

## EDUCATIONAL MODEL TO INCREASE KNOWLEDGE OF AGILITY IN METAL INDUSTRIAL COMPANIES FOR PROJECT PORTFOLIO MANAGEMENT

<sup>1</sup>Pavel KOLOŠ, <sup>2</sup>Adam PAWLICZEK, <sup>3</sup>Štefan KOLUMBER

<sup>1</sup>*Moravian Business College Olomouc, Olomouc, Czech Republic, EU,*  
[pavel.kolos@mvso.cz](mailto:pavel.kolos@mvso.cz), [adam.pawliczek@mvso.cz](mailto:adam.pawliczek@mvso.cz), [Stefan.kolumber@mvso.cz](mailto:Stefan.kolumber@mvso.cz)

<https://doi.org/10.37904/metal.2023.4674>

### Abstract

The aim of the paper is to present educational model for increasing agility of metal industrial companies. Education and development of knowledge of agile principles is a key element and prerequisite for successful implementation of agile principles in project portfolio management. For that reason, an education model is presented in this paper, and it reflects the results of a survey from 2022 of the knowledge and application of agile principles in metal industrial companies worldwide. The educational model was verified within expert verification method and the results are summarized in the final part of the paper.

**Keywords:** Agility, portfolio, management, industry, education

### 1. INTRODUCTION

The main motivation for research on the topic of agile management in connection with the management of an industrial company's project portfolio is the ever-increasing importance and contribution of agile elements to project portfolio management about the competitiveness, strategy, and strategic goals of an industrial company [1].

Agility [2] in general is linked to application in project management, especially with a focus on information technology. Agile methodologies and principles have their roots in IT and software development. However, their contribution is gradually becoming apparent in many other areas of management. The basis of agile methodologies is a focus on customer satisfaction and their involvement in the process, constant focus on changes during the solution, selection of the right teams and teamwork, transparency of individual elements, processes, and strategy [3].

#### 1.1 Basic principles of agility, agile methods, and tools

According to Rico [4], agility is defined as a concept that focuses on winning and overall success in the competitive environment of the business world. Rico [4] further describes agility as the ability to respond to changes for profit with a quick response to changes in priorities as a response to sudden changes.

The project-oriented definition, on the other hand, describes agility and an agile approach as the optimization of processes and project documentation [5] to bring the highest possible value to the customer compared to the effort expended.

The basics of agile project management can be traced back to the Agile Manifesto in 2001, when software developers came together to discover better ways to develop software. Based on this, the basic values of the agile approach include [6]:

- individuals and interactions over processes and tools,
- working software before comprehensive documentation,
- cooperation with the customer on contract negotiation,

- reaction to change over compliance with the plan.

An integral part of agile methodologies and tools are the 12 basic principles of agility, which are based on the agile manifesto [7]:

- The highest priority is to satisfy the customer through their involvement in development.
- Requests for changes are welcome, even at late stages of development. Agile processes use change to achieve a competitive advantage for the customer.
- Deliver working parts of the product frequently, from an interval of several weeks to several months with the aim of shortening the time interval.
- Developers and the sales department must work together daily throughout the project.
- Motivated individuals must be involved in projects. The conditions and environment for work must correspond to their needs, as well as trust is an integral part of success.
- The most efficient and effective way of transferring information and sharing it is a form of direct communication (so-called face to face).
- Working software/product is the main indicator of development progress.
- Agile processes support sustainable development. Project sponsors, developers and customers should be able to maintain a constant pace of development indefinitely.
- Sustained attention to improving the quality and technical level of application design improves agility.
- Simplicity is important. The bottom line is to minimize the amount of work that doesn't need to be done.
- The best requests and suggestions arise in self-organizing teams.
- The team is constantly working on improving and streamlining its operation. Important input is the ideas of all team members, or the customer at regular intervals.

## 1.2 Project portfolio management

Project portfolio management is a relatively young discipline that, unlike project management, is not used in many companies [8]. While project management is more connected to the tactical level of management, where it is decided whether projects are implemented on time and correctly with regard to the project plan, project portfolio management is linked to strategic goals, i.e. whether the right projects are being worked on, whether investments are being made in the right areas and in the right projects, and whether there are sufficient resources for these projects to implement them [9].

The basic goal of project portfolio management is to determine the optimal portfolio of projects, maximizing its contribution from the point of view of strategic goals while respecting portfolio balance and limited resources [10]. The means for achieving the basic goal of portfolio management is a clearly set rational and transparent process using appropriate management methods and techniques.

The following can be defined as sub-goals of project portfolio management [11].

