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ICT Capabilities and Possibilities in Micro-firms: *A Study of Micro-firms in the Åland Islands Archipelago*

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Abstract

Regardless of what ICT solutions are planned or proposed, or in what situations ICT is considered, it is important to first have a thorough understanding of the current state of the situation in the organization in question, so as to be able to understand the e-readiness and the challenges that need to be overcome in the adoption process and resource-wise of the organization. In this paper we focus on these issues in micro-firms, which we define as firms having four or fewer workers. The aim of this paper is threefold; i) to make an assessment of the current ICT-capabilities and –skills in micro-firms, ii) to see if the micro-firm owners realize potentials that ICT solutions can bring, and iii) assess the adoption process, what is needed for the micro-firms to come from i) to successfully adopting ICT solutions which could enhance the firm operations. To embark upon these aims, we have results from a survey sent to all firms in the Åland Islands archipelago.

Keywords: Micro-firms, SME, ICT, eReadiness, Adoption, Entrepreneurship

1 Background

Small- and Medium-sized Enterprises (SMEs) and entrepreneurship are continuously recognized as crucial for society and the overall economy, and being what provides existing work places as well as innovation and growth (see e.g. Stevenson & Lundström 2001 and Schaffers & Santoro, 2010). SMEs are generally considered to be entrepreneurial by default, but in fact most SMEs remain small and do not grow. This is something recognized for example by Rohra & Junejo (2009), Qureshi et al. (2008), and Piscitello & Sgobbi (2004) who have studied possible reasons for this. Factors they have found as reasons that hinder growth are for example access to financing, skills and capabilities, access to partners, motivation to grow, and time. In an Information- and Communication Technology (ICT) context, the question arises whether ICT can be a growth and innovation enabler that helps SMEs with their problems. The first steps in this quest is to identify the current challenges towards growth and innovation, the current ICT capabilities in SMEs, what ICT can contribute with in SMEs, and the

adoption process towards higher utilization of ICT. Matthews (2007) finds that ICT can act as a growth enabler, but also as a growth inhibitor, through poor access or adoption. Hence, there is more to it than merely the technology itself. The people and organizational structures cannot be forgotten or put out of the equation. (Windrum & Berranger 2002) The question how to make better use of the technology is whether the technologies that exist must be improved, or if the major challenges lie in organizations' processes and peoples' habits and attitudes. Both are probably true and both improvements in ICT and in organizations' processes are important. The ICT implementation should be done in parallel with development of the organization and according to process re-engineering and change management standards (Hammer & Champy, 1993). The challenges relating to ICT implementation and use in organizations mentioned are general, but applies also to micro-firms. In some regards even more, as micro-firms often have unique problems, as access to finance and skills related to for example ICT (Windruml & Berranger, 2002). What needs micro-firms have, and how they are relating to ICT differ significantly from larger organizations, where larger organizations usually have an IT-department or at least a person responsible for IT-support, micro-firms often have nowhere to turn for help (see e.g. Korvela & Packalén, 2009).

Questions arising from this background are for example: i) what the current level of ICT skills are among micro-firms, ii) what ICT skills that would be necessary for the micro-firms to have and iii) how these could be attained, within the existing constraints.

2 Introduction

This paper aims at identifying the current general ICT capabilities of micro-firms, and opportunities that ICT adoption can give SMEs, as well as challenges and barriers towards adoption of such ICT-solutions. We see this as important in all endeavors where ICT is considered in relation to SMEs. Information systems have the opportunity to deliver two major contributions to organizations: *i) make current operations more effective by automating complicated or time-consuming activities*, and *ii) enable organizations to accomplish new things that are not possible within current resource limitations*. (see e.g Levy et al, 2003). Preferably both things can be accomplished. Which of these that is given priority depends on the individual organization and its objectives.

