

Study of Digital Divide: Measuring ICT Utilization and Implementation Barriers Among SMEs of Central California

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Abstract

This paper reports on findings of a study conducted among over 750 small and mid size businesses of Central California regarding uses and application barriers for Information and Communication Technology solutions. This study focused on the scale, dimensions and reasons for existence of so called “Digital Divide”. It shows that primary reason for discrepancies in utilization of ICT among SMEs and large corporations is not as much lack of funds or access to information technology as it is lack of proper management, education, training and skilled labor. Some comparative pilot data from Poland and Brazil indicate also that insufficient management, education and training may contribute to existence of Digital Divide regardless of economic status of a country.

1. Introduction

Digital Divide phenomenon has been a focus of many discussions in recent years in both political and academic forums. The state of California is considered a prime example of disturbing discrepancies between Information Technology “haves” and “have nots”. California being the fifth economy of the world spans between two edges of Digital Divide: corporations of Silicon Valley with cutting edge technology on one side and old fashion and outdated SMEs, rural and agricultural businesses on the other. This is not to conclude that a division line runs only geographically between the progressive, ICT savvy coast and underdeveloped, rural Central California. It has been shown in other studies that equally important criteria for this divide is a size of the company with the small business being definitely on the weaker side in ICT applications [Papazafeiropoulou, A., Pouloudi, A 2003] [1].

A survey has been conducted between 2003 and 2005 to audit information technology uses among small and medium sized businesses in California's Central Valley. A sample of surveyed SMEs exceeded initially $n=750$ observations and was eventually reduced to 679 valid observations.

The purpose of the survey was twofold:

1. to identify how Information Technology solutions are being used by SMEs, and
2. to identify barriers for non-use.

The study sample included 679 businesses, government and non-profit agencies. The information collected not only provides a baseline for current ICT use, but allows for identification of opportunities and strategies for increased use leading to potentially major productivity gains.

2. Literature survey

Study of Digital Divide spans across many disciplines from sociology and political science to economy, business and information systems. Consequently, some of the most popular definitions of the Digital Divide concept are very broad. Holmes defines it broadly as “the great disparities between and within societies in the use of digital technology” – [Holmes, 2003]. This is also a definition used widely with United Nations literature [2]. There were numerous attempts to create a complex index identifying an overall scale of Digital Divide. Dolnicar, Vehovar, and Sicherl proposed two forms of advanced methodological measurements: a composed measure - the digital divide index (DIDIX) and the time distance methodology, which offers a significant improvement at both conceptual and application levels [3]. In another study completed in Germany [Husing, Selhofer, Korte 2001] attempt to measure Digital Divide was based on four dimensions: gender, age, education and income [4]. Authors concluded that education was an area of the largest discrepancy whereas gender had a negligible impact. Digital Divide was defined in this study as “the gap between individuals, households, businesses and geographical areas at different socio-economic levels with regard to both their opportunities to access information and communication technology (ICT) and to their use of Internet for a wide variety of activities.”

Out of three major levels of Digital Divide discussed in the literature: individual, business, and region, it is business aspect that is the focus of this paper. It has been shown in many studies that existence of Digital Divide may have a profound impact on operations of business in this information driven century. A typical example could be possible failure or limited growth of e-commerce ventures due to the limited level of computer literacy of broad market participants. Dynamic growth of e-commerce economy which we have enjoyed over the last decade could turn out to be very deceiving. Its growth is still fueled by specific section of society that is positioned on the right (knowledgeable) side of Digital Divide. However, as it was discussed by Gregorio, Kassiech, and De Gouvea Neto [2005] drivers of e-business activity in developed and emerging

markets may encounter a major limitations and barriers associated with existence of Digital Divide in terms of large sections of the market incapable to utilize this technology driven offer [5].

As we look closer at Digital Divide issue in the context of SMEs and their performance, it becomes clear that all three levels described above are very well connected. It is individuals and their attitude toward technology that contributes to SME's ability to use ICT, which in turn enhances its performance and contribution of this business to an overall wealth of the region. If it this happens at much smaller scale among SMEs than among large corporations, then the question is – why? Study conducted by H. Hudson [Hudson, 2000] led to conclusions addressing reasons for Digital Divide at the level of an individual: “since computer use requires literacy and more skills than using a telephone, we could expect than education rather than income would be a better predictor of demand (.. for ICT). U.S. data appear to indicate that education is critical to adoption (..of ICT).” [6]. It is intention of this study to confirm this conclusion and extend it to the level of small and mid size business, where lack of proper education, training and knowledge among employees may play more vital role in creating ICT implementation barriers than for instance lack of funds or access to this technology.

3. The sample, methodology and hypothesis

The focus of this study was on SMEs – Small and Mid size Enterprises but included also small percentage of businesses, which operated relatively independently even though formally they sometimes represented part of a larger corporation. Those businesses were included in the study even though their formal number of employees exceeded 500. Small and medium sized enterprises count for 99% of all businesses in the EU and about 98% in the US. The term of 'SME' consequently covers a wide range of business types, from the self-employed through typical small or mid size business to multinational public limited companies with up to 500 employees.

