







“Introducing project management system into enterprises of defense industry in Kazakhstan”

AUTHORS	Alizhan Tulembayev  https://orcid.org/0000-0002-4909-076X
	 http://www.researcherid.com/rid/G-8742-2019
	Shynara Jumadilova  https://orcid.org/0000-0001-8509-3688
	 http://www.researcherid.com/rid/O-2177-2017
	Aliya Adilova  https://orcid.org/0000-0001-9962-7898
Dina Seidaliyeva	
ARTICLE INFO	Alizhan Tulembayev, Shynara Jumadilova, Aliya Adilova and Dina Seidaliyeva (2019). Introducing project management system into enterprises of defense industry in Kazakhstan. <i>Problems and Perspectives in Management</i> , 17(2), 527-540. doi: 10.21511/ppm.17(2).2019.41
DOI	http://dx.doi.org/10.21511/ppm.17(2).2019.41
RELEASED ON	Monday, 01 July 2019
RECEIVED ON	Monday, 08 April 2019
ACCEPTED ON	Thursday, 06 June 2019
LICENSE	 This work is licensed under a Creative Commons Attribution 4.0 International License
JOURNAL	"Problems and Perspectives in Management"
ISSN PRINT	1727-7051
ISSN ONLINE	1810-5467
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”


NUMBER OF REFERENCES
31


NUMBER OF FIGURES
1


NUMBER OF TABLES
2

© The author(s) 2024. This publication is an open access article.



BUSINESS PERSPECTIVES



LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

Received on: 8th of April, 2019

Accepted on: 6th of June, 2019

© Alizhan Tulembayev, Shynara Jumadilova, Aliya Adilova, Dina Seidaliyeva, 2019

Alizhan Tulembayev, Ph.D., Head of Department of Engineering and Innovations, JSC "National company "Kazakhstan Engineering", Kazakhstan.

Shynara Jumadilova, Ph.D., Associate Professor, Information Technology, Department of Economics and Business, International IT University, Kazakhstan.

Aliya Adilova, Ph.D., Senior Lecturer, Department of Economics, Kazakh University of International Relations and World Languages, Kazakhstan.

Dina Seidaliyeva, Doctoral candidate, Economics Faculty, Management Department, L. N. Gumilyov Eurasian National University, Kazakhstan.



This is an Open Access article, distributed under the terms of the [Creative Commons Attribution 4.0 International license](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited.

Alizhan Tulembayev (Kazakhstan), Shynara Jumadilova (Kazakhstan), Aliya Adilova (Kazakhstan), Dina Seidaliyeva (Kazakhstan)

INTRODUCING PROJECT MANAGEMENT SYSTEM INTO ENTERPRISES OF DEFENSE INDUSTRY IN KAZAKHSTAN

Abstract

Currently, active work is underway to introduce a project-based approach to the management of new product production processes. However, even if the need to implement project management is undeniable, the question arises of the pitfalls in implementing these innovations into the defense enterprises. Based on this, this work aims to determine organizational problems of implementing project management system into an enterprise of the defense industry. The following methods were used to collect data: in-depth interviews with employees of the company, taking a direct and key part in the PM processes; study of internal regulatory and other documentation on the research object; conducting a survey of employees. The research revealed the use of project management tools that are developed mostly in procurement management. The main problems of project management implementation are in scheduling, communications and integration management. The weaknesses in terms of the support provided for the implementation of projects by the enterprise include such areas as the availability of standard project management software and the organization of permanent trainings on project management. Based on the problems revealed, some recommendations are made for implementation of project management system in the enterprise of the defense industry.

Keywords

organization, diagnostics, problems, R&D, national company, planning, resource, performance

JEL Classification M10, L10, O22

INTRODUCTION

The defense industry in Kazakhstan is represented by a small number of large and medium-sized private companies, state and quasi-state enterprises. This sector is supervised by the Ministry of Digital Development, Defense and Aerospace Industry of the Republic of Kazakhstan (hereinafter – MDDDAI). The largest organization in this sector is JSC "National Company "Kazakhstan Engineering" (hereinafter – KE). KE consists of 26 organizations, including 14 subsidiaries, 3 second-tier subsidiaries, 3 jointly controlled and 6 dependent organizations. The company's activity consists of the production of special-purpose products and services for the security agencies of Kazakhstan and exports; production of equipment for the oil and gas industry; production of equipment for the railway complex; agricultural engineering; production of electronics.

1. LITERATURE REVIEW

In the defense industry, as in other industries, the competitiveness of enterprises, the timely introduction of innovative technologies, the production of high-tech products, etc. are important.

Project management is relatively recently emerged and widely spread profession. Project management is one of the fastest growing management technologies. In the modern world, almost every organization needs it, regardless of the type of its activity. Proper use of knowledge, practices and methodologies of project management (Obradović et al., 2018), understanding the features of the project management platforms (Yunofri & Kurniawan, 2019) will help to achieve sustainable development of the company.

