

RELATIONSHIP BETWEEN PROJECT TEAM PERFORMANCE AND KEY PROJECT SUCCESS FACTORS

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Introduction/background: This paper explores the relation between a concept of project key success factors, popular among project management practitioners, with the operational performance of the project delivered by its team.

Aim of the paper: This paper presents research, which answers the question if teams working with the support of project key success factors achieve better performance.

Materials and methods: Literature research was conducted, which covered both the subject of team performance and project success. This led to the definition of project team performance and analysis of its relationship with project success. The literature on key success factors was analysed in a historical overview from 1967 to 2020. The empirical research covered the correlation between project success factors and project team performance.

Results and conclusions: The analysis of the results showed that each of the team performance components is associated with other group of success factors: project time with collaborative atmosphere (parent organisation-related factors), project quality with professional competence of project team members (team-related factors), project cost with clearly defined objectives (project-related factors).

Keywords: Project success factors, project team performance, project management, human capital management.

1. Introduction

Working in a project, project-based organisation, temporary employment, flat organisational structures are no longer a trend or a near future, but a contemporary reality, well rooted in the nowadays economy. Even agile methods in project management are no longer a curiosity, but a commonly used management style in a wide spectrum of project types. However, even if not new or not so fresh as it used to be 10-20 years ago, subject of project team performance, its measurement and factors is still important. Arguably it will be important as long as project management lasts, as there is always room for improvements in management, if only because of ever-changing projects` environment.

But what exactly is a project team performance? Who measures it and when? And what about the success? Does a good performance equal to a project's success? These questions, yet simple and with a rather straightforward answers at a first glance, are not so obvious after a longer consideration. To start with the first one, more questions arise. Especially a team seems to be a problematic subject, as its constitution can take place at the very beginning of the project life cycle, but also after the planning phase, not mentioning the team's structure evolution along the way until the project is finished. Moreover, the team structure itself adds more analytical layers, as it can imply having or not having a project manager among the team members. Self-organizing team is an enormous research subject itself. So, as shown, there are no simple questions when project team performance is considered. But, aside from this argumentation, each of those questions is crucial, when it comes to the project team assessment. Especially a matter of project success and its relation to the team performance seems to be an interesting research subject. This is because a success tends to be a wide, multi-dimensional construct, whereas performance characteristics are rather quantitative and, relatively, easily interpretable. Success also sounds better than performance. And this is not of a negligible importance. As Belbin's model of team development example shows, even unproven theory can become popular with a good sounding name – in this case “Forming-Norming-Storming-Performing”.

This paper addresses the relationship between key project success factors and project team performance. It is important, because the project team performance is a component of project success and as such should be affected by key success factors. The research was focused on the question, if teams which work in better conditions, in terms of project key success factors, achieve better performance measured in the quality, cost and time. Literature research was conducted, which covered both the subject of project team performance and project success. This led to the definition of project team performance and analysis of its relationship with project success. The literature on project key success factors was analysed in a historical overview from 1967 to 2009. The empirical research covered the correlation between key project success factors and project team performance. A post analysis of the results was made, with the use of the most recent research on the subject from years 2019 – 2020.

The goals of the article are: 1. to present the relationship between project team performance and project team success, 2. to present the relationship between project team performance and key project success factors. The first goal is covered in the literature review section. The second goal was the subject of empirical research and is covered in the method, results and conclusions sections.

2. Literature review

2.1. Project team performance

Project evaluation is complex and depends on the evaluator, as well as the time of evaluation.

According to Trocki's (2013) concept of project evaluation system, there are 3 levels on which projects can be evaluated. These are levels of: the project, the project's parent organisation, the parent organisation's environment. The level of the project and project's parent organisation are the intra-organisational levels, whereas the third one extends beyond the organisation.

On each of those levels, evaluation can be made according to the following criteria: purposefulness, feasibility, performance, efficiency, quality, usefulness. Although all of them are important for the evaluation, only the criterion of performance is considered in this paper. Performance can be further divided into three categories: operational performance, basic performance, and strategic performance.

