DOI: 10.2478/v10051-012-0009-1

Usage of Information and Communication Technology in Micro Enterprises in the Last Decade

Anja Žnidaršič, Borut Werber

University of Maribor, Faculty of Organizational Sciences, Kidričeva c. 55a, 4000 Kranj, Slovenia
anja.znidarsic@fov.uni-mb.si; borut.werber@fov.uni-mb.si

The paper presents the comparison of Information and Communication Technology (ICT) usage in Slovenian micro enterprises, using data derived from two studies carried out in years 1999 and 2009. Data for the studies were collected via structured interviews with owners or top managers of micro enterprises. We compared hardware and software equipment, business properties, characteristics of the interviewees and their impact on the successful use of ICT. The results show considerable changes in the ICT equipment, but that does not reflect in a better use of software compared to a decade ago. Key factors of successful use of ICT remain the same. The investment in ICT depends on owners' decisions and the most important factors are the owners' formal education and their skills and knowledge in ICT field. It was indicated that in recent years the investment of education in ICT field for both groups, owners and employees, was considerable lowered.

Keywords: Micro enterprises, Information and Communication Technology, Research

1 Introduction

There is no doubt that micro businesses play an important role in modern economy, especially in times of recession, when we can daily see collapsing of large firms that are not able to cope with changed market conditions. In our first study in 1999 we were focusing on small enterprises. Instead of that we got sample mostly with micro enterprises. We cannot generalize that micro enterprise characteristics are similar to small or medium size enterprises. There are not many researchers dealing with micro enterprises characteristics and that is why we are interested in them. The European Union also recognized micro business importance. On 6 May 2003 the Commission of the European Communities (2003) adopted Recommendation 2003/361/EC regarding the definition of micro, small and medium-sized enterprises (SMS) in Community policies applied within the Community and the European Economic Area. Within the SME category, a micro enterprise is defined as an enterprise which employs fewer than 10 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 2 million (Neuberger and Räthke, 2009). Slovenia accepted this Recommendation as a Member State of EU.

According to the findings reported by Matek and Butalič (2009) in Slovenia there were 105.272 enterprises registered in the Standard Classification of Activities (NACE - EU classification of activities) in 2007; 92.8% of them were micro enterprises, 5.7% were small enterprises and 1.5% were medium-sized and large enterprises. The overall share of individual private entrepreneurs was 58.1% and of limited liability companies 35.9%. Enterprises organized in other organizational forms represented only 6.0% of all enterprises. Despite the large difference in the number of enterprises between micro (1-9 total employees), small (10-49 total employees) and medium-sized enterprises (50-249), each of these three size classes generated around one fifth of total turnover. Among them, most persons were employed in micro enterprises (27.4%), followed by medium-sized (20.8%) and small enterprises (18.0%) (Matek and Butalič, 2007).

Based on the results from the investigation in 1999 (Zupančič and Werber, 2002), recent Slovenian statistical data and present legislation, we decided in 2009 to focus our attention on micro enterprises.

2 Background

Micro enterprises cannot be treated as downscaled versions of large companies (Rohde, 2004), due to differences in organization, management style, business practice and information

Received: 28th December 2011; revised 24th February 2012; accepted 2nd March 2012

systems (IS). However, the available evidence on the size–efficiency relation seems to strongly indicate that there is a positive association between firm size and technical efficiency, and there are also substantial and persistent productivity differences between SMEs and large firms (Yang and Chen, 2009).

Micro enterprises are a major component of all economies and are generally considered to be flexible, adaptive organizations. The influence of micro enterprises in the entire economy is increasing. It is generally accepted that e-commerce contributes to the advancement of SME business in developing countries (Kapurubandara and Lawson, 2007). More people than ever are employed by micro enterprises and many more are starting their own businesses. Micro enterprises sometimes act as incubators for future economic giants. The role of small and medium-sized enterprises (SMEs) in economic development and economic growth for both developed and developing countries has been increasingly recognized (Yang and Chen, 2009).

The decision-making process is often more intuitive than based on reliable, precise and unambiguous information. In particular, innovative business ideas require people to make decisions based on very little evidence (Koellinger, 2008; Andersson and Florén, 2008). Small firms generally lag behind medium and large companies in adopting and implementing computerization (Lee et al. 2009; Jungwoo, 2004). This is due to severe constraints on financial resources, lack of in-house expertise, and a short-term management perspective imposed by a volatile competitive environment. Small, young and innovative firms tend to be opaque, because most potential lenders have little information on the managerial capabilities or investment opportunities of such firms. They benefit most from being monitored in a close house bank relationship (Neuberger and Räthke, 2009).

On the other hand, micro enterprises demonstrate a high level of ability to adapt to changes in the environment. They use IT for automation of existing processes, rather than for decision support, or to increase flexibility of the firm and gain competitive advantage. While large firms are typically capital and equipment intensive, labor-intensive micro enterprises may be able to increase productivity and provide value added services through increased computerization and digitization (Lee et al., 2009).

In the research (Burke et al., 2008) we can also find results that confirm personal characteristic of the owner (father) as important for die-hard entrepreneur. For men, inheritance encourages persistence, and facilitates initial self-employment. Having a self-employed father as a role model makes sons persist longer. Similarly, higher levels of education tend to be associated with entrepreneur persistence among both males and females. However, somewhat surprisingly, early experience of unemployment does not affect the probability of self-employment, while reducing persistence.

Slovenia started investing in ICT later than the leading developed countries, just as other new EU member states (NMS). A more dynamic push in ICT investment occurred in 1999, reflecting increased concerns associated with Millennium bug on one hand and the prospects of the introduction of value-added tax in second half of 1999. But while other NMS are increasing their ICT investments in recent years, Slovenia has not followed such dynamics. The share of investments in GDP in Slovenia is lower than the average in EU 15, as well as lower than in most NMS. Trend performance of Slovenia regarding ICT expenditure in GDP during the period 2001–2004 was also negative (Bučar et al., 2006).

