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Al-Farabi Kazakh National University<sup>1</sup>**HOW TO MEASURE SUCCESS OF HIGH-TECH PROJECT?****Abstract**

The paper discusses the problems and prospects of high-tech projects in Kazakhstan. The authors investigated the domestic and foreign markets of high-tech projects and identified the main factors contributing to the success and effectiveness of such projects. The study is relevant nowadays, because the high-tech projects ensure the development of national innovative system and entire economy sector. Successfully implemented advanced projects contribute to the development of the innovation system of the country, improving the competitiveness of domestic enterprises and production, thereby improving the standard of living of the population and benefiting society. The aim of the study is to identify factors that influence the success of such projects, as well as the preparation of recommendations for improving the management of advanced projects in Kazakhstan. The authors identified the main dimensions that ensure a positive dynamics of the project's success in the course of the work. They found the main for dimensions of success and analyzed the processes of knowledge areas that directly affect to high-tech project success. The analysis of domestic and Israeli projects ensure the authors with data about level of success and effectiveness of domestic projects and foreign projects. The results of the study allowed to develop a series of measures to improve the toolkit for managing high-tech projects. The authors identified the main factors that positively affect the dynamics of the successful completion of high-tech projects. As the results of the study showed, timely and complete implementation of planning processes in project management and organizational support from the company bring a positive effect and increase the efficiency of high-tech projects.

Key words: project management, high-tech project, efficiency, competitiveness, dynamics, innovation system.

High technologies and innovations captured the world, because they help to simplify our lives. New technologies solve our daily problems and accelerate our pace. Moreover, advanced technologies contribute to development of local industries and improve the competitive advantages of different sectors of the economy.

The high-tech sector is characterized by the use of the most advanced technologies. These technologies not only ensure the success of the industry, but also improve the competitive advantage of the entire economy [1]. High-tech projects have high risks associated with a wide range of connections, high investment costs, a long period of development and production cycle, a complex operating system [2]. Therefore, exploring the high-tech project management always will be relevant.

The complexity of managing high-tech projects and their importance for the national economy make it necessary to develop tools for managing such projects. One of directions of managing such projects should cover the measurement of high-tech project success.

In the beginning of the study it's important to identify success dimensions of high-tech project. The most of project managers often use common success dimensions as "gold triangle". This approach of measuring project success is depicted in the Figure 1 (p. 178).

According to this picture, project success depends on project budget, schedule and quality. Project will complete successful if it's achieve good results in these dimensions.

Project that finished in time, in budget and in good quality is considered as successful project. But many scientist believe that it's not enough for modern projects. Because we should pay attention to project stakeholders. Project may complete with good quality, in time and with good budget, but may not satisfy customer or other stakeholders. Therefore, we should expand the definition of project success.

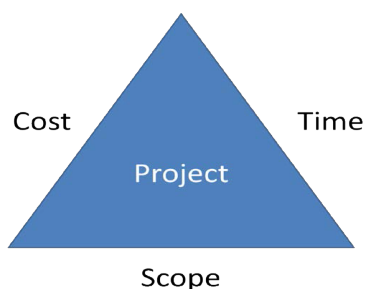


Figure 1 – Golden triangle

Note – Recourse [4].

The current thinking is that, project success is best judged by the stakeholders, especially the primary sponsor [3]. Project considered successful if stakeholders are satisfied by results of the project.

We optimize all findings from literature review and reveal the general success dimensions. It's depicted in the Figure 2.

