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PROJECT MANAGEMENT METHODOLOGY: THEORETICAL REVIEW

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Abstract

In today's changing at accelerating rate economic and business environment, there is a growing popularity, interest and need for an effective way of organizing work such as projects. The application of projects as a working form and their management concepts were transferred to different industries: government, construction, energy, IT, consulting, financial services, education, manufacturing. The current state of project management can be characterized by significant increase in the number of projects implemented in these fields. When we consider the concept of project management methodology, we face with a whole system of components. Many scholars and practitioners strive to construct the right definition and components of project management methodology in order to apply it in a best way. The term project management methodology dates back to 1960 and continues to develop by inventions of relatively new approaches such as agile and hybrid. This research aims to provide a theoretical literature review on the concept of project management methodology by considering diverse research works, theories, models, ideas, opinions, and methods to get deeper comprehension of its basic principles (fundamentals), what advantages and disadvantages of project management approaches are presented in previous studies and what are additional findings in project management methodology theories. This paper provides an examination of different views, knowledge and research results to explain the importance of project management methodology as a part of project success that is the final target of methodology. It will be the basis for further research within PhD dissertation as a part of research strategy. This review deepens the knowledge within the project management context and is intended to make a theoretical contribution to scientific literature base.

Key words: project management, methodology, approach, project success.
JEL code: O22

Introduction

Project management methodology is one of the frequently researched topics in project management. But, project management methodology is based on a distinct project management approach, that defines set of principles and guidelines for managing project.

In order to better understand the nature of these two concepts, it should be first investigated what is the meaning of the notion of project management methodology as well as project management approach, as they are commonly used as mutually replacing. At the same time, the interconnections of two terms should be highlighted. In addition, differences between agile and traditional project management approaches and advantages/disadvantages of each approach should be detailed.

Project success is the essential goal of any methodology, be it within the context of agile or traditional approaches. The number of factors influencing project success continues to supplement, but the results of projects continue to disappoint (Cooke-Davies, 2002). Project management methodology is meant to enhance project effectiveness and increase chances of success (Vaskimo 2011). However, the extent that the objective of achieving project successful results by project management methodology is reached is unknown as project still fails to reach their goals (Lehtonen and Martinsuo, 2006; Wells, 2013).

The paper aims to contribute to scientific knowledge of project management methodology concept as the part of project success and provide an overview on the given topic by considering diverse views, works, models, opinions, results. The article consists of the following parts: first part sheds light on project management methodology and project management approach, then comparison of two main project management approaches are presented. Later, project success is revealed through such factors as project management methodology, management support, human resources, legislation/ regulation, and at the end conclusion is provided.

Project management methodology

The term project management methodology was first defined by early 1960 (Adrian and Anca, 2014). The concept has been supplemented and changed over time. Project management methodology is a strictly combination of logically related policies, practices, processes, tools, techniques and templates that determine how best to plan, execute, monitor and deliver a project (Whitaker, 2014).

Project Management Institute defines project management methodology as a system of practices, techniques, procedures, and rules used by those who work in a discipline (Project Management Institute, 2017). The existing definitions have similar meanings and are presented in Table 1.

Table 1

Project management methodology definitions

Year	Definition	Author
1989	Set of tools, methods and practices used in software development.	Humphrey
1996	A structured way to manage projects consisting of rules and directions and is based on specific way of thinking.	Brinkkemper
1997	Set of techniques and tools used for solving specific problem.	Introna and Whitley
1999	Framework to improve inter-organizational communication; and avoid duplication of effort by having documentation, common resources and training.	Clarke
2000	Structured approach for delivering a project, and consists of set of processes and activities, with each process or activity having clearly defined schedule and resources.	Turner
2001	Knowledge set about tasks, techniques, deliveries, roles and tools.	Gane
2002	Structured project management method.	Office of Government Commerce
2003	Any principle project management team relies on in order to successfully deliver project result.	Cockburn
2003	Set of guidelines and principles that can be tailored and applied to specific situation, where guidelines could be as simple as task list, or it could be specific approach to project with defined tools and techniques.	Charvat
2004	Theoretical framework that describes each task in	Kerzner

