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EFFECTIVENESS OF INFORMATION SYSTEMS IMPLEMENTATION THE CASE OF THE POLISH SMALL AND MEDIUM ENTERPRISES

Łukasz Wiechetek
Maria Curie-Skłodowska University, Poland
lukasz.wiechetek@umcs.pl

Abstract:
Implementation of IT systems puts an impact on effectiveness of systems functioning and efficiency of company performance, that is why it is important to explore IT systems implementation process. In Poland there is about 3,8 mln enterprises. Since the early nineties the sector of small and medium enterprises has constituted one of the main pillar of the Polish economy. In the years 2003-2008 more than half of employment has been generated by small and medium companies. The rapid development and improving effectiveness of the operation is often conditioned by the possibility of new IT technology absorption. However even the best designed IT tool without appropriate implementation, by properly selected implementation team, is not able to satisfy the enterprise needs. This paper discusses the research procedure and the main findings of qualitative research performed by the author to identify and classify factors that have influence on the effectiveness of information systems implementation. The article describes: Polish it market: services, software and hardware sector; ICT usage in Polish SME's, including sources of applications and most computerized company areas. The main subject of the article is to present what factors are considered to be crucial for the increase of information systems implementation effectiveness. The article is aimed to point out the important factors and discuss if there is a possibility to control them. The main conclusion of the paper is that implementation process is realized by two groups of people with different perception of the project performance and factors impact. It is also important that implementation process has to be perceived in holistic manner, which includes not only preparation and realization stage, but also the operation phase.

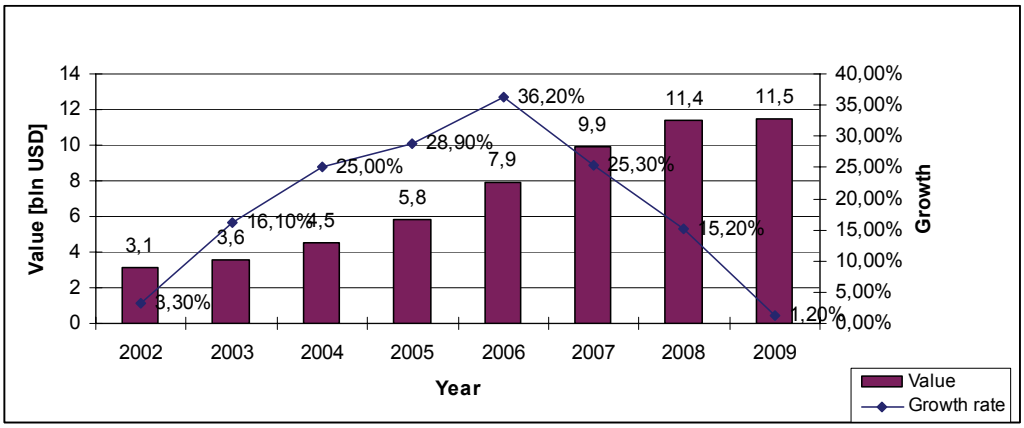
Keywords: ICT effectivness, ICT implementation, SME, implementation perception.

1. THE POLISH IT MARKET

History of the Polish private IT market started in 1980's when the company called CSK Kajkowski began to assemble computers and write financial and accounting software (Iszkowski, 2011, pp. 95–96). Nowadays the Polish IT market is the second largest (after Russia) IT market in Central and Eastern Europe.

According to the Polish Information and Foreign Investment Agency (Polish Information and Foreign Investment Agency, 2009, p. 4) the Polish IT market undergoes a lot of changes. In the years 2002-2008 its value changed form 3,1 bln USD to 11,4 bln USD. The Polish IT market value and its dynamics is presented on *picture 1*. The IT market growth was two-digit till the beginning of 21st century. The slowdown at the beginning of the 21st century was caused mainly by dot-com bubble burst.