Strategic performance is a measure of project's overall, long-term impact. Specifically, it explains to what extent strategic objectives were achieved. Such objectives transcend the project's parent organisation. Their origin lays in the primary need, to which fulfilment, strategic objectives are formulated. For them to be achieved, many separate but complementary projects may have to be launched. A good example are projects funded by European Union programmes. None of such projects can achieve the strategic objective on its own, but their combined impact can lead to its achievement (Aid Delivery Methods, 2004). Unfortunately, strategic performance is difficult to quantify (Trocki, 2012).

Basic objectives are formulated on the organisation's level, based on the strategic objectives. This type of an objective refers to the internal need of the organisation, which, however, should somehow respond to the primary need from the strategic level. Basic performance measures how well basic objective was completed assessing mid-term project's results (Trocki, 2012).

Although satisfying the primary need laying behind the strategic objective, as well as basic needs may require more than one project, there can be situations where a single undertaking is enough. In such cases only the time frame of evaluation will exceed the project's life cycle, but additional projects will not affect the evaluation results.

None of the above objectives, however, is a subject of the project's team concern. This is because of two reasons. First one is the time of measurement. Team's work is measured just after it's finished, when project products are delivered. Quality of those products, time in which they were delivered, and resources used in relation the operational objective give the measure of operational performance (Trocki, 2012). The second one is the real influence of the team on how well strategic, basic, and operational objectives fit to each other. Both basic

performance and strategic performance are somehow biased by how well the primary and organisation's needs were translated into objectives. In this paper, it's assumed that entities other than project team formulate those goals. As a result, perfect project products, delivered by perfect teams, can lead to imperfect project results and, as an effect, to poor project impact. Therefore, in this paper, the project team performance is considered as the one fully dependent on the team's effort, without any bias imposed by the goals' formulation, which is equal to the project operational performance.

Putting the performance of the project team on a par with the operational performance of the project means that also the components of both measures must be the same. Given that performance is a measure of the degree to which the objective is achieved, and the project objective, according to the project triangle concept, is defined by: quality, time and cost (Project Management Institute, 2017), the operational objective of the project must also be defined in these three categories. As a result, team performance also consists of quality, time and cost.

But the cost criterion refers rather to the measure of efficiency, than performance (Głuchowski, 2001). This means that team performance combines features of two measures: efficiency and performance. This combination, however, seems natural in the context of project team's work. If the team could generate any cost, it would always achieve the desired quality in the expected time. But the task of a team, as a separate organisational unit, is to achieve a goal defined in business terms. Hence, an inherent component of its evaluation is the use of available resources.

2.2. Project success

Project success is a concept related to performance, but not identical. Its definition is constantly evolving and is perceived in many ways (Baccarini, 1999). In the initial definitions, project success was described as a successful implementation of a project or a project, which desired results were achieved. However, such definitions based on the so-called golden triangle (Haffer, 2009) were insufficient, due to the complex nature of projects and the wide range of actors involved in their implementation (Beleiu et al., 2015). Currently, project success is mainly considered on two levels: first-order success (basic), second-order success (Trocki, 2012).

First-order success is the degree of achievement of the project objective, defined according to quality, time and cost. It stems from the concept of the so-called golden triangle of the project. Success so defined is operational in nature and is equivalent to the operational performance of the project. Second-order success is extended by factors related to the satisfaction of customer needs, customer acceptance (Kerzner, 2004). This level corresponds to the basic performance of the project.

With the popularisation of project-based activities, further levels have been included in the definition of project success. Satisfaction of the project stakeholders' needs are considered the most important (Westerveld, 2003). The group of project stakeholders, however, is very diverse. It consists of: project champions, project participants, the community of project participants, parasites (Tuman, 2006). Project champions are the entities that define the overall objective of the project, representing the need for which the project is initiated. Representatives of this group are different types of customers. Project participants are primarily members of the project team and other entities directly related to the implementation of the project. Their goal is to ensure high operational performance. The community of participants includes the social, environmental, and political groups that constitute the project environment. From their point of view, the measure of a project's success is its impact, i.e. strategic performance. The parasite group is not directly associated with the project and seeks only to prey on its success or failure. Measuring performance is not applicable to this type of stakeholder (Tuman, 2006).