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	depth, so that a project manager or team will know what to do in order to implement activities of project according to the budget, schedule, specifications and other requirements.	
2009	Set of guidelines that support project manager and team through controlled, managed and visible set of activities in order to achieve project results.	Office of Government Commerce
2013	Model that describes all of the project management activities and documentation.	Ericsson
2014	Set of methods, techniques, procedures, rules, templates, and best practices used on a project.	Spundak
2019	Governance tool that defines the roles, responsibilities, process, milestones, and control points in the project. Management tool that provides guidance in the planning and implementation of the project.	Muller et al.

Source: author's construction based on literature review

Based on the wide range of definitions, we propose the following description of project management methodology: Project management methodology is the doctrine on organization of activity that includes:

- rules, principles, values, common terminology
- roles, responsibilities
- guidelines, standards, documentation
- processes, procedures
- methods, tools, techniques, templates
- tasks, activities
- milestones, deliveries
- best practices.

It is important to note the purposes and benefits of project management methodology. Introduction of the new team members to the process, easier replacement of the team members, clear responsibilities, customer impression, visible progress and status reporting and education are several methodology purposes (Cockburn, 2006). Kerzner (2001) argues that characteristics of a good methodology are recommended level of details, usage of templates, standardized planning, time management and cost controlling techniques, standardized reporting, flexibility for usage on all projects, flexibility for quick development, that it is understandable to user, accepted and usable within organization, it uses standardized project life cycle phases, and that is based on guidelines and good business ethics. Wells (2012) states that project management methodology benefits to projects and organizations, such as control and monitoring, standardization and unified language, guidance and support. However, the findings suggest a misalignment between the intended benefit of project management methodologies at the strategic level and the reported benefits by project managers at the project level (Wells, 2012).

It is worth mentioning here that forty years ago, the first formal project management methodologies were set up by government agencies to control budget, plans and quality (Packendorff, 1995). Three types of project management methodologies are revealed in the literature: standardized, customized and combined project management methodologies. However, the main question of debate among the researchers and practitioners is whether standardization with little project environmental context; customization with context; or mixed with some context can result in project success.

Project management approaches

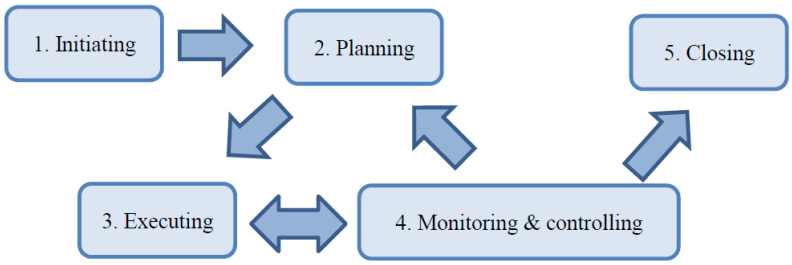
The term project management approach is most frequently applied as a set of principles and guidelines that define how specific project is managed (Iivari, Hirschheim & Klein, 2000; Introna & Whitley, 1997). Two main project management approaches that is traditional (predictive, waterfall) and agile (adaptive) are discussed in the research works. Furthermore, the absence of consensus on which one is better and preferable lead to the emergence of relatively new hybrid project management approach that combined both approaches.

Traditional project management approach

Traditional or classical project management approach was designed for projects that are implemented by the fixed planned manner. The main reason for this orientation is that project principles were set up in the 1950's which can be characterized by stable economic conditions and of course, by absence of dynamic changing environment caused by rapidly advancing technologies as in today's world. The essential target of traditional project management approach is following the established plan within the project triangle that is time, cost and scope. The main idea behind that classical, rational approach is that projects are quite simple and predictable with clear borders and limits, which gives the possibility to construct the plan in detail and pursue it without big changes (Spundak, 2014; Andersen, 2006; Wysocki, 2007, Shenhar, A. J. & Dvir, D., 2007).