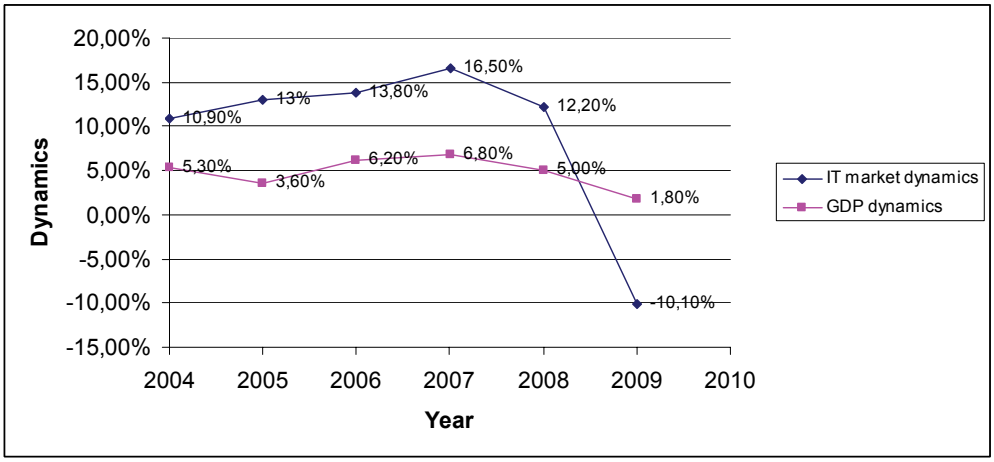
Picture 1: The Polish IT market value in years 2002–2009



Source: The Economic Information Department. The Polish Information and Foreign Investment Agency, 2009, p. 4.

During the first decade of 21st century IT market growth has been twice the Polish GDP. In 2009 when global crisis reached Poland it shrank by about 10 %. Comparison of GDP growth and the Polish IT market dynamics in the years 2004–2009 is shown on *picture 2*.

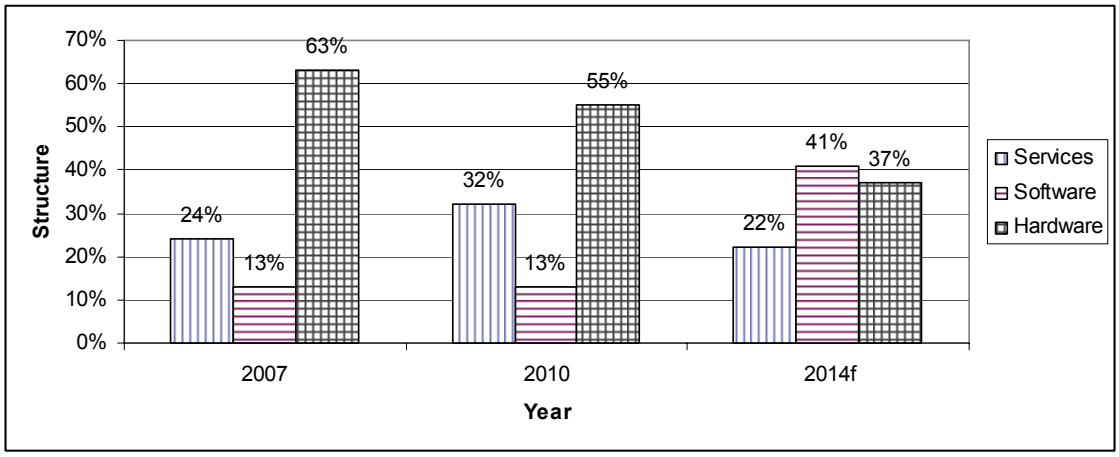
Picture 2: Comparison of GDP growth and the Polish IT market dynamics in the years 2004 – 2009



Source: own work based on Olszynka, 2010.

The Polish IT market consists of three sectors: services, software and hardware. The structure of the market is presented on *picture 3*. According to the statistics (Olszynka, 2010, p. 3) the biggest part is the hardware sector about 55 % of whole market value, services take the second place with 32 % of the market, software only 13 %.

Picture 3: Structure of the Polish IT market



Source: own work based on: Olszynka, 2010, p. 3, Computerworld, 2011, Rogiński, 2010.

According to the forecasts the fastest growing part is software sector, an increasing trend is also observed in services. In the near future the hardware segment will loose the leading position. In analytics' opinion in 2014 value of software sector will exceed hardware.

