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Jolanta SŁONIEC
Lublin University of Technology
Faculty of Management
Department of Enterprise Organization
j.sloniec@pollub.pl

Anna KACZOROWSKA
University of Lodz
Faculty of Management
Department of Computer Science
annak@wzmail.uni.lodz.pl

Sabina MOTYKA
Cracow University of Technology
Faculty of Mechanical
Department of Manufacturing Processes
motyka@mech.pk.edu.pl

RISK ASSESSMENT OF IT OUTSOURCING IN ENTERPRISES DEPENDING ON THEIR BRANCH

Abstract. The article presents the study of the risks of IT outsourcing in companies. The main research question is: Does the risk of the IT outsourcing depend statistically on the branches of the enterprise? The following methods were used in the study: literature analysis, surveys of Polish enterprises, statistical methods, analysis and synthesis – to compare the literature research to author's own research on IT outsourcing. The results indicate that some of the risks of IT outsourcing dependent on the enterprises' branches, and they are: *incompliance with the contract*, *unclear relationships between costs and benefits*, *hidden costs of the contract* and *irreversibility of the decision*. For other risks, the difference was not observed.

Keywords: risk factors, IT outsourcing, branch of enterprises

OCENA RYZYKA KORZYSTANIA Z OUTSOURCINGU IT W PRZEDSIĘBIORSTWACH W ZALEŻNOŚCI OD ICH BRANŻY

Streszczenie. Artykuł przedstawia badanie ryzyka stosowania outsourcingu IT w przedsiębiorstwach. Podstawowe pytanie badawcze brzmi: czy ryzyko korzystania z outsourcingu IT różni się statystycznie w zależności od branży przedsiębiorstw? Metody wykorzystane do przygotowania niniejszego artykułu to: studium literaturowe w odniesieniu do literatury przedmiotu, badania ankietowe przedsiębiorstw polskich, metody statystyczne oraz analiza i synteza wykorzystana do porównania badań literaturowych z badaniami własnymi outsourcingu IT. Wyniki badań wskazują, że niektóre ryzyka outsourcingu IT zależne są od branży przedsiębiorstw. Są to w szczególności: brak przestrzegania przez dostawcę umowy, niejasne relacje między kosztami a korzyściami, ukryte koszty umowy i nieodwracalność decyzji. Dla innych ryzyk różnicy tej nie zaobserwowano.

Słowa kluczowe: czynniki ryzyka, outsourcing IT, branża przedsiębiorstw

1. Introduction – IT outsourcing IT in organizations and enterprises

The concept of outsourcing developed in the twentieth century from the English words and literally means the use of resources from outside – the company, organization or the use of external resources. One of the recognized definitions of this phenomenon is given by Trocky, i.e. "a project, consisting in separation of the organizational structure of the parent company associated functions and transfer them to the realization of other business entities"[1].

Outsourcing can be used in many areas of business. The main areas of its application are: logistics, general management/administration, IT/telecommunications, finance, production management, marketing, HR[2].

The area of IT outsourcing is one of the areas that are developing most rapidly today. Research carried out in 2015 by Orange showed that "63% of large companies and corporations say that IT outsourcing allows them to build competitive advantage, 55% see an increase in its importance in recent years, and nearly half (45%) are able to admit that the use of IT outsourcing has an importance for business efficiency[3]".

As for the future of IT outsourcing, according to a study by KPMG of 2014/15, in the next 2-3 years, the reasons for planning outsourcing will include: cost reduction – 26%, quality improvement – 21%, access to skills – 19%, financial flexibility – 11% and access to the latest technology – 11%[4].

[1] Trocki M.: Outsourcing. Metoda restrukturyzacji działalności gospodarczej. PWE, Warszawa 2001, s. 13.
[2] Kłos M.: Outsourcing w polskich przedsiębiorstwach. CeDeWu.pl, Warszawa 2009, s. 158.
[3] Baranowska-Skimina A.: Outsourcing IT okiem dużych firm. „eGospodarka.pl", 2015.
[4] KPMG: Zupełnie nowy świat outsourcingu usług IT, 2015.

Polish potential in the development of business services outsourcing and IT outsourcing increases. Poland is called the India of Europe. Krakow was rated ninth in the report Top 100 Outsourcing Destinations 2015 (Warsaw – 30th place, Wroclaw – 62th place)[5].

