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Project success and individual entrepreneurial orientation of project managers: Russian context

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Abstract

Projects implemented in conditions of high uncertainty are sometimes called entrepreneurial projects. Success in such projects is more difficult to achieve. To successfully manage entrepreneurial projects, project managers should have entrepreneurial skills. The article explores two issues related to project success, entrepreneurial characteristics, and project uncertainty. First, the article tries to find out whether the increase in the entrepreneurial nature of the project, manifested in the increase in project goals and methods uncertainty, is accompanied by a decrease in project success. Second question is – does the entrepreneurial orientation of project managers affect project success and the relationship between the projects' success and their entrepreneurial features. To answer these questions, data were collected from Russian project managers assessing the entrepreneurial nature of projects, project success and the individual entrepreneurial orientation of project-managers. The collected data were examined using factor and regression analysis. The findings indicate that there is a negative relationship between the entrepreneurial nature and such indicators of project success as internal efficiency, preparation for the future, and results for clients. Some indicators of success were positively associated with such indicators of entrepreneurial orientation as proactivity and risk taking. As uncertainty increased, some measures of individual entrepreneurial orientation of project managers can positively compensate negative impact on project success from uncertainty associated with projects' entrepreneurial nature.

Keywords: project success, project management, entrepreneurship, entrepreneurial orientation, entrepreneurial projects.

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1. INTRODUCTION

The current business environment is characterized by high uncertainty, complexity and dynamism, which leads to poor project outcomes. According to a well-known review by the Standish Group, within the period of 2015-2020, only about a third of projects was successfully completed [CHAOS 2020.., 2020]. A review by the Project Management Institute "Pulse of the Profession" also notes that the content of modern projects is becoming more complex [Pulse of the profession.., 2021]. Today, projects are implemented not only to develop and create products, but also to introduce complex initiatives, such as digital transformation and business development. In such an environment, project management can improve performance by learning entrepreneurial practices. After all, entrepreneurship is realized in similar conditions and has developed a number of attitudes and approaches for management in situations of increased uncertainty and complexity.

A number of authors note the expediency of mastering entrepreneurial practices in order to increase innovation, creativity, proactivity and willingness to take risks [Rauch et al., 2009; Wales et al., 2021]. In particular, the positive impact of the entrepreneurial orientation of companies on their performance has been studied well [Martens et al., 2016], including the evidence that entrepreneurial orientation is especially useful in turbulent conditions [Kraus et al., 2012]. [Martens et al., 2018] proved that the entrepreneurial orientation of companies has a positive effect on the success of projects, whereas in the scientific literature, the question of the relationship between the entrepreneurial orientation of project managers and the success of projects remains relatively unexplored. This issue seems to be quite important from a practical point of view, since project managers have

a direct impact on the success of the project, and the use of entrepreneurial practices in project management depends on their entrepreneurial skills. The question is also interesting from a theoretical point of view, because the concept of individual entrepreneurial orientation in relation to empirical research has not yet been applied in project management.

Thus, the present study seeks to find out how the entrepreneurial behavior of project managers, viewed through the prism of the concept of individual entrepreneurial orientation, correlates with the success of projects that, to varying degrees, embody the uncertainty inherent in entrepreneurial activity. The study is structured as follows. The relationship between entrepreneurship, project management and uncertainty is first explored on the basis of available research results. According to these results, questions for the present study are specified. The third section analyzes the scientific literature to identify concepts that can be used to evaluate project success and the entrepreneurial behavior of project managers. Next, the research methodology is described, which consists of collecting primary data using selected measurement models and their quantitative analysis by building correlation-regression models. The coefficients of the independent variables of these models act as the key results of the study. The sixth section interprets the results and conforms them with the available scientific and practical ideas. Finally, the conclusion contains the key findings of the study, its limitations, and directions for further research.

2. ENTREPRENEURSHIP, PROJECT MANAGEMENT, UNCERTAINTY

The development of the theory and practice of project management is accompanied by interaction with other practical and theoretical disciplines. One of the interesting manifestations of this cross-disciplinary development of project management is its interaction with entrepreneurship. [Kuura et al., 2014; Fonrouge et al., 2019] review this interaction and conclude that both disciplines have much in common in practical terms, but there is very little theoretical and methodological mutual enrichment. Nevertheless, it is implemented, including the adaptation of theoretical concepts and practical approaches of entrepreneurship in project management.

Some authors argue that entrepreneurship is most in demand in project management in conditions of increased uncertainty. So, in [Cooke-Davies et al., 2009] a special type of project management system is distinguished, which arises when it is necessary to increase the differentiation of the created results and improve the economic indicators of processes. The authors characterized this type of system as entrepreneurship. This system strives to be both innovative and internally effective at the same time. In this context, "project managers must act as entrepreneurs who identify and seize market opportunities." They play more the role of business leaders and self-employed entrepreneurs and should have the appropriate skills and qualities.

The authors emphasize that such a context is characterized by a high degree of complexity and uncertainty.

Following the logic of the model from [Cooke-Davies et al., 2009], [Kuura et al., 2014] the concept of an entrepreneurial project is proposed as a special variant, which is characterized by two types of uncertainty at the same time - uncertainty in goals and uncertainty in methods. According to the framework of the model developed by the authors (Fig. 1), the higher the uncertainty in these measurements is, the more the project has an entrepreneurial nature.

