milk was higher than could be handled by the dairies. This goat milk was dried and sold as goat milk powder. Both goat milk fodder and goat milk powder were products that obtained low prices.

The way ahead

At the beginning of this chapter we chose to interpret the problem associated with the resource – goat milk – as a use-problem. Then we provided two descriptions of use of the resource at a certain point in time. A logical question to ask then is if the use of the resource changed in some way afterwards and eventually how the use changed and what the new use 'looked like.' There is no reason here to suppress the information that the use of the resource really did change in the following years. Later we will describe this change. However, at this stage in the investigation, we feel a need to halt and consider how we should approach the empirical problem we have stated more principally. In other words, we are in need of a 'device' that can focus our further investigation. Therefore, we now turn to the development of such a device, or as we prefer to call it, a theoretical approach.

URN:NBN:no-3404

Chapter 2 Approaching a Resource-use Problem

The purpose of this chapter is to find a theoretical perspective that we can apply to our problem in order to understand it better. But before we do that some explanation of the order of chapters in the thesis is appropriate.

Order of chapters reflecting the research process

Our research process can be characterized as stepwise.[25] This process originated in an observation of an empirical problem brought to our attention by a human individual (Ola in chapter 1). Later, after having gained more insight into theory, we obtained other people's views of the empirical problem. This led us to reinterpret the problem. In other words we have *gradually* approached the problem by obtaining *some empirical data*, then developing *some theory,* then collected *some more empirical data* followed by more development of the theoretical argument and so forth. The order of chapters reflects this stepwise research process, for the most part symbolically, but to some extent also literally.

The thesis is ordered in the following way. In chapter 1 the empirical problem – use of a certain resource – is introduced and described. In chapter 2 we identify a theoretical perspective by which the empirical problem can be approached and understood. Chapter 3 provides description of seven cases which all concern either different or new uses of the focal resource. The starting point for the cases is the use of the resource at a certain time described in chapter 1. In chapter 4 the theoretical framework becomes more focussed. This more focussed framework helps us to analyse the empirical material in terms of resource development (chapter 5). Chapter 6 is an attempt to describe and understand, from a network

[25] Our research process is extensively described in chapter 8, a chapter that is placed at the end in order not to 'distract' the argument running in the previous seven chapters. The research process is briefly described here in chapter 2 in order to give the reader an idea why the chapters are organized the way they are.

perspective, the economic logic 'hidden' in the development. Chapter 7 concludes the six previous (empirical and theoretical) chapters with a few suggestions regarding further research. Finally, in chapter 8 we give an account of the research process underlying the thesis.

Theory in relation to problems

In chapter 1 we identified a problem. Moreover, we defined it as a resource-use problem.

> The prediction of improved performance is based on the theory of how the system works. (Alderson 1965: 29).

Whether our purpose is prediction or understanding, in both cases a theory of the 'system' in which the problem (in our case resource-use) occurs, is needed. In this connection practitioners are not in principle different from researchers:

> Both are inquirers, concerned with detecting and correcting errors, making sense of confusing and conflictual problematic situations. (Argyris & Schön 1996: 34-43)

However, scientific theories differ from 'practice theories' in that the former must be more general; they must apply for more than one specific situation and not be reducible to the explanation practitioners themselves offer for their own behaviour (Waters 1994: 3). But the *degree* of generality among scientific theories varies, from universal laws that postulate general causal propositions (Argyris & Schön 1996: 38) to 'the minutiae of everyday findings of empirical research' (Waters 1994: 347). Somewhere in between the sociologist Robert Merton locates 'theories of the middle-range', which address particular substantive events and problems (Waters 1994: 347). We will look upon resource-use as such a particular problem and hence look for a theory of the middle-range to understand it.

Wholes and elements

A central aspect of any theory is the assumptions that it makes regarding its subject matter (or nature of reality). From a stance within the social sciences Alderson (1965: 8-9) divides

theories into those that see social reality in terms of systematic *wholes* and those that see it in terms of separate distinguishable *elements*. This distinction parallels Giddens' (1993: 718) division between structuralist explanations and explanations based on (individual actors') actions. Hence, there exist theories where wholes (like structure) are regarded as having primacy over elements (like action) when it comes to explaining phenomena or understanding problems, and there exist theories where elements are considered more important than wholes.

Both types of social theories have been criticized. Giddens (1993: 720) claims that: 1) it is mistaken to suppose that society is 'external' to human beings, and 2) society does not determine what human beings do; it only *constrains* what they do, and within constrains they can make *choices*. Thus:

> The way forward in bridging the gap between 'structural' and 'action' approaches is to recognize that we *actively make and remake* social structure during the course of our everyday activities. (p. 721).

Thinking in terms of resource-use, then, we can put it that during the course of everyday activities we actively make and remake the resource structure. However, while we follow Giddens' (1993) advice to bridge the gap between 'holistic' and 'elementary' approaches his own contribution (which he calls 'structuration theory') is rather general; it does not address a particular problem. On the other hand, structuration theory also seems too narrow for us, as it is developed in order to explain 'purely' social phenomena. Hence, the problem of use of resources seems beyond its scope.

Alderson (1965) and Granovetter (1985) are two social scientists that (like Giddens 1993) bridge the 'whole – element' gap, but that (unlike Giddens) address economic problems.

Alderson (1965) applies a 'soft' version of functionalism to develop a theory of market systems. He claims that market systems are loosely coupled:[26]

[26] Alderson (1965) finds that in general theories within marketing and economics tend to assume some form of equilibrating system and identifies three basic types of such systems. One is the *atomistic* system and is an 'element' explanation. Neo-classical economics builds on such an assumption. At the other extreme is the system regarded as an *organic whole* where elements are joined together in an inflexible pattern, like cells in the human body. This is a 'whole' explanation. In between is the 'loosely coupled system' where the elements are joined but in a flexible way.

> A loosely coupled system might be regarded as consisting of semi-fabricated components but which bear in themselves the capacity to change or replace these components. … marketing systems are essentially of this latter type. A marketing system, like an ecological group, can adapt to the environment. (p. 10).[27]

According to this theory we could formulate our problem as something like 'resource-use in a loosely coupled marketing system.' While we like the term 'loosely coupled system,' is the problem that we learnt about in chapter 1 related to a loosely coupled *marketing* system only? Maybe there are other loosely coupled systems that can explain the resource-use that we have identified?

Towards a network approach

Granovetter (1985, 1992) recognizes that the term 'economy' refers to unique phenomena in the world, but criticizes the 'elementary' explanations found in theories based on neo-classical economics and the 'whole' explanations found in functional and cultural theories. He claims that social relations and social structure have an impact on economic phenomena like production, distribution and consumption. By contrast in economics:

> …, the fact that actors may have social relations with one another has been treated, if at all, as a *frictional drag* that impedes competitive markets (p. 484, Italics provided).

On the other hand economic actors are not so 'social' that their action is dictated by norms and values (Granovetter 1985: 483). Thus, Granovetter's argumentation comes close to Giddens' structuration theory with the difference that the former deals with a more specific problem; the 'economic problem.' It also comes close to the structuration theory in another sense, that is, on the insistence on taking dynamics into consideration. In economic life structures of social relations are not static, but *ongoing* (Granovetter 1985: 481). Thus, we need a theory that takes into account that the factors that influence economic action are not made once-and-for-all, but are shaped by *ongoing processes*, continuously constructed and

[27] Along the same lines Weick (1979: 136) develops an argument about organizations: "If organizations are loosely coupled, then relatively small units – such as double interacts, dyads, and triads – become eminently sensible as places to understand the major workings of organizations."

reconstructed during interaction. Interpersonal ties have *specific content, history and structural location*. This leads Granovetter (1985) to the concept of embeddedness:

> Actors' … attempts at purposive action are … embedded in concrete, ongoing systems of social relations. … this view of embeddedness alters our theoretical and empirical approach to the study of economic behavior. (p. 487).

> The embeddedness argument stresses … the role of concrete personal relations and structures (or 'networks') of such relations (p. 490).

The embeddedness approach to the problem of order in economic life, then:

> follows and analyses concrete patterns of social relations; it makes no sweeping predictions of universal order or disorder, but assumes that the *details of social structure* will determine which is found (Granovetter 1985: 493). (Italics provided)

Such assumptions about the economic world require that:

> both theory and empirical research pay attention to *dynamics*. (Granovetter 1992: 26). (Italics provided)

Then we can, with a slight reformulation of Granovetter (1992: 51) argue that: Many resources are locked in by processes that need not be confined to random 'small events,' but rather can be analysed as *evolving from purposive networks of action mounted by interested actors*. In other words, any resource-use is embedded in a network. On the other side this use is not given once and for all, which must mean that there is a reciprocal relation between the network and the resource-use. This assumption is illustrated in Figure 2-1

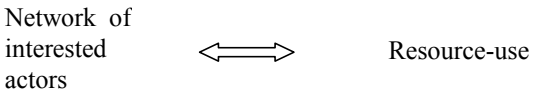

Figure 2-1: The reciprocal relation between the use of a resource and its context in the form of a network of interested actors.

To sum up: We can look upon use of a resource as an economic problem. Nevertheless it is not only an economic problem. Granovetter (1985, 1992) suggests that we should also look at this problem as a social problem. For studying this side of the problem he proposes a network perspective as an approach that bridges the 'whole – element gap.' This is reflected on the left side in Figure 2-1. However, in his specific network approach the technical dimension is not explicated. The same is true for the economic aspect. In the figure the right side reflects the technical and economic dimensions and thus our problem. But this side is little explicated. In order to approach our problem we therefore need a language for describing and interpreting technology and economics in a network perspective.

There exists a research tradition that has been engaged in applying and developing the network approach specifically in business settings and industrial systems and which also has addressed change processes in such systems. Like Araujo & Easton (1996) we will refer to this tradition as 'The industrial networks approach.'[28] The industrial networks approach encompasses broadly speaking the social perspective of Granovetter (1985, 1992). In addition it provides a conceptual apparatus for describing and explaining the techno-economic dimension of industrial systems from a network perspective. The industrial networks approach will be used as a theoretical 'guide' in the rest of the thesis. The remainder of this chapter is therefore devoted to a description of concepts in this approach that seems relevant in relation to the problem, which we have identified.

The industrial networks approach

The industrial networks approach is a distinct network approach in many ways. These distinctions stem among other things from the subject matter of this research, which is firms operating in business markets. One claim made within the industrial networks approach is that business markets differ from consumer markets. One difference is that business buyers are active and hence that the interaction between buyers and sellers in business markets – like the one that we described in chapter 1 – tends to be 'thicker' than assumed in consumer markets. This has the consequence that firms can only manage few relationships with other firms. This

[28] However, when referring to specific networks (and not the research approach) we prefer the broader term 'business network.' Moreover, sometimes we use the term 'industrial network theory' instead of 'industrial networks approach.'

makes business relationships the more important.[29] Moreover, business relationships tend to be long-lasting[30] and 'infused' with complex content (Håkansson 1982, Håkansson & Snehota 2000).

The industrial networks approach did not start out with a network perspective of business markets. It was isolated (business) relationships (dyads) that first invoked attention and was theorized (cf. 'the interaction model of buyer-seller relationships' presented in Håkansson 1982). But gradually it was realized that relationships could not explain 'everything.' Relationships were part of a context, and the concept of network was found to be fruitful to represent this context.

Another consequence of the first research of the industrial networks approach and its focus on buying and selling was that the issue of dynamics was less studied and theorized. However, in the mid-1980s a research program aimed at studying technical development in business settings was launched in Sweden. Several studies within this program applied the interaction perspective of the industrial networks approach and developed it further (Waluszewski 1989). One of the insights from these studies was that technology does not 'live a life of its own' in business networks. Technological development takes place in interplay with social beings (humans) within firms. This insight is theoretically formulated in a model, which contains three elements – activities, resources and actors. Moreover, the model states that there is a reciprocal relation between these elements.[31] To put it simply activities represent the economic dimension, resources[32] include the technological dimension and actors the 'social factor' (Håkansson 1989). This model can also be seen as a replication and specification of the earlier claim made within the industrial networks approach that business relationships have complex content. What the ARA-model suggests is that business relationships more precisely encompass economy, technology (broadly understood) and sociology.[33]

[29] They are termed business relationships to indicate that they are particular; they are not totally identical to other types of relationships, for example those between friends.
[30] This is why it is meaningful to term them relationships (and not for example incidents, episodes or encounters).
[31] Thus the model is in brief referred to as the ARA-model.
[32] Resources encompass more than technology. This will be discussed extensively later in the thesis.
[33] Hence, the ARA-model is in line with Granovetters (1985, 1992) statement that economic actors have economic as well as non-economic motives. What the ARA-model adds is that non-economic motives are not only of a social kind but can also be of a technological kind.

This industrial networks approach to technological development built on the earlier assumption of the importance of interaction in business networks. But interaction was now 'lifted' to a network level and used to study and understand technological development – dynamics – on such a level. The ARA-model and the network approach have been further co-developed (Håkansson & Snehota 1995). Here there is less stress on the reciprocal relation between the three elements activities, resources and actors. The emphasis is on conceptualizing and seizing 'network' in a business setting. Business networks are found to operate on three interdependent levels; an activity (or economic) level, a resource (or technological) level and an actor (or social) level.

The question now is to what extent this can help us in understanding our empirical problem, which we view as a resource-use problem. Since use has to do with activities it seems logical to have a closer look at the concept of activities in a network perspective. In addition it would be interesting to pursue the issue of resources on a network level. The aim is to position the empirical material in chapter 1 theoretically and to pave the way for adding more empirical material concerning use of 'our' resource.

Activities in business networks

In general activities are necessary to create an output. In the business world a huge number of various activities are carried out (Håkansson & Snehota 1995: 28). Many types of activities can exist in the 'room' between two firms. Alderson (1965) makes a distinction between sorting activities and transformation activities within a marketing system. The point is that before every transformation there has to be a sorting in order to provide the appropriate collection of different resources which are then to be transformed into new resources. In a market system transformation activities can be classified as production, transportation, storing and display. Activities like product development, purchasing, marketing, financing and administration can involve both sorting and transformation activities.

The critical point is that all these various activities have to be co-ordinated (or organized) in order to make desired outputs. Such co-ordination can come about in three principal ways; by firms, in the market or through relationships (Dubois 1998; Richardson 1972). If, in general, the *scale* of an activity does not affect its efficiency and no special *capabilities* are required for performing that activity, one firm could co-ordinate and do all activities; buy inputs, such

as land and labour, and sell directly to consumers (Richardson 1972: 890). When this is not the case – that is, when there are economies of scale and special capabilities are necessary – there will exist more than one firm in the 'economic landscape'. Hence, activities have to be co-ordinated *between* firms also.

Activities that result in standard products can be expected to be co-ordinated impersonally through 'market forces.' This is because the firms expect the aggregate demand to be more stable and predictable than its component elements (Richardson 1972). In other words, aggregate output of a general-purpose input is matched with the aggregate output for which it is needed. However, if it is not a general-purpose input that is needed, but a special-purpose input – that is, not only the quantity but also the quality of the product has to be determined – a firm cannot rely on impersonal market forces. One will here rely, again, on co-ordination within the firm insofar as the firm's *own capabilities* can be exploited efficiently to produce this product. To the extent that this is not the case (the firm does not have the appropriate capability), the only solution is for the firm to rely on a *specific other firm.* In other words, in this situation, two firms have to co-operate; that is, match their respective enterprise plans beforehand (ex ante) (Richardson 1972: 892).

Research within the industrial networks approach has confirmed that activity interdependencies are common in business markets. Håkansson & Snehota (1995: 52-54) relate activity interdependencies to economics and find two principal ways such interdependencies can be exploited. One is the *cost* dimension. This reflects the 'firm – market' dichotomy and corresponds directly to the two first types of co-ordination described by Richardson (1972) above. The cost dimension involves an internal, 'mechanical' view of the firm and regards production activities as most important. According to the authors it leads to an emphasis on standardization and economies of scale and scope (Chandler 1990); in other words efficiency, or productivity (Torvatn 1996). The other dimension regards *effectiveness*. It builds on a 'behavioural' view of the firm inspired by parts of organization theory that explain human behaviour as interlocked and enacted (Weick 1979). This dimension highlights the possibilities and needs of customization and corresponds to the third co-ordination mechanism described by Richardson (1972).

Dubois (1994, 1998) has applied this theory to analyse activity interdependencies in order to understand 'make-or-buy' problems within the context of a business network. According to her, since an activity analysis concerns efficiency and effectiveness, it reveals and can explain 'status quo' (stability) in a business network. In other words, an activity pattern (that is the structure of interdependent activities in a business network across firm boundaries[34]) can explain a certain use of a given resource (a specific activity). The specific activity is as it is because actors involved regard it as efficient and effective within the activity pattern in which it is embedded. For example, the activity 'use of goat milk for making brown cheese' described in chapter 1 is as it is because actors involved (among those Namdalsmeieriet and Norske Meierier) regard it as efficient and effective within the particular activity pattern in which it is embedded.

We could have gone much deeper into this activity pattern. Then, we might have been able to say something more about the efficiency and effectiveness of this activity compared to, for example, the activity of using the resource as feed. However, in order to understand *why* Namdalsmeieriet changes from using goat milk for making a certain food product to selling it as feed it is not sufficient to point to activity patterns. According to Dubois (1998) we then should analyse the resource dimension; development and control of resources influences the way actors in a business network link activities. Change in one or more resources impacts on what activities and activity patterns are efficient and effective and thus what is economic. The question that concluded chapter 1 was how the use of the focal resource could be improved. Enhanced understanding of resources in a business network can help us approach this problem.

Resources in business networks

The discussion above revealed that resources affect the way activities are organized in two ways – via the type of input/output (general purpose versus special purpose) and via capabilities (similar or dissimilar). Actors can treat resources in two ways; as *given* or *non-given ('open')*. To be produced or used in a specific way – that is, embedded in a certain activity pattern – a resource has to be treated as given. In such a situation actors face the problem of availability and control of the resource (Håkansson & Snehota 1995: 134). The

[34] Cf. Håkansson & Snehota (1995).

use of goat milk for making brown cheese described in chapter 1 is a good example of actors treating a resource as given.

But a resource need not *necessarily* be used as it is. Actors can imagine changes in the resource, something that subsequently can affect its production and use. It can also be the other way round; actors imagine other ways to produce or use it, and this can change their view of the resource. In both cases it turns from something given to something 'open.' Therefore resources and the way actors 'look upon' them affects the innovativeness of companies. This also has a further implication. Neither technology nor any other type of resource can be seen as external to business networks. They are part of the network. The ARA-model reflects this since resources are included as an element in the model.

Generally speaking a resource can be any element that some actor treat as valuable. It can be a physical product (like the goat milk in chapter 1) and something that aids the production or use of that product (for example a certain technology or a particular capability). An organization, like a firm, can also be a resource. Moreover, a relationship can give a firm access to resources that it does not own or cannot make itself. A relationship, thus, ties two resource collections[35] together and forms a supra-firm resource constellation (Håkansson & Snehota 1995). Such a constellation can embrace more than two firms and represent constraints as well as opportunities for the firms regarding exploitation and development. A relationship, then, can be regarded as a 'space' where resources can be developed.

When resources are not viewed as given, what they can be used for is 'open.' Since the value of resources depends on how they are combined with other resources (Penrose 1995), development is – broadly speaking – a question of new combinations. A new combination is – like a relationship between two firms – relative. A focal resource that is combined with some other resources is related to these other resources. Hence, development can take place in one of two ways 1) change in the focal resource, 2) change among the other, related resources. This means that actors have to obtain knowledge about features of resources and the relation between these features and features of other resources (Holmen 2000). It may be that components (smaller parts of resources) can be regarded as resources as well; theoretically the

possibilities for decomposition of any single resource are infinite and demonstrate once more that resources can be viewed as 'open.'

In general the term 'feature' refers to a distinctive trait of an individual or a class; more precisely *an outstanding or marked property which attracts attention* (Webster's 1989). According to Aschehoug & Gyldendal (1995-98) it was in elder philosophy common to distinguish between the 'thing itself' and its features, but such a separation has been shown to be notoriously difficult. Hence we should regard features as part of the content of a resource. Moreover, the mechanical view of the world (cf. e.g. Galilee, Descartes) makes a distinction between primary and secondary features. Only the first are regarded as belonging to the thing, while the latter are a result of our subjective experience about the thing. Primary features are for example mobility and divisibility. Examples of secondary features are smell, taste and colour. In other words, secondary features of a resource can be regarded as relative in the sense that their existence is revealed only when they come in contact or are seen in relation to other resources.

For example, to talk about taste of goat milk has no meaning before it has been related to the tongue of a human being. Moreover, the word taste is a result of more human beings experiencing a physical relation between their tongues and different things and their subsequent 'agreement' to refer to this specific experience by the word 'taste;' a process of objectifying (Berger & Luckmann 1967). The important message for us, considering a poorly used resource, is that features can give 'their' respective resources value if actors tie them to certain other resources with *their* specific features. This presupposes actors with some knowledge of features of these resources.

The resource dimension thus incorporates dynamics; it reminds us that the 'status quo' in a business network can change. An important 'driving force' here can be said to be the reciprocal influence between different resources (cf. Penrose 1995); more precisely the reciprocal influence between actors' knowledge and physical resources. Technology, for example, can be seen as a resource resulting from such reciprocal influence. Håkansson & Snehota (2000) identify three ways in which resource ties become manifest in business

[35] Håkansson & Snehota (1995) define a 'resource collection' as the combination of resources found within the boundaries of a single firm, while 'resource constellation' refers to the resource combination within a business

networks; through technicians, products and projects. Technicians solve technical problems appearing over time and by this means gain knowledge about how products and production processes are mutually adjusted. Products of the seller have to fit the technical system of the buyer; on a continuing basis this fit can only be found via mutual learning in interaction. Special projects aiming at solving technical problems or developing technical solutions can involve two or more parties in a network. If this is the case business relationships and networks can be infused with technical content, thereby creating resource ties across firm boundaries.

In relation to our problem, then, what we can learn from the resource perspective is that our focal resource is not ultimately given. In different ways actors handling the resource can obtain new knowledge of it which can lead them to explore new ways of using it. What the industrial networks approach in particular tells us is that new knowledge and new uses can arise out of actors' interaction; that is acts carried out between firms. According to this perspective our problem can be viewed as interaction about resources within the context of a business network. Hence, we should obtain empirical material that can illustrate interactive development related to our resource within a network context. An idea here is to pay attention to technicians, products and projects.

Actors in business networks

Although the resource dimension seems most relevant for approaching our problem, the picture is not complete without the actor dimension. The discussion above revealed that resources do not develop by themselves; development is dependent on actors. In the industrial networks approach the actor dimension enters our conceptual scheme indirectly via the term interaction. Nevertheless, it can be helpful to explicate the 'network actor' to some extent. By referring to Granovetter (1985, 1992) we have already touched upon this theme. We realized then that companies are represented by interested actors pursuing not only economic purposes but also non-economic ones, like prestige and status. Because of humans there are *will, intention* and *purpose* in business networks, 'life' if you wish. This is the origin of the actor dimension of business networks (Håkansson & Snehota 1995).

---

network across firm boundaries.

The understanding of the 'network actor' has undergone development since it was introduced as part of the ARA-model. Håkansson (1989: 16) defines actors by their performance of activities and their control over resources and specifies various sub-entities within the actor concept; people, groups of people, departments in a company, whole companies and groups of companies. However (on p. 21) he recognizes that actors are *more than* performers of activities and controllers of resources. Actors also possess particular *identities*. The concept of identity is further developed in Håkansson & Snehota (1995):

> There are actions that cannot be explained from resource and activity dimensions alone. (p. 192).

It is claimed that the legitimacy of referring to companies, firms and other individuals and collectives that carry out economic activities *as* actors rests on the assumption that these:

> have an *identity* and thus [can be] ascribed purposeful action (p.193). (Author's Italics).

Since actors interact, identity is developed in response to other actors' reactions. Thus, identity is not something that a single actor 'has' and 'controls' all alone, but is something that it shares with other actors in the network. An actor's identity is thus as much a result of how other actors perceive this actor. An important consequence of seeing businesses as actors with identity is that their uniqueness comes to the forefront. To have or be ascribed identity points to what makes an actor *different* from other actors and its *specific* role in the business network it is part of. This role does not so much stem from some common goal, but rather the identity the actor is ascribed by the actors it interact with (Håkansson & Snehota 1995). The term *actor bond* refers to this shared, interacted identity (Håkansson & Snehota 1995).

If more than two actors interact, bonds may become connected and form a certain inter-organizational structure, a web of actors. The term 'web of actors' has in our opinion much in common with Granovetter's (1992) concept 'network of interested actors.'

The term bond contains also another dimension. This is referred to as the *character* of actors (Håkansson & Snehota 1995). Character has to do with the activities that the actor carries out

and the resources that it possesses, and determines what actors can achieve in relationships with other actors. This implies that knowledge possessed by an actor contributes to its character.

Applied to our problem this implies that we should not view resource development purely as a question of knowledge. We should also pay attention to how the use of resources is related to the identity of actors. For example, one thing is that an actor *knows* that a resource has these and these features. Another thing is whether the actor would *appreciate* it if these features were put to use. In our opinion appreciation has much to do with identity and hence we should at least have a picture of the actor dimension in mind when we set out to study our problem further. The actor dimension reminds us that it is not only new or improved uses of the actual resource as we (the researchers) see it, but also as actors in the actual business network see it. Moreover, there is the possibility that actors in a network view resources and resource ties differently.

We have thus far in this chapter arrived at network as general theoretical approach. Furthermore we have described a specific network approach and substance elements in this approach. However, it is helpful for our further study to clarify two additional concepts in this approach. The first is the concept of connectedness. The other concerns the notion of process in business networks.

Relationships are connected

As part of an effort to develop a theoretical model by which social phenomena that they argue are fundamentally structural (in their case power and justice) can be analysed, Cook & Emerson (1978) suggest that:

> Two exchange relations are connected to the degree that exchange in one relation is contingent upon exchange (or nonexchange) in the other relation… An *exchange network* is a set of two or more connected exchange relations. (p. 725).

A business relationship is a kind of exchange relation. And as such it is connected to – contingent upon – other business relationships (Pedersen 1996). That business relationships are connected and form business networks is perfectly in line with the argument provided by

Granovetter (1973, 1985, 1992) referred above. The logic is that no single relationship – neither its existence nor its content – can be explained without reference to the system of which it is part. A business network can be viewed as a (certain kind of) system. In a business network single business relationships are the primary elements. Johanson & Mattson (1987) put the argument succintly:

> The network approach bases its analyses on characteristics of *systems of interdependent dyadic relations*. Thus, if A first buys from B, but then merges with B, not only is the relationship between A and B changed … but also A's reaction to B's *other customers, suppliers, competitors, etc*. What might be gained in the A-B relationships might very well be lost through the changes in the other relationships that B had before the merger. (p. 180, Italics provided).

In other words, if we analyse single relationships in isolation, that is, 'commit dyadic reductionism' (Granovetter 1992), we lose sight of the effect indirect relationships (third parties) have on a certain actor or relationship, and vice versa. Thus:

> A business enterprise looks more like a linking unit where its strategic attributes lie in how it connects other market participants to each other. (Håkansson & Snehota 1995: 21).

In addition, a network is a structural entity that is interesting in itself.

The 'network way' of viewing markets (as in the industrial networks approach) has another important characteristic, too. The division between market and firm, which is sharp and an important assumption within neo-classical economics and new institutional economics, is less sharp in a business network. That is, interaction is not necessarily much 'thicker' *within* firms than *between* firms (Granovetter 1985, 1992; Johanson & Mattsson 1987; Håkansson & Snehota 1995). Piore (1992: 443) even claims that 'economic landscapes' basically consist of networks of which markets and firms represent two extremes:

> If one understands the process of technological change in terms of the priorities of specialization and integration, it may be that what we think of as networks are a natural form of organization and that markets and hierarchies are two extremes. The market extreme involves no integration at all. The hierarchical organization involves completely rigid integration. (p. 443).

This view is compatible with Richardson's (1972) three co-ordination mechanisms referred to in our discussion of activities above.

Towards dynamics: Interaction and processes in business networks

Through the concepts of content and connectedness we grasp *structural* aspects of business networks; what elements such networks are built of and how these elements relate to each other. Basically the notion of structure refers to something static. But as Araujo & Easton (1996: 101) point out, the notion of connectedness of business relationships implies that dynamic processes are at the heart of the industrial network approach. Also in the discussion of resources we realized that industrial networks are not static. *Processes* take place within them. Hence, Johanson & Mattsson (1987) argue that a 'market-as-network approach' provides opportunities to describe and analyse problems related to dynamics in industrial systems:

> For us, industrial markets are characterised by lasting relationships among firms because such relationships can … promote knowledge development and change. (p. 180)

What distinguishes the industrial networks approach is its emphasis on the interactive character of these processes. Hence interaction and process are to a large extent two sides of the same coin. More specifically over time interactive processes change content and connectedness in business networks.

Håkansson & Snehota (1995: 10) point out that these changes are marked by continuity (as opposed to breaks) and suggest that *continuous change* is typical. Thus, changes in networks are by and large evolutionary – that is, changes are gradual and organic; they consist of many, small changes. Big alterations – 'revolutions' – are the exception. Actors have to relate to change both in single relationships and on a network level. Sometimes change can be absorbed, sometimes actively promoted (Håkansson & Snehota 1995: 22), for example in the form of projects (Håkansson & Snehota 2000). Many will recognize actively promoted change as development.

The continuous changes stem from interaction between the actors in the network. Håkansson & Snehota (2000: 80-82) identify two *economic effects* of interaction in networks. First it can be used to exploit complementarities between activities performed by different actors and their resources. In other words, interaction in relationships can be 'used' to link activities to each other in order to reach a more satisfactory combination of scale-effective production and customization. The motivation is efficient and effective exploitation of resources.

The other effect of interaction in business relationships is *knowledge creation*. This affects development of resources. Håkansson & Snehota (2000: 82) claim that new knowledge can be created in two ways, 1) when two actors confront and use knowledge from quite different sources or areas in order to find new solutions, and 2) when two actors with different knowledge try to combine and confront each other's resources. If we regard knowledge as a resource – a non-material one – new knowledge stems in the first situation from a new combination of existing non-material resources, while in the latter it is a result of a new combination of material resources.

We realize that these two economic effects of interaction parallel our earlier discussion of, respectively, activities and resources. It seems, then, that interactive development of a specific resource – for example the goat milk in chapter 1 – must involve material as well as non-material resources and include both confrontation and combination. In other words, we must be aware that development processes comprise conflict as well as co-operation (Håkansson & Snehota 1995: 9).

Technological change

As already mentioned the type of change that have been mostly studied within the industrial networks approach is technological change (cf. e.g. Håkansson 1989, Waluszewski 1990, Lundgren 1995, Wedin 2001). Broadly speaking technological change concerns development of products and processes (Gressetvold 2003, Håkansson & Snehota 1995). Many of the mutual adaptations that firms do vis-à-vis one another stem from the technical side of products or processes:

> As a relationship develops, possible technical misfits have to be avoided. (Håkansson & Snehota 1995: 13)

Within the network products and processes are part of a larger technical system. In our case we can reckon goat milk, the focal resource, as a product. Technological change in one part of the network can influence, as well as be influenced by, rather distant technological changes in other parts of the network:

> … The technical connections make relationships at a certain stage of transformation subject to, or the origin of, changes in other sometimes rather distant areas of the technological system. (Håkansson & Snehota 1995: 13).

Technological changes can also affect other functions of business, in the firm, relationship or network:

> The technology employed by the parties to a business relationship tends to influence not only the characteristics of the products and services exchanged but also the ways to do business in general, such as logistics, routines, planning and so on. (p. 14).

Hence, we can look at the way Norwegian goat milk was used in the 1980s (as described in chapter 1) partly as a result of previous technological development in the network in which this resource was embedded. But development in 'business in general,' like logistics, routines and planning, must also have had an impact. This recognition evokes the multi-content view of business relationships that we stressed earlier. The multi-content understanding of business relationships makes industrial network theory different from other approaches to technological change where the relationship is perceived to have a single, technical content (Håkansson & Snehota 1995: 357). In other words, since goat milk can be regarded as a product, developing it must be reckoned as technological development. However, we must look for more than 'pure' technical influences 'behind' this technological development.

Summing up chapters 1 and 2

In chapter 1 we 'met' a certain resource – goat milk – and became acquainted with three actors' (one producer's, one user's and one researcher's) view of the actual use of this resource. The views differed somewhat but a joint concern was that the resource was poorly used, implying that it could have been used 'better.' On the background of the theoretical perspective developed in this chapter we may say that the problem is that the resource is

dominated by the structure in which it is embedded. We view this structure as a business network made up of a specific connection of activity links, resource ties and actor bonds. The problem, then, seen from the perspective of our focal resource is that 'its' business network is structured around another, almost similar, but much 'larger' resource, cow milk. The actual business network (we could call it 'the Norwegian milk network') at the time was efficient for cow milk, but less efficient for goat milk – the 'smaller' resource. In other words, the milk network made cow milk a rather valuable resource, while it turned goat milk into a less valuable resource. This had something to do with that cow milk 'existed' in far larger volumes than goat milk.[36] Thus, economies of scale and scope could within this network to a much higher degree be applied in relation to cow milk than in relation to goat milk. As long as the activity pattern in the network was dominated by efficiency logic goat milk would be the subordinate resource (compared to cow milk). As a consequence we may say that the network was a structure that confined goat milk as a resource.

From this two problems arise. The first is of an abstract, *theoretical* nature and can be put this way; what can actors do to improve the use of a resource that is subordinate in a business network? Håkansson & Ford (2002: 138-139) point to the paradox that if an actor in a business network 'succeeds' in acquiring 'final' control over the surrounding network, the network will die; thus, the development 'vigour' may vanish through one-sided planning and too much structuring. Thus, we should be looking for the existence of a dynamic element in business networks. How can value of a resource be created? And what is the role of actors then? We have touched upon this topic in the last part of this chapter, and it seems that we should be digging even deeper into this issue. Chapter 4 is devoted to a discussion of this – theoretical – issue.

The other problem is concrete and *empirical* and concerns what the actors in (this particular) practical reality (of which some was revealed in chapter 1) can do in relation to the actual resource ('Norwegian goat milk of 1987') and the use of it. For example, should Ola and Kari at Skånaliseter let 'their' resource remain marginal, or should they break out of the prevailing milk network structure? Or should this structure be broken? And can Ola and Kari do all this on their own? This empirical problem and related questions will be addressed in chapter 3.

[36] Volume is also the reason why we use the characterization 'large' respectively 'small' in relation to these two resources.

From the discussion earlier we can note that we then should provide detailed data of processes in which outcomes evolve over time; in our case how the use of goat milk develops over time within the milk network. This is in line with Granovetter (1992: 49) who claims that:

> any observed outcome may be the product of a mixture of aims implemented by complex networks of actors. Without an understanding of the *historical process* by which it arose, the resource-use can easily be misinterpreted. (Italics provided).

The empirical data in chapter 3 are of such a kind; they are about processes and history. More precisely we refer to this material as case stories. They start at different times from 1987 onwards and end at different times up to 2001. As mentioned earlier in this chapter they are a continuation of the empirical material presented in chapter 1 and are organized in this way:

Case stories 1 and 2 are found under the heading 'part A,' which implies that they are a continuation of 'part A' in chapter 1. In 'part A' case story 1 is the main case, while case story 2 should be read as a kind of 'supporting' or 'comparative' story to case 1 rather than an independent story.

The other five case stories (3-7) are found under 'part B,' suggesting that these case stories originated in the material described under 'part B' in chapter 1. In contrast to the cases in 'part A' each of the cases in 'part B' is organized around a specific *product* made from the focal resource. Case story 5 is the main story. Case stories 3 and 4 can be read as 'chronological precursors' to case 5; even if we have no empirical evidence of links between these cases, each of them reveals in different ways development of products based on the resource. Cases 6 and 7 are not stories really. They are included primarily because they illustrate how features of the focal resource differ from its 'big brother' in the network (cow milk) and how actors in the network utilize these features.

Chapter 3 Developing the Resource – Case Stories

In order to facilitate the reading of the case stories, we will first provide the reader with two pieces of background information that are common to the cases and which do not appear in chapter 1. The first regards some general organizational features and use of names in Tine. The second is about identification and description of some features of goat milk.

Organizational features and use of names in Norske Meierier/Tine

As we mentioned in chapter 1, dairy companies that together have covered the whole of Norway have, under different names and since 1928 had a common organization. In 1984 its name was changed to Norske Meierier. When Tine was introduced in 1992 as common brand for all products produced by the dairy companies that owned Norske Meierier, the name of the common organization became Tine Norske Meierier.[37] In this chapter we will use the term Tine when it is not so important to be specific about what part of Tine we refer to. We will also in this chapter use the term Tine when the actual time is before 1992. When it is necessary to be more specific we will add the organizational name. Hence, individual dairies we will term Tine followed by the name of the place where the dairy is located, for example Tine Verdal. Companies are called Tine followed by the name of the region that the company covers, for example Tine Midt-Norge. These companies' common organization will be called Tine Norske Meierier, which is also the official name.

All the regional dairy companies that own Tine are co-operatives owned by milk producing farmers in that region. In fact Tine is owned 'double' as all the milk farmers in the different regions also have their share in Tine. In 2000 there were approximately 21.500 milk farmers. Of these nearly 700 produced goat milk. The others produced cow milk. Numbers of cow milk

[37] Source: Tine. [http://www.tine.no/kunder/tine/TineStruktur.nsf].

and goat milk producers have steadily decreased over the years. Around 1990, when the following stories 'begin', the number was around 30% higher. In 2000 there were 10 regional companies running altogether 62 dairies.[38] Both numbers of companies and dairies within Tine have steadily decreased during the years. The conditions for milk production, transportation distances and distance to customers vary between the different regions. Thus, nearly 90% of the goat farmers are found in five of the ten regions.[39] This situation has not changed very much during the period we mainly deal with in this thesis, 1980-2001.

Tine makes various types of milk products; liquid products like milk for drinking, yoghurt and sour cream and solid products like butter and cheese. Tine widened their range of dairy products in the 1980s and 1990s (Stræte 2001: 23-24). In 1999 retailers marketed in Norway 50 liquid products from Tine representing 205 product variants. The same year 1630 different variants of cheeses were marketed. However, variants of two cheeses – Tine Gudbrandsdalsost (made of cow milk and goat milk mixed) and gouda (in the form of TINE Norvegia and the competitor Synnøve Finden's Gulost) represented 49% of sales value. From 1997 Tine Norske Meierier also allows 'its' regional companies to develop their own products as supplement to the range of products that are marketed under the Tine brand (Stræte et al. 2000: 23). These regional products are not marketed centrally by Tine Norske Meierier, but can 'instead' add the name of the producing dairy and the dairy company on the product. By contrast 'ordinary' Tine products cannot – and shall not – be identified with the dairy and the dairy company producing the product, only Tine as such. The overall impression, then, is that Tine produces a considerable range of dairy products and that, regarding cheeses, only two represent the bulk of sales.

Tine Norske Meierier has defined different functions. These have mainly been constant in the period we are dealing with. Various departments take care of the different functions. In 2000 there were departments for:

1) Information and Organization

2) International

[38] Source: Tine Årsmelding (Annual Report) 2000.

[39] In 2001 these are: "Tine Northern Norway" with headquarters in Harstad, "Tine Dairy West" with headquarters in Ålesund, "Tine Dairy East" with headquarters in Oslo, "Tine Dairy South" with headquarters in Stavanger and "Tine Vestland Dairy" with headquarters in Bergen. In addition three other regional dairy companies have

3) Economy, Logistics, Information Technology, Controller and Purchasing

4) Market

5) Research and Development

The Department for Research and Development (R&D) is, moreover, subdivided into two R&D Centres. Tine R&D Voll in Rogaland deals mainly with product development. Tine R&D Kalbakken is purposely located next to the dairy Tine Fellesmeieriet in Oslo and deals mostly with technology and process development.[40]

The regional companies are thus semi-independent in the sense that Tine is responsible for some types of decisions and tasks, while the regional companies are responsible primarily for production. Within the 'Tine system'[41] some companies, departments, dairies, employees and members have been more engaged in the development of goat milk than others.

Identification and description of some features of goat milk

As for other resources, the features of goat milk are important for the use and development of it. For the actors involved in the development work it is important to know at least some of the features of the resource. It is also important to have some idea of how one goes about discovering or developing new features. Furthermore it is crucial to know of features of at least some other resources. The aim of the cases is to describe how actors discover and use features related to the actual resource and how they combine it with other resources. The purpose of the list below, however, is to list some features of goat milk that have been described in the literature independent of the case stories. Actors in the cases are aware of and use some of these features, while they are not aware of and do not use others.

Let us first suppose that we are novices regarding milk in general. Somebody has given us the task to identify features of something called goat milk. How would we go about it? One strategy is to seek to get hold of 'an exemplar' of the resource in order to wrest the mysteries

---

members who are goat farmers. Almost 2/3 of the goat milk is produced in the three counties Troms, Sogn & Fjordane and Møre & Romsdal. (Tine Årsmelding 2000).

[40] Source: Tine Årsmelding 2000.

[41] We can think of the "Tine system" as Tine Norske Meierier with its departments and all its member companies with its different production plants. (Nota bene: On January 1st 2002 Tine Norwegian Dairies and its member companies merged into one company – Tine BA. However, very little of our empirical material concerns this period.)

from it with our own senses. One solution could be to search for a retailer that sells goat milk and buy some cartons. Then we probably would do something to the resource; look at it, smell it, pour it, shake it, and maybe warm it up and see what happened. But could we be sure that this 'white liquid stuff' would not be dangerous for us? Could we take the chance of feeling it with our hands, or drink it to feel its taste? Maybe we should test it on a few rats first and observe their reactions. But probably, since we already from the start knew that the stuff was a sort of milk, and we already knew that stuff called milk in general is not dangerous for humans, we would be convinced that the actual stuff was not dangerous. We would also be reassured by the fact that the stuff was placed in a refrigerating counter together with other types of milk and dairy products and not together with detergents, insecticides or shampoo for example. It even had the word 'milk' written on the packaging. Then we could give it to our kittens, and maybe members of our family, and notice the effects. The milk could also be purchased from a Norwegian goat farmer, or a dairy. A more exciting method would be to hijack a tank lorry with goat milk and demand some litres of the elixir from the driver.

No doubt by these actions we could gain some knowledge of features of goat milk. If we had some previous knowledge of a more common milk, cow milk, and its features, we could to a certain extent test if goat milk had some of the same features. Then we would have further increased our knowledge of Norwegian goat milk. But we could still not be sure if there were not additional features to be discovered. The time we could spend on further investigation would be limited, since we had other tasks to do. If a friend of ours asked if we could make a creamy cheese for him from the goat milk, we probably would realize that we lacked some ingredients and equipment, in addition to some basic knowledge. And if we managed to make such a cheese, what should we answer if our friend asked about the health effects of eating the cheese, or in which types of food this cheese could fit as an ingredient? And did it matter for making the cheese whether we used milk bought in the retail store, purchased from the farm, obtained in the dairy or stolen from the tank lorry? It is clear that what initially seemed to be a relatively easy task, had gradually grown above our heads.

Fortunately there exist scientists and science about goat milk. Thus we have approached the Department of Food Science at the Norwegian Agricultural University. Here we found two scientists whom we interviewed. Moreover, we read two articles, one written by one of these scientists (Skeie 1998) dealing with goat milk as raw material and another written by the other

scientist together with some colleagues at the Department (Vegarud et al. 1999) about the relation between genetics and features of goat milk. In addition we studied abstracts of two other publications from the Department; two postgraduate theses, one on 'Laktoferrin in Norwegian goat milk' (Grøtte 2001) and one on 'Goat milk – genetic variants of α_{s1}-casein and effects on milk properties' (Nordbø 2001). We also interviewed a scientist at the Department of Animal Science at the same university and examined some publications from this department (Eknæs et al. 1998, and Eknæs & Hove 2002). In addition we have interviewed two consultants in Tine, one working with processes related to goat milk, the other with product development. We have also used a foreign article (Haenlein, G.F.W. & Caccese, R. (1984)). This article is part of a larger work – Extension Goat Handbook – published by the Extension Service, United States Department of Agriculture.

Defined chemically milk is a mixture (emulsion) of fat in water, where sugar and salts are dissolved, and where the proteins exist in colloidal solution (Aschehoug & Gyldendal 1995-1998).

1. Milk in general is the food article that has the most versatile composition of all food articles (Eeg-Larsen 1976: 148). All nutrients in milk can be easily digested and absorbed. The nutrients are resolved in water in a special proportion, ca. 90% water and 10% nutrients. Like any milk, then, goat milk is *nutritious*. It contains proteins, carbohydrates, fat, minerals, trace elements and vitamins in proportions and amounts well suited for the new-born kid to develop and move during the first period of its life. The protein fraction (casein, albumin and globulin) contains most of the vital amino acids and has thus a very high biological value (Eeg-Larsen 1976: 148). Protein in goat milk consists of more whey proteins (albumin and globulin) and less casein than the protein of cow milk (Skeie 1998). There are also relatively more short and medium sized saturated fatty acids in goat milk, fewer carbohydrates and more potassium.
2. Thus goat milk has a certain consistency; it is *liquid* and consequently 'pourable', 'pumpable', 'suckable' and drinkable.
3. In addition it is *tasty*. Human taste referees can tell that goat milk has a distinct taste different from cow milk (Skeie 1998).
4. Goat milk appears in a certain *colour*: white. But it is whiter than cow milk (Skeie 1998: 308). This is because the fat in goat milk contains much smaller amounts of red β-

carotene, since it already is converted to colourless vitamin A. The white colour in general is due to the amount of calcium in the casein-micells particles.

5. Because they are smaller and lack a fat globule clustering agent (Agglutinin) *fat globules are more evenly dispersed* in goat milk than in cow milk (Maree 1978). Thus goat milk creams much more slowly and less completely than cow milk. It is hypothesized that the *membrane* around the fat globules is more fragile in goat milk than in cow milk. All this makes goat milk fat easier to digest than cow milk fat, but also more susceptible for developing off-flavours (Haenlein & Caccese 1984).
6. When it is exposed to a certain digestive enzyme – rennet – one fraction of the protein in milk – casein – *coagulates* to solid matter as a gel. The gel of goat milk casein is softer and more brittle because milk from most goats lacks the Alfa S-1 type of casein (Skeie 1998, Vegarud et al. 1999). This gives a lower curd tension. It is argued that goat milk protein is easier to digest than cow milk protein (Haenlein & Caccese 1984).
7. As in all milk the whey proteins (albumin and globulin) coagulate when goat milk is warmed above their denaturation temperature.
8. In certain states dried goat milk casein, like any casein, has the ability to bind water.
9. A certain component in goat milk – *lactose* (the type of carbohydrate that one finds in milk in general) – can be isolated, for example by membrane filtering or by heating whey left over from the making of white cheese.

These are features that both our scientific informants and the scientific literature that we have studied regard as scientifically proven at the time being. Regarding:

10. If goat milk has specific *health features* (in addition to its nutritious qualities)

our two scientists have different opinions. One of them regards the health issue in relation to goat milk as highly controversial and argues that specific health effects of goat milk is a claim put forward by 'fanatics.' The other scientist disagrees and points to a recent study at the department (Grøtte 2001) which shows that the content of lactoferrin (a glycoprotein) is higher in goat milk than in cow milk. Since lactoferrin has antibacterial properties and increases the body's absorption of iron, the study concludes that goat milk has specific health benefits (at least compared to cow milk).

Moreover, on the Internet, one producer of goat milk soap claim that:

11. Soap made of goat milk is closer to the pH of the human skin and thus has better *softening, moisturizing and cleansing properties* than conventional soap because goat milk contains alpha-hydroxy acids and has a low pH.[42]

One of 'our' scientists strongly rejects this claim. And we have found no verification of this claim in the scientific literature that we have read.

Finally, we have ourselves found that:
12. When putting cubes of (white) cheese made of goat milk into hot water the cubes remained cohesive and relatively solid, while cubes of (white) cheese made of cow milk put into equally as hot water melted and dissolved.

This is an observation that our scientific informants have no opinion about.

[42] Home Soap Works, Millington, New Jersey. [http://www.cidigital.net/homesoapworks]

Part A: Development from the 'use side'

Case 1: Developing farm based cheese making from goat milk: Skånaliseter

Negotiations about joint production of 'niche cheese'

Ola and Kari had ever since they discovered that the goat milk they produced was unpopular in Tine, speculated about doing the processing themselves on the farm. The reason for this was threefold: 1) They regarded their goat milk as an excellent raw material, 2) they were convinced that there were customers 'out there' who wanted special goat cheese, and 3) they were convinced that they themselves could serve these customers better than Tine could. Their view gained support when, on a study trip to Jämtland in Sweden in 1985, they talked to goat farmers that had successfully started farm dairies. They had done this because the existing co-operative dairy company NNP[43] around 1980 found it too problematic to take care of the small amount of goat milk produced around in Jämtland. Ola says that:

> After this trip I saw somehow 'the Writing on the Wall' and how things would turn out. So therefore we started a process to take responsibility for the goat milk ourselves. But it has taken time, because it is not that easy. Those within the dairy co-operative system 'sat down on their hind legs' and did not find it quite acceptable that I steered the process.

When the outbuilding on Skånaliseter burned down in 1985 and a new building had to be set up, Ola and Kari secured sufficient space for a possible cheese factory in the future.

The couple had to solve some problems before they could realize their dairy. Most of the problems were related to public regulations regarding production and processing of milk and Tine Norske Meierier' own rules. In 1983 the agricultural authorities introduced *quotas* on all milk production in Norway including goat milk production. Skånaliseter got their quota. Similarly all milk producers had, according to national regulation, not only right to, but also the duty to deliver to the co-operative Tine dairy in their region. Also significant state subsidies were given to dairy farmers only if they delivered milk to Tine. Consequently the

[43] NNP is short for Nedre Norrlands Producentförening (Producer Association of Lower Norrland).

rules had to be adjusted on these points if farm processing should be legally allowed and economically possible. Skånaliseter was the first farm in Norway to confront the prevailing rules at this point and met resistance. But the problems were solved, although it took more years. In 1988 all goat farmers in Indre Namdal assembled for a meeting to discuss what to do with the goat milk. A working group was established and was assisted by consultants from the agricultural authorities and politicians in the county of Nord-Trøndelag. A new trip was arranged to study goat milk processing in Jämtland and Undredal in the county of Sogn & Fjordane. Undredal is a small, hilly community that was not connected to the public road system until 1987.[44] The goat farmers there had for long been doing craft-based processing of their goat milk. Their products were cheese and brown cheese. The group wrote a report that concluded positively about farm processing of goat milk in Indre Namdal. The group also sent an inquiry to the Ministry of Agriculture in 1988. This lead to certain regulations being changed so that it became possible for farmers under specific conditions to process their own milk without losing any state subsidies.

