

# MOTIVATION AND BARRIERS OF ICT ADOPTION IN SMALL AND MEDIUM-SIZED ENTERPRISES

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## Introduction

The current business world is undergoing consistent change. To survive in the current competitive environment companies have to be able to respond to such changes. The ability to react quickly to these changes is itself becoming a competitive advantage for small and medium-sized (SMEs) enterprises compared to those that are unable to be as flexible as other SMEs or larger companies. These companies also demonstrate their ability to work with large companies with which they create new partnerships and strategic alliances. These adaptable companies working in a global environment with the consistent threat of new competition and changing markets, legislation and suppliers, show it is necessary to possess data, information, knowledge and value the experience of their employees. The need for new knowledge and skills requires that employees improve their skills and knowledge continually; by increasing their intellectual capital employees contribute to a consistent improvement in services and product innovation. The transformation of intellectual capital into new products and services, however, requires a new approach to management of the organisation, a flexible organisational structure and the use of information and communication technologies.

For many SMEs owners the business represents their lifestyle fulfilling their personal dreams and visions. The research suggests the approach of the owner, age, personality, experience, managerial skills, education, enthusiasm, etc. are important for the growth of SMEs. The owner's approach may be also influenced by mutual relations with other family members who participate in the ownership or running of the organisation. Sometimes quite complicated family relations can be observed to have negative impacts on the running of the business.

The structure of this article is as follows; the first part analyses ICT adoption in the group of thirty small and medium - sized companies while the second part looks at the most frequent reasons and problems cited as barriers of ICT adoption. Understanding these barriers can help to find better solutions for ICT adoption and implementation in SMEs and to show how successful, growing companies use ICT for their strategic advantage.

### **Benefits of SMEs for Economies**

Based on the long term survey of ICT use in European countries [5] the economic and social benefits of being a small or medium-sized enterprise are:

- Ability to mitigate the negative impact of structural changes.
- Ability to work as sub-contractors of large companies.
- Ability to create conditions for development and implementation of new technologies.
- Ability to create work opportunities under low capital investment.
- Ability to quickly adapt to requirements and fluctuation of the market.
- Ability to operate in marginal areas of the market that are not attractive for bigger companies.
- Ability to decentralize business activities.
- Ability to support fast development of regions, small towns and communities.

### **Negative Factors Affecting Business of SMEs**

The development of a SMEs is also influenced by its surrounding economic environment that impacts the demand for products and services. This either facilitates or limits access of the SME's to the markets that support its further wealth creation and growth. In addition managers of SMEs

have to be able to respond flexibly to changes in their environment and to the wishes of their customers. To do this they need appropriate tools, not only knowledge of the employees, but also information and communication technologies.

Previous research [1] showed that potential growth and survival of SMEs is largely dependent on the environment surrounding the companies. Small and middle-sized enterprises are negatively affected by the following factors:

- Low economic power compared to large companies.
- Difficultly gaining access to capital with a consequently limited ability to finance development activities.
- Worse access to specialized training and education compared to larger companies.
- Lower access to necessary information and consultancy services.
- Unfair competition from large companies and dumping prices of imported products.
- Limited sale of finished products on the domestic market and increased cost of export.
- Competition of retail organisations managed by financially strong companies.
- Weak position in public tenders.
- Failure to and delay in receiving payments resulting in secondary financial insolvency.
- High administrative demands from government bodies and agencies.

## 1. Literature Review

Existing literature reviews propose major differences between SMEs and large organisations [11]:

- SMEs tend to use computers more as tools and less as a communications medium,
- SMEs have much fewer resources available to implement in ICT solutions.

Planning in a small firm has the following characteristics [12]:

- Often done on an ad hoc basis.
- Frequently only a mental activity of the owner or manager.
- Informal, sporadic, and closed.
- Often relying on advice from random acquaintances with less skill and/or less experience than the owner himself.

SMEs have also particular problems in adopting and using ICT. They usually do not have the

appropriate skills available in-house and thus have to train existing staff or purchase those skills in the marketplace [29]. But ICT must be associated with a systematic approach to management and decision making and its introduction requires careful planning [14]. Although the technology is much cheaper than before, it still represents a considerable investment for SMEs, that traditionally lack such funds [16]. The introduction of ICT, which may lead to dramatic changes in the business's fundamental activities, requires an awareness and basic knowledge at the management function, but many owners of SMEs appear to be too busy „surviving“ to invest time in such projects [21;3]. Therefore, there is a significant risk that such efforts to introduce ICT will be unsuccessful, and the cost of such failure may be fatal for the small firm lacking adequate financial and productive cushioning [4]. It is not surprising that, many SMEs have avoided such risks by ignoring ICT [10].

During the long term qualitative survey the approach to and use of ICT in small and medium companies has been monitored. The aim of the research is to find key factors influencing the preparedness for strategic use of ICT and to be better prepared for further education activities for owners or managers of SMEs.