Effective use of project management methods requires a change in the organizational structure of the company, the introduction of new positions and divisions, among which the project office plays the main role. According to Philbin (2018, p. 681), "the project management office (PMO) is an organizational unit designed to standardize how projects are delivered and achieve efficiencies through deploying best practice gained from the delivery of successive projects". Bredillet et al. (2018) claim that project management offices are considered as useful for implementing the strategy through project portfolios, but they (the offices) are not durable.

Paton and Andrew (2019, p. 44) refer to Hodgson (2002) and name as responsibility of project management professionals "the delivery of projects on time, on budget and to a required level of performance in relation to both scope and quality". Xiao et al. (2019) argue that project manager's competences are the key for the success of a project, and they affect the project schedule. Therefore, the project management is used in various areas for managing under uncertainty, especially, in knowledge-intensive businesses (Whittington et al., 1999).

Paton and Andrew (2019, p. 43), referring to Hill (2014), Hobbs and Aubry (2010), state that "contemporary analysis of project control within large multi-project organizations typically includes examination of the form and function of the Project Management Office (PMO)". However, in this study, an analysis of project control is performed by scrutinizing forms and technology of processes in the entire organization.

There are substantiating findings about project management methodology's (PMM) role as a suc-

cess factors in projects. So, Joslin and Muller (2015, p. 1380) look at the relationship between the use of PMM and project success. Based on a cross-sectional, world-wide, online survey of 254 responses, they could conclude whether PMM is applied or not explains 22.3% of the variation in project success. The higher levels of project success are related to the treat of PMMs: whether they are comprehensive to manage the project or "need to be supplemented during project execution". As they state, project governance acts as a quasi-moderator in this relationship.

In Puthamont and Charoenngam (2007), organizational sustainability is directly related to the effective and efficient selection of projects in strategy-focused environments. Defense industry can be considered as such an environment. It worth to note that Puthamont and Charoenngam (2007) consider the process of decision making as bottleneck to the success of projects, since it is a complex and multistage process.

Recently, the need to manage innovation have been realized and some issues related have begun to be addressed (Milewski et al., 2015). Nowadays, new product hardly can be launched without product control (He et al., 2006). Special techniques are used in new product development (Bevilacqua et al., 2007).

In defense industry, many projects are related to development of a new product. Thus, in this context, organizations in this sector can be considered as temporary ones (Lundin & Söderholm, 1995). The work in these organizations is based on the product lifecycle. Product development process is based on the CADMID (Concept, Assessment, Demonstration, Manufacture, In-service, Disposal) acquisition cycle (DSE, 2002, p. 13).

The paper among a plenty of works devoted to study the factors of project success is one by Rodríguez-Segura et al. (2016), which provides an analysis of 29 international large industry projects in the aerospace and defense sectors. For these projects' success, the customer, the company, and the time were important as success criteria. Thus, the project management and business processes in the company are under consideration in the current study.

Many projects in defense industry are innovative ones. The research in Artto et al. (2011) examines management control in the front end of innovation projects. On the basis of the empirical material derived from four companies managing multiple innovation projects, there are revealed a variety of the organizational and managerial mechanisms of a firm.

Cantwell et al. (2012, p. 646) argue that “defense projects are themselves complex systems and traditional approaches have failed because their linear logic inadequately captures the dynamics of complex adaptive systems”. In this direction, there is also a study by Chang et al. (2013, p. 1139), where it is stated that “contrary to the traditional output-focused project methodology, the value creation perspective argues for the importance of creating new knowledge, processes, and systems for suppliers and customers”. In the study, the authors present interview data from three Australian defense mega projects to demonstrate that senior executives have a more complex understanding of project success than traditional iron triangle measures.

Despite the fact that usefulness of traditional approaches for defense projects is ambiguous, there is no doubt in the necessity of project management. Recently, Paton and Andrew (2019) described a case study in the defense industry and found that the PMO can provide continuity across phases by maintaining coherence of purpose, process, and method.

Currently, active work is underway to introduce a project-based approach to the management of new product production processes. However, even if the need to implement project management is undeniable, the question arises of the degree the defense enterprises are ready to these innovations.

2. AIMS

This work aims to determine the organizational problems of implementing project management system into an enterprise of the defense industry.

3. METHODS

The increase in the growth rate of project activities has put the company's management at the

need to create a corporate project management system. To create a project management system (PMS), analysis of current PM processes was carried out. During the analysis, some organizational problems were revealed. Therefore, along with the identification of the “bottlenecks” in the management system, a number of recommendations were prepared for further work on the introduction of PMS in an enterprise of the defense industry.

Research was carried out in order to collect materials for analyzing the development and operation of project management at the enterprises of the defense industry of Kazakhstan, for revealing its features in implementing project management system. For this study, an analysis has been made of the current state of the project management system at KE. The following research methods were used to obtain results:

- 1) in-depth interviews with employees of the company, taking a direct and key part in the PM processes in the form of personal meetings and group meetings. The interview was attended by 20 employees of various departments of KE;
- 2) study of internal regulatory and other documentation on the research object, including company development strategies and programs, production programs, financial and economic justification of projects, company activity reports, project monitoring reports, departmental regulations, staff job descriptions, regulations, and meeting minutes of board of directors;
- 3) conducting a survey of employees of the defense industry companies, during which 28 respondents were interviewed working at 18 enterprises of the defense industry of the RK (including 20 employees of 11 enterprises of KE) and directly involved in project implementation;
- 4) analysis and aggregation of the information obtained by the above methods to understand the main characteristics and features, which should be taken into account in the implementation of project management systems;

- 5) formulation of conclusions and recommendations for the further construction of project management in KE.