3.1. The sample

Businesses participating in a survey by design were supposed to fall into category of so called small and mid size enterprises. However, this definition is not yet consistently developed and is used here in rather broad term. For instance – there are some difference between SME definitions used in EC countries and US.

The SME definition used in the countries of European Community is as follows:

- 1. Small and medium-sized enterprises, hereinafter referred to as 'SMEs', are defined as enterprises which:
- have fewer than 250 employees, and*

- have either,
 - an annual turnover not exceeding ECU 40 million, or
 - an annual balance-sheet total not exceeding ECU 27 million,
- 2. Where it is necessary to distinguish between small and medium-sized enterprises, the 'small enterprise' is defined as an enterprise which:
 - has fewer than 50 employees and
 - has either,
 - an annual turnover not exceeding ECU 7 million, or
 - an annual balance-sheet total not exceeding ECU 5 million [7]

The World Bank Group is defining SMEs as follows:

The SME Department is currently working with the following definitions: micro enterprise-up to 10 employees, total assets of up to \$100,000 and total annual sales of up to \$100,000; small enterprise-up to 50 employees, total assets of up to \$3 million and total sales of up to \$3 million; medium enterprise-up to 300 employees, total assets of up to \$15 million, and total annual sales of up to \$15 million. While these definitions are admittedly subjective and still under review, they are broadly consistent with those used by most other international financial institutions. Still, it should be noted that the numbers shown above depend heavily on choice of this (or any other) definition.

A total of 679 Central California companies and other organizations participated in the survey. The companies were ranked based on the number of employees, annual revenues, and industry type. The company size classification is displayed in Fig. 1 and 2 below.

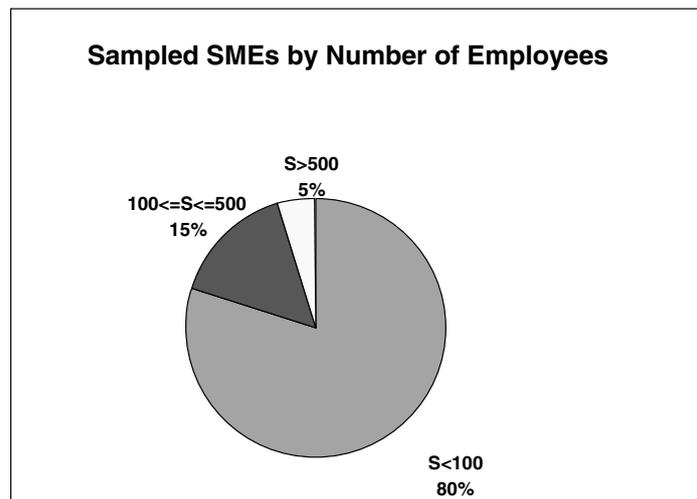


Figure 1. Company Size by Number of Employees.

Some 80 percent of the participants had 100 or fewer employees, and 15 percent of the respondents reported more than 100 but less than 500 employees. There were 5% companies with number of employees above 500. Most of the companies in the last category were closely affiliated with larger corporations but operated relatively independently.

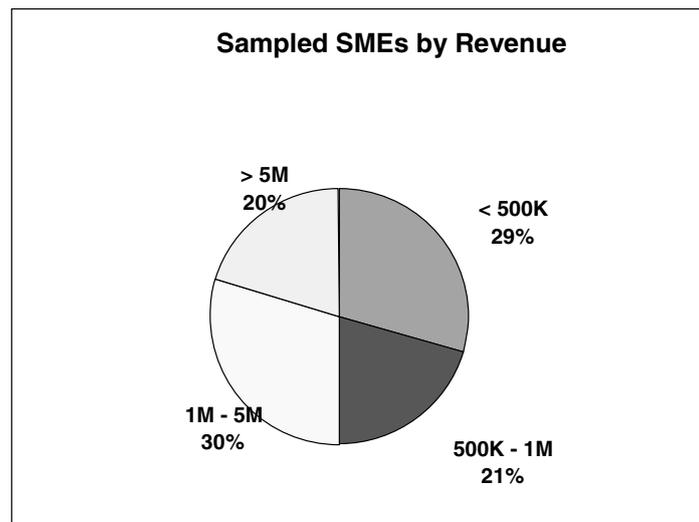


Figure 2. Company Size by Revenue.

Entire sample of SMEs was distributed pretty evenly with respect to revenue. Revenue of surveyed SMEs ranged from less than 500 thousand to more than 5 million dollars a year. This was an important factor for analysis of an impact that access to funds plays in implementation and usage of Information Technology among SMEs.

Figure 3 reports on the industry segments of participating companies. Forty three percent of the respondents were in the broadly defined service industry, which includes restaurants, auto repair shops but also banking and insurance. Twenty one percent were typical retail businesses, 5 percent were in the public or government sector, 6 percent in medical, 6 percent in manufacturing, 6 percent in non-profit, 6 percent in agriculture, and 7 percent were classified as "other."