2. The risk of IT outsourcing use

2.1. The definition of IT outsourcing risk

The use of outsourcing services in the IT area is associated with some risks. Risk is "a situation where at least one of its elements is not known, but the probability of its occurrence is known (or - their occurrence, when there is more than one element)[6]".

Another definition of risk is given by Kluk (2014). The definition applies to risk factors determining the process of identifying the requirements in outsourcing IT projects. So understood risk is "the probability of events that can lead to make a system operate contrary to the customer's needs or exceeding the fixed term of the project"[7].

The risk of IT outsourcing in this paper is understood as a situation where the elements of this risk are not known, but the probability of each of the elements of risk can be determined. There are many factors that cause the risk of IT outsourcing. The next chapter discusses the elements presented in Polish and foreign researches.

2.2. The literature study of the risks of IT outsourcing

The assessment of threats and risks of IT outsourcing were dealt with by many Polish and foreign scientists studying the essence of the phenomenon.

In English publications various risk factors are enumerated. Earl MJ (1996) lists eleven factors: possibility of weak management, inexperienced staff, business uncertainty, outdated technology skills, endemic uncertainty, hidden costs, lack of organizational learning, loss of innovative capacity, dangers of an eternal triangle, technological indivisibility, fuzzy focus. He emphasizes that the most important results of business activities relate to the external sphere of enterprises, especially the market and customers. This also applies to the results of activity in the IT area. The management of enterprises should focus on the implementation of IT outsourcing in such a way as to maximize company profit.

[5] Albin M.: Polska mogłaby być światowym centrum outsourcingu IT, ale brakuje nam specjalistów, „benchmarkt.pl", 2016.
[6] Pasieczny L. (red.): Encyklopedia organizacji i zarządzania. PWE, Warszawa, 1981, s. 456.
[7] Kluk J.A.: Model identyfikacji wymagań w outsourcingowych projektach informatycznych. Uniwersytet Gdański, Gdańsk 2014, s. 48.

B. Bahli, S. Rivard (2005) provide a list of risk factors of IT outsourcing divided by the source of risk (table 1).

Table 1

Risk factors in outsourcing IT operations

Source of risk	Risk factors	Details
1.Transaction	1.1. Asset specificity	1.1.1. Client investments 1.1.2. Supplier investments 1.1.3. Human resources
	1.2. Small number of suppliers	
	1.3. Uncertainty	
	1.4. Internal relatedness	
	1.5. External relatedness	
	1.6. Measurement problems	1.6.1. Job standardization 1.6.2. Task complexity 1.6.3. Task difficulty
2. Client	2.1. Degree of expertise with the IT operation 2.2. Degree of expertise without sourcing	
3. Supplier	3.1. Degree of expertise with the IT operation 3.2. Degree of expertise without sourcing	

Source: Bahli B., Rivard S.: Validating measures of information technology outsourcing risk factors. „The International Journal of Management Science", No. 33, 2005, p. 180.

The study was conducted on a random sample of 132 Canadian companies. The author looked for relationships between specific risks and the number of employees and business assets, but the relationship was not discovered. In the conclusions the author emphasized that future research of the IT outsourcing risk should be carried out from different perspectives: social, political and cultural.

In papers by Gonzalez M.R., J.L. Gasco, Llopis J. (2005, 2010) ten risk factors of IT outsourcing were presented and ranked in order of their importance (Table 2).

Table 2

Outsourcing risks

Rang	Risks	% valid
1	An excessive dependence on the provider	61,8
2	Loss of critical skills and competences	36,6
3	Qualification of the provider's staff	35,9
4	The provider does not comply with the contract	33,0
5	Unclear cost-benefit relationship	30,7
6	Hidden costs in the contract	29,4
7	Security issues	20,6
8	Irreversibility of the outsourcing decision	9,8
9	The possibility opposition if our IT staff	7,2
10	Inability to adapt to new technologies	6,2

Source: Gonzalez M.R., Gasco J.L., Llopis J.: Information systems outsourcing risks: a study of large firms. "Industrial Management & Data Systems", No. 105, 2005, p. 54.