During the analysis of the data obtained, a comparison was made of the results for the industry with the results of the responses of representatives of enterprises that make up the KE.

4. RESEARCH RESULTS

Research has been made using mostly data on KE, since KE is a national company in the defense industry and the largest one. The economic indicators of defense industry of Kazakhstan and KE are given in Table 1.

Table 1. Economic indicators of defense industry and KE

Indicators	Defense industry	KE
Output in 2017, in bln tenge	90	83.6
Number of occupants	More than 8,000	4,891
Number of enterprises	45	26

Data on past and current projects were taken in the organization under study. As the analysis showed, at the moment, there are more than 80 current projects in the company, including subsidiaries, which can be classified as follows:

- privatization or liquidation projects;
- projects on developing strategies and development plans;
- projects related to the introduction of information technology (IT);
- R&D;
- projects related to military technical cooperation (MTC) with other countries.

At the moment, the following project portfolios can be distinguished in the parent organization: investment – 7 projects; R&D – 1 project; IT – 2 projects.

In the near future, 42 more projects are planned, 20 of them for experimental design work, 17 are applied research and development work, and 5 projects are design and technological works.

Project for the experimental design work is the development work, the creation of a set of design documentation suitable for mass production of the product. Applied research work refers to the resolution of specific scientific problems for creating new products, receiving recommendations, instructions, calculation and technical materials, methods, and determining the possibility of conducting research and development work on the subject of scientific research. Design and technological works include the development of new production technologies, management, etc.

If, in Western countries, the maturity of project management is greatest in companies in the oil and gas industry and the defense industry, as stated in Cooke-Davies and Arzymanow (2003), in Kazakhstan, the situation is quite different.

In the course of research on projects implemented in KE, no standardized plans, project charters, status reports or project completion reports were received for analysis. This indicates the absence of PM on a system basis. There are project presentations at different stages of project management. However, they do not contain a full-fledged system of project management indicators, such as exceeding the planned time, the number of changes made to the project, time reserve, etc. Thus, it can be concluded that the company lacks a documented project management methodology.

Frequency of planning processes was estimated by interviewing employees of subordinate organizations of KE. The frequency of a particular process was estimated using Likert scale from 1 to 5, and the average score for all processes was estimated 3.58. Comparing the average scores for the frequency of each process, we can conclude that the weakest points at the planning stage are such processes as scheduling and communication planning. The highest score was for budget definition, i.e. it is always ongoing process.

Table 2. Frequency of planning processes at KE

Process	Average score
Develop project management plan	4.11
Collect requirements	3.71
Create WBS	3.69
Define scope	3.78
Define activities	3.56
Sequence activities	3.53
Develop schedule	2.89
Estimate activity resources	3.76
Estimate costs	4.06
Determine budget	4.17
Plan quality management	3.56
Plan stakeholder management	3.39
Plan human resource management	3.35
Plan communications	3.00
Plan risk management	3.44
Plan procurement	3.33

Notes: Here 5 – this process is always carried out by me; 4 – this process is carried out by me quite often; 3 – this process is often carried out by me; 2 – this process is rarely carried out by me; 1 – this process has never been carried out by me.

In accordance with the methodology described in PMBOK guide, project management consists of five groups of management processes in ten areas of knowledge: project integration management, project content management, project timeline management, project cost management, project quality management, project human resource management, project communication management, project risk management, project supply management, stakeholder management (PMI, 2017).

To understand the features of the KE environment, this should be taken into account when introducing a PMS, the analysis of current management processes in the above areas has been made.

4.1. Integration management

Formally, the Company has established a Project Office for the Department of Strategic Planning, Asset Management and Investment, which in the future may centralize this function on itself, including all project management processes.

The following tasks were assigned to the project office:

- to develop a plan for visiting subsidiaries of the company;
- to analyze the readiness of the company and its subsidiaries to automate;
- to provide an analysis report;
- to develop and approve the roadmap for digitization of the company and its subsidiaries.

Today, the project management function is partially performed by such units as the Department of Strategic Planning, Asset Management and Investments and the Department of Economics and Planning, but there is no separate department that fully performs and controls this function at all stages.

One of the main problems is the lack of integration. Since any information about a project is available to stakeholders and project team members only on request, a team loses coherence. As in any large enterprise, employees perform their work in accordance with their job descriptions. However, the job descriptions state clearly the duties concerning independent work rather than sufficiently detailed description of joint work and work transfer processes.

4.2. Scope management

Monitoring and management of project work is coordinated at the top level – the level of signing acts. Despite the fact that scope management, i.e. requirements to the final product, is crucial in defense, intermediate and detailed work in it is not regulated. Changes to the project are made, but not recorded. Hence, it is impossible to track the indicators of the volume of changes in project plans. Since content is controlled via certificate of acceptance, project team is aimed only at obtaining it rather than identifying real necessities of stakeholders and improving content. The latter acquires unique significance for R&D projects.