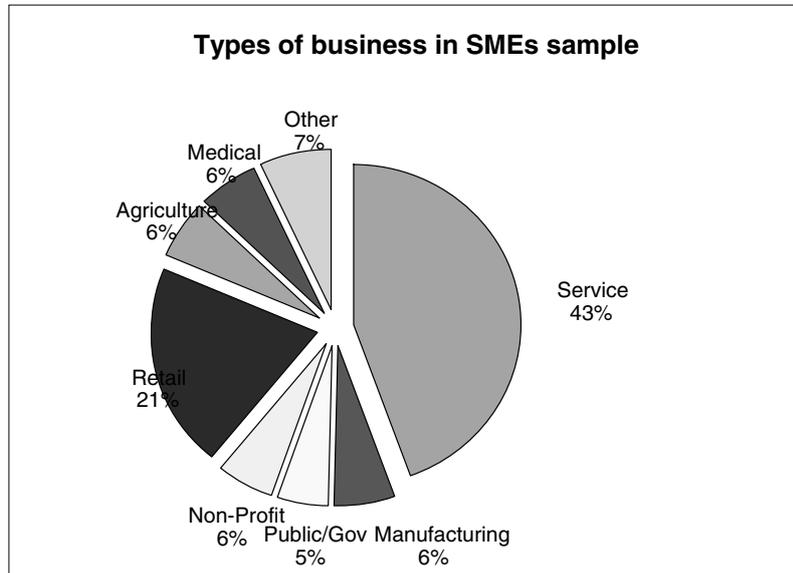


Figure 3. Industry type breakdown within the sample of n=679 SMEs.

Thus 89 percent of the sample were private sector organizations and only 11 percent were non-profit or government organizations. With the exception of agriculture, the sample represents a reasonably accurate cross section of the Central California economy in both employee size and type.

3.2. Methodology

The data was collected using structured interview format and short survey instrument. Interviews were conducted with either owners of small businesses or managers. It is important to realize that all the answers represent owner/manager's prospective of ICT problems in small business. This approach was used in the study due to our decision to focus on ICT impact on core business processes and its relation to SME's performance. Relatively low computer literacy of lower level employees in SMEs would most likely prevent us from getting enough information to evaluate those factors.

The survey can be broken down into five general sections. The first section deals with general background information about the size and type of business, the second section identifies intensity of current ICT use within the organization (hardware, software, connectivity), the third section identifies use of ICT in the context of various business processes already utilizing ICT, and the ones which could be enhanced by ICT, and the fourth section identifies the barriers for utilizing information technology. The survey was conducted and data collected over the period of two years. It may eventually lead to creation of a longitudinal

research model capable of capturing time trends in utilization of ICT by small and mid size businesses.

The last part of the survey was devoted to capturing subjective opinions of respondents about perceived barriers to implementation of ICT in the small and mid size businesses. Respondents were asked to rank degree to which listed factors were perceived as barriers in implementation of ICT. Due to the nominal character of data a numerical scale (from 0 to 4) was used to translate subjective answers into ratio data.

Two types of statistical tools were used in this study:

- descriptive statistics – to provide overall diagnosis of status quo in the subject of utilization of Information Technology among SMEs and perceived barriers to ICT implementation, and
- hypothesis testing tools (specifically Chi Square and ANOVA) to verify hypothesis about causal relationship between such variables as company size or type of industry and degree of ICT utilization or perception of barriers to ICT implementation.

All tests and calculations were conducted using Mega Stat statistical package run in the Excel environment.

3.3. Hypothesis

It seems that great advances in Information Technology achieved over the last decade benefit large corporations and major market players to a larger extent than small and mid size companies. This can be seen in dramatic increases in productivity of large corporations, which continuously delivers more output with fewer resources (especially labor). SMEs seem to be lagging behind in ICT driven productivity revolution in spite of very favorable changes in price/performance ratio of new ICT tools and products.

The first hypothesis to be verified in this study was a statement that mere access to hardware, software and connectivity does not translate into evident enhancement of specific business processes conducted within SMEs. In other words, we will question a degree to which potential or actual access to advanced ICT tools really contributes to the bottom line of SMEs.

The second hypothesis driving this study was a statement that in spite of popular perception it is not only cost of hardware and software anymore that constitutes a main barrier causing the technology gap, but lack of education and management skills, which limits ability of SMEs own ICT applications to potentially improve its business processes. We were looking for a confirmation of Champy's rule of education as a driving force behind BPR [8].

A pilot comparative study using data from two additional countries - Poland and Brazil, will be eventually used to verify the last hypothesis. A full scale study is planned to compare utilization of ICT by SMEs across Europe and North and South America with intention to support the third hypothesis described above.