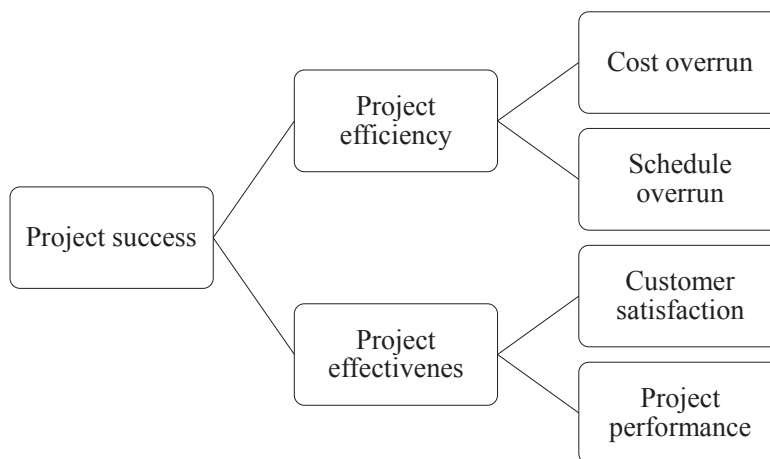


Figure 2 – Project success dimensions

Note – Designed by authors.

According to the Figure 2, project success includes project efficiency and project effectiveness. It's important to understand the differences between these two dimensions.

Many scholars state that “there are many cases where projects are executed as planned, on time, on budget and achieve the planned performance goals, but turn out to be complete failures because they failed to produce actual benefits to the customer or adequate revenue and profit for the performing organization [4].”

We found a way of measuring high-tech project success through project planning processes. Planning is critical phase for project, because planning processes consist of about 51% of all processes which should be performed by project managers [5]. Also planning described in literature as critical factor for project success [6, 7, 8]. We prepared specific questionnaire for measuring project success. This questionnaire was send to project supervisors and managers. They gave us information about project cost, schedule, technical performance and extent of customer satisfaction. Authors used SPSS Statistics for calculating correlation level, Cronbach alpha and P-value of results. Example of above-mentioned results depicted in the Table 1 (p. 179). There are example of Green energy projects results, which derived from Kazakh project managers.

Table 1 – Questionnaire result for measuring success level of Green energy projects in Kazakhstan Republic

Green energy projects	Cost overrun	Schedule overrun	Project performance	Customer satisfaction
1. Project 1	33	12	5	5
2. Project 2	15	5	9	8
3. Project 3	70	0	5	4
4. Project 4	40	0	9	9
5. Project 5	0	0	9	10
6. Project 6	150	5	8	5
7. Project 7	70	0	8	8
8. Project 8	20	0	9	9
9. Project 9	35	15	9	8
10. Project 10	75	0	10	10
11. Project 11	55	15	7	7
12. Project 12	70	20	9	9
13. Project 13	0	0	8	7
14. Total score	633	72	105	99
15. Average	48,69231	5,538462	8,076923	7,615385
16. Standard deviation	40,38024	7,332751	1,5525	1,938146
Note – Designed by authors.				

These results provide the authors with other useful information. Because the amount of Average (48,69) and Standard deviation (40,38) help to calculate the dispersion and regression analysis. Unfortunately, today there are very few models and methods of quality management, in particular, there is only one model of measuring quality of planning – the PMPQ model. This model allows to analyze the impact of many factors as performing planning processes and organizational support processes on the success of the project. Authors conducted the regression analysis by SPSS Statistics program and derived the correlation, p-value, F-value. These analysis depicted in Table 2.

Table 2 – Regression analysis of Green energy projects' success dimension (cost overrun)

Cost overrun	Value		
1. Multiple R	0,239697		
2. R-square	0,057455		
3. The normalized R-square	0,010328		
4. Standard Error	33,51646		
5. Observations	22		
1. Dispersion analysis			
2. Indicator	df	SS	MS
3. Regression	1	1369,528	1369,528
4. Balance	20	22467,06	1123,353
5. Total	21	23836,59	
Note – Designed by authors.			

As depicted in the Table 2, cost overrun has negative correlation ( $R = 0,05$ ), when customer satisfaction and project performance have positive correlation. Authors pasted their analysis in this study partly, because there are a lot of data, which couldn't be imagine complexly in this study. The results of the final measurement shown in Figure 3.

