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RESEARCH NOTE

Women, reindeer herding and the Internet: an innovative process in northern Sweden

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This research note deals with an innovation initiative involving women, reindeer herding and the Internet. It shows how women reindeer herders from a Swedish Sámi village were a driving force in the development of several innovative, EU-funded projects focusing on information and communications technology. The article shows how the innovation initiative involved a wide range of actors, ascribing stakeholders from civil society important roles besides the public and private sectors. The innovation initiative involved several different strategies. One of these strategies was internationalization – both at the European and worldwide levels. This strategy was employed to prevent rigid political hierarchies blocking the prospects of gaining support from local and regional authorities. Another strategy was the continuous exchange of knowledge between engineers and potential end users, adapting the initiative results to the needs of the local context. As a result, the innovation initiative has produced several kinds of outcomes. It has generated new technology as well as economic and social benefits.

Keywords: innovative process; gender; women; information and communications technology (ICT)

Introduction

This research note will show how women from a Swedish Sámi village became a driving force in the development of several innovative projects concerning information and communications technology (ICT). The projects received funding from the European Union Structural Fund, the Interreg Programme and the Seventh Framework programme. The projects were related to EU policy on ICT, innovation and regional development. However, the participants in the innovation initiative were not "passive recipients", one-sidedly informed by ICT experts. Instead, these new groups and locations made a unique contribution to the "knowledge society" being promoted by the EU. This research note describes this contribution by highlighting three aspects: problem identification, the actors involved and the strategies used in the innovation initiative.

The data presented originate from project documents (e.g. project descriptions, reports and websites), from the documentation of dialogue seminars jointly arranged by researchers and participants and ethnographic material such as field notes. In the analysis an attempt has been made to remain close to the views and expressions communicated by the participants in the situations described. In order to protect the participants and their opinions, the projects and persons have been left anonymous.

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Problem identification

At the beginning of the twenty-first century, a group of women in a Swedish Sámi village drew attention to inequalities between men's and women's living and working conditions in the village, as well as to their future potential to live and work as reindeer herders and entrepreneurs. The inequalities were regarded as both unjust and a threat to the sustainability of the Sámi village, which led to a gender equality project (AFFIRM) being carried out between 2001 and 2003. The AFFIRM project aimed at documenting women's lives in the Sámi village, especially reindeer herding, working conditions and the working methods used in reindeer herding. The project was facilitated by a spin-off project (GENDER) at Luleå University of Technology (LTU), researching both the social and technical factors of women's working and living conditions. The engineer/gender researcher involved at LTU was the project leader and used feminist research methods similar to the participatory research approach (Gunnarsson 2007).

The GENDER project involved observing reindeer herding work. The reindeer herders work under demanding and even dangerous field conditions. An inexperienced person can therefore constitute a hazard. For the purposes of observation, representatives of the GENDER project participated in a reindeer selection event in the winter, an inspection of the reindeer herd in the spring with the aid of snowmobiles as well as a reindeer slaughter in the autumn. One gender-related issue identified in GENDER concerned the use of snowmobiles, which was given as the reason why women could not become reindeer herders. This view was based on the notion of the difference in physical strength between men and women, without questioning the design and choice of snowmobiles. Difficulties in combining the reindeer herding business with family life, education and employment were identified as another obstacle to gender equality among reindeer herders. Families were forced to live separated for long periods of time so that the reindeer could be taken care of, whilst children simultaneously attended school and parents fulfilled their civic and social duties. Often it was the man of the family who spent his time on the reindeer grazing pastures, whilst the women stayed at home with the children.

Technical and ergonomic solutions were elaborated in AFFIRM to make the work easier for reindeer herders. Seemingly obvious but untried solutions were suggested, such as negotiating with the farmers delivering the reindeer feed (silage) to pack it in slightly smaller bundles. Silage is predominantly used for feeding cattle in stables, where manual handling can often be avoided. Since the silage is handled manually when the reindeer herders put it out in the spring under difficult field conditions, such an improvement greatly decreased the physical strain of the work. AFFIRM also rented new types of snowmobile which the reindeer herding women could borrow in return for evaluating them.

