

# Logical Adaptation to Modern Technology - Snowmobile Revolution in Sápmi

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## Introduction

New technology is increasingly visible in indigenous societies since technologization of everyday life is one of the most central features of the modern society. Technology refers in this context mainly to technological objects (snowmobiles), values (cultural and ethical), and the field of activities and skills (for instance, know-how about technological devices and their use under different circumstances). Other aspects, such as masculinisation of technology, science and technological progress, and economic and ecological consequences, are left out here.

Reindeer herding is regarded by many as a core element in the maintenance of the Sami culture. During the latest decades, reindeer herding has gone through enormous changes. The commercialization and the technologization of herding as an occupation and social organization is one of the main themes when discussing change in the Sami herding society (Helander 1993; Nilsen & Mosli 1994).

This paper examines adaptation and change as related to technology in reindeer herding.<sup>1</sup> I will make use of the actor-network approach (see below), and map actors and connections of herders' network in order to get a better understanding of adaptation strategies and things that influence them. In other words, my aim is to follow "how a given element becomes strategic through the number of connections it commands" (cf. Latour 1998, p. 4). My approach is open-ended and will integrate several levels and dimensions.

In tradition, the Sami people have had a very close relationship with their lands. Embedded in this relationship is knowledge on the environment of the Sami people. Ingold (1993; 2000) argues that humans and their environment influence each other. Traditional ecological

knowledge (TEK) refers to the human-environment interactions of Sami and other indigenous people herding (see below, sect. 4). The reindeer herders can use TEK to understand and influence their environment. In this paper, traditional ecological knowledge is taken into consideration when analyzing the introduction of the snowmobile to reindeer herding.

Adapting to snowmobile technology within the reindeer herding society took place in North Finland in early 1960's. Kaldoaivi reindeer district in north-eastern part of Utsjoki municipality was the first reindeer area in Finnish Lapland to acquire and experiment with snowmobiles in herding. The technical change of herding was rapidly welcomed by the local herdsman and was also lodged easily in the lives of herders in other herding areas.<sup>2</sup> Today, the snowmobile as a technological entity is an actant<sup>3</sup> in the Sami cultural space.

Perti J. Pelto (1973) has studied the adoption of snowmobile among the reindeer herders in Sevetijärvi, north-eastern part of Finland. Pelto uses in his study John Bennett's (1969, p. 13) definition of adaptation. Pelto (1973, p. 11) writes about adaptive behavior of different individuals as related to a new technical object and economic situation. Adaptive behavior is usually defined in terms of goal satisfaction (Bennett 1969), as related for instance to securing of livelihoods (Berkes & Jolly 2001, p. 2). Modern technology surely fulfils some particular purposes: reindeer herders need a certain amount of technical artifacts to carry on their business. As an occupation, reindeer herding is expected to bring sufficient subsistence and survival possibilities for Sami households. Snowmobiles and other technical inventories make it possible to run herding smoothly and effectively.

The main effects of the early technological revolution are, according to Pelto, "de-localisation" and "techno-

economic differentiation". Pelto (1973, p. 166-168) uses the term "de-localisation" to describe some processes of modernization that lead to the dependency on different outside factors, such as commercially distributed sources of energy. Technology is not free. Thus, snowmobiles presuppose operation with budgets, and the maintenance of snowmobiles also costs money. Some herders live very scarcely. They do not have enough cash or reindeer to buy new technology and maintain it. Scarce resources are used for the operation of basic human needs and wants.

Some herders are doing economically well and manage to buy and support different technical devices. Thus, they are able to take part in all activities that are necessary in order to maintain and increase the size of a herd (Pelto & Müller-Wille 1972/73, p. 135). This means that poor herders can easily fall out of the system, because they do not have money to consume and support mechanisation of modern herding. The techno-economic differentiation leads to social stratification of a formerly egalitarian community (Pelto 1973, p. 168-178). In this way, it can be argued that technology shapes society. Some researchers also see the introduction of the new technology to the Sami reindeer society as a new mode through which the Sami herders may become oppressed by outside forces (Bergland 2005, p. 119-121).