## 2. Data Collection and Methodology

The thirty companies (all from the Czech Republic) have been analysed during qualitative research for 15 years. The data has been collected through interviews with the managers or the owners and also through the cooperation of students and their teachers on some real projects. During this long period SMEs developed and passed through the different levels of changes that impact their size and style of management. This development of SMEs is discussed in the literature [7]. Every stage of development is characterized by several key factors. This research has used the five stages model from Levy and Powell [17]. These five stages of development are:

- **Commencement** (focus on profit, necessity of transparency and acceleration of administration).
- **Survival** (increasing number of customers, higher need for data sharing inside the company).

**Tab.1: Organisations grouped by area of business and number of employees**

Business area (industry)	Total number of org.	Number of org. with 1-9 employees	Number of org. with 10-49 employees	Number of org. with 50-199 employees	Number of org. with 200-250 employees	25% share of a foreign owner
Manufacturing	4		3		1	
Building	4			2	2	4
Services	11	3	8			
Logistic	2	1		1		
ICT	6	1	3	2		
Automotive	3			1	2	3
In total	30	5	14	6	5	7

Source: own

- **Successful position in the market** (competitive pressure, implementation of quality certificates, etc.).
- **Expansion** (financial issues, electronic communication with customers and suppliers).
- **Maturity** (necessity of innovation, change in the management, training and education of employees).

The following Table 1 describes details of business areas of the organisations and their number of employees.

These above mentioned stages are influenced by competitive pressure, changes of the company's environment, necessity of managerial changes and also by a number of other internal and external factors. Therefore the questions at interview with the managers or owners were focused on the development of organisations and the identification of stages such as:

- Market opportunities.
- Managerial experience.
- Surrounding environment of the company.
- New technologies.
- New products of competitors on the market.
- Legal environment etc.
- Cultural internal environment in the company.
- Approach to learning of employees.

The analysed organisations were divided into five groups according to the level of their development during their business existence. Each group has its specific way of managing the organisation, its organisational structure, presence or absence of a corporate strategy, level of utilization of ICT,

internal and external integration ICT supporting processes in the organisation and way of utilization of knowledge of the employees. The objective of this division is to emphasize changes of the management's information needs and better understanding of their approach to ICT. For the purpose of division the following parameters have been used, as they significantly contribute to the acceptance or not of using ICT:

- Defining corporate strategy (long-term financial situation of the organisation, competitive environment and position in the market, parameters of the planning process and assumed development of the organisation, way of managing and general culture in the organisation).
- Defining of the information strategy: the status and expected development of utilisation of ICT (internal communication of employees, using an internal computer network or internet, access from home, support of the management process).
- Management of knowledge (focused on knowledge and skills of employees, ways of sharing their knowledge).
- Innovation (investment into research and design, searching for new ways and possibilities of services and marketing).
- Communication with customers and suppliers including management of the supply chain and online ordering.

### **1st. Stage of Growth: Commencement**

At the beginning of a company's development the owners are able to manage it on their own and are familiar with the details. Taking a more

detailed look at this initial stage, we can observe a very simple organisational structure in this first period, employees and the owner have close relations with each other, strategic decisions are short-term and long-term strategic plan is absent. Investment into ICT is minimal, usually for the purpose of administration. The objective of the organisation is mainly to generate profit and to maintain its position in the market. Gradual growth of the company is connected with transmission into the second stage that can be described as „survival“.

This lowest level is represented by a group of companies where strategic objectives exist only in the minds of the owners or managers and can be often summed up as an effort to survive. It is common that a corporate strategy is not written and companies in this group run their business mainly in the area of services. Also the development of skills and knowledge of employees is neglected; employees are not motivated to improve their skills and knowledge. These organisations have the following characteristics:

- Lack of financial sources for the purchase of ICT, training, etc.
- The corporate strategy can be described as „survival“ and maintaining its position in the competitive environment of the market.
- Limited number of employees.
- Insufficient knowledge of ICT.
- Communication with the customers and suppliers only by e-mail, phone or in writing.
- Information support is by an office software package.
- Failure of the customers to comply with financial obligations.
- Often little specialization of individual associates with everybody doing what is presently needed.

### **2nd. Stage of Growth: Survival**

In this next level the majority of effort is devoted to maintaining stable group of customers with the emphasis on maintaining its position on the market. The strategic plan is still missing and information systems in the organisation are usually simple (often a standard office software package). The owner, however, begins to have issues with maintaining his detailed insight into all orders and with the increasing number of employees. Gradually, as the number of orders

increases together with the number of customers, employees, suppliers and partners, the owner has to delegate a number of tasks to others employees. Despite this the owner still remains a key person for strategic decision-making. Simultaneously, the need for management changes is emerging. These circumstances lead the company into the third stage when it becomes established in the market.

