

## SUCCESS FACTORS AND BARRIERS FOR IMPLEMENTATION OF IT SYSTEMS: THE CASE OF POLISH SMEs

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### **Abstract:**

IT systems play a crucial role in the functioning of many businesses. IT tools improve the performance of internal processes, but also facilitate contacts with co-operators, customers and government. Polish small and medium-sized enterprises have high rate of computer and the Internet usage (Giannakouris & Smihily, 2013, p. 2; Berezowska et al., 2013, pp. 37-39), but the level of effectiveness of the implementation projects and the associated efficiency of the deployed IT tools is relatively low, as the result of implementation process depends on many economical, technical, organizational, behavioural, or psychological determinants. The publication presents the results of research conducted among 103 Polish companies, providers and recipients of IT services. Analysis presented in the article is a part of a broader research conducted in the years 2011-2013 on the IT systems implementation effectiveness in the Polish SMEs. The article includes description of attitudes towards monitoring of the factors affecting the effectiveness of IT implementation processes, main factors positively affecting the implementation procedure and barriers for IT systems deployment. The research shows that prior to the implementation process IT service providers and recipients try to identify factors that may affect its effectiveness. The most important factors include: team experience, expertise of implementation team members, communication skills and the employees discipline. The key barriers for implementation process are: resistance of workers, the possibility of additional, unplanned costs as well as the emerging changes in customer requirements.

*Keywords: IT implementation, implementation CSF, ICT success factors, ICT barriers, ICT, IT management, SMEs*

## 1. INTRODUCTION

Nowadays, in the period of rapid science and technology development we can observe fast growth of information technology, which has a significant impact on the organization of economic life (Kozma, 2005, p. 117). The existence of many organizations is conditioned by the possession of certain data and information. Fast adoption of ICT stimulates growth of companies, organizations and even countries (Tarute, 2014, pp. 1218-1219).

Even the best designed and laboratory-tested IT solution cannot meet the actual requirements of the organization. That is why it is very important for the recipient to properly implement the system on the ground of the company, taking into account a wide range of factors and conditions affecting the effectiveness of the implementation process and effectiveness of the system in the operational phase (McLeod & MacDonell, 2011, p. 24.2; Kumar & Malik, 2011, p. 274).

Number of successful implementation of information systems, particularly considered in relation plan - execution is relatively low (Dyczkowski, 2007, p. 167). Therefore, it becomes important to explore the process of information system implementation, as performing correct implementation tasks guarantees achieving implementation goals and measurable benefits for the company.

Statistics (eGospodarka, 2009, p.1) indicates that the implementation market consists of large number of small and low-cost deployments, carried out for small and medium-sized enterprises. Therefore, an attempt to characterize and explore the effectiveness of small implementation projects should be the subject of a detailed analysis of the researchers.

Effectiveness of the implementation process is conditioned by a number of technical, economic, organizational, behavioural, or psychological factors (McLeod & MacDonell, 2011, p. 24.9). Implementation of the system is also complicated by the fact that the process is carried out by two cooperating entities: the service provider and the service recipient, which often strive to achieve their own, not always coherent goals. It becomes necessary to examine the factors that affect the game of supply and demand in the IT services market and determine the effectiveness of implementation.

Taking into account a significant impact of IT systems on the functioning of modern enterprises (Nowduri & Al-Dossary, 2012, pp. 125-131), noticing the complexity of the implementation process and the importance of the SME sector in the development of the Polish economy, the scope of the publication is limited to a group of small and medium-sized enterprises.

## 2. THE RESEARCH METHOD

### 2.1. Purpose and course of the research

The main aim of the whole research was to identify and specify what factors and how determine the effectiveness of IT systems implementation in small and medium-sized enterprises.

This paper shows a part of analysis and conclusions coming from the study on main determinants of successful implementation of IT systems. The research presented in this article was performed in order to answer the following questions:

- Do IT service providers and recipients try to identify factors that may affect effectiveness of implementation?
- What are the main factors affecting the effectiveness of implementation process?
- What are the main barriers in IS implementation process?

