

Information technology and networks in small enterprises in rural area

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Introduction

The objective of this paper is to investigate the Information and Communications Technology (ICT) and the networks used in Small Enterprises (SEs) in rural areas. It is assumed that ICT provides the opportunity for SEs to improve their competitiveness. The use of networks is becoming ever more important as a means of describing SEs in rural areas. This paper describes an ongoing study which aims to discover how small enterprises use ICT resources and the networks that accompany them. The paper thus focuses on the wider conditions of, and the relationships between, the factors in small enterprises related to ICT and networks. The study took the form of semi-structured interviews with leaders of 60 small enterprises in the rural areas of Northern Sweden. In what follows, the key findings of the study are discussed together with some practical implications for future research.

Information and communication technologies (ICT)

A major challenge facing society today is the need to maintain a high standard and quality of living, while at the same time significantly decreasing resource utilisation and thus preserving beneficial living patterns. Such a sustainable society is perhaps best based on a perspective that considers both human resources and technical possibilities. Despite concerted efforts by both governmental bodies and private-sector firms to discover a secret recipe for economic success in the countryside, rural areas continue to follow tradition-based logic and patterns for change.

In recent decades the network society, dominated by a global and informational mode of production with information rather than capital as inputs, has begun to replace industrial modes of production (Castells, 1996; Dicken, 1998). Some consequences aligned with this process are that the network memberships, information handling competence and communicative competence used in change processes become increasingly more important as competitive resources, both for individuals and enterprises (see e.g. Nahapiet and Ghoshal, 1998). In a project pilot study strong connections were found between the ICT-level of the enterprise and both leader and co-worker change competence (Vinberg et al.,

1999; Sandberg and Vinberg, 1999). Castells (1996) believes that network society is composed of “spaces of flows” in which spatial divisions such as urban and rural have broken down. Human relations are now structured more around socio-technological networks (e.g., new information technologies), and this reshaping of boundaries is leading to a profound shift in the composition of society. Definitions of distance, relationships in space and flows of information are being transformed. Concern for the *rural* dimensions of development processes may thus increasingly be seen as a legacy of the previous stage of “industrial” development when the distinctions between urban and rural were forged in ways that conformed to the spatial order of this earlier development mode. It is argued that this network form is relevant to rural development for it is concerned with the new networks of innovation and learning that are now seen as central to any successful form of economic development. It is therefore necessary to consider how thinking about rural development might proceed in the light of such emerging redefinitions and theorizing about people and space/distance.

Leading thinkers in the communications field have claimed that the advent of the digital “revolution” has created a society that is increasingly dependent on ICT to process it (Burstein & Kline, 1995). Researchers have questioned whether the impact of ICT will be even and whether certain categories of small enterprises in rural areas will be adversely affected by the ICT “revolution” (McConnaughey & Sloan, 1995). The changes brought about by this ICT revolution provide both opportunities and threats to SEs located in rural communities. ICT has made geographic locations and distances irrelevant, especially in the service industry. Such technologies open up new markets that were not previously accessible. Investing in these technologies can lead to economic benefits through greater price competition, lower inventory costs, reduced business travel and new distribution channels. ICT may however bring with it a number of potential threats to small enterprises. History has shown that the availability of basic infrastructure, such as rivers, railroads and interstate road systems drives local economic development. In an information economy the motors of economic growth are the telecommunications industry and the IT infrastructure. Thus, rural businesses are caught in a vicious cycle – lack of communications infrastructure reduces the demand for communications services, which further constrains future investment in the infrastructure. Another source of threat is that these ICT’s often provide the opportunity for business to simply bypass rural areas and relocate instead to developing countries.

E-mail has been described as “the most important new business communication technology since the introduction of the fax machine” (Moody, 1997). It allows electronic files such as documents, spreadsheets, databases and even CAD drawings to be exchanged worldwide, without degradation, in a matter of seconds. The World Wide Web, the graphical component of the Internet, allows

information to be accessed without geographical or time constraints (Haynes et al., 1998). The number of businesses with Web sites also followed this trend, with company size a major characteristic in determining the use of this technology. Specifically, smaller companies were found to lag behind their larger counterparts in the uptake of ICT (Spectrum, 1997).

In recent years small enterprises (SEs) have been the subject of increased attention. Integrated networks of small companies are often seen as promoting economic growth and new jobs. Research has shown that the type of change strategy employed is instrumental in influencing the outcomes of workplace oriented change projects (Gustavsen et al., 1996).