The current IT market situation depends mainly on the state of the economy. Prosperity determines the growth of investment, demand in the IT area. One of the main trends that can be seen in the IT industry is a significant increase of interest in its products and services by small and medium-sized enterprises. On the one hand SMEs investments in IT are caused by increasing competition, on the other hand, the growing value of the market is also due to greater variety of offers and the falling prices of computer systems (Rogiński, 2010, p.3).

2. ICT IN THE POLISH SMEs

Category of small and medium enterprises does not have a uniform global definition, which would allow making international comparisons. For example, Organisation for Economic Cooperation and Development (OECD) adopted the classification used by the European Union but also the division that is based solely on the number of employees.

The Polish regulations provide that a company is assigned to a category: micro, small or medium enterprise when it meets the criteria related to: employment, turnover, assets (Ustawa, 2004, p. 50). Classification of the Polish SMEs is presented in *table 1*.

Table 1: Classification of the Polish SMEs

Criterion	Company size		
	Micro	Small	Medium
The average number of employees	less than 10	less than 50	less than 250

Annual turnover [mln EUR]	no greater than 2	no greater than 10	no greater than 50
Total assets [mln EUR]	no greater than 2	no greater than 10	no greater than 43

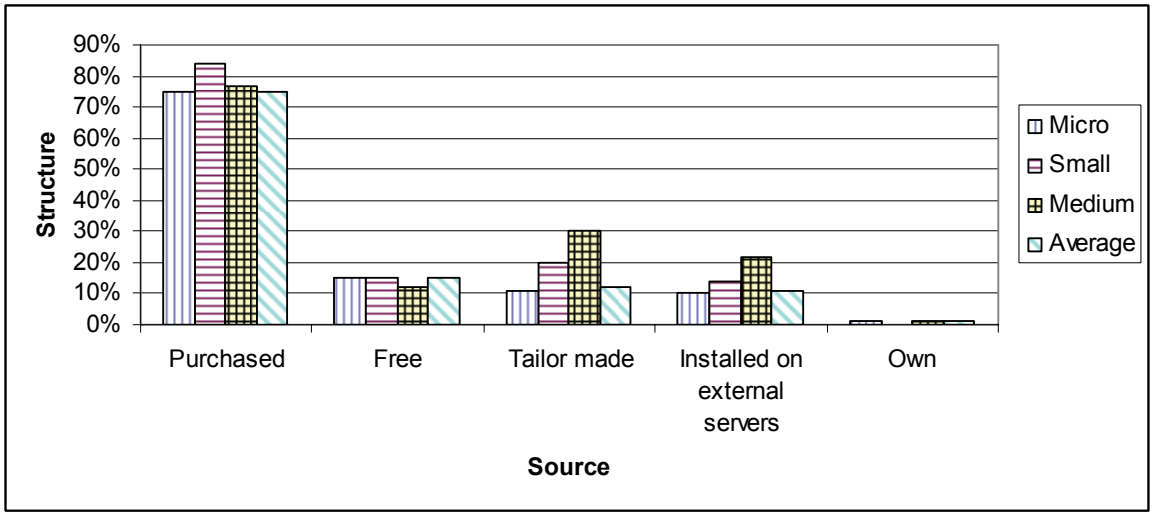
Source: own work based on Ustawa, 2004, p. 50.

In the 2009 in Poland there were about 3.88 million enterprises: 94.7 % micro, 4.4 % small and 0.8 % medium-sized enterprises. Since the early nineties the sector of small and medium enterprises has constituted one of the main pillar of the Polish economy. In 2008 the SME sector generated 47 % of The Polish GDP. In the years 2003–2008 more than half of employment has been generated by small and medium-sized enterprises.

Despite the significant role played by small and medium enterprises in the Polish economy, the level of computerization is relatively low (Kulisiewicz, 2007, p. 4).