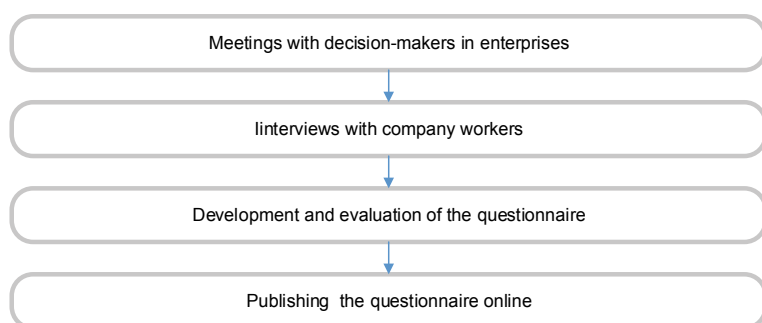
In order to achieve these goals author constructed research tools in the form of an interview scenario (semi-structured interview) and online questionnaire (prepared using Moodle questionnaire module, the link to the questionnaire was send to respondents via email).

In the process of constructing and testing the research tools author used the information found in Polish and English literature also author's own experiences in the area of implementation of IT systems in small and medium-sized enterprises, as well as local government units. Collected data were discussed with project managers, implementation consultants, system engineers, and developers, so experienced employees of companies producing and implementing management information systems.

The studies have been carried out in enterprises providing implementation services, as well as companies of the SME sector, which deployed IT system. The research sample consisted of small and medium-sized companies. The research procedure was divided into four stages: preparation, qualitative research, quantitative research, analysis of the results.

This article is an attempt to describe success factors and barriers of IT implementation and is a part of a broader analysis of the effectiveness determinants of information systems implementation in the Polish SME sector. The qualitative and quantitative research was conducted in the period from March 2011 to June 2013. Before starting qualitative research stage author organized several meetings with decision-makers in enterprises to present the topic and select the research participants. The course of performed research was shown on Figure 1.

**Figure 1:** The course of performed research



Source: own work.

The selected company workers were interviewed using interview scenario. Finally the starting point for quantitative research was to develop a questionnaire and its critical analysis by IT experts. Prepared questionnaire was published online. Detailed planning of the research process and cooperation with IT specialists enabled the precise control of the study course, and, as it turned out during the analysis stage, allowed for the preparation the research tools enabling to acquire complete and multi-dimensional data. Using collected data it was possible to characterize the IT system implementation process in small and medium-sized enterprises and identify the main factors affecting this process.

## 2.2. Characteristics of the research sample

The quantitative research investigated 126 enterprises. As a result of the data verification, due to incomplete data and failure to meet the research requirements, 23 questionnaires were rejected. The discarded opinions were mostly obtained from micro and large enterprises, which implemented the IT system. Finally, data analysis based on responses collected from 103 companies - providers and recipients of implementation services. Characteristics of the surveyed companies were presented in Table 1.

**Table 1:** Characteristics of the surveyed companies (n=103)

	Criterion	Number	(%)
<b>Status</b>	provider	59	57,3
	recipient	44	42,7
<b>The employment</b>	1-9 employees	13	12,6
	10-49 employees	33	32,0
	50-249 employees	49	47,6
	more than 249 employees	8	7,8
<b>Sector</b> (more than one answer)	production	38	36,9
	trade	37	35,9
	services	86	83,5
<b>The main area of activity</b>	manufacturing	5	4,9
	production and supply of energy	2	1,9
	building industry	2	1,9
	wholesale and retail trade	12	11,7
	transportation and storage	1	1
	information and communication	23	22,3
	financial and insurance activities	7	6,8

Criterion	Number	(%)
other professional, scientific and technical activities	7	6,8
business administration services	2	1,9
public administration and defines	6	5,8
education	2	1,9
health care and social assistance	10	9,7
other service activities	24	23,3
<b>The scale of the business</b>		
local	9	8,7
regional	12	11,7
national	44	42,7
international	38	36,9
<b>Planned expenditures on IT</b>		
at a higher level	33	32
at the same level	33	32
on the lower level	12	11,7
no data	25	24,3
<b>Form of IT system usage</b>		
installation on-premise/self-service	68	66,0
installation on-premise/external service	18	17,5
outsourcing	17	16,5
<b>The prospect of the enterprise in the next three years</b>		
limitation of activity	0	0,0
maintaining the current position	29	28,2
development	74	71,8

Source: own work.