International communications technologies such as the World Wide Web have created an environment that presents advantages to individual firms (Jungwoo, 2004). The Internet is gaining commercial viability and is particularly suited to small businesses, because it enables them to keep doors open 24 hours a day, at minimal cost, to customers all over the world. With access to increasing markets throughout the world, businesses, including those in rural areas, have a unique opportunity to expand from the traditional and local to the global. Whether a firm trades online with customers or not, however, the Internet can give firms the advantage of increased profile, in that it can allow companies to present information to potential customers and provide another channel for the purposes of brand building, advertising, and marketing (Galloway, 2007; Davies et al, 2006).

We tried to determine how ICT was used in Slovenian micro businesses 10 years ago and nowadays. We also compare the factors that have an effect on micro businesses successful use of ICT and their income.

3 Research approach

After having reviewed the literature on small enterprises, a structured interview framework was developed to help address the research objectives.

Implementation and operation of IT in small enterprises was investigated by several authors (e. g. DeLone, 1988; Yap 1992; Verber and Zupančič, 1993; Winston and Dologite, 1999; Seyal et al. 2001; Hunter, 2001; Antlová, 2009, …). These studies focused on issues related to IT, and considered success factors such as number of PCs, number of programs and/or software tools used by the company, number of users, history of use of IT in the company, security and safety, and computing knowledge and skills of managers and employees.

We expected that successful use of ICT (Chan et al., 2009; Wiklund et al. 2009…) will depend upon characteristic of business (Yang and Chen, 2009; Lee et al. 2009; Rodhe, 2004 …), characteristics of the owner (Koellinger, 2008; Andersson and Florén; 2008; Jeon, 2006…) and use of Internet (Jungwoo, 2004; Galloway, 2007, …).

Successful use of ICT was defined as the number of different groups of programs used in enterprises. Enterprises chose among ten groups of programs: sale, purchase, general ledger, salary (leave and illness), business specific programs (e.g. graphics, mechanical engineering, designing), general programs (e.g. text editors, tables and data editors), internet browsers, programming tools, decision support programs, and other types of programs (Zupančič and Werber, 2002). In 2009 successful use of ICT was also measured with the level of internet use (Werber and Žnidaršič, 2010).

Data for first study was collected via structured interviews with owners or top managers in 1999, and represents a sample of 94 businesses. Among them 15 business were defined as

small, because they employed more than 9 employees, therefore final sample has 79 enterprises.

Data for the second study was collected via structured interviews with owners or top managers of micro enterprises between October and December 2009. In total, 134 interviews were conducted.

Interviews took place at the headquarters of enterprises with owners or top managers. Several studies (e. g. Burke et al., 2008; Wiklund et al., 2009; Lee et al., 2009; Koellinger, 2008; Jeon, 2006) emphasized that this group plays a dominant role in decision-making in small enterprises. The duration of an interview was approximately half an hour. Mostly closed-response questions were asked in the interviews. Except for demographic data, respondents either rated statements on scale 1 to 5 or responded to multiple choice questions. During the interview the respondents were asked how previous experience would influence their new purchase of ICT and why, and about proposals for the improvement of use of ICT in small businesses.

The appropriate sample size was calculated with Cochran's sample size formula for continuous data (Bartlett et al., 2001):

$$n = {(t \cdot s)^2}/{d^2} = {(1.96 \cdot 1.25)^2}/{(5 \cdot 0.05)^2} = 96,$$

where an estimate of standard s in the population was calculated as 5 (range of scale) divided by 4 (number of standard deviations that include 95% of possible values in range and is equal to 1.25 according to the 5-point scale. According to the value for selected alpha level of 0.05 t is 1.96 and acceptable margin of error for mean d was estimated as 0.25 (number of points on primary scale times acceptable margin of error;). Because the calculated sample sizes do not exceed 5% of population, no correction of sample size is needed.

Sample sizes in comparable international studies are similar to our samples. Chuang et al. (2009) had a sample of 97 enterprises in study of the extent of information technology adoption in SMEs. 126 enterprises were used to measure ERP adoption of small and medium enterprises (Shiau et al., 2009). Gutierrez et al. (2009) used 104 surveys from enterprises around the world in order to find out factors affecting IT and business alignment. Ng & Keasey (2010) studied success and failure of small, closely held firms in Singapore with 45 interviews with board directors, senior and middle managers. Research study in case of Slovenian middle sized and large enterprises about innovations and lifelong learning has 67 complete responses (Žnidaršič & Jereb, 2011). Roblek and Zajec (2011) investigate 24 small family companies in order to establish important differences in success and in organizational culture between family companies in production and service sector in Slovenia. According to the above examples we think that our samples (79 micro enterprises for 1999 and 134 for 2009) used in the study are adequate for our purpose.

Based on this premise, we proposed the following null hypotheses:

H1: There are no differences among micro businesses according to their equipment with ICT in 1999 and 2009.

H2: There are no differences among the key factors of successful use of ICT among the studied micro businesses in 1999 and 2009.

4 Results

4.1 Characteristics of the enterprises in 1999 and 2009

Enterprises organized in other organizational forms represented only 4% of the sample. In the sample from 1999 the overall share of individual private entrepreneurs was 38% and limited liability companies 61%. Among 134 enterprises 44% were family owned. The largest share of enterprises in the research performed in 2009 came from service sector (28%), manufacturing (13.4%), construction (12.7%) and retail (10.4%). Others were from tourism (8.2%), repair and servicing (6.7%), agriculture (6.7%), wholesale (6.0%), transportation (4.5%) and other (2.7%). In 1999 our sample was also represented by micro enterprises from diverse industry sectors (Table 1.).