A project was then (1992-1994) carried out in co-operation between Namdalsmeieriet and the goat farmers in Indre Namdal and agricultural consultants in the county of North-Trøndelag. The objective was to establish a new Tine cheese factory aimed at producing 'niche' cheese in Namdal. Ola was the person among the goat farmers who most clearly engaged in this effort to obtain a more satisfactory use of the goat milk from *all* goat farms in Indre Namdal and not only Skånaliseter. One element in the plan was to locate the factory next to the newly established Namsskogan Familiepark, a Deer Park in the region, near the highway E6 and Nordlandsbanen railway. The park had around 50.000 visitors per year. Ola knew of such 'symbiotic' solutions in Finland and Ireland, where the businesses involved experienced more sales through such a co-localization. Another detail in the plan was to design the factory such that customers could observe the cheese making process. A consulting firm was hired and carried out a study among the goat farmers and a market study. Landteknikk – a company that supplies Tine with dairy equipment[45] – analysed the technical aspects of such a 'niche dairy'. The group also urged changes in certain regulations in 'Jordbruksavtalen' – an agreement between the Ministry of Agriculture and the two Farmers Unions in Norway that among other

[44] Gardsosten nr. 1 1998: 12.
[45] Source: http://www.landteknikk.no

things set the terms of prices and subsidies in Norwegian agriculture. The request resulted in local, small-scale processing of goat milk being allowed in 1993.

The plan regarding a 'niche dairy' became stranded. Even though the idea at the outset seemed to be to produce special cheese, the representatives of Tine could not imagine other products than:

> standard white and brown cheese. Period. (Ola).

And the price for these was, according to Tine's calculations, 60 kroner per kg. Given such assumptions the prospect of the planned dairy would never become profitable, and Tine stopped their involvement in the project. This was in 1994. With Tine out of the plan, the goat farmers also withdrew. Moreover, the study among the goat farmers showed that it was only Ola and Kari that wanted to do farm processing of goat milk.

For Ola and Kari this represented a clarification. For eight years they had worked to find a solution so that cheese could again be made out of the goat milk from Indre Namdal. Now, when it was clear that a joint solution could not be reached, they returned to their original plan: farm-based processing. Another 'breakthrough' was that Tine now stated that they would not hinder Ola and Kari in establishing a farm-based dairy provided that their products did not collide with Tine's products. Earlier Tine did not allow members to process milk themselves. Now Tine, firstly, admitted that there existed a 'niche market' for dairy products, and secondly, that it was not Tine's responsibility to serve such a market. Moreover, Tine declared that they wanted to facilitate conditions for members who wanted to serve such markets.

As mentioned, the other goat farmers did not want to process milk themselves. But since many of them had invested relatively recently, around 1980, in plants for goat milk production, and these plants had very limited alternative uses, it was clearly most economical for them to continue goat milk production. And the only buyer of this goat milk was Namdalsmeieriet that, as already mentioned, sold it to other animal farmers as feed. But the certainty that the goat milk that they produced ended up unprocessed as feed made the production less meaningful to the goat farmers. In addition they felt a bit insecure, being

uncertain how long Tine and the dairy regulation system would continue to support this use of goat milk.

Ola and Kari establish a farm dairy

Ola and Kari realized their plan regarding a farm dairy and started to produce cheese in 1995. The same year Kari ended her work as a nursery nurse at the local day-care centre, because she felt that work in the farm dairy would be more appealing. She could then escape early morning travelling to work with small children, often in snowy and windy weather. In the beginning Tine allowed Ola and Kari to use 15% of their total goat milk quota for farm processing. The rest had to be delivered to Tine. In the shed they had around 100 goats producing 40.000 litres of milk annually. This meant that they could dispose of 6.000 litres for cheese production. Normally this gives 600 kg cheese. There were some advantages from starting with this quite small volume when learning to master a new business. If something went wrong with the cheese making equipment for example they could deliver the goat milk to Tine and get paid for it. And bad batches of cheese production did not represent large losses, and it was less risky to experiment with different products and processes in the dairy. In 1997 Tine increased Skånaliseter's processing quota to 50%, and in 1999 Tine allowed them to use the whole quota for cheese making. Skånaliseter has remained a member of Tine all the time, and Ola and Kari want to continue the membership:

> We have nothing against the established co-operatives within agriculture like Tine, and would gladly go along with these organizations if they could take activities like the cheese-making we are doing here on the farm under their umbrella. We have not given up the idea that creative people can establish subsidiaries under co-operative organizations. To the extent that one can open up new markets and establish niche products in existing markets by this means, this will be a more efficient way of organizing than the way it can be organized within a large enterprise that 'thinks' bulk and big production.

Ola and Kari's basic idea behind farm-based processing was to supply a niche market that they were convinced existed. They also argued that goat milk was an excellent raw material that deserved a better fate than being used as feed. This fitted well in with Tines condition for letting Ola and Kari take care of the goat milk themselves: that their products should differ from Tine's products.

Developing goat milk cheeses in Skånaliseter

In earlier times coffee cheese was an obvious part of the food supply when people in Indre Namdal and northward – both on the Norwegian and Swedish side of the border – made trips in the mountains. Not least Lapps frequently used this special dairy product. It was customary to put cubes of unsalted, dried, white and solid goat cheese into hot coffee. The special taste of the cheese appears more distinctive then.[46] Unlike cheese made of cow milk, goat milk cheese does not melt when it is heated, it only softens a little. The coffee cheese was easy to carry and provided a versatile meal with much energy. The tradition of making and using coffee cheese was about to disappear. Recognizing this made Ola and Kari start to think of a farm dairy at Skånaliseter; the couple wanted to 'rescue' the coffee cheese. Ola tells that:

> The idea to start our own dairy on the farm started with the coffee cheese. The old tradition was about to vanish.[47]

Ola's mother, who lived on the farm, had made coffee cheese and provided the couple with the first information regarding the making of it. Ola and Kari also learned to produce brown goat cheese from Ola's mother. They later developed a decoratively formed version of this cheese and 'baptized' it Heidrun.

The couple found that they relatively soon mastered making brown cheese. The reason was that this 'craft' primarily depends on technical competence; for example it is critical to avoid material burning on the boiler walls during heating and to control the consecutive cooling so that the lactose crystallizes. Making cheese, however, involves living organisms 'from start to finish', and Ola and Kari had more trouble with this part of the production. In 1997 they therefore decided that Kari should attend a course in cheese making at Åsbygdens Naturbruksgymnasium outside Östersund. This is a Folk High School that in the 1980s and 1990s developed a centre that offers courses in craft-like cheese making. They both knew the centre from earlier study trips. At the course Kari learned basic cheese making processes like adding of acid, control of pH and temperature, cutting and packing. She also got to know recipes of some 'basic' cheeses. All in all the course led to more stable production and

[46] Bondebladet Julenummer 1999, p. 18.
[47] Landbrukstidende nr. 4 – 2001, p. 8.

product quality and a broader range of products at Skånaliseter. In 2000 Skånaliseter made the following cheeses:

- Coffee cheese (solid, without salt)
- Balder (solid and ripened, with or without caraway)
- Snøkvit (semi-solid, ripened with white mould on the surface)
- Blåmann (ripened, white, with blue mould on the surface)
- Real Feta (pickled or oil marinated on jar)
- Gomme (gum – made of goat milk, rennet, cinnamon, egg and wheat flour)
- Soft cheeses (to order)

The brown cheeses are:

- Brown goat cheese (solid)
- Heidrun (formed solid brown cheese)
- Prim (soft brown cheese)

They have written down the recipes for all of these cheeses.

The couple also tried to make a Camembert, but have found that goat milk based Camembert easily becomes too soft and thus too perishable. Moreover, Ola and Kari are considering producing a special cheese – ricotta – from albumin and globulin that precipitates as a by-product when whey is heated. Ricotta is Italian for 're-cooked' (Webster's 1989), denoting re-cooked whey. Ricotta is a soft and sometimes smoked cheese. In its 'homeland' Italy it is often used in salads and in pasta dishes like lasagne and ravioli.[48] So far Ola and Kari use this by-product as feed for their goats.

In the beginning the couple felt it was important to produce a quite broad range of products relatively quickly in order to 'test the market'. After five years – in 2000 – they feel that the range of products is satisfactory. Quality is doubtless the most important sales promoting factor. In the couple's opinion lack of quality due to inferior goat milk may have given goat cheese a bad reputation among many people. The couple thus put much effort into persuading

[48] Sources: "The Lactobacillus Bar on The Web" [http://countrylife.net/yoghurt/postings/2383.html] and Aschehoug & Gyldendal (1995-1998).

potential customers to try tasting their products. This they do in the farm shop they have established next-door to the dairy and at exhibitions. Ola says:

> Some people are very sceptical, but we 'fool' them to try [tasting], and then they become customers at once.

Ola and Kari have frequent contact with a food consultant in Namsos in order to learn new 'secrets' of goat milk and how their goat milk products can be used together with other products in new ways and new settings.

Finding and getting a price

Ola and Kari looked askance at the price that their colleagues in Jämtland received for their products when they decided the price of their own products. It meant about double of the price of an 'average' Tine cheese, which was about 60 kroner per kg. Ola and Kari soon found that their customers willingly accepted a price of 120 kroner per kg for their standard cheese. With more treatment – for example special packaging and extra long ripening – they get up to double the price. For example Feta on jar or in special packaging 'makes good money'. Ola puts it this way:

> We are gaining experience now…what pays best. The more you process the cheese; the better is the pay. Either in particular packaging or on jar like Feta. It gives a completely different price.

They sell Feta cheese pickled in jars for up to 170 kroner per kg. This is quite a high price, but Kari says that this is a very popular cheese, and they could have sold much more of it.

Developing production facilities

Ola and Kari needed various facilities to be able to transform their goat milk into special cheeses for sale. Barn, milk tank, dairy, cheese store and farm shop exist in separate rooms in the same outbuilding. The dairy lies next to the room where the milk tank is, and goat milk can be pumped automatically from the milk tank into the cheese-making tank.

Finding an appropriate cheese-making tank was one of the first tasks. The couple first inquired of Landteknikk A/L, a firm owned jointly by all the farmers co-operatives in Norway. Among other things Landteknikk plans and delivers installations in food processing

plants, has made and delivered milk cooling tanks to most dairy farms in Norway and tanks for transportation of milk. They also sell various special products like detergents, packing and packing equipment. Landteknikk has been involved in planning and delivering equipment to most dairies within Tine over the years. But Skånaliseter needed equipment that was quite different from the equipment in Tine dairies. The equipment in a cheese dairy in Tine is developed for handling up to about hundred times the volume of milk to be processed in Skånaliseter's farm dairy. And the equipment in Tine was designed for a continuous process, while in Skånaliseter they had to make cheese in a batch-wise process and with much cheaper equipment. A vat of around 500 litres would suit. Landteknikk could make such a vat, but had to calculate some special development costs, which would make the vat quite expensive. The couple then chose a very simple solution; they bought a much cheaper 400 litres milk cooling tank and made cheese in this. This tank had double walls and could be warmed and cooled by pumping warm and cold water in between the walls. However, it proved to be difficult to obtain a temperature sufficient for pasteurizing in this tank. Another solution had to be found.

During a visit to Åsbygdens Naturbruksgymnasium in 1995 they discovered that the training centre there used a tank made by a Dutch firm – Rademaker – that supplied food processors and large-scale households.[49] They were told that many farm dairies in Jämtland also used this kind of tank and experienced very few problems with it. Rademaker could deliver a tank specially made for small-scale batch-wise cheese making at a price far below that of Landteknikk. The couple decided to buy such a tank after Kari attended the course in Åsbygden in 1997. The boiler for making brown cheese however Ola and Kari bought from Landteknikk.

Precipitated curd in the vat must be transformed into cheeses of appropriate shape, size and hardness. Kari uses special cheese moulds for this. None of the Tine dairies form cheese manually, and there is no Norwegian producer of manual moulds. The couple found that Rademaker could also deliver cheese moulds, and they bought moulds of 0,5 kg, 1 kg, 2,5 kg and 5 kg. Moreover the cheese in the moulds has to be pressed in order to get the right compactness. Ola and Kari ordered a special cheese press from Tine, but nothing happened. The couple then approached the Department of Food Science at the Norwegian University of Agriculture. The workshop at this department then made a simple cheese press for them.

[49] Source: http://www.exportant.nl/gmv/expcat98/rademakers/catrademaker.html

Most of the cheese in Skånaliseter is packed in plastic film. This film has to be of a certain kind because the cheese must be able to 'breathe' during the whole ripening period. Again Kari and Ola approached Landteknikk, which supplies Tine with this special plastic film. Landteknikk could also supply Skånaliseter with the same film. A German firm, Süd Pack, produces the film. From a supplier of equipment to large-scale households in Trondheim they bought a vacuum packing machine.

However, Kari found out that it would be better to pack the cheese in a stiffer paper and asked again Landteknikk, who informed her about a French firm who produced such a paper. On behalf of Kari Landteknikk ordered a sample of the paper. Kari received the sample after five months. She then asked Landteknikk about the price, but never got any answer. She still packs cheese in plastic film, but has in later years progressively started to use coating, that is, putting wax around the cheese. She learned this method when she attended the course in Åsbygden in 1997.

Coating makes the cheese special and suits the basic philosophy of Skånaliseter farm dairy, which is to produce cheese products that 'stand out from the multitude'. The couple has realized that all types of packaging and design can make a cheese product special. Hence they have developed gift versions of certain cheeses. One version is cheese in chip boxes. They searched in Norway for a supplier of appropriate chip boxes, but found none, where upon they approached Tine. Tine referred them to a French supplier. This supplier did not normally take orders less than 10.000 boxes, but could this first time accept an order of 6000 boxes. This was far too much for Skånaliseter, but they knew of other firms that also had expressed interest in chip boxes as packaging. Together with these firms they managed to make an order of 6000 chip boxes.

To be able to make Heidrun the couple came to an agreement with a mechanical firm, which made a specially designed, manual mould press for them.

Developing distribution and sales

Ola and Kari had to find and reach customers for Balder, Gjeta, Heidrun and the other cheese products that they made. As members of Tine they could have aimed at Tine's customers and used Tine's resources for distribution, including the resources of retailers that sell Tine's

products. But Ola thought that Tine's delivery times were too long and made customers dissatisfied:

> Some have found that the Tine system has worked somewhat poorly and that deliveries have taken a long time. I know somebody in the restaurant branch, … among other things foreign cheeses going through that system took a very long time. This is not acceptable.

Thus Ola and Kari sought other ways to reach customers. Hard cheese can stand two days of travel at room temperature. If packed in expanded polyester and supplied with cooler bricks soft cheese and brown cheese can also endure two days of travel. Hence distribution with refrigeration would not be necessary if the cheese could reach the customer within two days. And there turned out to be more possibilities of reaching customers within two days.

The couple think it is critical for Skånaliseter to make the delivery time to each of its customers as short as possible. Kari says:

> It is so that people have wishes about when… In one case a private customer planned a special event, and had to have the cheese the same day. And then, one has to do it. The same with those that run shops and say: Now it's empty, now we must have cheese… Of course you execute that order as fast as possible. Because … then the shop also sells more … because then they avoid being out of stock for a week or two.

The couple therefore handles each order individually, unless more orders that can use the same means of transportation have arrived in the meantime. Normally Ola and Kari get along with post, train or bus. However, customers are not always in a big hurry. In such cases Ola and Kari wait until they have to do another errand by car in the same direction. Then it is also possible to co-handle more orders from customers along the same route.

Mail service

Ola and Kari found that individual, private customers that ordered directly could get their cheese via mail. An order is then packed as parcel post and the postal services take it to the customer. In the beginning Ola or Kari had to take the parcel to the post office in the nearest small town, Røyrvik, 10 km away. When their sales grew bigger, Skånaliseter was able to become a business customer of the postal services. A parcel sent by a business customer has

first priority and the invoicing is easier. A rural postman collects parcels from the farm. In recent years in certain localities postal services have been out-sourced. This is the case in Røyrvik, and the firm that handles the postal services is happy the more parcels that are sent, because this contributes to the persistence of postal services in the area. Skånaliseter has very good experience with sending parcels by mail. The list of customers has gradually increased and consists late in 2000 of 175 names. About half of them order quite regularly, the rest more occasionally. They order either by telephone or via e-mail.

Railway

For their part Ola and Kari preferred to ship orders by post, because this meant least work for them. But postal shipment did not suit most of the customers who were not private individuals. On the other hand these also made larger orders. Two types of collective transportation existed in the area. The railway from Trondheim to Bodø has a station in Namsskogan about 40 km west of Skånaliseter along the road. From Trondheim there are two railway lines to Oslo, one through the valley of Østerdalen and one through the valley of Gudbrandsdalen. From Oslo there are more railway lines to the east, south and west. Hence Ola and Kari could reach customers in Trondheim and the region of Østlandet by transporting orders first by their own car to Namsskogan and then by train. They reached agreements with the three specialized food shops Fenaknoken in Oslo, Byhaven Delikatesse in Trondheim and Ost & Bakst in Stjørdal. They send orders to all these customers by train. Later Byhaven Delikatesse went bankrupt, but was soon succeeded by another specialized food shop in Trondheim, Torvdelikatessen. Skånaliseter became a supplier of Torvdelikatessen. Later Skånaliseter got two more customers 'along the railway', a farm shop in Siljan in Telemark and a farm shop in Verdal in Nord-Trøndelag.

Bus

But not all customers were located near railway. Hence Ola and Kari had to consider other means of transportation for these. There was a bus route from Røyrvik to Grong and from there to Overhalla and Namsos and other localities in western Namdal. Skånaliseter could send orders by bus to their customers Grong Vertshus (an inn in Grong), Overhalla Hotell, Røthe (a specialized food shop) in Namsos, and Mo Gård in Salsnes. Packages by post, train or bus are not dispatched on Thursdays and Fridays in order to avoid them lying unattended over the weekend.

Farm shop

Ola and Kari have also established their own farm shop. In this shop they sell cheeses produced in the farm dairy. Skånaliseter is located 50 meters from the road that leads to Store Namsvatn ('Great Nams Lake'). In the summer season many tourists use this road in order to visit their private cottages, fish for trout in the lake or make excursions to Børgefjell National Park near by. Skånaliseter is an approved member of Norsk Gardsmat, an organization for farm-based specialized food producers in Norway.[50] Thus Skånaliseter can use its name together with Norsk Gardsmat's name and its logo – the weathercock – on signboards, leaflets and packaging. Near the 'gateway' to the farm Ola and Kari have put up the weathercock with the name Norsk Gardsmat. Both people travelling by car and bus tourists make a stop at Skånaliseter, some on their way to or from Store Namsvatn, others having Skånaliseter as their only destination in the area.

In some cases people have driven 300 km in order to visit Skånaliseter and buy cheese 'on the spot'. These customers want to see the farm, the cheese making and the surroundings of the farm. Many of them and other private customers that order directly have come to know the farm dairy via coverage in newspapers and weekly papers or Skånaliseter's home page on the web. These customers are searching for food that is new and exciting. Skånaliseter has been featured many times in Hjemmet, and also in Dagbladet, Universitetsavisa in Trondheim, Adresseavisen and SAS Magasinet nr. 7/8 2001. Out of curiosity Tine Midt-Norge visited Skånaliseter farm dairy as part of a course for employees. In order to accommodate visitors better, Ola and Kari want to build a separate reception and serving room next to the dairy and the shop.

Ola and Kari also take part in exhibitions. They do this primarily to promote their cheeses. They do not regard it as an important way of distributing the cheeses. At an exhibition they can inform the general public that Skånaliseter farm dairy exists. Furthermore visitors that stop at their stand can have a look at the cheeses and obtain information about them, where and how to buy them and how to use them. Visitors also have a chance to try a sample of the cheeses and eventually buy some of them 'on the spot'. And lastly visitors get to know the people in Skånaliseter farm dairy. However, a stand at an exhibition demands resources, and

[50] 183 farms, as of November 2000 are members of Norsk Gardsmat (literally 'Norwegian Farm Food'). Like the other members, Skånaliseter markets the farm and its products on the Internet site of Norsk Gardsmat [http://www.norskgardsmat.org].

since Ola and Kari are a bit unsure about how much it generates beyond the immediate sales, they only take part in a few exhibitions.

Ola and Kari wanted to sell their cheese products together with rich information about them. They put information about the content of the product and advice regarding handling and what food to use with the product, on the label. The same information is given on the product list. The product list is part of the web page Ola and Kari have made about Skånaliseter and its farm dairy. There is of course not room to put all the information on a label or a web page, hence much information must be disseminated and much promotion done using other means, for example by word of mouth. This is the reason why Skånaliseter up to now has chosen not to let large retail chains[51] sell its products. To be sure the chains have cheese counters in the shops that they run, but most of them are not staffed and thus cannot give verbal information.[52] Thus information on the package is the only information that a customer can obtain. Both in their own farm shop, the other farm shops where their products are sold and in the specialized food shops there are assistants who can inform customers about each different cheese from Skånaliseter and cut it individually. Moreover the whole range of products that these shops have fits in well with the products of Skånaliseter farm dairy. Also if customers order directly by telephone Kari or Ola can provide specific information about the actual cheeses.

Co-operation between Skånaliseter and other farm shops

About 20% of the cheese is sold in Skånaliseter's own Farm Shop, for the most part in the period July to October. Skånaliseter has also developed co-operation with four other farm shops, all located in Norway; Gangstad Farm Dairy in Inderøy, Mikvold Farm in Verdal, Løpstikka in Brønnøysund and Auen Herb Farm in Siljan (Telemark). None of the five farms produces exactly the same products. By operating together each farm shop is able to offer a broader assortment, at the same time as none of the shops has a totally identical range of products.

[51] There are four retail chains in Norway: The Hakon Group, REMA, The 'Norge' Group and Coop.
[52] There are a few exceptions, e.g. in Coop the Mega shops have manned cheese counters. But generally suppliers of cheese to Mega must be able to deliver the same products to all Mega shops in Norway, and this is a demand Skånaliseter cannot live up to at the time these words are written.

Gangstad farm dairy was established in 1998. As in Skånaliseter a farm shop[53] is located next-door to the farm's dairy, which again uses fresh goat milk produced in the barn next-door to produce, as it is put on their home page on the Internet, '*delicacy cheeses'*. The products are e.g. sold by Ost & Bakst in Stjørdal and Fenaknoken in Oslo, shops that also sell cheeses from Skånaliseter. Thus Gangstad has resources in common with Skånaliseter. But there are differences too. Gangstad also sells cheeses via a retail chain – Coop's Mega's shops in Namsos, Steinkjer, Verdal and Levanger. Furthermore cows, and not goats, produce the milk from which the various cheeses are made. The cheeses are: Feta pickled in rape oil with herbs and garlic or leek and paprika, two types of white mould cheeses and a soft, spreadable cheese with garlic and herbs, and a special confectionary brown cheese where coffee, sugar and dog rose vinegar are added. Nannas Kjøkken ('Nannas Kitchen') has developed the recipe of this brown cheese and also sells cheeses made in Gangstad Farm Dairy. Nannas Kjøkken is a small firm, located on a farm in Hønefoss and develops new dishes from traditional recipes and local raw material.[54]

The married couple Hans and Grete established a farm shop on their farm Mikvold Gård in 1994. In the shop they sell *cured ham* produced from pigs that they breed themselves, five kinds of potatoes grown on the farm and products from other farm food producers. They run the farm shop on a round-the-year basis. In 1997 and 1998 Grete attended meetings arranged by the agricultural authorities in the county of Nord-Trøndelag. The meetings were part of a nation-wide project, initiated by the Ministry of Agriculture, where the purpose was to recruit producers of 'farm food'. At one meeting, in 1997, Grete became acquainted with Ola who told her about Skånaliseter farm dairy. This led them to start co-operating and to sell and promote each other's products. Mikvold offers all the cheeses that Ola and Kari produce. When Mikvold established the farm food production and the farm shop they made a special agreement with the butchery to which they had delivered animals for many years. The butchery slaughters Mikvold's pigs and cut up the meat. Mikvold, then, 'buys back' some of the hams and makes cured ham of it. If the product is to be allowed to bear the name 'farm food' the raw material has to be produced on the farm. The pigs at Mikvold are fed with remnants from potato production, which results in a special quality of the fat. Cured meat from Mikvold is then sold in Mikvold's own farm shop and in Skånaliseter, among other farm

[53] Information about Gangstad, Løpstikka and Auen farm shops is taken from the home page of Norsk Gardsmat [http://www.norskgardsmat.org].

shops. Most customers of Mikvold live in Verdal, but some also come all the way from Trondheim to buy products. Many of them come because they want to buy white goat cheese. Most of the customers are 'returners'.

Løpstikka farm shop on the Tilrem farm was established in 1997 and has specialized in *herbs*. In the garden are grown culinary and medical herbs. From the herbs are produced four different blends of tea and seven different blends of spice. Herbs from the garden are also used in the manufacture of three types of red wine that the farm couple have developed. Vinmonopolet also sells these three wines. In addition the couple have developed raw syrup from crowberries, which they make and sell. They have also invested in a small restaurant on the farm where visitors can have among other things herb soup, herb bread, herb tea, wine and coffee. In addition they have established a picture-gallery where visitors can see and buy original paintings. Visitors can also have a guided tour of the herb garden.

Also in Auen farm shop near the river Siljan in Telemark, *herb* is the main product. The couple running the shop sells different products made on the farm from raw material produced on the farm. All products are organically grown and approved by Debio.[55] Herb products are fresh herbs, blends of herb (specially made for among other things fish, game, pizza, lamb, potatoes, casseroles, marination of meat and meddling in brandy ('snaps')) and different blends of tea. The couple also sells strawberries produced on the farm and meat cut according to the customer's wish, from lambs bred on the farm. Some products are also sold via mail order. From other producers Auen herb farm sells Debio approved vegetables like tomato, cucumber, salad, cabbage, onion and potato, and – as we have seen – goat cheese from Skånaliseter. A small restaurant is built on the farm, and the couple run herb courses.

Co-operation between Skånaliseter and specialized food shops

Ost & Bakst ('Cheese & Baking') in Stjørdal is one of the four specialized food shops that sell cheeses made in Skånaliseter. Gitte ran Ost & Bakst until 2001. The contact between the shop and Skånaliseter came about because Gitte's husband as co-worker in Landteknikk several times helped Skånaliseter with solving technical problems. In August 1998 the couple made a trip to Northern Norway. They then made a little detour via Røyrvik to visit Skånaliseter and have a look at the farm dairy. During the visit Kari asked Gitte if she could

[54] Source: Landbruksdepartementet (1996).
[55] Debio is the institution in Norway that approves organic farms and organic food.

imagine selling cheese made in Skånaliseter. Gitte found the production and the products exciting and accepted the inquiry. Since then, and also after Gitte left the shop, Ost & Bakst has sold cheeses from Skånaliseter.

Gitte[56] thinks the cheeses from Skånaliseter fit in well with the rest of the products that the shop sells. These consist of various dairy products, bakery products and fruit wine. Most of the cheese that Ost & Bakst sells comes from Tine. This is because Tine produces standard cheeses that are relatively cheap. But Gitte found that Tine did not produce special cheeses. And they had problems with white goat cheese. For a while she purchased a white goat cheese that Tine made. But she never felt comfortable with it; it was too unripe and thus too soft and hence difficult to cut with a cheese slicer.[57] The white, hard goat cheese from Skånaliseter does not have these problems, she says:

> There is a huge difference between the goat cheese that I got from Tine and the goat cheese that I get now from Skånaliseter. I think this has something to do with 'body' and ripening. Tine never managed to ripen the cheese completely. The cheese from Skånaliseter has a rich taste – it is not insipid, it is sufficiently firm so that the cheese slicer can cut all the way through, and it has taste.

And she also put forward other reasons:

> [The cheese from Skånaliseter] is not mixed with something, and you do not find E-substances in it. I have one example of an elderly customer who came in and bought goat cheese for several hundred kroner. I asked if he did not think this was expensive. He answered: 'I consider this as a health food, you see. I have arthritis'. To be sure, I know that goat milk can be used in connection with health. Earlier Ost & Bakst in many cases sold small cartons of goat milk to people who needed it for health reasons. And I also know that the goats [in Skånaliseter] are not fed with silage, but hay. They get better digestion then. I have seen cows myself that have been fed with silage and how lax dropping they have.

[56] We interviewed her in winter 2000, before she left Ost & Bakst.
[57] During the interview we forgot to ask Gitte about the name of the cheese, but we suspect that it must have been Rosendal. Tine produced this hard goat cheese until 1999. According to one development consultant in Tine that took part in the development of Rosendal, the problem was that it had too strong taste and a format (long, cylindrical and coated, weighing 1,8 kg) that made it hard to handle and cut with a cheese slicer.

Ost & Bakst purchase special cheese from three firms. Oluf Lorentzen, a specialized food retailer located in Oslo, supplies French and some German cheeses. From Gangstad farm dairy in Inderøy Ost & Bakst purchases different craft-made cheeses made of cow milk. These then differ from the cheeses the shop buys from Skånaliseter. Gitte says that:

> it is funny to have two so different farm dairies as suppliers.

Gitte takes care that the customers who buy cheese from Skånaliseter and Gangstad are informed that the cheeses are made in the region on specific locations. She also emphasizes that the cheeses therefore differ from Tine's cheeses and thus must be more expensive. She has found that Ost & Bakst has sold more of a certain Tine cheese after she has begun to tell customers that the cheese is made in Tine's dairy in the neighbouring municipality.

From Skånaliseter Ost & Bakst deal in Balder, Blåmann and Snøkvit plus brown cheese and Heidrun, totalling 200-300 kg altogether. So far they are not selling the coffee cheese and the Feta cheese Gjeta. Gitte thinks Gjeta could fit in salads, but fears that it is too strong and prefers to deal in the cow milk based Feta produced in Gangstad farm dairy instead. This Feta is moreover served as snack in a pub near Ost & Bakst.

Gitte and the other co-worker in Ost & Bakst make a point of talking with the customers about the products. Gitte says that:

> the products do not sell themselves. The most important thing is that after the sale the customer shall have reason to say that: 'here we got help'.

Hence the background of the two co-workers is essential; both have worked within the dairy business for years and know the products and how they are made very well. They serve the customers by answering their questions and tell them things about the products that they have not thought of. In addition they can hand out leaflets and offer samples. Gitte asserts that it is important that the cheese is cut 'on the spot':

> People want cheese that is newly cut. In a nearby shop of one of the retail chains they cut the cheese beforehand. Then the cheese deteriorates.

Regarding goat cheese samples are especially important, thinks Gitte:

> Norwegians seem to associate goat cheese with very strong taste. When they taste the Skånaliseter cheese many customers are surprized; it is milder than they had expected. Often elderly customers say that the Skånaliseter cheese reminds them of cheese they ate at the mountain pasture when they were young.

Most of the customers of Ost & Bakst are 'regulars;' they have been customers for years and both Gitte and her co-worker know them well. They also make cheese dishes from the cheeses that they deal in. In some cases, then, a friend of the customer enters the shop and asks for a specific cheese that was in the cheese dish. In summer many tourists enter the shop. Many of them did not know of the existence of farm dairies and because of that are curious about the cheeses that Ost & Bakst sells. In some cases Gitte has had to show a picture of Gangstad farm dairy in order to convince customers that it exists. The shop has private customers only and does not have the capacity to serve business customers.

Gitte orders cheese from Skånaliseter about one week before she is out of stock, by fax if it is a 'straight' order, by telephone if special explanations are necessary. An order lasts normally 2-3 weeks. Gitte knows that Ola or Kari have a long way to drive, even when they send the order by railway from Namsskogan to Stjørdal, as is normal. Hence Gitte does not want to bother them by ordering more frequently than is strictly necessary.

Co-operation between Skånaliseter and tourist firms

Concerning the products of Skånaliseter Ola and Kari have found firms within the tourist industry business in their own region, Namdal, interesting. They sell products to three such businesses, Mo Gård in Salsnes, Grong Vertshus and Overhalla Hotell. One reason that these firms have cheese from Skånaliseter on their menu is that their customers asked for cheese from the region they visited. This was the case for Mo Gård. Mo Gård is part of the company Firma Albert Collett, which operates businesses within power production, agriculture, forestry and tourism in Namdal.[58] Besides producing cow milk, since 1988 Mo Gård has offered full board and lodging, elk and roe-deer hunting and salmon fishing in the 570 square km of forest and outfield areas that Firma Albert Collett owns. The season lasts from June to October. Most customers are Norwegian, mainly from Oslo. Many of them have been customers of Mo Gård for years.

[58] Source: Firma Albert Collett etablert 1871 [http://www.collett.no].

Frida is a Namsos-based food consultant with training from the Department of Food Science at the Norwegian University of Agriculture. She works partly as an independent consultant and partly as a co-worker in Firma Albert Collett. Frida gives advice regarding food and dishes at Mo Gård. Around 1998 she was responsible in Nord-Trøndelag for a nation-wide project run by MATFORSK, a research foundation doing research and development regarding food. The project aimed at assisting small-scale food-processing firms. Skånaliseter took part in the project and hence got to know Frida. Frida knew that Mo Gård wanted to give their guests varied taste experiences as part of their offering. Regarding cheese they had until then served Norvegia (a gouda cheese) and other traditional cheeses from Tine together with more special cow milk and goat milk based French cheeses supplied by Røthe in Namsos. But many customers had commented that they missed special cheeses from the region, cheeses with a history and origin in Namdal. Thus when Frida got to know about the cheeses that Ola and Kari made in Skånaliseter farm dairy, she realized that these cheeses could satisfy the demand for cheeses with 'a regional anchoring' at Mo Gård. Skånaliseter was invited to deliver cheese to Mo Gård in 1998 and has since then been a supplier. However, because the French cheeses are somewhat different from the cheeses from Skånaliseter, the latter have not replaced the French cheeses; they have supplemented them and made Mo Gård's total offering more varied. In addition some of the customers have individual preferences and bring with them their own cheeses, which the personnel at Mo Gård prepare for them.

Cheese is served at all meals – breakfast, lunch and dinner. It is used as cold cuts and as ingredients in different dishes. Regarding cheese Frida thinks the challenge at Mo Gård is to learn to exploit cheese in new ways, for example in grilled dishes and warm dishes. She emphasizes that it is important to tell the customers about the special history behind each cheese, and she has trained the cooks at Mo Gård in telling the histories. For the same reason she appreciates the fact that Ola and Kari have written information about the origin, contents and making of their cheeses. So far Mo Gård does not buy products from any other farm food producer, because none except Skånaliseter produces food with a sufficiently strong 'Namdal anchoring'.

New ways of standardizing and customizing manufacture and sales of goat cheese

The milking season in Skånaliseter starts in the middle of February, when the goats bring forth, and lasts until early November, about 8,5 months altogether. In winter the goats eat dry

feed. Earlier, when they delivered goat milk to Namdalsmeieriet, they used silage. But after they started to make cheese on the farm, Ola and Kari found that silage sometimes transferred bad microbes to the goat milk, resulting in wrong fermentation of cheese.[59] From 1999 they have only used hay. In summer the goats graze in the mountain pastureland surrounding the farm.

Until 1999 Skånaliseter used only their own goat milk for cheese making. They make both cheese and brown cheese. Kari is responsible for cheese, while Ola takes care of brown cheese and goat milk production.

The cheese making is done batch-wise. Four batches are done every week: two of white cheese and two of brown cheese. Of white cheese each batch – on average from about 550 litres of goat milk – gives 55 kg of cheese. From whey, the by-product, a batch of brown cheese is done, resulting in about 40 kg of cheese. The process is craft-like and builds on quite simple technology and manual work. No part of the process is automated. Cheese is made on Mondays and Thursdays from goat milk produced the 3-4 previous days. Because the whey must not become sour, the making of brown cheese must follow immediately after the cheese making. Brown cheese is therefore made later every Tuesday and Friday. On the other days there are no cheese making.

Kari starts the manufacturing of white cheese around 8.30 a.m. by letting the goat milk in the cooling tank in the neighbouring room be pumped into a metal vat. The vat is specially made for cheese making and can handle up to 700 litres per batch.[60] One batch lasts around 8 hours. In the vat the goat milk is pasteurized. Ola and Kari have, like Tine, for health safety considerations, decided to make no unpasteurized cheese. In order to regulate the temperature, the vat has double walls where warm and cold water can flow in and out. Kari uses a method of pasteurizing where milk is held at 63° C for half an hour. This gives a result equivalent to the much quicker continual pasteurizing process in Tine Verdal where the milk is held at 72° C for 15 seconds. Kari controls time and temperature manually by using watch and a thermometer standing in the milk. Landteknikk can offer Ola and Kari equipment for automatic pasteurizing, but the couple finds this equipment too expensive in relation to the amount of milk they are processing.

[59] Note that Namdalsmeieriet never made cheese of goat milk, only brown cheese.

After pasteurizing she lowers the temperature to 28-32° C, depending on the type of cheese to be made. Kari thinks bactofugation – a centrifugation process where microbes are 'thrown out' of the milk at high speed – is not necessary. This is because their milk is produced on dry feed. This gives little risk of heat resistant bacteria, like clostridia, which survive pasteurizing, in the milk. In addition bactofugation also removes bacteria that can have a beneficial effect on the ripening of cheese, she thinks. The fat content in the milk is not standardized because Skånaliseter, unlike Tine, does not have to adjust to public regulations regarding fat content in food. Skånaliseter's goat milk contains around 3,5 % fat.

Then Kari puts a blend of bacteria into the milk. All cheese making – in Tine too – is based on the use of blends of bacteria and not pure cultures. Blends are specific compositions of certain pure cultures. Kari prefers to use freeze-dried bacteria, which she buys from the Danish firm Chr. Hansen's retailer in Oslo. Freeze-dried bacteria are less perishable than 'natural' bacteria and hence more suitable for sending by post. Tine also buys some of their blends of bacteria from this firm. The blend is an essential determinant for the type of cheese to come out of the cheese making process. Kari sees to it that she always has a minimum of all cheeses in store and chooses what cheese to produce accordingly. Feta, as a typical ingredient in salads, is a popular cheese in summer and consequently she produces more Feta then. 'Within' each cheese she can, against a 50 to 100% increase in price, make variations regarding shape, size, salting, ripening and packaging, all depending on customer orders or what she has noted specific customers want.

For example one customer wanted an especially well ripened cheese, which Kari made against a doubling in price. In another case, late in the season of 2000, she received unexpectedly a big order of 1000 cheeses of the type Blåmann from the shop Fenaknoken, an important customer in Oslo. Skånaliseter could not produce enough goat milk this season to meet the whole order, but Kari immediately made several batches of Blåmann in a row to meet as much of the order as possible. In another case, she got an order for the cheese Balder from the shop Torvdelikatessen. She knew that this shop had a cheese counter with service. Therefore she thought that Balder in 5 kg sizes would be suitable, because then the staff could cut cheese according to individual customers' preferences. But soon Torvdelikatessen made contact and

[60] The vat is made and delivered by the Dutch company Rademaker.

told Kari that the customers rather preferred uncut Balder of the size 0,5 kg. This was a practical size for an average household and the customers did not have to 'exert themselves' to give the staff information about the appropriate size and then wait for the cheese to be cut and packed.

However, Kari emphasizes that she has to set limits to customization. For example, she said no to a customer who wanted to by unripe coffee cheese that he wanted to ripen himself. Cheese ripening is not for 'amateurs', she believes. If the customer had failed, he could have put the blame on Kari's part of the process, giving Skånaliseter a bad reputation.

When the bacteria have worked in the milk for ½ – 1 hour, Kari puts rennet (an enzyme) into the milk. Each type of cheese requires specific amounts of rennet. Rennet causes the casein in the milk to precipitate as one lump of jelly in the vat. In order to form cheese out of it, the lump has to be cut in small pieces of around 1 cm3. Kari observes how the consistence of the lump changes and assess when it is appropriate to cut it. For this, she puts horizontal and vertical harp strings (cutting strings) on the rotator in the vat and the lump gradually converts into grains. There are different sizes of harp strings. Smaller grains give more compact cheese; thus Kari selects strings according to the type of cheese she is going to make. The time needed for conversion varies during the lactation. In each individual batch Kari evaluates the compactness of the mass by squeezing some of it in the hand. She checks acidity in the mass with a pH-meter. Acidity has to be adjusted to each specific type of cheese; if not, the cheese will not ripe in the right way. When Kari finds the mass appropriate, she bails it into cheese forms.

Kari has cheese forms of different form and size. Mostly she uses 0,5 kg, 1 kg, 2,5 kg and 5 kg forms.[61] What type of form Kari uses depends on orders received and what sizes of the actual cheese are lacking in store. The whey is tapped into a boiler where Ola makes brown cheese from it. To give the cheeses appropriate compactness Kari puts the moulds into the press. The couple bought the pressing equipment, which is quite simple, from the workshop at the Department of Food Science at the Norwegian University of Agriculture. After about four hours Kari takes the forms out of the press and each cheese out of its form.

[61] The same company that produces the vat, Rademaker, produces the forms.

She then salts the cheeses, either by putting dry salt on the surface or laying them in a salt bath. One type of cheese is unsalted. The duration of the salting affects the bacteria and with that the speed of ripening. The cheese has no taste and character before it has undergone fermentation in store. The more compact the cheese is, the longer time in store is needed. Each type of cheese requires therefore distinct salting, temperature and storing time. Some customers have their 'favourites' regarding salting and ripening. Some types of cheese demand mould on the surface. She then packs each cheese manually in plastic film[62] before it is put in store. Kari also experiments with coating, which is melting wax on the surface instead of film. She learned about waxing on a course at Åsbygdens Naturbruksgymnasium. On request Kari puts some types of cheese in special gift packaging. The transportation to store is done manually with a trolley table. There is one store, lying next door in the same building as the vat.

The whey that is poured into the brown cheese boiler is warmed up as fast as possible in order that it shall not become sour, first to 70° C. At this temperature the heat labile proteins albumin and globulin – which do not react with rennet – precipitate.[63] After albumin and globulin are removed, goat milk is mixed into the whey. In the beginning Ola used 25% goat milk, but changed it later to 50%. Once when they had surplus of goat milk as an emergency solution they mixed goat milk and whey in the proportion 50% – 50%. The shops that sold the brown cheese, however, reported that their customers found the 'new' brown cheese much better. Since then Ola has continued to make brown cheese of 50% goat milk and 50% goat milk whey. In the process this mixture is 'steamed in' and cooked under low pressure. This results in a solid mass with a brown colour. The colour is due to caramelized lactose. Depending on how much water that is removed the mass becomes soft brown cheese or hard brown cheese. The latter type Ola and Kari produces in a 'plain' and a formed version.

Ola and Kari write a diary during each batch of cheese making.

A visit to farmers that continued delivering goat milk to Tine

Hans and Inge are two of the goat milk producers in Indre Namdal that have not established farm processing of goat milk. They have continued to deliver the goat milk to

[62] A plastic film with special size of pores is needed for the cheese to be able to breathe in store. Skånaliseter and Tine use the same film. This is produced by the German company SüdPack.
[63] It is these proteins that form skin on the top of milk that is heated.

Namdalsmeieriet and, after 1.1.96, to Tine Verdal. Hans and Inge are neighbouring farmers in Namsskogan around 60 km south-west of Skånaliseter. Both farms have access to huge outfield and mountain pastures.

Originally sheep farming was the basic activity on both farms. Around 1980 the farmers – Hans and Inge's fathers – felt that it was necessary to expand their farms. They considered investing in milking cows, but found that milking goats were easier to purchase and relatively cheaper. Goats start to milk when they are one year old, while cows have to be two years. In addition goats normally get two offspring per birth and year, while cows get one. Hence it would take shorter time to build up a herd of milking goats than a herd of milking cows. Goats were also better suited for outfield pastures than cows. An additional factor was that the outlook for sales and price of goat milk seemed good at the time and one could count on abundant state subsidies. Agricultural consultants at the public county administration encouraged farmers in Indre Namdal to start up goat milk production at the time. Hans and Inge's fathers decided to start up. Around 1980 they invested in female kids and new buildings suited for goat milk production. The herds on both farms reached 100-110 milking goats. Both farmers continued their sheep breeding. Hans in addition had 15 nurse cows.

Like the other goat milk farmers in Indre Namdal both farmers from the start delivered their goat milk to Namdalsmeieriet. They continued goat milk production and delivery of goat milk to Namdalsmeieriet also after the shutting down of the brown cheese production there in 1986. As long as they obtained the same price for their goat milk as other goat farmers in Norway, from an economical standpoint, goat milk production represented the best use of the new buildings that they had built for goat milk production in 1980. Nevertheless, Hans and Inge started to feel somewhat insecure after Namdalsmeieriet shut down the production of brown cheese. They started to wonder if Tine would continue to purchase goat milk from Indre Namdal in the future. And if not, would they get quotas for producing cow milk instead? The certainty that they were producing a product that was good enough for human consumption, but all the same ended up as 'pig feed for farmers in Verdal', meant that it was hard for them to put all their heart into goat milk production. Hans' wife also had the same feeling about the goat milk production on their farm, although her main income was obtained from work off the farm. The fact that Tine tested the quality of their goat milk at every

collection by the tank lorry did not change this feeling of meaninglessness. Hans and Inge (who took over after his father in the late 1990s) asked themselves:

> For how long does Tine intend to continue operating like this?

Against this background Hans and Inge thought it was a good thing when Ola and Kari early in 2000 presented plans for expanding Skånaliseter farm dairy and purchasing all goat milk produced in Indre Namdal. All the goat farmers were informed about the plans. For their part Hans and Inge make it a condition that they still can be members of Tine. Hans and Inge look upon Skånaliseter as a small firm and they wonder if Skånaliseter has enough customers for output that will be four times as large. Are their products good enough? Do they have sufficient competence? They want Tine as a guarantor in case Skånaliseter fails with their expanded production.

Both Hans and Inge have sometimes had ideas about starting processing goat milk on the farm combined with some form of tourist business. They have, however, not found it probable that these ideas will be realized. As for the rest there has never been any tradition of goat milk processing on their farms and neither in Namsskogan at large. In addition the production on each farm is so large already that they have no idle labour within the family to handle a new enterprise.

Increased sales – need for more raw material in Skånaliseter

Ever since they established their farm dairy in 1995 Ola and Kari have received inquiries that exceed their capacity. Inquiries come from existing customers and new customers. For the time being they give priority to their existing customers. Their annual sales of cheese in 2000 were about 500.000 kroner. Their goal is 1 million. The limit is therefore not lack of customers; rather it is lack of raw material, goat milk. Ola and Kari have been working for a while to get more goat milk. Indeed they worked implicitly with this problem in 1992-94 when they, together with the other goat farmers, tried to establish a special Tine dairy in Namsskogan, a project which we have seen, failed.

Ola took up the idea again after the establishing of the farm dairy. As last time Tine and the other goat farmers have been negotiating. An agreement was made in the spring of 2000. The other goat farmers do not want to resign from Tine, because Tine in any case is obliged to pay

full price for the goat milk that they produce. On the other hand these farmers are more motivated to produce raw material for a more meaningful use. Ola and Kari, for their part, want additional supplies, but only from sources that can guarantee the quality of the raw material and also can transport it satisfactorily. Tine offered a solution. The solution is briefly that the other eight goat farmers as before sell their entire goat milk to Tine. Tine buys the goat milk, checks the milk quality and transports it to Skånaliseter, which buys it from Tine.

In June 2000 Tine made five test deliveries. Kari made cheese from the 'new' raw material. In one of the batches all the cheese fermented wrongly and had to be scrapped. Personnel from Tine tested the cheese and found Clostridia bacteria in it. Pasteurizing does not kill clostridia. The source of the bacteria was traced to silage bales on one of the farms. Until further notice the delivery of the 'new' goat milk was stopped until Tine together with the goat farmers had solved the problem. Ola and Kari are prepared to insist that the farmers shift from silage to hay, because unwanted bacteria like Clostridia thrive in moist feed. Kari points to a farm dairy in the neighbouring region Jämtland where the farmer says he has obtained a significantly higher price for cheese after guaranteeing that the cheese is manufactured only from milk produced from hay. Kari also is aware that hay is a critical element in the concept of the highly priced Italian Parmesan cheese.

In the autumn of 2000 Ola and Kari enlarged the goatshed from 100 to 115 milking goats. The reason is that Kari then will be able to use the whole capacity of the cheese-making vat. The couple is convinced that the Clostridia problem will be solved, and that Tine can start regular deliveries of goat milk from the other farms in 2001. As a consequence Ola and Kari have already planned to enlarge the cheese factory and the store on Skånaliseter in 2001.

Case 2: A comparison – using cow milk for cheese production in a large dairy in Tine

Handling goat milk from Indre Namdal

Tine Verdal took over the handling of the surplus goat milk from Skånaliseter and all the goat milk from the other goat farmers in Indre Namdal in 1996. Before that Namdalsmeieriet's dairy in Namsos had done this job. As we have explained earlier Namdalsmeieriet merged into the new company Tine Midt-Norge 1.1.1996. A tank lorry collects goat milk in Indre Namdal twice a week. The total amount is about 2000-4000 litres each time. Until 1995 Tine

sold surplus skim cow milk (a by-product from production of butter) to farmers that used it to feed animals. Then the goat milk from Indre Namdal was mixed with the surplus skim cow milk and sold to animal farmers as feed. In 1995 Tine stopped returning skim cow milk to animal farmers. From then on Tine Verdal has mixed the goat milk with cow milk water and sold it to animal farmers as feed. Milk water is a mix of milk residues from pasteurizing and cheese-making and rinsing water from cleaning of equipment.

Tine Verdal has never been quite satisfied with this way of utilizing goat milk. At a certain point in time they applied to Tine Norske Meierier for a quota for making mixed brown cheese ('Gudbrandsdalsost') as in the former Namdalsmeieriet before 1986. Tine Norske Meierier refused the application, and Tine Verdal found it futile to follow it up.

Making cheese of cow milk

Tine Verdal is a member of the company Tine Midt-Norge and is the largest cheese-making dairy in Norway. From November 1st 1999 Tine Verdal became a pure cheese making dairy. Before that the dairy also produced brown cheese and liquid dairy products, among other things drinking milk. Annually the dairy handles about 90 million litres of cow milk, 2000 times more than Skånaliseter. The cow milk is delivered from ca. 1.300 cow milk producers, most of them located within a radius of 50-70 km from the plant. The dairy produces medium hard cheeses of the types Jarlsberg[64], Norvegia (a Gouda type) and Gräddost ('sour cream cheese' – a fatter and more loose-textured cheese). Jarlsberg and Norvegia are manufactured in two fat variants, standard fat (27%) and semi-fat (18%)[65]. This requires cow milk with 3,8% and 2,7% fat respectively. The fat content in the cow milk delivered from the farms is on average higher than 3,8%. Surplus fat (cream) is used in manufacturing Gräddost, which needs cow milk containing 5,7% fat, and Japanprim, a soft brown whey-cheese.