We define micro-firms as having 4 or fewer workers, which follows the definition given by for example Skinner et al. (2003), even though the traditional micro-firm definition, for example by the European Union, usually consider firms having 10 or less workers to be of a micro-scale. The reason why we regard firms with less than 5 workers to be of micro scale and firms with 5 or more workers to be SMEs or larger is that the European definition of company sizes is too high in an Åland Islands context, and even a Nordic context, as most firms there is very small. For example the Åland Islands, in 2009 there were 2254 firms, of which 1963 had 4 or less workers, whilst only 8 companies had 50 or more employees (ÅSUB, 2010)

Especially smaller organizations seem not to, or are not able to, take advantage of the opportunities presented by ICT (Matthews, 2007). ICT-solutions and information systems are most often developed for larger organizations (Kotelnikov, 2007). The aim of this paper is to research what the micro-firms and entrepreneurs want to learn, what

they see having potential for their organizations. We have done this by asking a series of questions relating to their present use of different technologies and services, and their future intended use, what they want to use in the future. In addition to this, we wanted to identify any obstacles towards this adoption of more advanced ICT technologies and services. The challenge for micro-firm development is to find measures and means that would tackle the problems that micro-firms have, that is for example give them the same opportunities that normally are associated with larger organizations, while still preserving the advantages that have become synonymous with small firms, such as flexibility and personalized services.

3 Methodology

The empirical data for our study were collected within a project which objective were to gather background information about the present ICT situation of micro-firms and small organizations in the Åland Islands archipelago, of skills and technologies used, and to identify need and wishes for improvements of skills. The objective with this was to provide the background research needed for a new project proposal, which proposed setting up a teaching programme, teaching ICT-skills to firms and municipal employees. The data was gathered through surveys sent to all companies based in the Åland Islands archipelago and to all municipal offices for distribution among the municipal employees of all segments, including schools, kinder gardens, and elderly care. Several discussion sessions were also organized in each municipality were foremost the entrepreneurs, but also the general society and municipal employees were invited to come and discuss their present use and opinions about ICT and how their organizations presently use ICT and what they see as important improvements. This paper focuses on the micro-firms and the data gathered regarding other respondents are not considered.

The research is based on a survey sent to firms in the Åland Islands archipelago and a state of the art of the research field explained. The surveys, which provide the basis for the empirical data gathered, were sent to all firms in the Åland Islands archipelago using the regional postal offices services. We thus have answers from a full sample of firms registered in any of the six municipalities constituting the Åland Islands archipelago. The number of firms according to the regional post office was 209 of which we got responses from 36. Hence, the response rate was 17,2%.

The survey had a large set of different questions, related to the current technologies in use, the current usage of software, wanted future use of software, and corresponding questions related to Internet services. As one intent with the survey was to gather basic information to support a project proposal, the respondents was also asked to answer in what areas they wanted more ICT-skills. With the survey we were looking for technologies and software used at the moment and how skilful the respondents considered themselves regarding each software product, i.e. trying to identify the eReadiness of the micro-firms. We also wanted to find what the micro-firms themselves saw as important to learn more about which we see as highly related to adoption.

As the respondents were asked to do a self-evaluation of their current ICT skills in different fields, the answers cannot be seen as absolute. Self-evaluation is subjective, and there is no common baseline to determine own skills. To accurately determine actual skills, tests would need to be conducted, which, however, is a very time-consuming activity, and not feasible in practice.

3.1 Research questions

Relevant research questions related to micro-firms ICT usage, possibilities and barriers to adoption (see eg. Windrum & Berrenger, 2002, Powell & Woerndl, 2008, Morgan et al., 2006) are

- i. *What are general major challenges for micro-firms?*
- ii. *What are appropriate methods to study micro-firms?*
- iii. *What is the general level of ICT-skills among micro-firms?*
- iv. *What are the most essential obstacles towards micro-firms adopting more advanced ICT-tools and -solutions?*
- v. *What are the possibilities for micro-firm development by effective deployment of ICT?*

In the scope of this paper, we will focus on research question number iii) but also touch upon questions number iii) and iv).

We base our answers of the research questions on the results of a survey sent to all micro-firms in the Åland Islands archipelago. We cannot claim to have received a thorough general picture of the ICT-skills of all micro-firms, but we have at least gained some insights in key issues.

