KNOWLEDGE AND APPLICATION OF AGILE METHODS, TOOLS AND TECHNIQUES IN FOUNDRIES

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Abstract

The aim of the paper is to analyze and describe current knowledge and application of agile methods, tools and techniques in foundries in Czech and Slovakian foundries. The motivation of the research is increasing need of customer-focused management and competitiveness. Based on 2022 survey results and comparison with original authors research within industrial companies worldwide (2021), differences and similarity will be defined and described. Areas of research interest are project, program, and project portfolio management within the companies. The results of the research are presented in the final part of the paper.

Keywords: Agility, foundries, project, program, project portfolio

1. INTRODUCTION

Currently, the goal is to strive for the most effective approach to project portfolio management given the dynamically changing environment and strategy of industrial companies. At the same time, customer demands for performance are growing, which directly affects the company's financial results and overall performance. Therefore, it is very important, but on the other hand challenging, to set up an effective project portfolio management system. It is desirable to identify appropriate approaches and principles that will both effectively manage the project portfolio and at the same time contribute to the successful achievement of the company's strategic goals and customer satisfaction [1].

Agility [2] that is also translates as alive, moving, light. In connection with project management and the corporate environment, this concept is understood as a flexible way of management that allows you to easily respond to changes in projects and corporate strategy.

Agility is relatively strongly linked to the application in project management, especially with a focus on information technology. The agile approach to project management is very close to lean methods and principles and approaches such as kaizen or Six Sigma [3=47 - DP]. Agile methods and tools are based on a strong pro-customer nature, all activities during development are purposefully focused on achieving the desired result, and thus waste is minimized more significantly than with traditional procedures. When using agile methods and tools, smaller portions of results are realized in each development cycle in close cooperation with the customer [4].

1.1. Current state of knowledge – agility in project portfolio management

The critical evaluation of the available professional literature reveals a research gap in the implementation of agile principles in project portfolio management. All analysed studies have one thing in common, they generally describe the benefits of agile elements in project portfolio management.

Kaufmann et al. [5] describe in their research that agile practices are becoming increasingly popular in project, program and portfolio management, as they allow more flexibility to adapt to a dynamic environment than traditional methods. Based on a study published in 2020, which examined the implications of agile practices in project portfolio management processes, it was found that the application of agile elements has a generally positive effect on portfolio management from the development of its strategy to successful fulfillment of portfolio objectives. Furthermore, opportunities for agile approaches to change the uncertainties that arise in the portfolio were identified. Agile principles help to increase the complexity of the portfolio, especially in the exchange of information and resources within individual portfolio projects. According to the authors, an important element is the general expansion of agile thinking into corporate culture. Only thanks to this can progress be made in project portfolio management.

Stettina and Hörz [6] tried to understand the application of agile methods in project management and portfolios, especially in the field of information technology. Their research, published in 2015, highlights an important element of top management sponsorship for introducing agile elements into portfolio management. They also defined three aspects that are generally key to portfolio management - routines, structures, values. Agile management needs to include transparency of resources and tasks, close cooperation in the team and with customers, with elements of feedback and commitment to a strategically managed portfolio.

Hoffmann et al. [7] focus on portfolio management of information technology projects that require strategic alignment, efficiency and agility. Currently problems are identified as inconsistencies in project portfolio management between the various elements at the level of portfolio management, where formal rules are often circumvented, which is reflected in resource overload, malfunctioning projects, inability to respond to changing strategies.

Rautiainen et al. [8] presented a case study on agile project portfolio management in a software company environment. Within the presented outputs, the contribution of agile elements (back log, extreme programming, etc.) is observed, thanks to which problems were eliminated (prioritization, visibility of projects, structure of projects in portfolio).

Hörlach et al. [9] describe that organizations face a growing number of possible approaches for agile portfolio management and administration but emphasize that resources on best practices for the selection of a suitable methodology for the implementation of agile elements are rare. The focus of their research is again focused on the portfolio in the field of information technology, which is an area where the portfolio differs diametrically from manufacturing companies.