4.3. Time management

According to international project management standards, network modeling is used to manage the project schedule. Network planning and man-

agement methods include a set of computational methods, organizational and managerial techniques that provide modeling, analysis and dynamic restructuring of plans for the implementation of complex work packages and developments using a network schedule (PMI, 2017). In turn, the network graph is a graphical representation of the work package, reflecting their logical sequence, interrelation and duration.

In the area of project management, as a rule, KE has a roadmap (action plan) compiled at a general top level, not detailed in a system view, but usually executed in an operational mode. After studying the provided examples of such roadmaps, it was revealed that the deadlines for the tasks in the projects have a frame of up to several months, in connection with which there is a vagueness of the timing of individual actions and tasks, which does not allow the timing and more efficient management of the timing of projects. Thus, certain tasks are not planned and controlled on a systemic basis, and there is lack of standardized control mechanisms for them.

Time management in projects does not depend on the organization of the KE itself very often, but on the main body, the MDDDAI. Long project initiation and monitoring processes hamper further project steps.

Analysis of the documentation for the projects of KE and subordinate organizations showed that there are no indicators for managing timelines according to international standards of PM. Evaluation of the results of the calendar component of the project is carried out through the measurement of: the project implementation period, deviations from the project implementation period and the payback period. Managing the timing of project tasks is not developed.

The company does not have a regulated system for reporting on the progress of project work.

Obtaining information on the timing of the work and the status of the project is the method of "Request-Response".

The final processes, which imply the final closure of contracts and projects as a whole, are executed steadily and without fail, which is due to strict government requirements related mainly to the confirmation of the implementation of allocated budgets.

However, the quality of the implementation of these processes is low, as there is often a postponement of certain processes during the implementation of projects. This leads to a shift in the timing of its completion and the closure of all necessary documentation.

4.4. Project cost management

The entire project life cycle depends on funding. For this, a financing schedule is approved, which is executed by the Treasury. However, the timing of the receipt of funding often disagrees with the plan. This jeopardizes the overall project timeline.

For approval (initiation of projects), a financial and economic justification is written in conjunction with other departments. In the course of project management, project money flow plan is updated. The planning phase also tracks NPV and IRR indicators, the forecast for which is updated every month.

The collection of estimated data on prices and resource costs for the project is as follows (Figure 1).

Changes in projects occur constantly, usually once a month – mainly, the renewal of terms, often associated with delays in financing projects, as well as due to changes in the budget of projects.

Financial planning of projects, along with the Department of Strategic Planning, Asset Management and Investment, also deals with the

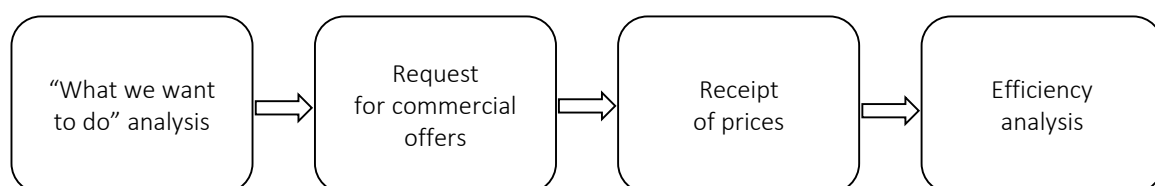


Figure 1. Diagram of the resource management process for the project in KE

Department of Economics and Planning, combining project planning and operating activities of the enterprise.

Basis for planning: agreements concluded, development plans, approved investment projects, actual cost structure.

There are 3 standard forms of financial statements for the planning of economic activities: BIE (budget of income and expenses), CFS Forecast (forecast cash flow statement), and Balance.

The following economic indicators of the organization are evaluated:

- labor productivity;
- economic value added (EVA);
- execution of sales plans;
- increase of sales of civilian products;
- debt/EBITDA (earnings before interest, tax, depreciation and amortization).

Also, indicators for assessing the effectiveness of project implementation (other than financial) are not calculated or applied. For comparison, an example can be of the United States Army Space and Missile Defense Technical Center can be taken, where for performance measurement profitability is not used, since they operate in a non-profit environment, but “measurements of organizational performance using typical project management measures of cost, schedule and technical performance”, and, moreover, some additional measures using “Technology Readiness Levels in an attempt to quantify innovation and technology advancement” are used (Weathington & Youngblood, 2005, p. 122).

To control the timing of the work, a combination of the planning system and the contracts managed by the production department takes place (there is no separate software for the contract management system).

Control over the financial flows of the projects has been put, but it is impossible to control the actual

shortages in the warehouses of the plants (the system cannot control this sufficiently) – a solution is needed in the field of monitoring and recording material resources at the plants, including comparing actual write-offs with estimated plans (calculation cards and product consumption rates).

Planning activities are conducted in the scope of organizations rather than in the scope of project. The analytics level “project” (as a separate reference book and analytics section) is not embedded in the system of planning and economic analysis in the organization.

