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ANALYSIS OF THE PROJECT-BASED ORGANIZATIONS' CHARACTERISTICS INFLUENCE ON PROJECT MANAGEMENT PERFORMANCE

Nenad Milijić*, Ivan Jovanović, Aleksandra Radić

*University of Belgrade, Technical Faculty in Bor, Engineering Management Department,
12 Vojske Jugoslavije, 19210 Bor, Serbia*

Abstract: This paper presents the empirical results of the analysis of the project-based organizations' characteristics influence on project management performance, that is, on the effectiveness of project goals achieving. As a basis, it was used a multidimensional approach to project success assessment, through project management performance analysis, which emphasizes meeting the expectations of all stakeholders. The broader approach was chosen as a more comprehensive way of solving problems in the project environment in the current crisis and changing circumstances.

The research was conducted in 11 project-based organizations operating in various industrial sectors on the territory of the Republic of Serbia. A total of 253 employees were surveyed (project managers, production workers, and workers indirectly related to production). Statistical analysis of collected data was performed using the SPSS 18.0 software package. The mentioned impact was tested using the Multivariate analysis of variance (MANOVA) and it was found that project-based organizations' characteristics have a significant influence on project management performance.

Keywords: Project-based organizations, project management performance, analysis

1. INTRODUCTION

Project-based organizations in certain cases do not implement their projects adequately. Projects are not implemented within the expected time frame and the planned costs are exceeded. On the other hand, some projects are implemented successfully, achieving and even exceeding all expectations (time and budget). In such circumstances, it can be considered as successful project management that created satisfactory project performance and thus contributed to the success of the project. Therefore, it can be said that the core of project success is not only project performance, but primarily project management performance (Bryde, 2008; Mir & Pinnington, 2014; Delise et al., 2023). Project management performance refers to the efficiency of the project management process, as well as to all the procedures and decisions that are made throughout the entire project life cycle, which contribute to the success of the project. Therefore, when creating adequate procedures and making correct decisions, project managers often use learning and previous similar project experiences as a method, considering the achieved performance (Ika et al., 2022).

* Corresponding author: nmilijic@tfbor.bg.ac.rs

Project management performance can also be viewed as a project implementation control system. Project management performance monitoring is actually a feedback loop in the process of controlling the organization, direction and consumption of resources on the project (Bourne et al., 2018). However, the success of projects should not be viewed unilaterally. Project success is actually multidimensional, as different stakeholders view and measure project success in different ways (Lim & Mohamed, 1999). This multidimensionality of project success also represents a broadening of the focus of project performance on project management performance. This view of project management and evaluation of project success is incorporated in the PMPA model (*Project Management Performance Assessment*) (Bryde, 2003). This model proposes six criteria for evaluating project management performance based on the EFQM business excellence model: 1. leadership, 2. personnel, 3. project management policy and strategy, 4. partnerships, 5. project life cycle and 6. key performance indicators.

All of the above leads to the appearance of certain new problems related to this holistic approach. It is about the difficulties in the performance measurement process, because all stakeholders do not have equal views, and it is necessary to incorporate them into the whole (Jiang et al., 2009; Mir & Pinnington, 2014). In addition, projects differ in their uniqueness, their specificities, size and other indicators, and therefore performance and success evaluation criteria may differ between projects (Müller & Turner, 2007). Also, in different industries there are different perceptions of performance, and also the demographic characteristics of the personnel engaged on the projects affect the mentioned perception (Chan & Chan, 2004; Muller & Jugdev, 2012). Hence, the question of the universality of this model arises. However, this model has been confirmed and generally accepted in the literature (Quereshi et al., 2009; Mir & Pinnington, 2014).

1.1. Aim and scope of research

The previously stated facts leave certain doubts and raise certain questions. This was the motivation for the research, which aim was to analyse the project-based organizations' characteristics influence on project management performance. Therefore, the subject of research was various project organizations that realize projects in various industrial sectors.