The use of ICT has been found to improve business competitiveness, with the Internet providing the opportunity for SEs to compete on equal terms with larger organisations (Mellor, 1998). In particular, e-mail and the World Wide Web present opportunities for SEs to harness the benefits of ICT in an affordable and simple fashion (Spectrum, 1997).

Network

Most research on small business performance has focused on the influence of internal managerial and product/service qualities on performance. Keats and Bracker (1988) proposed a theoretical model for explaining small business performance in which performance was measured by more than typical financial outcomes. Their model suggested the possibility that small firms may operate under a different set of performance criteria than large firms. Business performance success was seen as a function of leadership characteristics, and in particular to business planning approaches, as well as to the impact of elements in the community and industrial environments.

Many subcontractors are small enterprises that represent nearly 99 per cent of the total number of companies within the European Union (Storey, 1994). In contrast to large companies, these SEs are typically “lean” and not readily able to allocate much of their limited resources and reserves towards the integration of ICT into operations or towards innovative strategies. Change needs to be successful as the effort typically represents a significant investment where failure would be unaffordable. The question arising after learning about the level of risk faced by SEs and the potential benefit of successful ICT implementation is then how to get them to initiate and fulfil ICT work despite the barriers that seems to discourage the taking of such risks. Many studies in this area have been particularly interested in the personal network of the owner-manager at the time of the set-up or in their personal contact network (Ostgaard and Birley, 1994).

Although entrepreneurial networks as a research area have attracted increasing interest, empirical studies have produced variable and often quite contradictory

results (Dodd, 1997). Such confusion has been attributed to the over-reliance on quantitative methods to investigate the subject of small firm networking (Curran et al., 1993). The main focus of this paper proposes that a more appropriate research methodology be adopted in relation to interactive research (IR).

Prior studies into networks, specifically small enterprise networks, have produced useful information regarding the structural dimensions of a network, such as size, range, and density. However, studies in this area have mainly employed quantitative methods (Blackburn et al., 1990), and as such they have provided little understanding of the content of network relationships. Yet it is an understanding of the content that is needed if we are to better address the issue of how networking is used by small business leaders in the activities of their business.

In what ways can such networks make a difference in the development work of SEs? Here, the network acts as an arena where actions are scrutinised by others in order to acquire new perspectives unrecognised by the originator. The network makes it possible and practical for small enterprises to “act as a larger organisation”. Rather than being one small company with, for instance, 5-10 employees, the network can act as “one” large organisation with perhaps 50-100 employees. The “new” structure becomes an interesting organisation (customer) that is able to negotiate both disposition and price in areas such as training and consultant work. The cost of competence development and/or innovation can be split between the enterprises. In such an association each enterprise can participate in relation to their own size, needs and intentions. Engagement in networks of this kind can be one way for managers in SEs to compensate for the lack of internal resources as well as providing a development method that better enables learning. Moreover, the formation of SE consortia within a network structure can facilitate a more active role for government in public research and development funding by supporting the wider diffusion of research results. (Robertson and Longlois, 1995).

Research methodology

Interactive research (IR) has been defined as research that involves practical problem solving with theoretical relevance (Gustavsen, 1992; 1996; Gustavsen et al., 2001). In an IR project concerning, in this instance, networks, the researchers make use of the plurality of experiences and the capacity in the network as a means to enrich the development process. The credibility/validity of IR knowledge is measured according to whether actions that arise solve problems and increase participants’ control over their own situation (Levin & Greenwood, 1997). Internal credibility is essential in the IR process because of the collaborative character of the knowledge generated during group collaboration and during the research process. Since IR depends on the interaction of reflection and

action and the co-generation of new knowledge in specific contexts it is a challenge to effectively convey the credibility of this knowledge to outsiders (Levin & Greenwood, 1997).

As regards the interactive approach, a research design that would achieve the aims of this study is described in steps (I-IV) below. These steps are further illustrated in Figure 1:

- Step I.** Interviews with SE leaders.
- Step II.** Quantitative and qualitative analyses of data.
- Step III.** Initiate development- and change processes.
- Step IV.** Continue follow up and evaluation of development- and change processes.