The study sample was divided into two sets. The first group consisted of companies that provided implementation services, created demand in the IT market. The second group consisted of enterprises generated demand for implementation services. Among surveyed the 59 companies were providers (57.3%) and 44 recipients (42.7%) of implementation services.

The majority of the sample was medium-sized enterprises (47.6%) and small enterprises (32%). Although the study involved only the implementation of information systems in small and medium-sized enterprises, the analysed data contained also empirical material derived from micro and large companies (a total of 20.4% of responses). An analysis of the completed questionnaires showed that these data were obtained from the companies (providers) realizing implementation projects in small and medium-sized entities, thus were able to participate in the study.

The vast of respondents (83.5%) were service providers. The main areas of their activity were: other services (23.3%), information and communication (22.3%), wholesale and retail trade (11.7%) and health care and social assistance (9.7%).

Most respondents operated on a national and international scale, respectively 42.7% and 36.9%. Companies usually had on-premise systems, supported by internal IT departments (66%).

Among the respondents male were predominant part (86.4%), which is consistent with the general trend of employment in the Polish IT industry. 88.3% of the respondents had a university degree while the remainder had secondary school education.

The major parts of the respondents were: developers, project managers, implementation consultants and support staff, respectively 35%, 34%, 34% and 31.1%. Among the recipients, the largest group were system administrators (33%). Users of the system (26.2%) and key system users who are typically managers or directors of enterprise organizational units (18.4%) were a smaller group of respondents.

### **3. IDENTIFICATION AND MONITORING OF FACTORS THAT INFLUENCE THE EFFECTIVENESS OF IMPLEMENTATION**

#### **3.1. Identification of the factors affecting the effectiveness**

The effectiveness of implementation is determined by appropriate preparation of the deployment process, including the identification of many success factors (Shaul & Tauber, 2013, p. 55:3; Hossain & Jahed, 2010, p. 63; Kumar & Malik, 2011 p. 274).

In order to find if companies attending the IT system implementation identified and analysed factors affecting the effectiveness of the process, the questionnaire contained series of questions relating to the procedure for identifying that factors used by both the implementation service providers and recipients.

Using Likert scale (where 1 is – definitely not, 2 – rather not, 3 – hard to say, 4 – rather yes, 5 – definitely yes) respondents answered questions about the identification and monitoring of factors related to the implementation and effectiveness of the implementation process. Detailed respondents' opinions were presented in Table 2.

**Table 2:** Identification of factors that influence the effectiveness of the IT system implementation (Mann-Whitney test)

Question	All respondents (n=103)	Providers (n=59)		Recipients (n=44)		Z	p
	Me	Me	Mean rank	Me	Mean rank		
<b>Prior to the implementation</b> company identified factors that may influence the process effectiveness.	4,04	4,05	52,53	4,03	51,3	-0,216	0,829
<b>In preparation phase</b> , implementation team identified factors that may influence the process effectiveness.	3,87	3,86	51,54	3,88	52,61	-0,192	0,848
<b>During the implementing stage</b> factors that may influence the effectiveness of the process were identified.	3,84	3,7	48,08	4,06	57,25	-1,633	0,102
<b>After completion</b> of the implementation the factors affecting the effectiveness of the process were identified and analysed.	3,74	3,5	46,95	4,03	58,77	-2,065	0,039*
Analysis of factors affecting the implementation effectiveness allowed for a more complete adjustment to the enterprise needs.	3,71	3,63	49,69	3,81	55,1	-0,954	0,340
Identification and monitoring of key success factors had a positive impact on the implementation effectiveness.	3,69	3,66	50,96	3,74	53,4	-0,435	0,664
Analysis of factors affecting the effectiveness of implementation has limited the duration of the process.	3,48	3,39	50,09	3,59	54,56	-0,793	0,428
Identification and monitoring of key success factors was carried out especially in the preparation phase.	3,41	3,4	51,95	3,41	52,07	-0,021	0,983
Analysis of factors affecting the effectiveness of implementation has limited implementation costs.	3,37	3,33	51,03	3,43	53,31	-0,403	0,687
Identification and monitoring of key success factors was carried out at all stages of the implementation process.	3,22	3,06	49,02	3,42	56	-1,214	0,225

Symbols: \* – value with statistical significance, Me – median, Z – statistics of Mann-Whitney test, p – level of significance.