Reports of The Polish Agency for Enterprise Development indicate that degree of use of information technology is positively correlated with the size of the company. Taking into account the companies employing fewer than 250 employees, the broadest IT usage can be observed among medium-sized businesses, the lowest level of use of information technology is noticed in micro-enterprises. Among the functioning software around 75 % are ready software purchased from external vendors, much less popular is the free software downloaded from the Internet and applications written on the individual order. The usage of IT services outsourcing is also unusual, declared only by 11 % of companies (Polish Agency for Enterprise Development, 2007, p. 41). Sources of computer software used by the SME sector are presented on *picture 4*.

Picture 4: Sources of computer software used by the Polish SME sector

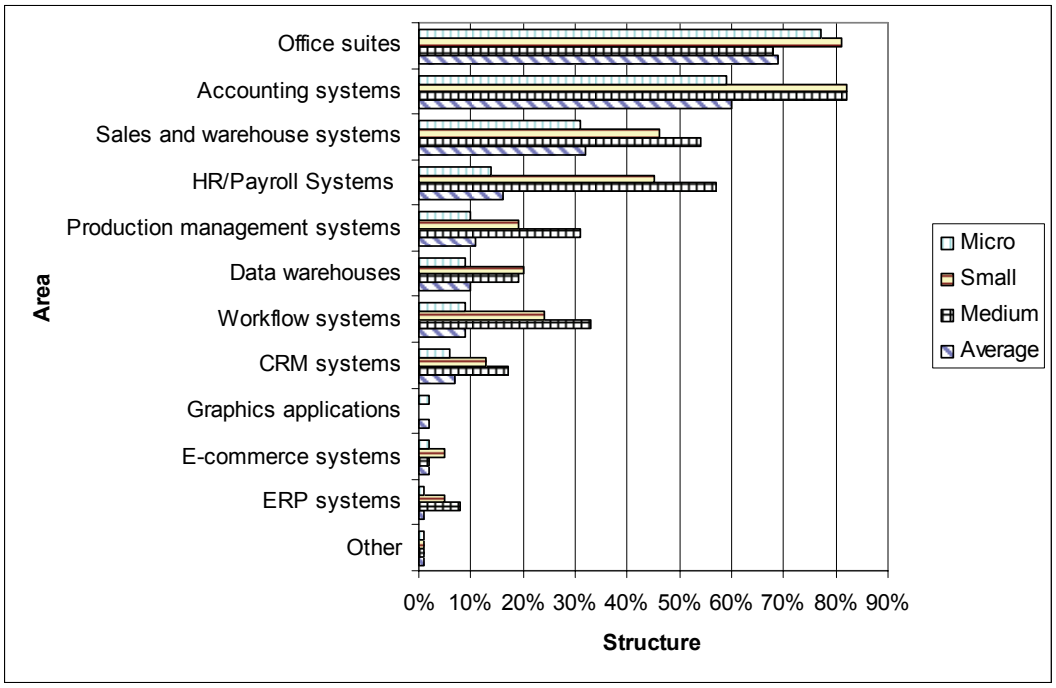


Source: own work based on The Polish Agency for Enterprise Development, 2007, p.44.

The most popular business computing tools used by SMEs are office suites (70 % of enterprises) and accounting systems (60 % of enterprises), relatively few companies have proved usage of production management systems, data warehouses and CRM systems

(respectively: 11 %, 10 %, and 7 % of surveyed enterprises) (Polish Agency for Enterprise Development, 2007, p. 44). Types of IT systems used by SMEs are presented on *picture 5*.

Picture 5: Types of IT systems used by the Polish SMEs



Source: own work based on The Polish Agency for Enterprise Development, 2007, p.44

Use of information technology increases the chances of the company to enhance the competitive position, it is especially important for small and medium-sized enterprises. IT systems have a significant impact on the functioning and organization of companies e.g.: changing the way of communication, reducing information access time, improving the data processing, enabling faster response to suppliers, customers or employees demands (Tsa, Chen, Hwang & Hsu, 2010, pp. 26–27).

However even the best designed IT tool without appropriate implementation, by properly selected implementation team, is not able to satisfy the enterprise needs. That is why it becomes necessary to examine the information systems implementation process, find what factors determine effectiveness of this process and notice if identified factors can be controlled or eliminated.

