

# ICT and E-business Adoption of SMEs in the Rovaniemi Region

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## **Abstract**

This paper describes an e-business development program carried out in the Rovaniemi region, Finland. There were six different business cases in the program and these cases were studied through action research and constructive research. The cases are depicted, compared and segmented in this paper using their strategic orientation and Focus-Dominance model. It appears that orientation towards growth and customers results in more promising- and complex – electronic business propositions. The results have implications to e-business support organisations, information system vendors and service providers. The results presented here are still preliminary, because the implementation of business models and information systems is not yet completed.

## **Keywords**

electronic business, small and medium-sized enterprises, ICT adoption

## **Introduction**

This paper describes six cases of ICT and e-business adoption among the small enterprises in the Rovaniemi region. These cases do not represent exhaustively the situation in the SMEs, but nevertheless give an insight into how small firms adopt and approach electronic business and information technology and how development or support organisations could stimulate this adoption. It is also possible to discern various information technology service offerings targeted to small businesses.

Rovaniemi region (the city of Rovaniemi, Rovaniemi county and Ranua commune) is located in the northern part of Finland and its population is approximately 62,000 people. The city of Rovaniemi is the capital of the province of Lapland. It is also the economic and educational centre of the province. (Rovaniemi 2005a) Over 80 per cent of the labour force is employed in the service sector, private or public. (Rovaniemi 2005b) Tourism is the most significant industry in the region. On the Finnish scale the region is considered a peripheral area, and certainly so on the scale of the European Union. According to the business register of the Rovaniemi region, there are 3,543 firms in the region. Out of these, almost 60 per cent have a personnel of less than 10 people and a turnover less than or equal to 1,000,000 euros. (Rovaniemi 2005c)

Between September 2004 and December 2005 the regional business development organisation (Business Developer eero Rovaniemi) together with the University of Lapland carried out an E-business Development Program (EDP) targeted for SMEs. The EDP was part

of a larger network competence project, which aimed to improve co-operation between the university and organisations in the public and private sector (Saloheimo et. al. 2005).

The EDP had its foundations in the earlier regional network project of Business Developer eero Rovaniemi, which aimed to expand the information networks in the region and train the entrepreneurs and/or employees of local companies to make better use of information technology in their businesses. The local enterprises were surveyed with respect to their use of technology and their technological training needs. The results implicated that the awareness of the different possibilities of electronic business was low. The experiences from the training phase showed that the training should be more integrated into firms' activities. These issues were later addressed in the EDP.

The scientific focus of this paper lies in the identification of strategic orientation of SME's (Jeffcoate et. al. 2002) and the relationship of this orientation to the e-business objectives. Also, the business cases are reflected in relation to the Focus-Dominance –model of ICT investments in the small and medium-sized enterprises (Levy et. al. 2001; Zheng et. al. 2004). Segmentation of SMEs using this model may be useful for regional e-business knowledge network and stimulation of electronic business activities (Boekhoudt & van der Stappen 2004). The description of development program contains tools for customised e-business support for small companies (Papazafeiropoulou et. al. 2002).

## **Theoretical background**

The concept of electronic business (or e-business) used in this paper includes all the internal and external activities of conducting a small business. It covers the processes in supply chains, sales channels and within the company itself (Puurunen & Takala 2005, 300). There is a distinction between e-business and e-commerce. E-commerce refers to activities directed outwards of the business (marketing, selling and transactions targeted to potential or existing clients); e-business takes into account also the inner activities of the business. (Chaffey 2002, 5-8) E-business happens in basically three strategic contexts: between business and employee (B2E), business and another business (B2B) or business and consumer (B2C) (Pather et al. 2002, 143).

According to the University of Texas and Cisco Systems there are several layers in the electronic business economy. Firms can operate in the Infrastructure layer or Economic Activity layer. Infrastructure is further divided into the layers of Internet infrastructure and applications. Economic activities divide into the layers of Intermediaries and Online transactions. These layers differ in the way of revenue-generation. Firms in the Infrastructure layer provide hardware (network equipment etc.) and software (operating systems, databases, etc.) which facilitate the actual business transactions. In the Economic Activity layer are the intermediaries, which facilitate the interaction of sellers and buyers. On top of all these layers is the actual online selling and buying between businesses and consumers. The layers are dependent on each other and it is possible to operate in multiple layers. (Puurunen & Takala 2005, 301-302).

