

УДК 338

JEL: M12, O15

DOI 10.24147/1812-3988.2019.17(4).77-83

KNOWLEDGE MANAGEMENT IN AGILE TEAMS OF FLEXIBLE ENTERPRISE PROJECTS

S.N. Apenko, M.A. Romanenko

Dostoevsky Omsk State University (Omsk, Russia)

Article info

Received

October 1, 2019

Accepted

November 11, 2019

Type paper

Research paper

Abstract. This article presents the results of the research on the grant of the Russian Foundation for Basic Research on the topic "Methodology of evaluation and formation of green (sustainable) project management in the regions of Russia (on the example of the Omsk region)". The purpose was to study the features of knowledge management in flexible projects and to offer a specific technology of knowledge management, which would allow achieving success of a flexible project in social indicators of sustainable development, research issues and how they are logically filed, what is presented. The actual problem is, on the one hand, the lack of development in the practice of knowledge management in flexible sustainable projects using agile technologies, on the other hand, the high need to adapt to the conditions of flexibility of knowledge management technology in projects. Our research question is as follows: "what should the technology of knowledge management look like taking into account the modern practice of managing flexible sustainable projects?" The answer to this question was obtained by means of a study using the method of expert assessments at 26 enterprises of Russia. The result was the technology of knowledge management developed by us in agile teams of flexible projects of the enterprise. A feature and novelty of the proposed technology is the repeated cycle of information sources refinement, information diagnostics and its transformation into knowledge, systematization and evaluation of the project knowledge quality. Our dedicated cycle takes place in each iteration of the project work according to the agile concept of project management. The relevance of this technology and the willingness to use it are confirmed by a survey of 54 experts at 26 enterprises of one of the regions of Russia.

Keywords

Projects, knowledge management, project teams, flexible technologies, project sustainability

Acknowledgements. The study was carried out with the financial support of RFBR in the framework of scientific project No. 18-010-01140.

УПРАВЛЕНИЕ ЗНАНИЯМИ В AGILE-КОМАНДАХ ГИБКИХ ПРОЕКТОВ ПРЕДПРИЯТИЯ

С.Н. Апенько, М.А. Романенко

Омский государственный университет им. Ф.М. Достоевского (Омск, Россия)

Информация о статье

Дата поступления

1 октября 2019 г.

Дата принятия в печать

11 ноября 2019 г.

Тип статьи

Исследовательская статья

Ключевые слова

Проекты, управление знаниями, команды проектов, гибкие технологии, устойчивость проектов

Аннотация. Изучаются особенности управления знаниями в гибких проектах и предлагается конкретная технология управления знаниями, которая позволяет добиться успеха гибкого проекта в социальных показателях устойчивого развития. Актуальность исследования определяется недостаточным развитием практики управления знаниями в гибких устойчивых проектах с использованием гибких технологий и высокой необходимостью адаптации к условиям гибкости технологии управления знаниями в проектах. В результате исследования с использованием метода экспертных оценок на 26 предприятиях России разработана технология управления знаниями в agile-командах гибких проектов предприятия, особенностью и новизной которой является повторяющийся цикл уточнения источников информации, диагностики информации и ее преобразования в знания, систематизации и оценки качества знаний проекта. Специальный цикл проходит в каждой итерации проектной работы в соответствии с гибкой концепцией управления проектами. Актуальность данной технологии и готовность к ее использованию подтверждены опросом 54 экспертов на 26 предприятиях России. Исследование выполнено по гранту Российского фонда фундаментальных исследований на тему «Методология оценки и формирования зеленого (устойчивого) управления проектами в регионах России (на примере Омской области)».

Исследование выполнено при финансовой поддержке РФФИ в рамках научного проекта № 18-010-01140.

1. Introduction. Currently, a project form of organizational activity is developing intensively all over the world and project management acquires the status of professional work with a certain set of specialized tools. These tools include knowledge management in the form of a set of technologies and methods of diagnosis, accumulation, analysis, storage and use of useful information for current and future projects. Knowledge management is especially important for projects implemented with a flexible methodology. The relevance of knowledge management for flexible projects stems from the fundamental principles of the flexibility concept, associated with the emphasis on people as knowledge holders, their interaction, their experience of teamwork in the project, learning lessons from the project stages, taking into account the needs of all stakeholders of the project.