4. Current use of Information Technology among SMEs

This study used two factors to measure degree of utilization of Information and Communication Technology: number of PCs used by the business and speed of used connectivity. The main focus was not technology itself but ways in which it was used to support specific business processes. Our assumption was that lots of ICT tools (hardware, software, connectivity solutions) existing within SMEs were not actually linked in any way to strategic goals of these businesses thus did not contribute to performance enhancement.

4.1. Number of PCs used and connectivity

An average number of PCs used by small businesses (below 100 employees) was 14. Small businesses were in the center of the study and represented 80% of the sample (556 businesses). Even though quantity of 14 PCs may seem to be a small number it has to be noted that only 3 out of 556 small businesses surveyed declared zero number of PCs. This means that almost in every small business ICT was accessible in some form. An average number of PCs for the entire sample was much higher – at 45 PCs. This number must be viewed with some reservations due to the fact that some businesses had more PCs than employees. This was the case when PCs were used as part of service delivered to the clients and not only as a support tool in running the business (training PC labs, Internet Cafe etc.). Overall impression delivered by this part of the survey was that Digital Divide does not really exist for SMEs in terms of limited access to basic hardware such as PCs. This has been confirmed by many previous studies pointing out to a massive proliferation of PCs hardware among businesses due to vary favorable price/ performance ratio.

Analysis of connectivity also confirmed many previous studies: almost all businesses (94%) have some form of connection to the outside world with only 26% still using old fashion dialup connection. About two third (61%) of surveyed SMEs used high speed connection in form of DSL or Broadband. Initial analysis of collected data from longitudinal prospective indicates also a dramatic increase over time in terms of the speed of connectivity used by SMEs. This could be attributed to very aggressive marketing of DSL and Broadband by major phone companies routinely bundling those services with telephone and cellular services.

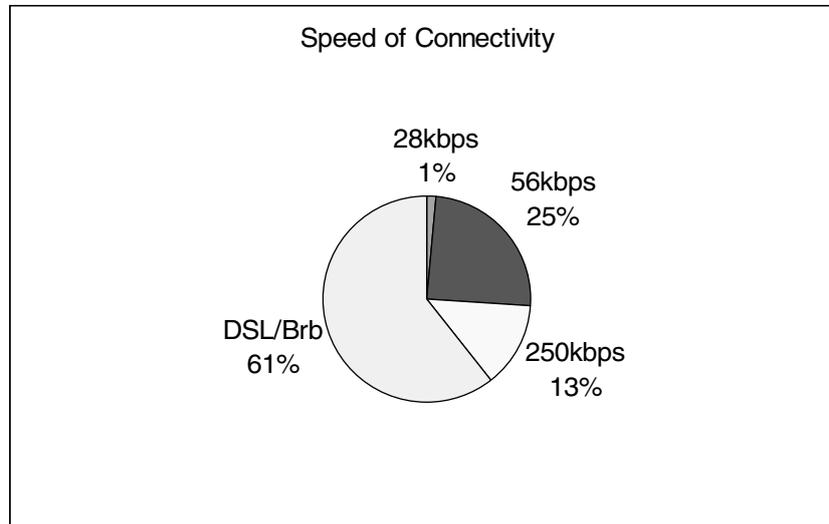


Figure 4. Internet connection speed among SMEs of Central California.

Similarly to hardware access issue, speed of connectivity used by SME may play a role in measuring of Digital Divide but may turn out to be meaningless for the SMEs performance unless it can be tied to enhancement of specific business processes.

Some preliminary data collected among SMEs in Poland under the project *Partnership for development of IT competences in Poland "IT QUAL"* funded by European Social Fund within the Equal Common Initiative and regarding speed of used connectivity revealed similar situation [Arendt, Krynska, 2006] [9]. A small sample of 30 Polish SMEs indicated that 76% used some form of high speed connection (ISDS, DSL or Broadband). This might point to an interesting fact that small and mid size businesses in fast developing countries like Poland could have succeeded in conducting a major technology leap and decrease a gap in the area of connectivity separating them from leading economies like US.

4.2. Uses of Internet and support of business processes.

Another way to measure degree to which ICT solutions are contributing to an overall performance of the SMEs was to look at the use of Internet. Figure 5 shows how companies used the Internet in relation to their business. It is quite clear that there is a great discrepancy between intensity of low level and high level use of Internet. By "low level use" we understand applications of Internet that are more typical to an individual and private use – like e-mail and browsing Internet in search of information. High level use would entail interactive Internet applications directly supporting business processes such as e-commerce, order processing, procurement, e-banking etc.

According to our data large majority of the respondents limit their use of Internet to browsing the Internet and using it for email: 84% and 85% respectively. Using e-mail even to communicate with the customer should not be confused with professional CRM applications and must be considered as a low level use of ICT in business.

It was surprising to find out that only 53% percent of the respondents were using the Internet for broadcasting promotion of products or services utilizing tools like web page development. It seems that this aspect alone could be a poster fact for Digital Divide between Internet savvy large corporations spending millions on fancy, interactive e-commerce sites powered by huge data bases and SMEs, where just having a stagnant basic web site is apparently an insurmountable challenge for almost every other small business.