- effective allocation of human, material and financial resources and, where appropriate, reallocate resources to increase the benefits of the project portfolio,
- securing links between strategic goals and projects that are a means of achieving these goals,
- achieving a balanced portfolio of projects for long-term sustainability of operation,
- maintaining the company's competitive position and increasing competitiveness on the market,
- specifying criteria for evaluating and selecting projects for the portfolio,
- investing in the right projects,
- acquiring and increasing competences and skills for continuous work on increasing the company's competitiveness,
- promoting systemic thinking,
- enforcement of transparency, objectivity and rationality of managerial decision-making processes,

- creating an environment for generating ideas and proposals for new projects while respecting the company's strategy and resource limitations,
- unification of reporting and exchange of information in the management of projects and project portfolios.

## 2. THE METHODOLOGY OF THE PAPER

On the basis of a 2022 in small and medium-sized industrial companies and large industrial companies and its evaluation, it was possible to identify both positives and shortcomings of the current state of project portfolio management, including the knowledge and application of agile principles. The research was performed worldwide and 112 responses have been received. Based on the research results, there is no significant statistical difference observed between small and medium-sized industrial company and large industrial company in the application of agile methodologies and tools based on the implemented tests of the independence of qualitative characteristics, it was possible to evaluate the project portfolio management in industrial companies as a whole.

As part of the research, it was also determined which principles from agile methodologies and tools are used in industrial companies. The use of agile methodologies and tools is used to a very small extent both for the management of projects and programs, as well as for the management of the project portfolio. In general, it can be said that the use of agile methodologies and tools is very similar within small and medium-sized and large industrial companies, and these companies do not use agile principles much. The highest frequency of positive answers was for generally known tools and methodologies such as Kanban, Lean, DMAC, PDCA, which does not necessarily mean knowledge or application of these tools and methodologies in relation to agile project management, but rather knowledge or application of their generally known form.

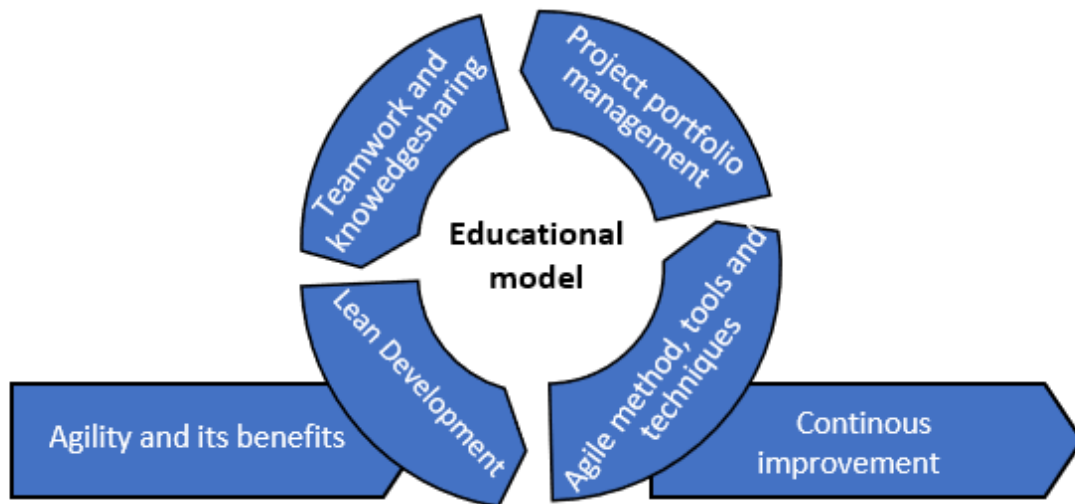
Education and development of knowledge of agile principles is a key element and prerequisite for successful implementation of agile principles in project portfolio management. For that reason, an education model was proposed within this methodology, which reflects the results of a survey of the knowledge and application of agile principles in industrial companies. The educational model has been verified by expert verification method which is presented in chapter 4 of this paper.

## 3. EDUCATIONAL MODEL

As the original research showed, the general level of knowledge of agile methodologies or tools is, with some exceptions, very low. Likewise, the level of application of principles from agile methodologies and tools for managing projects, programs and project portfolios is low, even lower than the general knowledge of these agile principles. For that reason, an important element is the education and development of workers in the field of agility, which is the content of this stage. Quality education and the development of knowledge of agile principles is a key element and prerequisite for the subsequent successful implementation of agile principles in project portfolio management. For that reason, a model of education is proposed (**Figure 1**), which describes in more detail the individual elements of the education of employees of an industrial company. The duration of the second stage can be very individual, depending on the level of knowledge of agile principles, but in general, the duration of this stage can be estimated at 15-20 % of the total implementation time.