Additional relevance of our research is attached to the fact that the technology of knowledge management makes the project sustainable, allows increasing its success and achieving social indicators within the concept of sustainable development.

However, as world practice shows, only 6% of projects are recognized as fully successful. Our research at the enterprises of Russia, which will be discussed in this work, showed that only 23% of enterprises use a diverse set of professional methods and techniques of project management, 19% of enterprises are trying to implement in their projects a knowledge management system. The situation is slightly better in companies of the IT-sector. Here, 36% of organizations use some methods of knowledge management, but these indicators are low. In general, most enterprises use only some methods of project management and fragments of knowledge management. In addition, almost all the experts of the organizations studied acknowledged the lack of readiness of flexible projects teams' staff to participate in knowledge management. Project managers say that the lack of effective knowledge management practices in projects is one of the significant factors affecting the success of projects. Leading companies in project management recognize that building of knowledge management technology significantly increases the chances for success, especially in flexible projects. Therefore, our research is related to the urgent problem of the need to organize knowledge management in companies for the growth of the percentage of successful flexible projects.

2. Theoretical basis. The issues of flexible project management technologies have been in the focus of researchers' attention in recent years. With regard to project management, flexible methodologies in the management of it projects, software development projects have been developed. To the works that laid the foundations of flexible project management or popularize them, we can refer to the publications of Rasmussen J., Wolfson B.I., Cohn M., Martin Robert C., Newkirk J.V., Koss R.S. [1–4] In these works highlighted the project flexibility parameters, such as: a high degree of project management system adaptation to changing environmental factors, the adjustment of the project parameters (timing, quality, cost, and other) under evolving product customer of the project, the implementation of the project in the form of short iterations of work, after which there is a process of testing and approval of manufactured product with the customer, systematically ascertaining the project implementation quality. Projects that meet these and other parameters are referred to flexible.

As a result, flexible project management requires flexible teams. In the publications can be found some comment about human resources of flexible projects. But at the moment there is no reflection of the flexible team essence. Therefore, we present our author's interpretation of agile teams, which we propose to understand the totality of the performers and managers of the project flexible working in terms of multitasking, the increased dynamism of the environment factors, the need to concentrate many of project roles and project functions in one, creating a product of the project with short iterations and systematic discussion of project work progress and produce the product with all stakeholders.

Knowledge management is recognized by practice and scientific direction of organizational management. The concept of knowledge management emerged in the 1990s. It considers knowledge management as a global structuring of information and knowledge in the organization. For example, in 1994 Davenport T. proposed to consider knowledge management as a process of formation, dissemination and effective use of knowledge [5]. In 1998, Duhon B. proposed to formulate the definition of knowledge management as "...a discipline that promotes an integrated approach to identifying, capturing, evaluating, retrieving, and sharing all of an enterprise's information assets. These assets may include da-

tabases, documents, policies, procedures, and previously uncaptured expertise and experience in individual workers.” [6, p. 102]

Vlasov A.I., Lytkin S.L. in the work “A brief practical guide for the developer of information systems based on Oracle DBMS” gave the definition of “knowledge” as “a combination of experience, values, contextual information, expert assessments, which sets the general framework for the evaluation and incorporation of new experience and information”. [7, p. 25]

Our research is devoted to knowledge management in projects as a separate functional area of project management. Many authors point to the importance of knowledge management in projects, for example, Larson E., Gray C., Meredith J., Mantel Jr.S., Polkovnikov A.V., Razu M., and others. [8–11] Most often, knowledge management in projects is understood as the accumulation and subsequent use of knowledge on projects, programs and project portfolios in the form of sets of knowledge, standards, project documentation and expert opinions and so on.

