Determinants of IT Project Management. The Experts Comparative Study between Poland and Serbia

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Abstract

The aim of the article is to identify success factors and barriers in IT project management conducted by experts from Poland and Serbia in 2023. Data was obtained using the CAWI method, conveniently using the opinions of experts gathered at industry conferences. The collected data were subjected to comparative analysis, and the obtained results were discussed. The obtained results indicated differences in opinions on success factors and barriers in IT project management in Poland and Serbia. The reason for this was the age structure of experts and their accustomedness to existing standards, as well as IT development in Poland and Serbia. Statistically significant differences occurred in views on additional knowledge or skills in the area of business process management necessary in the organization to manage IT projects, as well as in areas where the introduction of IT systems would translate into the greatest increase in revenues. The originality of the work lies in comparing views on IT project management between two countries with different cultures and histories. The analysis can be used by both experts at universities and business practitioners. Its limitation was the analysis conducted on a sample of experts associated with universities, only in two selected countries.

Keywords: project management, process management, comparative analysis, benefits of IT project management, barriers in IT project management, determinants of IT project management

1. Introduction

Rapid and multidirectional changes in the economy in recent years caused by the COVID-19 pandemic, climate change and war in Ukraine have led to a significant increase in the importance of IT and processes introducing information technology (IT) into organizations. The outbreak of the pandemic caused a sudden demand for remote systems, which resulted in a simultaneous increase in demand for design services. The outbreak of the war contributed to drawing attention to the security of IT systems. This led to the development of IT projects and the initiation of innovative IT products in the form of unique computer programs supporting automatic process robotization [4]. The success of IT projects is also contributed to by the involvement of project managers and effective cooperation between team members. However, in the current studies, there is a lack of references to regional differentiation. This article hopes to fill this gap, in terms of opinions on project management (city and Euclidean distance, not power distance index [5]). The aim of the study is therefore to identify the main factors determining the success or failure of IT project management. In this context, it is important to

answer the question:
RQ1: what influences IT project management in two culturally and economically different countries, Poland and Serbia?

To achieve this goal, the following structure of the article was adopted. The first chapter justifies the need for research in this area, determines the current status of research and the research gap. The second chapter conducts a literature review constituting the background of this research. The third chapter describes the research procedure and the research sample. The next chapter analyzes and discusses the obtained results. Then, conclusions are drawn and limitations and further directions of work are presented.

2. Literature Review

Project management is a science about effectively achieving assumed goals using rational use of resources (human, financial, material, etc.) and the relationships between them) in a given time [11]. A characteristic feature of this scientific field is its variability, related to the dynamics of the economic environment [2]. It therefore derives directly from economic practice and views on it should not differ across regions [3]. Economic practice also shows that in a narrower sense, project management is a unique, individual undertaking undertaken to produce a quantitatively and qualitatively specific product or service, using allocated human, material and financial resources, limited in time by a clearly defined starting and ending point, which are connected by implementation stages separated within a specific method, managed by a competent project manager [10]. The dependence of IT project management on the methods and procedures of implementing the economic strategy in reality results in the reflection of this concept in the literature [16]. Most often, it is viewed from the point of view of using an appropriate method to optimize economic activities [12], mainly the use of IT systems to increase the efficiency of the organization's functioning [17], the benefits it brings, the barriers that make it seem useless or of limited importance. Comparisons of specific groups of methodologies are frequent, where newer and more flexible methods are glorified without specifying what they are most useful for. Reality often verifies these views, which results in the use of either hybrid or improved methods [14].