Source: own work.

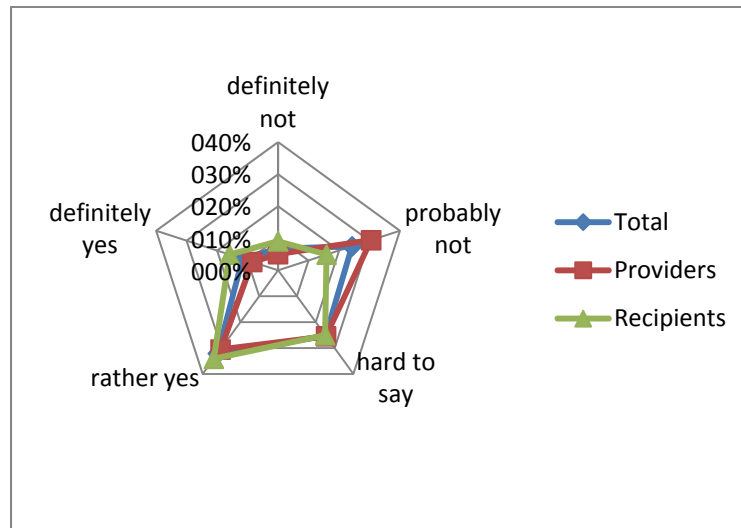
Respondents said that prior to the implementation they identified factors that may affect this process (Me = 4,04). They also expressed the opinion that the identification and analysis of factors was carried out less in the preparation, implementation, and system operation phase.

The study showed a significant difference in the SMEs approach to the identification of factors affecting the implementation process effectiveness after the end of the process. During the operation phase

service providers less identified and analysed the factors influencing the effectiveness ( $Me_{\text{providers}} = 3,50$ ). Such analysis was more often conducted by companies using the implemented tools ( $Me_{\text{recipients}} = 4,03$ ).

Gathered data does not allow to clearly state that the analysis of the factors influencing the effectiveness of implementation has limited the implementation costs. Similarly, remains unresolved the question, whether the identification and monitoring of key success factors was carried out at all stages of the implementation process ( $Me = 3,22$ ). Figure 2 shows respondents' opinion about identification and monitoring of key success factors at all stages of the implementation process.

**Figure 2:** Identification and monitoring of key success factors was carried out at all stages of the implementation process.



Source: own work.

While respondents reported that prior to the implementation process and during the realization phase the factors determining the effectiveness were often analysed, whereas these activities were carried out less frequently in other phases of implementation.

Both the suppliers and the recipients strive to identify and monitor the factors determining the implementation effectiveness. The only identified significant difference is related with performing that kind of analyses after the implementation, during the system operational phase. Operational phase monitoring is more frequently emphasized by recipients.

### 3.2. The main factors affecting the effectiveness of implementation

The research tool contained a list of factors determining the effectiveness of implementation. The list based on the analysis of literature (Soja, 2006, pp. 646-661; McLeod & MacDonell, 2011, p. 24.4; Kumar & Malik, 2011, p. 274) and data gathered during the interviews conducted with IT experts in the first stage of the research. Respondents evaluated the significance and impact of various factors on the effectiveness of implementations. Table 3 shows the respondents' opinions on the main factors that may affect the effectiveness of implementation of information systems in small and medium-sized enterprises (compare: Shaul&Tauber, 2013, pp. 55:1-55:39).