3. EFFECTIVENESS OF INFORMATION SYSTEMS IMPLEMENTATION

3.1. Research model

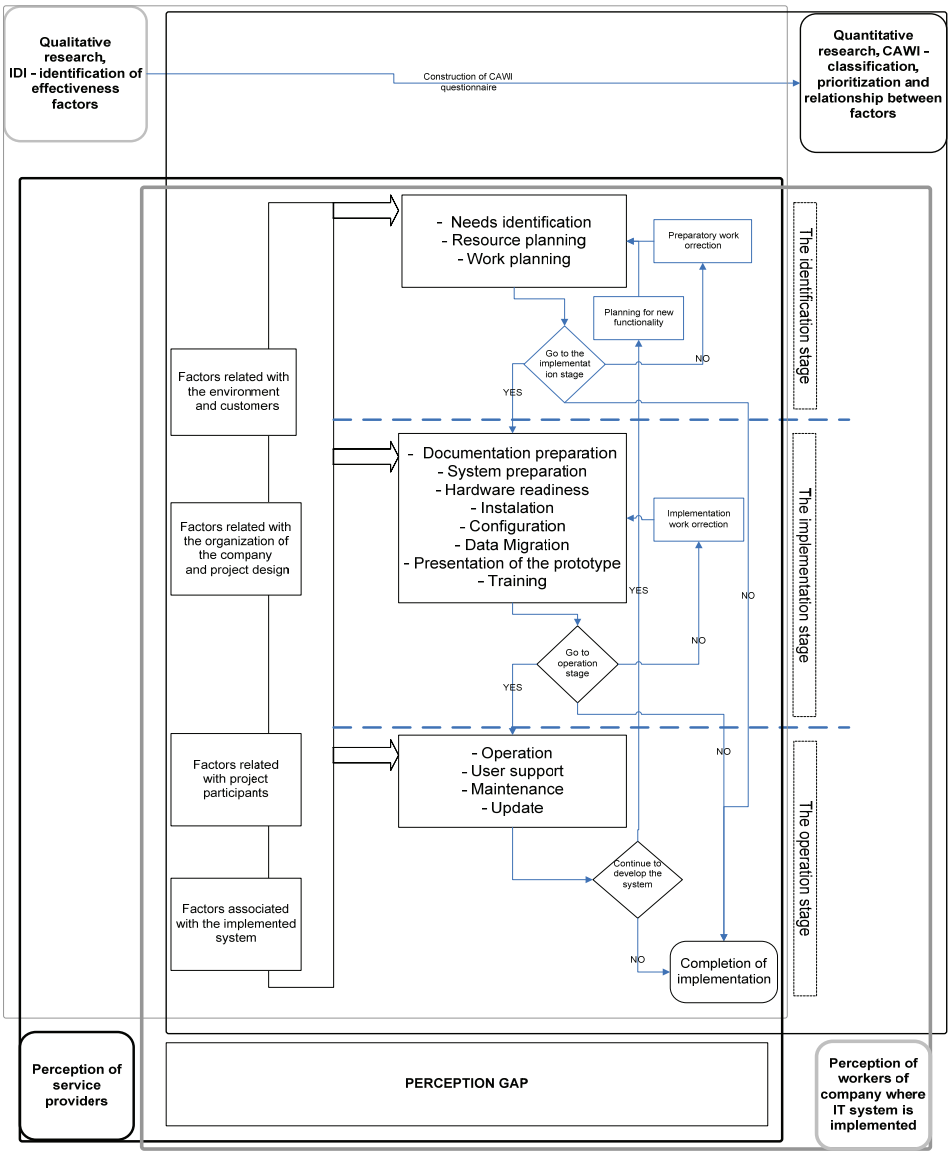
Implementation process plays important role in effectiveness of IT systems operation, which is strictly related with the company performance. To investigate this process author has built research model which consists of three parts. The main part is implementation process has been divided into three stages: identification, implementation (realization) and operation. In each of these stages process is conditioned by many factors that are related with: businesses ambient, company organization, implementation procedure and implemented system

(Gudănescu & Nicolau, 2010, p. 34), (Pabedinskaitė, 2010, p. 695). During the implementation process two groups of people: company workers and provider employees have to work together to achieve planned objectives. Those two groups can see implementation process in different ways, which may be relevant to the process course and the final results (Celjo, Hanić & Kazalac, 2011, pp. 82–88). To examine perception of implementation process and factors that have significant impact on the process author planned two step of research:

- qualitative IDI (*In-Depth-Interview*) research - to identify effectiveness factors,
- quantitative CAWI (*Computer Assisted Web Interviewing*) research - to classify and measure the impact of identified issues.