As examples of entrepreneurial projects, these authors cite the development and production of innovative products, the development of complex socio-technical systems that involve significant adaptation of dynamic organizational processes, and in particular projects for the creation of new business units, research and development projects. These projects, implemented in conditions of high uncertainty, are indeed the most similar to entrepreneurial activity. They are of little success, but at the same time, the use of entrepreneurial abilities by project managers can improve success rates.

Thus, the following research questions can be formulated:

1. Is a more pronounced entrepreneurial nature of projects (which manifests itself in an increasing uncertainty of methods and goals) accompanied by a decrease in the success of projects?
2. Does the entrepreneurial behavior of project managers increase their success while the entrepreneurial nature (and accordingly uncertainty) of projects increases?

Since the questions posed involve such complex concepts as project success and entrepreneurial behavior, it is necessary to review scientific theory and develop systems for evaluating these concepts in order to determine the research methodology.

3. LITERATURE REVIEW

The ideas about project success indicators have developed quite dynamically in the context of the development of the very concept of project success [Jugdev, Müller, 2005; Ika, 2009]. The iron triangle triad (timing, budget, quality) that had dominated until the 1980s was actively supplemented by such indicators as customer and end user satisfaction, results for the team, business results for the company, achievement of strategic goals, contribution to the development of organizational capabilities and etc. At present, the Shenhar and Dvir model [Shenhar, Dvir, 2007] can be singled out as the most holistic, covering various aspects of project success.

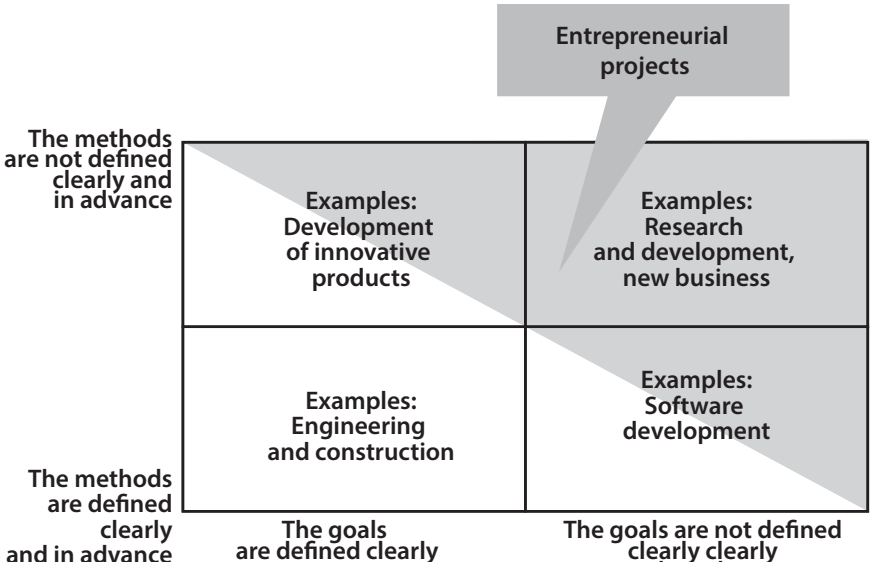
In their model of project success indicators, A. Shenhar and D. Dvir identify five different dimensions. This is directly the internal efficiency of the project, which is manifested in meeting deadlines, budgets, creating the required results and achieving other formal indicators within the framework of the project. Further, they are: results for the team (motivation, high morale, interest, personal and professional growth, loyalty to the company), results for the client (achievement

of their requests, degree of satisfaction, loyalty and willingness to repeat contracts), results for the company (profit , increasing profitability, increasing market share, value for owners) and future-oriented results (contributing to the success of subsequent projects, creating new products, markets, technologies, competencies). Entrepreneurship is traditionally perceived as an activity aimed at creating business results that go beyond short-term indicators.

Therefore, it can be assumed that the use of entrepreneurial approaches will be accompanied by a positive effect to a greater extent on long-term and business results for both the contractor and the customer.

However, according to [Cooke-Davies et al., 2009], an entrepreneurial approach to project management should combine both innovative performance and process efficiency. Therefore, entrepreneurial approaches should improve the internal results of projects as the uncertainty of the context increases. Nevertheless, it can be assumed that the entrepreneurial characteristics of project managers will influence different measures of success to varying degrees.

Fig. 1. Project typology model with entrepreneurial projects



The source: adapted from [Kuura et al., 2014].

Entrepreneurial behavior is multifaceted. As a part of the study of entrepreneurial behavior, the concepts are as follows:

- entrepreneurial intentions (about 2000 scientific publications in the Scopus database since 1993, the three most famous publications have citations of 2201, 1230 and 1132) [Fayolle, Liñán, 2014];
- entrepreneurial process (about 1050 scientific publications in the Scopus database since 1979, the three most famous publications have citations of 1903, 1535 and 964) [Acs, Audretsch, 2005];
- attitude to entrepreneurship (entrepreneurial attitude, about 580 scientific publications in the Scopus database since 1976, the three most famous publications have citations of 1290, 992 and 505) [Harris, Gibson, 2008];
- effectuation (about 460 scientific publications in the Scopus database since 2001, the three most famous publications have citations of 2356, 1568 and 816) [Sarasvathy, 2001];
- entrepreneurial self-efficacy [Chen et al., 1998], entrepreneurial self-efficiency [Baker, Nelson, 2005].