It is worth mentioning the research from Petrinska-Labudovikj [10] which deals with the theory and project portfolio management practices. Points to the importance of using software support for effective portfolio management and at the same time describes the great diversity in the approach to the implementation of project portfolio management, which varies across organizations. States that there are few resources and knowledge available on implementation, worldwide.

A comprehensive search for project portfolio management was carried out by Fotr [11]. As part of his research, he describes the basic components of portfolio creation - determining the overall evaluation of projects, selecting projects for the portfolio, optimizing the portfolio and evaluating performance and periodic portfolio reviews with the potential use of agile methods, which, however, are completely absent in the basic components of the project portfolio.

1.2. Agile methods, tools and techniques

In the following part of this article, the most well-known and most used agile methodologies, tools and techniques are listed in more detail. The overview is shown in **Table 1**.

Table 1 Agile methods, tools and techniques [own processing]

Agile methods	Agile tools and techniques
SCRUM, Extreme Programming (XP), Test Driven Development (TDD), Property Driven Development (FDD), Agile Unified Process (AUP), Dynamic Systems Development Method, Kanban, SCRUMBAN, Agile Modeling, Open Unified Process, Microsoft Solution Framework, DMAIC, PDCA, Last Planner System, Lean Development, Crystal Methodologies, Adaptive Software Development	Daily Stand-up, Sprint planning, User stories, Kanban board, Team reviews, Retrospective meetings, Sprint, Product backlog, Team walls, Sprint backlog, Relative estimate, Agile story chart, Dedicated teams, Collocation, Sprint review, Iteration, Task board , Workshop, Team communication, Feedback, WIP limit, EVM, time-boxing, Trend analysis, Burn down chart, Burn up chart, Control limits, Kaizen, Process improvement, VSM, Testing, Roadmap, Progressive processing, Wire-frames, Chartering, Learning Cycle, Collaboration Games, Agile Estimates, Agile Communications, Variance Analysis, Trend Analysis, Flow Diagram, Pre-Mortem, DoD, Usability Tests, Risk Planning, Customer Weighted Priority, Minimum Viable Product, Bucket size planning

2. THE METHODOLOGY OF THE PAPER

Goal of the paper has been set to analyze and describe recent knowledge and application of agile methods, tools and techniques in foundries in Czech Republic and Slovakia Republic based on 2022 reseaarch and compare the results with original research of authors who did research within industrial companies worldwide in 2021. Three research questions were formulated:

1) What level of knowledge of agile methods, tools and techniques is in foundries?
2) What level of application of agile methods, tools and techniques is in foundries? Are there similar results in utilization of management tools worldwide and in industrial companies in the Czech Republic?
3) Are there any trend differences between original 2021 research worldwide and foundries research from 2022?

2.1. Data collection

The data for foundries research were collected based on survey and its results in 2022 in foundries within Czech and Slovakian foundries. Totally 34 responds were collected and then it was compared to original worldwide research within 112 industrial companies (83 from EMEA and 29 from USA). The main focus of the survey was on knowledge and application of agile methods, tools and techniques in project, program and project portfolio management. The survey was performed through Google Forms and then evaluated in MS Excel.

3. RESULTS OF THE PAPER

The chapter presents the most important findings of agile methods, tools and techniques knowledge and application in Czech and Slovakian foundries. Results are presented in **Figure 1**, **Figure 2**, **Figure 3**, **Figure 4** and **Figure 5** that shows knowledge and application in project, program and project portfolio management of foundries that participated the survey.

The **Figure 1** shows current state of knowledge of agile methods, tools and techniques in foundries.