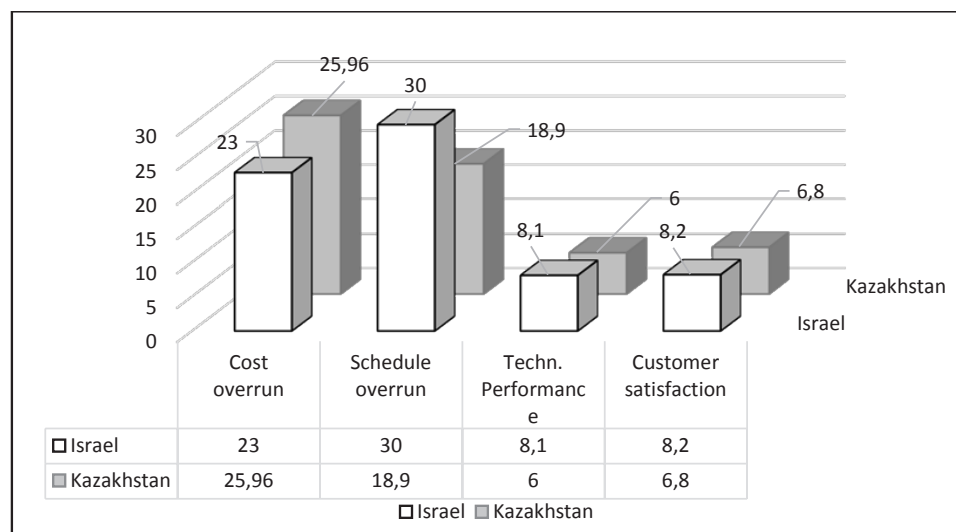


Figure 3 – Project success level in Israel and Kazakhstan

Note – Designed by authors.

Questionnaire was send to Kazakhstani and Israeli project managers. Project success level for each country measured by average of cost overrun, schedule overrun, customer satisfaction and technical performance.

Results of the questionnaire provide us with useful data about projects' quantitative indicators. These indicators ensure the study with local and Israeli projects success dimensions results.

According to the data depicted in figure 3, our local project managers have problems with cost budgeting (25,96%), technical performance (6) and customer satisfaction (6,8). It may be due to the fact that Kazakhstan is one of the developing countries and project management comparatively new scope for our professionals. There are lack of experience and practice for efficient and effective management of projects. Therefore, local projects show lower results than Israeli projects.

Thus, we understand the complexity of managing high-tech projects and their importance for the economy. It necessary to develop tools for managing such projects in right way through using project management tools [9]. We should do a lot for improving the level of success of high-tech projects and project management in general. First steps should be directed to training specialist, government support and ensuring new technologies transfer for our markets through using foreign successful experience.

#### LIST OF LITERATURE

- 1 Shenhar A. From low-to hi-tech project management // R&D Management, 2007. Issue 3, p. 199–217.
- 2 Chao R., Kavidiyas S. A theoretical framework for managing the new product development portfolio: When and how to use strategic buckets // Management Science. 54(5), p. 907–921.
- 3 Turner R. & Zolin R. Forecasting success on large projects: developing reliable scales to predict multiple perspectives by multiple stakeholders over multiple time frames. Project Management Journal, 2012, 43(5), 87–99.
- 4 Dvir D., Raz T. & Shenhar A. (2003). An empirical analysis of the relationship between project planning and project success. International Journal of Project Management, 21(2), 89–95.
- 5 PMI Standards Committee. (2008). A Guide to the project management body of knowledge: 4th Edition. Newtown Square.

- 6 Zwikael O., Sadeh A. (2007). Planning effort as an effective risk management tool // Journal of Operations Management. Vol. 25, № 6, 454–62.
- 7 Glenn G. (2008). Enterprise resource planning 100 success secrets – 100 most asked questions: the missing ERP software, systems, solutions, applications and implementations guide. Emereo Pty Ltd., Queensland.
- 8 Serrador P. (2013). The impact of planning on project success – A literature review // The Journal of Modern Project Management. Vol. 1.
- 9 High technology, Collins Dictionary. Available on: [www.wikipedia.com](http://www.wikipedia.com).