2. RESEARCH METHODOLOGY

2.1. Questionnaire

As part of the conducted research, a questionnaire methodology for data collection was applied. During previous research (Milijić et al., 2020a; 2020b), the questionnaire was developed by modifying the original questionnaire, created by Quereshi et al. (2009), which is based on the PMPA model (Bryde, 2003). The questionnaire consists of two parts. The first part contains 9 control questions, 4 of which are of an organizational nature and are of particular importance for this research. (Number of employees, Years of existence, Ownership structure, and Type of project). The second part of the questionnaire is consisting of 41 questions, divided into 7 groups that describe project management performance.

2.2. Sample and data collection

Data collection was conducted by anonymous surveying of employees in 11 project-based organizations in the Republic of Serbia, whose activity is the implementation of various types of projects (Table 1). A total of 290 employees were surveyed, of which 253 correctly

completed questionnaires were collected, which represents 87.2%. A five-point Likert scale with values from 1 to 5 was used to evaluate respondents' answers, where 1 indicating the least and 5 the greatest importance.

From total of 253 respondents, 191 men and 62 women participated in the research. From total of number of employees who filled the questionnaire, there were 57 managers, 172 workers directly engaged in projects, as well as 24 workers indirectly related to the projects. As the goal of the research was to analyse the influence of project-based organizations' characteristics (Number of employees, Years of existence, Ownership structure, and Type of project) on project management performance, more detailed information on the organizational characteristics of the companies are shown in Table 1.

Table 1. Demographic and organizational characteristics of the study sample

Variables	Category	N	Percentage %
Gender	Male	191	75.5
	Female	62	24.5
Age	Less than 25 years	26	10.3
	26 – 35 years	69	27.3
	36 – 45 years	77	30.4
	46 – 55 years	55	21.7
	Above 56 years	26	10.3
Years of work experience	Less than 5 years	58	22.9
	6 – 10 years	84	33.2
	11 – 20 years	65	25.7
	21 – 30 years	26	10.3
	Above 31 years	20	7.9
Educational level	Elementary school	5	2.0
	High school	169	66.8
	Higher education	22	8.7
	University	54	21.3
	Doctoral degree	3	1.2
Project position	Manager	57	22.5
	Production workers on the project	172	68.0
	Workers indirectly related to the project	24	9.5
No. of employees	Less than 10 employees	8	3.2
	11 – 50 employees	158	62.5
	51 – 250 employees	70	27.7
	Above 251 employees	17	6.7
Years of existence	Less than 6 years	10	4.0
	6 – 10 years	44	17.4
	11 – 20 years	56	22.1
	21 – 30 years	70	27.7
	Above 31 years	73	28.9
Ownership structure	Domestic ownership	142	56.1
	Foreign ownership	74	29.2
	Mixed ownership	37	14.6
Type of project	Event organizing projects	41	16.2
	IT projects	43	17.0
	Industrial projects	47	18.6
	Construction projects	122	48.2

3. RESEARCH RESULTS

Based on the collected and arranged data, an initial database was formed. The data set from the database was further analysed with statistical tools using the SPSS 18.0 software package.

3.1. Descriptive statistics

As an initial step in data analysis, descriptive statistics of the examined sample were performed. Table 2 shows standard statistical parameters: sample size, range, mean, standard deviation and variance.