Table 1. Enterprise by industry sectors in 1999 and 2009

	1999	**2009**
Manufacturing	16.5%	13.4%
Agriculture	1.3%	6.7%
Tourism	6.3%	8.2%
Construction	5.1%	12.7%
Retail	26.6%	10.4%
Wholesale	15.2%	6.0%
Transportation	1.3%	4.5%
Service	20.3%	28.7%
Repair and servicing	3.8%	6.7%
Other	3.8%	2.7%

Table 2 presents a comparison of enterprise characteristics from our findings in 1999 and 2009. Respondents who supplied data came from a wide variety of business backgrounds and sizes.

Table 2. Enterprise characteristics in 1999 and 2009

Year of research	**1999**	**2009**
Sample	79	134
Individual private entrepreneurs	38.0%	56.0%
Limited liability companies	60.7%	40.0%
Joint stock companies	1.3%	0.0%
Other organizational forms	0.0%	4.0%
Average number of total employees	3.8	3.4
Average age of business	7.6	12.33
Average years of computer use	4.6	8.9
Owner IS related training in last three years (percent)	43.0%	28.0%
Owner IS related training in last three years (hours)	30.5	9.3
Employees IS related training in last three years (%)	40.5%	25.0%

Employees IS related training in last three years (hours)	18.5	9.9
Business as cooperation partner	27.8%	21.8%
Outsourced accounting and bookkeeping	67.1%	80.0%

In 2009 the overall share of individual private entrepreneurs was 56% and of limited liability companies 40%. The average number of employees in 1999 was 3.8, while the average number of total employees in 2009 was 3.4, including the owner of the enterprise. The average estimation (in 2009) of total number of employees three years ago was 3.2. From the data we can conclude that micro businesses on average employ more employees than three years ago despite the economic crises. We can confirm our results with the statistical data of employment in micro enterprises in 2008, 2009 and 2010 on the website of Statistical Office of Slovenia under the option "Enterprises by activities" (SI-STAT Data Portal, Economy), where the growth in number of employees among micro business is also evident. In 2008 there were 217874 persons employed in micro businesses. In 2010 the number increased from 226638 in 2009 to 227225. The average existence time of micro enterprises has increased from 7.6 in 1999 to 12.3 years in 2009, and average years of computer use increased from 4.6 (in 1999) to 8.9 years (in 2009) as well. There are evident differences in amount and time spent for IS related training of owner and employees. The number of owners and employees that attended some kind of IS related education in last three years decreased from 43% in 1999 to 28% in 2009 for owners and from 41% to 25% for employees. Similarly, a decrease of spent hours of IS related education is evident. In 1999 the average number of hours spent for owner's IS training in last three years was 30.5 hours, while in 2009 the number decreases to 9.3 hours. We can discuss what the reasons for such differences are. It is true that a decade ago Windows graphic system replaced all sign based computer programs and consequently the emergency for IS education was higher. On the other hand we are witnesses of new releases and novelties in software every year, so we can argue this view. Maybe it is more likely that recent crisis did have an effect on micro business financial capital, and because of that the investment in education was considerably lower.

A lot of big companies collapsed in recent years because of financial and stocks machinations. We detected a decrease of micro businesses that work as a cooperation partner. From 31.1% in 1999 the number of businesses functioning as a cooperation partner reduced to 21.8% in 2009. Of course we can assume that the number also depends on the sample selected in 2009. The majority of enterprises (80%) in 2009 outsourced accounting and bookkeeping to an external partner who specialized in selling accounting services to small companies. The share of such enterprises in 1999 was 70.4%.

4.2 Characteristics of the respondents

The majority of respondents in 2009 (76%) was owner of the business, 10% were executive directors, 7 % owner relatives and 7% were other employees. There was a lower proportion of owners (61%) in study from 1999 and a higher number of directors (20%). The age of most of them (45%) was between 31 and 45 years in 2009, while in 1999 the percentage of the same age group was 50.6%. In 2009 33.6% were between 46 and 55 years of age. The same group was in 1999 represented by 13%, so we can conclude that they became older. In 2009 only 2% were between 21 and 25, 9% between 26 and 30 years and 10% were older than 55 years. There were no owners younger than 21 years in both studies. There were 72% male and 28% female respondents in 2009, while in 1999 we had 20% of female respondents. Formal education (in 2009) in most cases was secondary school (50%), 12% vocational level, 11% higher, 23% graduate and 4% postgraduate. The majority of respondents (40%) self-estimated their computer knowledge (Figure 2) as neither good, neither bad. Twenty–one percent of respondents estimated their computer knowledge as poor and 10% as very poor. We can conclude that respondents estimate their computer knowledge as higher than it was in 1999. When we asked the respondents where they mostly get information for ICT purchase, they answered that they ask friends or relatives in 1999. In 2009 the answer was different, they would mostly ask an ICT seller or service personal. In second place they selected the option "I find the information myself" in both researches.