A logical model that considers both levels of project success evaluation is Atkinson's Square Route of project success criteria, according to which, when evaluating project success, the following should be considered: golden triangle, project result, benefits for the organisation, benefits for the stakeholders (Atkinson, 1999).

Table 1.

Evaluation elements in the Square Route model of project success criteria

Golden triangle	Project result	Benefits (organisational)	Benefits for the stakeholders
Quality Time Cost	Compliance with requirements Reliability Validity Information Appropriate quality Use	Increase in performance Increase in efficiency Increase in revenue Achieving the strategic goal Organisational learning Reduction of losses	User satisfaction Impact on the environment Impact on the community Personal development Access to finance Project team satisfaction Economic impact on the environment

Note. (Atkinson, 1999).

The large diversity of the stakeholder group means that each stakeholder places emphasis on different components of project success evaluation. Koelmans (2004) proposes a model of disaggregating success factors into eight specific factors, which are selected according to the needs of the evaluating stakeholder. The dimensions of success in Koelmans (2004) model are: quality, schedule, budget, project team, tools and techniques, health, safety and environment, usability, customer satisfaction. Shenhar et al. (1997) point out that the selection of components and weights for project success evaluation depends not only on the stakeholder but also on the phase of the project life cycle being measured. The authors propose the following four dimensions of evaluation, the weights of which are variable depending on the stakeholder and time: project performance, customer impact, business and immediate success, and preparation for the future. The dimensions of success in the model are arranged according to relative importance, which changes in time counted from project completion. According to this

arrangement, project performance is the most significant criterion at the time of project completion. The later success is measured, the more significant are the other measures. In the long term, only criteria related to the impact on the parent organisation are significant (Shenhar et al., 1997). According to Munns and Bjeirmi (1996), the composition of the group of project's stakeholders changes over the course of the project. During the concept (definition and initiation) phase, the customer, the users of the project results and the environment are most associated with the project. During the planning phase, the project team becomes associated with the project, while the users cease to be a significant stakeholder. During project implementation, the group expands to include the manufacturer and remains in this composition until the end of the handover phase. Only the client and the environment are interested in the closing of the project. Gardiner and Stewart (2000) point out that it is the NPV calculation that should be the basis for assessing the success of a project as well as any changes made to it.

Project success, although seemingly obvious, can be defined in many ways. Its perception depends on how the evaluator's relation with the project, when the assessment is made and how it is affected by the project products and results. The above argumentation shows that there are many analogies between success and project performance on the one hand and several divergences on the other. For example, in the Atkinson's model, the project team, which in the operational performance assessment is the assessed one, also stands on the side of the evaluators as a stakeholder. This shows how complex and ambiguous is a process of project evaluation.

2.3. Project key success factors

Considering the close relation between project team performance and project success, a research analysis of key project success factors has been conducted. The research question was asked, if teams working with the support of key project success factors achieve better performance? To build a set of the project key success factors a chronological analysis of research on their subject was made. It shows a significant development of interest in this area among authors throughout last decades. The first empirical research on the subject was conducted in 1967 by Rubin & Seelig (1967). They showed that a project manager's previous experience had a minimal effect on project success, but that the size of the projects in which he or she worked influenced project success. More conclusions were provided by the theoretical research of Avots (1969). He showed that the main causes of project failures are: choosing the wrong project manager, unexpected project termination, insufficient support from high-level management entities. The main causes of project failure according to Hughes (1986) are: reward for inappropriate actions and lack of communication of objectives. A study of large, complex projects by Morris and Hough (1987) found that the causes of project success or failure can be captured within a seven-element model. This consists of: project objectives, technical uncertainty, politics, community involvement, schedule, legal issues regarding contracts, and implementation problems. One of the first attempts to systematise the issue of project success was made by Schultz et al. (1987). Their systematics is based on the division of project

success factors into strategic and tactical. To the group of strategic factors they included: project mission, support of the top management, scheduling. Whereas among the tactical factors were: client consultation, staff selection and training. The model of two groups of project success factors was developed during two empirical studies conducted by the teams of Pinto and Slevin (1989) and Pinto and Prescott (1988). They resulted in the identification of the relationship between the strength of impact of factors on the project and the phase of the project life cycle.