These studies were carried out on a group of 357 enterprises and organizations, some of them are using the outsourcing (86% of companies), but also some do not use it (14%). When it comes to the size of enterprises (classification is based on Spanish standards) there were very

large companies (more than 500 employees – 37%), medium size companies (51-500 employees – 57%) and small companies (up to 50 employees – 6%). The authors studied the dependence of the risk of IT outsourcing depending on the level of outsourcing (below or above the average) with the help of chi-square test of Pearson. With the assumed confidence level of 0.06 for three factors: *An excessive dependence on the provider*, *The possibility opposition if our IT staff* and *Security issues* they found a relationship of these factors with the level of outsourcing. They also studied the dependence of these risk factors on the size of enterprise (less than 500 and more than 500 employees), as well as on the value of sales (above and below 15 billion pesetas). For the risk factors 1, 3, 5, 7, 9 from Table 2, they have recognized a dependence on the companies' size and for factors 1, 2, 6, 9, a dependence on the value of sales.

The paper of the same authors from 2010, apart from the previously mentioned analysis, includes additionally the analysis of risk factors when comparing studies from 2001 and 2006.

Outsourcing risks were also studied by Polish scientists. Research of Klos (2009) apply to the entire area of outsourcing, it was conducted on a group of 322 Polish companies from various industries. In this monograph the author listed the following risks of outsourcing and the significance of the individual risks assessed by the respondents[8]:

- untimely execution of the service by the service provider – 47.8%,
- fear of additional costs – 45.4%,
- organizational/employee problems – 45%,
- loss of control of the company over a separate area – 41.2%,
- mismatch of organizational culture – 35.5%,
- fear of dependence on supplier – 33.6%,
- risk of monopolistic behaviour subsidiary company – 29.3%,
- misuse of confidentiality and secrecy of company – 25.3% and others.
- Kopczyński (2010) discusses the reasons for limiting the effectiveness of outsourcing in business organizations. Analyzing the risks of outsourcing the author distinguishes: the risk of the organization, the risk of competition and the risk of my own losses.

The risk of the organization includes the following factors[9]:

- Failure to perform the work in accordance with applicable standards and earlier arrangements,
- Lack of compatibility of organizational cultures,
- Staff resistance and misunderstandings due to changes in personnel policy.

[8] Kłos M.: op.cit, s. 174-176.
[9] Kopczyński T.: Outsourcing w zarządzaniu przedsiębiorstwami. PWE, Warszawa 2010, s. 124-139.

Risk factors of competition are as follows:

- Failure to maintain the confidentiality of information by executing the service,
- Dishonesty partner manifested in the strengthening at the expense of the other company.

Risk factors my own losses include:

- Client's dependence from the external partner,
- Loss of identity,
- Inability to rebuild my own business in the field of commissioned service.

The most widely the problem of IT outsourcing risk is discussed in Kluk's publications (2010, 2014). In the first one she shows the classification of risks according to selected publications divided into three periods of years: 1996-2000, 2001-2004 and 2005-2008. Risk factors are divided into seven categories: client, vendor, requirements, technology, project management, relationship management and multiple country.

In another publication the author presents another risk classification. In the first classification she distinguishes four forms of risk in projects related to IT and they are: strategic risk, operational risk, internal decay and risk of location. In the second classification she distinguishes exogenous and endogenous risks.

She lists the risk factors according to their importance in different countries (Hong Kong, USA and Finland) and they are:

- Lack of managers' commitment to the project,
- Failures in obtaining the users' involvement,
- Misunderstanding of requirements,
- Involvement of unsuitable persons from the client side,
- The failure to manage the requirements of users,
- Changes in the scope,
- Lack of the required knowledge and skills in the project team,
- No freeze of requirements,
- Introduction of new technologies,
- Insufficient or inadequate staff,
- The conflict between internal departments of client.

The summary provides an overview of the literature related to the risk factors in IT outsourcing. It should be noted that the overwhelming number of scientists list, classify and sometimes determine the significance of factors. Only in the publications of Gonzalez M.R. et al. (2005, 2010) the relationship were examined between risk factors and some characteristics of enterprises, such as the size of enterprises and the value of sales.