The survival stage is represented by a group of organisations with slight growth where the increasing number of customers drives the need to speed up administrative processes. Also the need for employees to share growing amount of data and the managers need a better overview of customers' orders. The owners in this group are already trying to search for and formulate their corporate strategy. The organisation typically tries to establish itself in the areas with lower competition, such as in newly developing areas focused on specialized services requiring for instance environment-related certificates. Information strategy in such organisations is still not defined. Parameters of these organisations can be summed up as follows:

- The organisation aims to survive successfully in the competitive environment and possibly improve its position in the market. The corporate strategy is formulated with the objective to decrease cost and increase effectiveness, but some strategies are based on innovated special services responding to e.g. environmental requirements utilizing the benefit of a less competitive environment.
- The owners respond to increasing numbers of customers by the effort to multiply economic administrative activities striving to maintain better overview of the financial situation and individual orders.
- Customers of this group are usually small and middle-sized organisations. Some organisations already tried to utilise some applications of electronic business, e.g. electronic e-shop, or at least start to consider it.
- The organisations typically have software applications for accounting and warehouse management.
- These organisations are very often owned by families and their relationships play a key role in decision making, innovation and growth.

**3rd. Stage of Growth: Successful Position in the Market**

In the third stage of growth the company is successfully growing and the manager begins to undertake mid-term planning. In this phase of development, the further growth of the company significantly depends on the approach of the manager or owner. The companies are forced to respond to market demands, wishes of the customers and have to be competitive, in order to avoid declining to an earlier stage. Consequently the managers need to have a vision for the organisation and to share it with the employees. The need for strategic management is growing and simultaneously the necessity of possessing sufficient information about the company is increasing. This stage is connected with requirements for better utilisation of ICT. Typically the companies utilise databases of customers, accounting systems and a warehouse system.

In this group there are organisations trying to increase their number of customers and to respond flexibly to their customers' needs and wishes. In this group of organisations are small manufacturing companies focused on quite special products, e.g. machines for crushing and processing of metal waste, special glass furnaces. These organisations have the following common characteristics:

- Using of ICT is based on applications such as CAD (Computer Aided Design - software design application), in addition to accounting and other administrative applications.
- These organisations are aware of the importance of ICT and often have an information strategy, within which they consider future integration of electronic shopping into their business model.
- The organisations have a certain organisational structure, i.e. the owner has got co-workers participating in managing areas of the organisation, e.g. commercial, marketing and manufacturing.

**4th. Stage of Growth: Expansion**

This fourth stage of growth or expansion is very hard for the SMEs, as the company is trying to be an important player in its business area. That is why this stage requires the owner or the manager to have experience of planning and management, as well as sufficient finance to enact these plans.

There is also a requirement for increased internal and external communication.

These organisations are aiming to become important market players. The owners or managers have defined visions they wish to achieve and share them with their employees. With an increasing number of employees there is a need for the owner to formalize the organisational structure and to delegate responsibility. This is connected with the need to share visions and business strategies of the organisation with a greater number of employees, this means taking into account more opinions, experience and knowledge, which is important for success and growth. This group already contains organisations, usually manufacturing facilities that are often a part of a supply chain with the following characteristics:

- Standard ERP (Enterprise Resource Planning), systems for communication with their partners, so they utilise the electronic exchange of data.
- The organisations have defined a corporate and information strategy, they have a hierarchical organisational structure and they need to optimize their processes with information support.
- This group differs from the previous groups of organisations by their higher utilisation of knowledge of their employees.

**5th. Stage of Growth: Maturity**

To achieve further growth the organisation has an increasing need for data and information to support planning, managing and strategic decision-making. Information is a strategic resource determining the business's success and providing data about customers, financial results, capabilities and opportunities for evaluating changes to business objectives. That is the only way the organisation may ensure its development and growth. Consequently it needs effective tools, i.e. information system enabling the company to maintain, sort, analyse and search for data for the purpose of support of internal processes. The information system may now yield a competitive advantage compared to other companies.

Investment in ICT requires a long-term strategic plan for the organisation based on detailed analysis of the current status. The manager or the owner has to have a clear vision of the expected outcome and benefit of ICT, this can be

demanding on the knowledge of the managers or owners of SME's. The purchase of information technologies creates a lasting obligation, as finance sources of SME's are limited. Owners of the companies should recognize that information systems may strongly impact on capacity, strength and chance for survival of the company. Speed of technological innovation together with demanding implementation in the company environment support the serious need for planning the use of information technologies. To be successful here implies that each decision regarding information systems will conform with the wider business strategy of the company.

This level of growth is represented by organisations that are significant market players. These organisations typically have higher number of employees (80-250), are managed by a team of managers and have hierarchical structure of leadership. The group differs from the previous groups especially with its focus on management of knowledge within the workforce. These organisations show effort to optimize internal and external processes. Two organisations run their business in the area of ICT and the three remaining organisations are manufacturing companies in the building industry. Companies in this last group with their approach to using ICT and emphasises on sharing of employees knowledge can be good role models for others companies. They have the following common characteristics:

- Existence of written corporate and information strategy.
- Matured level of ICT processes is typical.
- They are aware of the importance of knowledge of their employees.
- Access to the information system by employees from home.
- Willingness to support training of employees.
- A culture of innovative in the organisation.
- Application of different management methods (Balanced Scorecard, ABC analyses, etc.).
- On-line communication with customers and suppliers.
- Using e-commerce (buying and selling on internet).