Table 2.

Chronological listing of project success factors

1967	1969	1971	1976	1983	1983
Rubin and Seelig (1967)	Avots (1969)	Sayles and Chandler (1971)	Martin (1976)	Baker et al. (1983)	Cleland and King (1983)
The performance of a project manager depends on the size of the projects in which he/she has accumulated experience.	Project manager selection Project completion on time Support from top management	Project manager competences Scheduling Control and accountability system Monitoring and feedback Continued commitment to the project	Defined objectives Selected philosophy of project Organisation Support from top management Organising and delegating authority Selection of the project team Allocation of sufficient resources Information and control mechanisms Planning and revision of the plan	Clearly defined objectives Commitment of the team to the project objectives "Stationary" project manager Sufficient funding Sufficient team competence Accurate cost estimation Minimal difficulties at the start of the project Planning and control techniques Task-orientation vs. people-orientation No bureaucracy	Project summary Operational concept Support from top management Financial support Logistical requirements Technical facilities Economic intelligence Project schedule Development and training of managers Human capital and organisation Sourcing (?) Information and communication channels Project overview

Cont. table 2.

1984	1986	1987	1989	1996
Lock (1984)	Hughes (1986)	Morris and Hough (1987)	Pinto and Slevin (1989)	Belassi and Tukul (1996)
Public awareness of obligations to the project	Rewarding the right action	Project objectives	Support from top management	Project-related factors
Authority for the project granted at a high level of the organisation	Communication of objectives	Technical uncertainty	Consultation with the customer	The size and value of the project, Uniqueness of project activities, Density of the project, Project life cycle, Urgency of the project.
Project manager competences		Politics	Recruitment of Staff	Factors relating to the project manager
Defined procedures and means of communication		Community involvement	Technical tasks	Ability to delegate authority, Ability to compromise, Ability to coordinate, Perception of one's role and responsibility, Competence, Commitment.
Defined control mechanisms		Schedule	Customer acceptance	
Project meetings to inform about progress		Legal issues concerning contracts	Monitoring and feedback	Factors relating to the project team
		Implementation problems	Communication	Technical preparation, Communication skills, Dealing with problems, Commitment.
			Dealing with problems	
			Characteristics of a project leader	Factors relating to the organisation
			Power and politics	Support from the top management, Organisational structure
			Events in the environment	Support from functional managers
			Urgency	Project champion
				Factors related to the environment
				Political environment,
				Economic environment,
				Social environment
				Technical environment,
				Natural environment,
				Customer,
				Competitors,
				Subcontractors.

Note. Based on (Belassi and Tukul, 1996).

Particularly noteworthy is the comprehensive model developed by Belassi and Tukul (1996), which divides project success factors into four groups: project-related factors, project manager and team-related factors, organization-related factors, and environment-related factors. The group of project-related factors includes: project size and value, uniqueness of project activities, project density, project life cycle, project urgency. The size and value of a project translate directly into its scope, but the direction of the relationship between scope and project success cannot be clearly defined. Undoubtedly, the more unique the project activities, the fewer proven working patterns can be used, thus increasing the risk of implementation failure. The higher the project density, the more difficult it becomes to allocate resources and increases the risk of project failure. The urgency of the project is also a factor that significantly affects success. Projects implemented in the "fastest possible way" are at risk of not meeting

quality and cost expectations, as well as insufficient customer satisfaction. Among the factors related to the organisation, Belassi and Tukul (1996) mention: support of the top management, organisational structure, support of functional managers, project champion. The factors of this group refer primarily to the availability of resources available to the project manager. Cooperation with the top management and the champion, which plays the role of a project patron, is important from the point of view of negotiating for resources from selected organisational divisions. The group of environmental factors includes: political environment, economic environment, social environment, technical environment, natural environment, customer, competitors, subcontractors. Due to the lack of control over the environmental factors, their impact on the project may change unexpectedly during the project. A way to partially control this influence is to identify risks related to the project environment and prepare for their occurrence. Factors directly attributed to the manager include: ability to delegate, ability to compromise, ability to coordinate, perception of one's role and responsibility, competence, commitment. Factors directly related to the team are: technical preparation, communication skills, dealing with problems, commitment. Empirical research conducted by Belassi and Tukul (1996) indicates that this group of factors is the most important for project success. A previously conducted study by Tukul and Rom (1998) showed the greatest importance of a group of factors related to the organisation, especially access to resources and support from the top management.