Knowledge in project management is understood to be different in content components. For example, a team of researchers, including Diaz Anadon L., Matus K., Moon S., include knowledge to technology. They say that “technology is seen as knowing how to accomplish certain human goals in a certain and reproducible way.” Therefore, the knowledge management technology we propose further can be considered as an element of corporate knowledge in itself. [12]

Our research focuses on sustainable projects, that is, contributing to the maintenance of sustainable development policies. Issues related to the transition of projects to sustainable development have been actively discussed recently. For example, scientists say that technological innovations that are implemented in projects do not always provide sustainability, therefore, the urgent task is to find solutions on how to make technological innovations more sustainable in projects. In this way, scientists see improved functioning of the “global innovation system”, in particular, its fairness to “meet the needs of the poorest, most vulnerable or marginalized segments of the population in the present and future generations.”

Develop the idea of a more effective policy implementation sustainability technological innovation scientists Stock T., Obenaus M., Slaymaker A., Seliger G. They write that “targeted development of new sustainable innovations is

one of the key activities to ensure sustainable industrial growth”. In response to practice requests, scientists propose a model for the development of sustainable innovation, which focuses on the generation of ideas at an early stage of the innovation process, focusing on indicators of sustainability and innovation. The ideas of these authors are in good agreement with flexible projects, as these projects are able to take into account the sustainability indicators at the early stages of generating ideas for an innovative product. For our research, the principle of iterating over the creation of a new product in the project is important, which we will take as a basis for the development of knowledge management technology. So, scientists Stock T., Obenaus M., Slaymaker A., Seliger G. say that the process steps in their proposed model of sustainable innovation development, “should not be considered as a rigid sequence, but rather should be considered as an iterative process to the idea of solution. This concept is based on the assumption that a human-generated process can be ideally obtained in such an iterative way, as it follows the natural behavior of a human being in solving problems. The iterative approach also provides a possible reorientation of the solution search process and allows ex post to integrate new relevant aspects”. [13, p. 132]

Our research is also interested in developments on the relationship between the human situation in the enterprise and the requirements of sustainable development. We give an example of study by Larsson L. and Larsson J. In their work, they say that from the standpoint of sustainability “human development is something much more than the growth or decline of national income. It is about creating an environment in which people can reach their full potential and lead a productive, creative life in accordance with their needs and interests”. [14, p. 14]

Flexible teams, which we will talk about further, create such conditions for the disclosure of the potential of team members. The mentioned authors propose two approaches for analysis: the first concerns the sustainability of the labor activities associated with the technological choice; the second discusses the development of labor activity with purpose of introducing an enabling technology for sustainable development. Our research is consistent with the first approach, as knowledge management is a technology that contributes to the social dimension of sustainable development.

To clarify the object of our study, it is important to divide the projects into different types. For example, the division into two types of projects proposed by Larsson L. and Larsson J. is of interest. They say that for “innovation can arise as a result of solving exploitative problems in business projects, and as a result of research projects in specific organizations, followed by implementation in inter-organizational business projects” [14, p. 23]. That is, business projects and research projects are highlighted. Our research will be more focused on research projects, as the need for flexible teams is higher in research projects.

In addition, Larsson L. and Larsson J. conducted a study on the method of case study and showed the character of influence on the success of innovative projects such factors as the flexibility of the process, the commitment of senior management, roles of key individuals, internal and external cooperation, customer orientation [14]. For our study it is important to recognize the flexibility of the processes that support cooperation as success factors in innovative projects. The knowledge management technology offered by us further supports the flexibility and collaboration of stakeholders in the project.

Therefore, there are studies that provide answers to questions about what is knowledge management in projects and why knowledge management is necessary in projects. The answer to the question on how to manage knowledge in agile projects is presented in fragmented way. Therefore, it remains unclear what to do exactly, managing knowledge in flexible projects. There are also studies on the sustainability of innovative projects, in which different aspects of sustainability are studied. But the flexibility of the team and its use of knowledge management technology to ensure social sustainability have not yet been addressed by scientists.

3. The formulation of the research question. Our research question follows: “What should the technology of knowledge management look like taking into account the modern practice of flexible sustainable project management?” We hypothesize that the technology of knowledge management in flexible projects should be different from the technology in conventional projects and non-project activities. Understanding the technology allows to implement knowledge management more efficiently. And the introduction of technology will contribute to the achievement of social indicators of sustainability. Therefore, the

purpose of our research is to develop a technology of knowledge management taking into account the generalization of best practices in this field and expert assessments. Knowledge management should cover the whole enterprise, but we put in the spotlight is a flexible project team and knowledge management in this team focused on sustainability indicators.