Contribution of the above mentioned categorization is in the identification of different approaches that managers or owners have to ICT adoption and its strategic use. The companies

from the forth and fifth groups are successfully developing and growing in the long term. The research into the analysed companies also investigated what the drivers for purchase of ICT were. It was typical in these companies that the adoption of ICT was not a given reason to achieve the strategic advantage but the most frequent reasons cited were:

- Pressure from the suppliers, customers and competitors.
- Influence of the specific area of business.
- Size of the organisation.
- Implementation of different quality certificates.
- Knowledge of the employees or owners.

Also the majority of the specified factors contributed to decision-making about acceptance of information and communication technologies are:

- Technological factors (image of company, relative advantage, need of compatibility).
- Factors arising from the environment of the organisation (competitive pressure of customers and suppliers, changes in the market place).
- Organisational factors (management, size of company, specialization of company, costs).
- Individual factors (knowledge of the manager, enthusiasm for ICT, innovation).

It is obvious that the factors mentioned are not all-inclusive and it is recognized that certain simplifications and judgments were applied. These analysed factors can help to better understand the issues connected with ICT adoption. The next part of the chapter explains these factors in more detail.

### 3. Technological Impact

The majority of the bigger companies of the analysed group that have a 25% share of foreign investment were forced to change their current ICT as a requirement for harmonization of information and communication systems with the parent organisation. These organisations had no choice in the selection of an appropriate information system and its supplier; both were nominated by the parent organisation. Also management of the information system was carried out by the owning company, usually abroad, with changes to the system, such as enrolling a new user, taking a longer time that might be expected.

**Tab. 2: Utilisation of individual applications in the analysed group of SMEs**

Business area (number of companies)	E- mail	EDI	ERP	EI. supply	Intranet	Online orders	Outsourcing	ICT training	CAD
Manufacturing	4								3
Building	4		4					2	
Services	11			1	1				
Logistic	2	1	1						
ICT	6				4			6	
Automotive	3	3	3			3	1		

Source: own

Some of the organisations also begin to realize the benefits of electronic business (selling and buying on the internet) and trying to keep abreast of competitors. Another reason for implementation of ICT is gradual aging and insufficient capacity of existing hardware and software in the organisation.

Table 2 describes how many organisations use ICT for the purpose of communication within the company, with the customers, other options of electronic business, outsourcing, and training in ICT. The comparison brings significant contrast between utilisation of electronic mail (used by 100% of all organisations of the analysed sample) and other ICT applications, such as electronic supplying, acceptance of electronic purchase orders from customers and utilisation of an intranet (internal web pages). The least utilized application is electronic supplying and outsourcing. While EDI type of communication with the partners is typically used by all organisations in the automotive industry, all bigger organisations have implemented standard ERP system and devote significant effort to training of employees in ICT. In case of implementation of any other ICT application a number of companies do not consider further evaluation and monitoring of benefits of the chosen solution.

#### **Impact of the Company's Environment**

A very frequent reason for innovation or purchase of ICT is pressure from customers for mutual communication, in order to enable electronic data interchange (EDI). This is a way of electronic exchange of structured data (e.g. orders) on the basis of agreed standards between the information systems of individual business partners. Such pressure from the customers is common in

both the automotive industry and between retail businesses. The reason for acceptance of EDI applications by the organisations is to prevent the loss of the current customers and also to attract new ones.

Another reason for innovation of ICT is the frequent need of SMEs to implement applications for bar code data capture. In these cases the purchase of applications is typically focused on solving current problems and not on further ICT usage across other areas of the organisation, such as in marketing or knowledge management.

## **4. Innovation**

Innovation, flexibility and the ability to promptly respond to the wishes of customers are one of the key advantages of small and middle-sized companies and simultaneously a condition of long-term competitiveness of an organisation.

**„Innovation represents invention multiplied by business creativeness, management, co-operation, customers, company culture, suppliers, competitors, systemic view, external conditions, natural environment and fortuitous factors.“**

This definition is based on a long-term research of Prof. Mulej [19]) from University of Mariboro in Slovenia, who is intensively involved in the area of SMEs in post-communist countries. This definition implies that some factors can not be influenced completely, such as the natural environment, but on the other hand it is necessary to respond to them in time. Table 3 specifies percentage share of investment into research in the turnover of the analysed organisations (as at the end of the year 2006). The table shows that especially small organisations do not possess

sufficient finance for searching for new innovative products or services. In this area universities and grant supported by European Union may significantly help.

### **Organisational Factors**

Small companies are characterised by simple organisational structures. This may be considered a positive factor when implementing information systems. Another special advantage of this flat organisational structure is the relative simplicity in the analysis of the organisation and the requirements to adjust the information system to the needs of the corporate strategy (if it has been defined) generated by the SME's owners and managers.