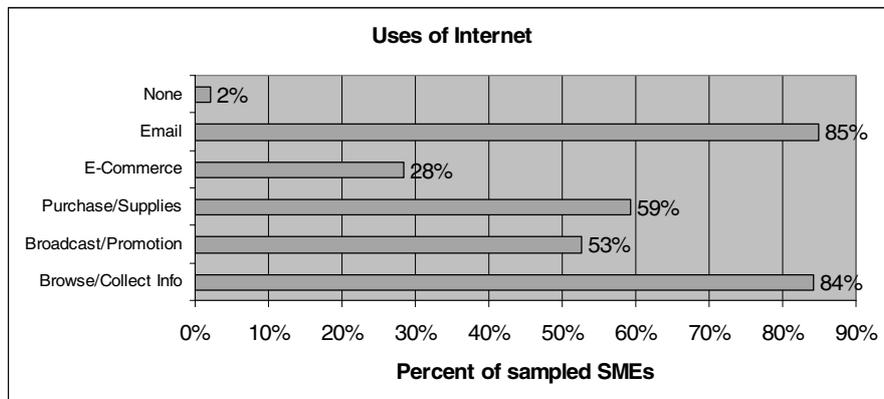


Figure 5. Uses of Internet by SMEs of Central California.

Even though 59% percent of investigated businesses used Internet for purchasing of supplies, it was clear that this activity was not integrated with any internal business processes. This was confirmed by only 28% of SMEs reporting engaging in a real e-commerce activity, which would suggest existence of higher level Internet based applications automating not only purchasing but also order fulfillment process, billing, payments and possibly customer support. Analysis of results presented in Figure 5 above may lead to conclusion that over half of SMEs do not use Internet in any way that is related to enhancement of any specific business process.

The next part of the survey was focusing on the link between uses of Information Technology and specific business processes that company was engaged in. In other words – we were trying to determine how use of Information Technology was impacting company's performance within specific business processes.

This approach stems from the assumption that most companies achieve a quantum leap improvement through Business Process Reengineering, which in turn is usually fueled by innovative uses of ICT. It has been said in the literature

that “to help ensure the success of reengineering, communicate, and to achieve reinvention and transformation, educate” (see Bennis, Mische, 1995) [10].

Our survey was relying on educated definition of processes that owners or managers could identify within the company. We have suggested nine very typical and standard businesses processes that the interviewed companies could choose from. These processes included: ordering, purchasing, customer support, advertising, sales, billing, manufacturing, and shipping.

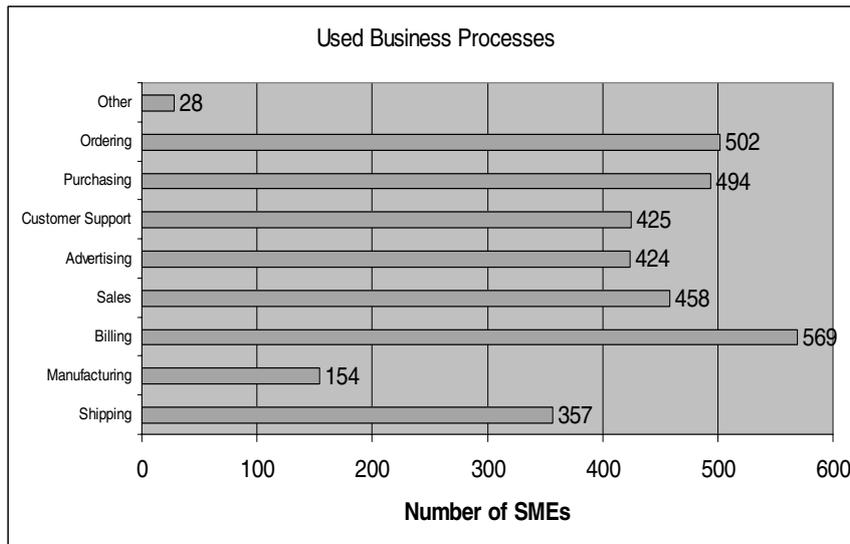


Figure 6. Used business processes among SMEs of Central California.

The bar in the Fig. 6 above indicates the number of companies using each process. Identification of used business processes was followed by the question about utilization of ICT in these processes and potential for improvements with ICT as seen by participants of the survey.

Figure 7 reports on use of ICT in each of the nine processes. Note that ICT was most frequently used in billing, ordering, and purchasing. Such universally needed processes as advertising, customer support and shipping were found to be technology supported in less than half of small businesses. Limited support of computer and Internet technology in advertising was not surprising and reaffirmed findings presented in Figure 5 above on uses of Internet. This would indicate that small businesses in spite of operating in the Information Age are still more “yellow pages” driven than web site driven.