A set built by Belassi and Tukul (1996), comprehensively covering both the project and its relationship with the environment, shows that there are many factors influencing the success of a project. Other interesting attempt to group them was made by Haffer (2009) in an empirical study carried out in enterprises in Poland. The author of the study used a modified set of success factors from Belassi and Tukul, in which she divided a group of environment factors into a group of general environment factors and a group of sector environment factors. The highest average ratings were given by the survey's respondents to the group of factors related to the project manager and the group of factors related to the project team. The groups of factors related directly to the project and the organisation received lower average ratings. The influence of external factors was rated the lowest. Table 3. presents a set of factors, which received an average score of 4/5 or higher. As none of the external factors received an average score of 4/5 or higher, this group was excluded from the summary.

Table 3.*Key success factors ordered by decreasing influence on the project*

Factors related to the project manager	Factors related to the project team	Factors related to the project	Factors related to the parent organisation
Commitment	Commitment	Clearly defined project objectives	Atmosphere of cooperation
Sense of responsibility	Sense of responsibility	Systematic control of the implementation of the project plan	
Ability to respond to change	Professional/work competence	Free access to relevant resources needed for project implementation	
Communication skills	Communication skills	Realistic project plan	
Leadership skills	Appropriate team composition	Detailed and transparent structure of the project work division	
Formal and informal authority	Atmosphere that triggers creativity	Permission for active customer participation in project work / customer involvement	
Ability to coordinate activities and work	Acceptance and good relations between project team members		
Speed of decision-making	Transparency of the responsibilities assigned		
Previous experience in a similar position	Motivation		
Knowledge and skills in project management			
Ability to delegate			
Ability to compromise			
Motivation of the project manager			

Note. (Haffer, 2009).

Researchers studying the subject of the project key success factors try to build comprehensive sets of factors, which cover both the parent organisation and the environment in which projects are conducted. This seems to be an advantage, but also creates interpretation problems in at least two fields.

The first interpretive problem concerns the relationship between the project life cycle and measures of project success. As Shenhar et al. (1997) showed, as a project moves through the phases of its life cycle, the importance of the dimensions of its success changes. Meanwhile, most of the empirical research focuses on success as a conglomerate.

The second dilemma concerns the actors who evaluate project success factors. As Munns and Bjeirmi (1996) showed, the composition of project stakeholders with an interest in project success is variable over time. Therefore, results of empirical research depend on the relation between the respondents and the evaluated projects.

3. Method

The aim of the empirical research was to analyse the relationship between project team performance and the occurrence of key project success factors. The starting points for the study were: 1. the adopted definition of project team performance and 2. a summary of key intra-organizational success factors identified by Haffer (2009).

The research tool was an electronic questionnaire distributed to a purposively selected group of project managers with the support of polish branches of the International Project Management Association and the Project Management Institute. Respondents to the survey assessed the components of operational performance and the level of occurrence of key success factors on a scale from 1 to 5 in a project of their choice. The components of operational performance were: time, quality, costs. Each of the components was evaluated in relation to the value planned in the project: achievement by the project team of the planned value of the component gave a value of 3; deviation by no more than +/- 25% gave a score of 2 or 4; deviation by more than +/- 25% gave a score of 1 or 5. A set of key project success factors highlighted in the study by Haffer (2009) was used. The three most important project success factors from each of the four groups of intra-organisational factors, namely: project manager factors, project team factors, project factors, parent organisation factors, were adopted for the study. Since, according to the summary presented in Table 3, only one factor related to the parent organisation would have made it to the comparison, this group was expanded to include its two additional factors: organisational culture, project management autonomy. This selection ensured comparable representation in the study of each group of success factors.