The most developed is the concept of entrepreneurial orientation (about 2470 scientific publications in the Scopus database since 1971, the three most famous publications have citations of 4359, 1464 and 1436), which allows you to analyze how the organization shows the characteristics inherent in entrepreneurial structures, and to what extent it is entrepreneurial [Wales et al., 2021]. The analysis and evaluation of a company's entrepreneurial orientation usually use such dimensions as innovation, risk taking, proactivity, competitive aggressiveness, and independence (autonomy) [Martens et al., 2018].

The concept of entrepreneurial orientation is predominantly applied at the level of individual organizations. Nevertheless, some authors have begun using entrepreneurial orientation towards the team level [Covin et al., 2020] and the individual level [Bolton, 2012; Bolton and Lane, 2012]. With the help of individual entrepreneurial orientation, these authors understand the behavioral characteristics displayed by an individual that bring him closer to the behavior of an entrepreneur. This concept seems to be successful for this work, as it allows you to explore the entrepreneurial behavior of project managers. To measure and evaluate individual entrepreneurial orientation, a scale was developed and tested, which involves the study of three aspects - willingness to take risks, proactivity and innovativeness. All three aspects are indeed associated with entrepreneurial activity. D. Bolton and M. Lane [Bolton, Lane, 2012] showed that three evaluations of individual entrepreneurial orientation correlate with individuals' intentions to engage in entrepreneurial activity. Based on this, the concept of individual entrepreneurial orientation can be used to analyze and assess the entrepreneurial behavior of project managers.

The relationship between entrepreneurial orientation and improvement in company performance has been extensively researched. [Rauch et al., 2009; Wales et al., 2021] conclude that most studies show a positive correlation between company performance and entrepreneurial orientation. A number of studies examine the role of entrepreneurial orientation in the activities of project-oriented companies and the results of their projects. Thus, [Martens et al., 2018], using the Shenhar and Dvir project success model, shows the positive impact of the entrepreneurial orientation in companies on the success of their projects, on the maturity of project management. [Sabahi, Parast, 2020] found that project results are positively associated with only one

dimension of entrepreneurial orientation, namely proactivity. These studies did not assess the individual entrepreneurial orientation of project managers, but their results suggest that it positively correlates with project success rates.

It can also be expected that individual entrepreneurial orientation has a greater impact on project success in conditions of high uncertainty. [Garcia et al., 2021] demonstrated that the entrepreneurial orientation of companies contributes to the adaptation of agile project management methods, which are successfully applied mainly in conditions of high uncertainty. [Kraus et al., 2012] found a positive impact of entrepreneurial orientation on company performance in the face of uncertainty and turbulence in the external business environment.

Based on the literature review, it can be concluded that:

- the concept of individual entrepreneurial orientation can reasonably act for the analysis and evaluation of the entrepreneurial behavior of project managers;
- both entrepreneurial orientation and project success are multidimensional concepts and involve assessment systems with several dimensions, respectively, and it makes sense to consider the research questions posed in a differentiated way, that is, in the context of various dimensions of individual entrepreneurial orientation and project success, rather than to reduce them to aggregate variables ;
- The Bolton and Lane model is suitable for the study of individual entrepreneurial orientation of project managers, and the Shenhar and Dvir model seems to be preferable for assessing project success rates.

4. RESEARCH METHODOLOGY

Based on the review of the theory, in order to address the research questions raised, a primary study of data was conducted to assess the entrepreneurial nature of projects, the success of projects, and the individual entrepreneurial orientation of project leaders. The entrepreneurial nature of the projects was measured by the indicators of uncertainty in objectives and methods derived from the model and then aggregated into one indicator [Kuura et al., 2014]. Project success was assessed with the use of five variables according to the Shenhar and Dvir model. The individual entrepreneurial orientation of project managers was measured by three variables according to the Bolton and Lane individual entrepreneurial orientation model. To assess the entrepreneurial nature, the success of the project and the individual entrepreneurial orientation of project managers, measurement models were developed or adapted, in which primary data were collected in the course of the survey. All ratings were given on a five-point Likert scale. The data were collected from project managers of Russian companies in 2021. Consistency and validity of data collected were analyzed using Cronbach's alpha and confirmatory factor analysis, highlighting the number of factors implied by theoretical models.

Based on the data obtained, five correlation-regression models were built for each project success variable. In the models, the outcome variables were project success indicators, and the independent ones were of entrepreneurial nature and three individual entrepreneurial orientation variables of project managers.

Table 1
Questions to assess project entrepreneurial nature

Estimated indicator of project entrepreneurial nature	Estimating indicator (question) (on a 5-point scale, where 1 point is the lowest score, 5 points is the highest)	Abbreviation used in the analysis
Goal uncertainty	Project goals were clearly articulated at start of the project (as part of the analysis, the scores were inverted, that is, 1 point became 5, 2 – 4 etc.)	GFB
	Project goals were unambiguously and equally understood by the stakeholders of the project known to you (estimates were inverted)	GSS
	Project goals were transformed during the implementation of the project	GTP
Method uncertainty	At the beginning of the project, the methods and technologies for its implementation were clearly defined (estimates were inverted)	MFB
	Methods and technologies for project implementation were known to the main project contractors (estimates were inverted)	MSS
	Project implementation methods and technologies changed during the project delivery	MTP

Also, the models contained elements that reflect the interaction of project entrepreneurial nature with the three dimensions of individual entrepreneurial orientation. In correlation-regression models, the coefficients for each independent variable, their p-values, R2 indicators and p-values for the models as a whole were calculated. The resulting coefficients (taking into account p-values) were interpreted as indicators reflecting the relationship between various indicators of project success, on the one hand, as well as the entrepreneurial nature and individual entrepreneurial orientation of project managers.