The research model is shown on *picture 6*.

Picture 6: Effectiveness of implementation – research model



Source: own work based on: Bazini, Qarri & Ilia, 2011, pp. 5–8; Gudănescu & Nicolau, 2010, p. 34; Chang & Chou, 2011, pp. 251–257.

3.2. Research goals

The main target of the presented research is to identify and group factors that have influence on the effectiveness of information systems implementation. The cognitive targets are:

- to show the gaps in the identification of factors, that determine the effectiveness of information systems implementation,
- to know the opinion of representatives of enterprises and service providers in the area of identification and control of conditions affecting the effectiveness,
- to show differences in the perception of IT system implementation by analyzing the opinion of enterprises and service providers representatives.

The applicable targets are:

- to develop a set of criteria to decide whether to start or postpone the implementation of IT system,
- to develop a set of recommendation about identification and possibilities of control IT systems implementation success factors, that can by used by providers and companies wanting to implement IT system,
- to determine the break-even of IT system implementation, point (before the end of full implementation) when finishing IT implementation is more favorable than conducting the IT project.

3.3. Research process

Research is divided into two sections: qualitative part was conducted in 2011, some collected data are presented in this paper; quantitative part was started in 2012.

The qualitative research has been conducted via in-depth interview (IDI) with the representatives of 15 SMEs (10 providers and 5 where IT systems was implemented). The interview scenario consisted of 130 open questions, divided into sections:

- preparation for implementation,
- realization of the implementation,
- finish of the implementation,
- exploitation of implemented system.

Respondents were asked about their last implementation of IT system.

The quantitative research will be conducted via computer aided web interviewing (CAWI). Author plans to collect 200 responses (100 form providers, 100 form companies that implemented IT system). Prepared questionnaire consists of a set of blocks:

- preparation for implementation,
  - sources of information,
- effectiveness of implementation
  - factors determining the effectiveness of implementation (impact and possibility of control),
  - CSF for a successful IT system implementation
- realization of the implementation (start time, documentation, business process influence),
- finish of the implementation and exploitation,
- characteristic of the: company, respondent, implementation process.

Respondents, employees of SMEs and IT services providers, will be asked about last performed implementation.

3.4. Research description

Data collected during each step of research are being consulted with an experts in area of IT implementation. After qualitative stage summary report was sent to five experts for suggestions. Final version of qualitative report was used to create questionnaire for CAWI research. At the moment questionnaire project is being consulted with experts. After taking into account the comments the questionnaire will be published on-line. At this stage author will prepare only the Polish version of the survey, in the future it will be possible to expand research into other European Union countries.

To verify data collected during the first and second stage of research, author started cooperation with Polish company that has been producing and implementing IT systems for small and medium enterprises for twenty three years. The employees of the company: implementation consultants and project managers, experts in IT systems will finally evaluate and examine the possibility of research findings practical application.

3.5. Main findings

According to performed research, managers of small and medium enterprises and IT project managers claim that the most important factors affecting the effectiveness of information system implementation can be grouped into three categories:

- social factors – related to implementation team and attitude of company employees,
- organizational factors – organization of implementation process, organization of the enterprise,
- technical factors – characteristics of implemented system, available IT infrastructure.

Extended list of factors that affect effectiveness of IT systems implementation shows *table 2*.