Table 2. Descriptive statistics

Variable	N	Range	Mean		Std. Deviation	Variance
			Statistic	Std. Error		
Q 1_1	253	4	3.66	.069	1.096	1.201
Q 1_2	253	4	3.93	.061	.972	.944
Q 1_3	253	4	3.49	.075	1.201	1.441
Q 1_4	253	4	3.75	.066	1.044	1.091
Q 1_5	253	4	3.64	.070	1.106	1.222
Q 1_6	253	4	3.55	.078	1.235	1.526
Q 2_1	253	4	3.66	.069	1.097	1.203
Q 2_2	253	4	3.73	.068	1.083	1.174
Q 2_3	253	4	3.84	.067	1.062	1.128
Q 3_1	253	4	3.62	.065	1.034	1.070
Q 3_2	253	4	3.83	.060	.956	.914
Q 3_3	253	4	3.80	.057	.914	.836
Q 3_4	253	4	3.84	.062	.983	.967
Q 3_5	253	4	3.62	.074	1.171	1.372
Q 3_6	253	4	3.53	.076	1.217	1.480
Q 4_1	253	4	3.95	.063	1.003	1.006
Q 4_2	253	4	3.93	.066	1.050	1.103
Q 4_3	253	4	4.02	.062	.986	.972
Q 5_1	253	4	3.75	.065	1.027	1.055
Q 5_2	253	4	3.68	.066	1.044	1.090
Q 5_3	253	4	3.86	.068	1.082	1.170
Q 5_4	253	4	3.81	.063	1.008	1.017
Q 5_5	253	4	3.98	.058	.923	.853
Q 5_6	253	4	3.92	.061	.971	.943
Q 5_7	253	4	3.86	.059	.939	.882
Q 5_8	253	4	3.78	.064	1.014	1.028
Q 5_9	253	4	3.98	.060	.961	.924
Q 5_10	253	4	4.06	.060	.949	.901
Q 6_1	253	4	4.08	.059	.946	.895
Q 6_2	253	4	3.85	.063	1.001	1.001
Q 6_3	253	4	3.86	.061	.976	.953
Q 6_4	253	4	3.98	.064	1.015	1.031
Q 6_5	253	4	3.87	.064	1.020	1.039
Q 6_6	253	4	3.93	.066	1.042	1.087
Q 6_7	253	4	3.91	.064	1.016	1.032
Q 7_1	253	4	4.28	.056	.892	.796

Q 7_2	253	4	4.09	.063	.996	.992
Q 7_3	253	4	4.17	.065	1.033	1.068
Q 7_4	253	4	4.13	.062	.992	.984
Q 7_5	253	4	4.14	.060	.949	.900
Q 7_6	253	4	4.18	.060	.957	.917

3.2. Reliability analysis of the project management performance measurement

In order to enable a quality statistical analysis of data, that is, in order to generate quality results of the conducted research, it is necessary to determine the reliability and validity of the used measurement scales (McDonald, 1999). For this reason, the internal consistency of the data collection instrument used was assessed using Cronbach's alpha test (Cronbach, 1951). Cronbach's alpha test is applied when the answers to the questions are evaluated based on the degree of the given scales (in the conducted research, a five-point Likert scale with values from 1 to 5 was used).

According to the Cronbach's alpha test, all values of the coefficient α greater than 0.70 represent a good possibility of modeling the results of the questionnaire based on the studied population. Also, satisfactory results of all further analyzes are expected (Nunnalli, 1994). Observing the obtained Cronbach's alpha coefficients of internal consistency of the sets of questions (GQ1 - GQ7), which comprise the questionnaire that assesses the level of project management performance in project-based organizations, the validity and reliability of the questionnaire was confirmed (Table 3). In this way, the selection of all questions in the used questionnaire was confirmed, as well as the correctness of the formed groups of questions within the questionnaire. Finally, all the necessary prerequisites for obtaining reliable results of the conducted research on the project-based organizations' characteristics influence on project management performance they implement have been achieved.

Table 3. Interconsistency coefficients of the questionnaire

Groups of questions	Number of Items	Cronbach alpha coefficient
GQ1	6	0.843
GQ2	3	0.813
GQ3	6	0.810
GQ4	3	0.871
GQ5	10	0.901
GQ6	7	0.908
GQ7	6	0.907