Tine Norske Meierier decided in 1999 that the dairy in Verdal should produce all the Gräddost in Norway. A primary reason for this co-localization was that Gräddost could 'use' surplus fat from the production of the two other cheeses. Since Tine Norske Meierier, together

[64]In the 1960s Department of Dairy Science (now Food Science) sold the recipe and blend of bacteria of Jarlsberg cheese to Norske Meierier. Jarlsberg was the result of a long attempt at the department to reconstruct an old, reputable, 'Norwegian' Swiss cheese produced at Auli, a neighbouring farm to Jarlsberg – the estate of Jarlsberg county – in Vestfold, thus the name Jarlsberg. The production of the Auli cheese started in 1815, but was terminated in 1833 (Kielland 1976: 96-97, Pettersen 1984: 73-74).

[65] Computed in proportion of total mass. In proportion of dry matter (which constitutes 59% of total mass) the fat constitutes 45% and 30% respectively.

with the regional companies, constantly seek better utilization of the resources in the Tine system as a whole, Tine Verdal can never be sure what they will be producing 'tomorrow'. Already in the course of one year their product configuration may be altered due to overriding considerations at company and supra-company level in Tine.

Tine Verdal produces annually 9 million kg cheese; 1,3 million kg Gräddost and 7,7 million kg Jarlsberg and Norvegia. Japanprim comes in addition. This production started in Verdal in 1978, and the product is sold to the Japanese market only. The three white cheeses are restricted for the home market.[66] The fat content in all cheeses is, as for all other Tine products, regulated via Norwegian public nutrition rules. The volume Tine Verdal produces of each product is decided by Tine Norske Meierier in a quota system embracing all Tine dairies. Tine Norske Meierier (through the Research and Development Department) is also responsible for the recipes of each Tine product. Tine Verdal has developed none of the products that they produce. They only produce products that have been developed by the R&D department in Tine or, as in the case of Jarlsberg, have been developed by other firms or institutions and later bought by Tine.

Supply of cow milk

On each of the about 1300 supplying farms, after it is milked, cow milk is stored in cooling tanks at 4° C. Milk is quality-controlled and collected from each farm every third day by tank lorries. Smell and taste is controlled 2-3 times per month. Private transporters, which Tine has long-term contracts with, run the tank lorries. The transport from farms to Tine Verdal goes on seven days a week, from 6 a.m. to 9 p.m.

Cheese-making equipment

The cheese making process in Tine Verdal builds on a highly automated, high capacity technology. This requires standardized raw material in large volumes. Computer programs control much of the process along the line. Based on Tine Verdal's specifications, recipes for the different cheeses have been 'converted' into data programs by the suppliers of the equipment. The task of the co-workers is by and large to control the ingredients, monitor the process on the different displays and, when necessary, adjust the setting of the parameters in relation to variation in the cow milk during the year.

[66] In another Tine dairy is produced 10 kg round Jarlsberg. This type of Jarlsberg is only for export.

Two suppliers delivered the equipment for making cheese, including the data programs. Alfa Laval (a Swedish based company[67]) produced the first part of the production line including the pressing towers. Landteknikk delivered this part of the equipment. APV (a Danish company[68]) produced the rest of the equipment. APV's Norwegian subsidiary delivered this equipment. All types of (real) cheese can in principle be made with the help of the equipment.

The cow milk is pumped from the tank lorries to a buffer store in the factory. From the buffer store the cow milk is moved in a continuous stream in pipes to a standardizing process called 'milk treatment'. Here four things happen. First microbes with own weight more than cow milk, e.g. clostridia, are removed in a *bactofuge* – a special centrifuge – and killed at 140° C. Other microbes are killed in a continual plate *pasteur* at 72° C in 15 seconds. Then, depending on which cheese that is to be made, *fat* is removed or added and *temperature* regulated. The milk treatment is to a large extent regulated via computers and only supervized by employees in a control room near by.

The standardized cow milk is then pumped in a pipeline to new tanks. Here, depending on the cheese to be made, a person manually puts a special blend of bacteria in allotted amount into the cow milk. Tine holds the blend, which is used to make Jarlsberg at their R&D centre in Oslo. Blends of bacteria for Norvegia and Gräddost Tine buys from foreign producers. Two Danish suppliers, Visby and Chr. Hansen, are used for the most part.

Then rennet is put into the cow milk. From here to the pressing towers, the process is done batch-wise. Each batch takes 38 minutes. Different parameters relating to the cow milk to be processed – temperature, pH and time – are controlled by computer programs and supervized by employees in a second control room located a few meters from the tanks. The rennet causes the casein to precipitate. Because the whole substance is kept in constant motion, the casein is precipitated as small grains in the whey, highly suitable for pressing. This is done in pressing towers. Here the grains are pressed in one operation into rectangular blocks of cheese of appropriate compactness. Whey is automatically drained off and sent to another production line where it is mixed with cream left over from the fat standardizing process and processed to Japanprim.

[67] Source: http://www.alfalaval.com
[68] Source: http://www.apv.com

Jarlsberg and Norvegia are pressed in standard, rectangular blocks of 20 kg. In the batches where Gräddost is made, the mass is sent into another press, because Gräddost has to be produced as round cheeses of smaller size. Each cheese is then weighed by an automatic weighing-machine and transported by conveyor to a salt bath. Here the cheese lies in 24 hours. Then the cheese is transported on a new conveyor to a quality point. Here a person takes the cheese in hand and inspects its surface manually. Rejected cheese is put aside, while accepted cheese goes further on the conveyor to an automatic packaging point. Cheese is packaged in plastic film specially designed for cheese, and a person put it on pallets and transports it to a store by truck.

There are three successive stores. In the cold store the temperature is 15°, in the warm store 20° C and in the cooling store 4° C. For example Jarlsberg is typically stored 14 days in cold store, 3 days in warm store and 7-14 days in cooling store. After 1-1½ months the cheese is ripe and evaluated by 'cheese referees' from Tine Norske Meierier. They classify each pallet of cheese according to three predefined quality categories, which results in premium, normal and low price. The results of this evaluation are also used as a criterion when Tine Norske Meierier determines the distribution of production quotas between the dairies each year. Dairies that get high quality scores normally obtain higher production quotas.

Development of equipment and change in competence

The equipment for making cheese in Tine Verdal changed significantly during the 1980s and 1990s. Competence has altered accordingly. Asle, one of the production managers in Tine Verdal, thinks that two changes have been especially important. The coupling of information technology and physical equipment has removed manual work. As Asle says:

> The co-workers do not have to run around in the milk handling process any more to turn valves.

The other important change is that the cheese mass must not be cut manually any more, as a mechanical form press does this job. Asle claims that the change in equipment has given better precision in the cheese-making process and better and more uniform quality of the cheese.

Another consequence is that Tine has changed the estimate for 'economically optimal amount' in a cheese-making dairy, from 3000 tons of cheese per year to 7000 tons of cheese per year. However, this figure is small compared to cheese dairies in for example The Netherlands, Denmark and Finland where an amount of up to 20.000 tons can be made per year. The difference is due to by larger cheese-making tanks and 3 shifts per 24 hours, compared to 2 shifts per 24 hours in Tine Verdal.

As mentioned Tine Norske Meierier in co-operation with the different regional Tine companies evaluate the distribution of activities between the different dairies. According to Asle, the aim of the evaluation is better profitability. Tine thinks that two equally important factors affect profitability: 1) unit costs of products, which have to be constantly reduced, and 2) quality of the products, which have to be continually improved. The transfer and concentration of production of Gräddost to Tine Verdal in 2000 was made with reference to these two points. Tine was convinced that there were idle equipment and competence in Tine Verdal that could be used to produce Gräddost in addition to producing Jarlsberg and Norvegia.

The relative number of skilled co-workers in Tine Verdal has increased over the years. This covers both dairy trained co-workers and technically trained co-workers. The introduction of data assisted production has given rise to more electricians and people trained in automation among the staff; earlier there were more mechanics. Food industrial competence is still very important. Basic education in this subject is given by other institutions than Tine. Tine Verdal extends this basic training themselves or in co-operation with other dairies in Tine. Tine Verdal has many apprentices. The suppliers of equipment give Tine Verdal's co-workers basic training in using the equipment. In relation to the reorganization of the production of Gräddost, much of the existing equipment in the two dairies that had this production before – Tine Snåsa and Tine Finnøy – was moved and installed anew in Tine Verdal. During this installation Tine asked the companies that once delivered the equipment, to assist, which they did. Because of situations like this Tine prefers to have long-term relationships to its equipment suppliers.

Ties to wholesalers and retailers

Tine Verdal is not directly engaged in marketing of the cheese that it produces. In general, all long-term non-perishable products made in Tine dairies in the region stretching from Romsdal

to the Russian border are transported to Tines central store in Heimdal in Trondheim.[69] All products from Tine Verdal are in this category and are in its totality transported to the store in Heimdal. Tine transports fluid products directly from dairy to retail grocery store. 1-2 lorries leave from Verdal each day five days a week. In the central store some of the cheese is grated. The rest is cut in appropriate sizes, equipped with packaging and sent to store in anticipation of orders. Tine's main customers are four large retail chains, The Hakon Group, REMA, Norgesgruppen (a group of independent merchants) and Coop. These run all in all about 35 retail grocery stores in the area which Tine's central store in Heimdal covers.

The retail grocery stores send orders to Tine's central store on fixed days via an EDI-system. The largest customers order each day (five days a week), while the smallest order once a week. Together with other Tine products, products from Tine Verdal are transported on lorries to each retail grocery store. There is only one transportation 'medium' and one route to each retail grocery store. From the retail grocery stores the retailers transport Tine products together with products from other manufacturers to the local shops.

Tine's central store in Heimdal does not give any customer 'special treatment'. Their goal is to offer each customer the ability to have any given product in any volume when they order it. A consumer or a shopkeeper cannot, for example, send an order directly to Tine Verdal or Tine Heimdal and ask for a specially salted, ripened, formed or packaged Jarlsberg cheese or reserve e.g. one batch of Norvegia production for delivery at a special place on a special time. In fact, the retail chains are not interested in such 'special' treatment. Furthermore prices of each Tine product are determined at national level through negotiations between state authorities and farmer's organizations. Consequently price is not a topic of discussion between Tine Heimdal and the retail grocery stores.

Tine Heimdal knows that the retail chains are constantly seeking to decrease their stocks through faster turnover of products. Ability to deliver is therefore what the retail grocery stores first of all expect from Tine Heimdal. This means the right product, in the right volume, at the right place at the right time. On the other hand, Tine Heimdal knows that ability to deliver is an economic question of 'not too much – not too little'. In order to achieve an adaptation which they think is reasonably economic, Tine Heimdal has put each of their

[69] There are two more central stores. A store in Oslo serves Eastern Norway. A store in Klepp (Rogaland) distributes to Southern and Western Norway.

products in one of three classes of importance regarding delivery ability, 99%, 95% and 90% respectively. For instance 99% means that the product is delivered on time in 99 out of 100 cases. In addition the transport must always be efficient, and Tine Heimdal has recently found total outsourcing of its transportation to be most economical.

Regarding prices one can get Jarlsberg and Norvegia for around 60-70 kroner per kg in a retail shop. For Gräddost one has to pay a slightly higher price, but still well under the price for any Skånaliseter cheese.

Part B: Development from the 'provision side'

Case 3: Request from Greek restaurants: Goat milk Feta

During the 1970s and 1980s many immigrants settled in Norway, not least in the Oslo area. In the late 1980s, Greek immigrants, who had established restaurants in Oslo, asked Tine to start production of Feta cheese. Tine was positive towards the request. It was decided that Tine R&D Voll, in co-operation with the goat milk dairy Tine Haukelid in Telemark, should develop a Feta. The Greek restaurants also participated in the development. Feta is originally a Greek cheese, produced from sheep milk, goat milk or a mix of the two. However, a court decision in EU has stated that the Greeks have no copyright of the name Feta, hence Feta made from cow milk can also be made and marketed. Danish dairies for example started in the 1970s large-scale production of Feta purely made from cow milk. However, all recipes for Feta have in common that real, fresh cheese (made of casein) is cut into cubes and pickled in brine (Fankhauser 2000). In brine cheese can be stored for more than a year. It is often used together with olives and pita bread and in Greek salads (Fankhauser 2000).

The Greek restaurants wanted an original, real Feta. Since there had hardly been any sheep milk production in Norway and Tine had never purchased and processed any milk of this type, the only original Feta Tine could produce was a Feta made of goat milk. To choose Tine Haukelid as the dairy to produce the new cheese was not a coincidence. This dairy was one of the few dairies in Tine that processed only goat milk. Most other Tine dairies processed cow milk only and the rest both cow milk and goat milk. Consequently, the latter group of dairies can produce products based on a combination of cow milk and goat milk as well as pure goat milk products, of course. For example they can use a mix of cow milk and goat milk as raw material and produce mixed brown cheese (like Gudbrandsdalsost and Misværost), mixed hard white cheese (like Balsfjord) and mixed soft white cheese (like Snøfrisk). Tine Haukelid was not able to produce mixed products in this way.[70] In 1989 this dairy produced only pure goat brown cheese. This gave casein as a by-product. This casein was transported to another Tine dairy (Tine Tolga) many hundred km away for drying. With a Feta production at Tine

[70] Theoretically, Tine Haukelid had still the possibility to combine milk and goat milk in the product by purchasing some form of milk-based cheese from another dairy and then technically "mount" this cheese on a goat milk-based cheese that Tine Haukelid would produce itself.

Haukelid, Tine could avoid the long transportation of surplus goat milk casein. Feta also represented a more valuable use of the goat milk casein than drying it.

Tine's R&D centre, Tine Haukelid and the Greek restaurants managed in co-operation to develop the Feta, and Tine Haukelid started to produce it in 1989. In addition to being sold to the Greek restaurants, the new Feta was also sold to consumers via some retailers. The volume was quite low, 30-35 tons a year. However, it was not the low volume that led Tine to terminate the production in 1991, but the strong taste in cheese made of goat milk produced in summer. And the longer the Feta was stored, the stronger became the taste. At last the Greek restaurants did not want to purchase Tine's Feta cheese any more.

Tine made no systematic attempt to identify the causes of the problem of strong taste in the Feta. One reason for the lack of attempt was that the import of cheaper Danish Feta made from cow milk increased considerably from 1990. The other reason may be that Tine felt that the name and reputation of their goat Feta had already been destroyed. For their part Tine Haukelid concentrated on continuing the production of pure goat brown cheese as before 1989.

Case 4: One 'traditional' product development: Snøfrisk

In 1993, four years after the Feta project, Tine decided under pressure from its goat farm members (especially in the region of Sunnmøre) to develop a new (real) cheese product based on goat milk:

> The product, which in the beginning was called 'Midas', ended up in Snøfrisk. The project [behind Snøfrisk] was successful in several ways. Midas encompassed both [Tine's] International Department, Department of Marketing, R&D, Organization and after a while [the company] Tine Dairy West, department [dairy] Ørsta. Snøfrisk received many words of praise. … In addition the project contributed to better internal co-operation within [Tine]. (Handlingsplan for geitmelk). (Author's translation from Norwegian.)

The new product needed to compensate for the decrease in sales of the two white goat cheeses Rosendal and Balsfjord and reduce the problem with surplus goat milk and goat milk casein. In addition the sales of pure brown goat cheese also seemed to be decreasing a little.

Already from the start it was clear that the main market for the new product should be foreign. The development process started with an English company carrying out market research in England and Germany on the behalf of Tine. The main finding from this research was that Germany was the most interesting market for a new goat cheese produced in Norway. Such a cheese should have an image of 'clean and pure nature'. In addition it should be soft, since German consumers, more than most other consumers, prefer soft cheeses. Based on these premises, Tine started the development.

Tine chose Tine Ørsta as the dairy to manufacture the new product. This dairy is part of the company Tine Dairy West and is situated in Sunnmøre, a region with relatively many goat farmers. It was members of Tine Dairy West and personnel at Tine Ørsta who took the initiative to develop the product that ended up as Snøfrisk. These persons were also active during the development process. Tine Ørsta already produced a soft cheese from cow milk, and thus had equipment and competence to produce a soft cheese based on goat milk as well. As casein from goat milk forms a looser coagel, it was regarded as easier to make a soft than a hard goat milk based white cheese. On the other hand it is more difficult to distribute a soft cheese, since it is more perishable. But Tine felt that they were relatively competent in distribution of cheese and could take on the extra challenges of handling a more perishable product.

Tine was aware that German consumers, like consumers in many other European countries, were accustomed to goat cheese with a mild taste. Tine found that Norwegian goat milk – also goat milk from Sunnmøre – had a tendency to get a strong taste in summer. However, contrary to Frozen Curd, Snøfrisk (literally 'Snow Fresh') as the new cheese was named, had not to be a pure goat milk product. It was only necessary that the casein be from goat milk, in order to market the new product as a goat milk cheese. The component that gave the strong taste, fat, did not have to be from goat milk. This opportunity has so far been used to secure a mild taste in Snøfrisk. Instead of changing the delivered raw material, goat milk, the fat component in it

(the cream) is substituted with the fat component in cow milk. Fat from Norwegian cow milk has, for different reasons, not the same tendency as fat from Norwegian goat milk to get a tart and rancid (strong) taste. Tine Ørsta already purchased cow milk for the production of other products, so this substitution was quite unproblematic.

But the raw material had to be changed in other dimensions. It was crucial that Tine was able to deliver Snøfrisk all the year round. But the customers did not accept that two deliveries in a row had the same date of production stamped on it. That is, producing extra for the store to meet demands in the future was not an actual solution. On most Norwegian goat farms the goats give birth in February, and thus goat milk production goes on from February to November. Then the goats have to rest for 2-3 months. In co-operation with Tine, goat farmers who supply goat milk to Snøfrisk have managed to shift the time of birth, so that Tine Ørsta get supplies more evenly during the year.

Another question is that in 2001 – after several years with research and development regarding taste in goat milk, mainly a result of Frozen Curd, goat milk delivered to Tine Ørsta also has got a milder taste. As a consequence, Tine plans to produce a variant of Snøfrisk that is based purely of goat milk.

Ordinary production of Snøfrisk started in 1994, the same year as The Winter Olympic Games were held in Lillehammer, and Norwegian culture and products were heavily marketed abroad. Thus Snøfrisk got an extra boost when it was launched. It is produced in four variants: Natural (without admixtures), with mushrooms, juniper berries and dill. The cheese is packaged in a three cornered, white box. With this form the box has rather narrow corners, which gives associations to Norwegian mountains. It was the English marketing company that had the idea for this solution.

In 2001 Tine's subsidiary Tine Norske Meierier GMBH in Hamburg markets Snøfrisk in Germany. Norseland markets Snøfrisk in USA and Canada. Snøfrisk is also sold in Great Britain and Norway. In 2000 the German association of agricultural products (DLG) awarded

Snøfrisk a gold medal. Snøfrisk got 4,95 points out of 5. Among the criteria that were evaluated were nutritional content, taste, consistency and appearance.[71]

Case 5: Inquiry from a foreign cheese maker: Frozen Curd

In 1994 the packing machine in Tine Haukelid broke down. 15 employees were granted leave and the production of real goat brown cheese was stopped.[72] Almost at the same time Tine Norske Meierier received, via its subsidiary in USA – Norseland Inc. – a request from Laura Chenel's Chèvre Inc. in California. This company needed extended deliveries of frozen goat milk curd to be used in the production of various products.[73]

Laura Chenel's Chèvre Inc. in California has produced 'French style' fresh and aged goat's milk cheeses since 1979.[74] The firm is located in the county of Sonoma, a wine district around 100 km north of San Francisco. Laura Chenel runs a dairy and has its own goatherd. Unlike in Norway, goats in California are held within fences and fed with hay, straw and concentrated fodder all the year round. The firm also purchases goat milk from around ten other farms in the district. The number of speciality cheese makers in USA increased significantly in the 1990s, from a handful in the 1980s to about 200 in 1998 (Werlin n. d.). Many of them, like Laura Chenel, process goat milk that is produced on the farm. From most of the goat milk Chenel makes fresh, unripened frozen curd. Under the name Frozen Curd, Chenel has marketed this product as a health product in USA since 1979. Frozen Curd is sold mainly to industrial customers, e.g. 'gourmet' restaurants. It is produced in a pure version (Naturell) and a spiced version (Tine Meieriet Sør 2001) and is used among other things in pizza as flavouring. In addition the company makes ripened goat cheese.

Norseland is a company that markets speciality cheeses in USA and Canada. The company's main task is to market selected Tine cheeses. The cow milk based Jarlsberg has been marketed since 1965, and is the most important. The brand Jarlsberg is regarded uppermost among cheeses imported to USA.[75] Norseland also sells Tine's Norvegia, Ridder and Nøkkelost,

[71] Source: Tine 6.11.2000: Gull til TINE i Tyskland. [http://www.tine.no/kunder/tine/tinepublish.nsf].
[72] Gardsosten nr. 1 1999: 26.
[73] Tine Meieriet Sør. [http://tms.tine.no/drift/haukelid.htm]
[74] Sources: FarmWorld, The Cheese Shop of Ridgewood (1998).
[75] Bondebladet 5. juli 2001, p. 18.

mixed brown cheese, and Snøfrisk.[76] In order to broaden the range of products Norseland has in recent years also started to market cheeses from other companies, Unilever, Tholstrup and – as we will see below – Laura Chenel.[77]

In 1995 Tine decided to start production of Frozen Curd. There were several dairies to choose from (Voss, Vik, Storsteinnes and Haukelid).[78] In the end the board of Tine chose to locate the new production to Tine Haukelid. The farmers supplying goat milk to Tine Haukelid were enthusiastic about the plans for a new production at the dairy.

Tine Haukelid started the production early in 1995. In the beginning, Chenel was very satisfied with the quality of the product. But in April the same year, she complained that the taste of the curd had become too strong. Tine's Frozen Curd continued to have a strong taste the whole summer. She made it clear that she could not purchase more of the product until the taste had become milder. This time, as opposed to the earlier case of Feta production at Haukelid, Tine put much effort in solving the problem. Because she produced Frozen Curd herself, Chenel knew the product and the production of it very well. She sent one of her dairymen to assist Tine Haukelid in improving the process in the dairy.

However, it was discovered that the main problem was not connected to processes in the dairy. It seemed more likely that the problem had to do with the raw material; the goat milk that was supplied to the dairy. Since Frozen Curd was a 100% goat milk based product, it was not possible to solve the taste problem by for example adding or subtracting components in the goat milk. Hence the problem had to be localized and solved in the production of the goat milk and in the transportation and storing of it before it reached the dairy. Tine now asked the Departments of Food Science and Animal Science at the Norwegian Agricultural University for help. In addition, personnel at Tine's own departments for Organization and Research & Development took part in the effort to find the causes of the problem and solve it. Tine's Department of Organization deals with questions related to animal health, breeding, feeding and milking operations, while the R&D department deals with product development and new and improved technological solutions. A project group with participants from the

[76] Bondebladet 16. august 2001, p. 18.
[77] Tine's nyhetsarkiv 22.06.2000 [http://www.tine.no]
[78] Tine Meieriet Sør BA [http://tms.tine.no/drift/haukelid.htm]

organizations mentioned above was set up. The project went on from 1995 to 1999. The group identified three problem areas related to strong taste in the goat milk: feeding, breeding and transportation and storage.

Taste problems – change of feeding

Personnel at The Department of Food Science and The Department of Animal Science co-operated to research the connection between taste and feeding. Anne – today (2002) associate professor – was one of the main participants from Department of Food Science. Clara – a doctoral student – was one of the leading persons from Department of Animal Science. Anne had already become involved in the problems regarding goat milk quality in 1994, at Haukelid, in other words before the problems related to Frozen Curd happened. Anne is especially interested in fermentation and ripening processes in cheese.

Chenel had complained about strong taste. Since Tine and the various panels of taste referees set up to evaluate taste traditionally had perceived strong taste as a positive quality of goat milk, the very notion of taste had to be re-evaluated. For example, Anne found in an experiment at The Department of Food Science that a sensory panel of older 'taste referees' gave a sample of goat milk that was fresh (about four hours old) the description 'normal', whereas a younger taste panel classified the same sample as tart and rancid. This convinced Anne that the 'right taste' of goat milk might vary from generation to generation. Earlier it had been usual to operate with a scale from 1 to 5 when characterizing taste in goat milk. 1 represented 'weak taste' while 5 meant 'strong taste'. Instead, Anne and Clara proposed to divide the taste into three components, goat taste, rancid taste and tart taste (Skeie 1998). Goat milk with goat taste has a distinct[79] taste that is easy to distinguish from the taste of cow milk, but is neither rancid nor tart, they claimed. In this scheme strong taste is entirely tied to the two latter elements and is a negative feature of goat milk, they claimed. Consequently, the causes of rancid and tart taste in the goat milk that Tine Haukelid purchased had to be found and fought.

Anne and Clara now carried out some experiments at a small number of goat farms. From the experiments they learned that goat milk produced on mountain pastures, especially late in

[79] On the question of how goat milk tastes one goat milk producer in Canada answers that the 'slightly sweet taste [of goat milk] often has been described as "hazelnutty" ' (Zandbergen Farms Ltd. 1996).

summer, tended to have a stronger taste than goat milk produced during other seasons. The main finding from their research was that strong taste was mostly related to the *amount of free fatty acids* in the goat milk. At the outset, the fat in milk is contained in globules enclosed by a membrane. Free fatty acids are produced when the membrane is broken. Then an enzyme – lipase – attacks the fat molecules and splits them into free fatty acids. This is a process called *lipolysis* and which subsequently gives rancid and tart taste.

What Anne and Clara were able to show, was that *lipolysis was related to feeding*. In an article (Eknæs et al. 1998) they and two colleagues write that rancid and tart flavour is negatively correlated (r = –0,2 to –0,5) to the dry matter content in the milk. They found that reduced dry matter content of milk was related to a negative energy balance resulting from low energy intake, high milk yield or both. From this connection, Clara and her colleagues stated a hypothesis; *energy deficit is the main cause of lipolysis and thus strong taste in goat milk*. An energy deficit means that the goats mobilize energy resources from their own bodies in addition to exploiting the fodder they eat. Energy deficit occurs especially late in the grazing season when the weather is colder and more humid and there is less and poorer grazing, which urges the milking goats to make more and longer grazing trips.

Clara now advises farmers who find that their milking goats produce 'strong milk' in the out-door period to avoid the top of the lactation curve falling in the late mountain grazing period. This can to some extent be regulated through the timing of the goats' kidding. However, more important in Clara's view is it to avoid the lactation curve becoming steep. A moderate lactation curve is better; very high yields are often connected to low content of dry matter in the milk and thus tart and rancid taste. The lactation curve can be evened out if the goats gradually get more feed before and around kidding.

But type and quality of feed were found to matter maybe the most. First of all it is a question of versatile feed with a quality that suits goats that produce milk. To investigate the significance of high quality fodder, Clara and her colleagues carried out an experiment. 24 milking goats in-door were given as much hay as they could eat (appetite feeding) in 48 hours and 24 other goats grazed outdoors for 48 hours on a mountain pasture. Only 10% of the goats in the first group produced milk with off-flavour, while 90% of the goats in the last group

produced milk with unacceptable flavour. Clara concluded that to allot additional feed in the late grazing season could prevent energy imbalance.

In direct co-operation with the project, Felleskjøpet – a farmers' supply co-operative – therefore developed and started to produce a special feed concentrate for milking goats (FORMEL) (Felleskjøpet Øst Vest 2001). This feed could complement grass fodder, prevent energy deficit and thus contribute to reducing the occurrence of off-flavour in goat milk.

In the beginning Clara had to measure the status of the goats regarding their energy balance by feeling with her hands and looking at the 'firmness' of their bodies. Judging firmness from the outside could only give a very rough estimation of energy balance at a certain time and change from time to time. Because of this measurement problem, Clara looked for an interior method that did not destroy the subject of measurement – the goat. An instrument called x-ray tomograph, which the Department of Animal Science had purchased in the 1980s, caught her eye.

The x-ray tomograph was developed in the 1970s and by 1980 it had become a rather well known and common instrument by which to screen internal structures of human patients. The Department bought such an instrument in order to measure, among other things, fat marbling in pigs. In 2000, Clara gained access to the Department's tomograph and could measure the energy status of 'her' goats much more precisely. She measured energy status of 12 of her experimental milking goats at 6 different points in time; before, during and after mountain pasture. At the same times she also measured milk yield, milk composition, evaluated its taste and measured certain blood parameters of the goats. Until the time of our interview, she had been able only to do provisional evaluation of the data. But as far as she could assess, they confirmed Anne's and her earlier findings that milking goats mobilize energy resources from their own bodies during the first months of lactation. This mobilization results in higher frequency of lipolysis in the milk, especially in the last part of the grazing season. According to Clara, to prevent off-flavour in goat milk, the goats should be fed towards their energy balance point.

Taste problems – changing breeding goals[80]

Contrary to feeding, breeding is a much more long term undertaking. In 1997 Anne and Clara investigated 50 milking goats from the herd at the Agricultural University and found that 5 animals (10%) produced milk with a strong (rancid and tart) taste. In 1998 they investigated 60 milking goats of the same herd and got a similar result. Since Anne and Clara obtained data from animals representing several generations in these investigations, they were also able to conclude that the characteristics of producing strong milk was due to heredity. Consequently systematic work to identify and remove individual animals producing strong milk in individual herds is one way to obtain a more mild-tasting goat milk.

However, breeding organized above the farm level is also important. The Norwegian Association for Sheep- and Goat Breeding (Norsk Sau- og Geitalslag – NSG) have worked to develop what they term 'the Norwegian goat race' for many years. NSG is a member organization for sheep farmers and goat farmers in Norway and is responsible for the goat breeding in Norway. The National Goat Breeding Board (Landsrådet for geiteavl) gives advice to NSG when it comes to goat breeding. This board consists of different competencies and represents different organizations. Two goat farmers, of whom one heads the board, represent NSG. There is one member from Tine and one from Department of Animal Science on the board. The Ministry of Agriculture is represented by the animal consultant (Fylkesagronom i husdyrbruk) at one of the County Governor Offices. NSG alone has not sufficient expertise to carry out the organized system of goat breeding. In addition breeding scientists at the Department of Animal Science and regional consultants in Tine contribute in specific ways.

One main task of the board is to shape the goat breeding goals. In general, animals that produce good milk, have efficient exploitation of natural resources, and good health and fertility are chosen for further breeding. Regarding the feature 'milk', high yield was the primary goal until 1996. Then the board changed the goal and introduced a new formulation: 'Develop a goat that produces milk with good and distinct taste'. High yield was not a goal in itself any more. However, obtaining a reliable and valid measure of the taste of the milk from every milking goat in the country is a too complicated undertaking. But it is known that goat

[80] Much of this part of the chapter draws upon information provided by Norsk Sau- og Geitalslag (2001) [http://www.nsg.no] and a telephone interview with one of their consultants.

milk with a high relative portion of dry matter has a more mild taste. Therefore the breeding board doubled the weight that was put on the parameter 'relative portion of dry matter in the milk' when crossing within the population of Norwegian goats. In addition genes from the Swiss race Saanen has been used. Saanen goats are recognized as the best milking goats in the world (Haenlein & Ace 1984), and they produce milk with a mild taste.

That this change in the breeding goals occurred in 1996 was not a coincidence. It was a direct result of the problems of strong taste in Frozen Curd that Tine experienced in 1995 combined with the fact that Tine had a representative in the breeding board. And as a participant in the breeding board, Tine could directly influence the actors who were responsible for and carried out goat breeding.

Taste problems – changing storage and transportation

Feed and genetics are two – of many influences – affecting goat milk. Transportation and storage facilities are a third group. Since, in the case of Frozen Curd, the processing of the goat milk was organized in such a way as to take care of milk produced at many farms, the milk had to be transported from (all) these farms to the dairy. This demanded specific transport facilities and storage facilities. That is, one could not take it for granted that fresh goat milk on the farm had the same taste as the goat milk that arrived at the gate of the dairy.

Tine's Department of Research & Development work to improve the transport and storage facilities so that the taste of the goat milk remains mild along the way from the farms to the dairy. In the case of Tine Haukelid, goat milk is transported to the dairy from farms that are situated up to 350 km away. Tine has chosen to collect milk every third day, which of course has the consequence that milk has to be stored on the farms for up to so long. On the farm the normal practice is, immediately after milking with milking machine, to pump the milk into a pipe leading to a cooling tank. In the cooling tank there is an agitator. Agitation implies that all the milk is mixed, that the fat does not rise to the top, and that all the milk at no time gets warmer than +4° C. Until around 2000 the tank solution with the agitator has been the same for cow milk and goat milk in the Tine system. Since cow milk is produced in far larger volumes than goat milk, the design of the agitator has been made on the basis of requirements for cow milk:

> Goat milk does not have the same need to be agitated as the distribution of fat is easier to maintain in goat milk [than in cow milk]. (David, a consultant in Tine R&D)

This has to do with the fact that goat milk, in contrast to cow milk, lacks agglutinin (Skeie 1998: 308). The supplier of milk tanks, Landteknikk, started to deliver tanks in which it was possible to program the intensity of agitation. David and his colleagues believed that the fat in goat milk had been too intensely treated in the former type of tank and started to experiment with lower intensity. However, their analysis showed that there was no less splitting of fat (into fatty acids) when the intensity of the agitation was reduced.

David and his colleagues have also been working to find other improvements regarding transportation and storing of goat milk. One is based on the observation that *lipases are inactivated at temperatures above 60-70°C*. Some farmers are taking part in this work by letting David use their milk handling facilities in his experiments. David envisages two technical solutions. One is to plug in a *heater* on the milk pipe between the milking machine and the cooling tank. In addition a small water cooler has to be plugged in after the heater to bring the temperature in the milk down to the level it had before it entered the heater. This solution will be quite expensive and is considered only for livestock where so-called spontaneous lipolysis is a serious problem. Spontaneous lipolysis is lipolysis that starts immediately after milking. David carried out a small-scale experiment in the summer of 2000 in a setting where the goats grazed on a mountain pasture. He experienced what he terms 'dramatic effects'. Goat milk that was heated was almost without exception classified as having 'mild taste', '1. class' and 'low content of free fatty acids'. Contrary to this, untreated goat milk generally obtained the classification 'tart and rancid taste', '2. or 3. class' and 'high content of free fatty acids'. In 2001 David plans to carry out the 'inactivation experiment' on a larger scale.

A cheaper solution is to heat up the goat milk after it has been pumped from the tank on the farm to the tank lorry that transports the goat milk to the dairy. In this case, the lorry must be equipped with two tanks. Untreated goat milk (from the tank on the farm) is pumped into a small buffer tank. During the trip to the next farm this milk is pumped into the heater and then the cooler before it enters the largest tank on the lorry. In the autumn of 2002 Tine will decide

whether a prototype of such a 'rolling dairy' shall be installed. If so, Tine will start to use the prototype in 2003.

Half versus full tank during transportation to the dairy also makes a difference. One of David's colleagues carried out an experiment and found that if the tank was full, the goat milk had fewer free fatty acids after the transportation than when the tank was half full. The explanation is that in the former case the goat milk does not 'splash' so much. Splashing may destroy the membrane around the fat globules so that fat is released and can be attacked by the lipase enzyme.

On her side Anne has made experiments and found that goat milk that was 72 hours old had a significantly stronger taste than goat milk that was 4 hours old. Clara points to France where it is common to make cheese the same day as the goat is milked, because the quality of the raw material is regarded as being better then.[81]

Epilogue 2002: Satisfactory goat milk – Tine Norseland starts to sell Chenel products

In March 2001 the director at Tine Haukelid was able to report that the situation regarding taste of the goat milk had improved considerably. He now considers that the production of Frozen Curd is 'on track.' Already in 1995, when they first experienced taste problems, Tine Haukelid started a new routine with weekly evaluations of the taste of each producer's goat milk. The practice until then had been to measure taste in samples from each carload arriving in the dairy. Carloads consist of a mix of goat milk from many farms and thus do not tell anything about the quality of goat milk from single farms. Since then Tine Haukelid have, for the production of Frozen Curd, only used goat milk with no taste defects from the farms. Goat milk with taste defects is, however, collected, but is priced less[82] and sold as feed.[83]

[81] At first sight it may seem difficult to avoid splashing during transportation *and* collect the goat milk when it is fresh as long as the total volume of milk delivered to the dairy varies during the year. Avoidance of splashing demands full tank and therefore infrequent collection of milk from the farms. Collecting fresh milk demands frequent collection. However, it is – at least theoretically – possible to solve this problem with a lorry tank with flexible volume, for example with a kind of piston in it.
[82] Bondebladet 7. september 2000, p. 15.
[83] Gardsosten nr. 1 1999: 26.

In August and September 1997 the whole production of Frozen Curd at Tine Haukelid was stopped.[84] In 1998 – the first year with full round-the-year production of Frozen Curd – 65% of the goat milk had to be rejected because of too strong a taste. In 2000, the figure had declined to 15%. Since then the figure has changed very little, which means that the dairy still has to sort all the incoming goat milk. But all in all the director boasts of the suppliers:

> They have been very motivated and have made a redoubtable contribution in changing the quality of the goat milk that they deliver. Without this effort our dairy would have had no chance… Now, with the new quality of the goat milk we can even go further and develop new products that we can produce and market.

In the director's opinion (interview June 2002) the reason for the improvement in quality of the goat milk is not solely a question of new fodder and improved feeding routines among the suppliers. Neither is it solely a question of outdoor conditions. It is a compound problem, which includes climate *and* feeding, indoors *as well as* outdoors. For example, he finds that farmers who manage to establish good ventilation in their barns deliver better goat milk. This is due to the fact that milking goats staying in stalls with bad ventilation lose their appetite and hence eat less. Moreover, most of the bulk fodder used in the indoor season is silage, and this loses quality during the season. Hence it is 'worst' late in the indoor season, which in this case means April. Thus it is as important to provide extra concentrated fodder then as it is in the outdoor season.

Case 6: Turning feed to food: 'Taiwan Powder'

Due to much air pollution, respiratory infections are common among Taiwanese people. Chinese medicine emphasizes holism, prevention and natural food. Goat milk is seen as a natural article that prevents and eases asthma and other respiratory infections and gives better immunity (Kvam 1999:20). As a consequence, Taiwanese people consume quite a lot of goat milk. The capacity for goat milk production in Taiwan is limited, and most of the goat milk is imported, mainly in the form of dried goat milk powder. In 1999 The Norwegian Trade Council informed Tine that more goat milk was needed on Taiwan. Tine made contacts with an import company on the island. Because people in East Asia have problems with digesting

[84] Tine Årsmelding 1998.

lactose, the company suggested that Tine started to deliver dried, lactose reduced goat milk powder to Taiwan with the company as 'middle man'. Such a product would be a new and unique product on the Taiwanese market.

This request was interesting for Tine, since the company had for many years produced goat milk powder in many factories, and thus had the knowledge and facilities for such production. Tine's factory in Brumunddal was in a special position, because here Tine also had facilities and expertise for research on the drying of milk. The production of goat milk powder was more occasional and was carried out mainly in times of surplus production of goat milk. The goat milk powder was sold and used mainly as animal feed, among other things for puppies, because goat milk gives them nice and shiny fur. The price Tine got for this powder was quite low. Goat milk powder sold to Taiwan would result in a better price. Tine therefore decided to start to produce a specially adjusted goat milk powder for the Taiwanese importer. The special adjustment consists, in addition to the reduction of lactose, in artificially adding the vitamins A and D, and packing in special metal boxes. Tine buys the vitamins in the form of a mixture from a specialized producer of food additives. Special metal boxes are needed because of the very humid climate in Taiwan. The importing company sells the product under its own brand. Tine Brumunddal started to produce the product in 1999[85]. Also in this production Tine had experienced problems of strong taste in June and July. However, since dried milk powder is non-perishable (the contract between the importer and Tine states 2 years durability), Tine Brumunddal has concentrated the production of Taiwan Powder in periods when there are no taste problems, in spring and autumn.

Tine is not the only actor on the East-Asian market for goat milk powder. Thus it is important for Tine to convince consumers in Taiwan that Tine's goat milk powder has unique qualities compared to other goat milk powder products. Scientifically based documentation about the Norwegian goat breed and goat milk is therefore needed. There is still a lack of knowledge regarding what the body tolerates and does not tolerate and dissimilarities between different peoples. Betty, professor at the Department of Food Science at the Norwegian Agricultural University, cannot recall any documentation so far that goat milk has specific health or nutritional effects on East-Asian people. The uniqueness of 'Taiwan Powder' is, in her

[85] In the spring of 2001 Tine has temporarily stopped the production of Taiwan Powder.

opinion, more a matter of belief. If there are 'real' effects, these are most likely tied to the specific mineral composition of goat milk, mineral-binding proteins in the goat milk and the specific protein composition (lack of α_{s1} casein). Regarding allergic reactions these are always tied to proteins and protein structures. Betty admits that it is commonly recognized among scientists, that cow milk allergic people can tolerate goat milk. Haenlein & Ace (1984:E1 p. 2-3) put it this way:

> The quality of curd is judged on… 2. Relative size of flakes – formed by the addition of strong acid to milk, causing curd flakes to precipitate. It can be seen that goat milk forms finer flakes more rapidly than [cow] milk, which tend to form large lumps and more slowly. This test tends to *duplicate reactions that occurs in the stomach, and demonstrates why goat milk is more easily and rapidly digested*. (Italics added by the author.)

A reasonable conclusion then, is that different peoples in the world have different abilities to digest proteins from different types of milk. Since goat milk protein is more easily and rapidly digested than cow milk protein, people who cannot digest the latter, may well be able to digest the former. Haenlein & Ace (1984:E1) also refer to practical findings where motherless foals and puppies, for lack of mother's milk, have survived on goat milk, but not on cow milk.

Case 7: A bad feature for one use can be good for another: UHT goat milk

Anne at Department of Food Science at the Norwegian University of Agriculture does not regard goat milk casein as good as cow milk casein when it comes to making cheese. Thus, for Tine, to make 1 kg white cheese from cow milk is less costly than to make 1 kg white cheese from goat milk, even if the raw material has the same cost. This cost disadvantage becomes especially severe when one uses large-scale equipment and produces cheese in large blocks, say 10 kg. The reason is, as referred to in the case of Taiwan Powder, that when goat milk is exposed to the digestive enzyme rennet, the resulting coagel does not hang together in such big lumps as a cow milk coagel. Thus, it is difficult to produce white cheese of goat milk in blocks of, say, 10 kg. An additional effect is that relatively less goat milk casein enters into the coagel. Thus, a larger proportion of the casein can be utilized as cheese when cow milk is used as raw material than when goat milk is used as raw material.

However, this difference in the quality of cow milk compared to goat milk, represents a relative advantage and not an absolute advantage. Because, when the goat milk is processed in the stomach and not by cheese making equipment, the advantage/disadvantage problem is turned on its head. Then, milk that has casein that produces a loose coagel becomes an advantage, because casein that forms a loose coagel is easier to digest and take up in the body. This difference has also to be further qualified. A stomach of a native Norwegian for example normally has few problems with digesting cow milk casein, while a stomach of someone from Asia, Africa or Latin-America in many cases is not able to digest cow milk at all, neither its casein nor its lactose. In other words, the latter type of person is allergic to cow milk casein.[86]

From 1968 on, Tine, in its dairy in Ålesund has produced goat milk for drinking. This milk is treated with Ultra High Temperature (+145° C) in a few seconds (UHT Treatment). All microbial life in the milk is killed in this process. To remain free of microbes, UHT treated goat milk has to be stored in aseptic packages, so that microbes from outside do not enter into it. Because of the combination of UHT treatment and aseptic packaging, this goat milk is non-perishable. In addition, a digestive enzyme splits the lactose in the goat milk. Especially people of non-European origin lack this enzyme. Thus, the lactose in the UHT goat milk is 'ready digested'. Regarding the fat component in goat milk, this component exists in the form of globules that are 1/5 of the size of the fat globules in cow milk. Thus the fat in goat milk is more evenly dispersed and does not need to be artificially homogenized if used for drinking. Fat globules in cow milk on the other hand, because they are bigger, rise up to the surface as cream. Therefore cow milk for drinking is normally artificially homogenized through high-pressure treatment. UHT treatment, however, transforms the small fat globules in goat milk into larger units in the form of liquid fat. Therefore Tine Ålesund must homogenize the UHT treated goat milk, as they do with cow milk. Conventional, perishable goat milk for drinking is not produced in Norway.

Tine's UHT goat milk, then, differs from conventional (cow) milk for drinking in three ways: it is non-perishable, it is lactose reduced, and it contains casein that is more easily digested. The microbial life is similar in cow milk and goat milk. The lactose in cow milk and goat milk is also by and large similar. For that matter, a non-perishable, lactose reduced drinking milk

[86] Allergy is by definition related to proteins. Casein is a protein. Lactose, on the other hand, is not a protein. Thus

could also have been produced of cow milk. But because of the specific casein in it cow milk is not an alternative for non-Europeans and non-North-Americans that have settled in Norway and who want to drink animal milk. Goat milk is a 'closer' alternative. In addition this group of people are by and large lactose intolerant. Therefore Tine produces UHT goat milk that in addition is lactose reduced. Also some 'native' Norwegians are lactose intolerant and can not drink natural milk. Thus, lactose reduced UHT goat milk is an alternative also for this group of Norwegians.

Why then the UHT treatment and aseptic packaging of this goat milk? The reason is that UHT milk originally was made for another user group: people that stayed at sea for long periods (seamen and fishermen). These categories of customers still exist, and thus, some kind of UHT treated milk has to be produced anyway.

On top of this, Tine has for some years sold UHT goat milk to a Belgian health shop. The customers of this shop emphasize the unique nutritional composition of goat milk in general and value its role together with other foodstuffs in a versatile, healthy diet. It would be quite expensive to deliver ordinary liquid goat milk from Ålesund to Belgium, as it would require deliveries several times a week. UHT milk, on the other hand, can be delivered at much longer intervals.

An additional cause for UHT treatment and aseptic packaging is that a main reason for keeping milking goats in Norway is that they graze on outfield pastures. The goats need most fodder in the period when they are milking (the lactation period). Because of this, nearly all the milking goats in Norway are set to bring forth in the period January-March, so that they can get much of the fodder on outfield pastures when they produce milk. Since the goats have to pause 2-3 months before the next lactation, Tine Ålesund could not have delivered conventionally packaged goat milk in this period. But when the goat milk is UHT treated, Tine can deliver goat milk for drinking all the year round.

There are at least three reasons why Tine produces its UHT-milk in Ålesund. As long as the UHT milk is goat milk, it is advantageous to produce it in a geographical location that is near

---

it is not correct to use the term lactose allergy. Instead the term lactose intolerance is used.

to where the raw material is produced. Ålesund is the 'capital' of Sunnmøre, a district where there are many goat farmers. The other reason is that Ålesund is a centre for the fishing fleet, and thus the transport of UHT milk from the dairy to the boats is very short. In addition the aseptic packaging equipment and competence at Tine Ålesund are also used in the manufacture of vanilla sauce, vanilla cream and certain puddings. These products are based on cow milk and have to be made non-perishable as well.

New questions emerging from the cases given our approach

We have described seven cases about how the use of the focal resource changed after 'the beginning' described in chapter 1. Each case presents development in the use of the resource within a business network context – especially what we can call the 'Norwegian milk network.' In this way the cases 'answer' the question that we asked in chapter 2 – in what way did the use of the specific resource that we met in chapter 1 develop? However, each individual case and the cases as a whole also lead to further questions; that is, more specific questions concerning the changed use of the resource within 'its' business networks. Some possible questions (related to a theme that we regard important in each case) are given in the table below.[87]

We will not address the specific questions asked in the table directly. They have been formulated primarily to demonstrate that a case story not necessarily constitutes the direct answer – the end – of something. It can also lead to new problems and thus rather be a start of something. Nevertheless, we have advanced; the problem now seems much narrower than at the end of chapter 1; the resource-use problem has turned into a resource development problem. Hence, one way to advance in relation to the problem at this stage is thus to become more specific concerning the conceptual apparatus and then return for an analysis of the problem.

[87] Note that the term 'big' actor refers to Norske Meierier/Tine and the term 'small' actor points to Skånaliseter. In the same way the term 'big' resource points to cow milk, while 'small' resource refers to goat milk.

Table 3-1: Some themes and related questions arising from the case stories.

Case story	
1. Skånaliseter	Theme: A supplier (a 'small' actor) of the resource develops a new use of it. Questions: What are the important changes in the 'resource – network' relation leading to take over of the use of the resource by the 'small' actor? What consequences have the take-over for the 'resource – network' relation?
2. Tine Verdal	Theme: Comparing a 'small' actor's use of the resource and a 'big' actor's similar use of the 'big' resource (cow milk) in the milk network. Question: What characterizes the 'small' actor's resource (goat milk) in relation to *its* network context compared to the 'big' actor's 'big' resource (cow milk), when used to produce similar products (cheese), in relation to *its* network context?
3. Feta	Theme: The 'big' actor accepts an enquiry to use the resource to produce a traditional, existing product for a group of new customers, but fails. Questions: What is it with the 'resource – network' relation that causes the 'big' actor to terminate the production of the traditional, existing product Was the project a complete failure?
4. Snøfrisk	Theme: The 'big' actor develops a completely new product made of the resource. Questions: What are the important changes in the 'resource – network' relation that leads to the development, and is this development related to case 3?
5. Frozen Curd	Theme: The 'big' actor accepts an enquiry from a new customer to become an additional supplier of a certain product made from the resource. Question: What are the important changes in the 'resource – network' relation leading the 'big actor' to change a feature in the resource in this case and not in case 3?
6.Taiwan Powder	Theme: The 'big' actor receives an idea about a product from a foreign actor and modifies an existing product made of the resource to realize the idea. Question: What are the important changes in the 'resource – network' relation in this case?
7. UHT goat milk	Theme: The 'big' actor experiences demographic changes in the market and find new uses of one of its existing products made from the resource. Question: What are the important changes in the 'resource – network' relation in this case?
The case stories 'as a whole'	Theme: The 'big' actor in the network's use of one *component* (casein) in the resource compared to the 'small' actor's use of the same component. Question: What characterizes the relation between the (casein) component and the network in case of, respectively, the 'big' actor and the 'small' actor?

Chapter 4 Development in a Network Perspective

> If there are circumstances in which a businessman acquainted with the properties of the resources at his disposal (including his own abilities) says to himself regarding a particular resource, 'there ought to be some way in which I can use that', and subsequently proceeds to explore the possibilities of using it, then we can fairly conclude that he believes there are productive services inherent in that resource about which as yet he knows little or nothing. (Penrose 1995: 77)

Let this quotation serve as a starting point when we now set out to respond to the theoretical problem raised at the end of chapter 2, namely what actors can do to improve the use of a resource that is subordinate in a business network. We found there that the interplay between the resource and its context – the business network – was important. In pursuit of this we decided to investigate further what makes a business network dynamic, because we thought that this would affect in important ways how value is created in a resource. We also asked ourselves what the role of actors in a business network might be when it comes to improving the use and value of a resource.