The reindeer herding women showed great interest in technology. Several discussions between the engineer/gender researcher, AFFIRM's project leader and the project staff concerned the advantages and disadvantages of various transport vehicles, loading equipment and reindeer handling techniques. Therefore, it was hardly surprising that the reindeer herding women immediately reacted positively towards the suggestion of using advanced ICT technology. The suggestion was made by an Internet architect during AFFIRM's final year. However, when the idea was presented to the municipality's ICT office, it met with no interest.

How could the reindeer herding women, only one of whom reluctantly used a computer, grasp the benefits and implications of the proposed ICT technology? Even if the Internet had never been a part of the reindeer herders' everyday life out on the grazing pastures up until then, ICT solutions and their efficiency – or lack of it – were a common experience among the reindeer herders and their families. The idea was closely connected to the staff of a local educational facility for Sámi, which had adapted and developed tools for distance learning at an earlier date. Moreover, this phase of the project took place while the mobile NMT network was being dismantled in Scandinavia. Up until then, NMT had been the most effective mobile network in sparsely-populated areas. 3G had appeared on the horizon, but actual expansion had hardly started and, furthermore, it was not expected to reach those areas where reindeer herders needed telephone contact most. The research that was necessary to realize the new system for Internet access on reindeer grazing pastures was conducted in the TECH project, where the engineer/gender researcher again assumed the role of project leader. The two reindeer herding women who worked on AFFIRM were recruited as consultants to the project.

Advanced skills were required to develop a system architecture truly meeting the semi-nomadic lifestyle of the reindeer herding community. The Internet architect involved already had extensive experience of IP-based communications development. To ensure that the reindeer herders' needs were met, the goals and visions formulated by the Internet architect for the project were as follows:

- users are able to participate in social and political life even at times of the year when they live in areas without Internet connection;
- users are able to combine a modern lifestyle with their semi-nomadic lifestyle;
- opportunities are to be created for the members of the Sámi village to conduct business and sell their products and services over the Internet;
- opportunities are to be created for entrepreneurship and innovation based on the new technology.

In conclusion, the women who conceived the initiative proceeded from formulating problems to which the dimension of gender equality was central. In cooperation with external ICT experts a solution was designed which included the development of technology based on both social and financial incentives.

The participants in the initiative

A wide range of participants played key roles in the innovation initiative described here. The reindeer herding women who launched the project helped to form a business association in order to foster business and development ideas among women and young people. They also invested a lot of time and energy into trying to make contacts with LTU, local and regional authorities and international cooperation forums on the Internet in a way going far beyond their role as members of the Sámi village. These women were simultaneously driving the technological development in TECH as innovators and potential end users. The role of the Sámi village was primarily that of project owner in AFFIRM and TEST, the latter of which aimed at testing the new platform for Internet communication both in a laboratory as well as in the field.

The technology developed was based on Delayed Tolerant Networking (DTN), where information can be stored for some time until transfer is possible. This way, the information does not need to be transmitted in real time (which would require broadband cable, satellite, radio or other unbroken means of communication). The original idea to use DTN was developed by a group connected to NASA and including one of the founders of the Internet. This group was contacted after the Internet architect had heard of AFFIRM's and GENDER's plans to develop technologies for Internet access in the Swedish mountains. The Internet architect took note of the idea of employing DTN for "extreme" and demanding communications scenarios and worked towards a design along these lines.

The development from "slide ware" to system took place within TECH, with contributions being made by researchers and postgraduate students at the Department of Electrical Engineering at LTU in collaboration with the Royal Institute of Technology (KTH) and Uppsala University (UU). The NASA-associated founder of the Internet also agreed to sit on the reference committee for TECH, which definitely helped the project to obtain funding from the EU. He further showed his interest by participating in an international project meeting held by TECH in collaboration with a local training center in northern Sweden. In interaction with the local participants' activities, LTU served as the project owner of GENDER, TECH and WOMEN via the Department of Human Work Sciences, to which the engineer/gender researcher is affiliated. The aim of WOMEN was to monitor and initiate processes so that women in Norrbotten might have a good chance of developing and using TECH. It was through the engineer/gender researcher that the reindeer herding women first came into contact with the university. At a later stage, the Center for Distance-spanning Technology (CDT) at LTU also served as the project owner of two projects that emerged as results of TECH, i.e. UTILISE and MOBILE.