**Table 3:** Factors that influence the effectiveness of the IT system implementation (Mann-Whitney test)

Factor	All respondents (n =103)	Providers (n=59)		Recipients (n=44)		Z	p
	Me	Me	Mean rank	Me	Mean rank		
<b>Implementation team experience</b>	<b>4,34</b>	<b>4,37</b>	<b>53,32</b>	<b>4,31</b>	<b>50,23</b>	<b>-0,565</b>	<b>0,572</b>
<b>The expertise of the team members</b>	<b>4,30</b>	<b>4,40</b>	<b>55,31</b>	<b>4,18</b>	<b>47,57</b>	<b>-1,408</b>	<b>0,159</b>

Factor	All respondents (n =103)	Providers (n=59)		Recipients (n=44)		Z	p
	Me	Me	Mean rank	Me	Mean rank		
<b>Communication skills</b>	<b>4,26</b>	<b>4,31</b>	<b>53,97</b>	<b>4,18</b>	<b>49,35</b>	<b>-0,862</b>	<b>0,389</b>
<b>The discipline of employees</b>	<b>4,14</b>	<b>4,00</b>	<b>48,43</b>	<b>4,29</b>	<b>56,78</b>	<b>-1,498</b>	<b>0,134</b>
<b>The IT system flexibility</b>	<b>4,09</b>	<b>3,93</b>	<b>47,61</b>	<b>4,29</b>	<b>57,89</b>	<b>-1,840</b>	<b>0,066^</b>
<b>The IT system ease of use</b>	<b>4,08</b>	<b>3,97</b>	<b>48,71</b>	<b>4,21</b>	<b>56,41</b>	<b>-1,371</b>	<b>0,170</b>
<b>Consistency and determination</b>	<b>4,06</b>	<b>4,09</b>	<b>52,84</b>	<b>4,03</b>	<b>50,88</b>	<b>-0,354</b>	<b>0,723</b>
<b>Level of understanding the company needs</b>	<b>4,06</b>	<b>4,02</b>	<b>50,68</b>	<b>4,11</b>	<b>53,77</b>	<b>-0,560</b>	<b>0,575</b>
Ease of system administration	3,90	3,85	50,78	3,96	53,64	-0,510	0,610
Users' training level	3,85	3,69	47,69	4,09	57,78	-1,795	0,073^
Managerial skills of project leaders	3,83	3,76	49,98	3,91	54,70	-0,837	0,403
Fitting work schedule to company's needs	3,82	3,72	49,07	4,00	55,93	-1,220	0,222
Organization of implementation	3,82	3,77	50,46	3,88	54,07	-0,659	0,510
The administrators' training level	3,81	3,55	46,75	4,06	59,05	-2,147	0,032*
The stability of the team	3,74	3,64	49,61	3,88	55,20	-0,978	0,328
Monitoring of performance	3,74	3,64	49,35	3,85	55,56	-1,126	0,260
Strict compliance with the planned implementation schedule	3,71	3,54	47,98	3,96	57,39	-1,653	0,098^
Knowledge in project management	3,68	3,68	51,97	3,68	52,05	-0,014	0,989
Company's technical infrastructure	3,67	3,61	50,25	3,75	54,34	-0,723	0,470
Understanding the implementation aims by employees	3,67	3,58	48,67	3,80	56,47	-1,381	0,167
Strict division of responsibilities	3,66	3,70	52,73	3,60	51,02	-0,298	0,766
The quality of system documentation	3,65	3,61	50,73	3,70	53,70	-0,528	0,598
Management commitment	3,64	3,53	49,41	3,79	55,48	-1,060	0,289
Precise and clear contract	3,62	3,45	48,47	3,79	56,74	-1,438	0,150
The level of understanding of the company functioning	3,59	3,44	47,01	3,82	58,69	-2,071	0,038*
The company's employees' perception of implementation benefits	3,56	3,39	46,50	3,81	59,38	-2,309	0,021*
The way of functioning of the company	3,53	3,40	50,00	3,66	54,68	-0,821	0,411
Level of project culture	3,53	3,51	51,87	3,54	52,17	-0,053	0,958
Identification and monitoring of the implementation key success factors	3,50	3,43	49,54	3,60	55,30	-1,013	0,311
Active participation of employees in implementation process	3,48	3,35	49,18	3,65	55,78	-1,161	0,246
Regular trainings for employees in the area of system usage	3,45	3,21	47,64	3,73	57,85	-1,777	0,075^
Use of implementation methodology	3,40	3,47	53,35	3,31	50,19	-0,556	0,578
The quality of process documentation	3,35	3,36	52,31	3,33	51,59	-0,125	0,900
Level of project culture of implementation recipient	3,33	3,21	48,79	3,47	56,31	-1,323	0,186
Tight control of implementation costs	3,33	3,15	47,53	3,55	57,99	-1,822	0,069^
Informing workers about job progress	3,29	3,18	49,34	3,44	55,57	-1,096	0,273
The perception of threats generated by implementation	3,25	3,00	46,14	3,51	59,85	-2,423	0,015*
The reputation of the service provider	3,15	3,16	52,32	3,13	51,57	-0,131	0,896

Symbols: \* – value with statistical significance, ^ – value with statistical tendency, Me – median, Z – statistics of Mann-Whitney test, p – level of significance.