It is thus clear that this response for the main part must be based on thinking – our thinking and other researchers' thoughts on the topic. Nevertheless, we will 'employ to good purpose' some of the empirical material presented in the previous chapter; that is, we will try to extend our theoretical thinking by using empirical examples from this chapter. On the other hand, the purpose of this chapter 4 is not to *analyse* the empirical material. Such an examination will be the task of chapter 5.

Actual and potential uses

The quotation above pointed out that in any resource, beyond the actual uses there are potential uses (cf. Penrose 1995: 25). We touched upon this in chapter 2 when we stated that actors can treat resources as given or 'open' (cf. Håkansson & Snehota 1995: 135-136). The important thing to remember here is that it is not the case that one of these perspectives is wrong and the other right. Thus, when we now decide to have a closer look at the topic of potential uses, it is not because the issue of actual uses is wrong or irrelevant. The reason why we choose to ponder on the issue of potential uses in particular follows from the specific theoretical problem that we formulated at the end of chapter 2 and which we repeated above. This means that scarcity, availability and control of resources will not be in focus in this chapter; what we will focus on is resource development.

Reflecting on the cases described in the previous chapter, resource development seems to be a question of actors believing 'strongly enough' in potential uses of a resource and who in addition are interested in obtaining knowledge – or learning – about potential uses. Case 1 presents an example of an actor who both believes that there are potential uses in a resource (goat milk) and who also acts in order to discover new uses.[88] We also see in this case that learning is accompanied by 'power play' and fighting for the resource. Moreover, the case also describes actors who certainly believe in the existence of potential uses, but who are not interested in searching for such uses.

What is a resource then? We hinted at this in chapter 2 when we stated that any element that some actor regards as valuable 'counts' as a resource. Thus, Emerson (1981: 41) proposes that:

> [Possessions and capabilites] we shall call […] *resources* if they are valued by specific other actors. (Emerson 1981: 41).

This means that elements, like possessions and capabilities, which are not valued by specific other actors are not resources. Håkansson & Snehota (1995) state that with knowledge of use, including knowledge of potential use, any element changes status from 'element-that-is-not-a-resource' to 'element-that-is-a-resource.' Referring to Penrose (1995), Holmen (2000: 6)

argues for a less restrictive definition of resources and claims that an element that has *potential, but unknown* use for an actor also must qualify as a resource. Here we must understand the term actor to denote *specific* actor and not actor in the abstract. If not, all elements in the universe would qualify as resources, because we could not deny the possibility that any element *some* time in the future will be found useful by *some* actor. Thus, Holmen (2000) seem to claim that any element that some (concrete) actor is *convinced* has potential use, is a resource, regardless if he or she *knows* or *applies* specific uses to the element or not.[89] Understood in this way a resource can be defined (and also identified) as an element that some concrete actor regards as useful. This definition recognizes that use is basic when it comes to resources, but that this use need not be the actual use at a certain point in time at a specific location in space.[90]

Resource heterogeneity

Actors will never reach a 'state of balance' where there are no more 'unused uses' of a resource; hence there will be *a continuing availability of unused productive services*[91] (Penrose 1995: 68). Firstly, resources may be *indivisible;* in which case there can be idle capacity. In case 2 we learn that Tine Verdal does not use its production equipment between 9 p.m. and 6 a.m. Hence, the equipment is an idle resource during this time. Secondly, even if a resource is not idle, there will always be a potential to use it better in the form of *specializing* in the properties of the resource that are most valuable. This may be a reason why Norske Meierier in the 1980s concentrated on making brown cheese of goat milk. In both these cases we talk about kinds of uses that are already carried out to some degree, and potential use, then, concerns possibilities of increasing the *degree* of these uses, e.g. by selling more of a product.

---

[88] We recognize that there is an economic motive behind these activities, but this need not trouble us here.
[89] It is tempting here to call forth the Norwegian fairy-tale of the Askeladd who silenced the princess (Asbjørnsen & Mo 1982, I: 408). On his way together with his two brothers to the King's estate he finds various things, like a dead magpie. The brothers regard these things as useless – that is, elements, but not resources. The Askeladd, on the other hand, collects the things he finds systematically and with help of these he is able to silence the princess and win her and half the kingdom. He does not seem to know *exactly* what the things can be used for, only *that* the things can be used in the activity of silencing the princess. However, this example can also illustrate that there is a continuum between knowing concrete uses of an element and conviction that an element can be used.
[90] This explains also why it can be wise to discuss resources separate from activities in a business network.
[91] We prefer the term use, which we perceive as denoting the same as service.

But there is also a third type of potential uses; *new uses*. In a way this represents the 'opposite' of the second type of potential use in that here we are interested in the diversity of uses of a resource. Penrose (1995:74) points to this as the *heterogeneity* of resources. Of course, the situation may be that a resource 'already' has different actual uses. Thus, the heterogeneity concept refers to more than potential (new) uses. For example, in chapter 1 we are informed that Norske Meierier uses goat milk to produce more than one product. Hence, Norwegian goat milk in the 1980s was a resource that exhibited *heterogeneity in use* (Håkansson & Snehota 1995). Since use of a resource requires that it be combined with some other resources, heterogeneity points to the diverse combinations that one and the same resource may enter. As mentioned in chapter 2 this means that the value of a resource is determined by how it is combined with other resources, and to the extent that the combinations differ the value of the resource may also differ. Hence, searching for potential uses of a resource has to do with finding new value for it.

Actual heterogeneity seems to have much in common with the term *variety* of resources (Håkansson & Waluszewski 1999), which is regarded as a precondition for learning (Håkansson et al. 1999):

> A large number of interfaces[92] [between resources] increase the variation, which is one basic condition for learning (p. 445).

As we identified learning as a precondition for resource development, actual heterogeneity (or variety), then, should facilitate development.[93] Penrose (1995:76) finds that development of resources can occur if the people who work with them get different ideas about how they can be used:

> … there is an interaction between the two kinds of resources of a firm – its personnel and material resources – which affects the productive services available from each.

[92] The concept 'interface' will be discussed later in this chapter.
[93] This is not to say that actors always *treat* resources as heterogeneous. Often actors reduce or ignore variability of a certain resource because they want or have to carry out production efficiently (Alderson 1965). Tine Verdal's treatment of the cow milk that it purchases (case 2) is an example of this; a lot of effort is needed to make the milk homogeneous. This seems to lead to a kind of heaviness, which according to Håkansson & Waluszewski (1999) is the opposite of variety.

In other words, actors have little or no knowledge of potential uses of a resource, but can gain such knowledge. More precisely, knowledge can be gained in two different ways. One is through research[94] into the features of the resource, the other is research into ways of combining its known features with those of other resources (Penrose 1995:77). Håkansson & Snehota (1995: 133-134) argue along the same lines but put more emphasis on use:

> There always seems to be potential both to change and develop the resource *itself* and/or to change the way in which it is *used*. (Our italics)

Hence, searching for new potential uses of a resource can focus on the constitution of the resource itself as well as new combinations in which it can be of use. Since there is value tied to resources in combinations, actors carry out such searches with at least some interest in economy. E.g. when Ola and Kari in case 1 searched for new use combinations of goat milk they did it with an eye to the new combinations paying off better than the existing combination.

The double-faced nature of resources

Penrose (1995) discusses resource development with the purpose of explaining why firms grow. Hence, her perspective on ways of finding new uses of resources is the perspective of the firm; that is, from one side. Håkansson & Snehota (1995:132) suggest that we should rather view resources from two sides, the use side and the provision side. Thus, they argue that resources have a 'double face:'

> … resources are a result of activities as much as a condition that makes certain activities possible. (p. 132)

On these grounds they claim that research into the resource itself – its features – is typically carried out from the provision side, while research regarding new combinations typically is done from the use side. In a business network this means that:

[94] Research is here understood in a broad sense encompassing scientific research as well as other types of research and exploration (cf. March 1991:71).

> The provision and use, and thus the value, of resources hinge on the knowledge of resource use and on how it is spread and coordinated among the providers and users in the existing business network. Relationships activate and develop specific resource elements and different resource constellations. (p. 133)

The provision and use of a resource may be spread and co-ordinated in different ways. In case 1 at the beginning the actor who is provider of goat milk (Skånaliseter) is not the user; another actor (Namdalsmeieriet) uses the resource. After some years of development the provider also becomes user. This development seems to have little to do with changed distribution of *existing* knowledge in the network; it has more to do with *new* knowledge being developed, not at least on the part of Skånaliseter.

Håkansson & Snehota (1995:136) identify *relation of provision and use* as especially critical in resource development. However, the weight put on each may vary. E.g. case story 1 in chapter 3 views the focal resource mainly from the use side and describes development in the form of new use combinations. Case 5 on the other hand centres around the provision side and focuses on research into features of the focal resource. Nevertheless, in none of these cases do the actors involved ignore actors on the other side; there is *interaction* between them. However, this interaction varies in scope and depth and takes place in a business 'landscape' that is rather complex. It is not that one actor on the provision side interacts with one actor on the use side, and then the resource is 'all developed.' Sometimes there are many providers and one user, and only one actor on the provision side is interested in exploring potential uses of the resource. Case 1 illustrates this. Moreover, the actors on the provision side or the use side respectively may be quite diverse or relatively homogeneous, and actors on the same side may interact in different ways or not at all. And finally one and the same actor may be involved in development both on the provision side and the use side, more or less in interaction with other actors. We are getting close to the picture of a business network, more specifically a dynamic business network. And since interaction seems to be at the heart of this dynamism, we should discuss this concept more explicitly and how it impacts on development of resources.

From unknown to known: The role of interaction

> Develop[ment of] resources and resource combinations … often originate in relationships with other companies because it is in a relationship that the use of a resource is confronted with how it is produced. (Håkansson & Snehota 1995: 132)

Hence, it is maybe futile to look for the origin of development solely on the side of the provider *or* the user. E.g. it is difficult to judge whether it was Ola's (the provider's) complaints about use of goat milk *or* complaints made by personnel in Namdalsmeieriet (the user) that triggered subsequent development in use of the focal resource in case 1. A small act from a user can lead to a small counter-act from a provider leading to several rounds of 'interacts'[95] (Weick 1979) making the origin of the interaction obscure. Also in case 5 it is reasonable to state that the development of the focal resource started as a confrontation within the context of a (newly established) business relationship. The difference from case 1, however, was that the confrontation did not occur in the relationship between the provider and user of the *focal* resource, but between the provider of a *product made from the focal resource* and the user (of this product). After some initial interaction between these two actors the rest of the development process is moved to other business relationships involving other actors. Then technical scientists become central in the interaction. This interaction results in knowledge about 'factors' that give rise to a certain *feature* that the 'end user' dislikes. Moreover, this knowledge is *codified* in the form of written texts, like research reports and scientific articles. In this way this knowledge seems to contrast with case 1 and the knowledge (about the focal resource) created there, which appears to be more tacit and implicit, based on experience. Moreover, Ola and Kari seem to be more engaged in searching for new use combinations of the resource, while the scientists in case 5 are more occupied in investigating the resource 'itself' and its features.

Thus, it can be tempting to claim that interaction about the features of a resource is carried out from the provision side and will result in codified, explicit knowledge, while interaction

[95] Weick (1979) uses the word 'interact' both as verb and, like here, as noun. Maybe he in this way wants to stress that it is human beings and their 'acts' towards each others that he studies and not the movements of things or other living creatures vis-à-vis one another. In this study we regard the noun 'interact' to mean the same as the noun 'interaction,' cf. the discussion of interaction later in this chapter.

concerning new combinations (of existing features) is done from the user side resulting in tacit, implicit knowledge. However, Ola and Kari are also providers of the resource and seem to apply some of their knowledge about provision when developing products. Moreover, they also explicate some of their experiences.[96] And the researchers in case 5 co-operate with users of the resource when developing their knowledge.[97] In fact, Anne and Clara together represent science on each side of the resource; Anne (as food scientist) holds knowledge about the use of the resource, while Clara (as animal scientist) has knowledge about the provision of the resource. Since they interact they both learn about the other side of the resource also. Thus, it may be that the combined knowledge that they are able to create in this way is more valuable (for the users of this knowledge) than the sum of 'knowledge pieces' that they created if they had been doing research separately on each 'side' of the resource.

Hence, it seems as if interaction can develop a physical resource through knowledge being created and applied 'to' it by actors in the network. But it also seems important to remember that interaction about the resource occurs at many places in the network, between shifting and partly connected dyads, simultaneously as well as subsequently. Thus, actors can easily get the impression of a chaotic network. This faces actors with a dilemma; they could try to reduce this chaos by decreasing the variety of resources and increasing the structuring of relationships within the network. But then the innovativity in the network would be put at stake. According to Quinn (1988) chaos is necessary for resource development. We touched upon this possibility in chapter 2 when we said that too much structuring would kill the network. Hence, to think of development as a stepwise, linear process is unfruitful since it is incompatible with how resources are developed in reality (Van de Ven 1988). On the other side 'chaos only' would also kill the network and paralyse the actors in it; they would have no common point to refer to. Interaction can be seen as a 'practical' way to respond to this dilemma as, on the one hand, it contributes to chaos and non-linearity and, on the other hand, dissolves chaos through clarification of actors' interests and knowledge vis-à-vis one another.

[96] E.g. they keep a diary about their cheese making and provide a description of their products for customers and others on their web-site.

[97] Many authors discussing knowledge in relation to organizations, economic activity and innovation make a distinction between tacit and codified knowledge. Some of them, like Nelson & Winter (1982), Brown & Duguid (1991) and Loasby (1998) emphasize the importance of tacit knowledge or 'knowing-how' at the expense of codified knowledge or 'knowing-that.' Other authors, among them Nonaka & Takeuchi (1995) describe the creation of knowledge as an interplay between 'knowing-how' and 'knowing-that.' The empirical material presented in chapter 3 seems to be most in accordance with the latter description; hence, it seems insufficient to focus on tacit knowledge alone when describing and explaining development of resources.

Our case stories confirm the picture of chaos and non-linearity. They also show how this chaos can be replaced by order in a network when actors interact. But it could be interesting at this point to investigate, firstly, the concept of interaction and, secondly, its relation to various types of resources and their development. Maybe we can extend an analytical model of resource development in a business network?

The concept of interaction

While all living creatures are active in one way or another, it is only human beings that can *act* (Østerberg 1986: 11). Following this statement we have action when a human being acts. In that case we can call a human being an actor. Also a group of human beings is an actor if the participants are organized such that they can be mobilized for a common purpose (Brox 1991: 63). This is a kind of 'rational actor' definition. Another more 'social constructivist' definition is the one that we described in chapter 2. Here we found that two main dimensions of an actor are identity and character. The case stories reveal actors in the form of, for example, individuals, companies, associations of firms, departments within companies and public agencies.[98]

What is *inter*action then? We only just touched upon the topic in the previous section, but will respond more principally to it here by first going beyond the industrial networks approach and thereafter returning to this tradition.[99] The prefix 'inter-' denotes among other things 'between,' 'among' and 'reciprocally' (Webster's 1989). Thus, interaction signifies 'action between' or 'action among.' More precisely Webster's (1989) defines interaction as 'reciprocal action or influence.' As we have stated that actors act, interaction can denote 'reciprocal action between or among actors.'[100] Thus, social interaction is defined as

[98] Thus, actors are concrete. Abstract and faceless categories like 'agriculture'; 'information technology'; 'science' and 'Norway' are not actors (Brox 1991) and do not interact in the concrete sense in which we use the term here.
[99] We make this "detour" because the concept of interaction is used in many disciplines and was applied before it was adopted in the industrial networks approach in the 1970s. By paying a visit to some of these uses, it will perhaps become clearer – at least for those not so familiar with the industrial networks approach – what the concept refers to.
[100] Since interaction also denotes 'reciprocal *influence'* the term also makes sense when non-human entities are involved, for example to refer to 'things happening between resources.' In this thesis, however, we have chosen to refer to this situation with the term 'reciprocal influence.'

interstimulation and response taking place between individuals and between groups (Webster's 1989).

Interaction 'between or among' actors in the form of human individuals is one of the building blocks of the sociological tradition called agency[101] (Waters 1994). One of the founders of this tradition, Georg Simmel (1858-1918), answers the question 'How is society possible?' by pointing to the minds of individuals. More precisely he claims that society is built up by the actions of individuals. These actions comprise two inseparable elements: *content* (an interest, a purpose or a motive) and a form or mode of *interaction* (among individuals) through which, or in the shape of which, that content attains social reality (Simmel 1950, Waters 1994: 22).

> The motivations which propel life (e.g. hunger, love, religiosity, technology, intelligence) are not strictly social until they operate to transform isolated individuals into interactive relationships. (Op cit.: 22)

Thus, according to Simmel, social interaction is not only important for the actors taking part, but is *one of the building blocks of the structure called society*. For us, studying use of a resource within a business network, we could rewrite this formulation and state that *business interaction is one important building block of the structure called business network.* In the quotation we also meet the word relationship and we realize that social interaction is something that often goes on within relationships between actors.[102] We also realize that social interaction can take on different forms. Waters (1994) mentions imitation and differentiation.

Giddens (1993: 90) shows that theory of social interaction is characterized by direct, face-to-face communication, and via such communication meaning experiences are exchanged. Symbolic interactionists like Georg Herbert Mead – who was heavily influenced by Simmel – strongly emphasize the prominent role of language (symbols or representations of things) in this communication. It is only through interaction that involves language that it can be possible for an individual to understand the meaning of the other(s) and not merely react to the other's act (Waters 1994: 24). Other theorists influenced by Simmel and Mead – like

[101] Or (social) constructivism.

Goffman – in addition focus on non-verbal communication like facial expressions, gestures and movements of the body as important means in social interaction (Giddens 1993: 91). Interacting individuals then not only *exchange* meaning experiences; they also *develop* meaning experiences as they use parts of existing experiences in order to make sense of new situations (Goffman 1974). What all social interactionst theories have in common is their stress on mental processes and human beings as creative agents (Waters 1994: 25). With reference to the same theoretical foundation Weick (1979) argues that interaction[103] is the basic element in organizing and describes it as a *contingent response pattern*. On the other hand, interaction does not presuppose equality or equal abilities among the participants (Aschehoug & Gyldendal 1995-1998).

Co-operation is a term that is often used in parallel with interaction. And to be sure the two terms have much in common. But they do not seem to be identical. While 'co-' means: with-, together-, common-; 'inter-' – as we have seen – denotes: among, between, (a)cross. Hence, co-operation may be thought of as one side of interaction, where two or more actors jointly strive for a goal or object controlled by an actor other than those who co-operate (Stern 1996: 4). The actors act *together*, *with* each other, for some *common* purpose. A picture of harmony arises.

But harmony is not a suitable description of what is going on between Ola and Namdalsmeieriet at the beginning of chapter 1. The two actors disagree, yet they 'act, respond and act back,' something that also evokes the impression of a contingent response pattern. Hence, conflict seems to be 'the other side' of interaction. This accords with findings within research in the industrial networks approach; coexistence of co-operation and conflict is one of the process characteristics of business relationships (Håkansson 1982). Hence, this coexistence is interesting from a development point of view. A 'portion' of conflict is necessary in order to develop; and confrontation is an expression of conflict that can

[102] We may say that a relationship cannot come into being without interaction and will decay without interaction. But the reverse seems not to be true; not all interaction will 'convert' into a relationship.
[103] More precisely he sees interaction as a 'double interact;' a pattern in which an act by actor A evokes a specific response in actor B (Weick 1979: 89). So far this is an interact. If B's response is then responded by A, we have a double interact.

contribute to development.[104] On the other hand, mere confrontation would not be constructive.

Another aspect of interaction is that it is *situated* – in a particular place and in a specific period of time (Giddens 1993: 105). Moreover, the span in time and space can vary. E.g. in a fencing match an interaction can take less than a second and occur within a few square meters, while it can occur over thousands of kilometres and take months when a person sends out a message enclosed in a bottle and another person responds to this message. On the other hand any interaction can be separated – bracketed (Goffman 1974: 252) – in time and space from the one before and from others 'beside'. A relationship constitutes part of the context of an interaction as it links the interaction to the participants' experiences of the past and expectations about the future, but also, because of the connectedness of relationships, transmits the results of an interaction to other parts of the network. E.g. case 5 provides examples of this. Hence, to understand any single interaction we must pay attention to the business network in which it is situated.

The term interaction is also used within the science of *psychology* to emphasize that behaviour and human development is a combined product of personal traits and characteristics of the situation (Aschehoug & Gyldendal 1995-1998). Thus a person can shape the situation which influences her or him, and the situation can affect the person. Interaction is also used within *pedagogy* as a concept and as a teaching method (Stensaasen & Sletta 1983). Furthermore human-computer interaction is a term that has become common within *computer science* where there is a vast literature within this area.[105]

Interaction, then, can produce new meaning and develop the persons that interact. They may gain a new interpretation of a situation, or their existing interpretation may be confirmed. In comparison in a situation where there are two parties, but not any interaction, only isolated

[104] Note that competition between actors in a market is not regarded as interactive as these actors are not assumed to be 'visible' and known to each other. Another thing is that competition seems not to be possible without co-operation (Stern 1996: 7).

[105] Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them (Hewett et al 2001). The focus is specifically on interaction between one or more humans and one or more computational machines.

acts[106], the parties have very limited opportunities to develop their interpretations, and no social relationship can be created. But interaction can also develop elements of a more physical nature. To avoid any misconceptions in this thesis, we have chosen to use the term interaction *only* in relation to actors. This is the dominant way in which the concept of interaction has been used within the industrial networks approach.[107] For 'interaction' between resources or between resources and actors we will use the term *reciprocal influence* (cf. chapter 2).[108]

Business interaction concerning resources

Business actors may or may not be individuals. This need not necessarily imply that theory of social interaction is inapplicable for understanding business interaction. Firstly, collective business actors consist of individuals and can be perceived very much as the result of interacting individuals. The difference, of course, is that these individuals, when interacting with individuals of another collective business actor, do not represent only themselves. They also represent – more or less – the collective actor. This they normally do in a specific way. Gadde & Håkansson (2001: 100) thus suggest that we study interaction between specific functions within or between companies. A function is impersonal and usually more stable and lasting than the individuals who 'happen' to occupy that function at a certain time. In some situations it may be relevant to investigate interaction even on the corporate level. But we will argue that interaction between individuals is also important in the 'total' interaction between companies (Halinen & Salmi 2001). An example can be individuals who continue to interact even if they change function within a company or move to another company.

On a more abstract level, the theory of social interaction shows us that interaction can be interesting partly in itself and partly through its results. We have seen that social interaction develops 'meaning,' both individual and shared. Thus we can say that social interaction creates a non-material product. But what about interaction in relation to products with

[106] Østerberg (1982: 36) gives the example of a public debate where each actor presents her or his 'ready made' standpoints without sensitivity to the others' standpoint, in other words a situation with many monologues and no dialogue. Consequently there is no interaction, only several individual acts occurring in parallel.
[107] Cf. Håkansson & Snehota (1995: 2, 9, 10, 201, 273), Håkansson (1989: 3, 10, 15) and Håkansson (1982: 12, 15).
[108] This we do, because we are aware that the term interaction in other science or practice areas is used to describe the nature of the relation between such diverse elements as physical entities, statistical variables or abstract concepts.

physical features like our focal resource? 'Even' Goffman, a social constructivist, accepts that at the most microscopic level, behind all interpretations, there are *realities which cannot be contradicted and interpreted any further, especially the material constraints of the physical world* (Waters 1994). We will use this formulation to state that both the 'the material constraints of the physical world' and meaning (ideas) are important entities for business actors in general and for resource development in particular. Moreover, using the argument of Giddens (1993) cited in chapter 2, the physical world is not only a constraint, it is also an enabling entity. The same can be said about ideas. In 'real' business life actors work with many different types of resources, some are physical and some are non-physical.[109] Consequently we need a clarification of physical and non-physical resources (e.g. ideas) and the relation between resources and interaction.

Interaction and four types of resources

Over time mutual development of a number of different resources across firm boundaries may create 'heavy' resource combinations (Håkansson & Waluszewski 1999). We can experience this in the form of 'worked in' solutions – dominant designs (Utterbach 1994) – like the Windows Operating System with all its resources developed specifically in relation to it over the years. The heaviness of different resource combinations is not only due to intricate technical *interfaces* between resources, but also heavy investments in economic and social interfaces. The business network of Norske Meierier described in chapter 1 and 3 seems to incorporate such a heavy constellation of technical, economic and social interfaces. On the other hand, as mentioned earlier in this chapter, we can also observe variety in the resource constellations of business networks. Moreover, the tension between heaviness and variety might be a source of change and development. The confrontation between Ola and Namdalsmeieriet in chapter 1 can in many ways be said to reveal a tension between a heavy resource constellation and variety. In other words, there may be reason to focus on the *interface* between resources when understanding development.

[109] One may ask why we do not use the word material instead of physical here. The reason is that we perceive material to be included in the broader term physical, which encompasses the whole subject matter of the discipline physics – matter, space and time (Aschehoug & Gyldendal 1995-98). A physical resource, then, can be material, spatial and/or "timely," while a material resource only contains matter. Moreover, we let the term physical resource refer to dead as well as living physical elements that actors regard as useful. Hence we regard a biological resource as a type of material resource, which again is a type of physical resource. Non-physical may appear as a rather empty term; but it is used to denote useful elements and features that are not physical, and among these are ideas. The subsequent discussion will hopefully make this more clear.

The concept of interface

The term interface is logically consistent with the relational view of resources. Like Gadde & Håkansson (2001: 82) we will let the concept interface refer to 'what is between resources.' We stress 'is' because interface is a noun and thus static; it does not grasp what *happens* between resources. In the encyclopaedia interface is recognized among other things as:

> a common boundary or interconnection between systems, equipment, concepts, or human beings (Webster's 1989).

The term has been applied within computer technology to denote the interconnection between units that shall work together. Thus, like the concept relationship, interface denotes something *relational*; more entities separated by shared or common boundaries. In other words, an interface has a paradoxical feature; it both separates and connects. Like resources interfaces can be of different types. The interface can for example be physical (like the interface between agitator and milk in the cooling tank described in case 5 in chapter 3), conceptual (e.g. the logic underlying the stream of milk through the dairy at Tine Verdal), or human (e.g. the way the food researcher and the animal researcher relate to each other in the research project described in case 5) (Webster's 1989). Earlier we pointed to how crucial combinations are for resources. The term interface is compatible with the term combination but highlights the border area between resources. Figure 4-1 illustrates this.

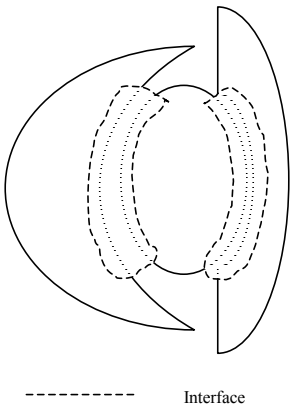

Figure 4-1: A resource combination consisting of three resources with two interfaces.

Activating resource features by systematic relating

Like reciprocal influence between human resources (what Penrose terms 'men') reciprocal influence between human resources and physical resources (what Penrose terms 'resources'[110]) can result in new ideas about use both of physical resources and of human resources. Furthermore, if a series of reciprocal influences is taking place, a relation in the form of an interface between the human and physical resource can be developed. A resource combination often has to include several resources if it is going to be useful – or 'potent' (Alderson 1965). As a consequence actors working with developing resources face multiple interfaces. In the interfaces certain features of each involved resource are activated. Resource development can thus be seen as a question of finding new interfaces; either through new features of resources that already are part of the combination or by altering the combination itself, through adding and/or removing resources to/from the combination. Actual activation (resource interfaces at a specific point in time) somewhere in the business network is the result of interaction processes over time, where:

> resources have been *systematically related* and where a solution of how to combine them has been gradually chiselled out. (Håkansson & Waluszewski 2001: 4). (Our Italics).

This can explain why we often find heavy resource constellations; thousands of small changes in interfaces have been implemented over a long time. It can also explain why actors, like Ola in chapter 1, are met by so much resistance when they try to identify interfaces for 'deviant resources.'

As already noted, development is contingent upon new knowledge being created. Or as Håkansson & Waluszewski (2000: ch.2) express it in relation to technical development:

> … to deal with technological development is to deal with the unknown. Per definition, what will be found in the search process can *never be known* in beforehand. Further, even when a new solution is found … it is only possible to capture *fragments* of its constitution and function. (Our Italics).

[110] Penrose (1995) applies a more restricted understanding of the concept 'resources' than we do and includes only physical (material) elements in the concept. Earlier in this chapter we found that resource is a part of the more encompassing concept element. Hence we consider that both physical things and humans can be elements.

In interaction between actors new knowledge can be created. Insofar as the new knowledge relates to a specific resource, unknown parts of the resource become known. This, we may say, is one ingredient in the development of the resource. Because of existing combinations development of the resource (by new combinations and/or new features) will affect other resources in certain ways, or, in the words of Håkansson & Waluszewski (2001), will create *friction*. Development must necessarily always begin with some existing resource combination (Håkansson & Waluszewski 1999). Moreover, the existing combination can be very complex. Thus, when we see an opportunity to develop a certain resource, it is necessary to restrict – *focus* – the analysis of resource interfaces (Gadde & Håkansson 2001: 84). It can also be helpful to some extent to distinguish between different types of resources.

Four aspects of interaction and types of resources

Various schemes can be used for distinguishing between resources. Thus, we can distinguish between resources that are *internal* to a firm and resources that are *external* to it. Resources that the firm controls – via ownership, beneficial right or otherwise – are internal. External resources are resources the firm has been involved in creating in relationship with other firms – suppliers, customers (Gadde & Håkansson 2001: 80) or other partners.

Another way is to classify resources as *physical* and *non-physical*, a distinction that we already have made. Håkansson & Snehota (1995) point to buildings, machines, manpower, materials and commodities as tangible resources as opposed to intangible resources. All these tangibles can also be referred to as material resources, but – as we have seen – the term physical also includes the elements of time and space. It is not uncommon to talk about time as a resource, and it fits well with the definition of a resource; an element that actors regard as useful. The same applies to space. For example some actors (states) regard the empty space surrounding the earth as useful. In order to use and create physical resources actors also need resources of another kind. Penrose (1995) points to the crucial role of knowledge, which is created when human and physical resources influence each other reciprocally. In the same way Itami (1991: 12) emphasizes the role of information, which he terms an invisible asset, to be distinguished from visible assets (people, goods and capital, including money). He finds that skill, artistic sense, morale, brand image and consumer trust, loyalty and reputation are

examples of invisible assets. He regards people as especially important assets because they embody much of the invisible assets (p. 14). In other words, non-physical resources have emotional and symbolic components that physical resources lack. Emotional components are manifest in resources like brand (Thomson 1998, Kotler et al 1999). Language is an example of a symbolic component.

We find the conceptual 'pairs' 'tangible–intangible,' 'material–non-material,' 'visible–invisible' and 'physical–human' to denote aspects of the same fundamental distinction about resources. Since the term physical incorporates the terms tangible, material and visible, but in addition time and space, we prefer to use the term physical. The term non-physical then refers to resources and features that are not physical. We could also have used the term idea, and the subsequent discussion will show that this is an important type of resource when it comes to development. However, we can also find non-physical resources that are difficult to call ideas; emotions and morale are two. Our empirical material however has not much to say about emotional and morale resources, but much to tell about ideas. So when we talk about non-physical resources in the following we could just as well have used the word idea.

Since interaction processes between business actors are complex and often also more or less concealed, a set of concepts is needed in order to *identify* and *characterize* these processes (Håkansson & Waluszewski 2000: ch.2). Furthermore, we will argue that some classification of resources can be helpful when we want to understand such interactive resource development processes. A key question is how certain features of single resources are developed and embedded into combinations of resources when business actors interact. Above we made a distinction between internal and external resources and between physical and non-physical resources. Based on lessons from research within the industrial networks approach Håkansson & Waluszewski (2000: ch.2) identify four types of resources. Each type of resource is seen as influenced by a certain aspect of interaction:

Interaction that deals with co-operation influences *business units*.
Interaction regarding selling and buying influences *products*
Interaction that is about producing and using influences *facilities*.
Interaction concerning networking influences *business relationships*.

In the following we give our own account of these four categories. We will see that within all the categories the distinction between physical and non-physical resources makes sense. The division between internal and external resources can also be combined with this 'quadruple categorization' in a meaningful way. The terms internal and external refer to resources that are internal or external to *something*, and that 'something' can be called *firm*. Hence firm is a type of resource and makes it logical to start a 'typologization' of resources with a discussion of the firm. But instead of the term firm we prefer the more abstract (and therefore encompassing and flexible) concept of business unit. A business unit can be any social unit where we can identify some kind of economic accountability and that is involved in 'business activity' of some kind.[111] An individual, 'whole' firm is thus obviously a business unit. But a business unit can also be a part of a firm (e.g. a department), an association of many firms or an organizational arrangement of parts of many firms (for example a project). Moreover, a business unit may not include firms or parts of firms only. It can also include parts (members and/or other resources) of public agencies or ideal organizations. Hence, what shall be regarded as a business unit will to some extent depend on the purpose of the investigation. In some cases it may 'even' be fruitful to regard households as business units, as these have economic accountability and may take part in economic activity.[112]

Next we discuss the concepts of product and facility. Literally product denotes a *result or end* of something. In a business network that 'something' is activity. The opposite of end is *mean*, and the category of resources termed facility refers to any mean that is necessary in transforming certain products into other products. When we apply a relational perspective the end of one activity – product – becomes the start of another activity. According to Håkansson & Waluszewski (2000) products are resources characterized by actors *selling* and *buying*[113] them, while facilities are used as means in *production* of a product or – seen from the user

[111] However, the concept of business unit must not be confused with the concept of actor. A business unit is a resource; that is, an element that some actor regards as useful. As such a business unit does not act, but can influence an actor; for example by facilitating some activities and not others.

[112] For example on a farm (like Skånaliseter in case 1) it can be difficult to draw exact boundaries between the 'business sphere' and the 'private (non-business) sphere.' Still it can be meaningful to look upon the farm *as* a business unit.

[113] It is possible to imagine resources that are not sold and bought but are nevertheless products in the sense that they are outputs of one activity and inputs to another activity. This is the case when the two activities are carried out within the boundaries of one business unit. Since our problem is related to what is going on *between* business units, a further discussion of this question is beyond the scope of this thesis. In any case, to operate with "internal products," would not make a distinction between products and facilities as resource categories less meaningful.

side – as means in the *use* of a product. Production must here be understood in a broad sense, encompassing also development and marketing.[114]

Lastly we discuss business relationships. This is perhaps the trickiest term seen from a resource point of view, but nevertheless important. Business relationships can be thought of as social and organizational 'extensions' of business units. As social and organizational entities they bear similarities with the entity business unit. But unlike a business unit a business relationship is 'owned' in common by two actors. Thus no sole actor can claim ownership of a business relationship.

Figure 4-2 illustrates a situation where resources of all the four types are related in a certain way. The illustration resembles a routine production situation in a business network (like the purchasing, production and distribution related to Tine Verdal described in case 2) and is probably different from what actors experience in most development situations. Business unit C has in interaction with the business units A and B developed the resources X and Y respectively. A sells X to C, B sells Y to C and C buys X and Y. Hence X and Y are *products* in our terminology. A uses the resources 1 and 2 to transform X and Y into another product Z. Hence 1 and 2 are means and thus *facilities* in our terminology. Viewed from the *production* side 1 and 2 are used in the production of product Z. Viewed from the *use* side 1 and 2 are used in the *use* of products X and Y. C sells Z to business unit D and D buys Z. Moreover, Z has been developed in interaction between C and D. The interaction between the four business units has been repeated over time, resulting in three business relationships, A:C, B:C and C:D. [115] These three business relationships are connected, forming a business network.

[114] Marketing can further be divided into *sorting* and various *transformation* activities like transportation, storing and display (Alderson 1965).

[115] We use the colon sign to symbolize a business relationship, because the colon sign in general, for example within mathematics, signifies a relationship between – something that connects – two elements. Note that the elements that "have" a business relationship are mainly not business units but *actors*. Therefore it is a bit misleading when
Figure 4-2 places the arrows which symbolize business relationships so neatly between business units. What we should do is to imagine actors on each "side" of the business relationships. Business units are resources and what is between two resources is, according to the terminology we apply, an interface.

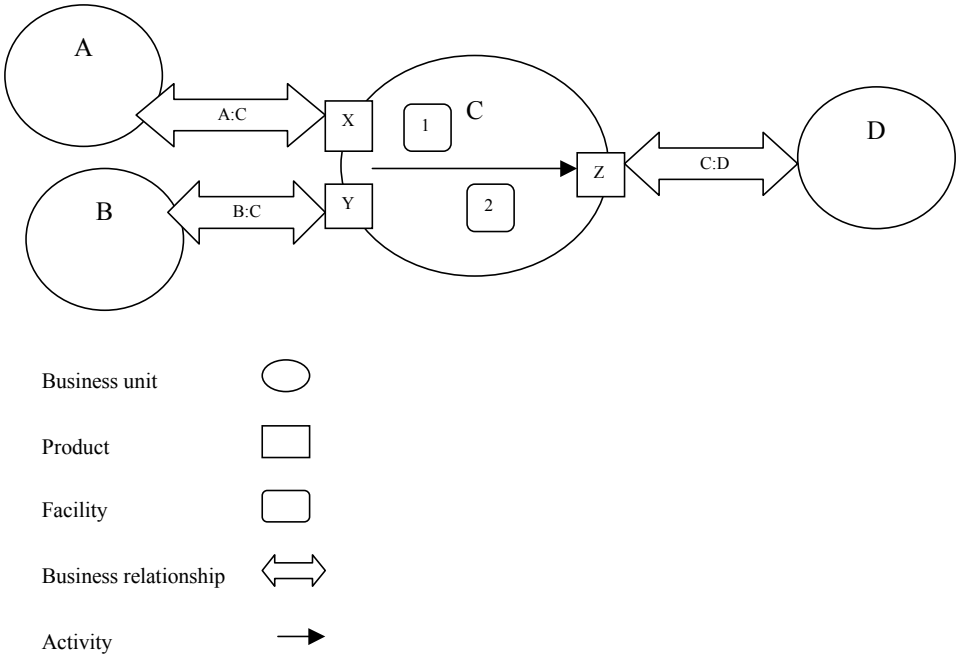

Figure 4-2: Four types of resources related in a specific way.[116]

Interaction influencing business units: co-operation

The farm dairy firm Skånaliseter in case 1 can serve as an example of a business unit. In the case we meet the two owners of this business unit, Ola and Kari. We are told how they use different resources (cheese making vat, knowledge, manpower etc.) in order to make certain cheese products, which they relate to various customers – business customers and households (consumers) – by using facilities of different kinds. Each customer can also be regarded as a business unit. By relating their products to these business units, Skånaliseter get access to resources they control; e.g. monetary resources and information of different kinds. The rationale behind business units is to co-ordinate the production and use of the different resources, because on their own resources cannot produce any meaningful outcome. The

[116] The visualization of business units and business relationships resembles the one used by Wedin (2001: 168) except that the symbols for products (edged rectangle) and facilities (rounded rectangle) are exchanged.

facilities, for example, have to be systematically related to the product in a certain way. More precisely the facilities have to carry out certain activities (pouring milk into the vat, regulating temperature and pH of the milk, handling customer orders, checking cheese on store etc.). Thus, organizing is necessary, or in the words of Weick (1979):

> To organize is to assemble ongoing interdependent actions into sensible sequences that generate sensible outcomes. (p. 3)

The main purpose of a business unit is thus to organize activities to generate sensible outcomes. Organizing involves co-ordination of different facilities in the transformation of certain products to certain other products. A departure from the example above is of course that many firms command several different physical and non-physical facilities (although may employ only one human individual) in its transformation of various products into other products. Thus simply to aggregate certain products and facilities does not generate any sensible outcome (Håkansson & Waluszewski 2000: ch. 2: 17). All the activities necessary to generate sensible outcomes must be co-ordinated in sequence and parallel (Dubois 1998). A firm can thus be viewed primarily as an administrative resource (Penrose 1995: 24).

It thus seems reasonable to regard business units as a *specific resource category*. However, the word firm can restrict our imagination since it only refers to a legal entity, and typically this is the unit that is registered in public business records. In many firms different internal sub units may be so responsible for the economic result that it makes sense to study them as firms. To avoid any misapprehension we choose, like Håkansson & Waluszewski (2000), to use the more abstract term *business unit*. Hence firms represent one example of business units.

What are the basic elements of a business unit? The answer is not straightforward, but let us make a suggestion. While products and facilities can be thought of as *technical* and *individual* resources, we perceive a business unit (and also a business relationship) primarily as a *social* entity (Håkansson & Waluszewski 2000: ch. 2: 17). This entity is a resource to the extent that it has a use potential; more precisely, if it can serve to organize the use of technical resources in order to make sensible products. Implicit in ‘organizing’ and ‘sensible product’ is some sense of economy; the business unit must organize the activities in an economical way. Hence, a business unit is also an economic unit.

A comment regarding the physical/non-physical dimension is in order here. Since they are organizational and social it can be tempting to think of business units and business relationships as purely non-physical resources and of products and facilities as physical resources. However in the two next sections we hope it will become clear that there are also non-physical products and facilities. For example knowledge – a non-physical resource – can be transformed into a product or used as a facility. The same applies for business units and business relationships; also these contain physical and non-physical elements; they have a physical structure and an image (non-physical) structure (Waluszewski & Håkansson 2001). For example in the case of Skånaliseter we are told how a certain product, goat milk, undergoes specific handling (activities) in sequence and parallel, is mixed with different other products, until a customer has a meaningful product (cheese) in her hands. These activities are 'physical' or real since we can observe them as they unfold. We may term the pattern we observe a physical (real) activity structure (Håkansson & Snehota 1995, Dubois 1998) to be distinguished from an imaged, non-physical activity structure. But a business unit does not only consist of organizational resources, it also contains social resources in terms of relationships between human individuals in the business unit.

The humans within the business unit have images (Morgan 1997) of the organization they are part of and images of other organizations they deal with. We can extend this argument by invoking the term organizational knowledge (Nonaka & Takeuchi 1995). We have already stated that knowledge can be found as or in the form of products and facilities. It is probably to stretch the point too far to say that knowledge can be a business unit. But knowledge can be a *part* of a business unit as is suggested by the concept organizational knowledge. Nonaka & Takeuchi (1995) describe and explain the process in which knowledge of individuals is transformed to common knowledge in an organization. In the same way Nelson & Winter (1982) argue that the routines of an organization parallel the skills of individuals. The term routine has much in common with the term activity structure mentioned above. In other words, the facility skill has its parallel in the business unit in the form of routines and organizational knowledge. Loasby (1998), for example, argues that the reason for the existence of economic organizations – like business units – is that they develop and use

knowledge. Skill – or capabilities[117] – is seen as crucial, as it is tacit, emergent and manifested in action and therefore difficult to copy.

> The organisation of capabilities is the organisation of systems for generating and testing new and improved skills. (p. 157)

This view contrasts with the assumption within economics and transaction cost theory (cf. Williamson 1975) that organizations exist because they allocate resources more *cost-efficiently* than the market. However, there is reason to believe that business units exist both because they develop skills and knowledge and because they allocate resources efficiently (Håkansson & Snehota 1995). Moreover a business unit may also develop physical resources and not only non-physical resources. But, as we have found, unless new knowledge is created, physical resources cannot be developed either.

Business units do not exist in isolation from each other. They are affected by actors' interaction. Håkansson & Waluszewski (2000: ch. 2: 17) find that interaction in the form of co-operation influences business units in particular. Hence, co-operation can develop organizational features of a business unit; its activity structure, its image as seen by its members or by counterparts. Features of the routines may be changed and new, shared knowledge among the members may be created. The social interaction and social relationships *within* the business unit may likewise be influenced through co-operation with counterparts. In this way various features of the business units involved may be mutually adjusted and developed over time as the co-operation continues.

Håkansson & Waluszewski (2000: ch. 2: 17) put forward the suggestion that the *ability* to co-operate is crucial in interacting with other actors. We agree, but would like to qualify this observation in light of our discussion of resource types above. We identify a skill as a type of facility residing in individuals, while routine is a part of the business unit and can only be understood on a supra-individual level. Thus we can distinguish between individual's ability to co-operate with another actor, and the routines a business unit possess when it comes to co-operating with other actors. We think both are important for interaction. Not only the ability to co-operate, but also some knowledge of the business unit of the counterpart and how to

[117] We use the concepts of skill and capabilities interchangeably here.

work with it is critical for interaction (Håkansson & Waluszewski 2000: ch. 2: 17). Here the use of previous experience in co-operating with that counterpart in new situations is important as it influences the development of products and facilities.

Gadde & Håkansson (2001: 84) suggest that a buying firm perceives suppliers as resource elements. The important issue, and the highly strategic question, is then how a supplier – another business unit – fits in with the internal resources of the buyer. Here not only products and facilities of the two parties have to be considered in relation to each other, but also the business units of the two as such. In this consideration not only past events and the present situation have to be evaluated, but also expectations regarding the future. In an early contribution in the industrial networks approach it was identified that interaction between industrial firms was not only marked by co-operation, but also by conflict (Håkansson 1982). Thus in fitting resources two parties must also be aware of the need to confront resources, for example images of their own and the counterpart's different resources and resource combinations.

Interaction affecting products: 'selling - buying'

A product can be viewed as the yield, result, or outcome of something (Penguin 1992). In economics the term product refers to the result of a production process (Samuelson & Nordhaus 1998). Products that are used to produce this product are not referred to as products, but factors of production. What is problematic in a theory of resource development is not that separate words are used for input and output, but the assumptions that are made regarding both factor and product within economics. They are both regarded as given. A factor for example is given since no distinction is made between a resource and the services the resource renders (Penrose 1995:25). A resource viewed as a factor, then, is identical to its actual (given) uses. Potential uses are ignored. Products are viewed in the same, given way within economics. Moreover, products are made in firms with no other contact with the external world than via price signals. The quality of the product is thus a result of development internal to firms.

Within logistics and quality management[118] the product as output is also highlighted, but the perspective is wider. In logistics one is engaged in making the flow of materials through different transformation processes efficient and effective. Since this normally involves several firms, co-operation between firms is often called for. But we will put forward the suggestion that the concept of flow is not well suited for analysing development processes, at least as long as the flow is assumed to be unidirectional and stepwise; that is, once the producer has made the product, his or her job is finished. In the next step the product is taken over by another producer who continues to 'add value' to the product and so it continues until a product has reached the final consumer. The term value chain (Porter 1985) has much in common with this unidirectional conception of how a product is formed and moved towards ultimate use. Moreover the very separation between purchasing and marketing in academia (Håkansson 1982:1), and also to a significant extent in practice, builds on the same conception. This applies whether we advocate a market-oriented view of production and development or a product-oriented view (Van de Ven 1988). In both cases we assume a unidirectional flow, in the first case from the seller to the buyer, in the latter case from the buyer to the seller.

The problem is that no interaction between seller and buyer is assumed, and thus an important mechanism in the development of products is ruled out. But buyers must accept new products; products must match needs and need must match products (Alderson 1965). We regard matching as an interactive process. This accords with the relational view of resources taken in this thesis and discussed earlier in this chapter. In a relational view of resources, products become outputs *and* inputs. If a product cannot be used as input, it has simply no value and hence is not a resource. And if it is not an output it simply does not exist. In the empirical material in chapter 1 and 3, goat milk is the resource we have in focus; it is the focal resource that we follow. In this specific business network goat milk is a product. Like any other product it is both an output and input; and it is sold and bought. But, as we will realize in the next section, a resource need not be *either* a product *or* a facility. In one activity pattern the resource may be a product that is transformed by a facility. In another activity pattern the resource may be a facility that transforms another product. In our cases goat milk clearly is a product. But it would be a facility if it were used as a means to transform or sort (other)

[118] Confer Persson & Virum (1989) and Aune (1996) respectively.

products. Thus, the basic distinction between facility and product resembles that between means and end.

Assuming interaction makes separate analysis of selling and buying rather meaningless; they are part of one and the same process (Håkansson 1982). This (combined) 'buying and selling' process can lead to development of products. It has been well documented that industrial products 'change' because buyer and seller interact during the 'buying – selling process' (Håkansson & Snehota 1995). In case 1 Skånaliseter is a seller of cheese. Some of the buyers have bought products from Skånaliseter for many years. One of the buyers sees a new opportunity for a more ripened cheese, interacts with Kari, who decides to make a new variant of an existing cheese (riper). Afterwards she can offer this special cheese also to other customers.

The rationale for a producing firm to sell a product that it produces – and vice versa for a user – may thus be that this gives better opportunities for interaction with the user about products than if the products were sold via one or more middlemen (Alderson 1965). When the buyer is not a firm, but a private household, it is more common to find middlemen between the user and the producer, but we see that Skånaliseter also interacts directly with private households. The cheese, which is not sold directly, is sold from manned cheese counters, and then the buyer has an opportunity to interact with the seller. The seller may be able to deal personally with some of the user's complaints about the product. He may give the user another product of the same or similar type, repair it or give him some extra information regarding the use of the product. Afterwards he or she can tell Kari in Skånaliseter how the customer has reacted to different products Skånaliseter is producing. This may make her change a certain product or develop a new product. This kind of interaction about products seems to be impossible in the case of Tine Verdal. It seems to be more common for producers of mass-produced consumer products to use abstract and indirect methods – instead of direct interaction – when they develop products. Hence, products can be improved by collecting survey data from a sample of consumers and analysing these data statistically (Page & Rosenbaum 1988).

All in all, then, 'buying – selling interaction' undoubtedly influences products. But there remains a theoretical question, namely whether this specific aspect of interaction is the *only* aspect of interaction that influences a product. We think not. The reason is simply that

products are not only sold and bought; they are also produced and used. Hence interaction between the producer of a certain product and a user of it may also result in development of the product. This observation springs directly from the discussion in the paragraphs immediately above. We think it is an important observation, especially since producers are not necessarily sellers and users are not necessarily buyers. If we only allow interaction regarding buying and selling to influence a product, we ignore the effect that interaction between a producer and a user can have on a product.

This view is in line with the textbook's definition of a product as an outcome or result. A product cannot be *defined* as something that is sold and bought, although many products *are* sold and bought and hence can be *identified* by observing selling and buying. But many products that are produced are not sold and consequently not bought, because the producer and the user are one and the same business unit (Håkansson & Snehota 1995: 145). In such a case interaction *within* the business unit may lead to development of the product. However, such *internal interaction is not the theme of this thesis*.