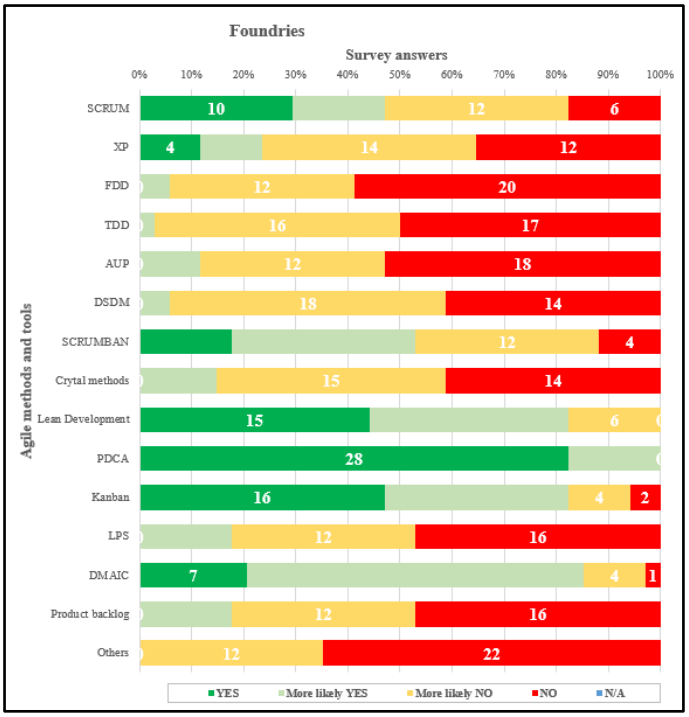

Figure 1 Knowledge of agile methods, tools and techniques in foundries (own processing)

As **Figure 1** presents, we can see that agile methods, tools and techniques that foundries know the most are PDCA (Plan-Do-Check-Act), Kanban, Lean Development, SCRUM and DMAIC.

The **Figure 2** shows current state of application of agile methods, tools and techniques in foundries in project management area.

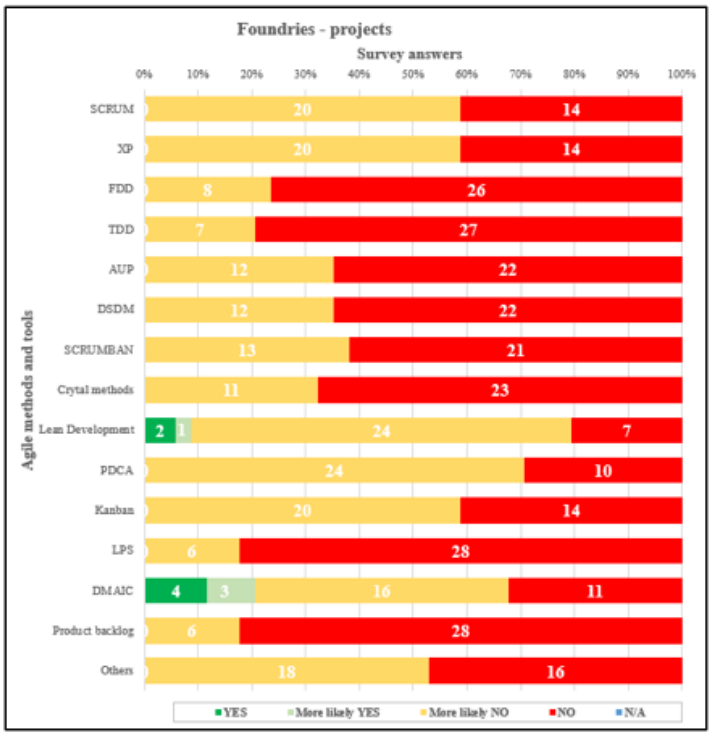

Figure 2 Application of agile methods, tools and techniques in foundries in projects (own processing)

As we can see in **Figure 2**, the application of agile methods, tools and techniques in projects in foundries is on very low level as the most answers were more likely no or no. The only two methods, that are being used are Lean Development and DMAIC.

The **Figure 3** shows current state of application of agile methods, tools and techniques in foundries in program management area.