Moreover, almost all bodies of knowledge of project management institutions are based on traditional project management approach. According to Spundak (2014), the reason for this domination could be explained by the fact that first variants of bodies of knowledge were introduced in the 1980s when no alternative approaches existed except for traditional approach. The subsequent editions of bodies of knowledge reflect the changes in the part of actual practices but do not always meet the expectations of practitioners.

The traditional approach is based on five sequential steps, as presented in the PMI (2017) PMBOK and depicted in Figure 1. The PMBOK guide divides the project management process into five process groups: initiating, planning, executing, monitoring and controlling, closing. These groups are broken down into 49 project management processes that are allocated in comply with the following ten knowledge areas: integration, scope, schedule, cost, quality, resource, communication, risk, procurement and stakeholder management.



Source: PMI (2017)

Fig. 1: **The five process groups of the PMBOK project management process.**

In software engineering and development, this approach is often named as the waterfall model, which is illustrated in Figure 2, and consists of several tasks in linear sequence.

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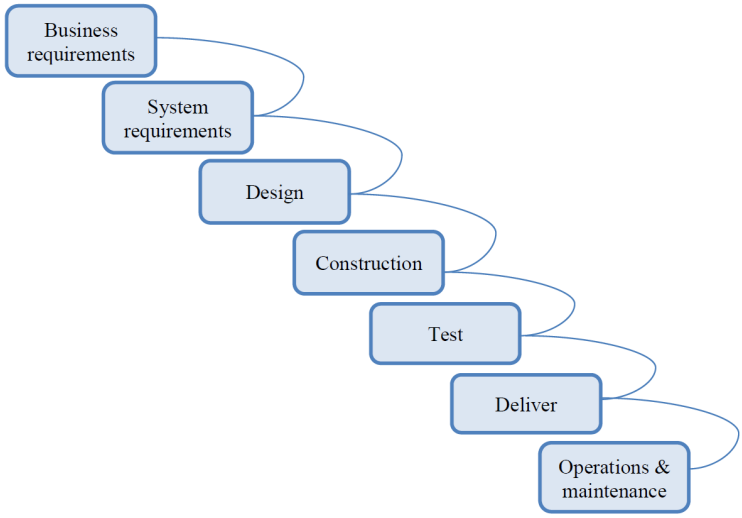

Source: (Hass, 2007)

Fig. 2: **The project life cycle model**

Traditional project management approach is oriented on projects where clear defined points and goals can be developed at the beginning of the life cycle. Fernandes et al. (2018) mentioned that in a predictive approach the time, cost and scope of project are determined in the early phases of the life cycle and any changes to project are strictly managed. Sheffield & Lemétayer (2010) shared similar ideas and pointed that in this type of projects, the requirements are clearly specified and little change is assumed. This approach is "change-resistant and focus on compliance to plan as a measure of success" (Wysocki, 2009). In addition, traditional approach requires considerable effort in the process and documentation, especially in case of change requests.

Furthermore, the predictive (waterfall) approach can be tailored to any project environment as basic principles, processes, procedures and methods can be applied to every project uniformly. It should "ensure robustness and applicability to a wide range of projects, from simple and small to most complex and large ones" (Spundak, 2014). At the same time, the number of authors adhering to the opinion that "one size does not fit all" is consequently growing. Thus, in project management the "one size does not fit all" principle is unanimously recognized (Charvat, 2003; Wysocky, 2009; Sheffield & Lemétayer, 2010). One of the crucial task is to select the right and appropriate approach and methodology for a specific project in order to be compatible with cost, quality, time and scope (Charvat, 2003). On the contrary, the mistake in choice of more suitable approach and methodology can lead to the increased rates of project risks (Elkington & Smallman, 2002).