Industrial sellers and buyers at least seldom regard the product as given (Håkansson & Snehota 1995). This is of course important from a development perspective. The reason that the buyer 'questions' the product may be that her or his production would be more *cost efficient* if certain features of the product were changed; for example it would better suit the producer's facilities. An even 'more' interactive way would be co-operation where the product of the seller and the facility of the buyer were mutually developed. It can also be that via a change in one of the features of the product or by adding another product, the buyer will be able to make *better products*; products that suits her or his customers better or that will attract new customers. In this case it is not only the *single* relationship that influences the development of the product, but more, *connected* relationships (Håkansson & Snehota 1995: 2), that is, a network. The seller may respond to these inquiries because he wants to secure further business with the buyer, or he may not. He may even find that during the efforts to alter the product he discovers some new features of it that will solve problems in relation to a facility of a second buyer. This is another example of the importance of connected relationships.

Products can be of many different kinds. A common distinction is between goods and services (Håkansson & Waluszewski 2000: Ch. 2: 13). With reference to the distinction we made earlier between physical and non-physical resources we find it more logical to distinguish between physical and non-physical products. Goods then are surely physical products. They can be sold and bought, and formed, stored and transported as raw materials, processed materials, components and equipment (Håkansson 1982) or in the shape of systems or art. The term service then we will only use in the Penrosian (1995) way; as something a resource does or potentially can do (that is, an activity) and not a resource in itself.

Products can range from exclusively physical ones to purely non-physical ones. Examples in the latter category are scientific concepts and theories (Latour 1987) and metaphors, stories, beliefs and values (Morgan 1997). An example in the first category is a resource in the natural state (Alderson 1965), that is, an unprocessed raw material (Håkansson 1982), for example grass. In addition to 'pure' knowledge products, knowledge can also be part of (embedded in) physical products (Håkansson et al. 1999). For example, by studying the equipment for cheese making in Tine Verdal we can acquire some of the knowledge necessary to make equipment for making cheese.

'Selling – buying interaction' can be used to help develop physical and non-physical products. Some products a firm may develop and produce internally for its own use, while other products the firm 'just' has access to, either because of beneficial rights or due to the product being free (Penrose 1995: 78). Air and sunlight are in this category. These products are free in the sense that no person, household or firm has to pay for them or make them. Thus one can discuss whether such natural, free resources are in fact resources. However, at least in an analysis of resource development it seems that free resources should be counted as resources. Like any other resource, free resources can render valuable services for firms that *acquire knowledge* of the resource and use of it (Penrose (1995: 78). Examples are the use of sunlight to grow vegetables in greenhouses and the use of air to produce fertilizers.

To sum up this discussion of product development and its relation to 'buying – selling interaction', we can say that within the discipline of economics (cf. e.g. Samuelson & Nordhaus 1998) 'buying – selling interaction' never occurs. If we take a relational view of resources we realize that a resource, which in the context of the selling firm is referred to as

an output, is referred to as input in the context of the buying firm. This product can be developed and affected by 'buying – selling interaction;' by features of the product being questioned and changed (as is especially illustrated in case 5) and/or by systematic relating of existing features of the product with existing features of other resources. Case 1 provides good examples on this latter point.[119]

Interaction concerning facilities: 'producing – using'

In general the term facility can be linked to words like ease and smoothness, aid and means, skill and ability (Penguin 1992). Thus the concept of facility contrasts with the concept of product as the latter refers to end, a result. In a business network, then, facility refers to any means of production.[120] Another way to put it is to say that facility points to method (Loasby 1998: 142) and not goal.

Facilities are necessary to produce a meaningful outcome, a result in the form of a product. But once production has started the actors involved may look for means that ease or speed up the production of the product. This may lead to a search for new features of the means, eventually giving them new features. Or a new means, or facility, is developed. The words assistance, aid and help remind us that a facility do not replace an actor. A facility is something that so to speak 'elongates' the actor, makes him or her more able.

Like products, facilities can have physical as well as non-physical dimensions. For example, we recognize the data-tomograph that Clara, the food researcher, uses to measure energy balance of goats in case 5 as a physical facility ('hard') and the skill to operate it as a non-physical facility ('soft'). Data programs, like that in the tomograph, are also usually regarded as non-physical (as associated with the term software) since they consist of symbolic representations of the physical world. But knowledge is embedded both in the physical

[119] The industrial networks approach is not exceptional in stressing the importance of viewing the product as part of a wider 'resource context.' The concept of 'augmented product' (Kotler et al. 1999: 274-283) used within consumer marketing is also an attempt to emphasize the significance of seeing the product as "bigger than itself." The augmented product includes core product, facilitating products (for example equipment for using the product), supporting products (for example certain biscuits if the core product is cheese) and the way the product is delivered, for example the possibilities for interaction between seller and buyer and between buyers. Nevertheless, the concept of augmented product seems to be underpinned by a one-sided (the seller's) view of the product and not a dual, relational view.

[120] Here we use production in a wide sense, encompassing any type of transformation activity and sorting (cf. Alderson 1965).

tomograph and in the software in it, thus any physical facility has a non-physical dimension tied to it. The concepts of skill (Nelson & Winter 1982), capability (Loasby 1998) and knowledge (Nonaka & Takeuchi 1995) all point to this non-physical dimension of facilities.

Loasby (1998) refers to two types of knowledge, 'knowledge-how' and 'knowledge-that.' 'Knowledge-how' is knowledge that an individual has acquired by doing things. 'Knowledge-that' is acquired by passively observing others doing things or by learning reference knowledge; knowledge that is codified. 'Pure' scientific knowledge, then, 'is knowledge-that.' We regard skill, ability and capability as synonyms for 'knowledge-how.' But like Nelson & Winter (1982) we prefer the term skill. In this scheme the word knowledge is quite wide, encompassing both codified knowledge and skill. Hence, to the extent that it has use, potential knowledge can be a facility. But knowledge can (as discussed in the previous section) be a product, too. Knowledge can also constitute a layer in a business unit or a business relationship, e.g. in the form of routines (Nelson & Winter 1982) or organizational knowledge (cf. Nonaka & Takeuchi 1995).

To discuss skill, then, seems to be the same as to discuss the knowledge dimension of facilities. Skill resides in human individuals. Both 'knowledge-how' and 'knowledge-that' indicate that knowledge is *a question of context*. It is only when a piece of information has been embedded in a specific human being that genuine knowledge has been created. And it is not before someone is able to do something that knowledge-how is created. A piece of knowledge taken out of its context is only information, not knowledge. It does not become knowledge in a new business network before it has been embedded in that business network.

A skill is a specific combination of tacit knowledge (Nelson & Winter 1982) and the ability to use physical or symbolic resources, including our own body. Manpower is thus a physical facility. The ability to judge what actions to take in a specific situation is a skill. Skill is related to technology and can be thought of as practical intelligence (Loasby 1998:146). Like physical facilities, skill eases, speeds up and aids in the production of products.

Sometimes it is easy to distinguish a product from a facility. In chapter 3 Tine Verdal buys cow milk from farmers. Cow milk is then a product. It is pumped into a system of pipes, tanks and conveyor belts and converted to cheese, which is bought by retail chains. The system of

pipes, tanks and conveyors is a facility. The facility helps Tine Verdal to transform cow milk – a product – into cheese – another product. There are also other facilities in the factory, including humans with specific skills. In other cases it might be more difficult to judge whether the resource is a product or a facility. First of all the resource must be seen from the perspective of a specific firm, because what is a product for a selling or producing firm can be a facility for a using firm. Next, taking the side of the using firm, we must ask, does the resource only ease, help, assist, speed up or make possible the transformation of products? If the answer to this question is yes, the resource is a facility. For example in making the cheese in the above example, certain microbes are necessary, as they are means that transform certain chemical compounds in the cheese so that it gains a satisfactory taste and texture. These microbes stay in the cheese and do their job as long as the cheese exists. But the microbes themselves do not have a taste or contribute directly to texture, they are only means in the production of these features of the product. Hence in this case the microbes are a facility for the dairy. But if the dairy buys bacteria that enhance digestion and mixes them into the milk before making cheese, we can regard these bacteria as a product; both bacteria and milk *are transformed* by facilities that *transform.*

Returning to our example, if we had visited the dairy that in 2000 was called Tine Verdal in 1920 or 1952,[121] we would have seen that the physical facilities were quite different. In other words, physical facilities had developed in the meantime. From the case in chapter 3 we also learn that the skills in the dairy were different in 2000 than in the 1970s. Moreover, these developments in dairy facilities were not entirely internal; business units outside Tine Verdal and Tine took part in many of the developments. For example Alfa Laval, a company delivering dairy equipment worldwide, delivered part of the cheese making equipment Tine Verdal was using in 2000. The equipment consisted partly of standard components developed by Alfa Laval and partly of components specially designed in interaction with Tine Verdal. Alfa Laval even contributed to developing skills (knowing-how) in Tine Verdal necessary for utilizing the new equipment. In other words the two companies interacted and this resulted in the development of physical and non-physical facilities in Tine Verdal. During this interaction they discovered that the user firm's facility could be adjusted in some way that would ease and speed up this firm's cheese making process. It may be that the adjustments allowed Tine

[121] Source: Pettersen (1984: 357, 380).

Verdal to develop the quality or increase the possibilities of differentiating existing products (Håkansson & Snehota 1995: 54), although the case provides little information on this point.

The aspect of interaction that first and foremost contributes to development of facilities, then, is 'producing – using interaction.' E.g. in case 5 we learn that the milking goat – a facility – undergoes change. This change stems from interaction between production and use of this facility, but in a somewhat complex and indirect way. Tine and the breeding organization are two actors involved. In this case Tine is on the use side (not as a 'direct' user of milking goats, but as user of a product that is dependent on milking goats' features). The breeding organization is on the production side as this actor is capable of affecting features of milking goats, more precisely their genetic 'composition.' In the example the two actors effect a change in this composition, not because of one-sided action but through interaction.

However, it is not only interaction between a firm that produces a product and another firm that uses this product as a facility that is interesting for development of facilities. Facilities can also be developed due to interaction between two or more firms that sell and buy each other's products. We mentioned this possibility in the previous section where we discussed products. Håkansson & Waluszewski (2000: ch. 2: 16) point out that facilities in this case can be developed in order to mutually adapt production, production schedules, delivery or handling of products. Such mutual development can – in fact this is often the very reason – lead to certain features of the facility being 'frozen' in order to use products with certain features as inputs. An example of this is the agitator in the milk cooling tank mentioned in the case of Frozen Curd. The agitator was designed for using cow milk as input, while it was less suitable for goat milk, which had a different fat characteristic. In the process of adjusting the agitator so that it suited goat milk better, the actors involved learned more about both the facility and the product.

Interaction impacting on business relationships: networking

If interaction between two actors is repeated a relationship between the two may develop (Håkansson & Snehota 1995: 273). We started a discussion of the concept of business relationship in chapter 2. What interests us here in chapter 4 is the recognition that a business relationship, once it is developed, can be used and hence be judged as valuable by actors

(Håkansson & Snehota 1995: 31). Thus, a business relationship has the property of a resource; it can be used for linking activities, tying resources and bonding actors. A business relationship can provide access to (given) resources and therefore have economic consequences in terms of productivity. But a business relationship can also facilitate 'meeting' of resources of different actors and eventually lead to resources being combined in new ways or new features being discovered. In this way business relationships have economic implications by affecting innovativity.

This means that, like business units, business relationships bring economic logic into the picture. Moreover, like all types of resources we have discussed, business relationships have one real (objective facticity) side and one imaged (subjective meaning) side.[122] Hence a business relationship can exist as an idea – knowledge – in the mind of people. To the extent that such ideas are realized we can talk about business relationships as facts – as real. And a business relationship is realized when two actors *really* start to interact repeatedly; *really* orient mutually towards each other and *really* commit themselves to each other. This 'relationship reality' can be observed; in activities mutually co-ordinated between two actors (Dubois 1998, Richardson 1972), through resources jointly adjusted and in lasting social interaction between individuals of the two actors.

A business relationship, then, is a 'real' resource insofar as actors 'really' use it. In the cases there are several examples of relationships being used. Via its relationship with Åsbygdens Naturbruksgymnasium Skånaliseter gains knowledge about cheese recipes and becomes aware of a company that supplies cheese making vats especially suited for small dairies. Through the relationship with the food consultant Skånaliseter becomes related – as a supplier – to a tourist firm. Via this business relationship Skånaliseter is able to sell some of its produce. Via its relationship with the goat breeding association, Tine influences the goat breeding goals. Thus, in relationships actors can get access to products and facilities, physical as well as non-physical, that are more suitable than products and facilities bought in the market or made by themselves. Moreover, it is in a business relationship that a product that an actor produces attains value. Or as Emerson (1981: 41) states:

[122] Confer Berger & Luckmann (1967: 30): "It is precisely the dual character of society in terms of objective facticity *and* subjective meaning that makes its 'reality *sui generis'*." This dual character applies to resources as well.

> Notice that a resource is not an attribute or a "possession" of an actor in the abstract, *but is rather an attribute of his relation to another or set of other actors* whose values define resources.

Therefore, for example:

> A mother's capacity to offer approval is a resource in her relation with her child but *may not be in her relation with someone else's child*. (Molm & Cook 1995: 216) (Italics added)

In other words, the value of a resource is something specific; it depends on relationship between actors and relationships are unique (Håkansson & Snehota 1995). An actor can obtain resources from others that *match* its other resources better. This can lead to a more *potent* resource collection (Alderson 1965), than if the resources were obtained in the 'faceless' market (Richardson 1972). This is also an advantage for the selling firm as it can expect to get a higher price when it sells its products through relationships with specific other firms than by competing for atomized customers in a market. This relationship benefit stems from the firm being able to produce a product that matches the buyer's collection of resources better (Alderson 1965), or in our terminology, more adapted with 'better' interfaces.

Through interaction in the relationship the selling firm can also expect to *learn* more about the products it is producing – how they are used, for what purpose, how they could be used better or differently and discover new features in them. A nice example of this occurred when Skånaliseter, because of incidentally having a surplus of goat milk, was urged to make brown cheese with double content of goat milk. Because customers, among them shops, 'fed' their positive taste experiences with this cheese back to Skånaliseter, Skånaliseter learned more about its brown cheese products and how they attained value. Since the relationship to the customers in this case also contained trust and commitment (Håkansson & Snehota 1995) Skånaliseter was reasonably sure that if they 'converted' the 'occasional cheese' into a standard product, this product could be sold and hence that resources spent on its development

would pay off. This, again, shows the economic dimension – logic if you wish – of business relationships.

Recalling the dual face of resources – that any resource has a provision side and a use side – we realize that purchasing and selling are two sides of the same coin (Håkansson 1982). There is no difference in principle between a customer searching for a seller and a seller searching for customers (Alderson 1965). In both cases the crucial thing is *matching*; there can be no purchasing without sale and no sale without purchasing. Interaction between provider and buyer may be thought of as one way in which matching takes place.[123] The unique 'feature' of interaction is that it 'allows' not only static matching of given and pre-existing products and needs. As we realized in the discussion of social interaction, interaction has a dynamic component as it may lead to *reinterpretation* of products and needs. We may say that interaction stimulates a kind of double loop learning, where not only means, but also ends are questioned and – eventually – changed (Argyris & Schön 1996). Much of the 'power' of interaction rests on information handling; it gives the parties 'rich' and specific knowledge. This may recontextualize the situation relating to a product, a facility or a business unit, opening up new possibilities for development. The rationale for letting the interaction unfold in the context of a lasting relationship, then, may be to increase the efficiency (output – input ratio) of the development process and to reduce the uncertainty about the effectiveness of it (will its output be valued by some other actor?).

Business relationships develop not only via interaction in dyads. Most firms have many business relationships – with suppliers, customers, public agencies and others. To the extent that actors regard their business relationships as resources it can be fruitful for them to systematically relate two or more relationships (Gadde & Håkansson 2001: 84). Hence, we can imagine a more complex pattern of 'multilateral' (or connected) interaction. (When discussing the other three resource types we assumed 'bilateral' interaction and not 'multilateral' interaction). We will refer to such multilateral interaction as *networking*. An important point is that networking can affect the business relationships involved.

[123] The other way is when the buyer searches in the market among different given products.

As with combination of other types of resources, there may be two types of economic rationale 'behind' networking; increased productivity or better innovativity. Networking for improved productivity will typically be to relate business relationships that are similar (homogeneous) to each other by terminating 'deviant' relationships, establishing similar relationships with new actors and/or making 'deviant' relationships more similar. This can make it possible for the actor in question to behave in the same, efficient way in a 'bulk' of relationships. Networking for innovativity requires the opposite; establishing a portfolio of different (heterogeneous) relationships in order to introduce variation, which is a prerequisite for learning (Håkansson, Havila & Pedersen 1999).

An example of the first situation in the cases is when Namdalsmeieriet in co-operation with Norske Meierier stops using goat milk for making cheese and starts to sell it as fodder. However, Norwegian Dairies continues to relate to these goat farmers in the same way as it does towards goat farmers who deliver goat milk that *is* used for producing cheese. An even 'heavier' example is Tine relating in the same way to every single one of its many thousand cow milk farmers. The project for solving the taste problems of Frozen Curd illustrates networking for innovativity. Here Tine 'assembles' different relationships. One is with an actor competent within animal science, one with an actor with competence in food science, one with an actor possessing facilities and abilities in animal and milk control. Tine's business relationship with the dairy producing the product and this dairy's relationships with its suppliers of goat milk are also part of the 'ensemble' of relationships within the project. And ultimately Tine fits all of these relationships with its customer relationship with Laura Chenel.

Consequently networking is a highly *strategic* task, as it affects the firm's position in the business network that it is a part of. Networking can be carried out in order to create *functional* improvements or be used for *political* purposes (Håkansson & Waluszewski 2000: Ch. 2: 18). Functional improvements may be made when a firm tries to adjust its own facilities to a product supplied by one of its suppliers and a product sold to a certain customer. Once the possibility of improvement is identified, this may be a simple task to accomplish. But relationships may also be characterized by conflict, for example due to different images of what constitutes an ideal solution and how to share costs and benefits among network partners. In such a situation *trust*, which is built up through previous interaction between the parties, may be a critical feature, likewise *social competence* – the ability to manage social

relations. Trust and social competence may increase when individuals from different firms strive for functional improvements or new political solutions.

Håkansson (1982) claims that power and dependence are also common features of many business relationships. Therefore we are likely to find enemies as well as friends in business networks. Hostility and friendship may be linked to social relations; sympathies and antipathies on the personal level across firm boundaries. One interesting situation is when former enemies become friends. This can be due to changes external to their relationship, for example because of specific technological or political changes in connected relationships (Håkansson & Waluszewski 2000: Ch. 2:18). Another situation is when two customers start to co-operate in order to gain more attention from their common supplier. There is also the situation when a business unit wants to terminate the relationship with one or more business units. We find an example of this in case 1 where Namdalsmeieriet wants to end the relationship with the goat farmers in Indre Namdal. The reason can be that the firm wants to prioritize other relationships that for different reasons seem more promising or important. The termination can also be part of a strategy to reduce the firm's total number of relationships, thereby simplifying its handling of relationships. The firm can also decide to terminate a relationship because it wants to improve its image in the overall network. This is the case for a retailer who is severely criticized by environmental organizations for purchasing and selling furniture from a supplier who uses wood from a rain forest and therefore terminates the relationship with this supplier.

To sum up, actors can utilize business relationships. A business relationship can therefore be treated as a resource. Moreover, it can be developed by systematically relating different relationships. This can be necessary for developing other types of resources, for example a product.

Web of actors constraining and enabling interaction

So far in this chapter we have discussed development of resources and the impact of interaction on such development. Even though the concept of interaction is general, referring to 'reciprocal action' (between human beings or groups of human beings) as well as 'reciprocal influence' (between other types of organisms, dead things or abstract concepts),

we have in this study chosen to restrict the concept to the former notion. This does not mean that 'interaction' between resources and between actors and resources are non-existent or irrelevant in relation to development. For example, a crucial element in the development problem in case 5 was 'bad' interaction between two resources, milking goat and fodder.[124] But instead of talking about interaction between the two resources 'milking goat' and 'fodder' we apply, then, the expression reciprocal influence between 'milking' goat' and 'fodder.'

Interaction between actors, then, can involve two parties. But interaction can also include many parties; if not networks would not come into being. The discussion of interaction in the form of 'networking' above hinted at this. In chapter 2 we identified our resource as 'located' in reciprocal relation with a certain context – a business network. Also actors interact within such a context. As they develop and use resources, bonds are created between actors. These bonds consist of mutual identity and a certain character in terms of activity links and resource ties. Because business relationships are connected to other relationships, bonds also are connected and form certain webs of actors. Hence, the web of actors constitutes the *actor layer* within a business network (Håkansson & Snehota 1995). What is important from our point of view is not the web of actors per se, but the recognition that *the web of actors constrains and enables interaction regarding development of resources*. In other words, we think that the web of actors affects resource use and changes in resource use, as it constitutes part of the context in which interactive, systematic relating of resources takes place. Thus, if we ignore the actor dimension we miss an important influence on resource use and resource development (Håkansson & Snehota 1995: 261).

The actor dimension, it is stated, concerns organizing:

> Management issues involved in handling the actor dimension of relationships revolve … about organizing. (Håkansson & Snehota 1995: 261).

The term 'web of actors' points to the organizing of several actor bonds; how the relationships between purposeful and interested actors are structured and combined to form a 'meaningful

[124] As the goats grazed late in summer the remaining grass at the nearest pastures became poorer, leading the goats to make longer trips, which 'tapped' their energy, leading them to eat at nearer locations with poorer grass etc. In other words, the pasture influenced the goats, but the goats also influenced the pasture, leading to poorer and poorer milk with respect to taste.

whole.' In chapter 2 we found that identity was perhaps the concept that best captured the meaning and legitimacy of the concept of actor in business networks. The term identity points to what makes an actor special in a business network, for example in terms of resources (knowledge included). Thus, we can apply the same logic to actors in business networks as we already have done regarding resources; because actors are different, combinations matter. And in actor terms we refer to such a combination as a web of actors. This web consists of connected bonds, more specifically *connected mutual identities and characters*. This web can be regarded as a kind of organization, a 'quasi organization' (Håkansson & Snehota 1995: 40). As an activity pattern or a resource constellation a web has no clear (natural) boundaries, nor any clear centre, although actors' positions in the web may vary.

From this view of actors a web contrasts with a 'conventional, rational' organization, as it has no common goal that unifies its members and directs their action by fiat. It can only be held together by some shared beliefs, for example regarding resources and their use in the network. Thus, one actor in a web may perceive a specific resource in a certain way, while another actor can perceive the same resource in another way. This is compatible with the relational view of resources emphasized in this chapter. Taking the 'web view', we realize that more than one actor can have purposes and interpretations relating to a resource.

So interaction, for example relating to development of a specific resource, does not occur in vacuum, but is shaped by the web 'its interactors' are part of. In other words, we can assume that there exist inter-organizational effects on resource development. Or as van de Ven (1988: 115) puts it:

> Innovation is not the enterprise of a single entrepreneur. Instead, it is a network-building effort that centers on the creation, adoption, and sustained implementation of a set of ideas among people who, through transactions, become sufficiently committed to these ideas to transform them into "good currency." … this network-building activity must occur both within the organization and in the larger community of which it is a part.

The author refers to the 'larger community network' as the extra-organizational infrastructure or context 'in which innovation can flourish.' This formulation seizes what we think of when

we use the concept 'web of actors,' with the exception that we would prefer the term interaction to transaction.

As we have emphasized many times in this chapter, development of resources hinges on knowledge. Actors hold this knowledge individually and collectively. But no single actor has full knowledge of any resource, its features and combinations. Thus, the actors' knowledge is fragmented; it does not exist in concentrated or integrated form but solely as the dispersed bits of incomplete and often contradictory knowledge held by the actors. (Hayek 1949, referred to in Kirzner 1992: 163). Or as stated by Hayek (1937):

> The problem … is how the spontaneous interaction of a number of people, each possessing only bits of knowledge, brings about a state of affairs in which prices correspond to costs, etc.

The recognition of fragmented knowledge means also, on the other hand, that actors have *different* incomplete knowledge, in other words that they have *specific* knowledge to offer. Via interaction fragmented and specific knowledge of different actors can be combined in a meaningful way:

> [Actors] relate their intentions and understanding to those of others making it thus possible to transcend their limits (Håkansson & Snehota 1995: 194).

And further:

> No actor can embrace all the complexities of the environment of which it is part. The web of bonds of an actor to others … provides a frame for knowledge development with respect to what exists and is happening beyond the horizon (provided that a common language exists). (p. 200).

Thus, the term web of actors is not empty (Alderson 1965). It is meaningful as it refers to 'realities' out there. Managers know that it is important to belong to a web together with other actors if for example new knowledge about a resource is to be created. Hence:

> The important thing is to ensure that the set of counterparts forms a meaningful totality. (Håkansson & Snehota 1995: 267).

From such a meaningful totality an actor can, through interaction, gain access to resources of others, including their specific knowledge. This access hinges on the actor receiving a minimum of commitment from the other actors, which again presupposes that the others ascribe some identity to the actor and trust him or her.

Development as interactive, systematic relating of actors in a web

This chapter started with a definition of the concept resource. We found that a resource is an element that some actor finds useful. Since a resource also has a provision side, actors can regard it from two sides, leaving us with a *relational* conception of resources. Furthermore we found that resources can be developed because there will always exist unused potential uses of resources. A purposeful actor will search for unused uses and can create *knowledge* about new features of a resource or knowledge about new combinations of it. Hence knowledge creation is inevitably tied to resource development. We see knowledge as a non-physical resource. In an inter-organizational setting an important part of the process of resource development is different actors' *interaction*. This interaction is constrained and enabled by the way physical and non-physical resources are related 'at the outset.' We term the way resources are related as *interface*. In an interface certain features of the resources are activated. Variety of interfaces is assumed to stimulate knowledge creation. Furthermore we identify and discuss four types of resources; business units, products, facilities and business relationships. Development will often involve resources from all of these four categories even if actors deliberately choose to focus on one type of resource, as is the case in product development and technical development.[125]

We will now make an effort to put these concepts together into a research model where we hope to grasp important elements relating to the *process* of resource development. To the extent that we 'picture' the *structure* of resource combinations (which is static as it relates to the situation at a specific point in time), we do this to facilitate the understanding of process.

[125] In the background of the discussion in this chapter we might say that technical development revolves around developing one of the four types of resources – facilities.

Development occurs when purposeful (interested) actors in a business network confront and combine resources of different categories. According to Håkansson & Waluszewski (2000: ch. 11: 8) this:

> can be expressed as efforts undertaken in order to *utilize several different but related resources*. This *systematic relating* appears as important both for the utilisation of individual resources and of larger constellations of resources. During this relating, features of some of the resource elements become successively embedded into each other [heaviness], while others are left out [variety]. (Author's Italics).

Thus, resource development in a business network can be seen as purposeful, systematic relating of resources. Hence, development is about creating and managing many and diverse interfaces between resources. This also makes it clear that development never starts from 'nothing', hence the significance of having a picture of the prevailing resource constellation (which can be seen as a structure 'variable'). Any development must by necessity start from some existing combination of physical (real) and non-physical resources. But since this combination in principle is infinite, any actor trying to understand and act in relation to the 'total' combination would be paralysed at the outset. However, actors – with identity and character – can approach *parts* of constellations and interfaces. In this way their approach to resources can be characterized as sub-optimization, local rationality and limited search processes (Håkansson 1989: 5, Cyert & March 1963). But in a network perspective the concepts 'sub,' 'local' and 'limited' must be reinterpreted. Also in a network an actor's search must necessarily be limited, but not 'sub' or local in the traditional meaning of these terms. A limited search for, for instance, a new resource combination can go far beyond the focal company and way beyond a local plant or community. That is one main insight from applying the network perspective.

A research model

After the discussion in this chapter we can move one step further from chapter 2 on our 'theoretical foot.' We can now be more specific about our problem, which concerned changed resource-use. Firstly, we have introduced and defined the concept of interaction and emphasized that this is a process carried out by actors in a business network. A second

purpose of chapter 4 has been to identify and relate concepts relevant to grasping the development aspect of physical resources. Here we found that the exploitation side and development side are both necessary in a model to explain development of physical resources. Moreover, the physical dimension is not sufficient; no resource can be a resource without the non-physical dimension. Regarding this dimension we have especially been focusing on knowledge, which is of two kinds. One is knowledge that already exists and hence can be exploited more or less directly, the other is knowledge that does not exist, but that can be developed. In relation to resource development interaction takes the form of systematic relating, hence we obtain the concept of interactive, systematic relating. The relating is supposed to be systematic because the actors doing it are supposed to be purposeful. Hence, without purpose there can be no systematic relating.

As we define it, it is purposeful actors that 'do' the interaction and hence interactive systematic relating. As a consequence we found it 'purposeful' to dig deeper into the actor dimension. This was the third and last aim of chapter 4. Already in chapter 2 we introduced the concept of purposeful (interested) actor in order to grasp the 'driver' of resource development. The actor dimension can be studied at many levels. Håkansson & Snehota (1995: 45) identify three: organizational structure on company level, actor bond on relationship level and web of actors on network level. We found the last level especially important given our 'contextual approach' and research task. A web of actors forms an important part of the 'business network context' in which development of a resource 'takes place.' Hence, we incorporate the concept 'web of purposeful actors' in our research model. This means that the rather general model of the relation between resource and network in chapter 2 can be specified as in Figure 4-3.

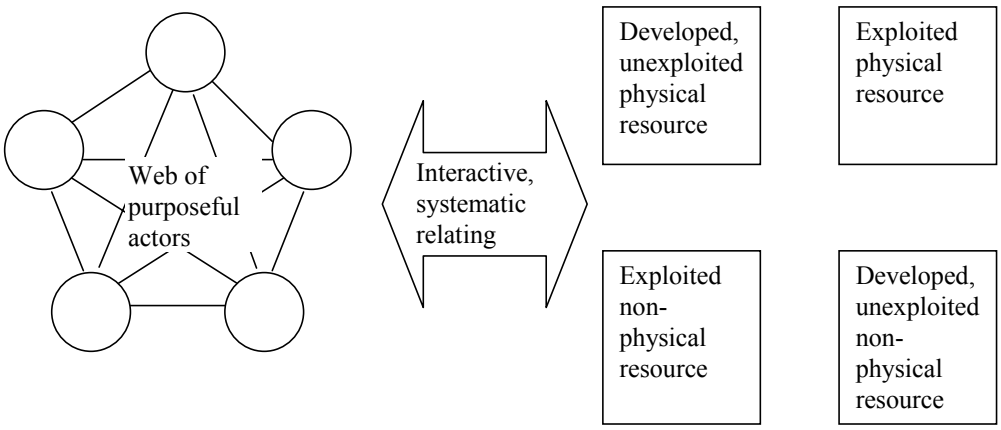

Figure 4-3: Development as interactive, systematic relating of exploited and unexploited, known and unknown features by a web of purposeful actors – an analytical model.

The model can be interpreted in this way: On the right side we have a certain physical resource. To this resource a web of actors has interactively and systematically related non-physical resources, of which knowledge is an important part. A resource cannot exist as such if no actor has related knowledge to it. On the right side of the model we also distinguish between exploited and developed resource, because a developed resource is not necessarily exploited. This relates to both physical and non-physical resources. Moreover, an exploited resource can have a role to play when it comes to development of a resource. Thus, resources in 'exploited' state as well as 'developed, but unexploited' state can be part of a process of systematic relating. On the left side of the figure we find the 'drivers' of the interactive, systematic relating – the web of purposeful actors. These actors have bonds with each other because they interact over time. But these bonds as well as the actors may be more varied than is suggested in the figure. Moreover, interactive, systematic relating is an *on-going process*. Therefore, the model does not refer to 'something' static, but to 'something' *dynamic*; it is ultimately one possible depiction of the process of development of a physical resource.

However, we can 'freeze' the process at a certain point in time and analyse outcomes of the process in terms of resources, the web of actors 'behind' it and the interaction between them.

Resources are not used by themselves. Neither do resources develop by themselves. In general any resource development process starts with one or more actors, and in our model we highlight the role of interaction between actors in resource development. In other words, there has to be a left side – an actor side – in our research model. However, another thing is to understand the 'play' on the right side – the resource side – *once actors have started to 'pull or push' some resource*. In our cases they pull at a physical resource that is already exploited. But in other cases actors can start a development process by 'pulling at' any of the four 'resource forms' on the right side in our figure.

We can take the resource we study empirically in this thesis as an example. In chapter 1 Ola tells us about goat milk being poorly exploited, hence this goat milk is an example of the box labelled 'exploited physical resource' in the figure. We regard Ola as a purposeful actor, and we learn in chapter 3 that the poor exploitation leads him and his wife (the two who run the firm Skånaliseter) to interact with certain other actors, something that leads to development of new knowledge (box labelled 'developed, unexploited non-physical resource'). Some of this knowledge is put to use, hence this knowledge is an example of the box labelled 'exploited non-physical resource.' The result of this exploitation of a non-physical resource again is development of a physical resource symbolized in the figure by the box named 'developed, unexploited resource.' An example of this is the 'space' for a future dairy that Ola and Kari built in relation to the new outbuilding after the burning down of the old one. Ola and Kari had not used this space before they started to use it as dairy, and we are back again in the box named exploited, physical resource. However, the unused space need not necessarily have been used.

A (poorly) exploited physical resource may not be the only starting point for development by actors. Anne, the researcher, complains in chapter 1 that the problem of poor use of goat milk is due to lack of use of knowledge and not lack of knowledge per se. Hence it seems that a physical resource can be developed without any *new* knowledge being developed. The point can be to relate knowledge that has already been developed to the actual (physical) resource and thereby to develop it.

The figure does not distinguish between search for new features and search for new combinations of a certain (physical) resource; we regard both these options as part of the entity 'Developed, unexploited physical resource.' Combination is implicitly also part of the entity 'exploited physical resource' since we have found that resources can only be exploited if they are part of a combination with other resources. In other words, the term 'exploited physical resource' presupposes that the resource is part of a certain combination. Nor are the four types of resources discussed in this chapter explicitly 'pictured' in the model; hence, with a little imagination each of them can be found in each of the four resource 'states.'

Specific research purpose

The *purpose* of the thesis may now be more specifically formulated. It is to:

Demonstrate that use of a certain resource can be improved through development if actors in a business network question knowledge about its existing features and combinations and interact in order to systematically relate the resource to existing and new resources.

In the next chapter we will analyse some of the results of the interactive, systematic relating of resources described in the 'empirical' chapters 1 and 3.

Chapter 5 Analysing Resource Interfaces

It is said that to analyse is to 'examine (something) in order to learn what it is made up of;' that an analysis is 'separation into parts possibly with comment and judgement' (Oxford 1974). Then analysis is seen as the opposite to synthesis, which refers to combination −the putting of things together. According to Penguin (1992) analysis denotes 'separation and decomposition,' but also 'examination and interpretation.' The terms separation and decomposition surely point to the finding out of what *parts* a whole consists of. The words examination and interpretation emphasize that finding out how the parts are *related* (and thereby contribute to the constitution of the whole), also is an important element in analysis.

The cases in themselves represent syntheses, wholes constructed by us on the basis of empirical data and under the influence of a certain theoretical perspective. In the subsequent analysis we will partly be engaged in identifying parts that make up our case stories (notably our focal resource and other resources of different kinds). Furthermore we will examine how some of these parts are related (resource interfaces) and how the resources and the way they are related constitute 'wholes'[126] (resource constellations). Our focal resource is related (embedded) in such wholes. Part of the analysis will therefore be to interpret such 'wholes' and how the way the resource is embedded in the wholes influences the value of it.

Since the problem we are studying relates to development (related to the focal resource), we will analyse resources and interfaces at two points in time, 'beginning' and 'end'. With 'beginning' we think of the point in time before the development processes described in chapter 3 begin. 1987 is a reasonable year to choose here since it is around this year Skånaliseter really started to interact with other actors with the aim of changing the use of the

goat milk it produces. The development processes described in the other cases start a few years later. Regarding the 'end' we can be more concrete because our empirical data 'stops' in 2001. In other words the 'end point in time' for our stories and thus for our analysis is the year 2001.

The resource's interfaces at 'the beginning'

In chapter 1, at 'the beginning,' we 'met' two focal resources – two goat milks. One was quite *specific*; goat milk produced (and sold) by Skånaliseter and (bought and) used by Namdalsmeieriet. The other was more *general* because it encompassed all goat milk produced and sold by Norwegian farmers and bought and used by dairies that were members of Norske Meierier. We referred to this general goat milk as Norwegian goat milk. Since Ola was one of these farmers and Namdalsmeieriet was a member of Norske Meierier, the latter (general) goat milk encompassed the first (specific or local) goat milk. Furthermore, Norwegian goat milk formed, together with Norwegian cow milk, the even more general resource Norwegian *milk*. In relation to Norwegian milk actors had over time developed a business network, which we termed the Norwegian milk network. Both Norwegian goat milk and goat milk from Skånaliseter were part of this network. We will start by analysing the general picture of the focal resource and its interfaces at 'the beginning.' Thereafter we turn to more specific analysis of resource interfaces.

Interfaces in general

The empirical material presented in chapter 1 reveals that many resources of different kinds were combined with and thus had interfaces to Norwegian goat milk at 'the beginning.' By having interfaces the focal resource is locked in a specific resource constellation involving many actors. These interfaces constrain and enable the actors' (subsequent, interactive) development of the resource, be it in the form of new features or new combinations.

Interfaces can be important for different reasons; some may be *technically* significant (like products and facilities), others *commercially (or economically)* important (like business units

[126] We put quotation marks around the word whole here to emphasize that we do not see it as pointing to an all-encompassing totality. Rather we think of relative wholes that result from some parts being related in a specific way. A business network is an example of such a relative whole; the same is a resource constellation.

and business relationships). Naming related resources and sorting them precisely into business units, products, facilities and business relationships can aid our 'research' of interfaces of Norwegian goat milk, both at 'the beginning' and in 'the end.' Moreover, because we want to examine development of the focal resource, we have to distinguish resources in substantiated form from images (knowledge) that actors have of them. Arranging substantiated and imaged resources produces a map like that in Figure 5-1. This map, of course, is a representation, an image – our image – of the 'resource landscape' in which we find our resource embedded at 'the beginning.'

The map in Figure 5-1 is rather 'crowded,' yet contains some logic. It symbolizes concrete resources of the four kinds, and which are mentioned in the empirical material relating to 'the beginning.' Moreover it orders them; places the different resources *in relation* to each other. Thus, the resources are not placed and related by chance on the map, but guided by the empirical material and the theory discussed in chapter 4. By so doing the map represents *one* way – of many – in which the resources could have been related, based on the empirical material. In this way the process of making the map mirrors, we think, the process in which actors 'themselves' in the 'real word' relate resources. The logic in our resource map (Figure 5-1) is that the focal resource (which in our story is a product), first of all, is related to *products* made of it. To emphasize this importance we have coloured the boxes symbolizing these resources gray. (We recognize mixed brown cheese, pure goat brown cheese, pure goat hard white cheese (Rosendal), mixed hard white cheese (Balsfjord), dried goat milk, mixed dried casein and mixed goat milk & rinsing cow milk.)

In the figure the products are made by one dairy each.[127] The dashed lines delimit the parts of the resource constellation in which the subsequent development described in the cases (chapter 3) takes place. 'Signboards' connect each case to the respective areas of the map. For example in the area marked 'Case 1&2' we find the business units Namdalsmeieriet and three suppliers (Skånaliseter, another goat milk farm and a cow milk farm). These four business units all have interfaces with the focal resource.

[127] For the sake of simplicity we depict only one dairy in relation to each product even if in reality more than one dairy produced some of the products.

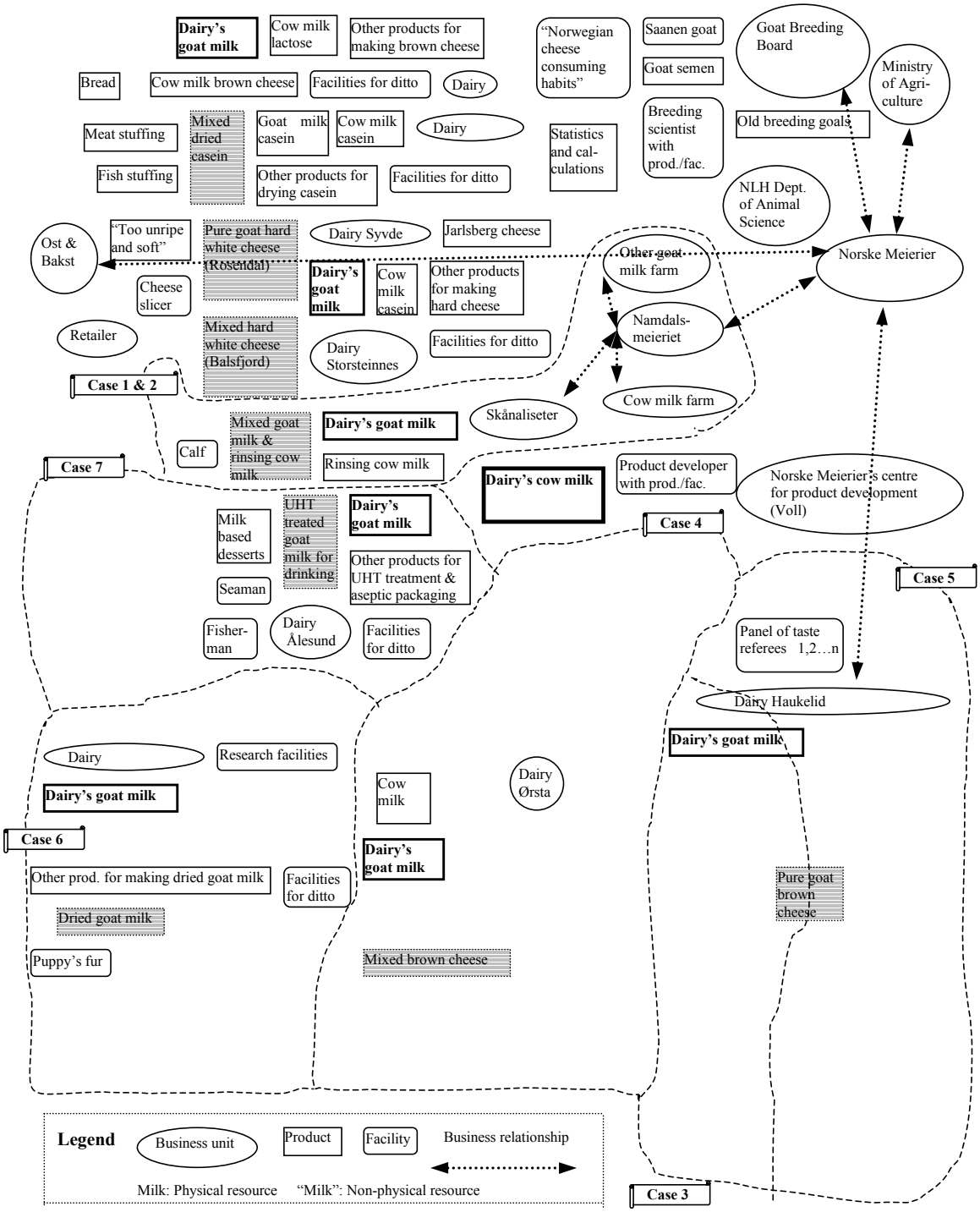

Figure 5-1: A resource constellation: Norwegian goat milk and certain business units, products, facilities and business relationships at 'the beginning' (1987).

Note that we have found it necessary to use a more specific name than Norwegian goat milk for 'our' resource here; 'dairy's goat milk.' The addendum 'dairy' emphasizes that we distinguish between a produced product and a used product; dairy's goat milk is the *used* goat milk. Especially in case 5 we learn that goat milk newly produced (on the farm) and goat milk used (in the dairy) can be two different things – two different resources. And resources that we observe to be different should also be referred to by different names. In case 1 the actor (Namdalsmeieriet) relates the goat milk to cow milk (in the form of rinsing cow milk), and makes a product we choose – for want of a better name – to term 'mixed goat milk & rinsing cow milk.' This product is related to a resource that we term calf. Here we regard the calf as a *facility* on a cow milk farm (the calf is a heifer that will become a milking cow).

This means that the business *relationship* between Namdalsmeieriet and the cow milk farm is multidimensional; both parties are both suppliers and customers to each other. Namdalsmeieriet has also a business relationship with Skånaliseter and the other goat farm. In addition there is a business relationship between Namdalsmeieriet and Norske Meierier. The latter we have placed outside the defined areas because this business unit is common to all the dairy companies in the cases. In each case there is one specific dairy, except in case 3 and case 5, which have one dairy 'in common.' Moreover, Norske Meierier has business relationships with the dairy in Haukelid, the goat breeding board, Ost & Bakst and Ministry of Agriculture.

There is no 'space' to indicate interfaces between resources in the map in Figure 5-1. But if we did that, what are the important interfaces? A resource that we did not pay so much attention to in chapter 1 and 3 appears in the map as central in relation to Norwegian goat milk in 1987, and that is *cow milk*. Economically in 1987 cow milk was a much more significant resource for Norske Meierier and most of its member companies than goat milk. In such terms Norwegian cow milk surely is Norwegian goat milk's 'big brother.'

Product – facility

A major impression is that the *facilities* which Norske Meierier, 'their' dairy companies and dairies use, seem to have been developed mainly in relation to cow milk. In fact, no facility is used *solely* and *specifically* for goat milk in the Norwegian milk network at 'the beginning.'

All goat milk products are produced with facilities that could also be used for producing cow milk products. However, the extent to which the various goat milk products fit business relationships between Norske Meierier and their customers (an economical interface) is variable. Goat brown cheese, for example, sells rather well, while the white goat cheese sells poorly and is regarded almost as a failure by one of the customers (Gitte in Ost & Bakst). In other words goat brown cheese fits rather well in to the business relationships between Norske Meierier and its customers while goat white cheese, we must say, fits poorly.

There may be a *technical* explanation for this difference. Any type of milk, we learn from the empirical material, consists of *components*, which also can be resources. Lactose and casein are two milk components that actors in the cases use; hence these components are resources. Judged from the information in the cases, lactose in goat milk and cow milk are similar from a physical point of view. Norske Meierier relates these two resources to similar facilities. Norske Meierier's customers value the products that result from both these interfaces.

Goat milk casein and cow milk casein, we learn from the cases, have some different physical features, but Norske Meierier also relates these two resources to similar facilities. Norske Meierier's customers value the products that come out of these two interfaces *differently*. Gitte – the shopkeeper – is very dissatisfied with Rosendal, the only pure casein food product that Norske Meierier makes in 1987. Norske Meierier sells this product at the same price as products resulting from the interface between the same facilities and cow milk casein. Nevertheless, the latter products (for example Norvegia and Jarlsberg) sell many times as much. Jarlsberg even, according to Norske Meierier, enjoys considerable reputation among American customers for its distinct features (taste, consistency), a further indication of value. In other words, relating two physically different products to the same facilities may result in products that have very different value in the same business relationship.

One reason contributing to similarity in valuation in the first case (lactose) and difference in the latter (casein), thus, seems to be *technical* interfaces which Norwegian goat milk has to other resources at the beginning. We note that for nearly 30 years (from around 1970 to 1999) Norske Meierier/Tine continuously keeps up the technically rather inappropriate interface between goat milk casein and facilities designed for producing products from cow milk casein. However, *why* this technical interface is kept up is more difficult to understand given

our case material. But, given our theory, we should seek answers based on the realization of business networks consisting not only of technical interfaces. We also find *economic* interfaces (as we already have shown in this analysis).

There are also other goat milk products that Norske Meierier manufactures using 'cow milk facilities;' dried goat milk, mixed dried casein, UHT milk and 'mixed goat milk & rinsing cow milk.' Our overall impression is that in 1987 – at 'the beginning' – all goat milk processed in the Norwegian milk network has – in one way or another – interfaces with facilities used to produce cow milk products.

Furthermore, cow milk as opposed to goat milk, also has interfaces 'of its own.' One important such interface is that between cow milk and Norske Meierier's system for price differentiation according to milk quality. In this setting it is reasonable to regard this system as a facility, as it is a technical means to obtain efficiency and effectiveness in production of products based on milk.[128] This facility is only related to cow milk, not to goat milk. There are other facilities that cow milk has 'alone,' for example facilities for producing milk for liquid consumption.

Moreover, goat milk is related to a milk *quota* system. This system we can regard as a facility, too. This facility also includes cow milk. The quota system affects the quantity of goat milk that is produced. At 'the beginning' it is the same for all goat milk producers and cow milk producers in the country. Moreover, the system is based on the milk produced being sold to a dairy company that is member of Norske Meierier. The farmers (through two member organizations) and the state agricultural authorities (Ministry of Agriculture) decide this quota system. Norske Meierier administers it.

Goat milk is at the beginning related to a system of state agricultural *subsidies,* too. We will regard this system as a facility. The principles underlying this system are the same for goat milk and cow milk. Norske Meierier administers two concrete subsidies to milk farmers,

[128] However, there is no reason to use the resource concepts generically. For example, since routines are attached to the price system and it probably has a budget of its own it might, in another setting, be reasonable to treat it as a business unit.

while the agricultural authorities administer the rest. The subsidies are paid out to the farmers and represent important resources (in terms of income) for goat milk farmers.

Product – product

Some of the goat milk is related directly to the *product* cow milk, that is to say, goat milk used to produce mixed brown cheese, mixed (hard, white) cheese, mixed dried casein and 'mixed goat milk & rinsing cow milk.' Some of these interfaces, too, are very technical. For example, to dry goat milk casein alone is technologically extremely difficult, while mixing it with casein from cow milk and then drying it is technically easier. *All these technical dependencies contribute to a 'heavy' interface between cow milk and goat milk in the Norwegian milk network at 'the beginning.'*

Product – business unit

At the beginning goat milk has an interface with only one business unit on the user side – Norske Meierier. Even if this business unit is a rather 'quasi' one – constituted as it is of many, partly independent business units (regional dairy companies, local dairies) – Norske Meierier has the final word when it comes to the *use* of the goat milk that these business units buy from their milk suppliers.

In other words, the business units that used goat milk and managed these other resources (quotas and subsidies) were common for goat milk and cow milk. Only on the production side are the business units *specific* for goat milk.

A picture of important interfaces at 'the beginning'

Hence, we get a picture of Norwegian goat milk and some important interfaces at 'the beginning' as in Figure 5-2.