A significant role in the assessment of IT project management is played by methodological standards, mainly PMI and PRINCE2 [13], often wrongly classified as traditional methods due to the number and complexity of the proposed solutions. The widespread knowledge of these standards should lead to the unification of views on IT project management in all countries using IT systems in organizational management, which, however, has not happened. The analysis of this phenomenon through comparative research focuses on comparisons of differences between domestic and international project management and emphasizing cultural differences. The trend counteracting this differentiation is globalization [15]. In addition, the development of project management is influenced by the latest technologies: cloud computing, artificial intelligence, etc. [1]. However, what is more important is what experts say about it, among whom professional experience exceeds information obtained from the Internet. There is little comparative research on this topic, which is why the analyses, the results of which are included in this conference article, are located in this area. h to increase the efficiency of the organization [17], the benefits it brings, the barriers that make it seem useless or of limited importance. Comparisons of specific groups of methodologies are common, where newer and more flexible methods are glorified without specifying what they are most useful for. Reality often verifies these views, which results in the use of either hybrid or improved methods [14]. There is little comparative research on this topic, which is why the analyses, the results of which are included in this conference article, are located in this area.

3. Research Methodology

3.1. Research Procedure

The following research procedure was used:

- formulation of the research topic, its scope and method of solving the problem, content analysis methods were used for the review and analysis of the literature,
- formulation of a research survey based on the literature and interviews with experts,
- distribution of the survey using the CAWI (Computer Assisted Web Interview) method and collection of results,
- preparation of data for processing, reduction to comparability and calculation of basic statistics (mean, variance, standard deviation),
- preparation for comparative analysis: calculation of city and Euclidean distance and for statistical significance of differences: F-Snedecor test,
- analysis and discussion of results and drawing conclusions from the research.

A systematic exploration of selected items from the databases was carried out: Google Scholar [9], ProQuest [7] and ScienceDirect [8], where the key words were entered: IT project management, and determinants of IT project management. The key words allowed us to locate publishing items from the last three years by title and to analyze their content initially. In addition, the next items from the first 50 places in the Google search engine were selected according to the same criteria. Data for the analyses were obtained by conducting a survey for Poland and Serbia in 2023. The surveys sent to Serbia were translated into English. The questionnaire consisted of 21 questions, divided into three sections: assessment of awareness of the most important factors influencing project management, estimation of the impact of process management and its tools on IT project management, and assessment of the importance of IT systems for the organization. Each question could be answered with one to several options from the proposed options. A detailed description of the survey can be found in the appendix.
In addition to the substantive questions, the survey questionnaire contained five demographic questions, specifying: gender, age, education, place of origin and professional status of respondents from both countries.

To determine the differences between the opinions in Poland and Serbia, the distances were calculated:

- city distance – the sum of absolute differences between subsequent attributes. The impact of large differences is mitigated, so it is more difficult to detect them in the population. It is calculated according to the formula:

$$CD = \sum_{i=1}^{n} |x_i - y_i| \tag{1}$$

where: CD – city distance, x_i, y_i – compared attributes,

- Euclidean distance – the square root of the sum of attribute differences squared.

The Euclidean distance formula is calculated by definition.

$$OE = \sqrt[2]{\sum_{i=1}^{n} (x_i - y_i)^2} \tag{2}$$

where: OE – distance formula, x_i, y_i – compared attributes,

The statistical significance of differences in the variance of the studied variable in the two populations was calculated using the right-sided F-Snedecor test. If s_1^2 and s_2^2 are independent variances from a population with normal distributions, then the statistics:

$$F - Snedecor = \frac{s_1^2}{s_2^2} \tag{3}$$

where: $s_1^2 > s_2^2$ has an F-Snedecor distribution with the numbers of degrees of freedom $u=n_1-1$ and $v=n_2-1$, where u is the number of degrees of freedom for the variance in the numerator and v is the number of degrees of freedom for the variance in the denominator.

3.2. Sample characteristic

The analysis was based on the results of the survey questionnaire distributed among experts from Poland and Serbia. The survey questionnaire was completed by 45 experts from Poland and 63 experts from Serbia. The survey questionnaire and its results are located on the servers of the Faculty of Management at the University of Warsaw [6] and may be made available with the authors' consent.