Source: own work.

Respondents said that the most important factors influencing the effectiveness of the implementation include: the implementation team experience, expertise of implementation team members, communication skills, the employees discipline, flexibility and ease of use of a implemented system, consistency and determination of the project team members and the level of understanding by implementation team members the company's needs and way of operating (Me  $\geq$  4,06) (see: Metrejean & Stocks, 2011, p. 2; Kumar & Malik, 2011, p. 279).

It is worth noting that, in the opinion of respondents, the most important for the effective implementation is to have adequate human resources with a high level of expert knowledge, extensive experience, high interpersonal skills and a high degree of discipline (Figure 3). The above analyse has been confirmed in a study conducted in the UK by Computer Weekly and The Coverdale Organisation (ComputerWeekly, p.1), which shows that the main reasons for the failure of the implementation should be sought not in the aspect of system specification or technical grounds, but in group work skills, which consist, among others, of communication skills and leadership skills.

**Figure 3:** The main factors determining the effectiveness of the implementation

<p>The main factors determining the effectiveness of the implementation:</p> <ul style="list-style-type: none"> <li>• experience of the implementation team,</li> <li>• expertise,</li> <li>• communication skills,</li> <li>• employees' discipline,</li> </ul>
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Source: own work.

The level of project culture of implementation recipient, tight control of costs related to the implementation, the transmission of information about the progress of implementation to the employees, the perception of threats generated by implementation by the company's employees and the reputation of the service provider were stated to be the least important factors that influence the effectiveness of IT systems implementation. The medians of these factors did not exceed 3,33.

It can be concluded that respondents during the implementation stage pay less attention to the service provider reputation, close costs monitoring and to informing employees about the progress of implementation.

## 4. BARRIERS FOR IT SYSTEMS IMPLEMENTATION

### 4.1. List of barriers known to inhibit the implementation process

Conducted study of literature (Amid et al.2012, pp. 231-232; Bazini et al., 2011, p. 6; Celjo et al., 2011, p. 84) and interviews with IT experts allowed to know the main barriers of the implementation process. Closed list of barriers containing 34 items was prepared and consulted with experts in the IT market during the first stage of research (qualitative research). Quantitative research allowed knowing the significance of these barriers in the implementation process. Table 4 shows respondents' opinions on the impact of selected barriers on implementation work.

**Table 4:** Barriers for IT systems implementation in Polish SMEs (Mann-Whitney test)

Barrier	All respondents (n=103)	Providers (n=59)		Recipients (n=44)		Z	p
	Me	Me	Mean rank	Me	Mean rank		
<i>Workers' resistance</i>	3,40	3,31	49,81	3,52	54,93	-0,882	0,378
<i>The appearance of the additional costs</i>	3,09	3,18	53,79	2,96	49,60	-0,725	0,468
<i>Changes in customer requirements</i>	3,07	3,36	56,79	2,73	45,58	-1,945	0,052 <sup>^</sup>
<i>Organizational barriers related to the organization of the company</i>	3,04	3,42	59,53	2,58	41,91	-3,051	0,002 <sup>*</sup>