It should be noted that according to the ratings of IT outsourcing practitioners this area in Poland will continue to grow dynamically. According to the results of research by BCC Data Centres consulting company in the next three years a third of Polish companies will consider

the introduction of outsourcing all or part of IT activities. Practitioners of IT outsourcing emphasize that this service, however, involves the security of information. Sometimes external consultants unreliable do their job, when in the company is lack of appropriate tools to control them. Then the company may lose control over sensitive confidential information and may even loss the information constituting of it competitive advantage[10].

Also, the practitioners from Western Europe pay attention to the dynamics of the development of this sector. By 2020, the National Outsourcing Association from the UK is expected that 78% of businesses and organizations expand their activities in the area of IT outsourcing. They underline that the conditions for the development of this sector has never been better and outsourcing gives impetus to the development of the UK economy.

Because the current state and prospects of development of the sector in the world and in Poland are very good research in this area should be carried out. The genesis of this research were reports about the dynamics of the development of IT outsourcing and growing importance of this sector in the economies of developed and developing countries.

3. Risk evaluation of IT outsourcing use depending on the branch of the enterprises on the basis of author's own research

3.1. The objective and the research, hypotheses and research methods

The aim of this publication is to identify the risks of IT outsourcing in Polish companies and as well as the assessment of risk depending on the industry branch of organizations on the basis of author's own research. The study included two branches of the organization: scientific/ research and industrial. The choice of the branches was not accidental because the initial author's interviews with representatives of the organizations that are using IT outsourcing pointed to the differences in the assessment of the implementation of this activity.

The problem is presented as follows: Does the branch of organization/company (scientific/research or industrial) diversify the opinions on the risks of IT outsourcing use?

The main hypothesis was formulated as follows: There are differences in the assessment of risks of IT outsourcing by organizations/research institutions and industrial companies.

The null hypothesis: There is no difference in the risk assessment of IT outsourcing application between institutions/companies from two branches: scientific/research and industrial.

Alternative hypothesis: There are differences in the assessment of IT outsourcing risks between institutions and enterprises of the two branches: scientific/research and industrial.

[10] Dawidek P.J.: Bezpieczeństwo IT w kontekście outsourcingu usług. „benchmakt.pl", 2014.

To evaluate the relationship between the branch of the company and the risk of IT outsourcing parametric Pearson's test chi-square was used. This test can help determine whether the difference between the two groups (the scientific/research or industrial branch) is statistically significant or you can reject the null hypothesis which assumes that the distributions will not vary with a fixed level of significance.

In order to verify the main hypothesis the results of extensive author's studies of IT outsourcing in large Polish enterprises were used. The research of IT outsourcing in large Polish companies have been carried out throughout the country using the CATI method in the year 2016. For this analysis, from the results of research of IT outsourcing in large Polish companies 40 organizations and companies were randomly selected from two industries: scientific/ research and industrial, 20 organizations/companies from each branch.

In the research questionnaire the following question was posed: "Evaluate the risk of outsourcing IT using". It was a semi-open question due to the possibility of adding your own answer in the line "Other (point to what?)". The answers were provided in the enlarged Likert scale:

	Coding
It is not important at all	1
It is not important	2
Relatively it is not important	3
Neither important, nor unimportant	4
It is moderately important	5
Is important	6
Is very important	7

Ranks were ordered – the lowest rank 1 – "It is not important at all".

Questionnaires were completed by IT managers in organizations or persons designated by them. The risks in the questionnaire were collected on basis of the research published by Earl M.J. (1996), Currie W.L. (1998), Madhuchhanda, D.A., Saji K.M. (2009), Bahli B., Rivard S. (2005), Kłos (2009), Gonzalez M., Gasco J.L., Llopis J. (2005, 2010), and they were as follows:

1. Personnel qualifications of the service provider.
2. Excessive dependence on supplier.
3. Failure to abide the agreement by the supplier.
4. Inability of a supplier to adapt quickly to new technologies.
5. Unclear relationship between costs and benefits.
6. Hidden contract costs.
7. Decision irreversibility.
8. Possible employees' resistance.
9. Security problems.

10. Problems with the staff (fear, gossips, low morale).

11. Other (indicate which ones?).

From the analysis the answers to the semi-open question were eliminated due to the fact that statistical methods were used, therefore, it was necessary to have homogeneous numerical data for the analysis. Finally, 10 possible risk factors of IT outsourcing use in the studied organizations/enterprises were taken into account.