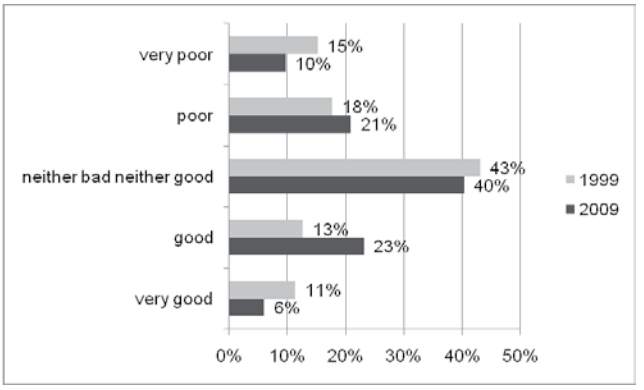


Figure 1: Respondents self-estimation of their computer knowledge

While we were talking with business owners several times, we could conclude that they are unaware of software they have on the computers. Many of them told us that they use PC for e-mail and internet search. Software was preinstalled when they purchased a PC. If we simplify, we can say that they do not care about computer business support, their primary thought is how to survive and earn enough money for the next day. We were especially disappointed while interviewing owners of newsstands that told us their employers forced them to self-employ as private entrepreneurs or to become unemployed. To lower the costs, large newspaper firms managers decided to separate newsstands from their business and consequently also the social payments for employees. On the other hand they dictate the subcontractors what and how to do. The use of ICT in such conditions is irrelevant.

Out of 134 micro-enterprises from the sample in 2009, 38 (28.4%) have expressed the interest in collaboration with our faculty in form of students work developing computer programs for their business support.

4.3 Computer use related issues

It is reasonable to expect that businesses make backup copies of their business data at one time or another. The question now was what type of backup media was used? The results are shown in *Figure 1*. Some businesses used two different backup procedures (backup on external HD and CD). Due to this, the percentage sum in Figure 2 is greater than a hundred. It is obvious that the famous floppy discs mostly used for business data backup in 1999 (63%) were replaced with CDs and external Hard Drives (35%) in year 2009. In most cases (61%) CD, ZIP, other backup specialized tools were used for backup copies In third place in both cases backup copies were made on a second hard drive, second computer or server (22% in 1999 and 20% in 2009). Recently also memory sticks are popular as business data backup store (10% in 2009). The most frightening results in 2009 came from the 3% total of businesses where no backup copies were made at all! Luckily the number is lower than in 1999 when 6 % of businesses made no copies.

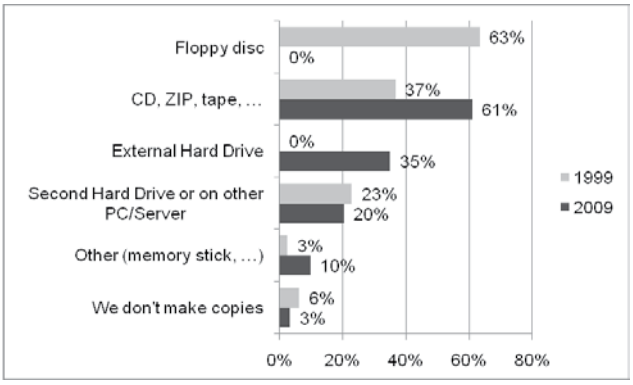


Figure 2: How micro businesses store backup copies of business data

Around forty-eight percent of businesses have not lost any business data yet in 2009 (Table 2). However, 24.1% did lose data at least once, 12.8% lost data twice and 15% three or more times. Data was similar, but smaller, also in year 1999. The main reason for the loss of business data is shown in Table 2. The sum of answers for year 1999 is not 100, because at that time correspondents were able to select different answers at once. However, in year 2009 we did not allow more than one answer. We can conclude that only SW errors were more often a reason for lost data in 1999. In all other possibilities the numbers are bigger in 2009. In 1999 the era of graphic interfaces started and we saw many new SW solutions that were not reliable. In that time also many new SW firms were formed that developed SW for small business support. In large enterprises they had their own computer centers and they developed SW for themselves. Cobol was one of most used computer languages for business support and then the problem of year 2000 raised. That was the time when Visual Basic and other languages with graphic supported interfaces began to replace Cobol. If we were used to robust and reliable operation of Cobol programs, now was the time we recognized the importance of reset button on PC. This could be why the number of SW errors as reason for business data loss in 1999 was higher than employee's mistakes.

If we consider that the number of ICT components was higher in 2009 and that the quality of ICT components is not as good as it was 10 years ago, it is reasonable to expect that there are also more HW failures. It is interesting to see that the number of virus related loss of business data is higher in 2009, although the number of antivirus software used increased. In 1999 only 60.7% of enterprises used antivirus protection. Ten years later ninety-three percent of enterprises used antivirus software. In average they invest 89.6€ per year for computer antivirus protection. On the other hand, 49% of micro businesses in 2009 used some kind of illegal software product (unlicensed, black copy). Alternatives for such businesses are free open source software solutions which are not yet widespread among micro businesses (Werber and Žnidaršič, 2010). The reason for that is unawareness of open software existence among micro business owners.

Employee mistake was listed as the second most important reason for business data lost in 2009. The comparison of average hours used in 2009 for IS related training in last three years (Table 1.) and the fact that almost every year there was a new version of software and computer system can be the reason why so many mistakes were made by employees. Only investments in education of employees can decrease this risk factor.

If almost every second business lost some business data at one time or another, how did they get it back? Results are shown in Table 3. In questionnaire from 1999 we did not offer the first possibility for restoring lost data "They did not (permanently lost)", that is why there is a slash in Table 3 instead of data. We can say "people do not learn others' mistakes". In Figure 2 we can notice the prospect of business data backup systems from 1999 to 2009. On the other hand in Table 2 we can see that in general number of business data loss is higher than in 1999. At first we can think, of course, that they had more SW and the result is obvious. But when we compare the data in Figure 3 we can notice that this is not true. The number of different SW for business support did not increase in year 2009, in many cases the number decreased or was similar. Only the number of general packages and Internet use was higher. We think the reason is in carelessness of micro business owners that did not change in recent years. Until they do not experience the problem of business data loss by themselves, they do not care about it.