The contact with LTU, however, posed some problems for the initiators. The Internet architect's idea of Internet access in summer grazing country was first received as a joke at the meeting where it was launched. She encountered this attitude on several subsequent occasions. A recurring joke centered on reindeer with antennas on their horns. It is interesting to note that, while the idea provoked laughter in some contexts, the combination of women, reindeer herding and the Internet raised serious interest in others. Indeed, the Sámi identity was probably of help in establishing contacts that would otherwise have been difficult to attain, not least at the global level. Manuel Castells (1997) has discussed the importance of a clear and communicable identity in the Information Society. In his opinion, it may even be a resource in itself. At the national level, the idea received a positive response from the Swedish Agency for Innovation Systems, VINNOVA.. In its decision to finance the TECH project, VINNOVA wrote that "the potential exists for this to become a new Swedish niche".

An attempt was made to arrange for a regional non-profit organization to act as the project owner of a complementary project aiming at intensifying the cooperation between engineers and the potential end users of the system. This did not work out, however, as the application for public funding was rejected. Nevertheless, the non-profit organization was involved behind the scenes throughout the project and was thus a member of the reference committee for TECH. Another partner that accompanied the whole length of the initiative was a local Sámi training center. Their role was to contribute their expertise to organizing knowledge and making the local adaptation of the Internet, which proved to be of benefit at the international

Box 1. Unfinanced projects

The first project that would link users to TECH was applied for by the leading women in the Sámi village in cooperation with a regional non-profit organization focusing on rural and agricultural sciences development. The project, which can be called TECHLOCAL, received national funding for the training of small business entrepreneurs in the Sámi village so that they could utilize the results of TECH. This would also have included learning to set up the communications network. Regional co-funding was not granted. One authority refused and another had still not come to a decision after a couple of years.

When the application for TECHLOCAL failed, other regional EU funds were sought in order locally to support TECH parallel to the R&D activities, i.e. as "technology diffusion in real time". This would give the local level a major lead in the technology development underway. The application included the construction of a test-bed for DTN, for which leading figures in Internet development had pointed out a need. This project, TECHREAL, whose owners would be the Department of Human Movement Sciences at LTU, was rejected by the regional decision-maker despite the fact that national counter-funding existed via TECH. The situation became critical when none of the projects to ensure that the results of TECH would be properly supported and useful locally, where they had originated, could be launched. Early on, it was nonetheless clear that it would be possible to find external financing because the reindeer herding women required good technical solutions and Avri Doria had developed an Internet architecture to meet their needs. Before TECH ended, the project WOMEN had had time to start.

The idea of a test-bed for the Internet and specifically DTN had been brought to the working group on AFFIRM and TECH by leading Internet developers already connected with TECH, and was added to the application for the project TECHREAL, which was rejected. This activity had already been launched with regional structural funds five years before funding was granted from the EU's Seventh Framework Programme.

ICT meeting arranged in the municipality. It was also conducive to the guidance of students from KTH's ICT training programme, who regularly carried out projects and performed thesis work in conjunction with the local participants and the research group at LTU for three years. The local Sámi education center also participated in writing the application for TEST (Box 1).

The education center and the regional association have in common with the Sámi village that they are all members of "civil society", i.e. that section of society composed of voluntary associations, cooperatives, foundations and adult education associations – all run not-for-profit rather than for economic or governmental purposes. In the innovation initiative, participants from civil society played a number of roles, e.g. as project owners, as knowledge organizations and as organizers.