Since traditional project management approach could not always response to changing nature of projects, the necessity for new ways to meet the challenges of today's economic and business environment arose. According to many researchers, the projects have changed and became more complicated with growing number of stakeholders, tasks and complex interrelations that traditional project management approach is not able to deal with (Cicmil & Hodgson, 2006; Golini & Landoni, 2014; Shehnar & Dvir, 2007; Van de Waldt, 2011). At the same time, the main weaknesses of traditional project management approach that were determined by scholars as well as by practitioners created the ground for alternative project management approach. Williams (2005) stresses that the essential reasons of inapplicability of

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the traditional approach to wide range of contemporary projects are "structural complexity, uncertainty in goal definition and project time constraints". To support this point of view, several authors note high fallibility of projects and their management as one of the key disadvantage of traditional project management approach (Cicmil & Hodgson, 2006; Gauthier & Ika, 2012; Ika & Hodgson, 2014; Shehnar & Dvir, 2007).

Agile project management approach

The term "agile" is defined as "able to move quickly and easily, and think quickly and in an intelligent way" (Oxford learner's dictionary). Basic characteristic of agility is the ability to react on time on changes created by turbulent environment. Interestingly that the concept of "agility" emerged in the field of manufacturing in 1991 and was developed by team of researchers at Iacocca Institute of Lehigh University (USA). They defined agility as "manufacturing system with capabilities (hard and soft technologies, human resources, educated management, information) to meet the rapidly changing needs of the marketplace (speed, flexibility, customers, competitors, suppliers, infrastructure, responsiveness)" (Yusuf, Sarhadi & Gunasekaran, 1999).

The concept of agile project management dates back to 1980s compared to traditional project management, which basic principles were developed in the 1950s and emerged from defense and construction industries. Contrary to the agile manufacturing and agile software development, few works dedicated to agile project management in other industries. Until 2009, agile project management approach was prevailing in IT projects. Therefore, most of studies were concentrated on software development projects. In the last decade, the little number of projects accepted and applied agile practices (Stare, 2013).

Confronto et al. (2014) offer the definition of agile project management as follows: "an approach is based on a set of principles, whose goal is to render the process of project management simpler, more flexible and iterative in order to achieve better performance (cost, time and quality), with less management effort and higher levels of innovation and added value for customer".

Furthermore, the agile approach is oriented on projects with big amount of uncertainty, unpredictability, adaptability, constant changes and updates, faster execution and deep client involvement. Similarly, Yusuf et al. (1999) point out the following foundations of agility: speed, flexibility, innovation, proactivity, quality and profitability. Agility is based on the number of business principles such as continuous innovation, product adaptation, reduction in delivery times, adjustment of people and processes, and reliable outcome (Highsmith, 2004).

The agile community, which shared the same views and beliefs, was founded in 2001 and set up four core values, as depicted in Figure 3. Based on the Agile Manifesto, four essential values like *individuals, software, customer and change* should be highlighted, which means that despite the recognized importance of items on the right, agile project management approach is more focused on the items on the left. Even though, Manifesto was developed for agile software projects, all the core values can be introduced and applied to different projects that use agile project management (Aguanno, 2004).

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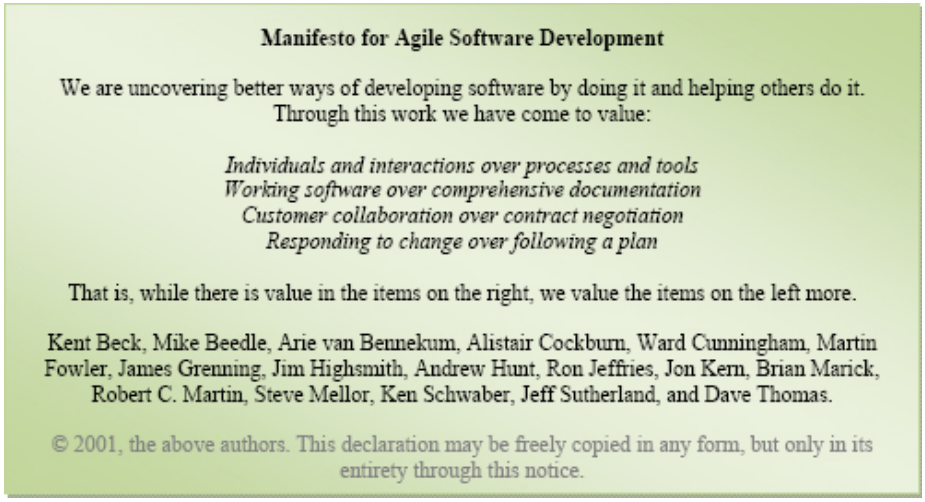