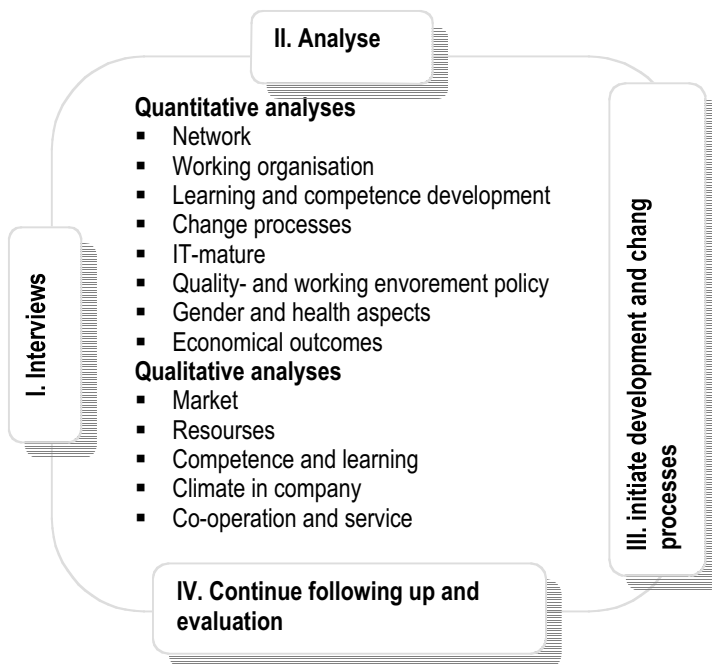


Figure 1. A research design.

Further studies should be designed to build upon what has been learned in previous steps of the process as outlined above. In our cases, the use of a variety of quantitative and qualitative techniques will help to achieve a deeper and broader understanding of the concept under scrutiny. By using a variety of methods, each should contribute in its own way to a better understanding of the issue, thereby allowing the next research steps to build upon previous learning and knowledge. Such a multiple stage research design must be at the centre of the study. In addition, it provides ongoing empirical support for the conceptual description. This cycle of fieldwork and the refinement of conceptual thought can

be continued according to the level of understanding desired and the time and resources available, as can be seen from Figure 1.

The present study is part of a much larger research programme; focusing on ICT and network use in SE's. In terms of the study question dealt with here we decided to find out how leaders of SEs in a rural regions used ICT and network resources. The proposed networks were to be based on a co-operative effort between small companies.

Findings

This study adopted a qualitative approach to data analysis. The following section discusses the major findings that have thus far emerged from the research.

IT-mature. The most frequent use of IT-services relate to use of PC, fax, Internet, e-mail, while use of large computer systems, local networks, Intranet etc were less prevalent.

Network relations. Tabel 1 illustrates that factors most significant to product- and activity development are sale- and customer relations, with the least unimportant factors (on a sliding scale) being technical consults, work environment, health, and competence.

Tabell 1. Co-operation and networking.

Co-operation with?	Yes (%)	N(%)o
Purchases	76	24
Product	62	38
Technology development	62	38
Competence development	62	38
Market	61	39
Production	59	41
Advice and support for management	45	55
Health	28	72
Rent of staff	22	78

Here we can see a summary of some of the research results gained from a pilot study (Vinberg et al., 1999). Concepts and data analysis are multi-level – an individual level with leaders and co-workers in the enterprises as units of study, and an organizational level, with the enterprises as units of study. In analyses on the organizational level, summary measures of individual data for the enterprises are used (for instance median or percentage levels of ergonomic and psychosocial tension and competencies). In individual level analyses the organizational level concepts and measurements are disaggregated to individual states (for instance measurements of a person's network relations or use of ICT-facilities).

Figure 2 shows the concepts and assumed relations used. The focus here is on some relations, studied empirically in this project.

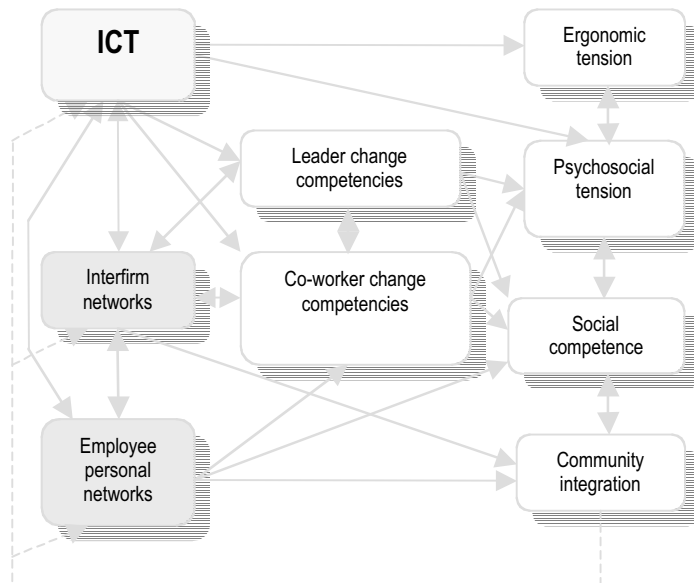


Figure 2. Networks, ICT-level and change competencies determine social outcomes through reduced ergonomic and psychosocial tension.