3.1. Method of research. Methods of data collection were: analysis of documents on the project activities of enterprises and expert assessment of the state of knowledge management in flexible projects. The study using these methods was carried out at 26 enterprises of Russia typical from the point of project management development. The selection of enterprises is based on the following criteria:

- availability of project activities at the enterprise;
- availability of at least some elements of knowledge management at the enterprise;
- use of flexible project management technologies at the enterprise;
- the need to cover the study of different enterprises: by size, industry, field of activity.

Have been investigated:

1. 38% of large enterprises, 35% of medium enterprises and 27% of small enterprises;
2. 15% of petrochemical enterprises, 27% of machine-building enterprises, 31% of enterprises in the IT-field, 15% of the construction industry; 12% of the enterprise of the trade industry.
3. all 100% of enterprises implement projects, have a project management system, implement sustainable development policies and to varying degrees are engaged in knowledge management.

The sample consists of 54 experts of these enterprises, who are experienced project managers. Their experience in project activities was not less than five years, including experience in managing flexible projects for at least two years. We emphasize that the enterprises participating in the study are leaders in flexible project management, they demonstrate the best experience that allows us to develop recommendations for those who want to improve their knowledge management in flexible projects.

3.2. The results of the study and the rationale for their novelty. When listing facts use either the style tag List signs or the style tag List numbers.

To substantiate the technology of knowledge management, we asked experts: “What is the dif-

ference between knowledge management in flexible projects and knowledge management in conventional projects?”

The differences are as follows:

1. knowledge is updated faster, they are more diverse, can often be contradictory, due to the increased dynamics of the factors of the project environment. This feature was confirmed by 89% of experts;

2. the knowledge management cycle is shorter and repetitive due to multiple iterations of product development and a return to the periods of diagnosis and knowledge accumulation. This feature is indicated by 70% of experts.

3. knowledge holders are not only project documents or project databases but the members of the project team, various stakeholders, whose knowledge often takes a hidden form. This feature was confirmed by 81% of experts.

It was also asked whether knowledge management was a technology that could contribute

to sustainable development. The majority of experts (85%) gave an affirmative answer.

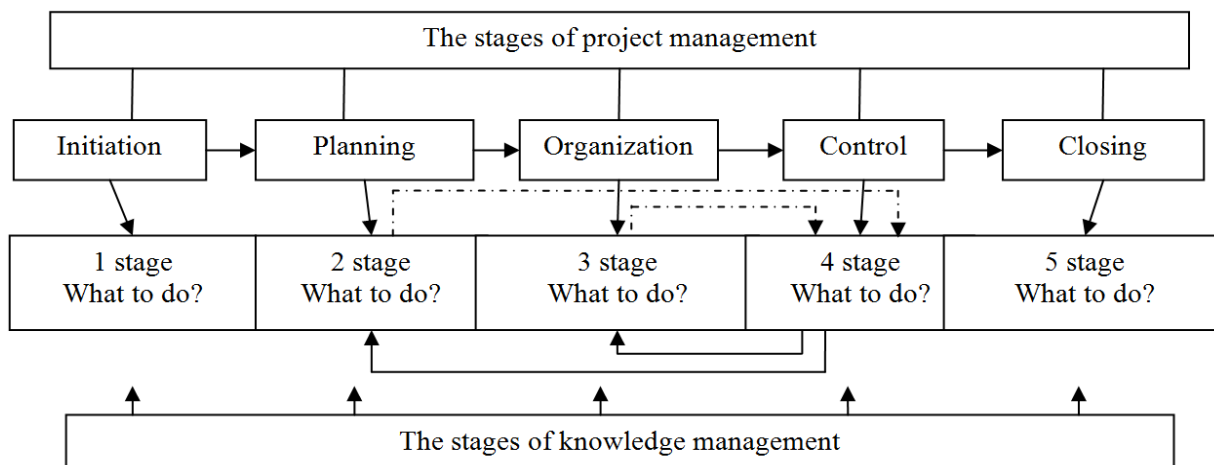
In particular, according to experts, knowledge management technology will achieve the following sustainability indicators:

– development of cooperation and partnership of participants and stakeholders of flexible projects (96% of experts pointed to this figure);

– equal access to training of different participants of project flexible teams (89% of experts named this indicator);

– availability of relevant information to all stakeholders (59% of experts noted the indicator).