The basic characteristics of the respondent from Poland and Serbia are listed below. In both countries, a slight majority - over 50% - were men. In Poland and Serbia, people aged

36-50+ predominated among the experts and constituted 78% each. Among Polish respondents, as many as 71% had a doctorate or, in a few cases, a postdoctoral degree, while in Serbia it was 67%. This resulted from the connections of people participating in thematic symposia on management processes with universities. In terms of place of origin, in Poland, over 44% of respondents came from cities with more than 500 thousand inhabitants, in Serbia - from cities with 101-500 thousand inhabitants. In Poland and Serbia, over 50% of respondents were IT experts and specialists. Before starting the analyses, the obtained data were first reduced to comparability, and then a reliability analysis was applied in the form of the Cronbach's α coefficient. For all the evaluation criteria, Cronbach's α indicates internal consistency and reliability of the sample, it was greater than 0.81.

4. Analysis and discussion of results

The study was to determine whether there are similarities and differences in opinions on the place and role of design in the creation and implementation of IT in organizations between countries distinguished due to cultural and historical differences. The analysis of selected results is presented below.

In the first section concerning awareness of the most important factors influencing the design of IT systems, the most important and most important features of an IT project were assessed in the opinion of experts. According to the respondents, the most important feature of an IT project is primarily its purposefulness - achieving specific economic results (average - 27%) and determinism - the possibility of action within the assumed constraints: time, budget, scope, etc. (average 18%). Urban distance (53%) and Euclidean distance (6%), due to this "interchangeability", were relatively high in this case. The variance and standard deviation, despite differences in individual items, were low (Poland 0.89, Serbia 0.54%). This meant that the calculated right-sided value of the Snedecor F test did not exceed the limit value, which indicated that the differences between the opinions of respondents from both countries were of low statistical significance. Much smaller differences (on average they did not exceed 4.5%) occurred in the experts' views on the most important features of an IT project (urban distance - 34%). Nevertheless, the ranking of the most important features showed that in Serbia these were: 23% dynamic project control (keeping and not exceeding deadlines). In Poland, the first position (18%) was taken by keeping up with changes and flexibility of project management and economic pragmatism (good ratio of effects to costs) - 15%. In these first two categories, there was therefore the greatest differentiation between the assessments, in the order of 6-7%. Far greater differences between the assessments of respondents from Poland and Serbia occurred in the determination of potential success factors. On average, the most important factor (12%) was agile methodology, modern design instead of traditional (Poland 10%; Serbia 13%) and experienced and competent project manager (Poland over 12% and Serbia over 11%). The remaining results - formed on the principle of opposites: clear business goal of the project (Poland 17%; Serbia 6%); support of the project management - sponsor (Poland 15%, Serbia 5%); standard programming tools and technical infrastructure (Poland 2%, Serbia 15%), or formal project management methodology (Poland 4%, Serbia 12%). The following distances were relatively high: urban (67%) and Euclidean (3%). A similar situation occurred when determining the main barriers to the success of an IT project. Out of the thirteen attributes listed, for example, the most important barrier was considered to be an inexperienced project manager (Poland 6%, Serbia 14%) and lack of involvement of business users (Poland 13%, Serbia 5%). Moreover, in Poland, the most important barriers included unclearly defined requirements of the project (10%), and in Serbia - avoiding responsibility for priority project tasks (12%). On the other hand, the value of urban distance was high at 73% and Euclidean distance at 3%.

A comparison of the assessment of the use of project task management methodologies traditional and agile, it results that currently the more popular method is the Agile group of methods (Poland 53%, Serbia 63%). This is probably the reason for the assessment of the most important features of IT project management methods. According to experts from Poland, these are mainly (21%) good communication between contractors and recipients