4. Results

The empirical survey was addressed to members of SPMP and PMI associations. The survey covered 146 respondents, of whom 80 correctly completed the questionnaire. The IP address from which the electronic questionnaire was completed was controlled. No duplicates were found.

A linear Pearson's correlation analysis of project team performance components with key project success factors was conducted. Table 4 presents the correlation values between:

- the degree of occurrence of the key success factor and the components of operational performance, and
- the degree of occurrence of the key success factor and the weighted (overall) operational performance (with weights equal to $\frac{1}{3}$).

Boxes without a value indicate a relationship with a significance lower than the assumed threshold of 0.05.

Table 4.*Relationship between key project success factors and operational performance*

Key success factors	Weighted (overall) performance	Time	Quality	Costs
(A.1) Commitment of the project manager	0.35	0.24	0.23	0.26
(A.2) Manager's sense of responsibility for the project	0.31		0.22	0.24
(A.3) Manager's ability to respond to change	0.30			0.31
(B.1) Commitment of team members in the project	0.34	0.32	0.24	
(B.2) Team members' sense of responsibility for project results			0.22	
(B.3) Expertise of team members in relation to project tasks	0.30		0.30	
(C.1) Clearly defined project objectives	0.46	0.31	0.16	0.46
(C.2) Systematic monitoring of implementation	0.40	0.30	0.21	0.32
(C.3) Access to the required resources	0.31	0.30		0.30
(D.1) Atmosphere of cooperation	0.46	0.38	0.23	0.35
(D.2) Organisational culture	0.28			0.25
(D.3) Project management autonomy	0.33	0.24		0.26

The study found significant correlations between the key project success factors and the project team performance. The results presented in Table 4 show that:

- clearly defined project objectives and an atmosphere of cooperation are strongly correlated to the overall project team performance,
- an atmosphere of cooperation is most strongly correlated to project time,
- professional competence of team members in relation to project tasks is strongly correlated to quality,
- clearly defined project goals are strongly correlated to costs.

Within the group of factors related to the project manager (A), the strongest correlation to performance is shown by the project manager's commitment. The project manager's sense of responsibility for the project and his/her ability to respond to change have a slightly weaker correlation to performance. The correlation of factors from group A to overall performance is stronger than to its individual components.

The group of factors related to the project team (B) shows the strongest correlation to project quality among all the studied groups of key project success factors. The study found that the professional competence of the project team members is the factor most strongly correlated to project quality. None of the three key success factors from group B is significantly related to project cost. Only the commitment of the project team members to the project shows a correlation to project execution time.

The strongest correlation to the overall performance is found in the group of project-related factors (C). As many as two factors from this group have a correlation with overall performance equal to or stronger than 0.4. Clear project objectives are the factor with the strongest correlation to both overall performance and project costs. A systematic control of project implementation and access to resources have a slightly weaker correlation to costs. The factors

from group C also show strong correlations with implementation time, but almost no correlation to project quality.

The atmosphere of cooperation, included in the group of factors concerning the project's parent organisation (D), is most strongly correlated to the time of project implementation. It also shows a strong correlation to cost and overall performance. Project management autonomy shows a strong correlation to overall performance. The results of this group are very interesting as they do not deviate from the other groups of factors in correlation to operational performance. Meanwhile, in Haffer's (2009) study they were much less significant. This indicates that they are strongly correlated to the activities of the project team in relation to the achievement of the operational objective.

All the examined project success factors, apart from the team's sense of responsibility, are significantly related to overall performance. This largely confirms the findings of Haffer (2009) and upholds the validity of Belassi and Tukel's (1996) model. On the other hand, in the study group, factors from the groups C and D were most strongly correlated to project overall performance, which diverges from the cited research of Haffer (2009).

It is worth paying attention to the relationships between the individual success factors. The study showed significant relationships between the factors within groups and between groups, which is important for drawing conclusions about the relationship of single factors with project effectiveness. Table 5 shows the correlations between the success factors. Boxes without a value indicate a relationship with a significance lower than the assumed threshold of 0.05.