Primary data were collected by means of survey forms prepared in MS Forms. Preliminary processing of data from survey forms was carried out in MS Excel. All calculations were carried out using the R language in the RStudio environment.

To analyze the entrepreneurial nature of the project, we used the scheme proposed by [Kuura el al., 2014] which based on the matrix of goals and methods [Turner, Cochrane, 1993] (Fig. 1). Each of the dimensions was assessed by three questions prepared by the authors of this article (Table 1).

To assess the success of projects, a success assessment scale of five indicators and twenty-seven indicators (four to six indicators in each indicator) was used, developed by [Martens et al., 2018] on the basis of the Shenhar and Dvir model (Table 6). For each indicator, respondents gave ratings on a five-point scale. When assessing the success of the project, self-assessment of projects by their project managers (self-report) was used. The possibility of self-assessment in studies of the relationship between entrepreneurial orientation and project success is explained by [Rauch et al., 2009; Kraus et al., 2012]. Projects implemented in the previous year with the direct and full participation of respondents were subject to evaluation. Respondents in the questionnaire provided additional data about the project to make sure that they remember well the circumstances of this project.

To assess the individual entrepreneurial orientation of project managers, a three-part scale proposed by Bolton and Lane (Table 7) was used, which evaluates individual entrepreneurial orientation in the context of three indicators: risk orientation,

Table 2
Respondents' demographic and professional structure

Indicator	Content	Number	Percent
Sex	Male	54	52
	Female	50	48
Age (years old)	Up to 30	17	16
	31–50	63	61
	From 51	24	23
Project manager experience (years)	Up to 5	17	16
	5–15	53	51
	From 15	34	33
Educational level	Academic degree	17	16
	Master's program/ MBA	30	28
	Bachelor's program/ Specialist program	57	56

Table 3
Respondents' companies by size, age, industry

Indicator	Content	Number	Percent
Headcount	Up to 50	39	37
	51–300	31	30
	301–1000	7	7
	1001–5000	15	14
	From 5001	12	12
Company's age (years old)	Up to 5	24	23
	6–15	24	23
	16–30	31	30
	From 31	24	23
Enlarged industry affiliation	Industry	31	30
	Innovative and technological cluster	34	33
	Services	39	37
Organizational structure of management	Design target	27	26
	Matrix	27	26
	Linear-functional	17	16
	Nerwork	12	12
	Not sure	22	21

Table 4
Respondents' projects by size, duration and methodology

Indicator	Content	Number	Percent
Project duration (months)	up to 6	41	40
	7–12	29	28
	from 13	34	33
Headcount in a project	up to 5	17	16
	6–10	34	33
	11–20	29	28
	from 21	24	23
Basic project management methodology	Flexible	24	23
	Linear (predictive)	22	21
	Hybrid	22	21
	Spontaneous	36	35

innovativeness and proactivity, each of which was assessed by three to four indicators. This rating scale was successfully used in the study of [Popov et al., 2019] in the Serbian cultural context, which can be considered as close to the Russian one.

The collection of data on the assessment of the entrepreneurial nature of projects, their success and individual entrepreneurial orientation was carried out through an online survey of the members from the Project Management journal group on Facebook. The appeal was sent to 200 out of 11400 randomly selected subscribers. Answers were received from 108 people, 4 answers were incomplete. The demographic and professional structure of the respondents is shown in Table. 2.

The distribution of respondents by companies in terms of their number, age, management organizational structure and industry affiliation is shown in Table. 3.

The distribution of projects assessed by respondents according to the number of personnel involved, duration and basic project management methodology is presented in Table. 4.

Dispersion analysis in the context of independent variables used in analytical models (formula (1), Table 8) did not reveal a statistically significant difference in the data of different groups of respondents, projects and organizations.

5. RESEARCH RESULTS

The results of the factor analysis of data according to the estimates of the project entrepreneurial nature are shown in Table. 5. The factor load indicator reflects the degree of indicator belonging to the factor. Values less than 0.3 are excluded from the presentation. Problem indicators are highlighted (the maximum factor load is less than 0.5, or the second load is greater than 0.3, or the commonality is less than 0.5). A practically significant factor load value is 0.5, and a value of 0.7 indicates a good indicator belonging to the factor [Hair et al., 2010]. The correlation between the factors is 0.56 (below 0.85), which means that the factors evaluate relatively different dimensions of the same phenomenon [Brown, 2015].

The structure of indicators and factors turned out to be practically significant. No cases of cross factor affiliation were found out. Yet, the structure is not entirely consistent with the theoretical model, since one factor with three indicators of uncertainty by goals (*GFB*, *GSS* and *GTP*) included an indicator from the groups of uncertainty by methods (*MTP*). In addition, the low level compared with the recommended (0.5) one of the generality index (h2) of the *GTP* (0.411) and *MTP* (0.422) indicators attracts attention. The commonality score can be interpreted as R^2 in regression models. It shows the proportion of indicator variance explained by the factor. Due to these circumstances, the *GTP* and *MTP* indicators were excluded

Table 5
Factor analysis of project entrepreneurial nature indicators

Indicators	Factors		Common character indicator (h2)
	Factor 1 «Goal uncertainty»	фактор 2 «Method uncertainty»	
GFB	0.543		0.539
GSS	0.914		0.781
GTP	0.649		0.411
MFB		0.984	0.930
MSS		0.588	0.584
MTP	0.513		0.422
Cronbachs alpha	**0.701**	**0.710**	

from the system that assesses the entrepreneurial nature of projects. It can be assumed, that the indicators of uncertainty in terms of objectives and methods arising during the project are not very consistent with the indicators of uncertainty inherent in the project at its beginning. The final system of indicators of the entrepreneurial nature of projects used in further analysis is shown in fig. 2. Here are the factor loadings and the correlation between the factors obtained after the exclusion of the two indicators presented above.