(users) and adaptability (20%). According to Serbian experts - compliance with reality (27%) and orientation towards project stakeholders, the user (22%). The greatest discrepancy occurs in the category of compliance with reality (19%) and simplicity of execution (17%), in favor of Serbia. This causes a high urban distance (77%). However, due to the low variance in both cases, the statistical differences expressed by the F-Snedecor test do not seem to be significant. In reference to communication barriers, the next question in the survey questionnaire concerned the gaps in mutual communication between designers and users during IT projects. In Poland, the first position (28%) was the lack of a common language between designers and users, the second was the lack of understanding the importance of management support processes in designing IT systems (25%). In Serbia, attention was drawn to the shortcomings and inconveniences of using technical means of common communication, e.g. software supporting Adonis, Aris - and the primitiveness of process modeling methods and their inadequacy to reality (20%). The presented list indicates the largest absolute percentage differences in the category of the lack of adequate technical means of communication supporting design (23%) and understanding among users of the importance of process management in designing IT systems. Management changes related to the introduction or modification of IT systems should be supported by a specialized organizational unit. According to the respondents, 60% of organizations in Poland and 54% of organizations in Serbia have such units. In Polish organizations, such units have existed mainly for over 5 years (32%) and 3-5 years (20%), in Serbia for 3-5 years (21%) and over 5 years (16%). The structure therefore seems to be similar. Meanwhile, in Poland, fewer and fewer such units are being created (existing for 1-2 years 5%), and in Serbia there are 14% of them, which indicates either a growing trend or a three-times slower decline in interest in this method of supporting the organizational design of IT systems. In both of these categories, there are absolute differences of the order of 14-16%. According to experts from Poland, the Competence Center should primarily fulfill such tasks as: participation in projects to improve processes (18%), establishing rules and methods for all process initiatives in the organization (17%) and modeling and describing processes in order to develop operating procedures for employees within the project (15%). Similarly, experts from Serbia determined that the main task of the Competence Centers is: providing methods and principles for improving processes in the project (25%), training employees in process knowledge and skills within projects (19%) and defining business requirements before implementing the IT system (18%). The difference lies in the approach to awareness of the role of the Competence Center - moving from a passive (educational) role to active participation in the implementation of projects. Process modeling is the most important technique supporting the design and implementation of IT systems. In Poland, judging from the statements of experts during selected analyses for complex design problems (37%). In Serbia - only for process modifications 35% and during selected analyses for complex design problems (17%). The largest absolute difference occurred in the category of process modifications only (24%), which resulted in a relatively high urban distance indicator (77%).

Similar results were obtained in response to the question about the assessment of the impact of IT process management in the design of IT systems on the operation of the organization. Polish experts mainly (64%) assessed this impact as very important for the success and coordination of activities in the entire organization, and 50% of respondents from Serbia also thought so (absolute difference of 14%). On the other hand, 17% of experts from Poland and 19% of experts from Serbia assessed this impact on simulated activities (Poland: 13% and 4%, and Serbia: 13% and 6%, respectively). This shows that almost one fifth still do not consider process management to be important for the management of IT system projects. This differentiation affects the high value of variance in both countries (Poland 7%, Serbia 4%), similar values in individual categories affect the low value (33%) of urban distance.

What could improve this situation even more? What additional knowledge or skills in the area of business process management are necessary in your opinion in the organization? Contrary to the findings regarding the Competence Center from the previous question, still 16% of respondents from Poland and 26% of respondents from Serbia believe that building

such a center can improve opinions on the importance of process management in the organization. The second important factor is the designers' knowledge of process modeling methods in the project (Poland 17% of opinions, Serbia 19%) and slightly less (Poland 15%, Serbia 16%) knowledge of process improvement methods in the project. Small but varied data variance in each country causes the calculated value of the F-Snedecor test ($FS_{calculated}$=4.9728) to be greater than the tabulated critical value ($FScrs_{tabulated}$=3.7870), which proves the significance of statistical differences between the views on this subject among respondents from both countries. The results obtained in response to questions regarding organizational and methodological determinants are surprising considering the existing awareness of the importance of introducing IT systems to organizations in both countries. In Poland, over 28% of experts believe that it is an important strategic initiative promoted by the management staff. In Serbia, on the other hand, 37% of respondents claim that it provides significant support for all information processes in the entire company, and another 28% that it allows for ongoing monitoring of the situation in the company and its economic environment. In both countries, however, no greater attention is paid to the emergence of new opportunities for the development of the organization's activities thanks to the introduction of IT systems to it.