4 Small firms, entrepreneurs and entrepreneurship

SMEs are continuously recognized as important for the overall society and economy. (See e.g. Tan et al. 2009) This is often stressed for example by the European Union and trade organizations. Although the major emphasis on SMEs and many development efforts, usually small firms remain small (Rohra & Junejo, 2009). Studies regarding SMEs do not generally differentiate between micro-firm and small- and medium-sized enterprises, although there, presumably, are major differences. Often, studies seem not to even consider micro-firms, but concentrate on larger enterprises.

In a European context, 99% of all enterprises in Europe are SMEs of which 90% are micro-firms, having fewer than 10 employees and the average staff only consists of 5 workers. However, these micro-firms create 53% of all jobs in Europe, and are, thus, very important to the European society and economy. (European Commission website, 2010, cf. list of references) In Finland, about 285.000 of 321.000 enterprises had 4 or less employees in 2008. 98% of all enterprises are thus micro-firms. The 285.000 micro-firms employed 291.000 persons. (Statistics Finland, 2010) Hence, the absolute majority of micro-firms consist of only one employee, the owner. In the Åland Islands archipelago 223 of 234 firms had 4 or less employees in 2008, which equals 95% micro-firms. (ÅSUB, 2010)

4.1 Challenges for micro-firms

SMEs are generally considered to have limited resources (Windrum & Berrenger, 2002), which is a major constraint when it comes to development effort. This is presumably even truer regarding micro-firms, which usually consist of only one worker, the owner, whose personal economy is intertwined with the firm's. The resources lacking are for example knowledge, experience, financial capital, equipment and material. (Landström & Löwegren, 2009)

Ylinen and Gullström (2008) have researched obstacles to growth for business enterprises and have found that the most profound obstacles are competition, taxation, knowledge, resources, innovation, networks, and bureaucracy. Resources can mean time, access to finance, skilful workers or knowledge needed to successfully conduct the business operations. In their study, Ylinen and Gullström have focused on SMEs that have proven to grow. We argue that also micro-firms suffer from the same challenges as their somewhat larger counterparts.

A sole entrepreneur's, depending on his or her own skills, income is depending on the amount of hours he or she is willing to work. Hence, there exist little possibilities to accomplish economies of scale. In these cases, it is more a question of self-employment, i.e. creating a workplace for him- or herself, than a business enterprise. The question is how the firm can expand beyond these time-constraints, whether the firm owner wants to change at all and if so how he wants to change. Firm development and expansion in very small firms normally depends on resource constraints; of financing, time and / or knowledge.

4.2 Micro-firms and ICT

There are a quite many studies regarding SMEs' ICT adoption, according to e.g. Shiels et al. (2003). However, the most do not differentiate between micro-firms and SMEs. As we see that there are substantial differences between the capabilities and resources of a micro-firm, compared to somewhat larger small firms, we see it as important to study the special circumstances and contexts of micro-firms. After all, they represent a significant proportion of the enterprises. Also, the setting and context, in where we have conducted the study is quite unique (i.e. the archipelago), which put additional challenges on the firm operations. We want to find out whether ICT can have a positive impact on these challenges, and firm operations.

In our studies we have seen that all have a computer in their firm. Almost everyone had access to fast Internet connection, with some few exceptions still having modem or mobile Internet connections. Also, almost everyone intended to acquire access to fibre Internet connection, if made available. All respondents had some Office suite installed. When it comes to other software, only firms with specific needs had some software to support their operations, for example Autocad for construction planners and specific software that supports farmers. A few also had some graphics software. Except from these mentioned, not any more significant usage of software was recognized.

Even though the development of ICT has come a long way, it seems that the impact ICT has had on micro enterprises has been quite limited. (Morgan et al., 2006) The utilization rate of ICT seems to be quite modest, and the capabilities and skills among many workers in small organizations seem to be at quite a low level. ICT can, and should, make current operations more effective and enable new possibilities to emerge. ICT can expand the market of the organization, enable access to information and knowledge otherwise not existing in the organization or accessible to the organization, by making operations more effective, routine tasks and work could be made obsolete, enabling the workers to focus on more prospective tasks, as developing the organization, innovating or finding new customers and markets. However, in practice, it seems that most organizations are a long way from this, and might be considered as a utopia.