## **5. Management in Small and Middle-Sized Enterprises**

Success and competitiveness in SMEs are influenced by a combination of business capabilities of the owner, his visions and strategies, and the ways he chooses to reach his visions. Further important factors are also market impact, flexibility of the employees, ability to innovate, sufficient number of customers and independency in decision-making. Another situation we can see in the case of 7 organisations from the observed group that have a 25% share of foreign capital, is that the decision-making process is strongly driven by the parent organisation's company abroad. These organisations, with foreign owners, have

**Tab. 3: Share of investment into research as a % of the turnover**

Number of Employees in 2007	Share of investment in % 0 (number of companies)	Share of investment in % 0.1-1 (number of companies)	Share of investment in % 1.1-5 (number of companies)	Share of investment in % above 5 (number of companies)
1-9	4			
10-49	9	2		
50-199	3	3	4	
200-250			3	2
In total	16	5	7	2

Source: own

Since the Czech Republic has joined the EU there has been an increased need for small and middle-sized enterprises to obtain a variety of certificates (such as those for safety, quality and environmental waste management). As a result small organisations have been looking for ways to keep records of all necessary documents connected with production, customers, safety at work, etc. This demand can be solved by purchasing new ICT applications, but unfortunately they seem not to exploit their further possibilities. Another reason for ICT purchase is an increasing number of customers, growth of the organisation and a need to have an overview of all orders. This was found to be especially so within small organisations of the analysed group, an effort to decrease costs is another frequent reason for implementation or innovation of information and communication technologies.

access to financial resources to purchase new manufacturing or information technologies or to undertake different marketing activities or training projects.

The way ICT is accepted in the company mainly depends also on previous training and experience of the managers and users. In small companies the training of employees is often insufficient and attitude towards information technologies is more sceptical. Expectations based on increased productivity are in general higher than expectations connected with improved effectiveness, and also higher than real results. However, unlike with large companies, in smaller SMEs the whole information system or its applications are often dependent on a single individual who often has to act in isolation.

Small companies are managed often only by their owner and strategic decisions are made more on intuition than analysis, and often depend



on complex family and property-related matters. What makes SMEs managers invest in information and communication technologies or their innovation? There are a number of reasons, but the following are the most frequent:

- Respect of the managers or owners for ICT.
- Financial situation.
- Pressure from customers or suppliers.
- Implementation of certificates standards.
- Enthusiasm of the owner for new technologies.

The above specified reasons are also influenced by the style of management in an SME. As already mentioned in the previous section, the manager of the small or middle-sized company plays a key role in managing the enterprise, and has a much bigger personal influence than he could have in a large organisation. This applies both to management and strategic planning. On the other hand, the managers or owners of SMEs do not prepare long-term strategic plans. The typical features of management in SMEs are the following:

- **Management style:** Autocratic or directive.
- **Decision-making:** insufficient delegation of authority and insufficient purposeful planning, combination of strategic and operational decision-making, ad hoc decisions.
- **Time horizon:** Short-term.
- **Internal environment:** Absence of formal organisation structure, management and information systems, high level of uncertainty, insufficiently shared information, absence of standard rules and procedures, usage of subjective criteria (missing formalized system), poor integration activities, poorly defined working procedures, roles and responsibilities.

Despite the above SMEs owners and managers have to solve problems equal to the problems of bigger companies often without the supporting of knowledge of associates from individual departments (such as ICT, marketing). That is why the managers make decisions in much wider contexts, i.e. on horizontal and vertical levels. This implies that information needed for decision-making by managers of SMEs is much more important than information for managers in large companies. As already mentioned, prosperity of SMEs is significantly influenced by experience, knowledge, relations and charisma of the owner

or manager. The style of management is very important for success and growth of the company. We can observe several different managerial styles. For example authors Covin & Slevin [2] describe the relationship between managing and utilisation of ICT. They distinguish business and conservative managerial styles in connection with organic (open) and mechanistic (bureaucratic) structures of the organisation. Individual organisations can be divided into the following four groups:

1. Type of organisation specified by proactive way of management with respect to ICT and willingness to innovate in a ICT.
2. Type of organisation with conservative style of management and approach to ICT.
3. Type of organisation respecting ICT with open, flexible and communicative managerial style.
4. Type of organisation with organic structure with respect to ICT.

Results from this research suggest that companies of the third type cannot be found among small organisations, but only amongst bigger ones. Companies at the edge between types „2“ and „4“ are typified by transfer to a new managerial style and innovation of information systems, often caused by the new incoming management or by young members of the family having graduated university joining the business.

Companies typically demonstrating an enterprise style of management that are making changes in organisational structure are found between types „1“ and „2“. Based on the research results these are often companies successfully utilizing information technologies thanks to which they have grown quite quickly (e.g. companies doing their business on the internet) and currently searching for ways to efficiently manage and run a growing company.

It is accepted that differences between management, organisational structure and the approach to ICT of individual companies have been simplified in some way.