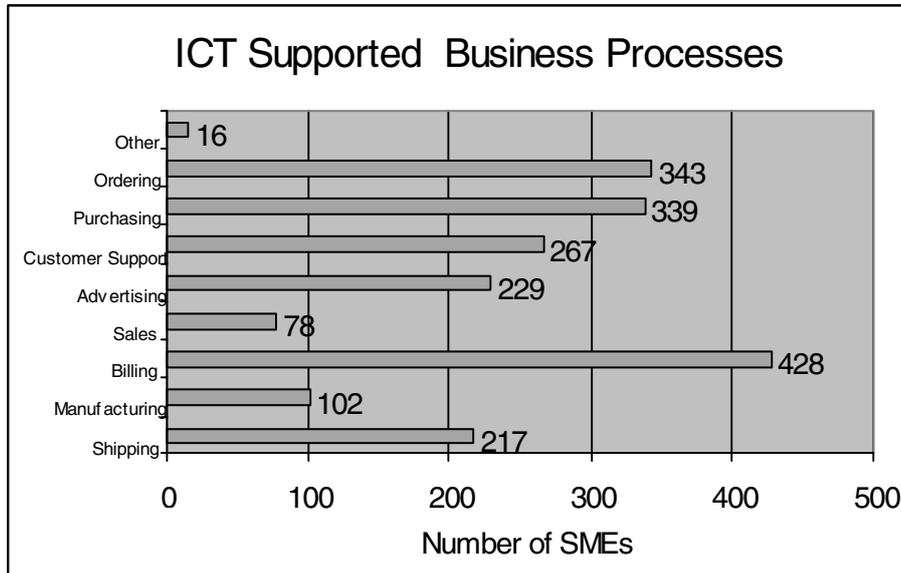


Figure 7. IT supported business processes among SMEs of Central California.

Finally, low frequency of using ICT to support manufacturing was probably due to characteristics of the sample with small number of manufacturing businesses, whereas low frequency of ICT supported sales could be explained by general perception of high complexity and cost of professional e-commerce applications. Cost of such application is routinely overestimated with today's availability of authoring tools and 4-GL programming languages. However, complexity, required skills and overall level of MIS quality needed within small business to build successful e-commerce supporting sales is usually underestimated. Either way sales seem to be another business process where Digital Divide between large and small companies is clear and glaring.

Figure 8 reports on "missed IT opportunities" in terms of areas where the survey respondents thought the company could benefit from future implementations of Information Technology. A relatively small number of respondents in the sample of 679 small and mid size businesses identified such missed IT opportunities. This could be attributed to either high level of satisfaction among owners and managers of SMEs with their used ICT solutions or perhaps lack of real knowledge about potentials that technology can still unleash to improve their bottom line (or both).

The highest number of respondents (140 out of 679) pointed toward advertising as a process most in need of ICT driven enhancement. This was not surprising in the context of our findings reported in Figures 5 and 7. It seems that small businesses are still clinging to traditional, low tech forms of advertising but are becoming quickly aware that an upgrade to ICT driven advertising is necessary and inevitable. One of the most likely drivers of this process is awareness that every business, small or big, operates today in a global

economy and must deal with its threats as well as seize opportunities that come with it. Globalization does not distinguish between small and big business and when applied across entire spectrum of national economy may in fact bring out real disparity of Digital Divide.

Other three processes which were also frequently mentioned as being in need of ICT driven improvement were: customer support, ordering and purchasing. It is interesting that all this processes are more typical for the functional areas served usually by extranet more so than intranet. This could be an indication that investigated small businesses did not see solid enough foundation in their existing MIS to build on it a network of more internal business processes supported and integrated with help of ICT. This statement, however, is only a hypothesis and would require a separate study and different instrument for collecting data.

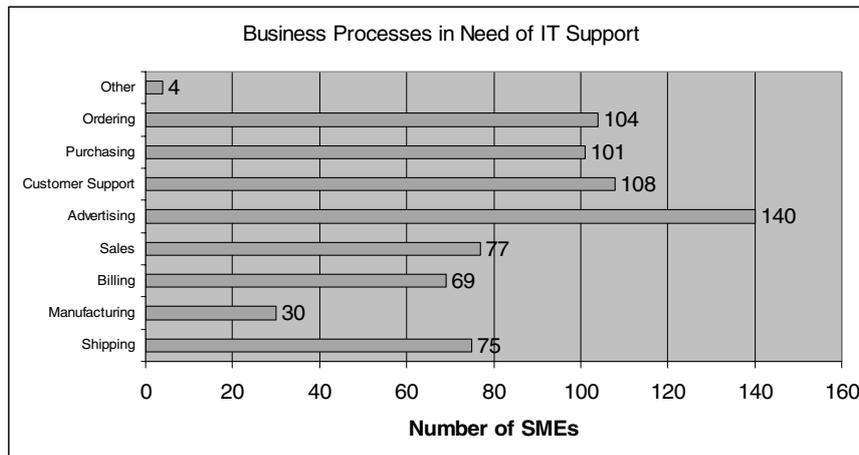


Figure 8. Business processes in need of IT support.