## Actor-Network Theory

Technological determinism positions people in a passive relationship to technology (Mackay 1995, p. 239). It presents technology as neutral and inevitable and perpetuates the idea that it is something beyond culture and society (ibid.). Technological determinism gives mono-causal explanations to change. The deterministic approaches "underestimate the importance of the interaction between technology and organisation and the process that mutually shapes the two" (Cordella & Shaikh 2006, p. 7). The actor-network approach can be regarded as oppositional to scientific determinism.

The goal of the actor-network theory (ANT), as developed by Bruno Latour, Mines Michel Callon and John Law, is to examine social, technological and organizational phenomena and processes. It pays a special attention to the analysis of socio-technical networks of aligned interests (Law 1999). Actors of networks are both natural and cultural. Actors and actants have each their own autonomous properties (Latour 1993, p. 6 and 64), but at the same time they possess cultural meaning and qualities established by human actors. Actors are entities that do particular things, but they cannot do anything without a network. "Actant" is a more abstract term than "actor". An actant is an independent entity

with actantability (probability to act). Actant can under specific circumstances become an actor (Law & Hasard 1999). Actors use an approach called "translation" to negotiate their will when creating, changing, maintaining or putting an end to a network. In other words, the alignment of a network occurs through translation (Law 1992).

ANT analyzes relationships and interactions seeking meaning in context and in doing so it denies the separability of the social and technological. ANT assumes that the construction of reality is achieved through the interplay of different actors with equal constitutive character (Law 1999; Cordella & Shaikh 2006). "Technology and people do not have *a priori* different and defined effects on their relational interplay" Cordella & Shaikh 2006, p. 10). Furthermore, social networks (human relations to each other) have "no privilege nor prominence" (Latour 1998). Thus, one should be aware of that ANT does not distinguish between human and non-human actors. Different actors or actants (objects, human and non-human actors and ideas) have the same ability to influence a network (Actor-Network-Theory 2006). Accordingly, technology has the status of actor.

As already indicated above, both human and non-human actors are treated as equal partners in the network of culture. Thus, actor-network theory deals with "persons, things, artifacts, and events all in the same breath" (Strathern 1999, p. 156). These entities or actors "take their form and acquire their attributes as a result of their relations with other entities" (Law 1999, p. 3). For instance, the snowmobile has become a symbol of wealth and a necessary tool as related to the reindeer herding society.

ANT as a research approach uses a variety of perspectives. Actor-network is open-ended. When looking at the changes and effects, ANT analyzes different factors influencing a network or operating within it. ANT may help to identify all people, things, technologies, connections, interaction sequences and power relations that simultaneously have a causative effect on someone or something, and influence a situation, a relationship, a process or what people do. For instance, what a reindeer herder does in a concrete working situation or as related to a meat production network, is a result of his or her connections to other acting entities within a specific network.

## The Adoption of Snowmobiles in Kaldoaivi Reindeer District

Kaldoaivi reindeer district (fi. paliskunta) was the first area or reindeer society in northern Finland to adopt

snowmobiles. The first snowmobile to reach Finland came from Canada. It was Bombardier Ski-Doo. It was bought in late 1961 by a Finnish schoolteacher living in the north. He used his vehicle mainly for fishing tours, and for transportation of wood and other goods. Other popular manufacturers were Polaris, Ockelbo and Motoski. The new mechanical vehicle of the above-mentioned schoolteacher awakened an immediate interest in some herders of Kaldoaivi (Read more, Pelto 1973, p. 67-75).

Kaldoaivi reindeer district bought in 1962 two snowmobiles, one for Heikki Länsman and one for Hilmar Holmberg to use and experiment in herding. At the same time Niiles Länsman and a couple of other local herders acquired snowmobiles. To start with, snowmobiles were used for different experiments in herding operations. While driving and gathering reindeer, the skis were combined with the use of modern technical vehicles, but soon enough the skis were abandoned as a means of herding tools (Helander-Renvall 2005-06).