The statistical analysis was performed using a licensed version of Statistica application, version PL12. To answer the research question Pearson's test chi-squared was used. It was assumed that if the value of the significance of the test is less than 0.05 the null hypothesis which assumes that there are no differences in schedules is rejected. It is also assumed premise that the distributions do not differ significantly ($p < 0.05$). When the value of the significance of the test is greater than 0.05, there is no reason to reject the null hypothesis of lack of differences in schedules.

3.2. Research results and their interpretation

The table 3 shows the results of chi-square test for individual risks investigated using a questionnaire.

Table 3

The value of Pearson's chi-square for individual risks depending on the enterprises' branch (scientific/research or industrial)

No	Kinds of risk of IT outsourcing use	Pearson's chi-square	Chi-square NW	p
1.	Personnel qualifications of the service provider	12,54854	15,19726	0,05079
2.	Excessive dependence on supplier	10,32015	12,81757	0,06666
3.	Failure to abide the agreement by the supplier	16,67426	21,79851	**0,01056**
4.	The inability of supplier to adapt quickly to new technologies	12,99741	16,93293	0,07217
5.	Unclear relationship between costs and benefits	15,44401	19,03185	**0,01707**
6.	The hidden contract costs	23,12546	29,91002	**0,00076**
7.	Decision irreversibility	16,09169	20,60399	**0,01327**
8.	Possible employees' resistance	11,68468	15,00650	0,06938
9.	Security problems	8,074680	10,77209	0,23268
10.	Problems with the staff (fear, gossips, low morale)	11,92778	15,85062	0,06672

Source: Own elaboration.

At a fixed level of significance α if $p < 0.05$ the null hypothesis is rejected, whereas in the opposite case, if $p > 0.05$ there is no reason to reject the null hypothesis.

The p-values for the four risks of IT outsourcing are less than the assumed level of significance (values marked in bold), which allow for the rejection of the null hypothesis and the acceptance of the alternative hypothesis. In the case of risks: *Failure to abide the agreement by the supplier*, *unclear relationship between costs and benefits*, *hidden contract costs*, and

decision irreversibility, there are differences in the risk assessment depending on the branch of organization/company (scientific/research and industrial).

At the same time, in other cases, there is no basis for rejection of the null hypothesis. There are risks: *Personnel qualifications of the service provider*, *Excessive dependence on supplier*, *The inability of supplier to adapt quickly to new technologies*, *Possible employees' resistance*, *Security problems* and *Problems with the staff (fear, gossips, low morale).*

To illustrate the differences in the risk assessment of IT outsourcing in the organizations/ enterprises in the two sectors: scientific/research and industrial the histograms of evaluation the four risks were inserted, for which the alternative hypothesis of the existence of differences in the risk assessment depending on the branch of organization/company was accepted (Figures 1-2).