Public authorities assumed the role of financiers of the projects. The County Administrative Board in Norrbotten channelled funding from EU Structural Funds to those projects covering social and economic development (AFFIRM and WOMEN). This funding came specifically from the parts of the policy programmes targeting gender equality. Via the EU Structural Funds administered by the Sámi parliament, funding was granted to the initial projects AFFIRM and GENDER and to the final project TEST. VINNOVA financed the projects focusing on technological development (GENDER, TECH and WOMEN). Via the County Administrative

Board, CDT at LTU received funding from the EU Interreg Programme and Structural Funds Objective 1 for the projects UTILISE and MOBILE respectively.

In practice, the initiators encountered certain problems regarding the financing of the ongoing development of the DTN system and the related products and services they wanted to commercialize. Among other things, the group to a large extent failed to gain access to regional development funding for business and technology development. Instead, they were referred to specific policy programmes targeting reindeer farming, which has limited the group's opportunities to realize their ideas. Similarly, at the regional level they have been consistently allocated funding from the area of gender equality instead of from the regional funding targeting entrepreneurship and innovation.

Initiative strategies

A number of strategies can be discerned that were used to drive the innovation initiative. One of these was internationalization. The development of the technological part of the process was based on groundwork done by a group including the above-mentioned founder of the Internet. The Internet architect introduced the reindeer herding women and the researchers at LTU to an international cooperation body working on developing what is now known as Internet governance over the last few years. The term "Internet governance" is defined as follows:

> Internet governance is the development and application by governments, the private sector, and civil society, in their respective roles, of shared principles, norms, rules, decision-making procedures and programmes, that shape the evolution and utilization of the Internet. (Doria 2006, p. 1)

Interaction beyond sectoral boundaries is a basic working method within Internet governance, and the process is coordinated by the UN. The activities within Internet governance fitted in well with a specific need identified by the participants in the innovation initiative, i.e. to build new, international, sector-crossing networks of actors and to acquire knowledge of ICT developments in other contexts. Apart from the fact that the reindeer herding women had experience with Sámi politics – which by definition is an international field in that the Sámi populate several nations and interact with native populations from all continents – it became obvious that they needed to meet others dealing with the same challenges as themselves.

The two first summits of Internet governance – the World Summit on Internet Society (WSIS) – were held in Geneva in 2003 and in Tunis in 2005 (www.itu.int/wsis). The third summit meeting – the Internet Governance Forum (IGF) – was held in Athens in 2006 (www.igfgreece2006.gr). Both the researchers and the reindeer herding women were present at these global meetings. The main aim of participating in these events was the opportunity to exchange information with people from different parts of the world concerning policy measures and activities in progress in ICT development. The experiences within TECH concerning developing DTN for application in sparsely-populated areas, for example, were included in the continued work of the Internet Research Task Force (IRTF).

Another strategy visible in the empirical data is the interaction between technicians and end users. The innovation initiative was launched because the initiators saw themselves as potential users of the results the initiative would produce.

The fact that the initiators continued to be a driving force in the initiative meant that there was continuous interaction between them and the engineers. Because of their professional expertise, the engineers were able to contribute to realizing the initiators' ideas. By means of this mutual exchange, the end users' wish for the final result to meet both social and financial requirements could be met from the birth of the initial idea right through to the completed system. The interaction between end users and technicians was visible in the involvement of the Internet architect too. Her involvement started in the specific context in which the system would be used. It was actually this that aroused her interest in the idea in the first place. Her first thought was that it was an interesting problem; how were communications to be brought to a population in a communications-challenged area?

A basic requirement by the Internet architect was that the Sámi village would explicitly accept that such an initiative be launched. There was no point in investing in the idea if the Sámi village members did not feel they could benefit from the results. As a result, the Internet architect thought that the Sámi group should be represented in the steering committee of a possible project. The efforts to secure the potential users' influence by public funding were, however, in vain. The funding available was exclusively focused either on the technical development or on gender equality issues. WOMEN might be viewed as one of the few instances in which end user interests could be matched with financiers' priorities, since the project aimed both at gender equality and at ensuring the influence of potential end users within TECH. The problem of funding to involve end users also became visible in that it was difficult to achieve project ownership at the local level and projects with the majority of the businesses involved at the local level.