The areas in which the introduction of IT systems would translate into an increase in revenues to the greatest extent in both countries were treated separately. In Poland, the most important were assessed as supporting the introduction of new products or services to the market (17%) and improving the financing of the organization's activities (15%). In Serbia - increasing sales of products and/or services (22%) and providing human resources for the organization. The differentiation of variances resulted in a statistically significant difference, because the calculated value of the F-Snedecor test ($FS_{calculated}$=3.3692) is greater than the tabulated critical value ($FScrs_{tabulated}$=3.1789).

5. Conclusion

The conducted research allows for the following conclusions:

- in individual categories, differences measured by urban distance allowed for the detection of the greatest success factors and barriers to the application of project management in Poland and Serbia. The reason for this was the age structure of experts and their accustomment to existing standards.
- statistically significant variance differentiation measured with the right-sided F-Snedecor test occurred in the views on additional knowledge or skills in the area of business process management necessary in the organization and in the assessment of areas in which the introduction of IT systems would translate into an increase in revenue to the greatest extent,
- in total, only 10% of the differences in opinions on project management between experts from Poland and Serbia were statistically significant.

The analysed differences in views and opinions related to project management resulted from the age structure of experts, where in Poland the research sample included younger people, slightly earlier development of IT systems, and therefore IT project management, which could have caused some differences in opinions in Serbia and probably related to this greater familiarity with the standards used in previous work. However, the above statements require additional research.

These studies had a number of limitations. The first was the fact that the comparison was made only for selected two countries. The second - that groups of experts were used, burdened with many years of work and habits resulting from previous experience, mainly related to the university environment. The third - the differences resulting from different cultural approaches to the work performed were not examined in depth. No less important - gaps in the completed surveys, which led us to abandon the analysis of the results of three out of 21 questions and the need to reduce the number of experts whose opinions were taken into account (no answer).

The above limitations affect the directions of further research. In order to obtain results

that could be considered binding, it is necessary to expand the research sample to other countries, conduct research on a group of people whose professional experience in IT does not exceed three years and who work outside of a university and analyze the cultural differences that occur in both countries and that affect project management according to Hofstede's postulates [5].

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Annex

Questions in the survey questionnaire. For each question there were several possibilities to choose from the listed options.

Part I. Assessment of awareness of the most important factors influencing project management:

1. What is, in your opinion, the most important feature of the IT project?
2. What are features of a modern IT project - out of those listed - seem to you the most important?

3. What are the most important determinants of the success of an IT project in your opinion?
4. What are, in your opinion, the most important barriers to project implementation?
5. In your opinion, what are the correct parameters for the implementation of an IT project? (defined scope, time and budget of the project; defined scope, time, budget and quality of the project; presented scope, time, budget, quality and user requirements; defined scope, time, budget, quality, user requirements and risk of project implementation),
6. What are, in your opinion, positive effects of the application of the IT project?
7. What groups of IT project management methods are the most often used during project management?
8. What are or should be the most important features of IT project management methods in your opinion?
9. What do you think is missing in communication between designers and users in conducting IT projects based on process modeling?
10. What goals do you think your organization wants to achieve by using IT project management methods during the computerization of the company?
11. How do you understand IT project management in your organization?
12. Is there an organizational unit dealing with project management in your organization?
13. If so, how long has a separate unit in the company structure that deals with supporting project management has been operating in the organization?
14. What are the main tasks of this organizational unit in your opinion today?
15. Which of the following features, in your opinion, is the strongest point of organizational culture during the implementation of IT projects?

Part II. Estimation of the impact of process management and its tools on IT project management:

16. How do you think if and when process modeling is used in your organization?
17. How do you assess the impact of process management on the operation of the organization?
18. What additional knowledge or skills in the area of business process management do you think are necessary in the organization?
19. To what extent does the management of your organization support process management?

Part III. Assessment of the importance of information systems for the organization:

20. How important is the introduction of IT for your organization?
21. Improvement, which areas in your organization would translate into the greatest increase in revenues?