The results of the factor analysis of data on the success of the project are given in Table. 6. Problematic indicators that were excluded during

Fig. 2. Indicators structure from factor analysis of project entrepreneurial nature

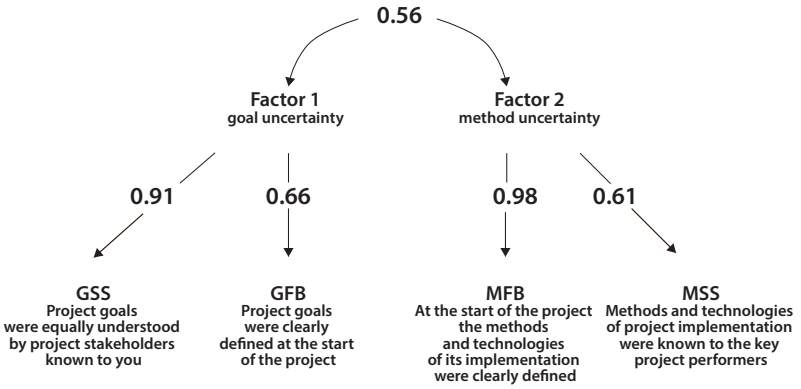


Table 6
Factor analysis of project success indicators

Indicator group (indicators)	Indicators	Factors					General character indicator (h2)
		factor 1	factor 2	factor 3	factor 4	factor 5	
Internal project efficiency (*PSEF*)	The project is completed in time or earlier (*PSEF_1*)					0.539	0.559
	The project is completed with budget performance or economy (*PSEF_2*)					0.790	0.637
	The project is completed in compliance with all the requirements for the results (*PSEF_3*)				**–0.341***	**0.353***	**0.313***
	The project completed with meeting other targets (*PSEF_4*)					0.532	0.582
Team results (*PSIT*)	The project team was satisfied and motivated (*PSIT_1*)		0.805				0.745
	The team was loyal to the project (*PSIT_2*)		0.564				0.763
	The team had high morale and energy (*PSIT_3*)		0.789				0.792
	The team was interested in working on the project (*PSIT_4*)		0.917				0.802
	Team members experienced personal or professional growth (*PSIT_5*)		**0.352***	**0.434***			0.680
	Team members did not try to leave the project/company (*PSIT_6*)		**0.396***	**0.361***			0.566
Preparation for the future (*PSPF*)	The project contributed to the success of subsequent projects (*PSPF_1*)		**0.441***				0.661
	The project led to the creation of new products (*PSPF_2*)			0.744			0.633
	The project contributed to the development of new markets (*PSPF_3*)			0.752			0.656
	The project created new technologies (*PSPF_4*)	**0.338***		**0.462***			**0.454***
	The project contributed to the emergence of new business processes/ models (*PSPF_5*)			0.808			0.692
	The project contributed to the development of managerial competencies (*PSPF_6*)			0.647			0.596
The results for the company (*PSBD*)	The project was economically successful (*PSBD_1*)				0.631		0.824
	The project helped increase the company's profitability (*PSBD_2*)		**0.323***		**0.452***		0.518
	The project had a positive ROI (*PSBD_3*)				0.799		0.728
	The project helped increase the company's market share (*PSBD_4*)				0.726		0.753
	The project created value for the owners (*PSBD_5*)				**0.523**	**0.318***	**0.536**
	The project directly contributed to improving company performance (*PSBD_6*)		**0.399***		**0.358***	**0.361***	0.583
The results for the client (*PSIC*)	The project contributed to the improvement of customer results (*PSIC_1*)	0.855					0.835
	The clients were satisfied (*PSIC_2*)	0.826					0.741
	The project met clients' requirements (*PSIC_3*)	0.771					0.605
	The customer started using the created results (*PSIC_4*)	0.641					0.518
	The customers will return to the company (*PSIC_5*)	0.658					0.523
Cronbachs alpha for the factors (for the final version)		**0.914**	**0.867**	**0.702**	**0.818**	**0.876**	

optimization are highlighted. According to them, indicators are given before optimization. The structure of factors obtained after optimization is characterized by high factor loading (not lower than 0.5), the absence of cross-factoriality, and good generality. Correlations above 0.85 between the factors are not found. Cronbachs alpha for all factors is above 0.7. The structure of the data (after excluding eight problematic ones) is consistent with the theoretical structure of the chosen model.

The results of the factor analysis of individual entrepreneurial orientation of project managers are given in Table. 7. The resulting structure is characterized by good belonging to the factors, high generality, and the absence of a significant correlation between the factors. Cronbachs alpha is greater than 0.7. Based on this fact, all the data for all indicators were used to calculate the indicators of individual entrepreneurial orientation.