The links between SEs and the local community are often crucial for the well being and survival of both the community and the enterprises themselves. On the macro-level, Putnam (1993) in a well-known study, in contrast to e.g. Olson (1982), maintains that there is a strong positive relationship between associational activity and growth. A recent study by Knack, Stephen and Keefer (1997) gives further support to the Putnam thesis. Discussions of the effects of such networks are summarized in Grandori (1999), Uzi (1997) and Gustavsen et al. (1997).

Network activities. To summarise, the key findings regarding the networking activities of the leaders of SEs are presented in Table 2.

Table 2. Networking activities in SEs.

Competitors	The leader's network and networking abilities are used to gather information about competitors, and keep them informed within the company as a whole. Frequently, social encounters are most productive.
Customers	The leaders realise the importance of building a close relationship with a number of key personnel in the customer's firm, and not just with one individual.
New markets	Entering new markets was a key decision facing many leaders in this study. They stressed the importance of networking in establishing themselves in a new market.
Planned and unplanned networking	Networking was often direct and deliberate on the part of the leader, but frequently the most productive form of networking was that which was opportunistic, intuitive, and unplanned.

Table 2. Cont.

External network players	It is usual in such cases for the leader to consult with someone in his network before selecting an external party and bringing them on board. This consultation process is often with a network member whom the leader trusts and whose opinion he respects, since it gives them more confidence and security to progress with the course of action.
Networking as a competency	While networking itself is often performed intuitively by the leader, many of those interviewed recognised the importance of networking, and of using their network more effectively in order to improve their business.
Networking as a means to an end	Networking is very much seen as a means to an end, and must result in some tangible benefit to the company, if the leader is to continue with it.

Discussions

In order to understand the networking activities of the leaders of SEs, it is necessary to look beyond conventional research methods. For such understanding to occur, it is proposed that a less conventional research approach be adopted. A qualitative methodology overcomes some of the problems associated with quantitative approaches.

By proposing an interactive approach to future research in this area through combining participant observation with the interviews, with each part of the research essentially building upon what has been learned at a previous stage, the concept can be continuously refined and developed allowing an even greater understanding of networking in SEs to be attained.

One interesting topic would be to examine specific SEs wide differences in the use of ICT as well as differences between rural and urban areas with respect to different industry segments. A pair-wise comparison of IT adoption and use between rural and urban firms controlling for size and industry would help to determine if rural firms are lacking in their level of ICT sophistication. A question that is frequently asked is “are rural firms stagnating from a lack of technology infrastructure?” We can only generally comment here in response that if a firm is a franchisee or a subsidiary of a parent company they are likely to have the necessary ICT infrastructure that compares well with their urban counterparts. Moreover, firms that face competitive or external pressure to use certain technologies do seem to have the necessary infrastructure. However, we did discover a number of independent firms with minimal ICT usage, in situations where owners were either unaware of new ICT developments or simply did not find a need for them.

Implications for practice in the context of the interactive research approach:

- To investigate and analyse existing networks, learning, leadership, ICT-mature, need for change, economic output in SEs. To develop networks between SEs, research institutions, and public actors.
- To initiate IT-supported SE-networks.
- To support female entrepreneurship and networks.
- To initiate “on-line community” networks.