5 ICT Capabilities in the Åland Islands Archipelago

The respondents in the study are active in the following industries: (i) Agriculture, hunting and forestry (6 / 11%), (ii) Activities relating to fishing (7 / 12,5%), (iii) Manufacturing (8 / 14,5%), (iv) Construction (6 / 11%), (v) Commerce and sales (5 / 9%), (vi) Tourism, hotel and restaurant-activities (14 / 25,5%), (vii) Transport, storage and logistics (3 / 5,5%), and (viii) Other, for example consulting (6 / 11%)

In the Åland Islands as a whole, the distribution among industries is as follows (ÅSUB 2010): (i) Agriculture, Forestry and Fishing (4%), (ii) Manufacturing (8,6%), (iii) Construction (19,3%), (iv) Commerce and Hotel (27,6%), (v) Transport, Postal services, Tele and IT (10,5%), (vi) Finance, Insurance and Real-estate (18,8%), and (vii) Other services (11,2%).

We see a resemblance in many of the industries between the two sets of data. Only agriculture and fishing has a significant difference, which can be explained by that it is a traditional industry in the archipelago. We also conclude that the tourism sector is prominent for the Åland Islands, and that we also have gained quite a good sample of the division among industries in our study.

As the number of respondents in our study was 36, but adding up the numbers from each industry gives 55, we see that many of the respondents are active in several industries, or have several firms, which is common, and typical for the archipelago. Of the firms most are active in the tourism-industry. The tourism industry is usually regarded as the most important industry of the Åland Islands, and especially of the Åland Islands archipelago. Historically, the most important industries have been in the primary-production, such as farming and fishing, but this industry is gradually decreasing as it is becoming more and more difficult to survive as the agricultural prices are falling and the industry requiring bigger and bigger players, which is nearly impossible to accomplish in the small islands comprising the archipelago. The archipelago is continuously suffering from de-population as people are moving to more densely populated areas. Those that still want to remain living in the archipelago have been required to find other sources of income, of which starting an own company is very common and often the only alternative as there are not many traditional work places. There is, hence, a need for entrepreneurship in the archipelago, for the municipalities to survive.

Most of the firms in the study have only one worker – the owner. If a firm has more workers, it is usually a couple who runs the firm together, or one of the spouses is somehow involved in the firm operations. Hence, it is not common that the firm hires external employees. Regarding development of the firms, not all want to expand, but are rather satisfied with the current situation, and with the current amount of customers.

5.1 Results from the study

Following are some results from the survey that we see as relevant to the aim of this paper. The questions are related to the entrepreneurs' present use of ICT and intended future use. It is important to see if the entrepreneurs have a belief that ICT will play a more important role in the future than today as this is highly related to adoption of the technologies. The number of respondents were 36, which makes $n=36$ in the presented visualized statistics. The scales of Figures 2 and 3 represent the self-evaluated number the respondents graded themselves, from a 1 to 5 scale were 1 = "I would never use the

service”, 2 = “I would probably not use the service”, 3 = I do not know”, 4 = “I would probably use the service”, and 5 = “I would absolutely use the service”.