### Аңдатпа

Мақалада Қазақстанда жоғары технологиялы жобалардың қиыншылықтары мен перспективалары қарастырылды. Авторлар жоғары технологиялы жобалардың отандық нарығын зерттеді және осындай жобалардың табыстылығы мен тиімділігіне ықпал ететін негізгі факторларды анықтады. Авторлар қазіргі таңда өте өзекті тақырыпты қарастырды, жоғары технологиялық жобалар сәтті аяқталуы, жоба қатысушыларына ғана емес, сондай-ақ жалпы ел экономикасына да пайдасын тигізуі мүмкін. Озық жобалар сәтті іске асырылып, мемлекеттің инновациялық жүйесін дамытуға, отандық кәсіпорындар мен өндірістің бәсекеге қабілеттілігін арттыруға, осылайша халықтың өмір сүру деңгейін жақсартуға және қоғамға пайда әкелуге мүмкіндік береді. Зерттеудің мақсаты жоғары технологиялық жобаларды басқарудың тиімділігін арттырушы факторларды анықтап, Қазақстанда озық жобаларды басқаруды жетілдіру бойынша ұсыныстар дайындау болып табылады. Жұмыс барысында авторлар жобаның табыстылығының оң үрдісін қамтамасыз ететін негізгі факторларды анықтады. Отандық және израильдік жобаларды талдай келе, авторлар отандық жобалардың табыстылығы мен тиімділігіне баға берді. Зерттеудің нәтижелері жоғары технологиялық жобаларды басқару құралдарын жетілдіру бойынша бірқатар шараларды дайындауға мүмкіндік берді. Авторлар жоғары технологиялық жобаларды сәтті аяқтау динамикасына оң әсер ететін негізгі факторларды анықтады. Зерттеу нәтижелері көрсеткендей, компаниядағы жобалық басқару мен компания тарапынан ұйымдастырушылық қолдауда жоспарлау үдерістерін уақтылы және толыққанды жүзеге асыру оң нәтиже береді және жоғары технологиялық жобалардың тиімділігін арттырады.

Тірек сөздер: жобаларды басқару, жоғары технологиялы жоба, тиімділік, бәсекеге қабілеттілік, динамика, инновациялық жүйе.

### Аннотация

В статье рассмотрены проблемы и перспективы высокотехнологичных проектов в Казахстане. Авторы исследовали отечественный рынок высокотехнологичных проектов и выявили основные факторы, способствующие повышению успешности и эффективности таких проектов. Исследование затронуло актуальную на сегодняшний день тематику, так как успешно завершённые высокотехнологичные проекты могут принести пользу не только участникам проекта, но и экономике страны в целом. Успешно реализованные передовые проекты способствуют развитию инновационной системы страны, повышению конкурентоспособности отечественных предприятий и производства, тем самым улучшая уровень жизни населения и принося пользу обществу. Целью исследования является выявление факторов, которые оказывают влияние на успешность таких проектов, а также подготовка рекомендаций для повышения эффективности управления передовыми проектами в Казахстане. В ходе работы авторы выявили основные факторы, обеспечивающие положительную динамику успешности проекта. Проанализировав отечественные и израильские проекты, авторы оценили уровень успешности и эффективности отечественных проектов. Результаты исследования позволили подготовить ряд мер по улучшению инструментария управления высокотехнологичными проектами. Авторами были выявлены основные факторы, положительно влияющие на динамику успешного завершения высокотехнологичных проектов. Как показали результаты исследования, своевременное и полноценное выполнение процессов планирования в проектном управлении и организационная поддержка со стороны компании приносят положительный эффект и повышают эффективность высокотехнологичных проектов.

Ключевые слова: управление проектами, высокотехнологичный проект, эффективность, конкурентоспособность, динамика, инновационная система.