After some experiments, the snowmobile was given a specific meaning by herders. The herders of Kaldoaivi realized that the snowmobile as a technical vehicle had multiple functions and it could perform many various tasks of importance for the herding society (Helander-Renvall 2005-06). They learnt to know various technical solutions of snowmobiles that make it possible to use them under harsh circumstances (*ibid.*). As a consequence, the snowmobile was given a status as an actor (actant) in the herding society.

The “scientific” analysis was made by the actors themselves. More precisely, the snowmobiles received locally and also in a wider region their characteristic attributes and shared meaning as a consequence of inter-district experimentation and as a result of discursive sharing of experiences between herders of different districts. Muddusjärvi district, which is immediately neighboring to Kaldoaivi area, was the first district to study the use of modern vehicles in Kaldoaivi’s herding operations. In early 1963, when herders from Muddusjärvi had difficulties in gathering reindeer, they hired herders and snowmobiles from Kaldoaivi to help them to bring reindeer to a corral (see Pelto 1973). The use of the snowmobile was regarded by Muddusjärvi people as so successful that they decided to buy these vehicles for themselves. By 1963/64 there were already 60 snowmobiles in northern districts and a couple of years later 335 snowmobiles. The snowmobile revolution was a fact (Pelto & Müller-Wille 1972/73).

In Kaldoaivi, the wealthy and influential herders were the first ones to introduce snowmobiles in herding. The

wealthy herders bought also cars, outboard motors and other kinds of modern equipment (Pelto 1973, p. 199). Those herders who had modern equipment tended to, and still do, control and monopolize reindeer herding in Kaldoaivi. These strong “actors” had the means to adopt new technology and the means to force other actors to do the same.

Actually there was enormous social pressure towards the acquisition of motorized vehicles. In accordance with ANT thinking, the non-operating herders were forced to change their attitudes with regard to the snowmobile. Actually, it became more and more difficult to use skis in herding operations for those who resisted modern technology. At the same time, some herders fell out of the system because they did not have the economic means and overall skills to support modern technology.

One has to be aware of that the real life-situations reveal the role of technology for various groups of an actor-network. It seems that the young herders were the willing proponents of the modern vehicles. The introduction of the snowmobile gave them new opportunities to become successful as reindeer herders. When it comes to the network dynamics, it can be stated that the young herders were eager to support the “translation” and modify their own behavior to meet the demands of modernization. They also were ready to take financial and other risks connected to the acquisition of snowmobiles (Pelto 1973, p. 140).

The traditional ecological knowledge was used when operating snowmobiles. On the other hand, some of the young men did not have proper traditional skills in all areas of importance (for instance, regarding snow and weather conditions, reindeer behavior, and various landscape features). Instead, they paid much attention to the technical capacities of the snowmobile. At the same time, the snowmobile took them to places and activities that provided them with good possibilities to learn traditional knowledge. Research made among the Sami in Northern Norway shows that young Sami boys are socialized outdoors in nature (see, Helander-Renvall 2007). Furthermore, many young herders are satisfied with the technological knowledge, that originates outside the traditional Sami learning contexts (Bergland 2005).

The attributes of the snowmobile have had unexpected effects. It has become clear that there are risks connected to the use of snowmobiles that were difficult to calculate when the snowmobile was introduced in 1960s. One of the risks is the health hazard. Reindeer herding is a physically demanding activity, and at least

in Sweden, it is one of the most hazardous occupations (Hassler et. al. 2004). Accidents among the male herders "caused" by the snowmobiles take place during herding activities, such as gathering, separation and slaughtering (ibid.). Snowmobiles are heavy machines and quite hard to operate. This unwanted attribute came out into view after the snowmobile was included in the actor-network of the herding society.

There are other threatening things that have emerged after the snowmobile was introduced to the Sami communities. An example is the need to have bigger herds in order to be able to acquire and maintain technical vehicles. Furthermore, the mechanization has resulted in higher slaughter rate (Pelto 1973) "gradually depleting the resources of some herders" (Müller Wille et. al. 2006, p. 373). The poor herders are forced to leave the occupation. Big herds create more pressure on the grazing lands which easily leads to ecological threats and to severe conflicts inside the Sami herding districts. Consequently, sovereignty and coherence of the Sami herding society become threatened.