Taking into account the peculiarities of knowledge in flexible projects, as well as the practice of advanced enterprises, we have compiled a knowledge management technology, which includes a list of sequential actions at different stages of flexible sustainable project management, as well as a description of the subjects of these actions (Fig.).



Knowledge management technology in Agile teams of flexible projects of the enterprise

The peculiarity and novelty of this technology supports the iterative cycle of further sources of information, diagnosis of information, and its transformation into knowledge, systematization and evaluation of the knowledge quality of sustainable project. Our dedicated cycle takes place during each iteration of the project work according to the Agile concept of project management.

For flexible sustainable projects can be used different diagnostic, knowledge storage and transfer tools. Moreover, flexible teams should use the same flexible methods of working with knowledge. For example, quite successfully enterprises use “cloud” software for project and program management in the situation of remote communi-

cation. This tool was named as useful by 87% of the experts we interviewed. Project teams can structure their documents and build remote project communication, as well as capture all their knowledge using a browser or mobile device.

However, even more adequate to the specifics of the flexible team is a set of methods of team direct interaction. The peculiarity of the information about the flexible sustainable project is that its significant part is owned by individual members of the project team. And the information in the head of the team members is often not structured, not identified and has not taken the form of knowledge. Therefore, the necessary special tools for the diagnosis of information and

transformation into knowledge. Such tools, for example, are scam meetings, sessions on retrospective analysis. These practices were named as actively used 57% of experts of the enterprises.

Often in the description of these methods are showing examples of visualization of knowledge information, for example, Kanban boards (visual boards). These visualization techniques help to track current knowledge and transform it into team knowledge. But it is also possible to combine methods of group development of knowledge on the project and information technologies of their storage and distribution.

We give examples of the benefits obtained in the course of cooperation within a flexible team, showing how the results of group work are converted into knowledge in the "cloud" software products:

- project questions, answers and brainstorming are integrated in one place as part of the team's natural workflow;

- while working with a flexible team, documents are created and processed through the cloud.

- all materials of project meetings, project progress analysis during implementation and after project completion are stored in the cloud and available for search.

Another specific feature of flexible teams is their constant interaction with many different stakeholders, for example, with the customer of the product, with contractors, with potential consumers of the product. For example, contractors who have important roles in a team become the most valuable because they have very important

information/knowledge. It is necessary to identify and preserve this knowledge until the project is completed and the contractors leave the project. In order to avoid knowledge leakage, it is recommended to use simple project management platforms with such social tools as news feed and discussions. When these technologies are integrated into the workflow, knowledge is extracted and captured in the cloud. In other words, the contractor is engaged in the management of knowledge, not knowing about it.

4. Summary. Knowledge management in projects is often considered as a very complex area of activity, as a consequence of this, many practices are afraid to turn to knowledge management tools, losing possible benefits. We argue that the time has come when knowledge management, especially in agile and sustainable projects, becomes a necessity. This requires the development of knowledge management technologies, the involvement of suitable methods and techniques for specific conditions and the training of a flexible team. Our research is devoted to solving these urgent problems. The introduction of the proposed technology will allow achieving social indicators of sustainable growth. Although we offer knowledge management technology, it should be said that effective knowledge management cannot be achieved by blindly following any standards for the implementation of processes, techniques and tools. Moreover, each organization and project team in particular should identify and discuss the processes and methods used, develop and implement improvements that may be unique within the framework of ongoing project work.