### **Investment into ICT**

SMEs often tend to utilise information technologies only as a tool for data processing, not as a means of sharing knowledge or strategic advantage. During the implementation of ICT they do not consider their current organisational

structure and possibilities of making changes. Furthermore they typically rely on short-term contracts with suppliers. Benefits of ICT for SMEs can be observed in the following areas:

- Higher productivity and performance of the company.
- Possibility of new organisational forms, e.g. development of business nets, participation in supply chains.
- Increased added value of the product or services.
- Entry to new markets.
- New products or services, changing business processes.
- Utilisation of new business channels.
- Responding to new business activities of competitors.

to management and planning, while management of SME 's is based on ad hoc decision-making and short-term planning. Although prices of ICT in certain areas have decreased, the costs for SMEs are still significant. As implementation of ICT often results in dramatic changes, it requires additional support from management and adequate knowledge. Many owners of companies are however busy with „the survival of the company“ and do not invest time into such projects. They are also afraid of possible risk of failure of the project, do not wish to risk finance and can not see future advantage of ICT. That is why a number of methods were designed that aim to create a supporting framework providing management with guidelines how to proceed during the planning of information systems or their innovation.

**Tab. 4: Share of investment in ICT in analysed organisations compared to the turnover % in the year 2006**

Number of employees	Number of companies with no investment in ICT	Number of companies with investment 0.1-1 %	Number of companies with investment 1.1-5 %	Number of companies with investment above 5%
1-9	4			
10-49	6	5		
50-199	4	2	2	1
200-250			4	1

Source: own

Simultaneously, the advantage of SMEs (compared with large companies) is in higher flexibility during implementation of information technologies and during promotion of the necessary changes arising from their implementation of ICT. ICT nowadays largely helps small and medium-sized companies in traditional areas, such as warehouse management, payment procedures, administration, sales and improvement of post-sale services. Unfortunately, in real life ICT is not widely used in the areas such as marketing, purchasing and managing relations with customers. This is supported by insufficient knowledge of ICT capabilities and the inability to quantify benefits of ICT for the organisation, this is often connected with the absence of corporate and information strategy.

It is necessary to acknowledge that SMEs usually do not have adequate numbers of appropriate and experienced employees. Information systems should be connected with a systematic approach

As financial capabilities of small and medium-sized companies are quite limited, the investment into ICT is often dependent on the size of the organisation (see following table 4). Despite the current options to utilize loans from European funds, SMEs are afraid of the payback with such projects with managers or owners being risk averse in this context. This situation can be solved by software applications, such as „open source“ (software with open source code means both the technical availability of the code and its legal availability or license, that enables users, upon meeting certain conditions, to utilize the source code and to modify it). This software is often freely accessible on the internet. Implementation of such software solutions is, however, demanding in terms of knowledge required by those implementing these systems which is usually absent in SME 's.

A frequent reason for the purchase of ICT applications is to quickly respond to the needs of the customers (e.g. obtaining of bar codes of goods, requirement for electronic communication, etc). Apart from that, the size of the organisation plays an important role in utilisation of ICT as development of the organisation increases demand for administrative systems if the company is to remain cohesive.

### **Individual Factors**

A frequent reason for innovation of ICT or purchase of new applications is the cited dependency of the current system solely on one person who possesses the necessary knowledge and experience. This is usually an employee who developed or implemented the application. Due to shortage of documentation and required compatibility with other applications; the owner recognizes this handicap and searches for alternative solutions and remove the dependency on a single associate.

Another reason for acceptance of ICT may even be enthusiasm and interest in information technologies on the part of the owner or his employees and the need for new and innovative services or products requiring new communication and sales channels utilising ICT. An example may also be searching for competitive advantages in new areas, e.g. the need to achieve certification in areas such as environmental waste management and related searches for new products and services corresponding to these certificates. Gaining certificates requires maintaining very precise documentation that it is not possible without ICT. Another additional reason may be searching for market gaps, the need to be in close contact with customers and to respond to their specific wishes.

### **Skills and Knowledge in an ICT Area**

Competitiveness of SME's is strongly dependent on the availability of company resources. This issue is explained by resource based theory which emphasizes those sources that bring important quality to a business that are hard to replicate by its competitors. Such sources encompass especially long-term processes of training and education and the culture of the organisation. For example, authors Peppard & Ward define in their article [22] company sources as „**all assets, abilities, company attributes, organisation processes, information and knowledge.**“ Skills and knowledge of the employees in the area of ICT are on a higher level especially in bigger organisations, where ICT is commonly used. The following table 5 details results of a questionnaire inquiring about the average level of ICT literacy. The questionnaires were distributed to two thirds of employees in each organisation. The respondents were to evaluate their ability to recognize and formulate their information needs, their overview of information sources, ability to search for information using ICT, to analyse such information and apply it for solving specific realistic situations or specific tasks. In particular, the questionnaire ascertained the following skills:

- Minimum skills: e.g. sending an e-mail, searching for a file or information on the internet.
- Ability to create a folder, search for and copy a file, re-name a file.
- Working skills when using application software.
- Work with any office package (spreadsheet, word processor, exporting files).
- Installation of simple applications to a PC (such as anti-virus programmes).

**Tab. 5: Average ICT literacy of employees in the analysed group of organisations**

Number of employees in 2007	Average ICT literacy Level 1 (No. of companies)	Average ICT literacy Level 2 (No. of companies)	Average ICT literacy Level 3 (No. of companies)	Average ICT literacy Level 4 (No. of companies)	Average ICT literacy Level 5 (No. of companies)
1-9			1	3	
10-49	5	4	1	1	
50-199	4	6			
200-250	5				

Source: own

The ability was ranked from 1 to 5 using Likert's scale, where 1 = the best result and 5 = the worst result.