Business processes, which received only marginal attention from respondents as candidates for ICT applications were: sales, billing, shipping, and manufacturing. Small number in case of billing could be explained by the fact that this process had the highest frequency of reported ICT usage (see Figure 7) thus it is not in immediate need of continuing improvement. Sales on the other hand represent totally different case: it was reported as using ICT sporadically, yet it seemed to be ignored when it comes to planning ICT driven enhancements. One possible explanation could be lack of knowledge and skills among SMEs needed to plan and execute enhancement of sales process with ICT based solutions.

In general, in spite of high level of connectivity and relative saturation of small and mid size businesses with PC related technology, business processes used by SMEs are not sufficiently supported by ICT based solutions. This represents confirmation of the first hypothesis described at the beginning of this

paper. Especially sales and advertising represent glaring examples of Digital Divide, when those important and universally used business processes have very little support from ICT based solutions. At the same time it is well known that those two business processes are routinely highly computerized and integrated through ERP type systems among big and technology savvy corporations.

5. Perceived Barriers to Use of Information and Communication Technology among SMEs

Figure 9 reports on barriers to incorporation of information technology into business processes as perceived by either owners or managers of small and mid size business. Respondents were asked to rate specific barriers to the implementation of ICT on a scale of 0 to 4, with 0 being “no barrier” to implementation and 4 being “extreme barrier.” Overall, the respondents perceived relatively low barriers to implementation of information technology. Proposed scale of 0 to 4 would have its mid point at 2. However, none of the means in ranking of barriers exceeded 2, which is suggesting that no one specific barrier is consistently perceived as extreme by SME’s owners and managers.

On the other hand large size of the sample could have such averaging effect. Also, respondents were told that ranking of the barriers is not mutually exclusive and they were asked to mark “all that applies”. Therefore, it is important to note before analyzing data in Figure 9 that number “4” (extreme barrier) was used by far the most frequently – by 86 businesses - with regard to “Lack of IS Plan”. The second barrier most frequently labeled as extreme was “Lack of Funds” – marked with value “4” by 63 businesses in the sample. On the other side of the scale only 20 businesses gave highest ranking of “4” to “Lack of understanding of business processes” and 39 to “Lack of Standard Operating Procedures”.

Analysis of perception of “extreme barriers” across the sample is very consistent with averaged results shown in Figure 9, where “Lack of IS Plan” is surprisingly the most important barrier in implementation of ICT driven solutions among SMEs of Central California with average score of 1.88.

This would directly confirm our second hypothesis that in spite of popular believe Digital Divide among today’s’ SMEs is not any more about access to funds and technology but more about needed education, training and management skills. Results shown below are suggesting that ICT is coming out of age and its main product – information, is being perceived as a key resource even by small businesses. The fact that SMEs are pointing to “Lack of IS Plan” as major barrier to utilization of ICT indicates increasing level of maturity in perception of technology but at the same time speaks to an obvious need for more education and managed approach to implementation of ICT based solutions.

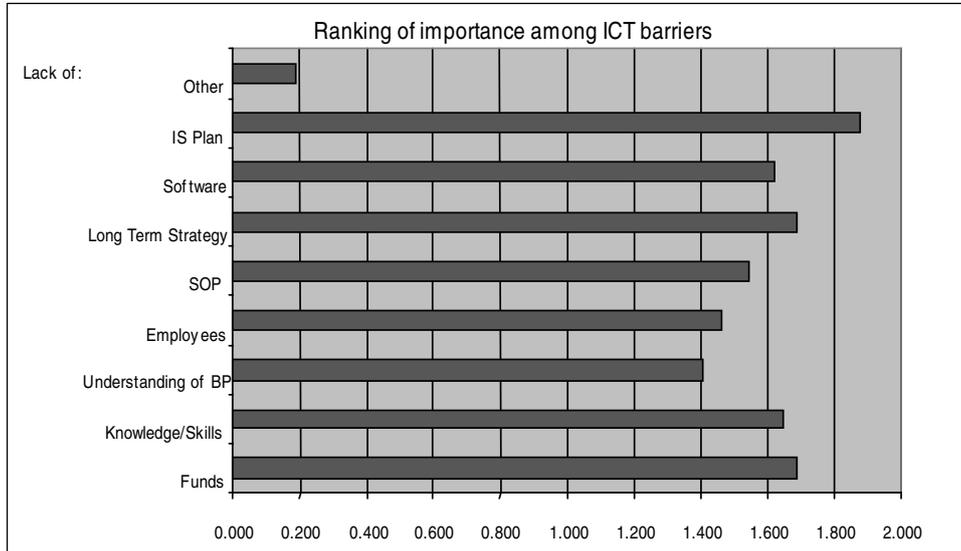


Figure 9. Perceived ICT implementation barriers.