Instead, LTU took principal responsibility for most projects. This was not a strategy of the participants in the innovation initiative, but was a result of failed attempts to achieve local project ownership. The only projects that had local project owners were AFFIRM and TEST, in which the Sámi village took on the role. Whilst the Sámi village has a population of 400–500 ranging in age from children to the elderly – of whom at least half the adults hold at least one job outside the Sámi village – the university has around 2000 employees, half of whom work on research and development and half work on supporting researchers. Hence, the question is whether the Sámi village's two projects should be seen as few or many in relation to the university's resources. The Sámi village was also involved in other projects while the innovation initiative was in progress, e.g. a radio project for reindeer tracking. LTU has a far greater turnover than the Sámi village and therefore a greater capacity for dealing with payment arrears and similar financial situations arising from project ownership.

Outcomes of the initiative

The original AFFIRM project led to a number of other projects: GENDER, TECH, WOMEN, UTILISE, MOBILE and TEST. Within the framework of these projects, the idea of Internet connectivity on the summer grazing pastures developed into a practical system which was successfully tested in the field and which will evolve in the future to become available both to the reindeer farmers who took the initiative of development and to others with similar needs. This result can be described as a user-oriented, delay-tolerant system for Internet access in sparsely-populated areas without fixed connections. The term "user-orientation" refers to the fact that

potential end users initiated the process, setting specific requirements for system design, actively participating in the development of the system and with the financial means to use the system since it is based on low-cost solutions.

Conceivably, access to the new system may make it more profitable and easier to be an entrepreneur within the reindeer industry, not least for women. In addition to this aspect, the new system is user-oriented in the sense that it has laid the foundations for a business idea to sell products and services related to the system, such as is currently being developed by some members of the Sámi village. Thus, the results of the innovation initiative were technological development as well as economic and social effects, enhancing entrepreneurship and innovation among reindeer herders irrespective of gender.

Conclusions

This research note has shown how indigenous women managed a number of innovative ICT projects – funded by EU's Objective 1, Interreg and Seventh Framework Programmes – and how this innovation initiative comprised a wide range of actors, strategies and outcomes. In conclusion, the innovation initiative was characterized by:

- civil society playing a key role alongside the public and private sectors;
- internationalization as a strategy for exchanging technical information;
- exchange of knowledge between technicians and end users;
- technological, economic and social outcomes.

In the innovation initiative, civil society was an important actor next to the public and private sectors. Internationalization – both at the European level and worldwide – was used as a strategy to overrule rigid political hierarchies, and the exchange of knowledge between engineers and users was a driving force. The initiative has produced new technology as well as economic and social advantages. The fact that the people initiating the innovation initiative were women, Sámi and micro-entrepreneurs makes them unlikely partners for a technical university. On the one hand, this situation drove participants to profit from their unique identity as reindeer herders in their communications with international partners. They have thus created a "market value" for their ideas of ICT development. On the other, their affiliation to a minority group in ICT contexts, i.e. women, created other problems. Participants learnt that, regardless of the way their idea is characterized by high-tech ICT development, they have to continuously refer to policy programmes promoting gender equality and women's entrepreneurship when applying for public funding from policy programmes promoting entrepreneurship and innovation in general.

Pointing this out may appear ungrateful since funding was obtained. However, depending on the foundation or programme handling the funds, not all types of expenses are authorized and the balance of participants must follow the rules in each programme. Gender equality funding, for example, does not allow for investment in technical equipment, which is obviously necessary to run the development of a communications network. Funding for research does not allow the intensive involvement of users, small business entrepreneurs and participants at the local level, whereas multinational collaboration limits the number and type of participants

at the local level. Not having access to regional development funding for industrial and technological development has in practice restricted participants' opportunities to realize their ideas locally and has delayed technological development in favor of international competition.

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