3.3. MANOVA test

During further research, data related to project management performance were analysed considering simple statistical differences (Table 4). The comparison of the difference in the evaluations of the project management performance level among project-based organizations with different characteristics (Number of employees, Years of existence, Ownership structure, and Type of project) was done with Multivariate analysis of variances (MANOVA). Multivariate analysis of variances is applied when there are several correlated dependent variables, and the researcher wants one, overall statistical test on this set of variables instead of performing several individual tests. On the other hand, this test investigates how the independent variables influence some pattern of response on the dependent variables (Larson-Hall, 2010; Stukalin & Einat, 2019). In this research, the aim was to investigate whether there was a significant difference in the assessment of project management performance levels among

organizational subgroups (project-based organizations with different characteristics). In order to conduct this analysis, four groups were distinguished based on the size of the organization, five groups based on the age of the organization, three categories based on the ownership structure, and four groups based on the type of projects (Table 1). The obtained results are shown in Table 4.

Table 4. Project management performance comparisons by number of employees, years of existence, ownership and type of project

Organizations characteristics	Significance	GQ1	GQ2	GQ3	GQ4	GQ5	GQ6	GQ7
No. of employees	F	7.945**	4.097**	6.017**	0.518	1.297	4.256**	2.817*
	p	0.000	0.007	0.001	n.s.	n.s.	0.006	0.040
Years of existence	F	7.456**	3.495**	3.386*	4.092**	9.405**	12.799	9.006
	p	0.000	0.008	0.010	0.003	0.000	0.000	0.000
Ownership structure	F	5.109**	5.546**	4.322*	2.077	1.251	2.410	2.153
	p	0.007	0.004	0.014	n.s.	n.s.	n.s.	n.s.
Type of project	F	1.307	0.822	2.422	0.662	0.289	1.388	4.082**
	p	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.007

** statistically significant at 0.01 level

* statistically significant at 0.05 level

4. DISCUSSION OF RESULTS

The demographic characteristics of the respondents are shown in Table 1. A significantly larger number of male respondents participated in the research, 191 of them (75.5%). On the other hand, the number of female respondents was only 62 (24.5%). This ratio of the number of respondents by gender can be explained by the fact that almost half of the respondents are employed in companies that deal with the realization of construction projects (48.2%). In observing the age structure of the respondents, it is noticeable that slightly more than half of the respondents, 132 of them (52.1%) are in the most productive age, from 36 to 55 years old. In observing years of experience, it can be seen that out of the total number of respondents, 58 of them (22.9%) have been working for less than 5 years in the company where they are currently employed. On the other hand, only 20 respondents (7.9%) who have been working in the company for more than 31 years participated in the research. All the rest respondents have been working between 6 and 30 years, 175 of them (69.2%). The educational structure of the respondents shows that the largest number of respondents have completed high school, 169 of them (66.8%), while 54 respondents (21.3%) have completed university and only 3 respondents (1.2%) have a doctoral degree. This data is consistent with the data that 68.0% of production workers on projects participated in the research, while 22.5% were project managers.

Previous data indicate the fact that a fairly experienced workforce is engaged in the realization of projects in the Republic of Serbia. Also, a fairly high educational level of workers engaged in projects is noticeable, which can be explained by the high unemployment rate, and individuals accept jobs that require a lower educational level (especially on construction projects).

When observing the results of descriptive statistics (Table 2), it can be noticed that the mean value of the worst rated question by the respondents is 3.49. On the other hand, the mean value of the best rated question is 4.28. Such a small difference between the extreme values of the evaluation of items in the questionnaire, show that employees have a fairly uniform attitude towards all criteria for evaluating project management performance. According to the

respondents, there is no criterion for evaluating project management performance that is unsatisfactorily developed. On the other hand, respondents believe that there are no criteria that can be assessed as extremely developed. The standard deviation in respondents' answers ranges from 0.892 to 1.235. Such high values of the standard deviation in the respondents' answers indicate a different perception of the criteria for evaluating project management performance in different groups of respondents. Such a pronounced difference in the perception of the evaluated items is present among production workers on the project and project managers.

The reliability and validity of the measurement scales used in the research was determined based on the evaluation of the internal consistency coefficients of the questionnaire, using the Cronbach alpha test. Based on the obtained results (Table 3), it can be concluded that there is mutual consistency of all variables within all 7 groups of questions of the applied model (the obtained values of Cronbach's alpha coefficients for all 7 groups of questions are significantly above the minimum recommended value of 0.7) (Nunnalli, 1994).