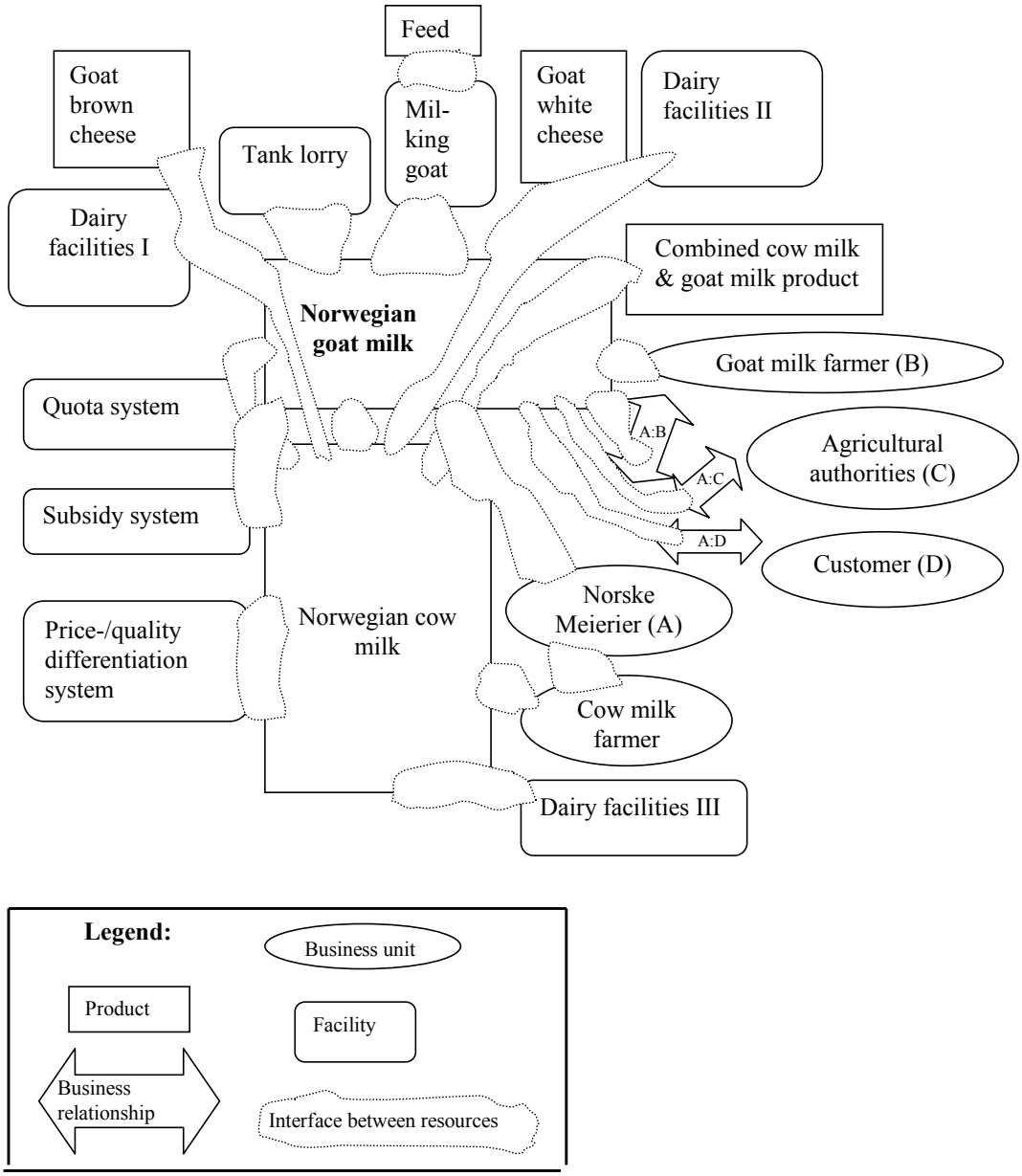

Figure 5-2: A general resource picture: Norwegian goat milk and interfaces with important products, facilities, business units and business relationships at 'the beginning' (year 1987).

We will now analyse some resource interfaces resulting from two specific developments described in the empirical chapters and which have affected the resource. These are Skånaliseter (case 1 and partly case 2, see Figure 5-1 on page 152) and Frozen Curd (case 5, see Figure 5-1 on page 152).

Development – the Skånaliseter case

Figure 5-3 visualizes some of the effects that interaction from 1987 to 2001 have had for a specific goat milk; goat milk *used* by Skånaliseter farm dairy in 2001. This goat milk is not identical with the Norwegian goat milk depicted in Figure 5-2; it is more specific. Neither is it the same resource as the goat milk that Skånaliseter farm *produces* in 2001 although this goat milk is also more specific than Norwegian goat milk. We will look at the effects the interactive development process has had on the resource (goat milk used by Skånaliseter farm dairy) in terms of interfaces between the resource and other resources.

From Figure 5-2 we see that Norwegian goat milk has an interface with a certain *quota* system and an interface with a certain *subsidy* system in 1987. In the Skånaliseter case we learn that Ola – the farmer – believes that the goat milk he produces is 'an excellent raw material,' that there are 'special cheese customers out there' and that 'he will be capable of using the resource better (than Namdalsmeieriet and Norske Meierier).' Thus we have two differences compared to the static picture in Figure 5-2. The first is that not only 'realized' resources but also resources in *idea* form are involved. For example 'special cheese customer' is an idea (image) Ola holds before 1995.[129] This idea is not static but develops as Ola interacts with certain other actors over time, for example a goat farmer in Jämtland. Moreover, Ola has the will to realize this idea. More precisely he will relate goat milk produced on Skånaliseter to resources that it was *not* related to (had no interfaces with) in 1987, at 'the beginning.' But certain 'old,' substantiated interfaces turn out to be *constraints* to the realization of the new, imaged interface. This constraining effect of interfaces is the second distinction compared to the static resource picture in Figure 5-2.

[129] In figures in this chapter we symbolize that resources are ideas by putting quotation marks around them. As we see there are many ideas embedded in the resource constellation in Figure 5-3 as well.

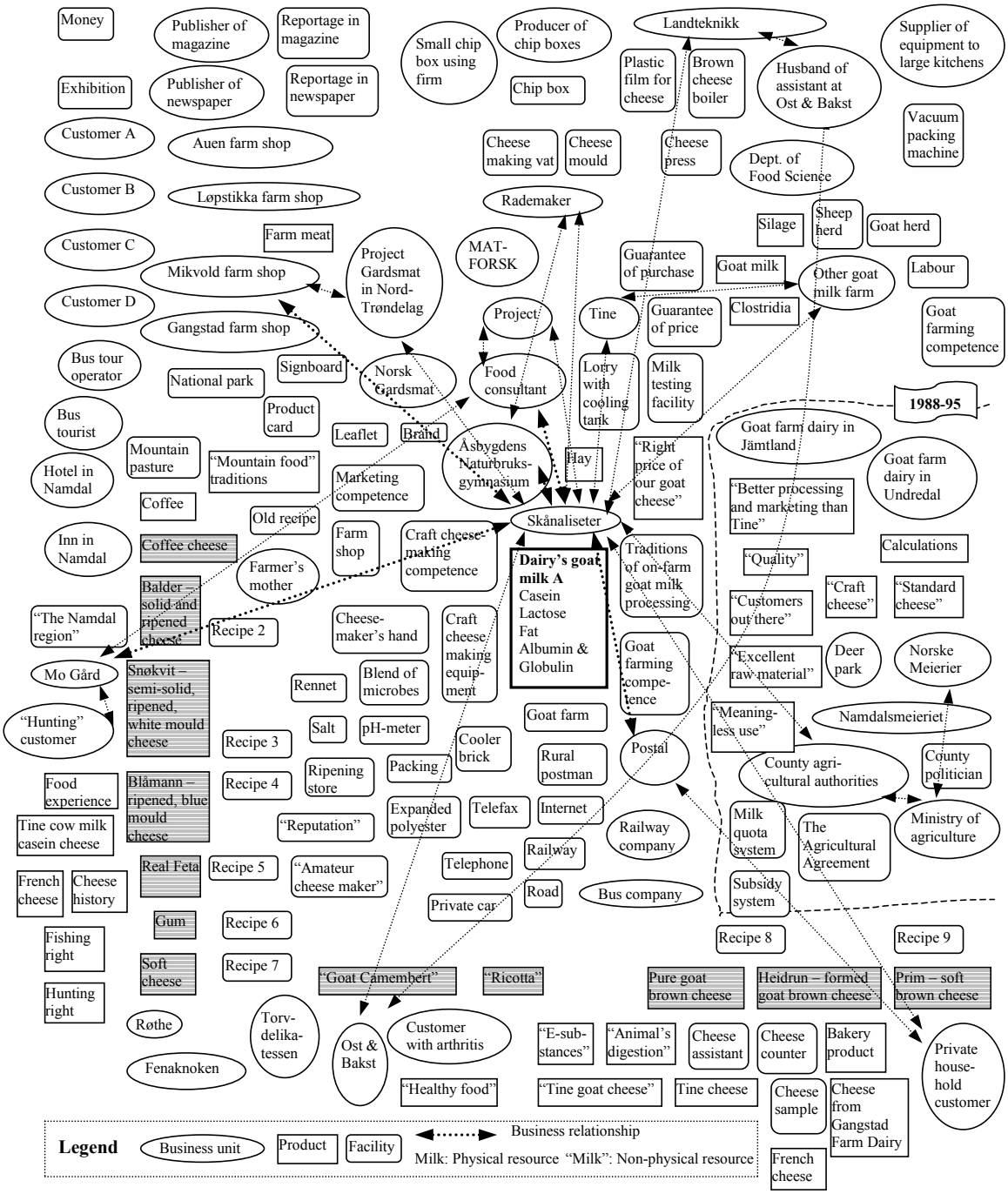

Figure 5-3: A resource constellation: Goat milk used by Skånaliseter farm dairy and certain business units, products, facilities and business relationships ca. 1988-1995 (small section to the right) and at 'the end' (year 2001) (large section to the left).

Two of these old, constraining interfaces are goat milk's interfaces with the milk quota system and the subsidy system. However, especially the latter interface is also enabling and therefore valuable for Skånaliseter as a business unit (as it produces income). Hence it is crucial for Skånaliseter not to remove this interface. Therefore, Skånaliseter starts interacting with specific other actors. As a result the two constraining interfaces are not removed but adjusted. More specifically the quota system and the subsidy system are adjusted towards – not only Skånaliseter's imaged interfaces for its goat milk, but – all Norwegian goat milk that is *used* in a specific way (processed on farm).

The resource we examine at Skånaliseter in 'the end' (2001) is not like the resource that Namdalsmeieriet used in 1985 to make brown cheese. This resource was among other things 1) a mixture of goat milks from different farms, and 2) transported by tank lorry. It is not identical with Norwegian goat milk in the year 2001 either. Moreover, it is not even similar to newly milked – fresh – goat milk at Skånaliseter. The resource that we analyse in this section – goat milk *used* by Skånaliseter ('dairy's goat milk') – is something other than goat milk *produced* in Skånaliseter, among other things because the former has been related to some specific logistical facilities (pipeline, cooling tank and agitator). Moreover, these facilities are different from those Tine Haukelid's goat milk are related to (and which we analyse in the next section). Therefore we can assume that the goat milks that these two dairies use are not similar but different; one or more of their features vary. Some possible interfaces contributing to these specific features are depicted in Figure 5-4 (page 161) respectively Figure 5-7 (page 169). In the figures we refer to goat milk that Skånaliseter's farm dairy *uses* in 2001 as 'Dairy's goat milk A,' while we refer to the goat milk that Tine Haukelid uses in 2001 as 'Dairy's goat milk B.' We use different names since we cannot be sure that the former and the latter goat milk have identical features.

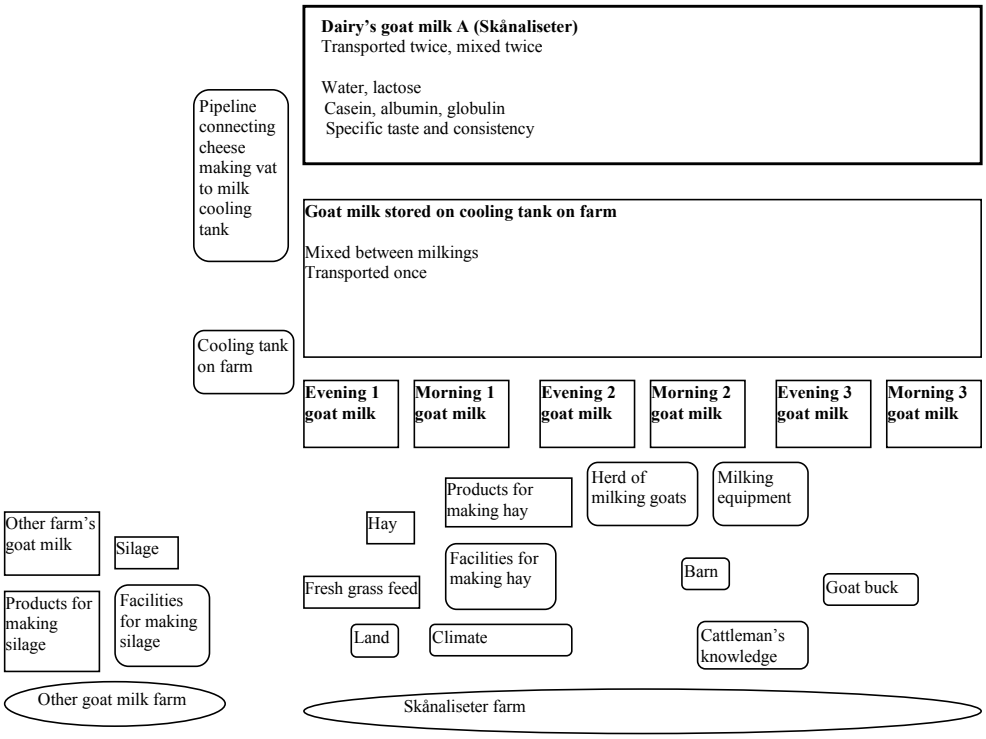

Figure 5-4: A resource constellation at 'the end' (year 2001): Goat milk used by Skånaliseter farm dairy (A in Figure 5-3) in relation to some business units, products and facilities on the provision side.

'Goat milk – hay' is one of the new interfaces in Figure 5-5. It is an interface between a product and a product. It replaces a former product – product interface; 'goat milk – silage' at Skånaliseter. However, the new interface gives little meaning viewed in isolation. We have to take other interfaces into consideration also. When Namdalsmeieriet used goat milk it used it only for producing brown cheese. Brown cheese does not have interface with the whole goat milk, but only a part of it – lactose

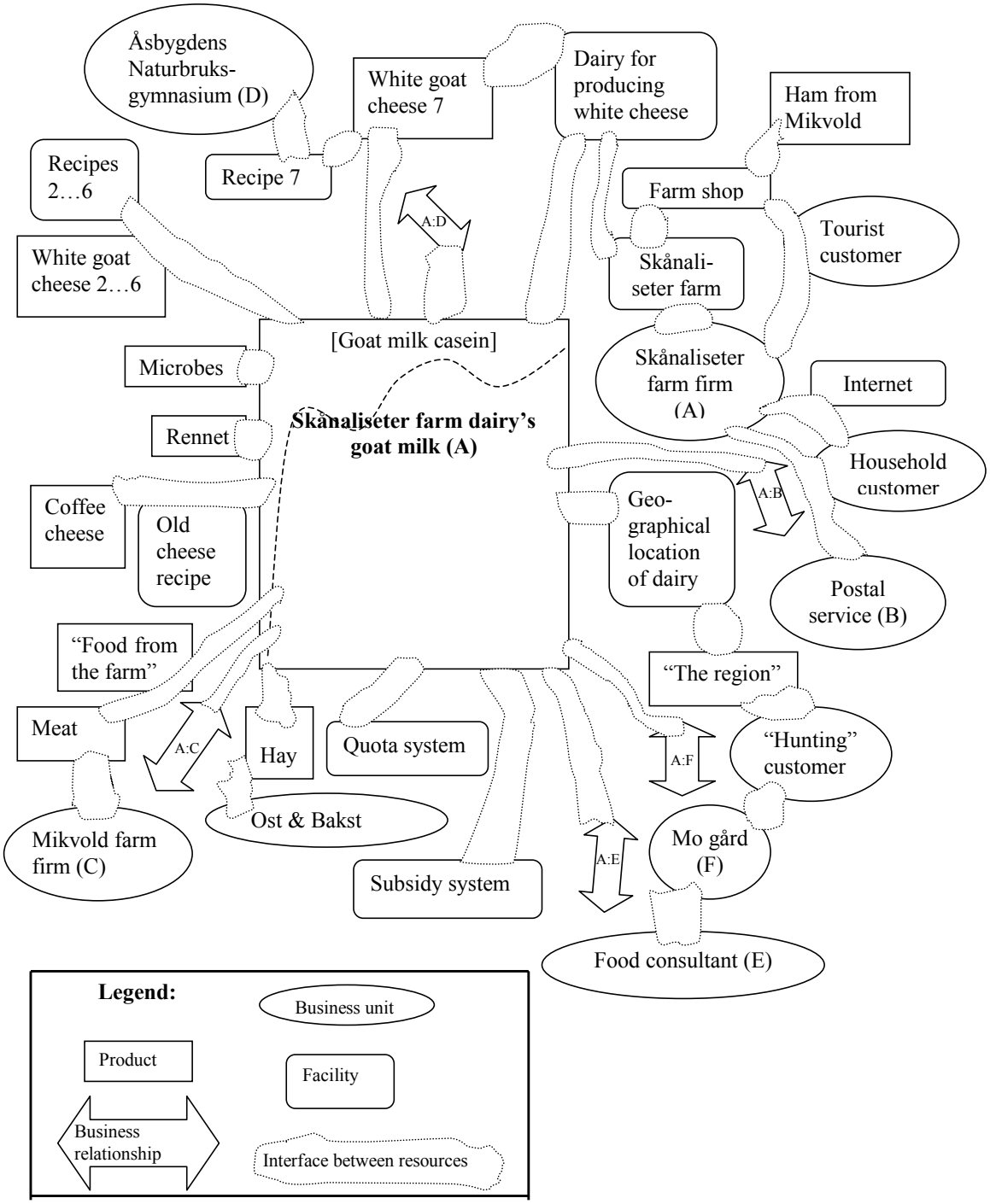

Figure 5-5: A local resource picture (I): Goat milk used by Skånaliseter at 'the end' (year 2001) and interfaces with important products, facilities, business units and business relationships.

(the carbohydrate component). Goat milk does not have to be activated by microbes in order to result in the product brown cheese.

Moreover, eventual interfaces between goat milk and microbes have no consequences for the features of brown cheese whatsoever. For example, an interface 'Clostridia – goat milk' has no consequences for the interface 'goat milk – brown cheese'. Furthermore we know that there is an interface between silage and Clostridia, but this interface does not influence the interface 'goat milk – brown cheese' either. In other words, because the business unit Namdalsmeieriet related only to a part – a specific component – of goat milk (of which Skånaliseter produced some), it could ignore the interface between goat milk and the 'facility' Clostridia.

However, for resource interfaces that include another component of goat milk – casein – the interface 'Clostridia – goat milk' matters. Clostridia facilitate transformation of goat milk into certain products. But these products suit neither Tine's nor Skånaliseter's customers. Hence the actors in this case want to get rid of the interface 'goat milk – Clostridia.' In the cases we get to know two ways of removal. Tine Verdal uses a specific facility – bactofuge – to separate (sort) Clostridia that have already entered the milk from the milk. Skånaliseter, given *its* resource interfaces, finds it more rational to prevent Clostridia from entering the milk in the first place. Replacing the interface 'goat milk – silage' with the interface 'goat milk – hay' does this. Thus hay does not change the features of Skånaliseter's goat milk *per se*, but is a way of physically *sorting* an element that is a resource from an element that is not.[130]

Moreover, Skånaliseter's hay also has an interface with the *business unit* Ost & Bakst, as the shopkeeper there has a more positive image of the interface 'milking goat – hay' than the interface 'milking goat – silage.' She seems, in interaction with customers, to be prepared to argue more positively for cheeses made in Skånaliseter, even if Skånaliseter doubtless could have produced products with the same *physical* features from goat milk produced on silage provided Clostridia had been sorted out before the cheese was made. The point is that the shopkeeper's *image* of a certain interface (in this case between a facility producing the

[130] Maybe we should use the term *negative facility* for resources that destroy other resources in a certain resource constellation…

resource and a product used by this facility) has a bearing on the resource – Skånaliseter's goat milk.

All in all we will argue that the effects on 'Dairy's goat milk A' of 14 years of development have to do with new combinations of existing features and nothing to do with new or changed features of the resource. In other words, in the Skånaliseter case it is the *use* side of the resource that is developed and not the provision side. After Skånaliseter's goat milk's interfaces with the facility 'quota system,' the facility 'subsidy system' and the business unit Norske Meierier/Tine are altered, a whole range of new interfaces are developed 'for' the resource over a relatively short period of time. Most of these new interfaces are of an even more specific kind as they mainly involve a *particular component* of the resource – casein. Thus, this component can in itself be viewed as a resource, a product within a product, so to speak. In Figure 5-5 some of the new interfaces are depicted. Some of them are technical as they are between casein and certain *products* and between casein and particular *facilities*. Others are economic as they deal with casein in relation to certain business units or casein in connection to specific business relationships. Let us analyse the effects on the resource of some of these new interfaces between one of its components and some other resources.

New 'product – product' interfaces

In 2001 Skånaliseter uses the goat milk that it produces to make seven different products in which casein is the major ingredient. In addition the firm makes three products from the component left over from the cheese making – lactose. When Namdalsmeieriet used the goat milk only, lactose-based products were made. To be sure the casein in the goat milk *was* used then, but 'only' as an 'unworked' component (in mixed brown cheese). When Skånaliseter starts to use the goat milk it sorts this component out and *relates it specifically* to certain products – rennet and blends of microbes. Namdalsmeieriet did not relate goat milk casein to these. However, there was nothing new about these products in themselves. Many dairies within Norske Meierier/Tine (for example Tine Verdal in case 2) used them daily in the manufacture of standard, white cheeses, the only difference being that these products were made of cow milk. One of the new resource interfaces in the Skånaliseter case is that these rather ordinary products (rennet and blend of microbes) are related to *another* product – goat milk.

A new 'product – facility' and 'product – business unit' interface

The specific goat milk of Skånaliseter has in 2001 a very weak interface with cow milk, but a strong interface with meat, that is, a specific meat; meat produced and used by Mikvold farm firm (see Figure 5-5). These two products (Skånaliseter's goat milk and Mikvold's meat) have an interface, we believe, because the actors 'behind' them have managed to connect the products to a common *idea*, 'food from the farm.' This idea can be understood in terms of resource interfaces. In relation to Skånaliseter there is a facility in the form of a farm (Skånaliseter farm), a business unit (Skånaliseter farm firm) controlling this – and mainly this – facility and a farm product (goat milk) made with the help of this facility. In addition there are products made from the farm product (food products, for example white goat cheese 7), facilities for producing this food product and a facility (shop) for retailing the product to a certain kind of customer (tourist customer).

The peculiarity of the 'food-from-the-farm' concept seems primarily related to two interfaces. The first is *technical* and is between the facility for *producing* a (farm) product – farm – and the facility for *using* this product in the manufacture of another (food) product. In the Skånaliseter case this latter facility is a farm dairy. The other interface relates to *commerce* (economy) and is between the business unit holding these facilities (the farm firm) and another business unit (the customer). In the Skånaliseter case there are several varied commercial interfaces. One is between Skånaliseter farm firm and a household customer; others are with the tourist firm Mo Gård and with Ost & Bakst. However, food products really become 'food from the farm' when a third – technical – interface is established, that between the facility 'farm' and the facility 'shop.' It is then that Skånaliseter can really refer to their food products as 'food from the farm.' This third interface again leads to still new commercial interfaces, between Skånaliseter firm and customers transporting themselves or being transported physically to the farm, in Figure 5-5 called tourist customer. In addition to obtaining specific products in exchange for money, then, these customers also *experience* the products' interfaces; with the specific facilities and capabilities that have produced them, the products used in this production and even the facilities and capabilities producing these (input) products. Moreover, as another business unit (Mikvold farm firm) also establishes a technical interface between its farm and a retail facility, Skånaliseter can also relate its

resources to this (other) business unit. Skånaliseter relates its food products to the retail *facility* of this other business unit and thereby establishes new interfaces between its food products and customers. Skånaliseter relates its (farm food) products to the (farm food) products of the other business unit by making them part of its own assortment of products and thereby increasing their value. This has effects for the focal resource; the value of the goat milk that Skånaliseter uses increases.

Novel 'product – business relationship' interfaces

After 1987 Skånaliseter establishes many new business relationships with other actors. These relationships are used – for different purposes – and are hence resources. Five of them are depicted in Figure 5-5. Each business relationship has a certain interface with the focal resource and affects this. Some of the relationships give Skånaliseter *access* to various existing facilities and capabilities and hence affect productivity. Others facilitate 'meeting' and thus affect development of resources.

An example of the first is the relationship between Skånaliseter and the Postal Service (labeled A:B).[131] Here Skånaliseter gets access on a long-term basis to certain resources; transportation facilities and capabilities that suit its food products and some of its customers (private household customers). In fact this relationship not only gives access to 'stationary' resources, but resources *in use* – a certain activity pattern – that *physically* moves goat milk products from Skånaliseter to particular customers.

The business relationship between Skånaliseter and Mikvold (A:C) provides access to other resources. These are the retail facility and capability located at Mikvold and food products produced by Mikvold, both analysed above.

The business relationship with Åsbygdens Naturbruksgymnasium (A:D) not only gives access to resources but also facilitates 'resource meeting' and therefore development. Skånaliseter obtains a recipe for white cheese through this relationship. However, Skånaliseter does not

[131] As mentioned in chapter 4, to be correct there are actors and not business units at "each side" of a business relationship. Actor is not identical to business unit. However, a business unit is very "near to" an actor as it can be looked upon as an actor that is used, thereby making it a resource (in the form of a business unit). Hence it is not

use this recipe as it is but develops it in specific relation to other of its resources. In A:D Skånaliseter also develops capabilities in white cheese making and obtains knowledge about appropriate dairy facilities and business units that supply such specific facilities.

The A:E relationship (Skånaliseter – Food Consultant) also has many uses. In this relationship Skånaliseter develops its knowledge about the uses of the resource. It also 'opens the door' to another relationship; Skånaliseter – Mo Gård (A:F). In this relationship (A:F) Skånaliseter's specific food products are valued. The most innovative element here is maybe that in this business relationship the specific physical *location* of Skånaliseter *farm* is valued. Mo Gård's customers want cheese made in the region where Mo Gård is located and where they 'get' their hunting product. Thus it is not the location of Skånaliseter farm that matters, but the location of the facility that uses the product that Skånaliseter farm produces – Skånaliseter's *dairy*. It is in this facility the cheese is produced that Mo Gård's customers value. By 'coincidence' this dairy facility has in this case a physical interface with Skånaliseter farm as well.

To be sure what Mo Gård's customers value is not the location of Skånaliseter's dairy *per se.* They value products that have interface with the region in which their supplier's (Mo Gård's) facilities are located. This interface is provided by the production facilities' (the dairy's) physical interface with the region. Because of all this there is an interface between the resource (Skånaliseter's goat milk) and the business relationship between Skånaliseter and Mo Gård.

Development – the Frozen Curd case

As with Skånaliseter the Frozen Curd case is about development. And similarly it is about use of goat milk, yet another goat milk; in Figure 5-6 and Figure 5-7 (page 169) referred to as 'Dairy's goat milk B.' Frozen Curd (case 5) is one among several cases in Figure 5-6 and is the one we find most stimulating regarding analysis of development and results of development.

---

totally meaningless to place the arrows symbolizing business relationships in the figures in this chapter between business units.

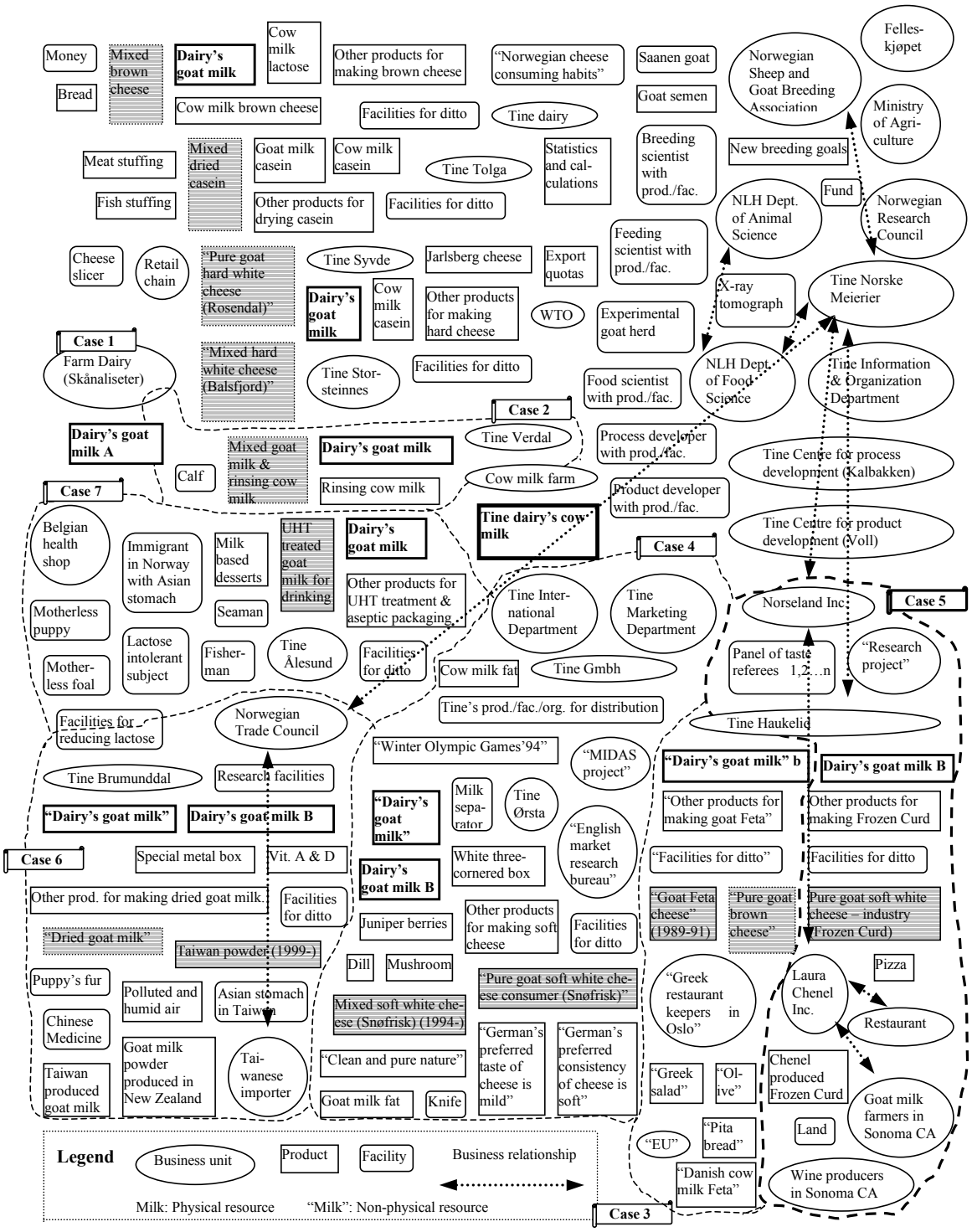

Figure 5-6: A resource constellation: Goat milks used by Tine Haukelid and other Tine dairies and certain business units, products, facilities and business relationships at 'the end' (year 2001).

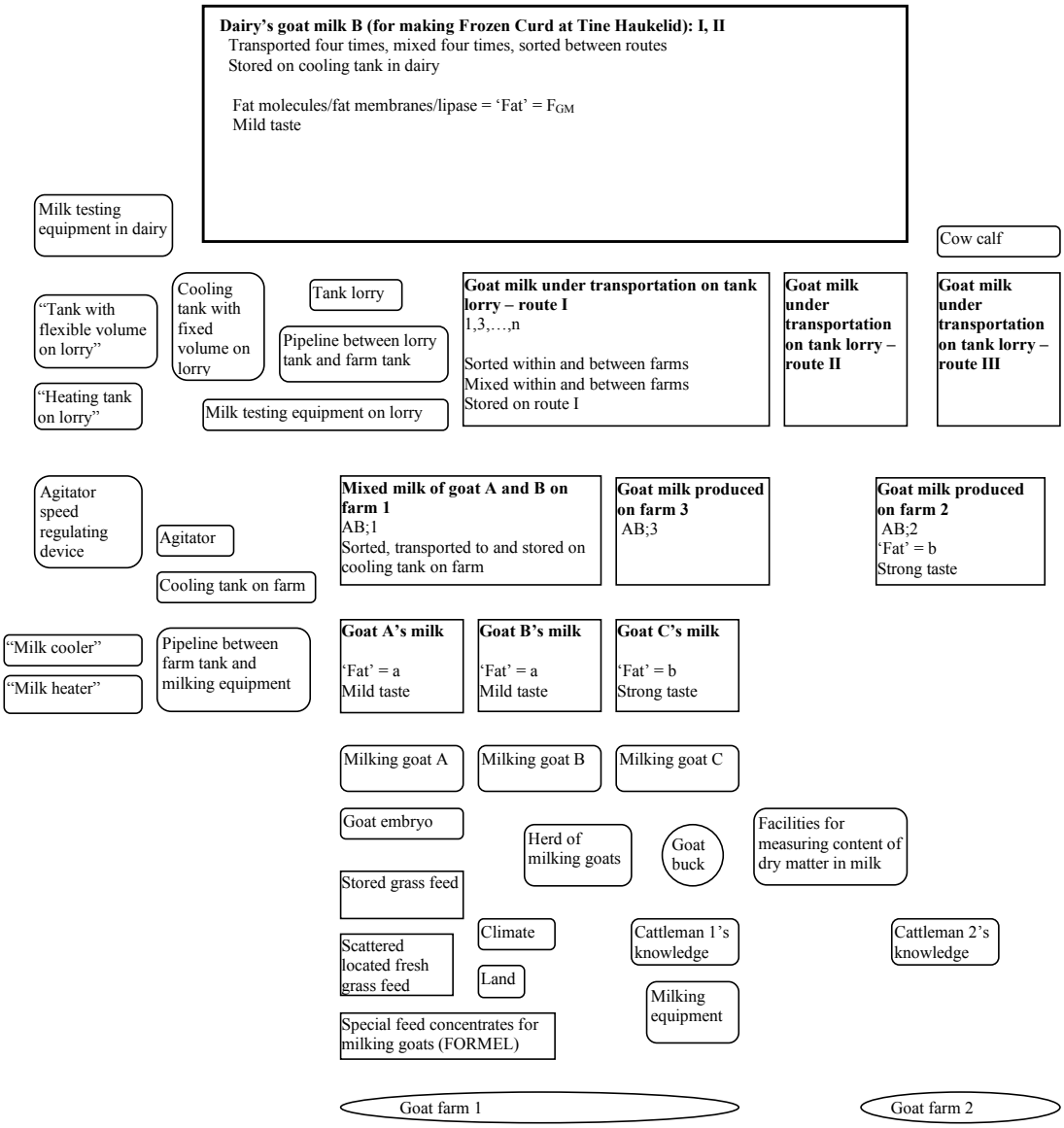

Figure 5-7: A resource constellation at 'the end' (year 2001): Goat milk used by Tine Haukelid in the production of Frozen Curd (B in Figure 5-6) in relation to some business units, products and facilities on the provision side.

The development is also different. While the development in the Skånaliseter case concerned finding *new combinations of existing features* of the resource, the development in the Frozen Curd case first and foremost amounts to giving a resource *new or changed features*. More precisely it is about changing one specific feature – taste. But the search for ways to alter this specific feature – which we regard as a technical matter – takes place within an economic context of certain business units and particular business relationships. Thus the case is not the story of 'pure' research with the sole purpose of 'worming' new secrets out of a natural element. Instead the purpose is to find 'better' interfaces between an element that is – already – in use (and hence is a resource). Changing the actual feature (taste) serves the purpose of improving interfaces of the resource in a specific business network and hence is about economy *and* technique, as for the rest exactly as in the Skånaliseter case.

In the analysis below we concentrate on discussing certain new interfaces for the resource. Figure 5-8 depicts the interfaces and the resources involved.

New 'product – product' interfaces

In the analysis of the Skånaliseter case above we found that the development of the resource was not so much tied to the 'whole' resource, as to a certain component of it – casein. The same is true for Frozen Curd, but here fat is the component that turns out to be critical. Although casein is the basic ingredient of the product Frozen Curd and in this way represents an important change in the use of the resource compared to the previous period (when lactose was the important component to be utilized), nevertheless, casein is a less central component in the story of Frozen curd. Fat is critical because it is this component that is found to be 'responsible' for the unwanted feature.

Figure 5-8 reminds us that goat milk B has different features than the earlier goat milk used by the same business unit. We shall not analyse the detailed process of interaction that leads to this change. However, we regard the origin of the development to be Tine's Frozen Curd interfacing with certain business units – specific customer's customers (depicted by 'Restaurant' in Figure 5-8). This meeting of two resources – one product and one business unit – is a real 'crash.' What is it that crashes? We believe that the answer is 'hidden' in certain resource interfaces. The fact that the actual business unit ('Restaurant') already has an

interface with Frozen Curd (not made by Tine but Laura Chenel, its customer) results in it experiencing a misfit with Tine's Frozen Curd especially sharply. Yet it would most probably have experienced this misfit without an interface with Chenel's Frozen Curd, hence an analysis of the interface between Tine's customer's Frozen Curd and Tine's customer's customer seems not very illuminating.

In principal the 'friction' in the interface between the customer's customer and Tine's Frozen Curd can be removed in one of three ways; by changing the features of the customer's customers, by changing the features of Tine's Frozen Curd or by changing both. In the actual case we note that the second solution is the only one that is pursued. The 'bad' interface is changed by (a feature of) Tine's Frozen Curd being altered. Moreover, altering a specific feature in a certain product that has *interface* with Tine's Frozen Curd brings about this change. This product is goat milk used by Tine Haukelid.

The change of one specific feature of this product is central to the development in the Frozen Curd case, in fact this is what the whole case is about. This change again is contingent upon alteration and establishment of certain interfaces, of which we find five especially important and hence worthy of analysis. Two of these are 'product – facility' interfaces:

1. 'Concentrated fodder for milking goats' and 'Milking goat'
2. 'Farmer's goat milk' and 'Agitator speed regulating device'

One interface has to do with the relation between two facilities:

3. 'New scheme for evaluating taste of goat milk' and 'Panel of taste referees'

One of the interfaces is a 'product – business relationship' interface:

4. 'Farmer's goat milk' and 'The business relationship between Tine and farmer' (A:B)

The last one is a 'facility – business relationship' interface:

5. 'Milking goat' and 'The business relationship between Tine and the Breeding board' (A:F)

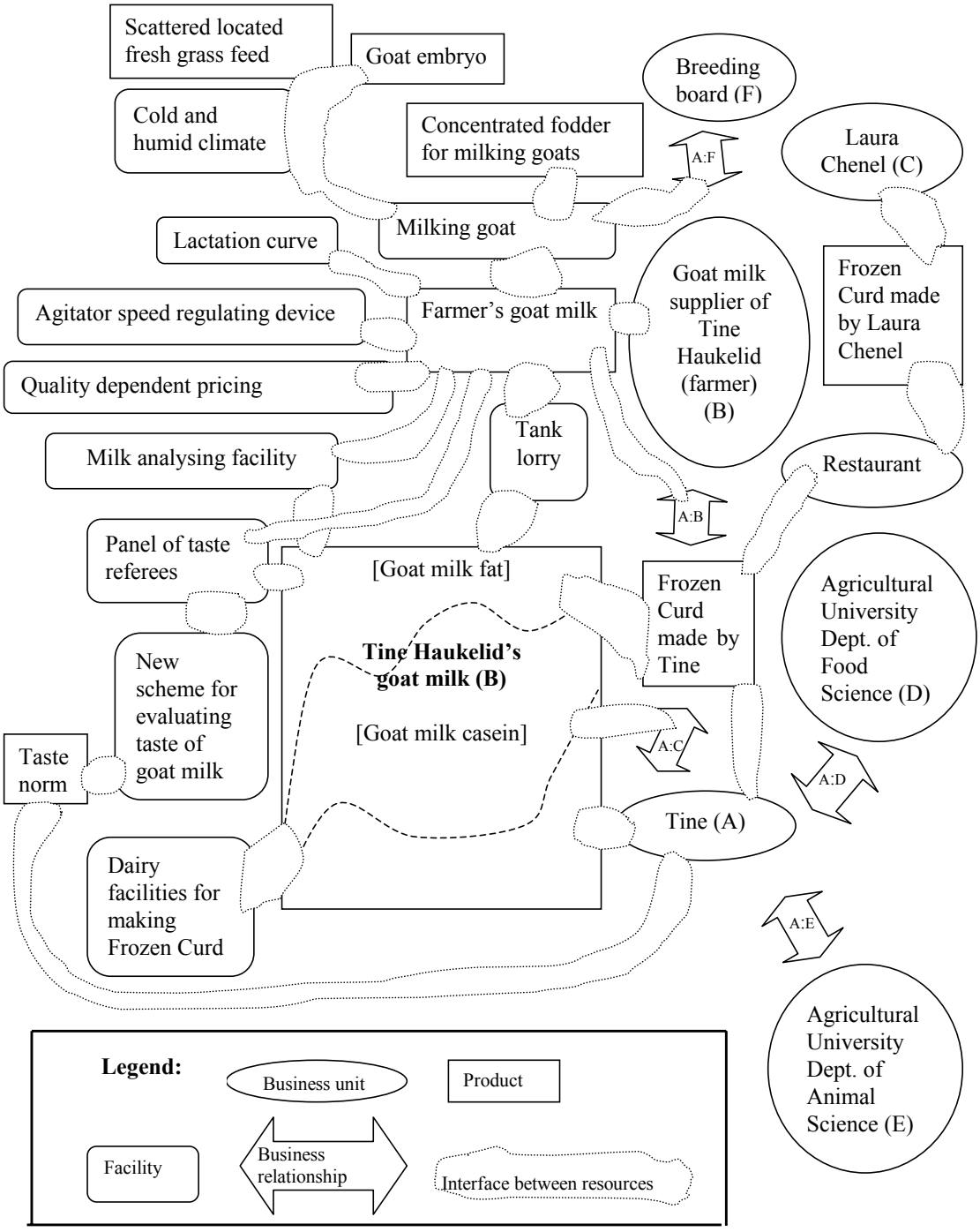

Figure 5-8: A local resource picture (II): Goat milk used by Tine Haukelid at 'the end' (year 2001) and interfaces with important products, facilities, business units and business relationships.

Two new 'product – facility' interfaces

One of the physical results of the research described in the story is a new product, a concentrated fodder specially designed for milking goats. Milking goats fed with this fodder produce a 'farmer's goat milk' with a different feature; a better ability to maintain mild taste. Thus this is a new interface between a product and a facility that affects one of the focal resource's (goat milk b's) features. However, this interface is contingent upon interfaces between the facility and other resources; two products (scattered located grazing and goat embryo) and a facility (cold and humid climate). When these interfaces are different or absent the interface between the specific fodder and milking goat have little or no value. For example, in cases where no embryo was 'related' to the facility (milking goat), the grass it needed was located within a small area space and the climate's features were different (warm and dry), the facility needed not be related to the special product in order to produce a product with the desirable feature. This is the situation all the year round for the goats at Laura Chenel's American suppliers and *most* of the year for the goats belonging to the business units supplying Tine Haukelid.

Another interface between a product and a facility that is assumed to affect the resource is that between farmer's goat milk and the agitator in the milk tank on the farm. Before Tine entered the business relationship with Laura Chenel it related farmer's goat milk to the same facility as it related (farmer's) cow milk. This interface influenced the taste feature of farmer's goat milk then too but still products (brown cheese) made from this product had value in all of Tine's business relationships with customers. Tine's new business relationship with Chenel is built around a (for Tine) new product, which puts other demands on goat milk. Based on their knowledge of features of goat milk consultants in Tine R&D assumes that a less 'aggressive' agitation in the cooling tank will contribute to a more suitable feature. Nevertheless, their experiments show no sign of such a contribution. On the other hand, they discover that another special facility may have such an effect, namely a heater device connected to the tank lorry. So a changed interface between tank lorry and resource – a technical interface – can become one, of many ways, for Tine to maintain its business relationship with the customer Laura Chenel. What is still unclear when we 'leave' the case in 2001 is if this technical

interface is economical, that is, if it results in a corresponding increase in or maintenance of value of other resources, of which one is Tine's business relationship with Chenel.

A novel 'facility – facility' interface

Tine is not unaware of the taste feature of the resource (Tine Haukelid's goat milk (B)) before it enters the business relationship with Chenel. Norske Meierier/Tine has for long had ideas about this specific feature of the resource. These ideas are realized in a scheme for evaluating taste. We can view the scheme as a facility. Behind the scheme, and implicit in the ideas, are certain norms. As such norms can be viewed as products (see Figure 5-8); inputs to the scheme. However, these are not norms for taste in general. They are very specific norms; views certain actors have developed regarding this particular feature in relation to a *specific* resource. In 1987 this resource is Norwegian goat milk. Norske Meierier together with at least one research institute (Department of Animal Science at the Agricultural University) are the actors holding the norm. Thus, the norm seems to reside in a *relationship* and is not held by one actor alone. Unlike most other facilities used in relation to Norwegian goat milk the taste scheme is *specific* for Norwegian goat milk. One, common scheme for Norwegian cow milk and Norwegian goat milk is not used.

Neither in 2001 nor earlier did the taste scheme for goat milk have a physical interface with the resource. The scheme affects the resource via another facility, the panel of taste referees. The *interface* between scheme and panel affects the resource. The panel is dependent on the scheme, as it actually has to use this scheme in order to produce its product – an evaluation of the resource concerning this specific feature. But the scheme is also 'dependent' upon the panel. In case 5 we learn that on at least one occasion different panels produced different evaluation products when using the same scheme. As result of the research activities described in the case, the scheme is changed. On closer scrutiny it is not the scheme *per se* that is changed but a certain idea, or norm, underlying it. The new idea is realized in form of a new pair of concepts: 'mild – strong'. This pair replaces an earlier pair of concepts: 'weak – strong'. The new scheme builds on *mild* being the sought-after feature of the taste of Norwegian goat milk. This is because we believe that the word 'strong' has negative connotations in *relation* to the word 'mild,' while positive connotations in relation to the word 'weak.

In other words, the change of scheme is not solely a technical matter. It also reflects the actors' new knowledge – idea – regarding the feature in relation to the resource. Together with a system for *physically* sorting goat milk with one feature (strong taste) and goat milk with another (mild taste), the new scheme facilitates the actor's (Tine's) production of a product that is specifically valued in a certain relationship, that between Tine and Laura Chenel. Moreover, since Chenel demands more of this product than Tine can deliver, and other uses of Tine Haukelid's goat milk are less valuable, Tine wants its suppliers to supply much goat milk having one feature (mild taste) and little goat milk having the 'opposite' feature (strong taste). In order to realize this idea, Tine puts into place another facility – *quality dependent pricing*. However, this is not new but an old facility for Tine, used for three decades in relation to cow milk. Then, seen from the goat milk supplier's point of view the resource they are producing become valued in relation to the new value *this specific goat milk* has obtained for Tine after its establishing a business relationship with Laura Chenel.

A new 'product – business relationship' interface

Interfaces between products, between facilities and between products and facilities all regard technology. In the Frozen Curd case the actors carry out much effort in order to alter interfaces of a technical nature. We see that these alterations really affect a certain feature of the focal resource; the goat milk that Tine Haukelid uses (B) obviously has a different taste in 2001 than earlier.

It is not only interaction regarding technical interfaces that has affected the change of the actual feature of the resource. Economic interfaces have had an influence too. This is something we have already touched upon. We find interfaces of a 'pure' economic nature between business units, between business relationships and between business units *and* business relationships. Interfaces between a business unit or a business relationship *and* a product or a facility involve both technical and economic features. The interface between 'farmer's goat milk' and the business relationship between Tine and the goat milk supplier ('A:B') is one such interface. It has also affected the focal resource – the goat milk used by Tine Haukelid – and contributed to its distinct taste in 2001.

Earlier we found that the new interface between fodder and milking goat affected farmer's goat milk. This is a purely technical interface. This new interface does not materialize 'by itself.' The actor producing the resource must also change. In Figure 5-8 it is represented by the goat milk supplier (B). The goat milk supplier and Tine (previously Norske Meierier) have a business relationship towards each other. In resource terms the relationship contains goat milk supplied by the goat milk supplier to Tine, which also is a member of Tine. Through this membership the supplier is obliged to deliver its entire goat milk to Tine. Tine pays in money for this opportunity to be sole purchaser. But the company also gives something back in terms of knowledge. This knowledge is about breeding, feeding, and hygiene in relation to milking and milk handling. Tine's department for organization provides this knowledge product for the goat milk farmers.

There is some mutual orientation and commitment between Tine and the goat milk supplier at 'the beginning'. On the other hand the relationship does not seem to be as strong as that between Tine and cow milk farmers. In the latter more and deeper mutual adjustments have been made, for example in handling and features of the product exchanged. They also concern adjustments in facilities (like milking cows and milk handling equipment) and use of these facilities in the form of for example routines to secure milk hygiene. The information in the case story suggests that the same adjustments have not been made between Tine and suppliers of goat milk. In other words, the business relationship between Tine and 'our' goat milk supplier is at the beginning not so intensive and this seems to have consequences for the quality of 'farmer's goat milk.' Since this goat milk is not improved through its interface with the tank lorry, the quality of Tine Haukelid's goat milk (B) is not any better. Nevertheless the quality is good enough for producing and marketing brown cheese. So a bold suggestion is that there is an interface between 'farmer's goat milk' and the 'business relationship between Tine and the goat milk supplier.' The two seem in a way to be 'balanced' vis-à-vis one another. For example the strength of the latter is to some extent 'congruent' with the taste feature of the former; in the end (2001) the relationship between Tine and the goat milk farmer is stronger and the farmer's goat milk also has a 'better' taste feature.

A novel 'facility – business relationship' interface

Is there also a congruence between the two resources 'Milking goat' and the 'Business relationship between Tine and the Breeding board ('A:F')? In other words, is there an interface between these two resources? And is it reasonable to postulate that this interface between a technical and an economic resource (or between a physical and a human resource to use Penrose's (1995) terms) – has influenced the focal resource, in this case the goat milk product that Tine Haukelid uses?

In chapter 4 we concluded that an interface is a *shared boundary* between devices or systems that 'work' together. An interface results from series of reciprocal influences between resources. An interface is a product of actors' systematic relating of resources. Thus interfaces, as we see them in this thesis, are the work of humans. An interface *activates features* of resources and thus gives value to resources. New interfaces can mean new value.