As a part of the research questions, five correlation-regression models were formed. The general view is presented below:

$$PSEF = b_0 + b_1\ ENP + b_2\ RISK + b_3\ INN + b_4\ PROA + \\ + b_5\ ENP{:}RISK + b_6\ ENP{:}INN + b_7\ ENP{:}PROA, \quad (1)$$

Where b_i are the regression coefficients of the model elements, *PSEF* is the assessment of the internal efficiency of the project, *ENP* is the assessment of the entrepreneurial nature of the project, *RISK* is the assessment of the attitude to risk as a component of an individual entrepreneurial orientation, *INN* is the assessment of innovativeness as a component of an individual entrepreneurial orientation, *PROA* is the assessment of proactivity as a component of individual entrepreneurial orientation, *ENP:RISK* is the interaction of the entrepreneurial nature of the project and the attitude to

Table 7
Factor analysis of project managers' individual entrepreneurial orientation indicators

Indicator group (indicators	Indicators	Factors			General character indicator (*h2*)
		factor 1	factor 2	factor 3	
Positive attitude to risk (*RISK*)	I tend to take decisive action when doing something in the face of uncertainty (*RISK_1*)			0.815	0.766
	I am willing to invest a lot of time and/or money in something that can bring high returns, even with high risk (*RISK_2*)			0.755	0.519
	I tend to act boldly and decisively in risky situations (*RISK_3*)			0.816	0.673
Innovativeness (*INN*)	I often try new and unusual activities, atypical in most cases, but not necessarily risky (*INN_4*)	0.686			0.619
	In general, I prefer to focus on unique, one-of-a-kind approaches, rather than to improve on proven and common methods (*INN_5*)	0.784			0.702
	I prefer to try my own unique approaches when I'm learning something new rather than to do it like everyone else (*INN_6*)	0.922			0.744
	I like experimentation and new approaches to solve problems, rather than widely used methods (*INN_7*)	0.673			0.640
Proactivity (*PROA*)	I usually act in anticipation of problems, needs and changes in the future (*PROA_8*)		0.919		0.837
	I tend to plan projects ahead of time (*PROA_9*)		0.877		0.692
	I prefer taking on problem solving and project work myself rather than waiting for someone to tell me what to do (*PROA_10*)		0.729		0.791
Cronbachs alpha for the factors		**0.830**	**0.885**	**0.898**	

risk (how much the relationship between the attitude to risk and the internal efficiency of the project will change with an increase in the indicator of entrepreneurial nature), similarly for *ENP:INN* and *ENP:PROA*.

In the other four models, outcome variables were Team Outcomes (*PSIT*), Company Outcomes (*PSBD*), Client Outcomes (*PSIC*) and Preparation for the Future (*PSPF*).

As can be seen from formula (1), the models also implied an analysis of the interaction between the entrepreneurial nature of the project and individual project nature indicators. The interaction of independent variables allows you to identify how one of the independent variables can affect the relationship of another independent variable with the resulting variable.

The results of the correlation-regression analysis in the context of the five generated models are presented in Table 8.

Looking at the statistically significant results (*p*-value less than 0.1 and 0.05), it can be found that the entrepreneurial nature of the project (*ENP*) is negatively correlated with success measures such as internal efficiency (*PSEF*), results for the company (*PSBD*) and outcomes for the client (*PSIC*). Moreover, the coefficient b_1 in all cases is greater than 1 to modulo. Projects with a greater entrepreneurial component are characterized by less success by these indicators, without considering the impact of other factors.

The direct relationship between project success and the individual entrepreneurial orientation of project managers is multidirectional. An improvement in risk attitude (*RISK*) is accompanied by an improvement in the future preparedness score (*PSPF*) (b_2 = 0.68). Project managers' innovativeness (*INN*) is negatively correlated with team outcomes (*PSIT*) (b_3 = –0.59 at *p*-value = 0.06). Proactivity (*PROA*) is positively associated with team outcomes (*PSIT*) (b_4 = 0.60, *p*-value = 0.07) and negatively with client outcomes (*PSIC*) (b_4 = –0.89).

The interaction of independent variables is also ambiguous. The improvement in risk attitude is accompanied by a weakening negative correlation between success and entrepreneurial nature. Thus, in the case of the internal efficiency index (*PSEF*) a 1% % increase in the risk ratio leads to a decrease in the coefficient b_1 (*ENP*) by 0.25% to modulo – from –1.66 to 1.31%. Thus, the attitude towards risk, as the entrepreneurial nature of the project increases, can improve the internal efficiency of projects. An improvement in the attitude towards risk in the conditions of high uncertainty inherent in projects with a high entrepreneurial nature is accompanied by an improvement in internal efficiency.

Similarly, project managers' innovativeness (*INN*) improves team outcomes (*PSIT*) as entrepreneurial nature increases (b_6 is positive and equals 0.32), and project managers' proactiveness (*PROA*) increase reduces the negative impact of entrepreneurial nature (*ENP*) on client outcomes (*PSIC*) (b_7 = 0.25).