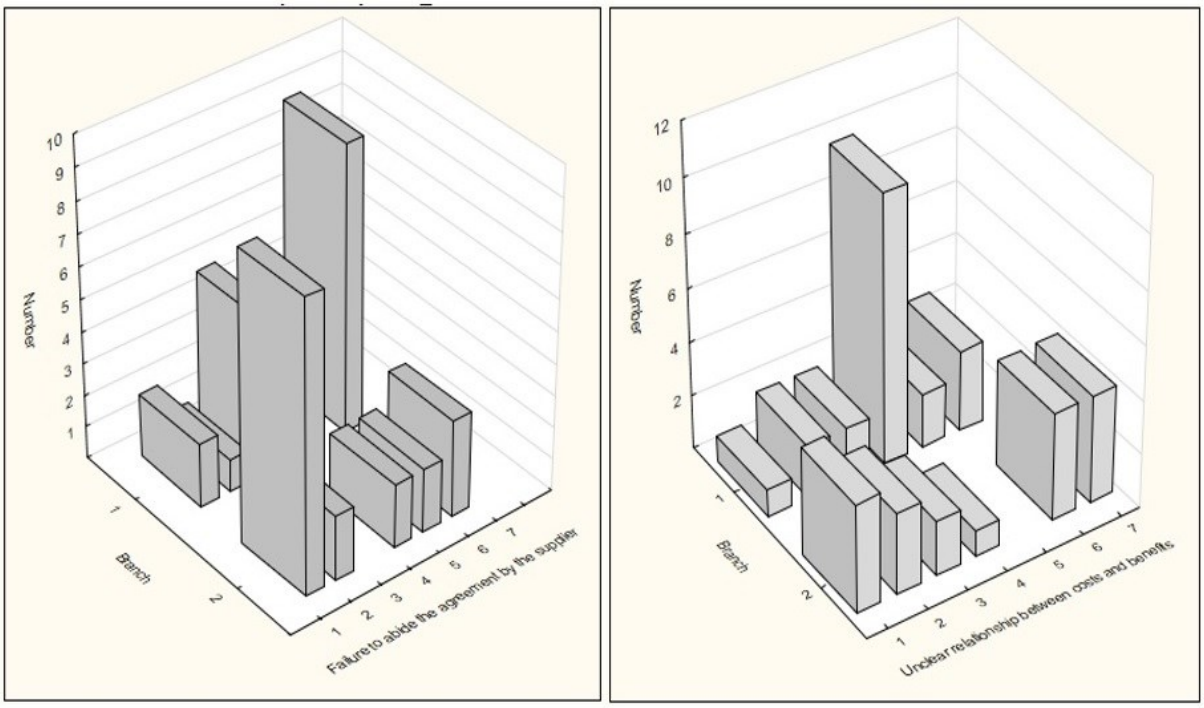

Fig. 1. Histograms assessment of risks *Failure to abide the agreement by the supplier* (left figure) and *Unclear relationship between costs and benefits* (right figure), (1 – scientific/research organizations, 2 – industrial companies)

In the risk assessment it was used an expanded Likert's scale:

It is not important at all	1	2	3	4	5	6	7	It is very important

Source: Own elaboration.

The histograms show the difference in the assessment of the risks. The studied industrial companies evaluated the risk *Failure to abide the agreement by the supplier* significantly lower than the scientific/research organizations. Risk *Unclear relationship between costs and benefits* was often rated by scientific/research organizations as neither important nor unimportant, while industrial companies assess this risk as rather unimportant or as important.

Analysing the reasons for the high risk assessment *Failure to abide the agreement by the supplier* by the scientific/research organizations, it should be noted that the contract of IT outsourcing has fundamental importance for these organizations. Both in relation to computer hardware or software, organizations from this branch of industry use electronic media and computer applications to store their own and customers' data, analyse and manage information and interact with customers.

This is their core business activity for them. Industrials below estimate the importance of this risk because, although it is important, it cannot fall within the core business. The present risk factor belongs to exogenous risks caused by external factors. As Kluk (2014) pointed out new risk factors of IT outsourcing projects concern the greater complexity of IT systems, which is associated with the precision of provisions in the contracts (scope of work, the principles of cooperation, the level of products and services quality, the rules of their acceptance IT projects at research institutions may be more complex than those implemented in industrial enterprises. That is why there are differences in the assessment of risk by the representatives of the two industries.

Similar differences in the assessment of risks *The hidden contract costs*, and *Decision irreversibility* represent histograms in Figure 2. Considering the differences in the risk assessment *The hidden contract costs* it is assessed higher by the scientific/research organizations, and lower by industrial enterprises. Higher risk assessment *The hidden contract costs* by the scientific/research institutions may also be associated with greater complexity of IT projects undertaken by these institutions and the greater importance of the project for this organizations (the core business).