Firms can commit themselves to e-business at various levels. These levels are 1) activity, 2) business process, 3) enterprise and 4) pure play. These levels are hierarchical by their

business impact. At the lower levels (activities and processes) there are opportunities to increase efficiency and effectiveness and at the higher levels there are opportunities to transform business more radically. (Strauss, el-Ansary & Frost 2003, 30)

The definitions of medium-sized, small and micro enterprises used by the European Union (2005) are based on headcount and turnover (or balance sheet total). A micro enterprise employs less than ten people and has a turnover less than or equal to 2 million euros. Small and medium-sized enterprises are seen as the engine of economic growth and the incubator of innovations. Small businesses are not just simplified versions of large organizations. The interactions and analysis of their environments are different. (Burke & Jarratt 2004, 126; Doukidis et. al. 1996, 190-191)

It should be noted that the strategy definition in the SMEs is personality-driven and the approach is instinctive. The role of the top manager is vital; He/she is the most important source of information, decision-maker and initiator of actions. Planning processes are emergent. Time horizons are short and the focus is on operational matters. In defining a strategy the small business decision makers rely on advice from a variety of professional, business and personal sources. (Burke & Jarratt 2004, 126; Doukidis et. al. 1996, 190-191) SMEs can be divided into two main groups on the basis of their attitude towards growth: growth orientated and quality of life. Growth-oriented companies attempt to maximise their value. Quality of life appeals to the companies whose purpose is to provide income for the owners. (Jeffcoate et. al. 2002, 126)

Small businesses could be more agile in making use of the technology. The transition process to implement the systems and the required re-organization to realize the benefits can be undertaken very rapidly. The lack of technological skills requires staff training or outsourcing. The management practises related to information systems are usually systematic, whereas the management of small businesses in general is rather informal or ad hoc. (Doukidis et. al. 1996, 191-192)

Actually, some of the first companies to adopt web-based electronic commerce were SMEs. In practice, many SMEs have difficulties to formulate and implement an electronic business strategy, because of a low IT or e-business readiness of customers and suppliers and their own lack of awareness, knowledge and expertise. Most successes have been in the field of niche or specialty products. (Turban et. al. 2004, 592-593) The strategic adoption and diffusion of e-business technologies in SMEs is lagging in comparison to large enterprises. The reasons for this can be attributed to their weak structure and resources, technology, individuals (CEO, management) and their susceptibility to environmental forces. (Corbitt 2004, vi)

According to the European Commission (2004, 9), ICT is becoming a “vanishing advantage”, because its many applications are so commonplace now. Large firms are still in better positions to benefit from e-commerce, although the applications are gradually adopted by SMEs. The relevance of ICT and e-business is average or above in the sectors of chemicals, electronics, transport equipment, tourism, business and ICT services.

A lack of awareness is one of the main barriers of e-business adoption in small enterprises. This inhibits the realization of electronic business opportunities. E-business is a technological and business innovation which needs awareness creation and information provision. The

necessary information is in the contexts of technology, human resources, business practices and costs. In regions where there already is a general awareness of e-business (e.g. the European Union), the target should be to provide customized and focused support for the SMEs. This support can be community networking, specific advice for individual companies, hands-on trials, tools assessment and training courses. (Papazafeiropoulou et. al. 2002, 234-235)

SMEs need external assistance to monitor interesting ICT developments. This information should be independent. The suppliers of ICT products and services have their own commercial interests, but knowledge institutions have an overview of developments and their general importance. Industry organisations might be able to assess the possibilities in their respective industries. Together these organizations create the knowledge needed by the SMEs. The preferred advice is personal and there should be a referral to an ICT-supplier, preferably a local one. (Boekhoudt & van der Stappen 2004, 204)

## Methodology

The E-Business Development Program has certain research methodological characteristics. It follows closely the guidelines of action research and, on the other hand, there are references to constructive research. However, the EDP is fundamentally a development tool, not a research project as such. The information gathered during the process can be helpful in future research design. In the domain of e-business research, combining real-world value with sufficient academic rigour is still problematic. The motivation for the research in this paper is instrumentalist; it aims to solve real-world problems. It concerns applications of technology or process and at the same time the adoption these applications. (Clarke 2001).