## Why was it Easy to Adapt to Mechanical Herding in Kaldoaivi?

As noted by Pelto (1973, p. 72), it is frequently stated that the introduction of new technology starts in centres and diffuses from there to peripheries. Concerning the snowmobile revolution in Finnish Lapland, the case was the opposite. The acquisition of snowmobiles started in the far north among the Sami reindeer herders and spread from there outward to the south. In Utsjoki there were certain facilities that made it possible to buy snowmobiles. For instance, there was a repair garage owned by a local Sami, Hans Guttorm. Also in a nearby village, Nuorgam, there was a mechanic. In addition, there was a bank which arranged loans for those who did not have cash.

It is evident that many various factors had an influence on the eagerness of Kaldoaivi herders to adopt the snowmobile and on the positive results of their undertaking. One relevant factor had to do with the characteristics of those herders that initiated the project. They had financial and material wealth and they came from families with political or social power within the reindeer herding society. They, and many other local herders, were already acquainted with mechanical vehicles and objects, such as outboard motors, modern fishing equipment, cars, bicycles, sewing machines and so forth. Many of them were also good at maintaining machinery. For young herders the snowmobile brought in new ways to combine physical strength, speed in time and space, and overall readiness with herding operations (Helander-Renvall 2005/06).

The snowmobile has its own attributes. For instance, it is a good working tool for transportation, driving and chasing the reindeer to a specific spot, and zooming around fast when searching for and gathering animals. It is time-saving which means, for example, that gathering of reindeer for round-ups takes place rapidly and that herders have more time for their families than before. According to the ANT approach, reindeer are also actors and influence the situation in a network. Reindeer are easily scared by the roar of the snowmobiles.<sup>4</sup> But reindeer tend to behave collectively in herds and follow leading individuals (reindeer) when chased or moving to a specific direction or place. These behavioural attributes make it easy to drive them towards a certain locality.

It is said that the main reason why it has been very easy for Kaldoaivi herders to become successful with mechanised reindeer herding may be of an ecological character (Pelto & Müller-Wille 1972/73, p. 139). Namely the Kaldoaivi district has favourable physical settings. The hills have heights from 400 to 600 meters. The trees are low and partly covered by snow during the winter time. The terrain is treeless in many areas and it is easy to see where the herds or single animals are located. It is also easy to drive animals to the corrals, the work, which takes little time and demands little or no losses of single animals.

However, there is a point that is not discussed earlier in research texts regarding the snowmobile revolution: namely, that the reindeer herders possess traditional ecological knowledge (TEK) that is very useful when moving through different terrains and landscapes, when herding reindeer, when predicting local weather conditions and interpreting landscape features. TEK is everyday knowledge about local environment transferred orally from previous generations (Helander 2005). TEK is about the relationships of living beings including humans with one another and with their environment (Berkes et.al. 1993, p. 2). It also encompasses relationships with the land. A close relationship with lands is central to Sami people's cultural thinking. Lands and landscapes have their own attributes. It is already said, that the terrain in Kaldoaivi is suitable for driving with off-road vehicles.

Tim Ingold (1993; 2000) argues that humans and their environment influence each other. Lands and landscapes become cultural because people act upon them. For Ingold, perceptions of nature are shared cultural modes of interpreting the environment. Cosgrove (1989) claims that humans and their culture write expressions into the landscape. Consequently, one can view lands and landscapes as cultural texts. Sami herders interact with their environment including reindeer in such a

way that they shape their environment and environment shapes them.

Herders have an ability to 'read' their lands, and relate the 'text' they see to snowmobile and how to drive it in order to take care of the herding business. TEK, based on empirical observations, is knowledge that herders have learnt in the context of everyday life and through learning from older people. Through years, decades and centuries of adaptation the Sami have built enormous knowledge regarding their environment. '*Johtit*' is a very old word in the Sami language. It means 'to move forward, move, migrate'. Through ages Sami have been migrating long distances and have learnt to know the nature thoroughly. Sami know for instance the snow and weather well. The precision and complexity of the reindeer herders' knowledge of snow and ice conditions is built in the Sami language. Herders also know a lot about the habits and behavior of reindeer under different ecological and weather-related conditions.