## 6. Barriers of ICT Adoption in Small and Medium-Sized Enterprises

The most significant barriers to ICT purchase are mainly internal issues of the organisations, such as a shortage of associates with appropriate knowledge, financial and often family reasons.

Similarly to the division of individual factors contributing to the acceptance of information and communication technologies, in following section indicates the cited barriers to ICT adoption in SMEs. They are:

1. Technological barriers (problems of security, insufficient infrastructure).
2. Organisational barriers (management style, shortage of financial sources).
3. Barriers arising from the surrounding environment (insufficient knowledge of the market).
4. Individual barriers (Insufficient knowledge, personal relations in organisation).

### **Technological Barriers**

The biggest barrier to utilisation of new information and communication technologies is, apart from insufficient infrastructure in the organisation, the fear regarding the security of internal data. This fear is sometimes a reason for non purchase of ICT from a well-established provider. Some organisations consequently try to design such applications internally although this solution is not always successful. The employees working on this task often lack sufficient knowledge and experience and are also unable to document their solution, which can bring some problems in the future. Another barrier may be caused by fear from financial demand but this can be resolved by purchase of application information services using an external supplier.

### **Decision-Making in SMEs**

One of the significant barriers to ICT acceptance in small and medium-sized companies is resistance to organisational changes, especially in connection with older managers or owners. Another barrier may be a missing long-term corporate strategy often omitted due to shortage of long-term orders and stable customers. Companies

frequently have to respond quickly to individual demands of random customers and do not consider any long-term corporate strategy. That is why planning in such organisations is focused on „solely on survival“ and on short-term activities. The managers or owners of SMEs make their decisions on the basis of current needs and the current situation. Consequently management processes are very sensitive to market behaviour, changing external conditions and market trends.

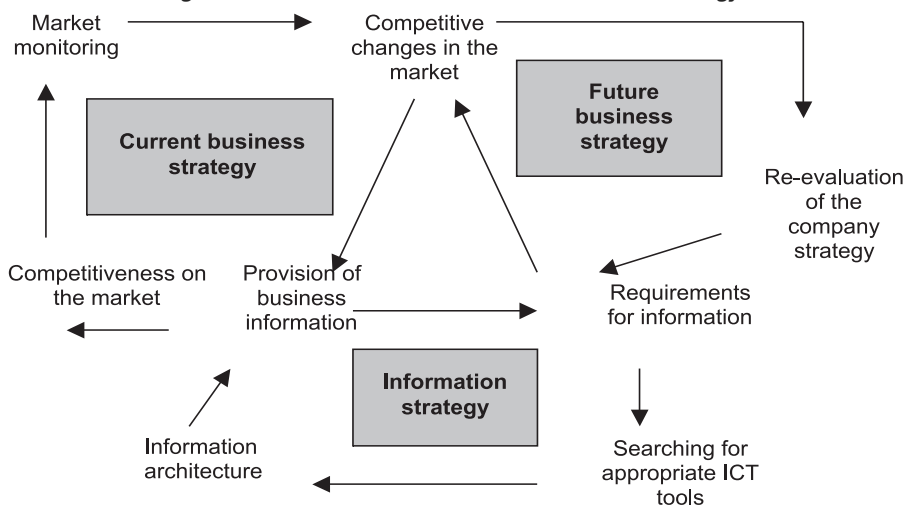
The time horizon of decision-making in SMEs is typically short-term, usually in the form of a response to a specific event rather than targeted assumptions. A low level of detailed planning often causes issues during the implementation and utilisation of information systems. Moreover, only a small percentage of leaders of small companies utilise different methods of forecasting, financial analysis, and project management. These results are also supported by a study [6] analysing 276 small and medium-sized companies in England. The decision-making process of the managers is rather intuitive, based on instinctive decisions and a less dependent on formal models of decision-making. They tend not to pass information and not to delegate decision-making authorities to their inferiors. They are often the only people in the company who have the authority, responsibility and access to the information necessary for identifying business opportunities including utilisation of information technologies for strategic and competitive purposes.

### **Surrounding Environment**

A barrier preventing wider acceptance of ICT in small and medium-sized companies is furthermore influenced by an inability to apply ICT in relations with customers and suppliers. The fact that SMEs do not influence their business-specific surrounding environment, but that they are influenced by it and particularly by their customers is an important issue.

### **Individual Factors**

One of the main barriers preventing acceptance of ICT, especially by small organisations is knowledge and skills regarding information technologies. Small companies do not have ICT departments (except for organisations with higher number of employees in the analysed sample) and rely on either external consultants or friends. A role of such

**Fig. 1: Relation between business and information strategy**


Source: own

a consultant is not always fully understood which leads to a number of mutual misunderstandings during specification, purchase and implementation of ICT applications. This problem is connected to a missing information strategy and as previously mentioned, an insufficient knowledge of ICT on the part of the owner or manager of the organisation. According to this research where the analysed sample were often employing less experienced students, owners typically searched for simple and cheap solutions using their own resources, relatives or friends. Based on such solutions different problems connected with a lack of experience and specific knowledge arise. These solutions do not bring expected benefits. It is often only a „quick fix“ and unfortunately a short-term solution of a given issue forgetting about further possibilities of the utilisation of ICT. This is connected with short-term planning of the organisations. ICT consequently cannot contribute to increased competitiveness and becomes only a tool for cost reductions and minimization of the administrative burden.