The survey results showed that the evaluation of the results of the financial component of the project is carried out by measuring the following indicators:

- net present value (NPV);
- internal rate of return (IRR);
- payback period/discounted payback period (DPP);
- net profit;
- profitability.

This approach, in our opinion, with all its simplicity in interpretation and universality, does not take into account the specifics of the defense sector. As stated in Sadeh et al. (2010, p. 2724), “The higher levels of novelty and complexity result in lower efficiency of defense projects in terms of meeting schedule and budget goals, but these projects create more opportunities for future businesses, by entering uncovered areas in the marketplace (new market segments and new lines of products) and establishing the technological and knowhow base for improved products”.

4.5. Quality management

In the field of quality management, as is known, the main goal is to improve the quality of the projects being implemented by improving the quality of execution of PM processes. The project management knowledge book describes the essence of processes in terms of integration between process-

es and the interactions between them, as well as the goals they serve. These processes are divided into five groups called “project management process groups”:

- 1) initiation process group;
- 2) a group of planning processes;
- 3) a group of execution processes;
- 4) a group of monitoring and management processes;
- 5) a group of final processes (PMI, 2017).

On the basis of a study of major government information technology projects by the Department of Defense of the UK Warren (2014, p. 425) names twelve factors as the key factors of success for defense industry projects, such as “spending more time on project initiation, expending resource on preparation rather than rushing into development, potentially a cultural problem within MOD procurement”. As for KE, the processes of project initiation, expending resource on preparation need more attention.

Tuzcu and Esatoğlu (2011, p. 78) investigate the determinants of the success for IT projects in the defense industry of Turkey, one of the countries with most powerful military. They conclude that “completed and accurate requirements at the beginning of the project, allocation of enough time to define and determine the requirements” have influence on project success, whereas the factors such as “the experience of project management, changing the project manager during the project”, etc. has no direct impact on project success. These findings related to completed and accurate requirements at the beginning of the project are also supported by Dvir et al. (2003, p. 89). They examined the relationship between project planning efforts and project success and conclude that “project success is insensitive to the level of implementation of management processes and procedures”; however, “project success is positively correlated with the investment in requirements’ definition and development of technical specifications”.

In other paper (Jayaraman et al., 2015), the authors study the factors influencing the failure of

web-based application of IT project in Malaysia and their findings show that five independent variables affect the failure of web-based IT projects. These two researches have common conclusion that clarity of goals and sufficient resources are crucial for project success. However, the latter study has results in some sense opposing to those in Tuzcu and Esatoğlu (2011). In particular, Jayaraman et al. (2015, p. 281) determine such factors as “low teamwork quality, ineffective project management, no reward and recognition system in place” as the factors influencing the failure of project.

4.6. Human resource management

The Development Strategy of JSC “NC “Kazakhstan Engineering” until 2027 describes the target organizational structure and states that the organizations of the future assume the work of the “network of teams”. The best companies in the world are built around systems that encourage teams and individuals to meet with each other, transparently share information and move from team to team, depending on the task to be solved.

To implement this approach, the Company will have to develop the necessary competencies of management and personnel, implement systems that simplify interaction in the organization, ensure transparency and visibility of setting goals and reporting, introduce principles of flexible project management, ensure the ability to quickly recruit teams and manage their effectiveness with feedback.

The appointment of project managers, curators and team members (working group) usually takes place with the Investment Committee Minutes document. But, over time, there is a change of personnel, and, with the arrival of new employees for posts, re-assignment of project members does not occur.

The assignment of labor resources in the first iteration of a project usually occurs in the form of an order or protocol, but further changes are not tracked when typing a command. Recruitment processes are limited to company level, not projects.

The distribution of labor resources between projects and individual tasks within a single project

is not documented, which in the future leads to the impossibility of efficiently managing labor resources.

In order to improve the efficiency of human resource management in this direction, it is recommended to record all the described assignments and changes, indicating the resources in more detail – by family name.

KE has not developed or applied any motivation system for the project participants (team), which may have a negative impact on the quality of the projects being implemented as a whole, although as can be seen from the research results (Tuzcu & Esatoğlu, 2011; Jayaraman et al., 2015), there is no unambiguity in this question.

Geraldi et al. (2010, p. 547), having studied the experience of project managers in defense industry enterprises, revealed factors of successful actions for responding to risks which are: “the reacting and functioning structure at the organizational level; good interpersonal relations at the group level and competent people at the individual level”. Therefore, it seems important to revise the processes included in human resources management.

4.7. Communications management

The analysis of the studied documentation showed that the interaction between the participants of the PM processes is regulated by job descriptions and regulations on the departments, but they do not describe the PM processes. And there is no internal regulatory documentation for PM. The interaction between the participants of the PM process is not systemic, but “on request”.

The lack of detailed planning (decomposition of tasks and plans for work and those responsible) leads to the emergence of irresponsible zones and timeliness due to inconsistencies.

4.8. Procurement management

The selection of third-party suppliers and contractors is well placed in control in connection with procurement legislation.

4.9. Stakeholder management

According to the results of the analysis, the development of project charters, the initial process of the initiation group, was not identified in KE. No documentary result of the determination of stakeholders in projects is carried out; this process is intuitive, without any documentation and explanation to the project team members.