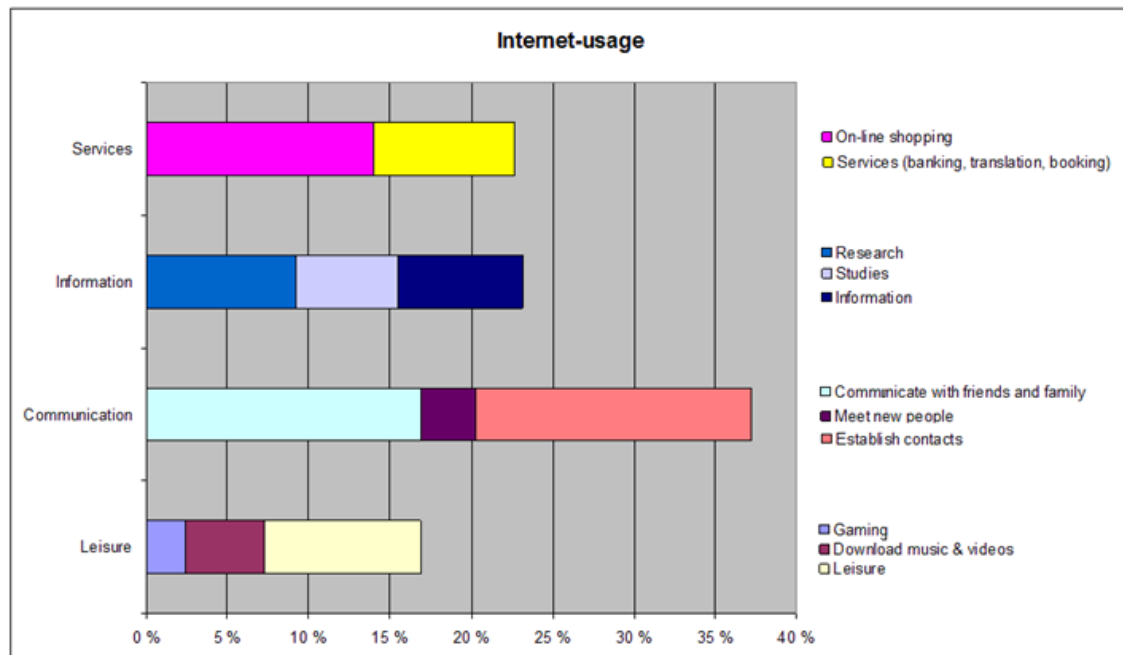


Figure 1: Current Internet-usage

As fast broadband fiber Internet connection currently is being installed in the archipelago, we wanted to find out for what purposes the respondents use Internet, and what they would like to accomplish using the faster Internet compared to today, which was an open-ended question. However, not one respondent had any novel usage idea, and most answered that they were doing the same as today, only with a greater speed. This is a dilemma as the main argument for quick Internet is to make the archipelago more competitive, which should mean to enable novel usage. Frequently, possibilities for telework are mentioned in relation to the fiber Internet connections, which representatives of the Archipelago hope can attract more inhabitants to settle in the archipelago, for example entrepreneurs. Figure 1 summarizes the respondents' current Internet usage, where we can see that communication is the major Internet activity. As it is difficult to distinguish between micro-firm owners' work-life and personal-life, which are very inter-related (Johannisson & Lindmark, 1996), we assume that the answers apply to both circumstances. We wanted to explore the Internet-usage as to see whether the respondents have enough ICT skills to utilize Internet as a tool to support work, which ultimately would result in a greater cash flow.