Table 3. Businesses problems with lost data

Number of times businesses lost their business data	**1999**	**2009**
Never	58.2%	48.1%
Once	17.7%	24.1%
Twice	16.5%	12.8%
More than twice	7.6%	15.0%
Reason for the loss of business data*		
SW errors	12.7%	4.2%
Computer virus	6.3%	19.4%
Employee mistake	11.4%	37.5%
HW failure	22.8%	38.9%

Other (stealing of PC, bad floppy,…)	7.7%	0.0%
How enterprises retrieved the lost data		
They did not (permanently lost)	/	27.6%
They re-entered the lost data	36.8%	34.2%
They retrieved the data from the backup copy	63.2%	38.2%

4.4 Computer software

Most enterprises in the study from 2009 (95%) use some version of the Windows system (XP, Vista, NT). From various other operating systems, 5% of the enterprises use Linux. In 93% of all companies (Figure 3) general programs (word processor, spread sheets, databases…) were installed, but only a few of them used them to analyze data from the database or to prepare customized reports.

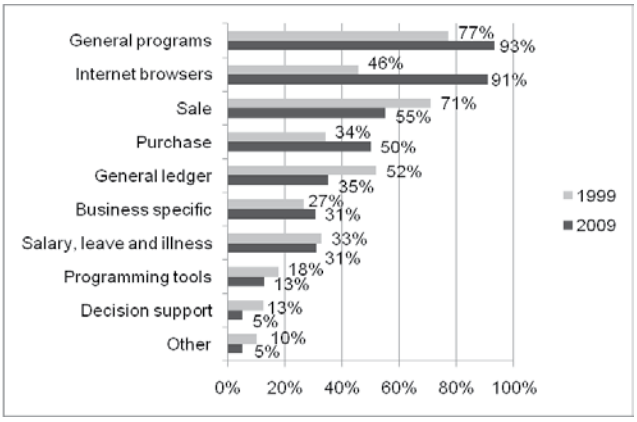


Figure 3: Type of software used by micro enterprises

These tools were mostly bought together with the computers, which may explain why they were not used much. Insufficient computer knowledge and skills of the owners/managers and employees may be a possible explanation for the non-use of software tools. Relatively low self-assessment of computer knowledge and skills, found in our study, supports this assumption. Only 12.7 % of businesses in 2009 used some type of package for application development (MS Access, Visual Basic …), and 5% had applications for decision support.

The difference in amount of used sale SW between 1999 and 2009 is the result of different sample of micro enterprises. In 1999 the number of retail businesses was larger (27%) compared to 2009 (10%).

We also notice a difference in characteristics of used business software. In 1999 51% of business SW was made specifically for the business needs, while the percentage of such SW was only 29% in 2009. Similar in both samples (33% in 1999/34% in 2009) is the amount of business SW that roughly corresponds to their business needs and they can adjust it if they pay for adjustments. The rest of business SW is general and does not allow any adjustments (26%/37%).

4.5 Computer hardware

Table 4 presents the comparison of ICT equipment of studied micro enterprises between years 1999 and 2009. To test statistical significant differences t-test and χ^2 –test were conducted.

The average number of laptops per company was 2.3, desktops 1.3, workstations 0.2 and network server 0.4. If we sum up, all computer companies from our sample had 4.1 computers per organization (1.6 computers per one employee). In 1999 there were on average 3.6 computers per organization (1.1 PC per employee). Those differences in the number of all computers per employee are statistically significant at 5% significance level (t=-2.495, p=0.013). There are also significant differences in average number of workstations per enterprise (t=3.322, p=0.001) and per employee (t=2.854, p=0.005), where the average number of workstations declines from 1999 to 2009. The reason for the decline is in higher performances of PC and LT in the last years, so there is no need for any more purchasing of expensive high performance workstations mostly used for graphic and engineering industry. Thirty-five (35%) enterprises have local network, 38% used an UPS for emergency power supply in case of power failure, and 13% use a "bar-code" system for product identification in 2009. There is evident growth in the percent of enterprises that use opportunities of the Internet (χ^2=42.97, p=0.000), online banking operations (χ^2=64.14, p=0.000) and e-business in 2009 (χ^2=16.77, p=0.000). On average, micro enterprises invest 1539 € per year in computer hardware or computer hardware services and 880 € in software or software licenses.

4.6 Results of hypothesis test

Based on the analysis of the results (Table 4) hypothesis H1 can be rejected, since statistically significant differences at 5% significance level in use of ICT are only greater in the number of workstations in enterprise and the number of workstations per employee from year 1999. All other compared ICT components are in 2009 presented in similar (not significantly different) or higher (significantly different) amount than in 1999.

Table 4 presents the factors that we studied in 1999 and 2009 in conjunction with the successful use of ICT and micro business success. To test the hypothesis, correlations, analysis of variance and t-test were conducted. Table 4 shows which factors have been confirmed and which not. Slash indicates that listed factor was not studied. Detailed statistical data are published in the publications of both authors with similar subjects from 2000 to 2011. Except where we have not dealt with the same factors in both studies results showed, that the factors of effective use of ICT and business success remain alike. The difference is at factor legal form of company where in 1999 there were no statistically significant differences in the number of programs used among enterprises with different form of organization, while in 2009 limited liability companies were using more programs than private entrepreneurs. Another difference is by factor outsourcing of accounting functions. There were no statistically significant differences in the number of programs used in 1999. The result was different when the entire (original) sample was used before we subtracted