4.10. Requirements for document flow

At all stages of project implementation at the enterprise, not all the documentation required by the requirements of international standards for project management is maintained.

KE develops and controls such documents as:

- business plan;
- resource plan (mostly material, less labor);
- roster of potential contractors;
- final report on the project (but not in full of the system of project management indicators);
- financial report on the progress of the project.

The list of documents that is not currently used in the company, but which is necessary for effective project management:

- project charter (there is a project passport, but it does not reflect all the necessary information);
- communication plan;
- project registry;
- change request;
- risk register;
- register of changes;
- register of instructions;

- monthly progress report (there is a Request-Response, there is no standardized form).

There are no standards and document templates for status reports and other forms of exchange reporting, they may change with each new request – only financial reporting forms and indicators are regulated.

Thus, it can be concluded that companies have separate elements of project management; however, it is not on a system basis.

5. DISCUSSION

Summarizing the above, the following shortcomings can be listed, overcoming of which is necessary for the implementation of the project management approach in the defense industry companies:

- there is no common understanding of the term “project”;
- in the allocation of resources there is no documental reassignment of labor resources;
- there is no single centralized database of the list of projects;
- not developed portfolio management and project programs;
- there is vagueness of terms and executives in the roadmaps used as project plans;
- the list of changes made to the project is not registered (documenting the changes and analyzing their causes);
- there is no transfer of knowledge (standardization of PM by types of projects);
- insufficiently complete set of indicators for assessing the quality of projects;
- there are no periodic status reports on a pre-approved form, and some other forms of the reporting system;
- the interaction between participants of the PM process is not systemic, but “on request”;

- there is a lack of detailed planning (decomposition of tasks and plans for work and those responsible) leads to the emergence of zones of irresponsibility and timeliness due to inconsistencies.

From the point of view of managing the project timeframe, there are few tools and measuring analytics in KE – the company’s calendar and network planning has not been delivered and the above indicators for measuring the time frames for performing work on projects are not calculated and not controlled. In the group of planning processes, the processes of developing the schedule and planning communications are often ignored.

In addition, one of the features of small open economies is the dependence on the exchange rate of the currency. One of the problems of financing projects is the exchange rate difference. Prices that are approved in the budget may rise over the period due to exchange rate differences.

Based on the analysis performed, the following recommendations can be made:

- to introduce project management processes according to PM standards;
- to select a working group to monitor these changes in the company;
- to purchase server hardware and software;
- to increase the number of hours of training in basic project management skills and the use of Microsoft-based software tools for project management;
- to manage the cost of projects (budgets and financial indicators), as well as terms and resources (and not only financial, but also material and labor);
- to write manuals and user instructions on the processes of PM;
- to implement an information system for centralized management of projects and programs on the service model of informatization;

- to create the created project office with the rights and powers for the effective implementation of the project management system;
- to standardize templates for periodic project status reports;
- in the process of dismissal and reception of employees, to take into account appointments/reassignments in approved projects of the company;
- to ensure the full involvement of the highest level (TOP) for the control of PM processes;
- to manage the timing of the work detailed and solve the problem of blurring the timing arising from the use of road maps in planning projects.

a different understanding of the terms “project” and “project management” by company employees and bring it to a common understanding by reflecting the terms in instructions, training materials and conducting training for participants.

It is necessary to indicate in the teaching materials the scope of MS Project, i.e. list the criteria the project must meet for applying this tool. Using these characteristics of projects, each employee of the organization could determine the compliance of a project for use in the PMS.

It is recommended to create a check-list (instruction) of the characteristic features of the project. For example, such signs of projects can be: the project is over 30 days long (the number is indicated for example and should be discussed); the project uses the resources of more than two workers in a joint parallel or sequential work to create one unique result, etc.

When implementing a project management system (PMS), it is necessary to take into account

CONCLUSION, LIMITATIONS AND FUTURE RESEARCH

In conclusion, the following findings can be drawn about the features that should be taken into account when implementing project management in the defense industry of Kazakhstan:

- the enterprises of the defense industry have the features of industrial enterprises and no specific features are separating them, except production of specific and dual use products;
- the strongest sides in terms of the frequency of implementation of certain processes in the implementation of projects at the enterprises of KE, as well as in the industry as a whole, according to employees, are the development of a plan project management (with a reservation of understanding of this term within the framework of the general PM methodology), defining a budget and estimating;
- in relation to such processes as “Collecting Requirements for the Project”, “Creating a Hierarchical Work Structure”, “Defining the List of Operations”, “Quality Planning”, “Distribution of Roles and Responsibilities” and “Procurement Planning” among KE enterprises, the indicators are lower than in the industry as a whole, there are no advantages of answers about the ongoing implementation of these processes;
- it is worth paying attention to such processes as determining the sequence of operations, developing a human resource management plan and planning communications due to the ambiguity of the distribution of response options (almost equal number of responses to opposite options);
- one of the weaknesses is the development of a schedule – this process scored most of all the answers “this process was never carried out by me” (moreover, 4 out of 5 noted options in the industry belong to the employees of KE);