References

1. Cohn M. *Scrum: agile software development. Succeeding with Agile: Software Development Using Scrum*, Addison-Wesley Signature Series, Moscow, Williams publ., 2011, 504 p. (in Russian).
2. Davenport T.H. *Managing knowledge*, Cambridge, MA, Harvard Business School Press, 1994, 241 p.
3. Duhon B. It's all in our heads. *Inform*, 1998, Vol. 12, no. 8, pp. 8-13.
4. Larson E. *Project Management*, ed. by E.W. Larson, C.F. Gray, Moscow, Delo i Servis publ., 2013, 347 p. (in Russian).
5. Martin R.C., Newkirk J.V., Koss R.S. *The rapid development of programs. Principles, examples, practice = Agile software development. Principles, Patterns, and Practices*, Williams publ., 2004, 241 p.
6. Meredith J., Mantel Jr. S. *Project Management*, 8th ed., St. Petersburg, Piter publ., 2014, 437 p. (in Russian).
7. Polkovnikov A.V. *Upravlenie proektami [Project Management]*, Full MBA course, Moscow, Olimp-Biznes publ., 2015, 552 p. (in Russian).
8. Rasmuson G. *Flexible management of IT-projects: a guide for real samurai*, St. Petersburg, Piter publ., 2012, 321 p. (in Russian).

9. Razu M. *Upravlenie proektami. Osnovy upravleniya proektami [Project Management. The Basics of Project Management]*, Moscow, KnoRus publ., 2011, 766 p. (in Russian).
10. Vlasov A.I., Lytkin S.L. *Kratkoe prakticheskoe rukovodstvo dlya razrabotchika informatsionnykh sistem na baze SUBD Oracle [A brief practical guide for the developer of information systems based on Oracle DBMS]*, Moscow, Mashinostroenie publ., 2000, 120 p. (in Russian).
11. Wolfson B.I. *Agile Project Management and Products*, St. Petersburg, Piter publ., 2015, 312 p. (in Russian).
12. Stock T., Obenaus M., Slaymaker A., Seliger G. A Model for the Development of Sustainable Innovations for the Early Phase of the Innovation Process. *Procedia Manufacturing*, 2017, Vol. 8, pp. 215-222. DOI: 10.1016/j.promfg.2017.02.027.
13. Diaz Anadon L., Matus K., Moon S. *Innovation and Access to Technologies for Sustainable Development*, 2012, available at: <https://www.hks.harvard.edu/centers/mrcbg/programs/sustsci/activities/program-initiatives/innovation/projects/innovation-and-access-to-technologies-for-sustainable-development>.
14. Larsson L., Larsson J. Sustainable Development in Project-Based Industries—Supporting the Realization of Explorative Innovation. *Sustainability*, 2018, Vol. 10, iss. 3, art. 683. DOI: 10.3390/su10030683.

About the authors

Апенко Светлана Николаевна – Doctor of Economic Sciences, Professor, Head of the Department of Innovation and Project Management
Postal address: 55, Mira pr., Omsk, 644077, Russia
E-mail: apenkosn@yandex.ru
RSCI AuthorID: 261581
ORCID: 0000-0002-7618-3961

Сведения об авторах

Апенько Светлана Николаевна – д-р экон. наук, профессор, зав. кафедрой инновационного и проектного управления
Адрес для корреспонденции: 644077, Россия, Омск, пр. Мира, 55
E-mail: apenkosn@yandex.ru
РИНЦ AuthorID: 261581
ORCID: 0000-0002-7618-3961

Mikhail A. Romanenko – PhD in Legal Sciences, Doctoral Student
Postal address: 55a, Mira pr., Omsk, 644077, Russia
E-mail: mihail.romanenko@gmail.com
RSCI SPIN-code: 6483-3092, AuthorID: 1048895

Романенко Михаил Алексеевич – канд. юрид. наук, докторант
Адрес для корреспонденции: 644077, Россия, Омск, пр. Мира, 55а
E-mail: mihail.romanenko@gmail.com
РИНЦ SPIN-код: 6483-3092, AuthorID: 1048895

For citations

Апенко С.Н., Романенко М.А. Knowledge management in agile teams of flexible enterprise projects. *Herald of Omsk University. Series "Economics"*, 2019, Vol. 17, no. 4, pp. 77-83. DOI: 10.24147/1812-3988.2019.17(4).77-83.

Для цитирования

Апенько С. Н., Романенко М. А. Управление знаниями в agile-командах гибких проектов предприятия // Вестн. Ом. ун-та. Сер. «Экономика». – 2019. – Т. 17, № 4. – С. 77–83. – DOI: 10.24147/1812-3988.2019.17(4).77-83. – (На англ. яз.).