References

- Blackburn, R., & McClure. 1998. *The Use of Information and Communication Technologies in Small Business Firms*. Small Business Centre, Kingston University.
- Blackburn, R. A., Curran, J., & Jarvis, R. 1990. “*Small firms and local networks: some theoretical and conceptual explanations*”, paper presented at XIIIth Small Firms Policy and Research Conference, Leeds Business School, Harrogate.
- Burstein D, & Kline D. 1995. *Road warriors*. New York, Dutton books.
- Castells, M. 1996. *The Information Age. Economy, Society and Culture. Vol. 1. The Rise of the Network Society*. Oxford: Blackwell.
- Castells, M., 1996. *The Rise of the Network Society*. Blackwell, Oxford.
- Curran, J., Jarvis, R., Blackburn, R.A., Black, S., 1993, “*Networks and small firms: constructs, methodological strategies and some findings*”, *International Small Business Journal*, 11, 2, 13-25.
- Dicken, P. 1998. *Global shift: transforming the world economy*. New York: Guilford Press.
- Dodd, S.D. 1997, “Social network membership and activity rates: some comparative data”, *International Small Business Journal*, 15, 4, 80-7.
- Grandori, A. (Ed.) (1999) *Interfirm networks: organization and industrial competitiveness*. London: Routledge.
- Gustavsen, B. 1998. From Experiments to Network Building: Trends in the Use of Research for Reconstructing Working Life, *Human Relations*, 51(3), 431-448.
- Gustavsen, B. 1992. *Dialogue and Development*. Assen, Holland: Van Gorcum.
- Gustavsen, B. 1996. Development the Social Sciences: An Uneasy Relationship. In: Toulmin, S and Gustavsen, B (eds.) *Beyond Theory: Changing Organisations through Participation*. Amsterdam/Philadelphia: John Benjamins.
- Gustavsen, B. Finne, H., & Oscarsson, B. 2001. *Creating Connectedness. The Role of Social Research in Innovation Policy*. Amsterdam/Philadelphia: John Benjamins.
- Gustavsen, B.; Hofmaier, B.; Ekman Philips, M. & Wikman, A. 1996. *Concept driven development and the organization of the processes of change*. Amsterdam: John Benjamins Publishing Company.
- Haynes, P.J., Becherer, R.C. and Helms, M.M. 1998. “Small and mid-sized businesses and Internet use: unrealized potential?”, *Internet Research: Electronic Networking Applications and Policy*, Vol. 8 No. 3, pp. 229-35.
- Keats, L., & Bracker, J. S. 1988. Toward a theory of small firm performance: a conceptual model. *American Journal of Small Business* 12 4, pp. 42-58.

- Knack, S., & Keefer, P. 1997. Does Social Capital Have an Economic Payoff? A Cross-Country Investigation. *Quarterly Journal of Economics*, 112, 1251-1288.
- Knoke, D., Kuklinski, J.H., 1982, *Network Analysis*, Sage, Beverly Hills, CA.
- Levin, M., & Greenwood, D. 1997. The reconstruction of universities: seeking a different integration into knowledge development processes. *Concept and Transformation*, 11, 2-3.
- McConnaughey J, Nila AC, & Sloan T. 1995. "Falling through the Net: a survey of the 'have nots' in rural and urban America". NTIA paper.
- Mellor, N. 1998. "E Commerce and the way forward", E-Business Seminar, 29 April, University of Wolverhampton.
- Moody, G. 1997. The Business Potential of the Internet, Uunet.
- Nahapiet, J. & Ghoshal, S. 1998. Social capital, intellectual capital and the organizational advantage. *Academy of Management Review*, 23(2):242-266.
- Olson, M. (1982) *The Rise and Decline of Nations*. New Haven: Yale University Press.
- Ostgaard, T.A., Birley, S., 1994, "Personal networks and firm competitive strategy - a strategic or coincidental match?", *Journal of Business Venturing*, 9, 281-305.
- Parker EB, & Hudson HE. 1992. *Electronic byways: state policies for rural development through telecommunications*. Westview Press.
- Putnam, R. (1993) *Making Democracy Work*. Princeton: Princeton University Press.
- Robertson, P.A. and Longlois, R.N. 1995. Innovation, networks, and vertical integration. *Research Policy*, 24(4), 543-562.
- Sandberg, K. W., & Vinberg, S. 1999. Competence ergonomics and learning in enterprises. 10th Ergonomics conference, 29-30 October, Luleå, Sweden.
- Sandberg, K. W., & Vinberg, S. 2000. Information technology and learning strategies in small enterprises. *Behaviour & Information Technology*, 19, 221-227.
- Sandberg, K. W. Vinberg, S. & Pan, Y. 2001. Learning, IT-changing and working in framework of competence ergonomics. In D. Harris (ed.) *Engineering Psychology and Cognitive Ergonomics*. Aldershot, England: Ashgate Publishing.
- Spectrum, 1997. *Moving into the Information Society*, HMSO, London.
- Storey, D. 1994. *Understanding the Small Business Sector*. New York: Routledge.
- Uzzi, B. 1997. Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly*, 42: 35-67.
- Vinberg, S., & Sandberg, K. W. 1999. Models for competence and health development in small business enterprises. 10th Ergonomics conference, 29-30 October, Luleå, Sweden.