6. INTERPRETATION OF THE OBTAINED RESULTS

The results provide incomplete and sometimes contradictory answers to the research questions posed. In the context of the first question, it can be seen that the entrepreneurial nature is indeed associated with lower project success rates. Nevertheless, this does not concern all the indicators. With the increased uncertainty inherent

Table 8
Regression analysis of the relationship between project success, entrepreneurial nature and individual entrepreneurial orientation

Model elements	*PSEF*		*PSIT*		*PSPF*		*PSBD*		*PSIC*	
	bi	*p*	*bi*	*p*	*bi*	*p*	*bi*	*p*	*bi*	*p*
b_0 (*intercept*)	**7.39**	**0.00****	1.87	0.10	–1.24	0.17	**5.23**	**0.00****	**7.15**	**0.00****
b_1 (*ENP*)	**–1.66**	**0.00****	–0.33	0.36	0.36	0.21	**–1.01**	**0.00****	**–1.53**	**0.00****
b_2 (*RISK*)	–0.91	0.02	0.10	0.80	**0.68**	**0.04****	–0.37	0.21	–0.30	0.36
b_3 (*INN*)	0.07	0.81	**–0.59**	**0.06***	0.31	0.21	0.03	0.88	0.05	0.84
b_4 (*PROA*)	–0.01	0.96	**0.60**	**0.07***	0.18	0.49	–0.22	0.37	–0.89	0.00**
b_5 (*ENP:RISK*)	**0.25**	**0.02****	–0.04	0.75	**–0.18**	**0.06***	0.11	0.18	0.08	0.43
b_6 (*ENP:INN*)	0.06	0.52	**0.32**	**0.00****	0.09	0.30	0.09	0.22	0.12	0.15
b_7 (*ENP:PROA*)	0.08	0.39	–0.09	0.36	0.02	0.77	0.11	0.16	**0.25**	**0.00****
R^2	0.34		0.51		0.64		0.39		0.41	
p-model value	0.00**		0.00**		0.00**		0.00**		0.00**	

Note. bi are the values of the coefficients b_0, …, b_7; *p* – *p*-values of coefficients b_0, …, b_7; * – *p*-value less than 0.10, ** – *p*-value less than 0.05.

in entrepreneurial projects, it is more difficult to achieve measures of internal efficiency (*PSEF*), business results for the company (*PSBD*) and results for the client (*PSIC*). Between the entrepreneurial nature, on the one hand, results for the team (*PSIT*) and results for the future (*PSPF*), on the other hand, no statistically significant relationship is found.

Internal efficiency is facilitated by the stability of both management and project execution processes. The uncertainty inherent in entrepreneurship can indeed conflict with internal efficiency [Cooke-Davies et al., 2009]. In addition, internal results, results for the company and for the client are much more related to the content of the project itself than the results for the team, which can be formed due to socio-psychological factors, and the results for the future, which go far beyond the scope of the project itself [Shenhar and Dvir 2007].

Between internal project outcomes (*PSEF*) and entrepreneurial nature (*ENP*) the coefficient has the highest modulo value (–1.66). This is clear, since uncertainty primarily affects the timing and budget indicators. The smallest ratio arose between the results for the company and the entrepreneurial nature of the project. Indeed, of the three dimensions associated with entrepreneurial nature, the results for the company seem to be the ones that go far beyond the scope of the project itself. Positive margins and increased market share (indicators) can be categorized as business outcomes that often result from entrepreneurial efforts.

Considering the results in the context of the second research question, it can be noted that the relationship between the individual entrepreneurial orientation of managers and the success of projects looks at least ambiguous. We will reveal this connection in the context of individual entrepreneurial orientation measurements.

Attitudes to risk (*RISK*) are directly positively related only to outcomes for the future (*PSPF*), and this is consistent with existing views. The creation of new products, the development of new markets, business models is a rather risky activity. Decisive action is required here, despite high uncertainty. The lack of association between attitude towards risk and future outcomes can partly be consistent with the results of the study [Kraus et al., 2012], which also did not reveal relationships between attitude towards risk and company performance despite non-project context.

The parameters of the relationship between the attitude to risk and the results of the project vary depending on the severity of the entrepreneurial nature (*ENP:RISK*). In the context of internal results (*PSEF*) a positive coefficient is visible (0.25 at the intersection of *ENP:RISK* and *PSEF*). This means that as the entrepreneurial nature of the project increases, the attitude towards risk reduces the negative impact of the entrepreneurial nature on the success of the project.

The attitude to risk proves useful for entrepreneurial projects with high uncertainty in methods and goals. Such a result should be recognized as unexpected, since the adoption of risky decisions is ambiguously reflected in the immediate results of the project.

An even more unexpected result is obtained within the framework of the interaction between the entrepreneurial nature of projects and attitudes towards risk (*ENP:RISK*)in the context of the results for the future (*PSPF*). The results show (although only 0.06 significant) that as entrepreneurial nature (*ENP*) increases, willingness to take risks (*RISK*) only reinforces the negative association of entrepreneurial nature with future outcomes (*PSPF*). The concept of entrepreneurial orientation suggests that a positive attitude towards risk contributes to the effectiveness of entrepreneurial activity, that is, activities carried out under high uncertainty [Lumpkin, Dess, 1996]. But, despite the surprise, these results are consistent with the study [Kraus et al., 2012]. They also found a negative effect of risk attitudes as uncertainty increased.

The category of unexpected results includes the absence of any correlation between the success of the project and the innovativeness of project managers, except for the negative relationship between innovativeness (*INN*) and results for the team (*PSIT*). It could be conceded that innovativeness is not entirely relevant to internal and company outcomes. But it turned out that the propensity for unique approaches, new activities, experimentation are in no way connected with the results of the project, and for motivation, loyalty and interest, innovation looks like a useful component. However, we see negative relationships. It can be assumed that the study deals with the individual entrepreneurial orientation of one person, namely, the project manager. An increase in his personal innovativeness can be negatively perceived by the project team.