Action research offers understanding of a phenomenon in its context. Action researchers should adopt an interpretive viewpoint and emphasise qualitative approaches. The aim is to contribute to the research and also the practical concerns. There is a strong collaboration between participants; the researcher learns from the practitioners and vice versa. (Kaitovaara 2001, 8)

In constructive research it is typical to build a new artefact, based on existing research knowledge, technological and organizational etc. advancements. Artefacts (or constructs) are entities that produce a solution to some explicit and practical problem. The utility of these constructs should be evaluated. The task of the researcher is to implement a desired change, from the initial state to the target state. Constructive research can also be seen as managerial problem solving through the construction of models, diagrams, plans, organisations and so forth. (Kaitovaara 2001, 9; see also Kasanen et. al. 1993; Järvinen 1999)

Action research and constructive research can be described as processes. These processes have certain similarities. In action research there can be several iterations of the process. The innovation of a construct is also iterative in nature. When combined, the overall research process follows the phases below (adapted from Kaitovaara 2001, 8-9):

- Identifying a practically relevant problem with research potential,
- Obtaining a general and comprehensive understanding of the research topic,

- Planning the action, considering alternative courses of action, innovating the solution idea,
- Selection of a relevant course of action, implementing the solution,
- Evaluating the consequences of action and demonstrating how the solution works,
- Specifying the learning and identifying findings, theoretical connections and research contribution,
- Examining the scope of applicability of the solution.

Constructs should undergo a market-based validation, or “market test”. The market test can be weak, semi-strong or strong. The weak market test is fulfilled if the construct has been implemented in an individual organization. The semi-strong test requires the construct to be widely adopted in other organizations also. The strong test is passed when business units which have implemented the construct produce better financial results than those units which have not implemented it. (Kaitovaara 2001, 9)

In the case of the EDP, the researcher has an active role and together with the entrepreneurs aims for a positive change in the business activities. Also, the entrepreneurs should improve their understanding and learn to solve future problems by themselves. The program produces artefacts, which may become constructs in the sense of constructive research. These artefacts are manifested in the smeISP model.

The functional framework for the EDP is based on the small and medium-sized enterprise oriented information systems planning methodology (smeISP). This method or model aims to facilitate comprehensive planning of information processing and take into account the characteristics of SMEs and different areas of information processing. The focus of smeISP is in the analysis of the present state of business and then the definition of the goal state. The development of the information processing is based on this analysis. The model is designed to give the company management a systematic way to develop information processing. Therefore it is also designed to be easy-to-learn and rapid in its planning cycle. The resulting development plan is meant to be in continuous use and should be updated regularly. (Närvänen et. al. 2001, 10)

Närvänen et. al. (2001, 1) find that smeISP is a framework that should be applied and modified when necessary. The method reaches its final form just when it is actually being undertaken. The model they present has the essential tools, but their applicability should be considered case by case. The main phases of smeISP are in the table below. (Närvänen et. al. 2001, 11)

Table 1. Phases of the smeISP

<b>Phase 1: Preparations</b>	<b>Phase 2: Analysis of present state</b>	<b>Phase 3: Definition of goal state</b>	<b>Phase 4: Conclusion</b>
Planning of preliminary study	Business modelling and analysis (iterative): history, organisation, products/services, customers, partners, competitors, business objectives, core competencies	Creation of development ideas and analysis, brainstorming (iterative)	Inspection of the development plan
Gathering of basic data	Description of information processing: applications, servers, workstations, networks, data management, maintenance, information flows	Finishing the development plan	Communication of the results
Interviews of managing director and IT-manager			
Kick Off meeting			

In the EDP there is one additional phase, the follow-up of the implementation. It examines the implementation of the resulting development plan. This feedback should be considered when the plan is next updated. This follow-up phase would also serve the needs of constructive research, involving the market test of the construct.