In the continuation of the research, data about project management performance were analysed based on simple statistical differences (Table 4). The purpose was to investigate whether there is a significant statistical difference in the perception of project management performance between organizational subgroups, or not. Organizational subgroups are located within the following organizational groups: Number of employees in the organization (four categories of organizations according to the number of employees), Years of the existence of the organization (five categories of organizations according to years of existence), Ownership structure (three categories - domestic ownership, foreign ownership, and mixed ownership) and Type projects (four categories of organizations according to the type of projects they realize). In this way, subgroups of organizations were formed within the aforementioned groups of organizations. Groups of organizations actually represent certain characteristics of organizations.

Observing the results in Table 4, it can notice the existence of certain differences in the respondents' answers in companies with different characteristics. The first organizational characteristic is Number of employees in the organization. Statistically significant differences in respondents' responses appear in five of the seven criteria for evaluating project management performance (GQ1 – Leadership, GQ2 – Staff, GQ3 – Policy and Strategy, GQ6 – Key Performance Indicators – KPIs, and GQ7 – Project Management Performances - PMP), while there are no statistically significant differences in the remaining two criteria for evaluating project management performance.

The next organizational characteristic is Years of existence of the organization. Statistically significant differences in respondents' answers appear for all seven criteria for evaluating project management performance (GQ1 – Leadership, GQ2 – Staff, GQ3 – Policy and Strategy, GQ4 – Partnership and Recourses, GQ5 – Project life cycle, GQ6 – Key Performance Indicators – KPIs, and GQ7 – Project Management Performances - PMP).

The third organizational characteristic is Ownership structure. Considering the respondents' answers from the aspect of this organizational characteristic, statistically significant differences between them occur in three criteria for project management performance evaluation (GQ1 – Leadership, GQ2 – Staff, GQ3 – Policy and Strategy), while there are no significant differences in the remaining factors.

The last examined organizational characteristic is Type of project. Statistically significant differences in the responses of respondents who work in organizations that realize different types of projects occur only with GQ7 - Project Management Performances - PMP, while with all other criteria for evaluating project management performance, there are no statistically significant differences.

Finally, it can be concluded that Number of employees in the organization and Ownership structure as organizational characteristics have a significant influence on the perception of criteria for project management performance evaluation by employees. Years of the existence

of the organization is an organizational characteristic that creates a completely different perception of employees regarding the criteria for evaluating project management performance. Finally, Type of project almost does not affect the perception of criteria for evaluating project management performance.

5. CONCLUSION

The analysis of the influence of the characteristics of project-based organizations on the project management performance assessment, as the final result, provides certain conclusions. Project management performance in project-based organizations can be reliably assessed using a model with 41 questions, divided into 7 groups. In accordance with the basic objective of the conducted research, the focus was on four control questions related to the characteristics of project-based organizations. Using Multivariate analysis of variances (MANOVA) it was determined that two of the four characteristics of project-based organizations (Number of employees in the organization and Ownership structure) exert a partial influence on the perception of criteria for project management performance evaluation. These two characteristics of project-based organizations have a significant influence on employees' opinions regarding the following criteria for project management performance evaluation: Leadership, Staff, and Policy and Strategy. On the other hand, Years of existence of the organization is an organizational characteristic that creates a completely different perception of employees regarding the criteria for project management performance evaluation. From there, it can be concluded that the project management performance is distinctly different in companies that have been operating in the business environment for a different number of years. It is obvious that experience (number of successfully completed projects) has a positive effect on project management performance, which is fully expected. On the other hand, the influence of the Type of project on project management performance is almost non-existent, which can be assessed as an unexpected result. Finally, it can be concluded that different project management performances are achieved in organizations with different years of existence and that this effect is partially observed in organizations of different sizes and different ownership structures.

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