Barrier	All respon- dents (n=103)	Providers (n=59)		Recipients (n=44)		Z	p
	Me	Me	Mean rank	Me	Mean rank		
Functional differences between the previous and current system	2,92	3,10	54,54	2,65	48,59	-1,030	0,303
Insufficient employees' motivation to perform implementation work	2,87	2,77	50,55	3,00	53,94	-0,588	0,557
Technical barriers (company infrastructure)	2,81	2,82	51,97	2,80	52,05	-0,014	0,989
Economic barriers (insufficient budget, low priority of costs)	2,70	2,64	51,70	2,77	52,40	-0,120	0,905
Social barriers associated with employees	2,67	2,68	52,28	2,67	51,63	-0,113	0,910
Insufficient knowledge in the area essence of the implementation	2,67	2,52	48,30	2,88	56,97	-1,504	0,132
The complexity of the IT system	2,64	2,50	48,32	2,83	56,93	-1,494	0,135
The complexity of company's business processes	2,60	2,52	49,70	2,69	55,08	-0,931	0,352
Insufficient support from the major suppliers	2,57	2,44	49,37	2,80	55,52	-1,064	0,287
Technological differences between the previous and current system	2,57	2,56	51,41	2,57	52,80	-0,239	0,811
Communication problems	2,56	2,47	49,93	2,71	54,77	-0,843	0,399
The need for scrupulous documentation of the performed work	2,53	2,50	51,19	2,57	53,09	-0,331	0,741
Inflexibility of the company's organizational structure	2,50	2,53	52,83	2,46	50,89	-0,338	0,735
Lack of support from the company's management	2,46	2,50	53,03	2,40	50,63	-0,416	0,678
Insufficient competences of the implementation participants	2,46	2,32	49,02	2,64	56,00	-1,220	0,223
Conflicts between employees	2,45	2,00	45,69	2,84	60,47	-2,560	0,010*
Incompatibility of the company's technical infrastructure	2,43	2,41	51,75	2,45	52,34	-0,103	0,918
Fear of losing flexibility	2,39	2,32	49,81	2,50	54,94	-0,892	0,372
Insufficient system customization capabilities to business processes	2,36	2,15	46,71	2,64	59,09	-2,156	0,031*
Incompatibility of provider's offer to the client's needs	2,35	2,18	47,91	2,58	57,49	-1,670	0,095^
Undefined key success factors	2,34	2,35	52,13	2,32	51,83	-0,052	0,959
Insufficient business processes customization capabilities to system requirements	2,33	2,11	48,21	2,53	57,08	-1,542	0,123
Lack of cost control	2,24	2,24	52,53	2,23	51,30	-0,219	0,827
Lack of process monitoring	2,21	2,28	53,35	2,12	50,19	-0,557	0,577
No central responsibility for the implementation process	2,20	2,25	53,42	2,13	50,10	-0,579	0,563
Incorrect implementation targets	2,20	2,27	54,09	2,11	49,19	-0,861	0,389
Conflicts between employees and implementation team members	2,18	1,83	46,85	2,60	58,91	-2,102	0,036*
Non transferability of budgeted between the various stages	2,16	2,13	51,92	2,19	52,10	-0,032	0,975
Lack of sufficient funds	2,09	2,00	50,10	2,20	54,55	-0,780	0,436
Selecting incorrect system	1,89	1,84	50,71	1,97	53,73	-0,533	0,594

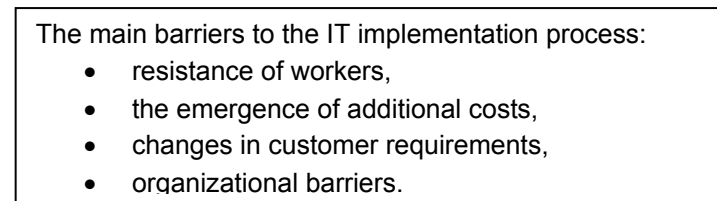
Symbols: \* – value with statistical significance, ^ – value with statistical tendency, Me – median, Z – statistics of Mann-Whitney test, p – level of significance.

Source: own work.

The resistance of workers was reported to be the major barrier hindering the IT implementation process (compare with Muganda Ochara et al., 2014, p. 318). On a scale of 1 to 5, mentioned factor obtained median value of 3,40. The significant barriers are also: additional, unplanned costs, changes in

customer requirements, barriers related to the organization of business and functional differences between the previously used and the currently implemented system. The above factors obtained median values, respectively: 3,09; 3,07; 3,04 and 2,92 (compare with Amid et al., 2012, pp. 231-233).

**Figure 4:** The main barriers to the IT implementation process



Source: own work.