Table 1.
Correlations between key project success factors

	A.1	A.2	A.3	B.1	B.2	B.3	C.1	C.2	C.3	D.1	D.2	D.3
A.1	X	0.7211	0.6184			0.2596	0.3779	0.5726	0.2367	0.5128	0.2768	
A.2	0.7211	X	0.5606			0.2803	0.3328	0.5239	0.2248	0.3583		0.2316
A.3	0.6184	0.5606	X	0.2928	0.2685	0.4240	0.3354	0.3231	0.2405	0.3358		0.2999
B.1			0.2928	X	0.7067	0.4201	0.2789			0.4920	0.3009	0.4873
B.2			0.2685	0.7067	X	0.2385	0.2207			0.3627		0.3780
B.3	0.2596	0.2803	0.4240	0.4201	0.2385	X	0.2862		0.2785	0.2632		0.4275
C.1	0.3779	0.3328	0.3354	0.2789	0.2207	0.2862	X	0.3676	0.5314	0.3994	0.2304	0.4550
C.2	0.5726	0.5239	0.3231				0.3676	X	0.3074	0.3008	0.2872	0.2593
C.3	0.2367	0.2248	0.2405			0.2785	0.5314	0.3074	X	0.4018	0.2618	0.4476
D.1	0.5128	0.3583	0.3358	0.4920	0.3627	0.2632	0.3994	0.3008	0.4018	X	0.5325	0.4878
D.2	0.2768			0.3009			0.2304	0.2872	0.2618	0.5325	X	0.5400
D.3		0.2316	0.2999	0.4873	0.3780	0.4275	0.4550	0.2593	0.4476	0.4878	0.5400	X

The factors of each of the four studied groups of success factors are correlated intragroup. The strongest relationships are in the group of project manager-related factors, and the weakest in the group of project-related factors. The most significant intergroup relationships occur: between the group of factors related to the project manager (A) and the group of factors related to the project (C) and between the group of factors related to the project (C) and the group of factors related to the organization (D).

The group of factors related to the project manager (A) and the group of factors related to the project team (B) are poorly correlated, which proves their mutual independence.

A very strong positive correlation connects the manager's sense of responsibility for the project and his commitment to the implementation of the project. There is a slightly weaker relationship with the project manager's ability to respond to change. It is worth noting that the manager's commitment positively correlates with the systematic control of the project and the atmosphere of cooperation. The sense of responsibility also shows a positive relationship with the control of design work.

In the group of project-related factors, it is worth paying attention to the relationship between clearly defined project objectives and the team's free access to the necessary resources. Both variables are related to each other and, moreover, to the autonomy of project management in the organization. This means that the higher the level of project management autonomy, the better the conditions for project teams to work.

As in the group of factors related to the project manager, also in the project team there is a strong positive relationship between commitment and a sense of responsibility. Significant and relatively strong correlations exist between: the atmosphere of cooperation in the organization, the autonomy of project management and the involvement of the project team. Each of the relationships in this "triangle" of dependence is characterized by a correlation value not lower than 0.48. Therefore, it can be concluded that the more autonomy the project management has and the better the atmosphere of cooperation, the higher the team's involvement in the project implementation. It is worth emphasizing that the group of factors related to manager and project shows a very weak relationship with factors related to the team. This means that the team is primarily influenced by organizational conditions, which are very closely related to each other!

Considering the large number of correlations between the project success factors, it is certainly not possible to conclude about their individual direct impact on the project performance. It is worth noting, however, that from the point of view of an organization as a system, knowledge about the coexistence of factors and their collective importance for performance is very valuable.