The interaction of innovativeness and entrepreneurial nature (*ENP:INN*) with the success of the project does not contradict the established theory. Entrepreneurship and project management studies note - it is innovation that helps project managers cope with uncertainty and complexity [Frederiksen, Davies, 2008]. Mastering this entrepreneurial quality improves the results of project managers in a dynamic environment [Kuura, Lundin, 2019]. But the results obtained cannot be called complete, since they relate to only one indicator of the success of the project - the results for the team. In the context of other indicators, the coefficients of the *ENP:INN* parameter do not have high significance.

And finally, in the context of proactivity (*PROA*) we face with an incomplete and sometimes contradictory picture again. Proactivity, that is, the ability to anticipate problems and deviations arising from the complexity, uncertainty and dynamism of the context, is supposed to improve all indicators of success. Indeed, the results suggest that the improvement in proactivity is consistent with only one measure of success, team outcomes (*PSIT*). The results for the client (*PSIC*) worsen as proactivity increases (*bi* at the intersection of *PROA* and *PSIC* = –0.89). It is difficult to explain, but it can be assumed that the proactivity of the project manager manifests itself as excessive independence and additional communication with clients, which negatively

affects their satisfaction, desire to return to the company and perceived results.

In the context of the entrepreneurial nature of the project, the connection between proactivity and results for the client looks understandable. In more entrepreneurial projects, improved proactivity tends to reduce the negative impact of uncertainty resulting from a pronounced entrepreneurial nature. Being proactive in entrepreneurial projects proves beneficial for results with regard to clients. Thus, an increase in proactivity, besides the entrepreneurial nature, is associated with a decrease in success. In an increasingly entrepreneurial environment, proactivity is associated with favorable outcomes, but this is only in terms of clients. For other indicators of project success, the results do not allow us to draw meaningful conclusions.

7. CONCLUSION

Projects implemented under conditions of high uncertainty are classified as entrepreneurial in the literature on project management. The success of such projects is usually more difficult to achieve. Entrepreneurial project managers are expected to have entrepreneurial abilities in order to successfully manage entrepreneurial projects. This article explores two questions regarding project success, entrepreneurial characteristics, and project uncertainty. First, the authors try to find out whether an increase in the entrepreneurial nature of the project, manifested in an increase in uncertainty about the goals of projects and methods of implementation, is accompanied by a decrease in the success of the project. Second, whether the entrepreneurial orientation of project managers affects the success of projects and the relationship between project success and their entrepreneurial nature.

The data collected during the survey from 104 Russian project managers were subject to quantitative analysis with the construction of five correlation-regression models. The results of the analysis allowed us to draw the following conclusions:

- An increase in the entrepreneurial nature of projects is accompanied by a decrease in project indicators such as internal project efficiency (compliance with deadlines, budgets and other internal indicators), preparation for the future (new products, markets, business models, competencies) and client outcomes (satisfaction, loyalty, compliance with requirements, etc.).
- Willingness to take risks, as a measure of the individual entrepreneurial orientation of project managers, is positively correlated with such an indicator of project success as preparation for the future. An increase in proactivity is accompanied by an improvement in such an indicator as the results for the team (satisfaction, loyalty, interest). At the same time, negative relationships were found between the innovativeness of project managers and results for the team, as well as between proactivity and results for the customer.
- With an increase in the entrepreneurial nature of projects, such indicators of individual entrepreneurial orientation as willingness to take risks (in terms of internal project effectiveness), innovativeness (in terms of the results for the team) and proactivity (in terms of the results for the client) turned out to be able to counteract the negative impact of uncertainty on the success of the project.).

In general, individual entrepreneurial orientation is characterized by a positive relationship with the success of the project, especially in terms of increasing the entrepreneurial nature of projects. However, the study produced some mixed results. In particular, innovativeness, in the absence of the influence of other factors, was negatively associated with results for the team, and proactivity inversely correlated with results for the client. For many links between entrepreneurial orientation and project success, no statistically significant relationships could be identified.

The mixed results may be due to limited character of the study, which includes the following:

- data were collected from only 104 respondents among the readers of one magazine, which makes the sample not completely representative;
- only Russian project managers participated in the survey, and accordingly, the results reflect only the realities of the Russian economy;
- the models used to measure the entrepreneurial nature and success of the project proved to be imperfect, which led to the exclusion of certain indicators from the analysis;
- not all factors capable of having a significant impact on the success of projects were included in the correlation-regression models.

The results obtained indicate a rather complex nature of the interaction between the entrepreneurial orientation of project managers and success indicators, taking into account the influence of the entrepreneurial characteristics of the project. Suggested areas for the further research are:

- clarification of the ideas about the entrepreneurial characteristics of projects and about entrepreneurial projects on the whole as a special category. In particular, in the article the entrepreneurial nature of projects is reduced to two dimensions, but it makes sense to include into consideration, in addition to uncertainty in terms of goals and methods, the complexity of the project or the turbulence of the external environment;
- consideration of mutual influence of different levels of entrepreneurial orientation. In addition to the individual orientation used in the article and the widespread entrepreneurial orientation of the company level, the entrepreneurial orientation of the team can influence the success of projects.

The study of the use of entrepreneurial approaches in project management is presented as an actual direction, which has both theoretical and practical significance..

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