Manifesto for Agile Software Development

We are uncovering better ways of developing software by doing it and helping others do it.
Through this work we have come to value:

Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan

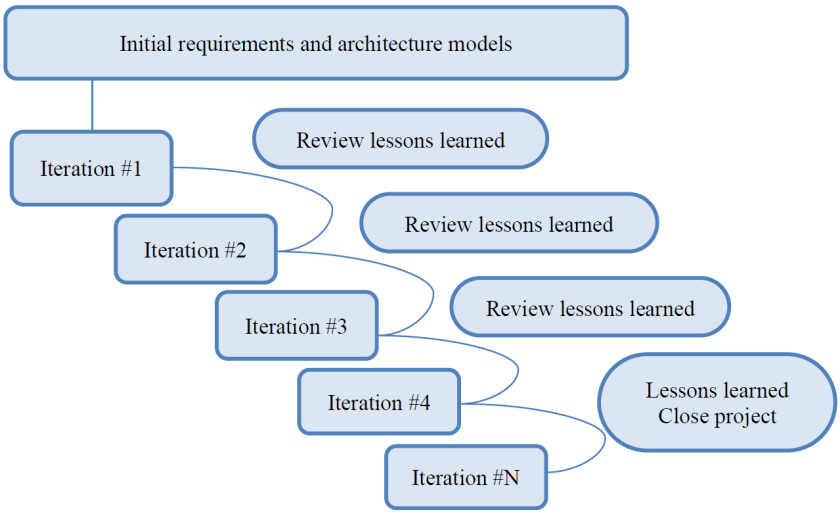
That is, while there is value in the items on the right, we value the items on the left more.

Kent Beck, Mike Beedle, Arie van Bennekum, Alistair Cockburn, Ward Cunningham, Martin Fowler, James Grenning, Jim Highsmith, Andrew Hunt, Ron Jeffries, Jon Kern, Brian Marick, Robert C. Martin, Steve Mellor, Ken Schwaber, Jeff Sutherland, and Dave Thomas.

Source: (Agile Alliance, 2001)

Fig. 3: **Agile Manifesto**

Agile project management is iterative and incremental process, which implies that stakeholders and project team members cooperate closely to understand the domain in question, identify requirements, and prioritize functionalities (Hass, 2007). The agile approach embraces lots of rapid iterative planning and development cycles, as illustrated in Figure 4, enabling checking and assessment of interim results and making corrections by users, clients and stakeholders in case of change in their preferences. This approach opens the opportunity for fast modifications of the product when previously uncertain goals and requirements are revealed.



Source: (Hass, 2007)

Fig. 4: **The agile project lifecycle model**

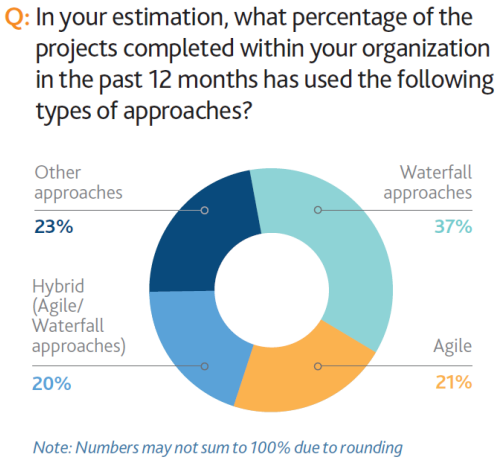
As the traditional project management approach that includes four phases of project life cycle, the agile approach also has several phases of project. Some authors developed the phases of agile project management approach in order to enable the users to compare two different approaches. Thus, Highsmith (2004) divides the project life cycle on the following phases:

Envision (define vision, project scope and project organization), Speculate (develop model defined by the product characteristics and time constraints, and iteration plan for vision implementation), Explore (deliver tested parts in short time and continuously search for a way to reduce project risk and uncertainty), Adapt (check deliverables, current situation, and team behavior to adapt if necessary), and Close (close project, create lessons learned, and celebrate). Similarly, De Carlo (2004) establishes Flexible Project Model that contains five iterative phases: Visionate, Speculate, Innovate, and Reevaluate, and closing phase Disseminate. In addition, each short iteration consists of all phases and final project scope is constructed by every iteration. Furthermore, project scope could be changed up to 30 % during each iteration (Benediktson & Dalcher, 2005).

