IMPACT OF AGILE PROJECT TEAM MANAGEMENT ON STAKEHOLDERS' VALUE IN SOFTWARE DEVELOPMENT PROJECTS

ABSTRACT

As a result of very rapidly progressing digital transformation and introduction of information technology (IT) into many areas of human activity, including business, the number of software development projects in progress has been increasing exponentially. The projects are often characterised by unpredictability of their result i.e. their final solution in the form of a finished product which is software. Project long-term planning and delivery based on traditional project management methods resulted in numerous delays or exceeded budgets. Agile approach was created as one of several potential approaches to address the above-described issues. It encompasses a vast collection of standards, methodologies, techniques and practices with values and principles formulated in the Agile philosophy called the *Agile Programming Manifesto* as their common denominator.

The topic of my doctoral dissertation is a relationship between the Agile approach followed to manage project teams and a value generated for stakeholders of software development projects. The research focused on project teams applying the Agile approach to the organisation of work in software development enterprises operating in Poland. The choice of the topic of my doctoral thesis emerged from observation of a growing general interest in applying the Agile approach to project management practice, predominantly in IT and creative projects. Research conducted so far indicates little, fragmented and low-quality empirical research in this area. A research gap in measuring agility of a project team and its impact on the performance of an enterprise, including its value for different groups of stakeholders, was identified.

The key research questions of the dissertation are: In what way the level of agility of a project team affects the value generated for different stakeholders' groups? The following specific questions were also raised in the dissertation: What is the impact of the level of agility of a team on the value generated for owners of an enterprise, its clients or users and on the value generated for a project team itself, which is connected with development, self-realisation, learning, acquiring knowledge and creating innovative product solutions? Which managerial practices of the Agile approach are the most important to determine how agile a project team is? Which managerial practices of the Agile approach are the most important to different project stakeholders' groups in the value context? What is the impact of a size of a team, complexity of project and products delivered, experience of the team, team's access to client or user and the type of the organisation where the project team works on the analysed relationship between agility and value for stakeholders? A quest for answers to these questions defines the overall objective of the research.

Research hypotheses aimed to respond to the questions. The main hypothesis of the dissertation (HG) is as follows: the level of agility of a project team definable by the extent to which Agile management practices are put into practice, impacts the value for different groups of stakeholders of a project team. The main hypothesis leads to the following specific hypotheses: H1 − Agility of a project team has a positive impact on the value generated for

owners of an enterprise (H1.1) its clients or users (H1.2); H2 – Agility of a project team affects the value for the project team related to development, self-realisation, learning, acquisition of knowledge and creation of innovative product solutions; H3 – Groups of management practices applied in the Agile approach of higher importance for defining the level of agility of a project team can be defined; H4 – Groups of management practices applied in the Agile approach of higher importance in the context of value for different stakeholders of a project team can be defined: enterprise owners (H4.1), its clients or users (H4.2) and the project team (H4.3) and H5 – The impact of the team agility on the value for different groups of stakeholders (enterprise owners, clients or users, a project team) depends on: a size of a project team (H5.1), the complexity of delivered projects and products (H5.2), experience of the project team (H5.3), access of the project team to client or user (H5.4) and the type of organisation in which the project team works (H5.5).

In terms of the methodology and applicability of the research, the aim was to determine the level of agility of software development project teams and develop a method to measure agility in order to identify the level of advancement. The theoretical and cognitive objective of the dissertation was to determine the relations between the advancement of agility in a project team and the value for selected stakeholders' groups. The empirical objective of the research was to verify the proposed model by comparing it to the research results. The utilitarian objective of the dissertation was to determine the potential applicability of the proposed model to supporting decisions on implementing and improving implementation methods of the Agile approach when organising work of software development project teams. The dissertation is cognitive and applicable in nature. Apart from filling the identified theoretic and cognitive gap, it also offers the opportunity to apply the proposed model as a tool supporting decisions when assessing preparedness to implementation of the Agile approach when organising work of a project team, analysing the status quo and identifying the necessary changes in response to issues arising during its implementation as well as to assessing or building own Agile methodology adopted to needs of different stakeholders involved in software development projects.

The dissertation consists of five chapters. Chapter One discusses the genesis and evolution of the Agile approach and shows the variety of definitions of the Agile concept. Chapter Two presents Agile management at the level of a project team, a project and a project organisation. The concept of agility is explained as a feature of each such entity complemented by a short overview of the most common Agile practices, their scaling frameworks in a project enterprise as well as models of an organisational change in a form of an Agile transformation.

Chapter Three proposes a proprietary method for a system-based review of the literature, including a presentation of a series of bibliometric analyses. Most importantly, the chapter identifies the main research gap of this dissertation.

In the Chapter Four, the essence of a project team as the main subject of the research is revealed and, in addition, a review of Agile practices is presented along with conditions stimulating their effective application. The key outcome of the Chapter Four is a proposed proprietary research model to measure agility of a research team in software development projects. The model for pilot testing was developed on the basis of the extent to which seven groups of Agile practices are used in a project team and by taking into account four moderating factors originating in the surroundings of the team and affecting the impact of a

group of Agile practices onto performance delivered to different groups of stakeholders in a project team. Agility of a project team has been put into operation as a range of responses to changes, efficiency of responses to changes, the quality of responses to changes and preparedness to give a rapid response to changes.

Chapter Five presents specificity of software development projects and identifies their potential stakeholders and benefits delivered to them. The following three groups were recognised as stakeholders of importance for the research: enterprise owners, clients or users and the project team.

In the Chapter Six, the research process was presented in detail. The pilot testing used quantitative questionnaire research and qualitative research based on interviews with experts. Pilot test results allowed for adopting the research model and correction of the questionnaire scenario. The interviews allowed a broader perspective of the context and interpretation of analysed issues and phenomena. Application of an advanced method for modelling structural equations PLS-SEM and CB-SEM in the qualitative research made it possible to analyse the impact and relation between many multidimensional non-observable variables. The applied method for modelling structural equations SEM led to assessment of the shape and the strenght of interdependencies between the analysed phenomena while allowing to account for and test mediation and moderation-related outcomes.

Chapter Seven presents detailed results of the research and conclusions. The interviews resulted both in very precise, final version of the research model and research questionnaire and formal conclusions formulated on the basis of analysed opinions expressed by respondents. The outcome of the questionnaire research was a presentation of basic descriptive statistics as well as results such as modelling of PLS-SEM and CB-SEM structural equations which allowed for verifying the hypothesis and respond to the research questions asked in the dissertation. In the analysis of research results, correlations of measurements among the analysed constructs were verified by using Spearman rang rho non-parametric correlation indicators and Kruskal-Wallis's non-parametric test. On the basis of the quantitative research results, 9 out of 13 research hypotheses verifiable in the research model were accepted. The remaining research hypotheses were rejected due to absence of their statistical significance permitting continuation of conclusions. The research hypotheses lead to the conclusion that agility of a team has a positive impact on the value generated for clients or users as well as for the project team itself. Furthermore, some Agile practices may vary in their impact on different levels of agility of a project team and, with the same, on the value generated for different groups of stakeholders. To summarise the results of the qualitative research one may conclude that application of the Agile approach may create a value for all stakeholders in a project time as long as it is implemented with full awareness accounting for the context and limitation in the operation of the team. The research results helped to fill in the gap in the empirical research conducted so far, while maintaining a high-quality research process as well as reliability and correctness of the results.

The summary offers a synthesis of the research results and indicates the potential to continue research in this area in the future.