- when considering the ratings of the frequency of application of processes in the planning of projects in the context of the various roles of employees, it was revealed that the lowest marks for most of the processes were noted by project managers;
- the weaknesses in terms of the support provided for the implementation of projects by the enterprise include such areas as the availability of standard project management software in the organization (MS Project, etc.), the organization of permanent trainings on project management and the use of new tools and equipment by the organization project management methods, and to the strengths – the storage of project information, the availability of an adapted organization structure to support the project and the organization's involvement risk management (in this issue, ratings of both across the industry and the group of KE companies are the same);
- according to estimates of the degree of support in the context of the various roles of participation in the project, it was revealed that a significant part of the areas was rated by the lowest project coordinators, and most of the highest marks were given by the project managers;
- the degree of accessibility of information on exceeding the budget and terms of projects is estimated at an average of 3.8 and 3.85 points out of 5, respectively, which is lower than the overall figures for the industry – there is a reserve for development in this direction and achieving results close to the “5” – availability of information in real time;
- the level of achievement of project results and the level of customer satisfaction according to respondents' estimates is at the level of 8 points, which is at the level of the average rating for the industry;
- taking into account the results of the analysis of answers on various issues and areas, it can be said that the strength of the project management at KE is budget management, and the weakness is timing management (calendar component);
- changes to the original project plan when changing the forecast deadlines for completion and the project budget take place when projects are implemented, which in principle is normal practice when the project results are focused on the wishes and ultimate customer satisfaction.

The research was aimed at revealing problems of companies in defense industry in the introduction of project management approach. Further investigations can be done for developing techniques for project selection, the ways of implementing project management approach, and so on.

ACKNOWLEDGEMENT

This work was funded in part by the Ministry of Education and Science of the Republic of Kazakhstan grant AP05134488.

REFERENCES

1. Artto, K., Kulvik, I., Poskela, J., & Turkulainen, V. (2011). The integrative role of the project management office in the front end of innovation. *International Journal of Project Management*, 29(4), 408-421. <https://doi.org/10.1016/j.ijproman.2011.01.008>
2. Bevilacqua, M., Ciarapica, F. E., & Giacchetta, G. (2007). Development of a sustainable product lifecycle in manufacturing firms: A case study. *International Journal of Production Research*, 45(18-19), 4073-4098. <https://doi.org/10.1080/00207540701439941>
3. Bredillet, C., Tywoniak, S., & Tootoonchy, M. (2018). Exploring the dynamics of project management office and portfolio management co-evolution: A routine lens. *International Journal of Project Management*, 36(1), 27-42.