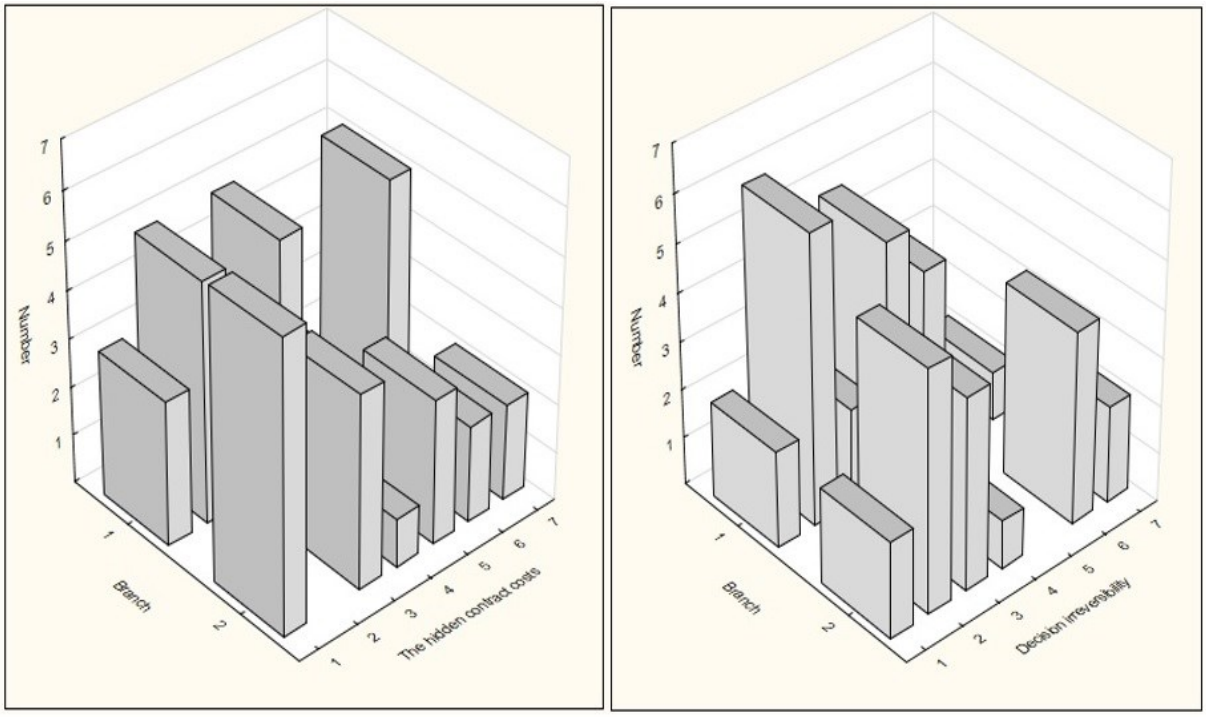

Fig. 2. Histograms assessment of risks The hidden contract costs (left figure) and Decision irreversibility (right figure), (1 – scientific/research organizations, 2 – industrial companies)

In the risk assessment it was used an expanded Likert's scale:

It is not important at all	1	2	3	4	5	6	7	It is very important

Source: Own elaboration.

4. Conclusions, further research

The paper presents the study of risk assessment of IT outsourcing, depending on the industry of organization. In reply to a research problem: does the industry of organization/company (scientific/research or industrial) diversify their opinion on the risk of outsourcing IT? On the basis on author's own research, it is clear that the industry of organization partially diversifies the opinion on the use of IT outsourcing (4 factor risk out of 11).

It should be noted that the studies presented in this paper had limitations. Firstly, they were limited to two sectors: scientific/research and industry, and secondly, they were related to 40 organizations, 20 of each branche. The differences in the assessment of eleven risk factors by organizations from two branches were examined. The most significant differences in the assessment of risk factors of IT outsourcing depending on the sector occurred in the case of factors: *Failure to abide the agreement by the supplier*, *Unclear relationship between costs and benefits*, *The hidden contract costs*, and *Decision irreversibility*. The reason for the differences in the assessment of these factors appears to be greater complexity of IT projects undertaken

by these research institutions and greater significance of IT projects for these organizations (the core business of the organization).

The problem of IT outsourcing risks studies is an important and current issue, due to increasing value of IT outsourcing market, development of the industry (new technologies), specializations in particular areas of outsourcing and areas of IT. A significant number of organizations and companies are using or intend to use this form of implementation the tasks related to IT in the near future. Further research directions in this area can be their quantitative extension (increasing the number of investigated organizations), the extension of the number of investigated sectors (trade, services, etc.), as well as increasing the number of studied factors. the case study of specific organisations should also be used, in order to make a thorough analysis of the reasons for the differences in the risk assessment, which could lead to the formulation of recommendations that would help the organizations minimize risks related to the use of IT outsourcing.

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