Table 4: Equipment of businesses with ICT and its use

Used ICT and Software	**1999**	**2009**	**t-test / χ^2 –test**
Number of enterprises	79	134/133*	/
All computers – average on business	3.61	4.09	t=-0.940, p=0.348
All computers – average on employees	1.06	1.56	t=-2,495, **p=0.013**
Personal computer – average on business	2.51	2.31*	t=0.580, p=0.563
Personal computer – average on employees	0.76	0.78*	t=-0.301, p=0.764
Laptop (on business/ employees)	/	1.29* / 0.50*	/
Work station – average on business	0.68	0.15*	t=3.322, **p=0.001**
Work station – average on employees	0.19	0.06*	t=2. 854, **p=0.005**
Network Server– average on business	0.47	0.41	t=0.414, p=0.679
Network Server- average on employees	0.09	0.12	t=-0.591, p=0.555
Internet connection	67.1%	97.7%	χ^2=42.97, **p=0.000**
Local area network	40.5%	35.0%	χ^2=0.63, p=0.426
Barcode reader	22.8%	12.7%	χ^2=3.69, p=0.055
UPS (Uninterruptible power supply system)	31.6%	37.6%	χ^2=0.75, p=0.386
Online banking operations	24.1%	80.2%	χ^2=64.14, **p=0.000**
E-business	35.4%	64.8%	χ^2=16.77, **p=0.000**
Selling on the Internet	8.9%	13,4%	χ^2=1.00, p=0.317
Antivirus program	60.8%	93.2%	χ^2=33.82, **p=0.000**
Use of illegal software	/	48.9%	/
DOS	13.8%	0.0%	/
WIN.(3.1 - 2000 or NT) in 1999; NT, XP, Vista in 2009	84%	14.9%,78.4% 17.2%	/
Other (Linux, Nowell, Netware)	2.2%	6.0%	/

** excluded data of one business that was specialized in IS and IT training (40 PC and 20 LT).*

only micro enterprises. Otherwise in 2009 the enterprises that have been outsourced accounting and bookkeeping were on average less successful in use of ICT. Owner's skills and knowledge from computer and information systems fields are important factor in successful use of ICT, while higher number of different programs used is in positive correlation with higher level of computer knowledge. Therefore we can accept hypothesis H2, because there are only a few differences between the studied factors.

5 Conclusion

Comparison of ICT usage and studied success factors of micro businesses success in time between 1999 and 2009 showed that businesses are better equipped with ICT than 10 years ago, but use less business computer programs. Perhaps the reason is in increased percentage (80%) of businesses that outsource accounting and bookkeeping services and so they do not need additional business programs. Instead of that, most of them use general purpose programs like MS Office and Internet browsers.

If we are pleased that micro enterprises are on average equipped with 1.6 computers per employee, we are disappointed regarding the exploitation of its full potential. As concluded in Lee et al., (2009) our results show that it is imperative for micro enterprises to adopt computerization to achieve improvements in business performance. But is it enough?

As stated by Stevart et al.(2007) thousands of companies have implemented large and small IT investments in software applications, work process, business organization, supply chain management and customer relationship management. Even though technology investments have contributed significantly to output growth in the United States, profitability and productivity have not always emerged as a result of IT investments. We agree that when IT investments, such as new work systems, are coupled with organizational redesign and business process reengineering, these changes are more likely to yield substantial productivity improvements, since many of these changes are likely to lead to a competitive advantage.

Table 5: Analyzed factors of successful use of ICT with summary of tests performed

Factors	**1999**	**2009**
Owner IS related knowledge	YES Pearson correlation: r=0.237*, p=0.025	YES Pearson correlation: r=0.295**, p=0.001
Legal form of company (private entrepreneurs, limited liability company, other)	NO t-test: Means: 3.80 (pe), 4.44 (llc). t=-1.566, p=0.112	YES ANOVA: Means: 3.57(pe), 4.76 (llc), 3.8 (other). F=9.684, p=0.000
Number of employees	YES Pearson correlation: r=0.253*, p=0.035	YES Pearson correlation: r=0.327**, p=0.000
Number of ICT components	YES Pearson correlation: r=0.301**, p=0.007	YES Pearson correlation: r=0.292**, p=0.001
Use of Internet (7 levels from information searching to an internet based business)	YES Pearson correlation: r=0.345**, p=0.000	YES Pearson correlation: r=0.327**, p=0.000
Outsourced accounting and bookkeeping	NO t-test: Means: 4.12 (yes), 4,23 (no) t=-0.099, p=0.921	YES t-test: Means: 3.79 (yes), 5.23 (no) t=-4.355, p=0.000
Years of ICT use	NO Pearson correlation: r=0.105, p=0.356	YES Pearson correlation: r=0.329**, p=0.000
Annual turnover	YES Pearson correlation: r=0.327**, p=0.000	YES Pearson correlation: r=0.358**, p=0.000

***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

Similar to Wiklund et al. (2009) and Jungwoo (2004) our study showed that owners'/ managers' personal attitudes directly and/or indirectly influence business growth and success. Implementation and successful operation of computerized business is strongly related to characteristics of the owner/manager (formal education, gender, computer knowledge and skills). Micro enterprise owners/managers in general recognize and value IT, but they use it mainly to support daily operations of the business rather than to support decision-making (5%), and are mostly not aware of its strategic and organizational impact. Most of them also do not use end-user friendly PC based development tools, such as databases which are readily available to most companies participating in our study. Only a small portion of them (13%) use end-user friendly tools to support their business. This may also indicate the lack of computer knowledge and skills in micro enterprises.

According to our findings and findings reported by Riemenschneider and Mykytyn, (2000) current owners and managers of micro enterprises are aware that in order to take full advantage of the existing technology they should increase the level of their computer skills and knowledge, stay informed about new trends, developments in the IT and communication area, and acquire technical and managerial competences needed to effectively manage the IS. Training in using of PC based end-user tools and their use for data analyses may also help owners, managers and employees of micro enterprises to gain self-confidence in using IT and better exploit the available technology. Because of that, investments in education and training are unavoidable.

Since majority of enterprises (80%) outsourced accounting and bookkeeping to an external partner, they should also consider outsourcing IT and IS as suggested by Rohde (2004). If they do so then the difference in SW use will be compensated.