Tools included in the smeISP are questionnaires for the present state of business and present state of information processing and technology. Information flows between different business functions can be modelled with diagonal matrixes. There is also a template of the development plan to work with. If smeISP is applied to a medium-sized organisation some management tools for commitment, communications and brainstorming might be needed; the model gives some useful hints about these. (Närvänen et. al. 2001)

The data was gathered in the interactions (interviews, discussions, training sessions, site visits) between the researcher and the representatives of the participant firms. It was documented on various notes, memos, e-mails, meeting protocols, visual diagrams, process descriptions, training materials etc. All this information was processed, refined and clarified into the development plan. The researcher also kept a research diary and a web log, which was targeted to the participant entrepreneurs.

## **Development program**

The firms participated in the E-Business development program based on their own motivation, interest and problem-solving needs. The program was advertised through various channels (press, mailing lists) and the interested firms registered themselves to the business development organisation. During registration they were asked to explain their present use of

IT in their business. There was no need to screen out any of them, because the number of registered firms was lower than expected.

The registered participants attended a Kick Off seminar and the EDP was explained in more detail. Their motivation, needs and interests were also discussed. Firms were given a few days to confirm or cancel their participation. Background data was gathered from the web Business Register and from firms' Internet homepages, when available.

The first task of the confirmed participants was to fill out a questionnaire about their business and the present technological infrastructure in use. Later, they were interviewed by the researcher and the questionnaire was complemented. The original smeISP questionnaires were too extensive for the micro firms, but this also demonstrated the complexity of technological matters for the entrepreneur. The questionnaires were slightly modified from the original versions.

The first interview clarified the problems, needs and potential e-business opportunities for each of the firms. All of them had a more or less clear idea of what they wanted to achieve in electronic business or in the use of information technology. This idea was refined to a "spearhead", which was the focus of later actions in the program. The researcher started to draft the development plans, which were regularly discussed with the respective firms. The drafting involved presentations and diagrams of business models, architectures and use cases of information systems, and also some process diagrams.

The researcher also sought for relevant information to solve the problems in the use of IT or the e-business model. The information concerned different technical issues (procurement, system architectures and usability), potential partners (financial support, information systems, intermediaries) and business issues (pricing, service process, contracts). Appropriate training sessions (e.g. workstation management) were organised when needed. These sessions were held in the premises of the firm. In practise, not all of the tools included in the smeISP were necessary. Especially the management tools were not needed because the participant organizations were so small. The use of other tools was linked to the firms' spearheads.

## **Business cases**

Several cases can be derived from the E-Business Development Program. These cases represent a wide scale of different levels and objectives within the field of electronic business. They are, of course, tied to their geographical, economical and social context. However, they can have value in the design of e-business support activities and services, training and education, research and development, and also in the supply of e-business information systems and application services. The business cases are summarized in Table 2.

Table 2. Business cases in EDP

	Line of business	Sphere of business	Growth vs. Quality of life	Driver	Spearhead	Level	Notes
<b>Case A</b>	Restaurant services	Local B2B, B2C	Quality of life	Internal efficiency	Better use of computers and the Internet	Activity	Foreign group travellers
<b>Case B</b>	Accounting & financial services	Local B2B	Quality of life	Internal efficiency	Upgrade of hardware and software, web presence	Activity	
<b>Case C</b>	Safaris & rental services	Regional B2B, B2C	Quality of life	Internal efficiency	Information sharing and management between offices	Activity	Cancelled participation later
<b>Case D</b>	Real estate design & planning	Regional, B2B	Growth	Customer	New e-service, full potential of existing business process	Process	
<b>Case E</b>	Electrical installations & maintenance	Regional, B2B	Growth	Customer	Workflow of field personnel, better quality of service	Process	
<b>Case F</b>	Internet-based SCM	National, B2B	Growth	Customer	New SCM-service for SMEs in specific industry	Company	Firm not yet established

All the business cases are micro-sized firms operating in the service sector. The sphere of their business is mainly local or regional and their clients are most often other businesses. All of them had at least general-level knowledge about e-business and information technology when they entered the EDP. Extensive, complex and ambitious spearheads are formulated in firms where the strategic stance is growth-oriented and the whole e-business is customer-driven.