- <https://doi.org/10.1016/j.ijproman.2017.04.017>
4. Cantwell, P. R., Sarkani, S., & Mazzuchi, T. (2012). The effect of using a systems approach to project control within the U.S. defense industry. In *Proceedings of the 2012 IEEE International Systems Conference SysCon 2012, Vancouver, BC, Canada* (pp. 646-650). <https://doi.org/10.1109/SysCon.2012.6189454>
 5. Chang, A., Chih, Y.-Y., Chew, E., & Pisarski, A. (2013). Reconceptualising mega project success in Australian Defence: Recognising the importance of value co-creation. *International Journal of Project Management*, 31(8), 1139-1153. <https://doi.org/10.1016/j.ijproman.2012.12.005>
 6. Cooke-Davies, T. J., & Arzymanow, A. (2003). The maturity of project management in different industries: An investigation into variations between project management models. *International Journal of Project Management*, 21, 471-478. [https://doi.org/10.1016/S0263-7863\(02\)00084-4](https://doi.org/10.1016/S0263-7863(02)00084-4)
 7. Defence Engineering Group (DSE). (2002). *The Defence Systems Engineering (DSE) handbook*. London: University College London.
 8. Dvir, D., Raz, T., & Shenhar, A. J. (2003). An empirical analysis of the relationship between project planning and project success. *International Journal of Project Management*, 21(2), 89-95. [https://doi.org/10.1016/S0263-7863\(02\)00012-1](https://doi.org/10.1016/S0263-7863(02)00012-1)
 9. Geraldi, J. G., Liz, L.-K., & Elmar, K. (2010). The Titanic Sunk, So What? Project Manager Response to Unexpected Events. *International Journal of Project Management*, 28(6), 547-58. <https://doi.org/10.1016/j.ijproman.2009.10.008>
 10. He, W., Ming, X. G., Ni, Q. F., Lu, W. F., & Lee, B. H. (2006). A unified product structure management for enterprise business process integration throughout the product lifecycle. *International Journal of Production Research*, 44(9), 1757-1776. <https://doi.org/10.1080/00207540500445453>
 11. Hill, G. M. (2014). *The Complete Project Management Office Handbook, third edition*. Boca Raton: CRC Press.
 12. Hobbs, B., & Aubry, M. (2010). *The Project Management Office (PMO): a Quest for Understanding*. Pennsylvania: PMI.
 13. Hodgson, D. (2002). Disciplining the professional: The case of project management. *Journal of Management Studies*, 39(6), 803-821. <https://doi.org/10.1111/1467-6486.00312>
 14. Jayaraman, K., Haron, H., Yee, Y. L., & Shruthi, R. (2015). Reasons for the failure of web-based application of information technology projects: An empirical study in Malaysia. *Problems and Perspectives in Management*, 13(2), 277-287. Retrieved from <https://businessperspectives.org/component/zoo/reasons-for-the-failure-of-web-based-application-information-technology-projects-an-empirical-study-in-malaysia>
 15. Joslin, R., & Muller, R. (2015). Relationships between a Project Management Methodology and Project Success in Different Project Governance Contexts. *International Journal of Project Management*, 33(6), 1377-92. <https://doi.org/10.1016/j.ijproman.2015.03.005>
 16. Lundin, R. A., & Söderholm, A. (1995). A theory of the temporary organization. *Scandinavian Journal of Management*, 11(4), 437-455. [https://doi.org/10.1016/0956-5221\(95\)00036-U](https://doi.org/10.1016/0956-5221(95)00036-U)
 17. Milewski, S. K., Fernandes, K. J., & Mount, M. P. (2015) Exploring technological process innovation from a lifecycle perspective. *International Journal of Operations & Production Management*, 35(9), 1312-1331. <https://doi.org/10.1108/IJOPM-02-2015-0105>
 18. Obradović, V., Todorović, M., & Bushuyev, S. (2018). Sustainability and agility in project management: Contradictory or complementary? (pp. 160-164). Paper presented at the 2018 IEEE 13th International Scientific and Technical Conference on Computer Sciences and Information Technologies, CSIT 2018. <https://doi.org/10.1109/STC-CSIT.2018.8526666>
 19. Paton, S., & Andrew, B. (2019). The role of the Project Management Office (PMO) in product lifecycle management: A case study in the defence industry. *International Journal of Production Economics*, 208, 43-52. <https://doi.org/10.1016/j.ijpe.2018.11.002>
 20. Philbin, S. P. (2018). PMO implementation for project management in a collaborative research context (pp. 681-690). Paper presented at the 39th International Annual Conference of the American Society for Engineering Management, ASEM 2018: Bridging the Gap between Engineering and Business.
 21. Project Management Institute (PMI). (2017). *A guide to the project management body of knowledge (PMBOK guide)*. Newtown Square: Project Management Institute.
 22. Puthamont, G. Capt. S., & Charoenngam, C. (2007). Strategic project selection in public sector: Construction projects of the Ministry of Defence in Thailand. *International Journal of Project Management*, 25(2), 178-188. <https://doi.org/10.1016/j.ijproman.2006.05.001>
 23. Rodríguez-Segura, E., Ortiz-Marcos, I., Romero, J. J., & Tafur-Segura, J. (2016). Critical success factors in large projects in the aerospace and defense sectors. *Journal of Business Research*, 69(11), 5419-5425. <https://doi.org/10.1016/j.jbusres.2016.04.148>
 24. Sadeh, A., Dvir, D., & Shenhar, A. J. (2010). Defense vs. civilian projects: The effect of project type on performance. In *Proceedings of the PICMET'10 - Portland International Center for Management of Engineering and Technology, Phuket, Thailand* (pp. 2724-2733).
 25. Tulembayev, A. N., Jumadilova, Sh. G., Adilova, A. M., & Shildibekov, Y. Z. (2018). Project management at the enterprises of the defense industry. *AUPET Herald*, 3(42), 133-139. Retrieved from https://aues.kz/magazine/18_3.pdf
 26. Tuzcu, A., & Esatoğlu, N. (2011). Factors of success in information

- technologies projects: Evidence from capital of Turkey, Ankara. *Problems and Perspectives in Management*, 9(2), 71-79. Retrieved from <https://businessperspectives.org/component/zoo/factors-of-success-in-information-technologies-projects-evidence-from-capital-of-turkey-ankara>
27. Warren, A. M. (2014). Critical Success Factors for IT Project Management: A Case Study of a UK MOD IT Project. In *Proceedings of the 13th European Conference on Research Methodology for Business and Management (ECRM 2014)* (pp. 425-432). Reading: Academic Conferences Ltd.
28. Weathington, A. A., & Youngblood, A. D. (2005). Performance measurement in a department of defense research and development organization. In *Proceedings of the 26th Annual National Conference of the American Society for Engineering Management*. Virginia Beach, VA, United States (pp. 122-126).
29. Whittington, R., Pettigrew, A., Peck, S., Fenton, E., & Conyon, M. (1999). Change and complementarities in the new competitive landscape: A European panel study, 1992–1996. *Organization Science*, 10(5), 583-600. <https://doi.org/10.1287/orsc.10.5.583>
30. Xiao, Y., Liu, J., & Pang, Y. (2019). Development of a competency model for real-estate project managers: Case study of china. *International Journal of Construction Management*, 19(4), 317-328. <https://doi.org/10.1080/15623599.2018.1435237>
31. Yunofri, & Kurniawan, N. B. (2019). A systematic literature review and meta-analysis on project management platform (pp. 82-86). Paper presented at the *2018 International Conference on Information Technology Systems and Innovation (ICITSI)*. Bandung – Padang, Indonesia. <https://doi.org/10.1109/ICITSI.2018.8695958>