The second level barriers to implementation of ICT in small business was lead by “Lack of Funds” with 1.68 average ranking closely followed by “Lack of Long Term Strategy” and “Lack of Knowledge and Skills” (with scores 1.68 and 1.64 respectively). Even though financial aspect of technology still plays a vital role among small businesses, it is clear that we are observing a major shift from resource driven to knowledge and management driven process of implementing Information and Communication Technology in small business. Pointing to “Lack of IS Plan” or “Lack of Long Term Strategy” as major barriers is an indication of two things: increasing maturity of small business and their vision for utilization of ICT, and certain level of irritation with “improvised” and “gadget driven” approach to ICT implementations among SMEs. This new approach has much higher chance to improve performance of small and mid size businesses with technology solutions and increase their vitality in global economy.

6. Conclusion

The survey of the Central California businesses allows several tentative conclusions to be drawn. It may also serve as a guideline and a predictor of ICT barriers and Digital Divide problems in developing countries. Difference between technology savvy, high tech and wealthy corporation of coastal California and small, rural and underdeveloped agricultural and service businesses of Central California resembles differences between most advanced

and developing countries. Those differences are similar at economic levels but also educational and cultural levels.

First, practically all of Central California businesses interviewed are “connected.” Virtually all respondents had access to PCs, and 94% percent were connected to the Internet, including 61 percent with connectivity at either DSL or Broadband levels. Most subscribed to Internet service providers that allowed high-speed data transfer, so that high-speed access is not a problem. It is safe to anticipate that connectivity issue will be solved first among developing countries and will not contribute to a digital divide. It is in fact an area that some technological leaps are to be expected like in the case of cellular telephony.

Second, many important business processes used by area businesses are currently IT-enhanced. In particular, our survey found that billing, purchasing, ordering, and customer support, employed some information technology with processes like shipping and manufacturing exhibiting low use of IT. Surprisingly, advertising and promotion turns out to be low tech among small businesses in spite of all potentials offered here by Internet based solutions. Over all we believe however, that smaller companies are less likely to have ICT-enhanced businesses processes than the larger companies. Additional study is needed to confirm this latter conclusion.

Third, the perceived barriers to the incorporation of information technology into business processes are somewhat consistent with the popular mythology that information technology is costly and complicated. However, this study showed a certain shift in perception – from cost to complexity. The cost was only the second most frequently cited reason for not incorporating information technology. In reality, most managers overestimate the cost of information technology and/ or overestimate the level of hardware and software needed for their operation. Thus, while cost of implementation is rated as a great barrier to implementation of IT, in reality substantial drop in the cost/ performance ratio of hardware and software is not being properly communicated and is not noticed by most of SMEs. As it was noted by M. Warschauer “the concept of a digital divide separating those with access to computers and communications technology from those without is simplistic and can lead to well-meaning but incomplete attempts at a solution based on merely adding technology to a given circumstance.” [11].

A surprising outcome of this survey is the ICT implementation barrier ranked as number one by the respondents: namely – lack of IS Plan in the company. This is a major indication that a view of ICT as a strategic resource also in the small business is maturing rapidly. Perceived lack of IS plan indicates on one hand growing understanding that a chaotic and random process of “growing” Information System in SMEs is not an option anymore, and on the other – that SMEs are lacking appropriate knowledge, skills and education to create a cohesive IS Plan.

Other perceived reasons for not implementing ICT into businesses processes are lack of knowledgeable employees, lack of an ICT strategy or plan, and lack of standard operating procedures. The lack of a long-term strategy is a very real

barrier to incorporation of information technology. It is difficult to overestimate the importance of developing an explicit ICT strategy. However, to develop an appropriate ICT implementation strategy requires a clear and accurate assessment of available technology, knowledge of what is appropriate for the specific circumstances, and a plan of orderly and economical implementation. Development of a comprehensive ICT implementation strategy is often beyond the capability of many small and medium-sized business owners and managers without sufficient education and training. This is especially true of developing countries where there is a shortage of people with specific business education.

Finally, the respondents appropriately identified the lack of standard operating procedures as a barrier to ICT implementation. Information technology should be used only to automate a well-conceived and efficient procedure or system. Businesses processes that are haphazard or inefficient cannot or should not be automated. One of the most important preconditions to effective implementation of information technology is making sure that the basic business processes are sound. Implementing information technology is not effective if it is perceived as simply a technological "quick fix." The result of computerizing an inefficient process to work faster is not improvement but a multiplication of errors. It is obvious that in a developing country with legal and economic fabric still emerging and not yet solidified it is very difficult to find a business that operates without substantial element of improvisation. This very fact may contribute to a Digital Divide at much larger scale than access to technology.

Closing the Digital Divide is most important for small and medium sized businesses. The good news revealed the survey is that the vast majority of the businesses had the basic information technology and Internet access needed to effectively incorporate information technology into their business processes. The most fundamental need identified in this survey is for education and training in developing efficient business processes (the need for "business process reengineering") and in education and training in appropriate information technology applications. It is our conclusion if education and training in appropriate information technology were provided for small and medium sized businesses, it would make great progress toward closing the Digital Divide between small and large businesses.

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