According to Chin (2004) in the contemporary environment, which is characterized by changing at accelerating rate conditions, the agile approach offers exclusive solutions and project results. Chow & Cao (2008) states that critical success factors for the agile approach embrace appropriate application of agile methods, highly qualified project team, and right delivery strategy, while appropriate management process, organizational environment, and customer involvement are factors that might contribute to project success.

Traditional vs. agile project management approach

There is no consensus on which project management approach is better, appropriate and more effective. Each approach has its advantages and disadvantages. According to survey results from 3234 project management practitioners, conducted by Project Management Institute, most organizations still use waterfall (traditional) approach – 37%, the rest percentage, wherein for each approach (other approaches, agile and hybrid) falls on around 20 % of application in 2017 (PMI, 2017). The survey results are presented in Figure 5.



Source: (PMI 2017 Pulse of the Profession In-Depth Reports: Organizational Agility Increases Project Success Rates)

Fig. 5. **The percentage of using different types of project approaches in 2017**

Depending on project characteristics and features, one should apply the appropriate project management approach. Additionally, organization's type of industry, strategy, goals, policy, rules, procedures and business processes play an important role in defining the suitable project approach. Since traditional (waterfall) project management approach is a time-proved

approach, and there is also empirical evidence on successful results of application of traditional project management methods and practices, this approach is more widespread in lots of industries.

Regarding benefits and drawbacks of both approaches, the kind of organization and project and their characteristics are essential elements in choosing what project management approach to employ. As already mentioned, the traditional approach is more acceptable for projects with well-defined goals, tasks, objectives, where the plan can be developed at the outset of the project, there is low level of changes during the project, and therefore low level of uncertainty. This kind of projects (e.g., construction, engineering, defense) implies that the changes in requirements will be low, and there is no need for active involvement of customers and interactions between project teams and clients (Shehnar & Dvir, 2007). Likewise, some authors note that traditional approach is more adequate for large projects, in which project team members have not so much experience and it is expected that project team turnover will be high (Aguanno, 2004; Coram & Bohner, 2005).

On the other hand, agile project management approach is more suitable for projects (e.g., manufacturing, IT, research projects, software development, new innovative product development, process modification projects) that have volatility of requirements, high level of uncertainty, unpredictable activities and changes, technological and organizational complexity and ambiguity (unknown cause and effect interdependencies). Moreover, since non-linear, iterative and incremental process of agile approach includes constant updates and additions, the human factor is considering as the most significant aspect in the collaboration process. Therefore, several authors in their recommendations state that highly skilled workforce, communication, collocations of project team members are critical success factors (Spundak, 2014; Highsmith, 2004).

Table 2

Difference between traditional and agile approach

Characteristic	Traditional approach	Agile approach
Requirements	clear initial requirements; low change rate	creative, innovative; requirements unclear
Users	not involved	close and frequent collaboration
Documentation	formal documentation required	tacit knowledge
Project size	bigger projects	smaller projects
Organizational support	use existing processes; bigger organizations	prepared to embrace agile approach
Team members	not accentuated; fluctuation expected; distributed team	collocated team; smaller team
System criticality	system failure consequences serious	less critical systems
Project plan	linear	complex; iterative

Source: Spundak (2014)

Taking into account the existing statements of several researchers, we present the main advantages and disadvantages of each approach (traditional and agile) in Table 3 and 4 respectively.