Suitable policy interventions from the government and active support from the private sector are needed to address the issue of eOpportunities (Kapurubandara and Lawson, 2007; Jeon et al., 2006). The government needs to take leadership to facilitate a regulatory environment, improve national infrastructure (Bučar et al., 2006) and continue to help with ICT education. The government and Chamber of Commerce and Industry of Slovenia should inform, consult and involve micro enterprise in business and finance opportunities of the EU.

Research limitations

Although many other authors use similar samples for studies of micro and small businesses as we, we can expect that a larger sample of micro businesses would indicate additional factors that were not confirmed this time, because they only showed statistically insignificant differences.

Because the study in 1999 was focusing on small enterprises, and in year 2009 on micro enterprises, the sample from year 1999 was reduced only to businesses that confirm with micro business characteristics.

Micro businesses as private entrepreneurs are not obligated to report financial results to Slovene statistical office according to Slovene legislation. Because of that we offered small business owners to indicate which class of annual turnover corresponds to their business instead of recording real financial data. This could be a potential source of non-significant correlations between the performance of enterprise and successful use of ICT.

Many other factors should be studied in further research (Werber & Zupančič, 2005) to fully understand micro business characteristics and their ICT use, e.g. location of the enterprise, reason for the establishment of enterprise, strength of micro business associations, international collaborations and associations…

International comparisons with other studies are almost impossible, because they use samples of small enterprises (10-50 employees) or SME samples that are on first glance similar to our samples, but do not take into account the specialties of micro business.

6 References

Andersson S. & Florén H. (2008). Exploring managerial behaviour in small international firms, *Journal of Small Business and Enterprise Development*, 15(1): 31-50. DOI: 10.1108/14626000810850838

Antlová K. (2009). Motivation and barriers of ICT adoption in small and medium-sized enterprises, *Ekonomie a Management* 12(2): 140-155, Retrieved January 12, 2012, from http://custom.kbbarko.cz/e+m/02_2009/11_antlova.pdf

Bartlett J., Kotrlik J. & Higgins C. (2001). Organizational Research: Determining Appropriate Sample Size in Survey Research, *Information Technology, Learning, and Performance Journal*, 19(1):43-50. Retrieved November 23, 2010, from http://www.osra.org/itlpj/bartlettkotrlikhiggins.pdf.

Bučar M., Stare M. & Jaklič A. (2006). eStrategy and ICT Investment in Slovenia In: Walden P. et al., (Eds.). *Proceedings of the 19th Bled eConference: eValues*, Bled 5 – 7 June. 2006, Slovenia: pp. 1-13. Retrieved January 4, 2012, from http://aisel.aisnet.org/bled2006/19/

Burke E. A., FitzRoy R. F. & Nolan A. M. (2008). What makes a die-hard entrepreneur? Beyond the 'employee or entrepreneur' dichotomy, *Small Bus Econ*, 31(2): 93–11. DOI: 10.1007/s11187-007-9086-6

Chuang T., Nakatani K. & Zhou D. (2009). An exploratory study of the extent of information technology adoption in SMEs: an application of upper echelon theory. *Journal of Enterprise Information Management*, 22(1-2): 183-196. DOI: 10.1108/17410390910932821

Davies A., Evans C., Parfett M. & Emery A. (2006). eBusiness Change Management in SMEs: An Initial Investigation, In: Walden P. et al. (Eds.). *Proceedings of the 19th Bled eConference: eValues*, Bled, Slovenia, 5–7 June 2006: pp. 1-12, Retrieved November 4, 2011, from https://domino.fov.uni-mb.si/proceedings.nsf/0/453223d94e506de3c12571800030c91d/$FILE/11_Davies.pdf

DeLone W. H. (1988). Determinants of success for computer usage in small business, *MIS Quarterly*, 12: 51-61.

Gutierrez J., Orozco J. & Serrano A. (2009). Factors affecting IT and business alignment: a comparative study in SMEs and large organisations. *Journal of Enterprise Information Management*, 22(1-2): 197-211. DOI: 10.1108/17410390910932830

Hunter M. G. (2001). Small business adoption of information technology: unique challenges, in: M. Khosrowpour (Ed.). *Managing Information Technology in a Global Economy*, IDEA Group Publishing, pp. 126-131.

Jeon B., Han K. & Lee M. (2006). Determining factors for the adoption of e-business: the case of SMEs in Korea, *Applied Economics*, November 38: 1905-1916. Retrieved January 4, 2012, from http://ssrn.com/abstract=1305653

Jungwoo L. (2004). Discriminant analysis of technology adoption behaviour: a case of Internet technologies in small businesses, *The Journal of Computer Information Systems*, 44(4): 57-66.

Kapurubandara M. & Lawson R. (2007). SMEs in Developing Countries Need Support to Address the Challenges of Adopting e-commerce Technologies, *Proceedings of the 20th Bled eConference eMergence: Merging and Emerging Technologies, Processes, and Institutions*, Markus, M. L. et al. (Eds.), June 4-6, 2007; Bled, Slovenia: pp. 1-15. Retrieved January 4, 2012, from https://domino.fov.uni-mb.si/proceedings.nsf/2007 .