For persons trained in identifying single elements 'of the world' and searching to demonstrate causal, unidirectional influences of one element *on* another, it can be hard to realize the factual existence of interfaces, especially if the actual elements are very different, as is the case of 'Milking goat' and the business relationship 'A:F'. But as Penrose (1995) states a human can become convinced of new possible uses of a (physical) resource and start to search for new uses, *and* the resource in turn can influence the human. In other words, the human activates features of the resource but the resource also activates features of the human. A business relationship can be seen as a relationship *between* humans of two companies. The question is if a business relationship really can search for new uses of a resource and if the resource then in its turn affects the relationship so that an interface develops between the resource and the relationship. In other words, if the relationship activates features of the resource *and* the resource activates features of the relationship, then it is – based on our definition of an interface above – reasonable to state that there really is an interface between the resource and the relationship.

Based on the Frozen Curd story it should be fairly reasonable to state that the facility 'milking goat' affects the product 'farmer's goat milk' and thus – via other interfaces – also the product 'Tine Haukelid's goat milk (B)'. The scientists 'speaking' in the story refer in a credible way to research concluding that there is genetic difference – both between individual milking goats

and between breeds of milking goats – regarding the ability to produce milk with mild taste. We accept this as a technical fact. Furthermore the breeding board has affected this feature of 'milking goat' via systematic, human-made breeding. If we now can demonstrate that 1) there is a business relationship (A:F) between A and F, and 2) that A:F influences 'milking goat' *and* 'milking goat' influences A:F, we can say that there is a resource interface between 'milking goat' and A:F. The answer to the last question – if this interface has influenced Tine Haukelid's goat milk (B) – should then be 'yes'.

Is there a business relationship (A:F) between Tine and the breeding board?

The goat breeding board is a kind of quasi-business unit. It consists of representatives from various business units. To put it simply, the *raison d'être* for the board is to make use of among other things scientific products and facilities (genetic theories, breeding methods) to produce a certain facility, milking goat genes,[132] in relation to certain norms. The norms are an expression – a knowledge product – regarding what constitutes an ideal milking goat, which is ultimately set by the board. However the norms are influenced also by each of the business units that are represented in the board. The board has existed for years and Tine has been a member all the time. Tine is committed to following the decisions made by the board, but the board also adjusts its activities and resources to requests from the members, including Tine. A concrete example, and central to our analysis, is when the board in 1996 at Tine's request decides to put more weight on taste of goat milk when breeding is carried out. Thus mutual orientation and commitment characterizes the relationship between the breeding board and Tine. In other words, the relationship bears all signs of being a (business) relationship.

Have A:F and 'milking goat' reciprocally influenced each other?

Thus, neither Tine alone nor the breeding board alone change the breeding norms regarding taste of milk produced by the facility 'milking goat'. At least it seems not incorrect to postulate that the shift of breeding norms is affected by interaction within a business relationship. And then we can somehow say that the business relationship A:F influences 'milking goat' with respect to this actual feature, which again influences the same feature of the goat milk that the dairy (Tine Haukelid) uses. This influence of changed genes on goat milk taste is very slow compared to the influence of for example the new (concentrated)

[132] The addition 'gene' is important here. Milking goats are influenced by "environmental factors" (for example fodder) in addition to genes, but the board has no activities and controls no resources in relation to these factors.

fodder. However it is obviously an influence and can within a period of, say, 100 years produce a milking goat that does not need the special fodder in order to produce goat milk a with mild tasting feature.

In order to demonstrate reciprocal influence between A:F and 'milking goat' one question remains to be answered: Does 'milking goat' affect the business relationship between Tine and the breeding board (A:F)? Has the development of 'milking goat' activated new features of A:F? To be honest, our empirical material on this point is thin. We can therefore only give a tentative answer. It is quite obvious that without 'milking goat' no business relationship between Tine and the breeding board would exist. So 'milking goat' affects A:F in this way. What is difficult to answer based on our empirical material is whether 'milking goat' has influenced in some way the already existing business relationship between Tine and the breeding board. Thus, we cannot say if there has been or is a reciprocal influence between the two. That notwithstanding, since they share boundaries it seems legitimate to say that there exists an interface between these two resources and, moreover, that this interface via specific other interfaces has affected the actual feature (taste) of the focal resource (goat milk that Tine Haukelid uses in 2001).

Chapter 6 Discussion: Resources and Economics

What can actors do to improve the use of a resource that is subordinate in a business network? This was the research problem that we formulated in chapter 2. In chapter 4 we 'narrowed' the approach as we chose to regard the problem as a development problem. We came to look upon development of a resource as something driven by interaction between actors. Since we found the use, and hence value, of a resource as depending on the match (combination) between its features and the features of other resources, 'better' use turned into a question of arriving at a 'better' combination. In a network various actors can arrive at 'better' combinations through interaction where different resources are systematically related. In chapter 5 we analysed some of the improved combinations described in the case stories. The analysis showed that the focal resource was part of a specific resource constellation at 'the beginning.' At 'the end,' however, it entered the resource constellation in another way and was considered differently by the actors. The difference between the 'start constellation' and the 'end constellation' turned partly on new combinations of existing features of the resource, partly on new features.

Certain actors have been instrumental in creating these specific constellations of resources. This means that the constellations are not 'natural' or 'accidental.' Moreover, the constellations represent investments for the actors, and hence actors have economic interests tied to the different constellations.[133] Thus, improved use of our focal resource is also a question of economics.[134] Or to put it in more everyday terms; how to make money on

[133] With reference to the ARA-model we may in a business network, in addition to economic interests, identify interests of a social nature and interests of a technical nature, but these are not focused in this chapter.

[134] The term 'economics' has two meanings. In singular it refers to the science called economics, which treats production, distribution, and consumption of goods and services. Construed as plural however 'economics' means 'financial considerations' and refers to any aspect that is economically significant, e.g. 'What are the economics of this product?' Economical again denotes 'avoiding waste' and implies prudent planning in the disposition of resources so as to avoid unnecessary waste or expense (cf. Webster's 1989). We use economics in the latter (plural) and not the former notion in this chapter.

features of a resource? The purpose of this chapter is to assess – or reason in terms of – economics on the background of the preceding descriptions and discussions in the study.[135]

Economics of combinations

One of the terms most frequently used by companies in their annual reports is 'synergy.'[136] Possibly they use this term as a catchword without reflecting company realities. Nevertheless it demonstrates that actors are aware that there are economic effects tied to the very combination of two or more resources. Thus, the word synergy points exactly to the limitations of assessing economics only in terms of quantity and suggests that an important aspect of economics is 'hidden' in resource combinations. And a resource combination is a question of different resources that match or are made to match. Resource heterogeneity, a term we entered in chapter 4, is a key concept here. The same resource can enter into more than one resource combination and have different values in different combinations. This fact is helpful when trying to develop a way of assessing how actors in a business network assess economics of resources.

Viewing the resource as a cost

Namdalsmeieriet in the 1980s has problems with the goat milk that it purchases. More precisely it views the resource 'by itself' as satisfactory; the technical features of it represent no problems. What is problematic is getting the resource to fit economically into the *specific* combination of other resources that Namdalsmeieriet use and produce. The calculation for the dairy (which can be regarded as a facility) overrides the calculation for goat milk. In this calculation goat milk is first and foremost *a cost*. Why it is regarded as a cost has to do with the other resources that this actor enters in the calculation, i.e. the 'large' technical resource cow milk around which a certain constellation of facilities is developed, and from which practically all the company's revenue (value) is produced.

---

[135] Actors with interest will be implicit in this assessment of economics. But the 'cause and effect' between interest and economics may go both ways. In some cases actors have an economic interest and succeed in fulfilling this interest; hence, 'interest' may lead to 'economics.' In other cases actors may reach economic effects that they did not think of at 'the outset' and may in hindsight find that these economic effects are in their interest; hence 'economics' may lead to 'interest.' However, to further clarify the relationship between interests and economics is not the main purpose of this chapter.

[136] Synergy points to the combined action of two or more elements in order to produce an effect or enhance the effect of each element (Webster's 1989). Within a business network the elements can for example be resources.

The shift in use of the resource in 1986 – from brown cheese to fodder – confirms that Namdalsmeieriet regards it first and foremost as a cost. What prevents the company from ceasing to purchase goat milk entirely (which would totally eliminate costs of goat milk) is probably that this would have affected the company's *relationships* with other business units, namely the cow milk farmers in the region. At first sight we might think that dropping goat milk would unequivocally be positive for the economics seen from the side of Namdalsmeieriet. On closer scrutiny the picture becomes more complex; there is more than one *resource tie* to consider when assessing the economic effect. 'Dropping' goat milk would require a change in the bylaws, an important element in the business relationship between the company and its suppliers. Such a change would presuppose the company disclaiming, in one way or another, its formal duty to *purchase* milk from its supplying members. In addition this would conflict with one central principle for all co-operative enterprises; it could mean that some or all members for their part terminated their formal obligation to *deliver* milk exclusively to the company. To the extent that this occurred the dairy would experience negative economics; negative economic effects in other (technical as well as social) resource ties would exceed the positive economic effect of stopping purchasing the resource. The crucial economic question concerning goat milk seen from the resource perspective of Namdalsmeieriet then was: 'How can we in the most economical way reduce the *costs* per litre of goat milk?'

Emphasizing the value side of the resource

In 1995, after nearly ten years of being fed to livestock, the focal resource (more specifically a part of it) is again being used to produce human food. Now, in Skånaliseter, the focus is on goat milk as having a value, the most prominent question being: 'How can we get the most out of 1 litre of goat milk?' This leads to a calculation where the revenue side is highlighted. But this calculation is not very explicit, and it is not especially precise as it contains few figures. Ola and Kari have learned that colleagues in a neighbouring region in another country obtain double the price per kg of goat milk product compared to the large, established dairy companies and 'adopt' this level of price for the resource that they control. The costs were mere conjecture, but not totally disconnected from the costs of real resources. For example, before establishing the farm dairy Ola and Kari visited many farm dairies and saw the

facilities used. Via these observations they gained some rough ideas about costs in the production and marketing also in an eventual dairy on their farm. In other words, calculations were present when Ola and Kari searched for ways to realize a dairy.

Actors consider economics in different ways; getting more out of a resource is truly something else than using a resource more efficiently. First and foremost such a job has qualitative aspects. Traditionally the identification of other resources to tie the resource with has been emphasized (cf. Penrose 1995, Håkansson & Snehota) 1995). Thus, it is interesting to note that many of the resources to which Skånaliseter later tied goat milk existed long before the farm dairy was established. Most customers existed, some of the special food shops existed, the postal service existed, expanded polyester existed. Even the special cheese-making vat existed. Børgefjell National Park existed. Namdal as a regional identity existed. Skånaliseter as a farm existed. On the other hand case 1 also demonstrates how important *untying* can be for getting more out of a resource and hence for economic effects. In this case goat milk was untied from e.g. the system of production quotas and product calculations within Tine Norske Meierier and the business relationships that Namdalsmeieriet had with cow milk suppliers. This untying seemed to be necessary for establishing new ties for the resource.

Namdalsmeieriet found none of these new resource ties relevant in relation to the focal resource. Ola and Kari did. *This discrepancy cannot be explained by one of these actors being uneconomical and the other economical.* Both actors acted economically and produced economic effects. But since the actors' resource ties[137] differed, the resources that they considered relevant in relation to the focal resource came to differ. Hence one and the same resource (goat milk) came to enter differently in their respective calculations. Figure 6-1 is an attempt at visualizing this situation, a situation that we believe is not unique for this case but rather an example of a relatively common circumstance in business networks.

Confronting different calculations

However, the latter calculation was not developed in isolation from the former. One link between the two was the calculation about using goat milk in the 1992-1994 project. Here

[137] It may be that 'their' activity links and actor bonds also differed. Whether this had consequences for the calculations will not be discussed here.

Namdalsmeieriet's cost-centred calculation was directly confronted – for the first time, as it seems – by a value-centred calculation. This latter built on an idea of a match between goat milk and a certain collection of resources. Some of these were absent from Namdalsmeieriet's calculation. They also differed from the combination exploited later by Skånaliseter farm

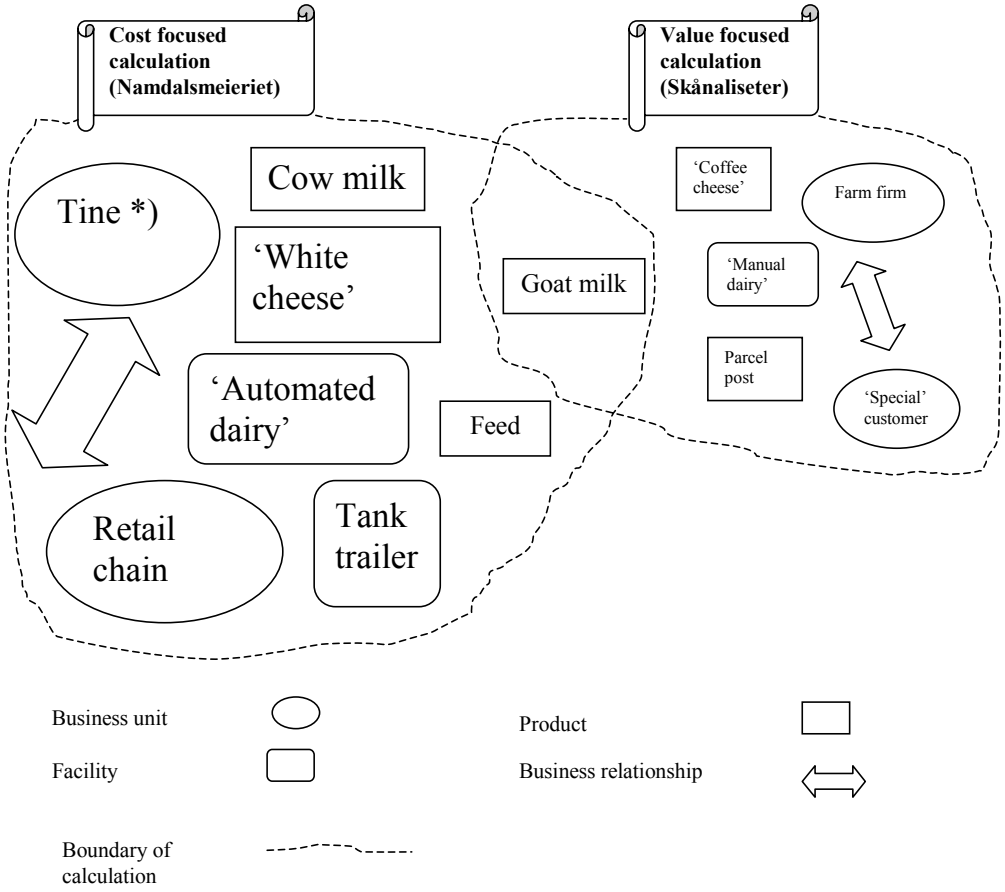

Figure 6-1: An illustration of how two actors calculate the same resource differently.

dairy. New resources not considered by Namdalsmeieriet included two facilities (a Deer Park

that was already in existence and the idea of a special ('niche') dairy located next to the Deer Park). In addition there was the idea of some new products made from the resource and the expectation that many customers of the Deer Park, because of the co-localization, would also become customers of the new dairy. An actor not taking directly part in the project calculated the costs of the new dairy facility. As it seems neither Namdalsmeieriet nor Skånaliseter questioned this calculation regarding a facility.

What they did not agree upon was the calculation of the product to be made in the new dairy. Skånaliseter emphasized the value of this product and found it to be considerably higher than the value of ordinary products of the same category made by Tine dairies. One basis for this assessment was differences in value for these types of products that Ola and Kari had observed in Sweden. Namdalsmeieriet on the other hand emphasized costs and assumed the value to be exactly the same as the value of ordinary products of the same category. With this value and estimated costs of other resources, Namdalsmeieriet made a calculation for the dairy facility and found the economics of the new dairy to be negative. This contrasted with the other calculation backed by Skånaliseter.

In other words, here one and the same resource entered into different calculations made by two different actors. The resource was assessed differently in economic terms in the various calculations. Firstly, Namdalsmeieriet lets its calculation centre on a facility (the 'niche' dairy) while products (like goat milk and products made from it) are secondary. As a consequence the cost side of the focal resource is emphasized. Skånaliseter, on the other hand, focuses on products and customers while the facility is secondary; hence it emphasizes the value side of the focal resource. Moreover, in the project the two calculations are confronted. This seems to change both actors' view of the resource and hence impact how Skånaliseter calculates the focal resource in relation to using it itself.

Regarding the old calculation, Namdalsmeieriet as a business unit of a certain kind, has for a long time been tied to other business units of the same kind through membership in a common business unit (from 1992 Tine). As we learnt in chapter 1 and 3 it is this common business unit that develops and markets non-fluid products on behalf of all 'its' business units. Moreover, this common business unit also makes standard calculations for each of these products. These calculations seem to be influenced by a policy that prices should not be too

high. In other words, there exists within the business network of Tine a certain (national) portfolio of dairy products, each with its standard calculation. Thus, we can imagine that Namdalsmeieriet in the project cannot move very far from these products and calculations when making the calculation for the 'niche' dairy.[138] If it does it will probably put its business relationship with the common business unit and thereby the other dairy companies at stake. These relationships are crucial for the economy of the business unit Namdalsmeieriet.

As a dairy farm Skånaliseter is also a member of the common business unit Tine. But its business relationship with Tine is different. First of all Skånaliseter is a producer of the focal resource and not a user. This means that it is not bound to the dairy products and calculations created by the common business unit in the same way as Namdalsmeieriet is. Furthermore, Skånaliseter has already secured an important part of its economy by having influenced changes in public regulations regarding milk subsidies and milk quotas. Thus, when Skånaliseter makes its calculation in the project and later for its farm dairy it can let goat milk enter in another way because it can ignore some resources that cannot be ignored by Namdalsmeieriet.

Calculations and interaction

As producers, users or in other ways actors have economic interests related to resources. Actors make, more or less consciously, calculations in order to handle these interests. They may make calculations for, and enter into calculations, 'whole' business units, products and facilities. They 'even' calculate business relationships. Our focal resource entered in several calculations; for products like brown cheese; for facilities like dairy and for transportation; for business units like a dairy company and a farm; and for business relationships like that between Namdalsmeieriet and Tine. Goat milk entered differently in the calculations in 1980 compared to twenty years later. This is so not only in case 1 (which we have chosen to build most extensively on in this discussion) but also in the other cases.

Moreover, not only does one and the same resource enter into different calculations; different actors might 'stand behind' these different calculations. This can be due to differences in

[138] We have no direct support in our empirical data for such a statement, but we think it is reasonable to assume it from 'circumstantial evidence.'

interests regarding the same resource. One actor may prioritize a certain resource and therefore put it in centre of its calculation. Another actor may judge the same resource only as 'a necessary evil' and let it enter at the fringe in the calculation. Both actors, however, have *interests* in relation to the resource, but necessarily also in relation to other resources. At least some of these resources will not be common for the two actors. In other words, the boundary that each actor sets in the resource constellation will 'only' partly overlap. Hence, there can be a chance of conflicting interests in relation to the 'common' resource. Assuming a business world consisting of firms (hierarchies) in a (neoclassical) market this conflict can be resolved in two ways. If the conflict is between firms (or between a firm and a consumer) the involved actors have either to accept or reject each other's calculations regarding the resource; that is, the price mechanism is at work. To the extent that the conflict is within a firm, it can be resolved through authority; that is, by use of power.

Within the world of a business network there is also the possibility that this conflict, when it is between firms, can be approached through interaction. Then, the boundaries that each actor sets around the resource and how they 'locate' the resource within this boundary (at the centre or at the fringe) can be directly confronted. This may lead the actors to change what resources are in focus respectively at the fringe. But it may also lead them to alter their view of their own calculations and the counterpart's calculation. This reasoning is in line with Torvatn's (1996: 190-191) argument about efficiency; that actors in an industrial network should be able to vary the 'network borders' in which they assess efficiency and not cling only to one border.

In other words, willingness and ability to understand and accept a counterpart's boundary setting as basis for calculation is crucial. E.g. in case 1 (in the project 1992-1994) it was essential for the subsequent development of the focal resource that Namdalsmeieriet changed its view regarding the *counterpart's* (Skånaliseter's) calculation. This made Namdalsmeieriet loosen its ties to the resource. On the basis of this change Skånaliseter could create a new calculation in which the value side of the focal resource was emphasized, but *in another way* than planned at the outset of the project.

Hence, calculations – in explicit or implicit form – can be seen as instruments that influence actors' view of resources and how they are developed and used within a business network. Here, in the interaction, 'having the "right" calculation' seems more important than 'having

the calculation "right".' On the other hand, actors cannot construct any calculation they like. Calculations must reflect some resources that are seen as real by some other actor. Thus, it is quite a 'social' job to create a calculation and *make other actors appreciate it*. Case 1 surely demonstrates this.

A reasonable inference, then, is that calculations are a consequence of resource constellations and actors' view of them; what resources they attach importance to and where they draw boundaries for their calculations. But the reverse is also true; calculations affect the way actors combine resources across firm boundaries and hence what resources are developed. The price of a product may be decided before it is developed, a researcher's level of pay settled before s/he starts working, and the budget of a development project determined prior to it. A customer may demand certain future reductions in price of a product provided by a supplier, something that necessarily must lead to some development on the side of the supplier in order for it to stay in business. This implies that calculations can be, and in fact are, used as instruments for change.

Chapter 7 Conclusion and Further Research

Concluding remarks

On an 'exterior' (empirical) level the problem that we have been pursuing in this study concerns how concrete actors can improve the use of a particular resource; an agricultural product that at a certain time is subordinate in the industrial network of which it is part. On these grounds one result of the study is – or, rather, can be found in – its documentation of concrete development processes in the actual network in subsequent years, leading to certain outcomes in the form of new or improved uses of the product in question. However, these new or improved uses did not concern Norwegian goat milk in its entirety, but certain *parts* of it.

In the Skånaliseter case (case 1) the goat milk produced on *one farm* was incrementally detached from certain resources in the network and attached to other resources. On these grounds use of one (small) portion of the product was improved. Moreover, this improved use had most to do with a certain component (casein) in the product. This component differed in some features from the corresponding component of cow milk. Because cow milk was economically most important in the prevailing network, facilities and capabilities for making casein-based products had been developed in relation to the features of cow milk casein and not in relation to the features of goat milk casein. In the new, smaller milk network which Skånaliseter was instrumental in creating, investments in and development of facilities and capabilities that were better suited to goat milk casein were made. This lead to new use of this component in a portion of Norwegian goat milk in the form of a variety of white goat cheeses. Previously this component had been used as feed, a use that generated low incomes.

The Frozen Curd case (case 5) demonstrates how use of another portion of the product (all goat milk supplied to a certain dairy) is improved while *remaining* attached to most resources

in the prevailing network. Starting from a product (Frozen Curd) that is already developed and manufactured, and taken as granted by the involved actors, the clue is not to combine existing features of the focal product in new ways with other resources. Rather, in order to suit the 'new' product the focal product 'itself' is changed, through alteration of a certain feature (taste). Moreover, while this 'new' product mainly is based on the same component as the products in case 1, the *critical* feature in case 5 is tied to a second component in the focal product, fat. By altering a feature (taste) in this component new use of another specific portion of the focal product is established. However, in case 4 it is demonstrated that a third casein-based use of the focal product (in the form of the product Snøfrisk) is established even if the taste feature of the fat component in it is 'bad.' Here a part of the 'big' product in the network (cow milk) is exploited in order to accomplish improved use of the focal product. More precisely, the fat component in the goat milk is substituted by the fat component in cow milk, which do not have the same problems with respect to the crucial feature (taste), but is similar with respect to other features.

Hence, not only have we demonstrated that the use of the actual, 'underestimated' product was improved; we have also shown how a *variety* of new uses was being developed and implemented. This variety concerning new uses had to do with discovery of new combinations of different resources involving several firms and institutions in the network. But the variety in new uses and hence development had also to do with 'opening' the resource 'itself;' recognizing that it consisted of many and diverse components, each with certain features that could be exploited, together or in combination with other resources. In fact, we could alternatively have regarded goat milk casein as a product and let the study be about improved uses of this product.

And then we inevitably have turned to the 'interior' side of our research problem; does the study have transferability on a theoretical level? In the next (last) chapter we will discuss the concept of transferability in more detail. There we will argue that the one who is to use the study, the reader, primarily must do eventual 'transfer'. The responsibility of the writer is 'restricted' to provide thick descriptions so that the reader gets a chance to compare the context described in the study with the context in which the study shall be applied. On these grounds we should strictly speaking, as authors, desist from suggesting applications of the study. However, if we imagined ourselves as users of the study, what would we emphasize?

Again, this would depend on e.g. in what industrial network we were located, the function we had in this network, the type of resources we were working with, what other actors we could interact with. For example, it might be that this study is easily applicable to problems of poor use of other physical products, while less employable to problems of poor use of non-physical resources (like knowledge) or social resources (e.g. a business relationship).

Nevertheless, let us point at a couple of more general lessons from the study concerning developing better uses of resources. As we have seen use of a resource requires it being combined with other resources, and by logic better use therefore becomes a question of better combinations. As shown, better combinations really were found for our focal product. But the word 'better' here has no meaning unless we take two other 'factors' or dimensions into consideration, economy and actors.

Firstly, better combinations will not be identified and implemented, in fact cannot be understood, in isolation from economic considerations (economics). Moreover, there is interplay between economics and development. In one way or another actors will have or make calculations in relation to any resource that they consider or handle. These calculations build on selected combination of resources, where some resources are regarded as more 'central' than others. Often actors will be economically 'conservative' in the sense that they will try to get the most out of investments in combinations already made. Therefore it can be difficult to arrive at new combinations. On the other hand, without development an industrial network will sooner or later die, hence there will always be a need of new combinations and features. This means that there at any time in a network exist possibilities for using a resource better. But this provides among other things that actors in the network confront, compare and discuss – that is, interact about – each other's calculations. In other words, interaction can be a way to clarify the resource combination 'behind' different actors' calculations and hence make it easier to identify 'better' combinations and, hence, uses. In addition, economics also can provide a way to encourage development of better uses.

If all actors in a business network were similar, we could as researchers approach the problem of finding better uses of a resource with a few general assumptions prevailing to all actors. However, this study confirms other studies within the industrial networks approach that actors, as well as resources, are heterogeneous. Hence, we leave out of the picture a crucial

element if we ignore the actor dimension when searching for and studying new ways to use a resource. The actor dimension is important because actors interact to discover and implement new resource combinations and to calculate resources. Not only do actors activate resources, they also have opinions about resources. They seem to appreciate some resources more than others, and this appreciation concerns more than economy, technology and knowledge. Hence, we might say that the actor dimension concerns the sociology of business networks. This sociology also affects the use of a resource and the possibilities of developing it. Improvement in use may thus as much be about changing actors view of what constitutes 'better use' as changing physical combinations and features. This makes interaction the more important.

The thesis, therefore, confirms other studies of resource development in the industrial networks approach, for example Wedin (2001), that has shown that the economics of a resource is something 'larger' than single organizations and relationships. Economics depends on a complex pattern of ongoing interaction by actors in a business network. In other words, no sole buyer or seller – user or producer – determines value. On the other hand, neither is economics of a resource a result of aggregated acts by a multitude of anonymous actors. Actors are concrete and unique in terms of identity and character and handle heterogeneous resources. This is why interaction is possible and can be worthwhile. And actors know this. On the other hand this makes it impossible, and also rather uninteresting, to predict development, use and value of a resource through intellectual exercise. Instead we can, as researchers, in relatively detailed ways, describe concrete, interactive processes in business networks through which certain resources are developed over time. By attempting to see these processes through conceptual lenses (like the one that we have been applying in this thesis) we can hope to learn from process descriptions and experiences and perhaps become better at understanding resources and seize ways in which they could be used better. It is in this way managerial implications of the thesis can be sought.

A suggestion for further research

As will be explained in the next chapter this study was financed by a regional development fund. The aim of the program was to bring up and support ideas and projects that among other things could lead to business development, value creation and new employment in the actual region. The market for food seemed to become more varied during the 1990s, and we found

farm processing of food as one interesting possibility for regional development to be studied. To make a long story short we ended up by researching development based on a certain agricultural product – goat milk. This research of 'the story of a product,' of which a portion was produced and used in the region where we started our research, took us far beyond the 'farm' and the 'region,' into a complex industrial network that at the same time was conservative and dynamic. In the network we found interaction of different forms and between various actors as crucial for development based on the product. This development had economic effects as the product came to be regarded as an asset for generating income rather than a liability causing costs. Hence, as previously stated, development seems as much to be about changing views of existing resources as physically changing resources.

This brings us to a theme for further research – interaction between business actors and public institutions regarding improved use of agricultural resources. The traditional view of the relationship between research, advisory service and farming has been linear; specialized agricultural research produces knowledge of 'best practice,' provides this to agricultural advisers who then transfer it to farmers who implement this knowledge in order to generate economic effects. This thesis suggests that such a view at best is incomplete. For example, we have seen farmers that experiment with new resource combinations, thereby generating new knowledge. Moreover, we have met farmers that are not trained in agriculture, but nevertheless with indubitable success exploit agricultural resources. And we have seen that knowledge about automated dairying cannot, without more ado, be used in manual dairying. We have also shown that an expert in marketing did not have superior knowledge regarding how to approach customers with a certain farm food product (cheese). And we have seen a regional public agency assisting a local farmer in influencing a central public agency. In another case the same regional agency served more as a facilitator of interaction between certain farmers and a business actor than as a transmitter of knowledge.

Beyond confirming the general argument that knowledge is contextual, these examples raise the more specific question of the 'substance and function' of advisers when it comes to improved use of agricultural resources. The old agricultural 'regime' seemed to sustain a clear, almost monolithic inter-organizational order with evident boundaries between knowledge areas. This gave predictability for every actor and a clear division of labour. But it also had consequences for development in agriculture. What this study demonstrates is not

that development was absent in the old regime. The difference – and what probably constitutes a challenge for the advisers of today and tomorrow – is that the new regime exhibit more than one path of development. The new regime thus appears more chaotic. But, as we have seen, chaos also represents possibilities. The question, then, is what role advisers can have and should have in this, let's say, more disordered and 'fleeting' agro-industrial network. Should they for example be even more specialized than today? Should they have less knowledge about 'substance' in order to be more clever at facilitating interactive processes among actors, e.g. across traditional business and disciplinary borders, based on the fact that new knowledge often is created when resources that traditionally have been seen as separate are viewed together. Hence, should agricultural advisers and public agencies help farm firms in building business relationships and enter important networks? What type of formal and experiential competence should advisers and their organizations then seek, and where should they seek it?

Chapter 8 The Research Journey

> We are convinced that learning in the research society as a whole would be improved if more of the processes of how we have learned were revealed to the reader. (Dubois & Gadde 2002: 560)

This last chapter is an attempt to follow up this request. We start with a presentation of the research process and discuss the impact of being in different research networks during the research process. In the next section we describe the intertwined relation between data and theory and how we developed cases. Sources and types of data are presented and discussed in section three, before in the fourth and last section we assess the trustworthiness of the study.

The research process: Impact of different research networks

We have not carried out this study in isolation. This might not be surprising. According to Kuhn (2002) scientific activity normally takes place within a community of researchers sharing some 'received views' (p. 17). The special thing about the actual study is that it started in one research community and moved into another. In itself this suggests that the boundaries between different research communities need not be absolute. Hence the term research network may be as suitable as research community.[139]

[139] The term community denotes (among other things) 'any set of social relationships operating within certain boundaries' and may e.g. 'refer to social relationships which… exist at a more abstract, ideological level.' (Collins 1995). Hence, one view is that in a community there exists a 'community spirit' or 'community feeling.' Kuhn (2002) seems to apply this understanding of the term community when he discusses how science is 'normally' carried out; by a community of researchers sharing some basic assumptions (paradigm). According to Collins (1995) community can also be denoted as a 'network of interrelationships' where not only mutuality but also conflict exist between the members. As we feel that the latter notion is more flexible and comes closer to the research communities that we have experienced (in addition to that we are more familiar with it), we prefer the term research network. However, like Kuhn (2002) we recognize the significance of researchers' interrelatedness in 'normal' science. The terms 'research environment' and 'research context' also express the idea of the single researcher not operating in isolation. Again, we prefer research network as this term denotes not only researchers being influenced (by the network) but also researchers influencing (the network).

The study started through discussions in the research network of the Centre for Rural Research. This is a private research foundation located in Trondheim with relationships to many departments at the Faculty of Social Sciences and Technology Management at the Norwegian University of Science and Technology (NTNU). The second network, which we later became part of, is that of the 'industrial networks approach' (cf. chapter 2). A part of this network exists at one of the departments of this faculty, the Department of Industrial Economics and Technology Management. We 'met' this network for the first time when we sought a doctoral education in 1997. Our doctoral studies have been done at this department, and persons belonging to the industrial networks approach there have supervised the study.

However, during most of the doctoral studies we were physically located at the Centre for Rural Research. The idea of finding a case within the food 'sector' originated in a program launched at the Centre in 1993. The program aimed at studying the food system from 'earth' to 'table' both empirically and theoretically. One of the themes was new ways of producing and distributing food. The program has led to many studies, and we consider this thesis as one of them as the program heavily influenced our choice of theme. This theme also fitted very well with the purpose of a new regional development program (Interreg) that began at the same time as we were seeking funding for our doctoral studies. One of the aims of this program was to further business development. Together with other research institutions the Centre for Rural Research succeeded in getting funding for eight doctoral projects on this Interreg-program in 1998, among them the project that would finance this thesis.

At that time the Centre for Rural Research had one person who was qualified to supervise doctoral studies. This person was a sociologist with permission to supervise doctoral students taken up at the Department of Sociology and Political Science at the university. Because this person then did not have capacity for more doctoral students, and we were trained as agricultural economists and not sociologists, we sought another department at the same faculty, the Department of Industrial Economics and Technology Management. A colleague of ours told us (in 1997) about a relatively new group there researching industrial networks. At the Centre for Rural Research we had previously been discussing network theory.[140] As a

[140] In the form of social network theory (cf. Granovetter 1973, 1985) and actor network theory (cf. Latour 1987).

result we had taken a general interest in network theory. Since we were also interested in studying firms and business this group seemed to us like the 'bull's eye.' We contacted two persons in the group and told them about our plans. We were welcome to apply for a doctoral education, we were given a supervisor from the group and were allowed to write a thesis on new ways of producing and distributing food that was theoretically informed by the industrial networks approach.[141] Formally we started our studies in 1998. As a result we had started to enter a new research network.

But for the next three and a half years we still had our place of work in our 'old' research network at the Centre for Rural Research. From here we tried to enter the new research network in various ways. Our first step was an individual doctoral course supervised by one of our supervisors at the Department of Industrial Economics and Technology Management. We wrote an essay where among other things we discussed the ARA-model (Activities, Resources and Actors). We discussed the essay a couple of times with the industrial networks group at the Department of Industrial Economics and Technology Management (hereafter called the Group). Via this interaction we discovered some confusion and deviance between 'the Group and us' regarding e.g. the role of the research question in the research process and what would count as appropriate data. However, we were physically in our old network, and the interaction with the Group was rather 'thin.'

One of our supervisors then (in 1999) advised us to follow a doctoral course in industrial networks theory led by him at the Norwegian School of Management BI. Here we got to know a larger group of persons, some – like us – trying to enter the industrial networks approach and some already within and quite experienced in it. We wrote a new essay in interaction with the participants where we imitated the 'tribal language' of our new research network. We wrote a new case story and were set to analyse it from the three main theoretical perspectives of the ARA-model. The essay was criticized but we were also encouraged to go on with our research. Via the course we got to know more actors within our new research network, became more familiar with facilities for producing research products within this network and

[141] In our doctoral application the research purpose was formulated as follows: 'The thesis deals with new small enterprises within the food sector within the two border regions Trøndelag and Jämtland, and how through improved relations and organizing they can improve their economy. The theoretical framework draws on industrial network theory.' (Our translation)

further developed the product that ended up in this thesis. Among other things we realized that we needed primary empirical data, especially personal interviews. All in all we may say that after the course we were more secure regarding the specific language of our new research network; how you should and should not express things.

We also had other chances to learn the language of our new research network. From 1998 to 2002 we had 28 meetings with one or both our supervisors at the Department. Often other persons from the group and visiting researchers 'belonging' to the network of the industrial networks approach also participated. Altogether we met 9 researchers and PhD-students via these 28 'encounters.' The meetings were all based on texts and outlines of chapters in the thesis that we had been writing.

In addition from 2000 to 2002 we presented and received comments on papers (expected to become parts in the thesis) at two IMP conferences, three Nordic Workshops of Inter-organisational Research, one research visit at the Department of Industrial Marketing at Chalmers University of Technology in Göteborg and one Forum of Inter-organisational Research at the Norwegian School of Management BI.

In retrospect we see that all these discussions and comments on texts were to a large extent about language; the use of concepts, the description of empirical material; the use of wrong concepts or not having appropriate concepts to 'express the world' with. According to the philosopher Quine (cf. Føllesdal et al. 1990, Aschehoug & Gyldendal 1995-1998) learning language *is* learning theory. The theory is in the language, not outside of it. Sentences are not true on their own. We have to see batches of sentences, whole texts, in relation to reality. Concepts are not good or bad in themselves but in relation to the web of concepts in which they are embedded and hence constitute the theory; assumptions about reality. Hence, learning the specific 'industrial networks approach' meant learning the particular 'industrial networks language;' it was not sufficient to pick a concept here and a concept there and via this explain some 'business reality.' There were persons in our existing research network that spoke individual words also found in the industrial networks language, but not whole batches of concepts, whole texts, in it. This meant that we had no person in the old network that we could practice the industrial networks language with. In retrospect we see that the way in which we learnt the industrial networks theory was by studying other industrial networks

researcher's texts, commenting on these orally, writing our own texts, presenting these and getting comments from others within this particular research network. In hindsight we might say that for a long time one major obstacle for us in learning the theory was our thinking in terms of fundmentals; we sought one single fundamental concept on which the whole industrial networks approach rested. There is no such fundamental concept. We sought it in vain. The theory was already there, in the texts.[142]

As long as we stayed in our old research network we produced texts that used words both from the language of industrial networks approach and from the language of our old research network. During interaction with people in the former network, then, most of the latter language was thrown out of the thesis. This was not because the language of the Centre for Rural Research was 'bad' in itself, but because it did not fit the language of the industrial networks approach. This is not to say that this 'double run' was unfruitful. We learned from it, but it was costly. After some time it appeared that trying to follow two paths did not benefit the thesis. It hindered us in 'really' learning the language of the new research network, a network that the thesis under all circumstances had to relate to.

In 2001, after three and a half years of doctoral studies, we were invited by one of our supervisors to stay at the Department of Industrial Economics and Technology Management. We 'took office' there for one year and most of the thesis was written in this period. The thesis now obtained a much sharper perspective building on the industrial networks approach. The language of rural sociology and other approaches (like economics and transaction cost theory) was now thrown away. A couple of new sociological elements, however, were entered.[143] One important reason for this was that we then had daily, or at least weekly, dialogue with people practising research within the industrial networks approach and who thus had mastered the language of this approach. This year was professionally very productive and personally very satisfying. At the end of the year we had produced an outline of the thesis that later could be discussed at an end seminar.[144] At this seminar we obtained extensive comments on the whole thesis from an experienced researcher within the industrial networks

[142] This situation may be illustrated by the phrase: 'Not seeing the wood for the trees.'
[143] Examples are the concept of 'purposeful actor' (Granovetter 1992) and the view of social interaction developed by Simmel (1950).
[144] 'Slutt-seminar' in Norwegian. Such a seminar is usually held about half a year before one expects the final thesis to be delivered.

approach and discussed her suggestions regarding improvements. Afterwards we incorporated most of these suggestions in the thesis.

According to Kuhn (2002) effective research cannot come into being without the existence of a community of researchers. Such a community cannot do research efficiently without a set of received views (paradigm). A set of received views incorporates answers to questions like: What basic elements build up the universe? How do these elements interact with each other and with us as researchers? What questions are legitimate to ask about these elements, and what techniques should be used to find answers to the questions? The industrial networks approach can be regarded as such a set of received views containing answers to these questions. However, the set of views may typically not be explicit, but exist as tacit knowledge in the actual community. Thus, the received set of views cannot be found in the form of a simple recipe. During the research process we have become more aware of the impacts of such views on the possibilities of doing research, especially on the possibilities of doing efficient research. Moreover, the received view of a research network is to be found in its specific language. In order to learn this language it is necessary but not sufficient to read and write texts. Oral discussion and physical proximity to other researchers within the specific research network are also crucial.

It is of course easier to learn the language of one research network than several. What made the research process behind this thesis rather exhausting was that we were already (at least to some extent) familiar with the language of one research network and tried to 'hold on to' this language at the same time as we tried to learn the language of a new research network.

Developing cases

We have developed our empirical data (see next section) into cases. The literature that we studied in our first doctoral course in industrial network theory revealed that typical studies within the industrial networks approach built on such empirical material. Thus, Smith & Laage-Hellman (1992) start by presenting a short case study describing a supplier's relationships with other significant organizations during the years of the development of a new market. They remark that:

> The above case is a typical example of the 'raw material' used by interaction and network researchers. (p. 39)

During the process neither we nor our supervisors ever questioned that 'case' should constitute the empirical material in the thesis. The first attempt to make a case study was done when we wrote an essay[145] in our first course in industrial network theory (in 1998). One of the members of the industrial networks group at NTNU advised us to prioritize the description of a case and a theoretical analysis of this in the essay. The text was about one page long and we referred to what it described as a 'case.' The empirical data for the case was rather simple; a couple of written documents and one short dialogue with one of the two persons running the farm. The case related to Skånaliseter farm dairy. At the time we wrote the case we felt that this text was rather insignificant. In retrospect we see that the case, and the process of writing it, was the first step towards case 1 and case 2 in this thesis.

The next time we wrote a case was in the second (and last) course in industrial network theory that we took (1999). Here we used a document and interview data from a new case (also a farm dairy). Our supervisors advised us not to use this case story text in the thesis but to start anew. We found the situation very frustrating, not least because a lot of work seemed to have been done in vain.

After three more years of research within the industrial networks approach we can make some sense of these two early essays (texts) and the process of making them. A couple of methodological issues seem to stand out. One issue is the theory relatedness of empirical data. Another issue is the process of developing the cases.

Relation between empirical material and theory

The 'collection[146]' and processing of empirical data was influenced by theory through the ARA-model and the 4R-model. But the empirical data also affected the theory during the research process. In other words, there was reciprocal influence between theory and empirical data during the research process.[147] According to Føllesdal et al. (1990: 105) this is one of the

[145] Forbord (1998).
[146] We put collection in quotation marks because we believe we have not simply been collecting data; e.g. a personal interview creates new and unique data as much as it transfers existing data (from informant to interviewer) (cf. Kvale 1997).
[147] The ordering of chapters in the thesis reflects in a way this reciprocal influence.

circular structures in a hermeneutic process where the aim is to understand.[148] Within the industrial networks approach Dubois & Gadde (2002) have termed this process 'systematic combining' and propose that:

> this approach creates fruitful cross-fertilization where new combinations are developed through a mixture of established theoretical models and new concepts derived from the confrontation with reality (p. 559).

They emphasize that systematic combining is not so much about inventing new theories. It is more about refining existing theories. The difference compared to deductive and inductive studies is that the original (theoretical) framework is successively modified:

> partly as a result of unanticipated empirical findings, but also of theoretical insights gained during the process. (p. 559).

How has this cross-fertilization been 'spelled out' in our study?

We became interested in the first case (Skånaliseter) because we were interested in new business activities and the possibilities of increased value creation in agriculture, and this farm firm had newly started a new activity based on a resource that it produced. Moreover, this activity deviated from the conventional pattern within that industry (the dairy industry in Norway in which Tine was by far – and still is – the dominant actor). In 1998 we made use of the ARA-model to understand the transition from selling milk to (also) processing it. We wrote a case text that was influenced by our reading of certain industrial networks literature. We analysed the case with two theoretical models based on the ARA-model. We used Dubois' (1994) model of activity patterns[149] in industrial networks to gain understanding of the difference between the 'before-the-new-activity-situation' and 'in-the-new-activity-situation.' Moreover, we discovered that we were interested in new resources (on the input

[148] In this study too a main aim has been to understand. Other circular structures characteristic of such hermeneutic process are according to Føllesdal et al. (1990) 'commuting' between whole and part, movement between the horizon of the subject (the researcher) and the horizon of the object and cycling between questions and answers. A basic assumption is that such processes are not static, but progresses. Circle can evoke an idea of standstill. Thus hermeneutic spiral (cf. Andersen 1994b: 173-174) may be a more apt term than hermeneutic circle.

side as well as the output side) in connection to the new activity. Furthermore, we analysed (verbally) using vector theory (Håkansson & Snehota 1995) stability and change in the milk network as a whole.

Thus, we see that our first case written within the perspective of the ARA-model aroused first an interest in the concepts of activity and activity pattern. From this derived an interest in resources. The interest in the network level came from reading Håkansson & Snehota (1995) and discussing their ideas with 'the Group' at the Department. We became convinced that this level (compared to the relationship level), at the time was the most interesting, but less researched concept within the industrial networks approach. And we discovered that it was possible to gain an understanding of 'standard' and 'variation' in a whole branch (milk) by applying a network perspective and the vector theory. In retrospect we also see that by doing this case analysis we obtained a 'first warning' of how detailed and complex analysis on a network level can be. Hence, in dialogue with our supervisors, we decided to reduce our original plan of writing 10-12 cases to 2-3 cases.

One year later, on the second course in industrial networks theory, we were presented with a new theoretical model, the 4R-model.[150] We regarded this as a more specific model within the more general ARA-model, more precisely a specification of the resource dimension in this model. On this course we produced new empirical material. The plan was to use interview data to develop a case describing the transition from production only to both production and use of the same resource (goat milk) on a different farm. However, the case turned into a story, if not to say history, leading up to this transition.

What seems to have happened was that our interest within the ARA-model had turned from activities to resources and that our focus had turned from describing structures (at two points in time) to processes (between two points in time). Our interest before the whole study started was also change and innovation but the 'encounter' with the 4R-model and the text surrounding it inspired us to dig much deeper into our empirical world regarding change and made us more conscious of the concept of resources. Hence, we came to see our empirical

[149] Dubois (1994) uses the term activity structure for many activities linked together across firm boundaries. However, later Håkansson & Snehota (1995) developed the whole ARA-model in the perspective of network further, and we prefer to use their term – activity pattern – for activities on a network level (cf. Chapter 2).

resource as a 'product,' one of the theoretical concepts in the 4R-model. Since we perceived this model to be encapsulated by the ARA-model, to regard the (empirical) goat milk as (theoretical) product would also fit with the ARA-model. In other words, here was a cross-fertilizing between empirical material and theory; a certain text containing a certain model with particular concepts made us develop the empirical material in a certain way. From then on product became the main unit of analysis in the thesis. However, this second case was never used in the thesis. Moreover, for yet another year we would stick to the theoretical concept of activity patterns.

Thus in 2000 we developed case 1 further. The idea was to use it to illustrate activity patterns in which the product was embedded. We wrote a paper presenting the case where we analysed it from the theoretical perspective of activity patterns and the two activity-related concepts of efficiency and effectiveness. This analysis was very confusing. We got next to nothing out of it. The confusion started to vanish when we received comments on the paper from the researcher who had developed the theoretical model of activity patterns in industrial networks (Dubois 1994). On the basis of the case she advised us to turn our focus (within the ARA-model) from activities to resources. This advice was confirmed by another researcher within the industrial networks approach. He viewed the case primarily as an illustration of value (and not costs). From then on we left the model of activity patterns, but not the network perspective. We realized that our thesis ought to deal with the resource dimension; more precisely development of a product within a business network.

However, development of the theoretical perspective did not stop, but it now turned to refinement of one element in the ARA-model, resources; in fact one dimension of this element, development. We still held on to the 4R-model and with product as the main unit of analysis. Hence, as a consequence of reciprocal influence between theory and reality the research problem had become quite specific – development of a product in a business network. This was late in 2000. One of our supervisors now advised us to drop our original plan for a case 2 (the other farm dairy) and instead obtain empirical material about technical research of the product we were studying. Later, when we developed the theoretical argument leading to chapter 4 in this thesis, we realized that this advice concerning empirical data was

[150] 4R denotes 'The four resources' (business units, products, facilities, business relationships) (cf. chapter 4).

based on theory, more precisely the distinction between two forms of development – giving a resource new features versus using its existing features in new ways.[151] The case that we had (case 1) would give a sufficient empirical illustration of the latter concept, but not the former.

In 2001 we collected data on technical development of the resource and developed a new case text (cases number 3 to 7). And we started our first analysis of these cases by making maps of the resource constellation in which the focal product was embedded. Thus, we stuck to the network level. While we knew that our research problem concerned development of a *product* (a specific resource) in an industrial network, we developed a theoretical argument about resources in general, based on the 4R-model including the concept of interaction (chapter 4 in the thesis). As a consequence of the shift in theoretical perspective one year earlier we rewrote the original case 1 (mainly case 1 *and* 2 in the thesis) so that it would primarily illustrate resources across firm boundaries.

The last cross-fertilizing between empirical material and theory was when we developed our theoretical argument about resources. During the process of writing, thinking and interaction with supervisors we realized for the first time the impact of the relativistic view of resources (provision – use) and its close connection to the concept interaction. Unfortunately it was too late to rewrite the cases once more. However, we realized that it was a serious lack in the original case 1 that we had no data about the use side in 'the beginning.' Hence we did a last interview and rewrote this part of the empirical material (part A of chapter 1).

Partly inspired by insight into a new concept (interaction) we made a final reciprocal structural change with respect to theory and reality in the thesis late in 2001. We organized the parts of case section A (with cases 1 and 2 focussing on new combinations) and case section B (with cases 3-7 focussing on new features) that concerned the state at 'the beginning' into a new chapter (1 in the thesis). Thus the old chapter (3 in the thesis) is a pure description of various development processes taking place afterwards in the actual network. Between the two empirical chapters we developed a new theoretical chapter focussing more generally on the industrial networks approach as a theoretical perspective for understanding a specific resource-use problem. As a consequence of writing this chapter our insight into the

[151] Cf. Chapter 4.

significance of the actor dimension of the ARA-model increased. This, in addition to the increased understanding of the term interaction, meant that in chapter 4 we brought in a discussion of the actor dimension, and we realized that the empirical material could have been used to illustrate and analyse problems related to the actor dimension as well. But the specific combination of resources that we were part of in the project[152] did not permit this.[153]

Processing cases

Smith & Laage-Hellman (1992) are in a way wrong when they state that a case is 'raw material.' Our experience in the study has been that a case is the result of *processing* of 'raw' empirical data. Above we recognized this raw material in our study mainly as interview data and written texts (documents).[154] This raw material could have been used in other ways than we used it. For example, many researchers doing qualitative research integrate parts of interviews (quotations) directly in the theoretical discussion and not as we have done, used quotations as elements in cases and not anywhere else in the text. Thus, in our study there are separate parts describing theory and data. This seems to be in line with most of the recent research in the industrial networks approach.