In the first step, it is necessary for the widest possible group of employees to become familiar with agility and its general benefits from a company-wide perspective. The next step is the education and training of employees on specific agile methodologies, tools and techniques. Here the aim is to present their meaning, purpose, use, benefits, but also the pitfalls they can bring. An important step is project portfolio management. Here, it is necessary to describe the individual phases of project portfolio management, their meaning and purpose, and point out the possibilities of applying agile principles within project portfolio management with specific recommendations and benefits. Given the nature of agility and agile principles in relation to teamwork and the constant sharing of knowledge and experience, the next step in education is precisely the principles of

teamwork and knowledge sharing. The last steps of training and development of employees are focused on Lean Development and continuous improvement because the principles of lean production are generally closely related to company-wide agility, and therefore it is important to interconnect agile and lean management in the company, and therefore to educate and develop employees in both these areas.



**Figure 1** Educational model to increase knowledge agility in metal industrial companies for project portfolio management (own processing)

#### 4. EXPERT VERIFICATION METHOD

The purpose and goal of expert verification was to verify the presented educational model for project portfolio management in the form of an expert assessment, i.e., assessment of workers who directly participate in project portfolio management in industrial companies. For the needs of expert verification, a questionnaire survey with closed questions was drawn up, followed by a focus group, where the goal was to verify whether the proposed suit meets the goals that were defined, i.e., that:

- takes into account the individual phases of project portfolio management,
- takes into account the current use, but also the importance of individual tools in the context of managing a portfolio of industrial companies,
- includes lists of recommendations for applying agile principles,
- is publicly available, flexible, transferable, understandable, general, and practical.

Based on the results of the questionnaire survey, it can be said that the proposed educational model is generally clear, understandable, and applicable for industrial companies. Respondents stated that the model can be used both for companies that do not systematically manage project portfolios and are just about to introduce this process, but also for industrial companies that already manage project portfolios. The overall assessment of the educational model to increase knowledge agility in metal industrial companies for project portfolio management was very positive.

#### 5. DISCUSSION AND CONCLUSION

The goal of the paper was to present educational model for increasing agility of metal industrial companies. In general, it can be stated that all the set goals have been reached. The educational model has been presented in chapter 3 of this paper and results of verification have been presented in chapter 4.

Based on the results of the expert verification, it can be stated that the proposed educational model is clear, understandable, and applicable for practice, and the same applies to the individual agile principles that the

model contains. Respondents confirmed that education model as important component for the successful integration of agile elements and the introduction of the agility within the company environment.

The main motivation for the development of agility in the management of the project portfolio of an industrial company and in companies in general is the ever-increasing importance and contribution of agile elements to the management of the project portfolio regarding the competitiveness, strategy, and strategic goals of the industrial company.

## REFERENCES

- [1] CASTELLION, G. A New Product's Development Strategy: Formulation and Implementation. *In The PDMA Handbook of New Product Development*. 2005, pp 29-45.
- [2] TELLER, J., UNDER, B.N., KOCK, A., GEMUNDEN, H.G. Formalisation of project portfolio management: The moderating role of project portfolio complexity. *International Journal of Project Management*. 2012, vol. 30, no. 5, pp. 596-607.
- [3] MCNALLY, R.C., DURMUSOGLU, S.S., CALANTONE, R.J.; HARMANCIOGLU, N. Exploring new product portfolio management decisions: the role of managers' dispositional traits. *In Industrial Marketing Management*. 2009, vol. 38, pp. 127-143.
- [4] PATZAK, G., RATTAY, G. *Projektmanagement. Leitfaden zum Management von Projekten, Projektportfolios und projektorientierten Unternehmen. 4 Auflage*. Wien: LINDE, 2004.
- [5] ENGWALL, M., JERBRANT, A. The resources allocation syndrome: the prime challenge of multi-project management? *In: International Journal of Project Management*. 2003. no. 21.
- [6] LAANTI, M., SALO, O., ABRAHAMSSON, P. Agile methods rapidly replacing traditional methods at Nokia: A survey of opinions on agile transformation. *Information and Software Technology*. 2011, vol. 53, no. 3, pp. 276-290.
- [7] KAUFMANN, C., KOCK, A., GEMUNDEN, H.G. Emerging strategy recognition in agile portfolios. *International Journal of Project Management*. 2020, vol. 38, pp. 429-440.
- [8] PETRINSKA-LABUDOVIKJ, R. Project Portfolio Management in Theory and Practice. *MEST Journal*. 2014, vol. 2, pp. 192-203.
- [9] HOFFMAN, D., AHELMANN, F., REINING, S. Reconciling alignment, efficiency, and agility in IT project portfolio management: Recommendations based on a relevatory case study. *International Journal of Project Management*. 2020, vol. 38, pp. 124-136.
- [10] FOTR, J. Practices, methods and tools for project portfolio management. *The Journal Ekonomika a Management*. 2016, vol. 4, pp. 1-16.
- [11] MUSAWIR, A., SERRA, M.E.C., ZWIKAEEL, O., ALI, I. Project governance, benefit management, and project success: Towards a framework for supporting organizational strategy implementation. *International Journal of Project Management*. 2017, vol. 35, no. 8, pp. 1658-1672.