TEK helps to analyze the changing conditions as related to nature. As already indicated, it is a part of the knowledge behind the decisions concerning acquisition and use of modern technology. TEK is of importance when making decisions in concrete working situations. An example is given here from herding terminology regarding snow and ice. The northern Sami word '*cuoŋu*' means 'hard crust on snow'. While there is *cuoŋu* it is difficult for animals to penetrate to the ground level for lichen. But the movement from one place to another becomes easy. Consequently they start moving to all directions after food. However, *cuoŋu* can turn into '*moarri*', which means that the hard cover starts getting softer. In the spring *moarri* can become '*soavli*', icy and soft snow, and reindeer have difficulties moving. *Soavli*-condition may hinder herders from using snowmobile, in any case in certain terrains and limited areas, such as wetlands, lakes and rivers.

## Concluding Words

My purpose has been to examine how snowmobile was adopted by reindeer herders in Kaldoaivi district in northern Finland. I have used actor-network theory (ANT) to map the nodes and strands of the herders' network in order to get a better understanding of adaptation strategies and things that influence them. Attention is also paid to the traditional ecological knowledge (TEK). As said above, traditional ecological knowledge is about the relationships of living beings including humans with one another and with their environment. TEK is everyday knowledge about local environment transferred from previous generations or learned in the context of the everyday activities. It is still used and

helps to analyze the changing conditions as related to nature. Based on this, it can be stated, that cultures never give away completely to the new.

From the text above one can draw the conclusion that there are many factors that simultaneously influence the ways mechanization of a specific culture takes place. To the snowmobile were ascribed some particular attributes when herders made experiments and compared the use of the snowmobile with the use of the skis. As a result, the snowmobile was rapidly adopted by the herders of the different districts and became an actor in the actor-network of the local herders. Snowmobiles were easy to operate even in the difficult snow conditions. The gathering of reindeer took place much faster than earlier. For the young herders, the new technology was especially attractive. The introduction of the snowmobile gave them new opportunities to become successful. What is more, the snowmobile took them to places and activities that provided them with good possibilities to learn more about the traditional ecological knowledge

As already said, I have used actor-network approach to study the snowmobile revolution in Finnish Sápmi. Actor-network theory analyzes relationships in context and in doing so it denies the separability of the social and technological. ANT assumes that the construction of reality is achieved through the interplay of different human and non-human actors with equal constitutive character. The research approach taken from ANT is found to be suitable when doing research on the adoption of the snowmobile by the Sami herding society. The snowmobile is regarded as an actor or actant of the herders' network. Various actors of the herding society may have different interests or attributes, but they are willing to translate (modify and change) their ways so that the alignment of their network can take place.

The material I have used in this paper concerns mainly the situation in the 1960s. In the long run, the changes and complexities embedded in them become more visible. This raises a need to do more research on the mechanisation of the Sami reindeer herding. The fact that the nodes and strands of a network have "as many dimensions as they have connections" (Latour 1998, p. 2) makes this theme even more intriguing to study.

## Notes

1 The material used for my paper is from the research of Pertti J. Pelto and Ludger Müller-Wille in addition to my own field notes and other information from Utsjoki.

2 Hannu Heikkinen, a Finnish anthropologist, has made research on adaptation in the western parts of Finnish reindeer herding area. Heikkinen (2002, p. 326-329) counts three clusters of change in herding: 1) slowly changing cultural core (for instance, the relationship between the behaviour

of reindeer and the locality of human settlement), 2) culture-based traditions (for instance, reindeer terminology), and 3) rapidly changing cultural features of everyday life (for instance, a new technology).

3 For Latour (1998), an "actant" can literally be anything provided it is granted to be the source of an action.

4 It has to be remarked that reindeer have become used to the noise of the snowmobiles, apparently because they (reindeer) associate the sound of the motor with extra food that herders bring in winter to them.

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