In order to remove this barrier, universities may contribute high-quality knowledge to managers and owners of SMEs by providing education and training in the area of management and ICT. Another option would be utilisation of specific ICT knowledge and skills in a co-operation with other organisations or business networks.

## Conclusion

SMEs are exposed to high competitive pressure. When they wish to survive current business competition, they have to search for new business opportunities. This effort has to be significantly supported by information and communication technologies. But the implementation of ICT can cause a number of issues for SMEs, such as insufficient financial sources, lack of experience with ICT and insufficient knowledge and skills in the area of computer literacy of employees. That is why the most frequent purpose of implementation of ICT in SMEs is, as supported by this research, on survival of the organisation in its competitive environment. Apart from that, adoption of ICT in the organisations is strongly influenced by the managerial style of the owner or manager. That is why motivation to purchase and implementation of ICT is also connected to clarification of ownership relations and the authority of individual owners.

Successful performance of SMEs in the business environment and their consequent development is influenced by the ability of the organisation to respond flexibly to customers demand and by the ability to innovate in products or services. That is why the owner or manager should consistently re-evaluate and search for appropriate corporate strategies, to keep developing himself and his employees, monitor the com-

petitive environment of the market and be familiar with demand and the wishes of customers. This consistently repeated process is illustrated by the following Figure 1. All specified activities require the support of adequate tools that are currently available within the domain of information and communication technologies.

For ICT to become one of the tools of competitive advantage, organisations will have to have a clear vision of the future and how to reach it. Current information and communication technologies enable a whole range of new business opportunities and are consistently upgraded but especially for the owners of SMEs are not easy to keep abreast of. Adoption of ICT is connected with higher investment demands that often create barriers to wider acceptance of ICT in small and middle-sized enterprises. Another issue may also be the fact that financial benefits and payback of ICT is not easily quantifiable without specific knowledge.

Current business entities are forced to consistently improve their products and services. They have to utilize information and communication technologies and modern management methods. This is the only way they can succeed in such competitive environments. Companies have to search for appropriate business strategies using an approach that reflects their own characteristics and to use as many benefits of ICT in the proposed business strategy as possible. Organisations are more and more connected with their suppliers and customers but yet need not lose their legal identity. They have their own culture, managerial style, they search for their own business strategies and should seek to share management decisions with their co-operating partners and customers.

Managers or owners of SMEs are, however, often afraid of organisational and financial demands of the implementation of ICT. This fear can be prevented by adequate strategic planning and preparation. From the successfully growing companies we analysed we can see the **importance of business, information and knowledge strategy**. Without articulation of these strategies companies will find it difficult to find their way in the current business environment. These strategies have to be followed by other supporting strategies, i.e. marketing, finance and human resources. It is highly important that even those

supporting strategies are in mutual harmony and support the defined global business strategy.

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Doručeno redakci: 6. 1. 2009

Recenzováno: 23. 2. 2009; 15. 3. 2009

Schváleno k publikování: 6. 4. 2009

**ABSTRACT****MOTIVATION AND BARRIERS OF ICT ADOPTION IN SMALL AND MEDIUM-SIZED ENTERPRISES****Klára Antlová**

The objective of this chapter is to emphasize issues connected with adoption of information and communication technology (ICT) as a strategic tool contributing to further organisational growth. This understanding is based on the results of a qualitative analysis of a group of small and medium-sized enterprises (SMEs). Gradual development of a group of 30 organisations has been monitored over the last fifteen years during their co-operation with the Technical University of Liberec. These organisations have hosted one-year student placements where students as part of their Bachelor degree course undertake a long term work experience enabling them to integrate the practical and theoretical aspects of their course. During this long period SMEs developed and passed through the different levels of changes that impact their size and style of management. The research focused on SME management's approach to ICT, its utilisation for competitive advantage and its relation to and defining of business and information strategy. Other aspects of the study looked at the effect of ICT on organisational performance, knowledge and skills of the employees, training and organisational culture.

The analysed organisations were divided into five groups according to the level of their development during their business existence. Each group has its specific way of managing the organisation, its organisational structure, presence or absence of the corporate strategy, level of utilisation of ICT, internal and external integration ICT supporting processes in the organisation and way of utilisation of knowledge of the employees. The objective of this division is to emphasize changes of the management information needs and better understand their approach to ICT. The results indicate that successful and growing companies have gradually established business, information and knowledge strategies and use ICT as a strategic advantage.

**Key Words:** Information Technology Adoption, Defining Information System Success, Information Systems Problems, Business Strategy, ICT Planning, Small and Medium - Sized Enterprises.

**JEL Classification:** O33, M15.