Levy et. al. (2001, 3-4) proposed a segmentation model based on SME characteristics: the Focus-Dominance model. According to this model there are two driving forces for the ICT investment, namely customer dominance and strategic focus. These dimensions create four scenarios for the IT adoption. (Zheng et. al. 2004, 30) The scenarios are presented in Figure 1 with the EDP business cases positioned in relevant quadrants. The cases are positioned according to the closest match.

Low customer dominance (many customers)	<b>Co-ordination</b> Effectiveness of business processes Limited integration to strategy Focus remains internal  <i>Case E</i>	<b>Innovation</b> Integral part of strategy Systems support management Communication and exchange of information with business partners  <i>Case F</i>
	High customer dominance (few customers)	<b>Efficiency</b> Financial control No integration to business strategy Stand-alone information systems Efficiency of individual internal functions Investment as a cost  <i>Case A</i> <i>Case B</i> <i>Case C</i>
	Strategic focus: Cost	Strategic focus: Value added

Figure 1. Focus-Dominance model and EDP business cases

Cases D, E and F might represent potential success stories. These stories are convincing means to communicate the use of new technology or methods. Therefore, the cases require special attention in the future. Also, the mentioned cases are the most promising ones in terms of constructs, so at least a weak market test should be tried in the future. Case F operates in the intermediary layer of the electronic business economy. Cases A, B and C represent probably the majority of small businesses in the Rovaniemi Region. They share certain technological issues, so they can be approached as one group by the support organisations and information system providers.

## Conclusions

It is fair to say that the process described here is not yet complete. As regards the phases of the research we are now in the phase of implementing the solutions. Therefore, it is very difficult to give any conclusive results, but there are some interesting developments so far. The next steps should be 1) to evaluate construct validity and 2) to measure possible changes in actions and knowledge level.

Construct validity (i.e. market test) is relevant in the cases of possible success stories. In other cases the constructs themselves are very ambiguous or non-existent and therefore it is more relevant to measure learning/awareness and change. It might be that the topic has been studied and learned, but it has not yet led to changes in the organisation or activities because of the short timeframe. It is expected that the level of awareness has risen more in cases A, B and C, because their initial level was lower in the beginning.

The constructs in question are basically business models with supporting information systems. The novelty value and innovativeness of these constructs is of course relative, but they are nonetheless valuable and something new to the firms (and their stakeholders) in these cases. The weak market test requires that the construct has to be implemented by at least one organisation. The system should be in long-term use and it also has to be accepted by the firm's stakeholders, customers and suppliers. If the implementation of any of these constructs fails, the reasons for this should be analysed. There is also the question of business impact: does the implemented construct generate profit, higher customer satisfaction or any other positive effects?

The success of information systems can be approached with the DeLone-McLean model. The IS success in this model is based on 1) system quality, 2) information quality, 3) use and user satisfaction, 4) individual impact and 5) organisational impact. (Iivari 2005, 9-10) An information system's end-user can be part of an organisation (employees) or without an organisation (customers). The measurements of customer satisfaction should take into account the service quality. (Pather 2003, 148)

For the support and development organisations, it could be of value to segment the firms in the region using the focus-dominance model. Different segments could be approached with an appropriate set of strategies, services and tools. The vendors of information systems and the service providers should be integrated into this work. These support functions could then be marketed through various interest groups of industry (see also Boekhoudt & van der Stappen 2004, 204-205).

It should be considered how to help firms to shift from one efficiency segment to other, more advanced segments. Support organisations, vendors and service providers should understand their critical role in the e-business success of SMEs and improve their understanding of the characteristics of small businesses. The service offerings should be more comprehensive (see also de Guinea et. al. 2005, 73-74). At the moment, it seems that the supply of different e-business services is scattered and somewhat difficult for small businesses to access.

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