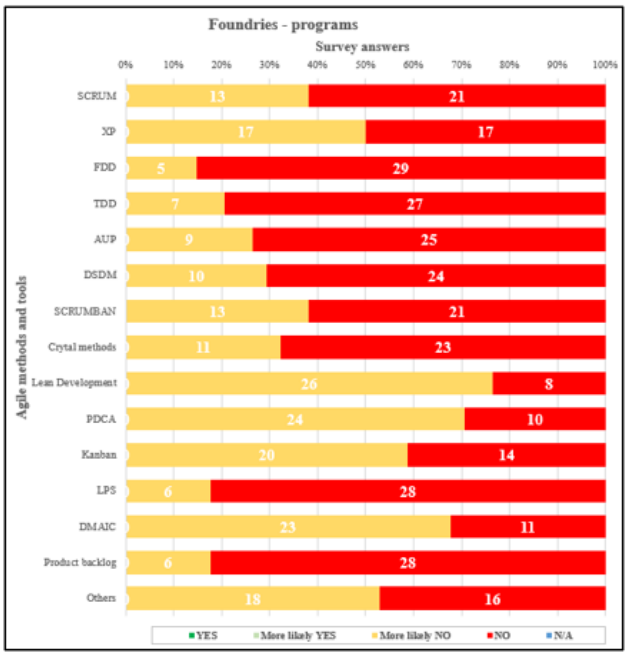

Figure 3 Application of agile methods, tools and techniques in foundries in programs (own processing)

Figure 3 shows that in program management, there is no application of agile methods, tools and techniques. The **Figure 4** presents current state of application of agility foundries in project portfolios

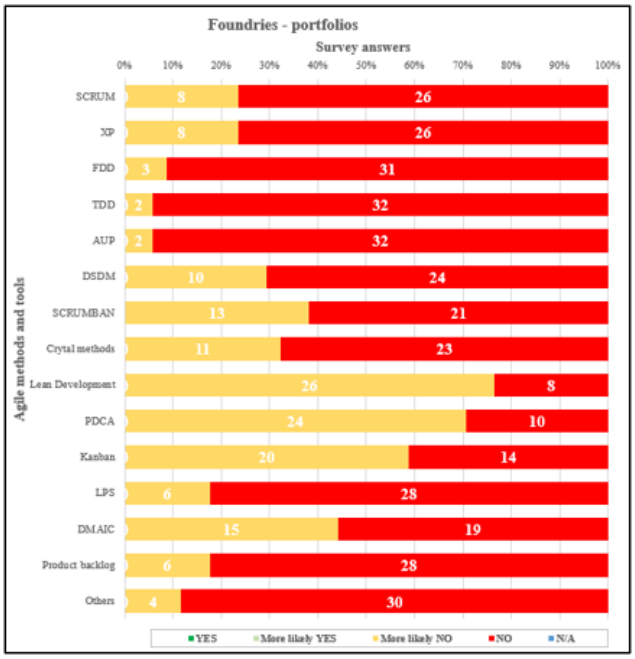

Figure 4 Application of agile methods, tools and techniques in foundries in portfolios (own processing)

As we can see in **Figure 4**, the application of agile methods, tools and techniques in project portfolio in foundries is on very low level too as there is no any application of agility.

4. DISCUSSION AND CONCLUSION

We can say that the goal of the paper to analyze and describe current knowledge and application of agile methods, tools and techniques in Czech and Slovakian foundries was fulfilled and all three research questions were answered. The knowledge and application are on low level in general within project, program an project portfolio management but we can see that knowledge is higher than application for specific agile methods, tools and techniques – DMAIC, PDCA, Kanban, Lean Development and SCRUM.

Comparing to original worldwide research within 112 industrial companies and subsequent statistical hypotheses testing (qualitative trait independence test), we can declare that:

- Knowledge of agile methods, tools and techniques is significantly different between both researches. Level of knowledge is higher in worldwide research**.**
- Application of agile methods, tools and techniques in projects, programs and portfolios management is significantly different between both researches. Level of application is higher in worldwide research.

It is desirable to identify appropriate approaches and principles that will both effectively manage the project portfolio and at the same time contribute to the successful achievement of the company's strategic goals and customer satisfaction within projects and programs. Agility and its methods, tools and techniques offer one possible solution to increase competitiveness in a dynamic market.

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