Hence, the cases in this thesis are 'processed raw data' and not 'raw data.' In this way the cases represent a first step towards analysis. Every case was the result of at least two rounds of writing. For example it was not before the second round that cases 3 to 7 arose; in the first round of writing they existed as one long case. It is difficult to explain exactly why the case texts ended up as they did. To a large extent 'casing' rests on tacit knowledge. But we think (at least that was so in our case) a desire for some 'order' and meaning influenced the writing. This is why we think it was fruitful to have had two rounds of writing; in the second round the case texts became more ordered and focussed than in the first round. This 'ordering' was facilitated among other things by our having obtained new theoretical insights, cf. the discussion earlier in this section.[155]

[152] Or was it the activity pattern or web of actors?
[153] However, at the 'end seminar' we found that the participants engaged in a lively discussion of the actor dimension. This discussion seemed for the most part to be inspired by case 1 in the thesis.
[154] What these data were (types) and where they came from (sources) is presented in detail later in this chapter.
[155] This is not to say that this was the only possible ordering of the material.

This illustrates two points. The first point is that the empirical material in the thesis is not 'objective' data simply collected by us; it is highly influenced by us. On the other hand the material is not 'pure poetry;' all the activities, resources and actors described actually exist. Any other observer could in principle have observed these entities. And the material has been approved by the informants (cf. the last section in this paper). The other point is that the cases were not 'given' at the outset, ready to be collected and entered into the text by us. E.g. the cases had to be delimited, and in our case *we* set the final boundaries around the cases since there existed no 'natural' boundaries around (and between) them. Moreover, these boundaries had to be meaningful and again we must point to the importance of 'writing up' the cases more than once; hence, the process of writing not only made the cases more 'ordered,' it also resulted in more meaningful boundaries of the cases.[156]

We chose to term the major part of chapter 3 'case stories,' because primarily it is continuous processes that are described and not states at different points in time. The 'embryos' of the case stories that we regard as main case stories (1 and 5) were personal interviews. In case 1 this raw material was notes made by us and transcribed audiotapes. In case 5 it was only audiotapes and notes. In some 'tacit' way the theoretical perspective of the industrial networks approach and the ARA-model influenced the interviews. But during the first writing of texts that would eventually end up as case stories, we had no explicit idea where the case would lead us. We tried to be as 'close' to the world of the informants and the resource as possible. Hence, we have used words and phrases used by the informants in the case stories (and the rest of the empirical material), but avoided concepts from our theoretical approach. Moreover, we had an ambition of writing something that 'hung together' when developing the case material.

Sources and types of data

The means by which we have obtained empirical data for the study have been interviews, documents and to some degree observation. These data have provided the empirical 'raw material' for constructing the case stories. We think that interviews have been the most important. We have made personal interviews as well as telephone interviews. Various

[156] In this we follow the view put forward by Hammersley & Atkinson (1995:239) that qualitative research to a large extent is produced through writing and not only via collecting and analysing data.

documents have also been a major source of data. Observation was done primarily in connection with some personal interviews.

Interviews

The interviews were carried out between October 1998 and June 2002. All in all we made 44 interviews, first 4 in Sweden and then 40 in Norway. Only the last 40 interviews have been employed in the thesis as case material. In these 40 interviews 33 persons were interviewed representing 29 organizations if we regard departments, centres and central stores within Tine Norske Meierier and dairies within dairy companies as organizations. Table 8-1 provides an overview of all interviews.[157]

Of the total 44 interviews 15 were personal and 29 telephone interviews. The personal interviews lasted for about 60-120 minutes each. The telephone interviews took from 10 to 30 minutes; the shortest of them aimed at checking or completing information already obtained via other interviews or documents. All the telephone interviews were carried out without prior appointment with the informant. This was the case for only one personal interview (with a food shopkeeper). All the other interviews were arranged beforehand. Only in one case (a US food firm) was our request for an interview ignored.[158] In the other cases – when we told the informant what the study was about, that it was a doctoral study and what our place of work was – he or she accepted without hesitation our request for interview and was helpful in finding a convenient time.

At the start of the interview we stated the purpose of the study, our role in it, place of work and professional connection. We found this information useful since it seemed to make our project serious in the eyes of the informants and thus perhaps more willing to engage in a dialogue. We made it clear before the interview started that none of the informants would be recognized by name in any publication from the project and that all recordings and notes in which they could be identified would be handled confidentially.[159]

[157] The structure of a table in Hulthén (2002: 57) served much as inspiration for this table.
[158] In this case we agreed with the informant by telephone on June 24th 2002 that she should provide answers to some questions that we would send by electronic mail later the same day. However, no answers came.
[159] As a consequence all interviewees referred to in the cases have, without exception, been given fictitious names, even if some of them after having read drafts of the stories found it a bit strange not to be referred to by their real names.

Table 8-1: Overview of interviews

Organization	*Job description of informant*	*Number of interviews*			*Time of interview (year)*	*Obser-vation*	*Data not used*
		Personal		Telephone			
		Recorded					
		Yes	No				
'Use side' cases (1, 2)							
Länsstyrelsen i Jämtland	Agricultural consultant	1			1998	X	X
Skärvångens Gårdsmejeri/Bymejeri	Farmer/dairyman Farmer/dairyman	1[160] 1			1998 1999	X X	X X
Jämtspira	Manager	1			1999	X	X
Skånaliseter Gårdsysteri	Farmer/dairyman Farmer/dairymaid	1[161]	 1	1 2	1999/2000 2000/2000/ 2000	 X	
Goat farm in Stroplsjødalen, Namskogan	Farmer	1			2000		
Another goat farm in Stroplsjødalen, Namskogan	Farmer	1			2000		
Landteknikk AL	Consultant			1	2000		
MATFORSK	Project manager			1	2000		
Nord-Trøndelag Næringsservice	Marketing adviser			1	2000		
Mo Gård, Albert Collet	Food consultant			1	1999		
Mikvold Gård	Food-producer/ shop-keeper			1	2000		
Ost & Bakst	Shop-keeper		1		2000	X	
Fenaknoken	Shop-keeper		1		2001	X	
Namdalsmeieriet[162]	Managing Director (1981-92)			1	2002		
Tine Midt-Norge, avd. Verdal[163]	Dairy Manager Consultant	 1		1 1	2000 2000/2000	 X	
Tine Norske Meierier Trondheim (Sentrallager)	Logistics Manager Marketing Manager			1 1	2000 2000		
'Provision side' cases (3-7)							
Tine Nord-Norge, avd. Tromsø	Project Manager			1	2001		
Tine Meieriet Vest, avd. Ørsta	Dairy Manager Product Manager			1 1	2001 2001		
Tine Meieriet Vest, avd. Ålesund	Quality Manager Product Consultant			1 1	2001 2001		
Tine Meieriet Sør, avd. Haukelid	Dairy Manager			2	2001/2001		
Tine Østlandsmeieriet, avd. Brumunddal	Product Manager			1	2001		
Tine Norske Meierier, Senter for Forskning & Utvikling, Kalbakken	R&D Consultant	1			2001		
Tine Norske Meierier, Senter for Forskning & Utvikling, Voll	R&D Consultant R&D Consultant			2 1	2001/2001 2001		
Tine Norske Meierier Ås (Husdyrkontrollen)	Consultant			1	2001		
Tine Norske Meierier, Internasjonal avdeling	Consultant			1	2001		
Tine Norske Meierier, Industriavdelingen	Consultant			1	2001		
Norges Landbrukshøgskole, Institutt for næringsmiddelfag	Assistant professor Professor	1 1		 1	2001 2001/2001		
Norges Landbrukshøgskole, Institutt for husdyrfag	Doctoral student	1			2001		
Norsk Sau- og Geitalslag	Breeding Consultant			1	2001		

[160] This interview was with both persons.
[161] This interview was partly with both persons.
[162] Namdalsmeieriet existed until 1996 when it became part of (the new company) Tine Midt-Norge.
[163] In the table all Tine organizations are entered according to administrative plan in the year 2000 (Tine Annual Report 2000).

The first four interviews (two in 1998 and two in 1999) were with persons that either practised or consulted in farm-processing of goat milk in Jämtland, a neighbouring region (and county) to Trøndelag where we had already located our first case (Skånaliseter farm dairy). Two of these interviews were with two farmers running a goat farm with a dairy in Jämtland. The third was with an agricultural consultant in the county offices (Länsstyrelsen). This person had for many years advised farmers how to establish and carry out farm based processing of milk, among other things. The fourth interview was with the manager of a co-operative owned by the two farmers that we interviewed among others. Based on these four interviews and a research report[164] we wrote a paper in 1999.[165] This paper was influenced by a new categorization of resources within the industrial network paradigm[166] and resulted in our identifying product as our main object of research in the thesis (cf. the previous section).

However, when we had accomplished the case study of the (Norwegian) case in broad outline, late in 2000 the study changed direction. Having identified product as our research object and, moreover, realized that we wanted to include development as topic in the study, it turned out that the Norwegian case would illustrate only one of the two ways of development described in theory;[167] development from the use side. Therefore we carried out some more interviews, mainly with researchers. These interviews resulted in five new case stories. We realized that these together with the first case story[168] constituted a body of empirical material sufficient for illuminating both theoretical dimensions. Consequently, the Swedish material turned out to be superfluous as it concerned the same theoretical dimension as the first Norwegian case. Hence, we found no place for 'the Swedish case' in the thesis, even though it was by analysing this case that we had identified our main object of research. However, some information from the Swedish case was helpful in the construction of case 1.

We prepared ourselves before each interview by considering questions and themes that seemed meaningful in relation to theoretical issues and empirical material already obtained. A

[164] This report (Stryjan & Fröman 1991) gives among other things a description of how the dairy co-operative in the region (NNP) for various reasons found it impossible to continue its processing of goat milk and how together with goat farmers, farmers' organizations and agricultural authorities in the region it was able to establish a new way of using the resource based on the French concept of making Roquefort.
[165] Forbord (1999)
[166] cf. Håkansson & Waluszewski (1999)
[167] More specifically we see the two ways as 1) a user using existing features of a resource in a new way, and 2) a provider giving a resource new or different features (cf. Håkansson & Snehota 1995, Penrose 1995).
[168] Later we divided this case into two case stories (case 1 and case 2).

kind of interview guide was made before each interview.[169] This guide was influenced by our theoretical approach. However, we avoided using very specific concepts from our theoretical apparatus in the interviews; rather we tried to stick to everyday language and industrial terminology used by the informants. The guide was most formal and detailed before personal interviews. It was not followed slavishly. Rather, we used it to 'spur' the interview. As we found each informant to be very competent in his or her field or job we let him or her talk freely interrupted only by follow-up questions from our side. As soon as we felt that a topic was exhausted we introduced a new topic based on the guide or information revealed earlier in the interview. Thus, the interviews had the character of conversation and not examination. These personal interviews provided considerably richer and 'livelier' material than the telephone interviews and have in major ways formed the cases that have been most extensively analysed in the thesis, cases 1 and 5.

Telephone interviews were typically made after personal interviews had been carried out and often when an outline of case stories was written. Thus, the purpose of telephone interviews was to fill gaps in a story and to investigate various resources and resource ties indicated in the personal interviews. In one case this led to new case stories; cases 3, 4, 6 and 7 may be seen as supplemental to case 5 which is the main case about development studied from the provision side. These four cases all developed as a consequence of case 5, and are all based mainly on telephone interviews.

The first five interviews were personal and the interviewee consented to our documenting these by tape recording and notes. A professional consultant transcribed these interviews afterwards. We used the transcription of the fifth interview extensively when writing the first version of case 1. After this we found transcription to be too cumbersome. Instead we wrote immediately after the interview, when our memory still was fresh, either a new text or, if we had already decided what case the interview regarded, we changed the case text directly. New texts were, after some consideration, either linked to an existing case story or made into a new one.

[169] Interested readers can obtain these guides by contacting us.

Documents

Documents of various types, printed as well as electronic, have been the other major data source (cf. Table 8-2). All in all 55 documents have been used.[170] We found 22 of these on the World Wide Web. The rest we accessed in printed form. Many of the documents were obtained after the first draft of the cases had been written in order to confirm, specify or extend information about specific actors or resources given in the interviews. In some cases we studied documents as preparation for interviews. This was especially the case before the interviews with researchers of the resource. The main purpose of these interviews was to get different 'technology' researchers' assessments of the focal resource and its features. Studying scientific articles and other written information that we found relevant[171] beforehand combined with our professional training in agricultural science made us feel able to take part in a dialogue with the interviewees. This dialogue centred mainly on physical and technological aspects of the resource, including certain technical controversies regarding the resource.

Table 8-2: Overview of documents used as sources of empirical data

	Number of documents	Used for empirical background	Used for cases 1 and 2 (use side)	Used for cases 3 – 7 (provision side)
Web – home pages	14		x	x
Web – articles	8		x	x
Scientific articles and theses	9	x		x
Popular articles in newspapers and journals	6		x	x
Specialized books incl. Encyclopaedia	5	x		x
Research reports	5	x		
Annual reports	3	x		x
Company and branch-histories	4	x	x	
Juridical documents	1	x		

[170] All these documents are referred in the reference list.
[171] Some were written by scientists working at scientific institutions and some were written by academics (e.g. a physician) that were not scientists but connected to firms producing and using the resource.

As indicated in the table certain types of documents were used for the 'use side' cases (1 and 2), while others were partly applied in the making of the 'provision side' cases (3 to 7). E.g. web documents were our only source of information about the US company Laura Chenel. Concerning the 'provision' cases scientific articles, theses and specialized books were important, while we found company and branch histories fruitful in the making of the 'use' cases. Documents were the most critical source of data for writing empirical background; that is the parts of chapters 1 and 3 which are common for the cases. Here we benefited much from using certain research reports about goat farming and use of goat milk.[172] Specialized books (about, or related to, our research object), annual reports and a branch history (about Norwegian agriculture) were also relied upon when writing the empirical background.

That we ended up using so many and rather diverse documents was not planned at the outset of the study. It was the result of theoretical 'moves' made at certain points during the research process. In addition came the role of documents in the preparation of some interviews and the discovery that cases could be made more interesting and 'complete' by combing interview data with data from documents. That we ended up with these 55 *particular* documents, then, was a consequence of systematic searches and use of hypertext on the web, regular reading of certain newspapers and journals, information resulting from interviews and dialogue with certain research colleagues.

Observations

Observation influenced our writing of case 1 and 2 to some degree. To the extent that we observed we did it openly and mainly in connection with personal interviews. In one case of data collection, however, observation was primary. This was in relation to case 1 when for one we day observed, and to some extent participated, when Kari and Ola carried out one ordinary batch of cheese-making at Skånaliseter and during which we conversed with them about e.g. the resource, other products, facilities and suppliers of them. We also stayed in the farm shop and could see facilities and products there. Some days before we observed, assisted by the consultant that we interviewed, the production in the factory of Tine Verdal.

[172] The author of one of them (Kvam 1999) happened to be a colleague of ours and we had many discussions with her regarding the research object.

Both observations were made primarily in order to provide empirical material for illuminating activity patterns, our theoretical interest then. However, the observations were just as valuable for illustrating resources, our final theoretical interest in the thesis. During the observations we came physically close to some concrete technical and social resources that informants and documents could only describe indirectly and symbolically. E.g. we could see the resource divide into two components after having been mixed with a certain product. At the same time we could hear the informant's comments; comments that hardly would have come without physical proximity between the informant and the resource. We could physically follow the handling of the 'almost similar resource' (cow milk) through a large dairy plant, look at its complexity and persons' operation of different facilities and handling of products in it. And we talked to some of these persons there and then.

Together the two observations revealed to us in a very concrete way two highly different uses of *almost* the same physical resource. Moreover, the observations helped to invest concepts like 'efficiency,' 'effectiveness' and 'capability' with some meaning and convinced us that there is sense in treating activities, resources and actors as separate entities in business networks. We believe that at least parts of cases 1 and 2 would have been written differently without the observations.

Assessing trustworthiness of the study

As with any resource, the value of this thesis is a question of relation between it and the network in which it is embedded. The thesis as such is 'settled.' But the assessment of its quality may change in subsequent times because of changing and differing views regarding what constitutes 'good science' (Kuhn 2002). In this last section we – as authors – make a modest attempt to assess the study.

A first question, then, is what should count as good science in our case, in other words what paradigm, research standard or scientific canon (cf. Strauss & Corbin 1990: 249) to use as 'benchmark?' As became clear in chapter 2 and further described in this chapter our paradigm followed from the industrial networks approach.[173] Within this paradigm we have been

[173] In that way we did not make an independent choice of method, and the question of scientific canons could as well be discussed in relation to our basic theoretical model (the ARA-model).

applying the ideal of the qualitative method in combination with the case method. To a large extent the case method arose out of qualitative research (Yin 1994) and thus to a large extent share its ideal. An important common denominator is the 'care' for the unique (as opposed to the general) (Maaløe 1996). Hence, Andersen (1994a: 21) finds that the scientific ideal[174] of the qualitative method[175] rests on the assumption that:

> any phenomenon consists of a unique combination of qualities, and that one therefore cannot count, measure or weigh (Andersen & Gamdrup 1994: 60). (Our translation)

An example of such a phenomenon is dynamic and reciprocal influences between actors and their social frameworks (Andersen & Gamdrup 1994: 60). This is a description that seems valid for our research phenomenon too; a resource in dynamic and reciprocal influence with the framework of a certain business network. Moreover, knowledge in relation to such unique, dynamic and reciprocal phenomena should have the form of holistic, comprehensive descriptions. Such pictures can best be produced from interpretations based on respondents' conceptions of the phenomenon. This demands that the research object is treated as a subject and that two-way communication (between researcher and respondent) is carried out. Moreover, this two-way communication presupposes flexibility in the research design. In every respect this fits with the way we have been collecting data and constructing cases in this thesis.

Lincoln & Guba (1985) have used these and other characteristics to develop an operational scheme for assessing qualitative research in particular.[176] They acknowledge that four basic questions pertain to any research; 'truth value,' applicability, consistency and neutrality (p. 290). Their point is that these four questions have specific meaning in particular paradigms. In our case, carrying out qualitative research, 'truth value' becomes a question of representing multiple constructions of reality (Lincoln & Guba 1985: 296). That is, our empirical material

[174] Moreover, a scientific ideal is one of three elements constituting a scientific paradigm (cf. Kuhn (2002) and the discussion earlier in this chapter). The other two elements are ontology and research ethics (Andersen 1994a).
[175] It is claimed that there exist a few *generally* acknowledged ideals (or canons) in science. These ideals say that scientific claims should be public, inter-subjectively testable, simple, systematic, complete, true and probable (Aschehoug & Gyldendal 1995-98). Beyond these general norms each science has developed its own canons. Partly because they are very general and partly because they are specified within specific sciences we do not find it appropriate to judge our study against these general ideals.
[176] This scheme has been used recently in two other theses building on the industrial networks approach (Holmen 2001, Hulthén 2002).

and interpretations of it must be credible to those that constructed 'realities' in the first place – for example our informants; hence a criteria of *credibility* is in place. Secondly, the applicability of a qualitative study is a question of knowledge of the sending and receiving context, hence a criteria of *transferability* makes sense. Thirdly, while rigour is appropriate in the research process, the researcher must also allow flexibility; adjust to changes in the entity being studied and capitalize on growing insight as the study emerges (Lincoln & Guba 1985: 299). Hence, there is a quest for *dependability* in qualitative research. Lastly, in qualitative research neutrality is a question of characteristics of the data and not the objectivity of the researcher. The question regards *confirmability* of data. If these four criteria are met our qualitative study should be trustworthy (Lincoln & Guba 1985: 290). On the next pages we make an attempt at using these four criteria. We start with dependability, then move to confirmability, before we finish with assessing credibility and transferability.

Dependability during the research process

In the first two sections of this chapter we described how we considered methodological aspects of the study at the beginning and how some of these (e.g. appropriate number of cases) were changed during the process. We also reoriented our approach in the empirical landscape on more than one occasion during the study, e.g. concerning what cases were relevant and boundaries around them. Basically these changes regarding method and data had two sources; interaction with other researchers and co-development of theoretical perspective and empirical data (systematic combining). This changed our view of the entity during our research journey, and we went for empirical data that we had not thought relevant at the beginning of the process. We also think it was a good thing to start early with writing and analysing a case (even if it was small) and discussing it with other researchers. In these ways we lived up to the dependability criteria; we were flexible in relation to how the research process developed.

Another question is whether the research process could have been improved in its dependability. We think it is a good thing that we did not follow every 'whim' along the way; we believe that some steadfastness was fruitful, e.g. to secure credibility (cf. 'prolonged engagement' and 'persistent observation' discussed later). On the other hand, the final product might have been better if we had revised the case material after the process of analysis in

order to sort out material that was less relevant for the analysis, in other words narrowed the boundaries around the case material.

All in all, making the process explicit has stimulated our own awareness concerning dependability and it also gives the reader a chance to audit our research process.

Confirmability of the thesis

Confirmability concerns the research product; more precisely if the different parts of it – data, conceptual frameworks and interpretations hang together. In other words, confirmability has to do with internal coherence (Lincoln & Guba 1985: 318). We think the 'litmus test' here is not whether we have chosen an appropriate theoretical approach for the research problem. Rather, the point is whether the interpretations (in this case analysis and discussion) are based on the data that we have chosen to present *and* apply the specific theory described in the thesis. All we can say here is that when developing chapter 5 (analysis) we put much effort into using the conceptual apparatus of chapter 4 in order to reveal patterns in the empirical material and thereby understanding the focal resource and the use of it better. The use of a theoretical model (rather than no model) in addition to allowing other researchers to comment on the text make readers (at least in principle) able to confirm the findings in the thesis. At least it means that the findings are not merely a matter of the author's subjective opinion, but the result of (some) facts and systematic sense-making of these facts by using concepts that are at least partly independent of the informants' own language.

Again, the question is whether the dependability could have been improved. We might e.g. have reduced the amount of different resources illustrated in the analysis and concentrated on fewer, presumably more interesting interfaces for our resource. The analysis chapter would then definitely have become more readable, but that is probably not a matter of dependability.

Credibility of the study

According to Lincoln & Guba (1985: 296) the credibility of our study depends on two factors. The first is whether we have carried out the inquiry in such a way that the probability that the findings will be found credible is enhanced. Here, the authors describe four different

techniques. The other, and perhaps most obvious factor is letting informants approve our representations of their multiple realities. Let us take the last factor first.

Informants' approval of cases

Both in chapter 1 and chapter 3 we represent different views of one and the same resource. For example, in chapter 1 we represent a producer's, a user's and a researcher's view of goat milk respectively. These three representations build on a personal interview, a telephone interview and a written source respectively. Data from these sources were, together with other data, used to develop the text in chapter 1. The text was then sent to the informants, who made comments that for the most part we incorporated into the final text. Other informants also approved the empirical material in chapter 1.

Informants also approved case stories in chapter 3 and the empirical introduction in this chapter. However, not all the cases were approved. The informants that we regarded as most important verified the case stories for which they had been providing information. Casea 1 and 2 were originally written in Norwegian and were verified by both informants at Skånaliseter and the consultant at Tine Verdal. The former managing director in Namdalsmeieriet later verified an English version of these cases, more specifically the part of them that we then had moved to chapter 1 (part A). Case 5, the other major case in this thesis, was written in English 'directly.' This case, plus the two general, first sections of chapter 3 and part B of chapter 1 were verified by eight informants. These were the project manager of Tine Nord-Norge, the dairy manager of Tine Haukelid, the R&D consultant in Tine at Kalbakken, the R&D consultant in Tine at Voll, the breeding consultant in Norsk Sau- og Geitalslag and the professor, assistant professor and doctoral student at Norges Landbrukshøgskole (cf.

Table 8-1). They all accepted the text in broad outline, but most of them suggested various changes in the text, for the most part regarding facts and quotations. We incorporated nearly all their suggestions in the final text in chapter 1 and 3. However, we did not find it necessary to let the informants approve the other chapters in the thesis.

Enhancing the likelihood of credibility

Lincoln & Guba (1985: 328) suggest four ways to enhance the probability of a credible study. Of these we regard two, 'negative case analysis' and 'referential adequacy,' as less relevant to our thesis. The other two prescriptions, however, have been rather crucial in our case. These are 'peer debriefing' and various 'activities in the field.'

Peer debriefing

Interaction with other researchers has in various ways been crucial in making this thesis. The number of meetings with supervisors and papers presented on conferences (cf. the previous section) demonstrate this. Peer debriefing has helped keep us honest, led us into new theoretical directions and given concrete advice regarding next step in the process when we had run out of ideas ourselves. A case in point was when we had made the first outline of the 'use-side' cases (1 and 2). We were then advised to obtain data about development from the provision side (cf. the previous sections). At that moment in time we were not able to see ourselves how much more appealing the study would be when including this kind of empirical material. On another occasion we had made the first draft of an analysis and received a clear message from one of our colleagues that certain parts in it did not build on data but rather on our hypothesis regarding data. Confirmability was at stake. We removed this and other attempts at 'inventing data' from the analysis. A third major step forward was when we had recommendations on a paper to change theoretical perspective from activities to resources. There are actually no parts in the thesis that are not in one way or another influenced by the 'friction' of peer debriefing.

Activities in the field

Lincoln & Guba (1985: 301) identify three types of field activities for enhancing the probability of a credible study.

Prolonged engagement has in our case been one of the main ways of reaching credibility. It has given us the chance to become familiar both with the focal resource and the context, the business network, surrounding it. We 'met' our first case in 1996, read and wrote about it in 1998, made interviews in the period August 1999 to June 2002 in addition to studying some documents (cf. the previous section).[177] Hence we were engaged for quite a time with this case. Regarding the other cases our engagement was not so long; from December 2000 to September 2002 (when we revised the cases on the basis of the informants' comments).

However, the data collection and processing (into cases) took place in shorter and more concentrated periods of time; the winter of 2000 and the winter of 2001. Of course, time was not sufficient in itself. Combination of engagement and time made the difference, and we think it was fruitful to concentrate the development of the empirical parts of the thesis in time. Then, data processing could follow immediately after data collection when empirical pictures still were fresh in mind. Furthermore, engagement has to do with going into the unknown. In many ways we experienced the research process as a criminal investigation where we started out with a 'victim' (the poorly used resource) and then little by little were able to fit the pieces into the puzzle (the resource constellation within the 'milk network'). In this way, by steadily building up the object with more detail, we have probably been able to come closer to some 'truth' about the object (cf. Diesing 1971, cited in Maaløe 1996: 17). But we do not underestimate the importance of the periods where we did not work with data but with theory; when we then returned to the data we were often able to see them in a new perspective or to reduce the number of significant 'pieces.' This was also a way of avoiding 'going native' (Lincoln & Guba 1985: 304).

Another field activity contributing to credibility was *triangulation*. This is use of e.g. multiple sources of data, different researchers, and/or methods in relation to the same fact or phenomenon (Yin 1994: 92). Especially if one is able to allow this variety in data, methods etc. produce a converging line of inquiry, the credibility of a study can be enhanced. In our case the phenomenon to be described and understood was use and changed use of a certain resource. As shown in the previous section we have used both multiple sources of data and methods to obtain information about this phenomenon. In Skånaliseter we obtained interview

[177] This resulted in part A in chapter 1 and case 1 and 2 (chapter 3).

data and observational data, but we also relied on documents that we located on the World Wide Web. In the same way the case story of Frozen Curd was constructed by combining personal interviews, telephone interviews and different types of documents. Moreover, different and partly independent persons in the network provided this information. We think that this variety in data etc. to a great extent has contributed to the credibility of the empirical parts of this study.

Regarding the third type of field activity, *persistent observation*, we are somewhat unsure regarding our thesis. Via prolonged engagement we obviously got an idea about the breadth surrounding our phenomenon. The purpose of persistent observation is somewhat the opposite; to dig deep into (some few) characteristics or elements that seem most relevant to the phenomenon (Lincoln & Guba 1985: 305). For quite a time we worked to reveal the resource aspect of the problem and how our resource developed. Thus, to the extent that we have been digging deep into something related to our problem, it must be resource development. On the other hand, we chose a network perspective, which meant concentrating on the context – the breadth – surrounding the phenomenon. We may have felt too loyal towards this breadth perspective in the sense that we did not dare to narrow the number of elements to be analysed in relation to the resource. Thus, the analysis might have become less massive and more focussed and 'accessible' if we had been more aware of 'the thing called' persistent observation before we started the process of analysis.

Is the study transferable?

Transferability refers to the possibilities of applying a case study in another context. This requires first of all effort from the person seeking to make an application elsewhere (Lincoln & Guba 1985: 298). The responsibility on our (the author's) side is to provide sufficient descriptive data (thick descriptions) to make it possible for a user to assess similarities and differences in context. In our opinion we have provided a rather thick description of the context surrounding our study object. Moreover, we have also described how this context changes. Cases 1 and 5 became thicker than the other cases because they could draw upon many personal interviews and observation of the physical world. Our experience is thus that 'proximate' methods provide thicker and richer cases than 'distant' methods like telephone interviews and documents. Hence, the other cases are in themselves 'thinner' and could hardly

provide much theoretical generalization alone. Added to the other two (main) cases, however, they may enhance the thickness and thus the transferability of the case material as a whole.

Nevertheless, we think there is another aspect which is even more important for transferability (and which seems to be forgotten by Lincoln & Guba (1985)), and that is theory. Yin (1994) emphasizes that case studies can be transferred on an analytical (in contrast to empirical) level. [178] Analytical here means the same as theoretical. In other words, much of the point of developing a theoretical framework and interpreting the empirical material in light of it in this thesis has been to make transfer possible. For example, to compare two contexts requires a common language, and that common language can only be created by more or less conscious efforts at developing concepts, using them and combining them into a meaningful conceptual framework. The ARA-model and the 4R-model are examples of such conceptual frameworks. In this thesis we have applied them to one part of the business world in the hope that others – researchers or practitioners – can learn and eventually apply the study to the same or other parts of the business world.

[178] Yin (1994) refers to this as analytical generalization.

References

Literature

Alderson, W. (1965): *Dynamic Marketing Behaviour. A Functionalist Theory of Marketing.* Richard D. Irwing, Inc. Homewood, Illinois.

Andersen, H. (1994a): Hvad er videnskabsteori og metodelære? (In Danish). In: Andersen, H. (ed.): *Videnskabsteori & metodelære.* Samfundslitteratur. Fredriksberg C.

Andersen, H. (1994b): Fortolkningsviden (In Danish). In: Andersen, H. (ed.): *Videnskabsteori & metodelære.* Samfundslitteratur. Fredriksberg C.

Andersen, V. & Gamdrup P. (1994): Forskningsmetoder (In Danish). In: Andersen, H. (ed.): *Videnskabsteori & metodelære.* Samfundslitteratur. Fredriksberg C.

Araujo, L. & Easton, G. (1996): Networks in Socioeconomic Systems: A Critical Review. In: Iacobucci, D. (ed.): *Networks in Marketing*. Sage.

Argyris, C. & Schön, D.A. (1996): *Organizational Learning II. Theory, method, and Practice*. Addison-Wesley Publishing Company.

Asbjørnsen, P.C & Mo, J. (1982): *Samlede eventyr* (In Norwegian). Den Norske Bokklubben. Oslo/Gjøvik.

Aschehoug & Gyldendal (1995-1998): *Store Norske Leksikon. 3. Utgave.* Kunnskapsforlaget, Oslo.

Aune, A. (1996): *Kvalitetsstyrte bedrifter* (In Norwegian). Ad Notam Gyldendal, Oslo.

Berger, P. & Luckmann, T. [1966] (1967): *The Social Construction of Reality*. Penguin Books, London.

Brown, J.S. & Duguid, P. (1991): Organizational learning and communities-of-practice: toward a unified view of working, learning, and innovation. *Organization Science*. Vol. 2, No. 1.

Brox, O. (1991): *Praktisk samfunnsvitenskap* (In Norwegian). Universitetsforlaget, Oslo.

Chandler, A.D. jr. (1990): *Scale and Scope. The Dynamics of Industrial Capitalism*. The Belknap Press of Harvard University Press. Cambridge Mass./London.

Collins *Dictionary of Sociology*. Second Edition (1995). HarperCollinsPublishers.

Cook, K.S. & Emerson, R. M. (1978): Power, equity, and commitment in exchange networks. *American Sociological Review*, Vol. 43 (October): 721-739.

Cyert, R.M. & March, J.G. (1963): *A Behavioral Theory of the Firm*. Prentice-Hall. Englewood Cliffs, N.J.

Diesing, P. (1971): *Patterns of Discovery in the Social Sciences*. Adine, Illinois.

Dubois, A. & Gadde, L.-E. (2002): Systematic combining: an abductive approach to case research. *Journal of Business Research* 55: 553-560.

Dubois, A. (1994): *Organising Industrial Activities - An Analytical Framework*. Doctoral Thesis. Department of Industrial Marketing, Chalmers University of Technology. Göteborg.

Dubois, A. (1998): *Organising Industrial Activities across Firm Boundaries*. Routledge. London, New York.

Emerson, R.M. (1981): Social Exchange Theory. In: Rosenberg, M. & Turner, R.H. (eds): *Social Psychology: Sociological Perspectives*. Basic Books, New York.

Forbord, M. (1998): *Småforetak i matvaresektoren i lys av industriell nettverksteori: vurderinger av teori og metode* (In Norwegian). Unpublished essay. Senter for bygdeforskning, Trondheim.

Forbord, M. (1999): *Integrasjon, oppløsning og ny integrasjon: Omstrukturering av et bedriftsnettverk for å bevare verdien av en rural ressurs* (In Norwegian). Unpublished PM. Senter for bygdeforskning, Trondheim.

Føllesdal, D., Walløe, L. og Elster, J. (1990): *Argumentasjonsteori, språk og vitenskapsfilosofi* (In Norwegian). Universitetsforlaget, Oslo.

Gadde, L.-E. & Håkansson, H. (2001): *Supply Network Strategies*. John Wiley & Sons, Ltd.

Giddens, A. (1993): *Sociology. Second Edition*. Polity Press. Cambridge, UK.

Goffman, E. (1974): *Frame Analysis. An Essay on the Organization of Experience*. Northeastern University Press. Boston.

Granovetter, M.S. (1973): The Strength of Weak Ties. *American Journal of Sociology*. Vol. 78, No.6.

Granovetter, M.S. (1985): Economic Action and Social Structure: The Problem of Embeddedness. *American Journal of Sociology*, 91, 3, pp. 481-510.

Granovetter, M.S. (1992): Problems of Explanation in Economic Sociology. In: Nohria, N. & Eccles, R.G: *Networks and Organizations. Structure, Form, and Action.* Harvard Business School Press. Boston, Massachusetts.

Gressetvold, E. (2003): *Developing Relationships within Industrial Networks – effects of Product Development.* Doctoral thesis, draft. Department of Industrial Economics and Technology Management, Norwegian University of Science and Technology, Trondheim.

Halinen, A. & Salmi, A. (2001): *Managing the informal side of business interaction: Personal contacts in the critical phases of business relationships*. Paper to the 17th Annual IMP Conference, Oslo, Sept. 9-11.

Hammersley, M. & Atkinson, P. (1995): *Ethnography. Principles in practice.* 2. edition. Routledge.

Hayek, F.A. (1937): *Economics and Knowledge*. Economica IV (new ser.) 33-54.

Hayek, F.A. (1949): The use of knowledge in society. In: *Individualism and economic order*. Routledge. London & Kegan Paul (originally published in American Economic Review 35 (4) (1945): 519-30).

Hewett, Baecker, Card, Carey, Gasen, Mantei, Perlman, Strong & Verplank (2001*): ACM SIGCHI Curricula for Human-Computer Interaction*. ACM SIGCHI. [http://sigchi.org/cdg/cdg2.html]

Holmen, E. (2000): *Central Resource-related Concepts within the Industrial Network Approach.* Draft of chapter in doctoral thesis. Unpublished.

Holmen, E. (2001): Methodological issues. Appendix in: *Notes on a Conceptualisation of Resource-Related Embeddedness of Interorganisational Product Development.* Doctoral thesis, University of Southern Denmark. Unpublished.

Hulthén, K. (2002): *Variety in Distribution Networks: A Transvection Analysis.* Department of Industrial Marketing, Chalmers University of Technology, Göteborg.

Håkansson, H. & Ford, D. (2002): How should companies interact in business networks? *Journal of Business Research* 55: 133 – 139.

Håkansson, H. & Snehota, I. (2000): The IMP Perspective. Assets and Liabilities of Business Relationships. In: Sheth, J.N. & Parvatiar, A. (eds): *Handbook of Relationship Marketing.* Sage.

Håkansson, H. & Snehota, I. (eds) (1995): *Developing Relationships in Business Networks.* International Thomson Business Press. London et al.

Håkansson, H. & Waluszewski, A. (1999): *Path-dependence: restricting or facilitating technical development?* Paper to the 15th IMP Conference, Dublin 2nd – 4th September 1999.

Håkansson, H. & Waluszewski, A. (2000): *Managing Development in Interaction or How White Paper was made Green*. Forthcoming.

Håkansson, H. & Waluszewski, A. (2001): *Co-evolution in technological development. The role of friction.* Paper to the 17th IMP Conference, Oslo 9th – 11th September 2001.

Håkansson, H. (1989): *Corporate Technological Behaviour. Co-operation and Networks*. Routledge. London and New York.

Håkansson, H. (ed.) (1982): *International Marketing and Purchasing of Industrial Goods*. An Interaction Approach. John Wiley & Sons.

Håkansson, H., Havila, V. & Pedersen, A.-C. (1999): Learning in Networks. *Industrial Marketing Management* 28, 443-452.

Itami, H. (1991): *Mobilizing Invisible Assets*. Harvard University Press, Cambridge, Mass.

Johanson, J. & Mattsson, L.-G. (1987): Interorganisational relations in Industrial Systems. A Network Approach Compared with the transaction-Cost Approach. *International Studies of Management & Organisation*, 17, No. 1, pp. 34-48

Kirzner, I.M. (1992): *The Meaning of Market Process. Essays in the development of Modern Austrian Economics*. Routledge. London & New York.

Kotler, P., Bowen, J. & Makens, J. (1999): *Marketing for Hospitality and Tourism*. Prentice Hall International, Inc.

Kuhn, T.S. (2002): *Vitenskapelige revolusjoners struktur* [The structure of scientific revolutions 1962/1970]. Spartacus Forlag, Oslo.

Kvale, S. (1997): *Det kvalitative forskningsintervju* (In Norwegian). ad Notam Gyldendal.

Latour, B. (1987): *Science in Action. How to follow scientists and engineers through society*. Harvard University Press. Cambridge, Massachusetts.

Lincoln, Y.S. & Guba, E.G. (1985): *Naturalistic Inquiry*. Sage.

Loasby, B.J. (1998): The organisation of capabilities. *Journal of Economic Behaviour & Organization.* Vol. 35: 139-160.

Lundgren, A. (1995): *Technological innovation and network evolution*. Routledge. London and New York.

March, J.G. (1991): Exploration and Exploitation in Organizational Learning. *Organizational Science*. Vol. 2, No. 1, February, pp. 71-87.

Molm, L.D. & Cook, K.S. (1995): Social Exchange and Exchange Networks. In: Cook, K.S., Fine, G.A. & House, J.S. (eds): *Sociological Perspectives on Social Psychology*. Allyn and Bacon.

Morgan, G. (1997): *Images of organization*. Sage.

Maaløe, E. (1996): *Case-studier – af og om mennesker i organisationer* (In Danish). Akademisk Forlag.

Nelson, R.R & Winter, S.G. (1982): *An Evolutionary Theory of Economic Change*. Belknap Press of Harvard University Press.

Nonaka, I. & Takeuchi, H. (1995): *The Knowledge-Creating Company*. Oxford University Press, New York/Oxford.

Oxford (1974): *Advanced learner's dictionary of current English*. Third edition.

Page, A.L. & Rosenbaum, H.F. (1988): Redesigning Product Lines with Conjoint Analysis: How Sunbeam Does It. In: Tushman, M.L. & Moore, W.L. (eds): *Readings in the management of innovation.* Harper Business.

Pedersen, A.-C. (1996): *Utvikling av leverandørrelasjoner i industrielle nettverk – en studie av koblinger mellom relasjoner* (In Norwegian). Doctoral thesis. Norwegian University of Science and Technology, Trondheim.

Penguin (1992): *Dictionary of English Synonyms and Antonyms*. Revised edition.

Penrose, E. [1959] (1995): *The Theory of the Growth of the Firm. 3. Edition.* Oxford University Press.

Persson, G. & Virum, H. (red.) (1989): *Materialadministrasjon for konkurransekraft* (In Norwegian). Ad Notam forlag AS, Oslo.

Piore, M. J. (1992): Fragments of a Cognitive Theory of technological Change and Organizational Structure. In: Nohria, N. & Eccles, R.G: *Networks and Organizations. Structure, Form, and Action.* Harvard Business School Press. Boston, Massachusetts.

Porter, M.E. (1985): *Competitive Advantage*. Free Press/MacMillan. New York.

Quinn, J.B. (1988): Innovation and Corporate Strategy: Managed Chaos. In: Tushman, M.L. & Moore, W.L. (eds): *Readings in the management of innovation.* Harper Business.

Richardson, G.B. (1972): The Organisation of Industry. *The Economic Journal*, Vol. 82. September: 883-96.

Simmel, G. (1950): Sociability – An Example of Pure, or Formal, Sociology. In: Wolff, K.H. (ed.): *The Sociology of Georg Simmel*. The Free Press, New York.

Smith, P.C. & Laage-Hellman J. (1992): Small group analysis in industrial networks. In: Axelsson & Easton (eds): *Industrial Networks – A New View of Reality*. Routledge.

Stensaasen & Sletta (1983): *Gruppeprosesser. Læring og samarbeid i grupper* (In Norwegian). Universitetsforlaget, Oslo.

Stern, L.W. (1996): Relationships, Networks, and the Three Cs. In: Iacobucci, D.: *Networks in Marketing.* Sage.

Strauss, A. & Corbin, J. (1990): *Basics of Qualitative Research. Grounded Theory Procedures and Techniques.* Sage.

Thomson, K.M. (1998): *Emotional capital: maximising the intangible assets at the heart of brand and business success*. Capstone, Oxford.

Torvatn, T. (1996): *Productivity in Industrial Networks – A case study of the Purchasing Function.* Doctoral Thesis. Norwegian University of Science and Technology, Trondheim.

Utterback, J. M. (1994): *Mastering the dynamics of innovation: how companies can seize opportunities in the face of technological change.* Harvard Business School Press. Boston, Mass.

Van de Ven, A. H. (1988): Central Problems in the Management of Innovation. In: Tushman, M.L. & Moore, W.L. (eds): *Readings in the management of innovation.* Harper Business.

Waluszewski, A. & Håkansson, H. (2001): *To investigate interaction between companies concerning use of heterogeneous resources – a methodological dogma*. Paper to 11th Nordic Workshop on Interorganisational research. August 2001, Chalmers University of Technology, Gothenburg.

Waluszewski, A. (1990): *Framväxten av en ny mekanisk massateknik – en utvecklingshistoria* (In Swedish). Doctoral Thesis. University of Uppsala.

Waters, M. (1994): *Modern Sociological Theory*. Sage.

Webster's *Encyclopedic Unabridged Dictionary of the English Language* (1989). Random House.

Wedin, T. (2001): *Networks and Demand. The Use of Electricity in an Industrial Process*. Doctoral Thesis. Department of Business Studies, Uppsala University.

Weick, K.E. (1979): *The Social Psychology of Organizing*. McGraw-Hill.

Yin, R. K. (1994): *Case Study Research*. Second Edition. Sage.

Østerberg, D. (1986): *Fortolkende sosiologi* (In Norwegian). Universitetsforlaget, Oslo.

Written sources of empirical data

Alme, E. (1999): Rapport om geithold, geitprodukter, og omsetning i Frankrike (In Norwegian). Vedlegg 2 in: Kvam, G.-T.: *Muligheter for geithold i Norge.* Rapport 15/99. Senter for bygdeforskning, Trondheim.

Bondebladet 16. August 2001.

Bondebladet 5. Juli 2001.

Bondebladet 7. September 2000.

Bondebladet Julenummer 1999.

Eeg-Larsen, N. (1976): *Ernæringslære* (In Norwegian). 4. Opplag. Landsforeningen for kosthold og helse, Oslo.

Eknæs, M. & Hove, K. (2002): Endringer i geitas fettreserver gjennom laktasjonen sett i forhold til sensorisk kvalitet på mjølka (In Norwegian). *Husdyrforsøksmøtet* 2002, Norwegian Agricultural University.

Eknæs, M., Eik, L.O., Skeie, S. & Havrevoll, Ø. (1998): Fôring og mjølkekvalitet hos geit (In Norwegian). *Meieriposten* Nr. 9.

Erland, S. (1996): *Meieribruket i Namdalen* (In Norwegian). Tine Midt-Norge, Namsos.

Fankhauser, D.B. (2000): *Feta Cheese*. [http://biology.clc.uc.edu/Fankhauser/Cheese/Feta.htm]

FAO (1999): *Codex general standard for the use of dairy terms*. Codex stan 206-1999.

Farm World [http://www.farmworld.com/trade/aa004961.html].

Felleskjøpet Øst Vest (2001): *Spesialfôr til melkegeit* (In Norwegian). [http://www2.felleskjopet.no/Fink/FKOV/index.cfm]

Firma Albert Collett etablert 1871 [http://www.collett.no].

Gardsosten nr. 1 1998.

Gardsosten nr. 1 1999.

Gjerdåker, B. (1995): *Norges Bondelag 1896-1996. Bind 2: Bygdesamfunn i omvelting 1945-1996* (In Norwegian). Landbruksforlaget, Oslo.

Grøtte, C.B. (2001): *Laktoferrin i norsk geitemelk* (In Norwegian). Post graduate thesis. Department of Food Science, Norwegian Agricultural University.

Haenlein, G.F.W. & Ace, D.L. (eds) (1984): *Extension Goat Handbook*. United States Department of Agriculture, Washington, D.C.

Haenlein, G.F.W. & Caccese, R. (1984): Goat milk versus cow milk. In: Haenlein, G.F.W. & Ace, D.L. (eds): *Extension Goat Handbook*. United States Department of Agriculture, Washington, D.C.

Handlingsplan for geitmelk [http://www.nsg.no/saugeit/2000_4/handlingsplan-geit.htm].

Home Soap Works, Millington, New Jersey [http://www.cidigital.net/homesoapworks]

http://www.alfalaval.com

http://www.apv.com

http://www.exportant.nl/gmv/expcat98/rademakers/catrademaker.html

http://www.landteknikk.no

Kielland, R.M. (1976): *Takk for melken. Om utvikling og bruk av meieriprodukter* (In Norwegian). Landbruksforlaget, Oslo.

Kvam, G.-T. (1999): *Muligheter for geithold i Norge* (In Norwegian). Rapport 15/99. Senter for bygdeforskning, Trondheim.

Landbruksdepartementet (1996) [http://kimen.dep.no/ld/publ/lkontakt/96-6/Piff.htm].

Landbrukstidende nr. 4, 2001.

Maree, H. P. (1978): Goat Milk and Its Use as a Hypo-Allergenic Infant Food. *Dairy Goat Journal*, May 1978.

Masui, K. & Yamada, T. (2000): *French Cheeses*. Dorling Kindersley, London.

Nordbø, R. (2001): *Geitmjølk – genetiske variantar av α_{s1}-kasein og effektar på eigenskapar i mjølka* (In Norwegian). Post graduate thesis. Department of Food Science, Norwegian Agricultural University.

Norsk Gardsmat [http://www.norskgardsmat.org].

Norsk Sau- og Geitalslag [http://www.nsg.no].

Nærkontakt 2 – 2001. *Vil fjerne jern fra brunost* (In Norwegian). Statens næringsmiddeltilsyn, Oslo.

Omsetningsrådet (1999): *Årsmelding 1999* (In Norwegian).

Pettersen, R. (1984*): A/L Innherredsmeieriet 1973-1983* (In Norwegian). Innherredsmeieriet, Verdal.

Rovde, O. (1995): *Norges Bondelag 1896-1996. Bind 1: I kamp for jamstelling 1896-1945* (In Norwegian). Landbruksforlaget, Oslo.

Skeie, S. (1998): *Geitemjølk som råstoff* (In Norwegian). Meieriposten Nr. 10 and 11.

Stryjan, Y. & Fröman, E. (1991): *Jämtspira – en studie i innovation* (In Swedish). Rapport 43. Swedish University of Agricultural Sciences, Department of Economics.

Stræte, E.P. (2001): *Produktmangfold i verdikjeden for melk* (In Norwegian). Rapport 5/01. Norsk Senter for Bygdeforskning, Trondheim.

Stræte, E.P., Stavrum, T., Kvam, G.-T. & Almås, R. (2000): *Omstilling i meierisamvirket* (In Norwegian). Rapport 12/00. Senter for Bygdeforskning, Trondheim.

Sørensen, F. (1980): *Trøndelag Melksentral gjennom 50 år* (In Norwegian). Trøndelag Melksentral, Trondheim.

The Cheese Shop of Ridgewood (1998): A new look at goat cheese. *Cheese shop news.* [http://www.cheeseandmore.com/events/1998sept/page3.htm]. New Jersey.

The Lactobacillus Bar on The Web [http://countrylife.net/yoghurt/postings/2383.html]

Tine [http://www.tine.no/kunder/tine/TineStruktur.nsf].

Tine 6.11.2000: Gull til TINE i Tyskland. [http://www.tine.no/kunder/tine/tinepublish.nsf].

Tine Meieriet Sør BA [http://tms.tine.no/drift/haukelid.htm]

Tine *Årsmelding* (Annual Report) 1998.

Tine *Årsmelding* (Annual Report) 2000 [http://www.tine.no].

Tine's nyhetsarkiv 22.06.2000 [http://www.tine.no]

Vegarud, G.E., Devold, T.G., Opheim, R., Loeding, E., Svenning, C., Abrahamsen, R.K., Lien, S. & Langsrud, T. (1999): Genetic variants of Norwegian goats milk

composition, micellar size and renneting properties. *International Dairy Journal* **9**: 367-368.

Werlin, L. (n.d.): *The New American Cheese*. American Cheese Society, Wisconsin.

Zandbergen Farms Ltd. (1996): *Questions & Answers We're Often Asked ...* [http://www.family-farms.on.ca/zand_q&a.html]. Ontario.