Table 2: Main factors that affect effectiveness of IT systems implementation

Factor	Type
Communication skills of implementation team members	Social
Company organization	Organizational
Consequence and determination of action	Organizational
Easiness of system aministration	Technical
Easiness of system usage	Technical
Employees discipline	Organizational
Employees participation in creating objectives and shaping the course of implementation	Organizational
Fitting the work schedule to needs of the company	Organizational
Giving the employees information regarding course and achieved implementation objectives	Organizational
Implementation process documentation quality	Organizational
Implementation process organization	Organizational
Implementation team experience	Social
IT system documentation quality	Technical
IT system flexibility	Technical
Key success factors identification and monitoring	Organizational

Factor	Type
Knowledge about IT project implementation management	Organizational
Knowledge and skills of members of the implementation team	Organizational
Level of project culture of the company	Organizational
Level of training for the system administrators	Organizational
Level of training for the system users	Organizational
Level of understanding the company processes by the employees	Social
Level of understanding the implementation objectives by the employees	Organizational
Management skills of project leaders	Organizational
Managers involvement	Social
Perception of implementation by the company's employees	Social
Periodic trainings for the employees	Organizational
Possession and use of implementation methodology	Organizational
Signing a precise and clear implementation agreement	Organizational
Stability of the composition of the implementation team	Organizational
Strict division of responsibilities and roles inside the implementation team	Organizational
System provider reputation	Organizational
Technical infrastructure of implementing company	Technical
Understanding the company by the implementation team members	Social

Performed research helped to identify many factors that have an impact on effectiveness of IT implementation process. Interviews and author's implementation practice indicate that the system implementation is seen differently by company workers and provider employees. Company workers often see the implementation in the short term, often only the project managers have vision of whole process. Provider employees seem to have more holistic view of implementation which includes not only preparation and realization stage but also the system operation phase.

REFERENCE LIST

1. Bazini, E., Qarri, A., & Ilia, D. (2011). Barriers of ICT Implementation within SMEs in service sector in Albania. *Journal of Information Technology & Economic Development*, *2*(1), pp. 1–8.
2. Celjo, A., Hanić, A., & Kazalac, M. (2011). Investigating reasons for resistance among project and general managers in enterprise resource planning implementations. *Economic Review: Journal of Economics & Business*, *9*(2), pp. 77–90.
3. Chang, H.-H., & Chou, H.-W. (2011). Drivers and effects of enterprise resource planning post-implementation learning, *Behaviour & Information Technology*, *30*(2), pp. 251–259.
4. Computerworld. (2011). Retrieved from http://www.computerworld.pl/top2010/
5. Economic Information Department. The Polish Information and Foreign Investment Agency. (2009). The Information Technology Sector in Poland. Retrieved from www.paiz.gov.pl
6. Gudănescu, N., & Nicolau, A. (2010). ICT strategy support for business development and innovation. *Internal Auditing & Risk Management*, *20*(4), 27–36.
7. Iszkowski, W. (2011). Polski rynek dóbr informatycznych w nowej ekonomii. In R. Tadeusiewicz (Ed.). *Wczoraj, dziś i jutro polskiej informatyki*. Poland, Warsaw: PTI.
8. Kulisiewicz, T. (2007). MS Indeks wskaźnik koniunktury informatycznej, Poland, Warsaw. Retrieved from http://www.komputerwfirmie.org

9. Olszynka, P. (2010). Rynek IT w Polsce wzrośnie do 25 mld zł w 2010 r. PMR Publications. Retrieved from http://www.itandtelecompoland.com
10. Pabedinskaitė, A. (2010), Factors of successful implementation of ERP systems. *Economics & Management*, 691–697.
11. Polish Agency for Enterprise Development (2007). Kierunki inwestowania w nowoczesne technologie w przedsiębiorstwach MSP. Raport z badania ankietowego. Poland, Warsaw.
12. Rogiński, M. (2010). Sektor informatyczny w Polsce. Departament Informacji Gospodarczej. Polska Agencja Informacji i Inwestycji Zagranicznych S.A. Poland, Warsaw: PAIiIZ. Retrieved from www.paiz.gov.pl.
13. Tsa, W-H., Chen, S-P., Hwang, E., & Hsu J-L. (2010). A Study of the impact of Business Process on the ERP System Effectiveness. *International Journal of Business & Management*, *5*(9), 26–37.
14. Ustawa z dnia 2 lipca 2004 r. o swobodzie działalności gospodarczej. Retrieved from http://isip.sejm.gov.pl.