5. Discussion

Results of the research allow to give a positive answer to the question, if project teams which are supported by key success factors achieve better performance. The choice of the key success factors was additionally justified in a post-hoc analysis of the most recent research about the project key success factors. According to Fossum et al. (2019) a universal key success factor for the global projects is a proper selection and training of team members. This confirms

group's B impact on the project success. Specifically emphasizes the B.3 factor – Expertise of team members in relation to project tasks. Also results from the research on the building construction projects (Mathar et al., 2020) stress out the importance of competencies and capability of the key personnel in different disciplines. Other important key success factors revealed by this research are: project manager competency, authority and involvement, clear communication channels between the project owner, project manager, designer and contractor, as well as commitment of all project participants to the established schedule and budget. This supports the importance of groups A, B, and the factor D.1 – The atmosphere of cooperation. The recent research on critical success factors of the project management in relation to Industry 4.0 for sustainability of projects also indicate that leadership and experiences – Group A – and employees and flexibility – Group B – are the most important ones (Vrchota et al., 2020). A bigger variety of project's key success factors is present in the results of the research on R&D projects in Indonesia (Hermawati, 2020). Among the most important ones are: lead and team researchers – Group B, laboratory or workshop and space – C.3, work, organizational culture – D.2, communication and support from decision makers – Group D. The mentioned research confirms the importance of key success factors considered in the empirical research presented in this paper.

What is important for project management practitioners, results show which key success factors affect specific performance components. This can be a valuable hint for project managers, who seek means for performance improvement, as well as for team members who would like to understand their current working conditions and propose improvements. Thanks to the structure adopted from Belassi and Tukel (1996) and analysis of the separate performance components, project managers, project team members and stakeholders responsible for project management can profit from the knowledge of a set of twelve key success factors with a confirmed impact on team's performance.

Yet, the correlations between key success factors shows, that they don't occur individually, but rather as groups. According to the results, especially factors from the group A, seem to form a package of a project manager's traits. This would suggest that if a project manager is committed to the project's goal, she or he would also feel the responsibility for results and be able to respond to the changes in the project. Considering these strong intra-group correlations, it's worth noting that group C, which consists of factors related to the project, has the strongest impact on the overall performance. This is very interesting, because all three factors from this group are to some extent results of the project manager's activity. This would suggest that personal features of the manager are less important than the results of her/his work, which impact the working conditions of project team. What is more, two out of three factors with highest correlation values (C.2 and D.1) with the overall performance are strongly correlated with the project manager's features: commitment and sense of responsibility for the project. Based on this, one can argue, that a good project manager focuses on creating the atmosphere of cooperation (D.1) and systematic monitoring of implementation (C.2). An interesting

conclusion can be drawn from the analysis of factors which correlate with the expertise of team members in relation to project tasks. Despite its obvious relation with the commitment of team members to the project, which allows to conclude that good employees' allocation supports their commitment, a strong relation was observed with the autonomy of project management and project manager's ability to respond to change. This would suggest, that with enough autonomy, a good manager can influence project's quality with the right staff allocation throughout the project's lifetime (emphasis on ability to respond to change). All the conclusions above, which are drawn from the intra-group correlations, point to the fact, that the real project manager's impact on team's performance is stronger, than suggested by the factors from group A.

As presented in Table 4, a set of key success factors and their relationship with the team's performance consider only operational performance level. A recommendation for the further research would be to use an analogous method to study basic and strategic levels of project's success. This would require implementing an additional dimension – stakeholder – as depending on stakeholder, a different point of view and success assessment should be considered.

6. Conclusions

The study made it possible to determine how strongly the individual success factors are correlated to the project performance components. The analysis of the results showed that the each of the performance components is related to other group of success factors: the time of implementation with the atmosphere of cooperation (parent organisation-related factors), the quality of the project with the professional competence of the project team members (team-related factors), the cost of implementation with clearly defined objectives (project-related factors). The results of the study show some similarities with the ranking created by Beleiu et al. (2015), according to which the five most important success factors in order are: clearly defined project objective, competent project team, clearly defined roles and responsibilities, communication and consultation with stakeholders, compliance with budget, schedule, and performance criteria. The study showed that from the project team's point of view the most important key success factors are those directly related to the project and organisation, i.e.: clearly defined project goals and the atmosphere of cooperation. However, the intra-group correlation analysis revealed the potentially stronger impact of project manager on team's performance, than the analysis of factors related him/her suggest. This impact, however, is made rather by the actions of the manager, than by the personal features, which were considered as key success factors.

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