Incorrectly defined implementation objectives ( $Me = 2,20$ ), the possibility of conflicts between workers and members of the implementation team ( $Me = 2,18$ ), lack of transferability of funds between the various stages of implementation ( $Me = 2,16$ ), the lack of sufficient funds ( $Me = 2,09$ ), and improper system selection ( $Me = 1,89$ ) have been found to be the least significant barriers. Therefore, it should be considered that, prior to the implementation, recipients prepare adequate financial resources, carefully define the objectives of implementation work, as well as choose the appropriate vendor and the system that meets their expectations.

#### **4.2. Differences in barrier perception between service providers and system users**

The study enabled to diagnose a few statistically significant differences in the perception of barriers related to: the organization of the company and the implementation process; the possibility of the conflicts emergence between employees and members of the implementation team, as well as in terms of insufficient ability of the system to adapt to business processes. In addition, statistical trends were also observed in the area of changes in customer requirements (in terms of the scope of work) and incompatibility of system provider's offer to the client's needs.

In the providers' opinion organization of company and course of implementation process is stronger barrier affecting the effectiveness of the implementation ( $Me_{\text{providers}} = 3.42$ ). According to the recipients barrier is rather unimportant ( $Me_{\text{recipients}} = 2.58$ ). For the recipients more significant barrier is the possibility of conflicts between workers as a result of the implementation process ( $Me_{\text{recipients}} = 2.84$ ,  $Me_{\text{providers}} = 2,00$ ). This difference may be due to the fact that for the recipients the implementation process is a unique, extraordinary situation generating additional stress for employees. Stress may be caused by increase of employee responsibilities, the need to perform casual work in conjunction with the activities directly related to the implementation process.

For service providers next implementations generate a certain level of risk, unpredictability, but usually consist of a sequence of steps repeated in most previously carried projects. So, it does not generate such a high level of stress. Information about conflicts that have arisen between recipient's employees is usually accented in the area of informal contacts and not transmitted outside of the company. So the service provider maybe not always aware of it.

Another barrier, where the perception of providers and recipients differs significantly is insufficient ability to customize the system to recipient's business processes. In the opinion of implementation services providers, this barrier is less important than from the recipients point of view ( $Me_{\text{providers}} = 2,15$  and  $Me_{\text{recipients}} = 2,64$ ).

This difference may be due to the fact that the provider employing experts in the field of programming, databases, computer networks, has the ability to adapt the system to any articulated requirement. However, additional programming work involves additional costs, which sometimes exceeding 50% value of the software. In addition to the economic aspects, the problem becomes also the stability of the modified system, ease of administration, and the possibility of future development and updates. For the client, the additional costs in the implementation phase and the operation phase combined with the risk of instability of the system, or the administrative problems is a major barrier that can be a reason for abandoning the implementation work.

The observed statistical trends show that from the providers point of view more important barrier is the possibility of changing customer requirements related to the scope of work. It is usually associated with changes in the schedule or cost of implementation ( $Me_{\text{providers}} = 3,36$ ;  $Me_{\text{recipients}} = 2,73$ ). The recipients more often expressed the opinion that the some barrier of effective implementation is incompatibility of offered system to the client's needs ( $Me_{\text{providers}} = 2,18$ ;  $Me_{\text{recipients}} = 2,58$ ).

## 5. SUMMARY

Respondents stated that prior to the implementation they identified factors that may affect effectiveness of this process. IT service providers and recipients also expressed the opinion that the identification and analysis of success factors was carried out less in implementation, and system operation phase.

The research showed that the most important factors influencing the effectiveness of the implementation include: the implementation team experience, expertise of implementation team members, communication skills, the employees' discipline, flexibility and ease of use of an implemented system, consistency, determination of the project team members and the level of understanding by implementation team members the company's needs and way of operating.

The least important factors are: the level of project culture, tight control of costs, the transmission of information, the perception of threats generated by implementation and finally the reputation of the service provider.

The respondents stated that the key barriers for implementation process are: resistance of workers, the possibility of additional costs as well as the emerging changes in customer requirements. The least important and unlikely were barriers related to the lack of financial resources as well as the improper selection of the system. It can be stated that the analysis conducted prior to the implementation allows minimizing the risk of the emergence of the above barriers. Significant differences in the perception of barriers were mainly related to the implementation organization, conflicts between workers caused by implementation process and insufficient system customization capabilities to business needs.

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