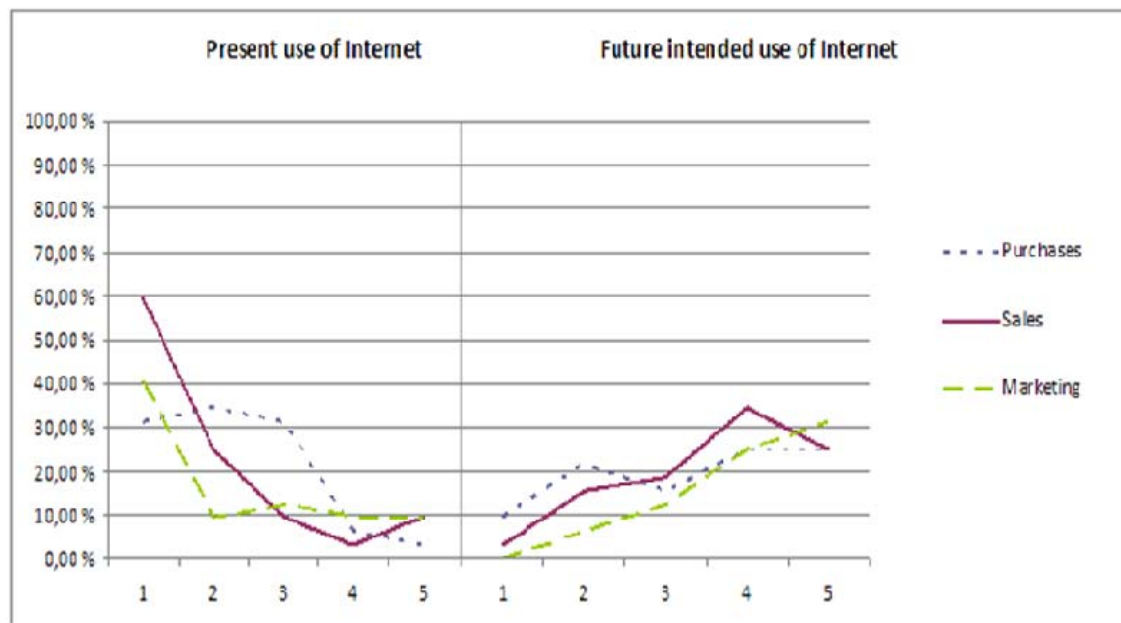


Figure 2: Present and future intended use of Internet

We wanted to explore whether the entrepreneurs see any potential in Internet as a media for enabling, presumably more effective or scalable purchasing, sales or marketing activities, and compare this to their present use of Internet for these activities. Looking at Figure 2, we see a slight upward trend in the respondents' view on Internet's potential. However, it seems that the entrepreneurs do not see Internet as a tremendous opportunity, at least not for their operations. However, most firms in the archipelago operate on the local market and its surroundings only. Electronic commerce seems not to be seen as an opportunity, even though this could expand the markets and be an opportunity for archipelago actors, as physical presence, or were the firm is situated, is not as important as in traditional trade. The most of the respondents, however, operate in traditional crafts, and hence, rely on their physical skills and working time to get an outcome for living.

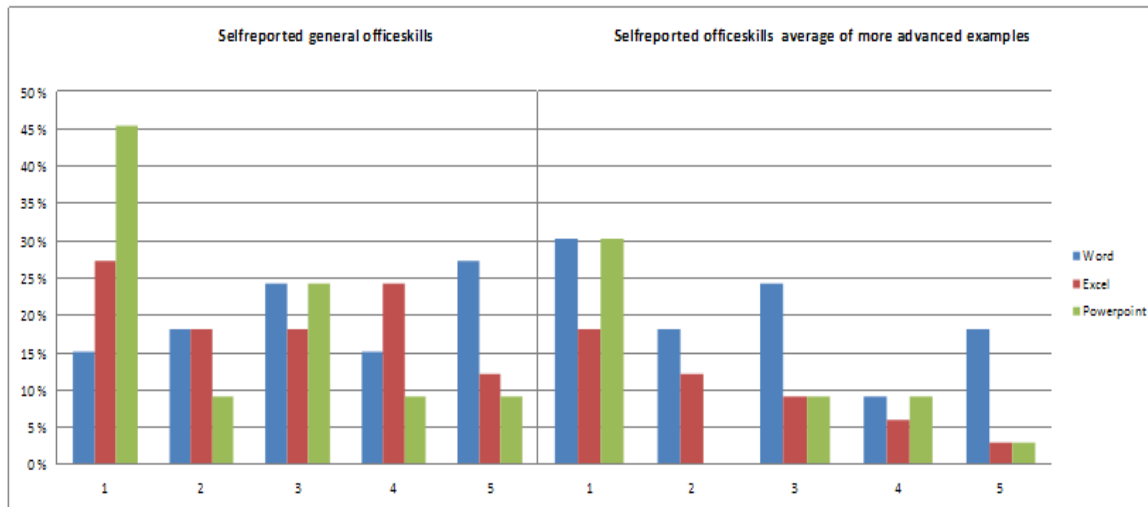


Figure 3: Self-reported general skills in Office vs. self-reported skills of more advanced Office functions