Koellinger P. (2008). Why are some entrepreneurs more innovative than others?, *Small Bus Econ*, 31(1): 21–37. DOI: 10.1007/s11187-008-9107-0

Galloway L. (2007). Can broadband access rescue the rural economy? *Journal of Small Business and Enterprise Development*, 14(4): 641-653. DOI: 10.1108/14626000710832749

Lee S. M., Kim J., Choi Y. & Lee S. G. (2009). Effects of IT knowledge and media selection on operational performance of small firms, *Small Bus Econ*, 32(3): 241–257. DOI: 10.1007/s11187-007-9095-5

Matek M. & Butalič S. (2009). Rapid reports, No. 6/2009, 14 BUSINESS ENTITIES No 1, Statistical office of the Republic of Slovenia: pp. 1-12. Retrieved February 21, 2011, from http://www.stat.si/doc/statinf/14-si-188-0901.pdf

Neuberger D. & Räthke S. (2009). Microenterprises and multiple bank relationships: The case of professionals, *Small Bus Econ*, 32(2): 207–229. DOI: 10.1007/s11187-007-9076-8

Ng W. & Keasey K. (2010). Growing beyond smallness: How do small, closely controlled firms survive? *International Small Business Journal,* 28(6): 620-630. DOI: 10.1177/0266242610369879

Riemenschneider C. & Mykytyn P. (2000). What small business executives have learned about managing information technology, *Information & Management*, 37(5): 257-269. DOI: 10.1016/S0378-7206(99)00052-X

Rohde F. (2004). IS/IT outsourcing practices of small- and medium sized manufacturers, *International Journal of Accounting Information Systems*, 5(4): 429-451. DOI: 10.1016/J.ACCINF.2004.04.006

Seyal A. H., Rahim M. M. & Rahman M. A. (2000). An empirical investigation of use of information technology among small and medium businesses organizations: a Bruneian Scenario, *The Electronic Journal on Information Systems in Developing Countries*, 2(1): 1:17. Retrieved January 4, 2012 from: http://www.ejisdc.org/ojs2/index.php/ejisdc/article/viewFile/12/12

Shiau W, Hsu P. & Wang J. (2009). Development of measures to assess the ERP adoption of small and medium enterprises. *Journal of Enterprise Information Management*, 22(1-2): 99-118. DOI: 10.1108/17410390910922859

SI-STAT Data Portal, Economy, Enterprises by activities (SKD 2008) and size class by number of persons employed, Slovenia, annually. Retrieved February 21, 2012, from http://pxweb.stat.si/pxweb/Dialog/varval.asp?ma=1418801E&ti=&path=../Database/Economy/14_business_subjects/01_14188_Enterprises/&lang=1.

Stewart W., Coulson S. & Wilson R. (2007). Information Technology: When is it Worth the Investment, *Communications of the IIMA*, 7(3): 119-122. Retrieved February 21, 2011, from http://www.iima.org/CIIMA/14%20CIIMA%207-3-07%20Stewart%20119-122.pdf

The commission of the European Communities, (2003). Commission recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises, *Official Journal of the European Union*, L124: 36-41. Retrieved February 21, 2011, from http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm

Yang C. H. & Chen K. H. (2009). Are small firms less efficient?, *Small Bus Econ*, 32(4): 375–395. DOI: 10.1007/s11187-007-9082-x

Yap C., Soh C. & Raman K. (1992). Information systems success factors in small business, *OMEGA*, 20:597-609.

Verber B. & Zupančič J. (1993). Application of information technology in small business in Slovenia, In: F. Stowell, D, West & J. Howell (Eds.). *Proceedings of the United Kingdom System Society Conference on System Science: Addressing Global Issues*, Plenum Press, 1993, pp. 493 - 504.

Werber B. & Zupančič J. (2005). Information system adoption in small companies - model of key issues. In: Jašková, M. (Ed.): *ECON* '05: [selected research papers], (Research works proceedings) Ostrava: Technical University of Ostrava, Faculty of Economics, 12: 355-367.

Werber B. & Žnidaršič A. (2010). Slovenian micro enterprises and eOpportunity challenge, *23th Bled eConference: implications for the individual, enterprises and society: conference proceedings*. June 20-23, 2010, Bled, Slovenia. Retrieved February 21, 2012, from: http://aisel.aisnet.org/bled2010/8/

Werber B. & Žnidaršič A. (2011). Awareness of existence and use of open source software in Slovene micro-enterprises. in: Kern T., Rajkovič V. (Eds). *People and sustainable organization*. Frankfurt am Main [etc.]: Peter Lang: pp. 421-439.

Wiklund J., Patzelt H. & Shepherd A. D. (2009). Building an integrative model of small business growth, *Small Bus Econ*, 32(4) :351–374. DOI: 10.1007/s11187-007-9084-8

Winston E. & Dologite D. (1999). Achieving IT Infusion, A Conceptual Model for Small Businesses, *Information Resources Management Journal*, 14(1): 26 – 38.

Zajec M. & Roblek M. (2011). Are There Important Differences in Success and in Organizational Culture between Family Companies in Production and Service Sector in Slovenia?. *Organizacija,* 44(6):195-205. DOI: 10.2478/v10051-011-0021-x

Zupančič J. & Werber B. (2002). Key issues in information technology adoption in small companies. In: Kirikova M. et. al. (Eds.), *Information systems development : advances in methodologies, components, and management*. New York [etc.]: Kluwer Academic/Plenum Publishers, cop. 2002, pp. 353-362.

Žnidaršič J. & Jereb E. (2011). Innovations and Lifelong Learning in Sustainable Organization. *Organizacija*, 44 (6):185-194. DOI: 10.2478/v10051-011-0020-y

Borut Werber graduated in Information Systems from the Faculty of Organizational Sciences, University of Maribor, Slovenia. At the same faculty in 2001, he became a senior university teacher of Information Systems. His fields of research are computerisation of small and micro-enterprises, computing and knowledge and skills of MIS professionals.

Anja Žnidaršič has a diploma in Mathematics from the University of Ljubljana. In 2007, she became a Teaching Assistant at the Faculty of Organizational Sciences, University of Maribor, Slovenia. She is currently working on her doctoral thesis in statistics where she explores social networks and blockmodelling. Her field of research also includes micro-enterprises.