Striving to get a more truthful measure of the actual ICT-skills among the respondents, without the ability to do real-life tests, we asked a series of questions related to their skills in various software, among them Microsoft Office or similar. The respondents got to do a self-evaluation of their overall skills in respective software and then the same, but answering questions relating to more detailed functions of the software, which represented the more advanced examples. For each software mentioned; in this case Microsoft Word or similar, Microsoft Office or similar, and Microsoft Powerpoint or similar, the respondents graded their own skills on four sub questions. First were their general skills concerning the software followed by three more detailed questions related to how to perform specific tasks in the software (hanging indent, mail merge, document templates).

As people generally tend to over-estimate their skills, as they usually are quite satisfied as long as they can accomplish a task somehow, although it might not be the most effective, we wanted to compare their general self-evaluation about a software with the more advanced examples. The results can be seen in Figure 3, where we can see that the self-evaluated grades regarding the more advanced examples were lower than the presumed overall skills.

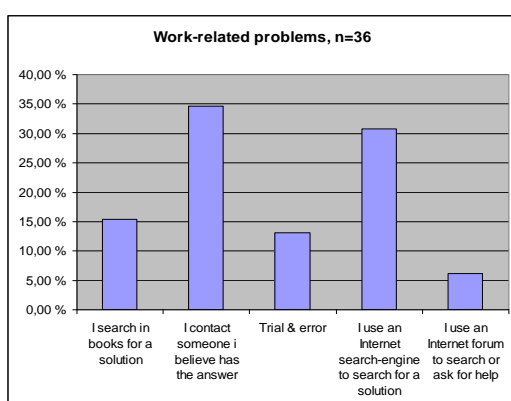


Figure 4: Sources for solving work-related problems

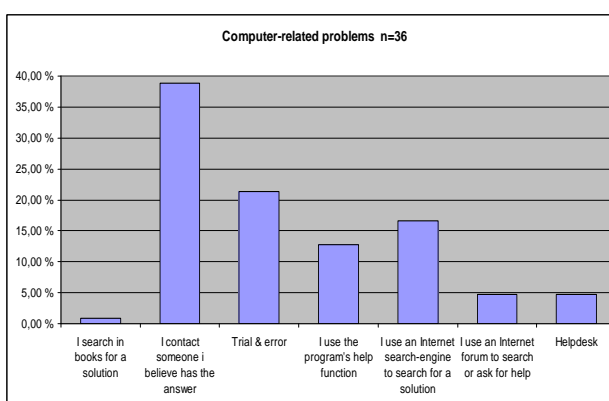


Figure 5: Sources for solving computer-related problems

As one of the major obstacles for micro-firms has been found to be skills, or access to people with skills, and as Internet potentially can act as a means or substitute towards reaching capable people, we wanted to find out if the entrepreneurs had realized this potential and, hence, asked what sources they use for answering problems related to the work (see Figure 4) or computers (see Figure 5). These sources of support, and results from research, are dealt with in more detail in Korvela & Packalén (2009 & 2010). Quite surprisingly Internet actually seems to be a significant source of support for work-related problems, however not as significant for computer-related problems.

6 Lessons and Discussion

The aim of this paper was to see if the entrepreneurs of micro-firms themselves see ICT as bringing benefits, or potential benefits to their own firm. We see that there is a belief in ICT among the respondents.

Comparing the results from section 5.1 to the main research questions what the current skills of micro-firms are, we see for example that the ICT skills seem to be quite evenly distributed, but with a slight concentration towards the lower end of the scale. Combining all Internet-related questions, we argue that the respondents in our study have a higher level of Internet skills, and are not novices. The respondents seem knowledgeable in the use of Internet for various different purposes, for example in Figure 4, we see that Internet as a support source seems to be quite highly utilized. This is promising, as the quality of Internet-services, and things they can be used for, for example for professional business operations, continuously are evolving, for example in the form of so called Web 2.0 services.

The potential of ICT is not utilized in most micro enterprises, as the ICT usage among the respondents of our survey mostly were on a low level. We see that ICT has a positive impact to that degree it is used. The tools used do bring productivity gains, for example to office work, where work can be made more effective by the utilization of templates and reuse of produced material, thus avoiding reinvention of the wheel. Also, ICT helps micro-firms become more organized, and to monitor the operations, e.g. calculating costs continuously. The ICT used at the current level, however, could be used more effectively, and micro-firms would often benefit also from taking new ICT into use, for example to utilize all the free alternatives that can be found on the Internet, to e.g. enhance communication, marketing purposes or to gain information. We have

reported these possibilities in Korvela & Packalén (2009 & 2010).

We see that one of the greatest challenges towards adoption is that the intended users would be assured that ICT will have a positive affect on their lives and on their firms. As it seems now, there is some skepticism towards ICT, but people want to believe that ICT could be of high value, although they have not seen this in practice yet. Therefore, the problems are: i) ICT solutions used in micro-firms are not very many, ii) The ICT that is used by micro organizations are not used very effectively, iii) The workers in micro-firms ICT-skills are not at a very high level. The solutions could include: i) The value of ICT should be clearly visible / the value how ICT can benefit small enterprises must be clearly visible, ii) a resource effective way to teach workers in micro-firms to learn the necessary skills of ICT must be found.

6.1 Research limitations and future research

The objective of the research was to be practically oriented, to identify micro-organizations' needs for improved ICT skills, as it was a part of a project. Aiming at practicality as the same time as remaining academic means that trade-offs can be needed, which then result in limitations to the research. For example the language of the researcher should be adapted to the skills and knowledge of the respondents, which is not always easy. Using too complex or advanced language can lead to misunderstandings, and using too simplistic language can lead to poor measurable results.

We acknowledge limitations of the sampling, as the objective of the surveys also were to gather interested participants to a schooling programme, where the entrepreneurs were given the possibility to participate in schooling in ICT for free, if the proposed project were to be accepted. The respondents, hence, all identified a need and wish for improved ICT skills, and people not interested in gaining more ICT skills, for various reasons are, thus, not part of the study.

Researching micro-firms and individual persons' ICT skills might be best done in person, by testing and evaluating in real life. However, this is not a viable option in most cases as it is very resource intensive, and we must, hence, rely on questionnaires and surveys to gain some quantitative material and interviews to aim at gaining a more in-depth understanding of the present situation.

Given the limitations in the study that were presented, we see the need for more studies regarding micro-firms, especially regarding what would be required to enable entrepreneurship, i.e. by our definition growth or improvements of existing work-routines. Such studies does not have to focus on ICT as the enabler, after all, ICT is not an end in itself, but can be an important tool or enabler. In the scope of this paper, we have not been able to discuss ICT adoption as much as would have been needed. It is important to find out how micro-firms could adopt ICT, and how they could gain the skills and capabilities needed, within their resource limitations. The next step in our research is to do more in-depth studies of micro-firms, using more qualitative research methods. The main question related to this research field, that still seem quite unanswered is what opportunities for micro-firm development, of innovation either of the existing organization or new products or services, that ICT offer, given the limitations in resources that exist, of time, money and skills. Are there ICT solutions that fulfill the needs without interfering, i.e. truly add value?

7 Conclusion

There exists a digital divide between micro-firms and larger organizations. Not only due to the traditional reason of age of the people, but possibly more on the characteristics and constraints of micro-firms. Micro-firms often do not have access to resources enabling them to hire people with special skills or educating the personnel, for example in ICT. This is presumably even truer in rural areas where geographical constraints exist, as in archipelagos. Micro-firms need to become more entrepreneurial, to benefit the individual entrepreneur and society and economy as a whole. Here lie opportunities for many further research approaches. There need to be more ICT solutions customized for the individual, and unique, demands of micro-firms that take current skills and resources into account. Also, it is very important to showcase the value of ICT, preferably from good cases of ICT usage in micro-firms. This is something that researchers and different trade and government agencies should be responsible for.

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