Table 3

Traditional approach

Advantages	Disadvantages
Stable working system	Top-down approach
Well-structured process	Leadership style is command, control and

	hierarchical
Optimization of processes and procedures	Very structured
Time-proved methods, tools and techniques	Huge amount of documentation and records
Importance of initial requirements	Bureaucracy and formalization
	Change-resistant

Source: author's construction derived from the literature

Table 4

Agile approach

Advantages	**Disadvantages**
Low hierarchy	Insufficient amount of empirical evidence on successful application of agile methods and practices
Speed, flexibility	Risks that can impact on product/service quality
Fast-learning by applying tacit knowledge	
Intense customer involvement	
Informal communication	
Joint decision-making	

Source: author's construction derived from the literature

Project success

Project success as well as project management methodology is one of the researched topics in project management literature. Numerous works have been dedicated to this topic. Furthermore, according to Highsmith (2009) the concept of success of the project can be difficult to define and measure. Traditional approach usually measures success in terms of scope, schedule and cost, while agile measures success in terms of response to change and value delivered to the customer (Sheffield & Lemétayer, 2010).

Project success criteria and critical success factors differ from project to project and depend on type of the project, its characteristics and the level of complexity. Thus, there is no uniform list of factors that influence on project success. However, some scholars tried to determine the common factors and criteria and constructed the model of critical success factors and project success. As an example, Alexandrova & Ivanova (2012) developed the conceptual model, where they identified the main components of critical success factors (project manager, top management support, motivated team, effective communication), success criteria (goals achieved in due terms and within planned budget, satisfaction, sustainable positive effects) and project success (achievement of results). The following definitions of success factors and criteria are stated by Muller & Judgev (2012): "1) Project success factors, which are the elements of a project, which when influenced, increase the likelihood of success; these are the independent variables that make success more likely. 2) Project success criteria, which are the measures used to judge on the success or failure of a project; these are the dependent variables that measure success".

Due to further considerations of project success factors, the model of significant factors was elaborated. Based on relevant studies, the important elements of project success are depicted in Figure 6.

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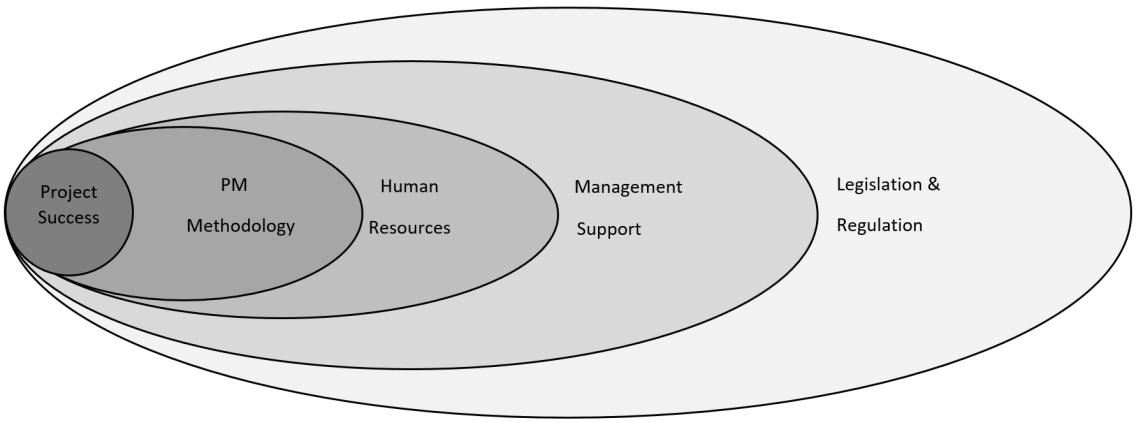

Source: author's construction derived from the literature

Fig. 6. **Aspects of project success.**

Project management methodology as an element of project success

The main target of any approach and methodology is successful project results. Vaskimo (2011) notes that project management methodology is one of the project success factors that improve project performance and can enhance chances of success. So, according to study by Joslin & Muller (2015), using a deductive approach and cross-sectional questionnaire with 254 responses, identified that the application of project management methodology accounts for 22,3 % of the variation in project success. These results correspond to the findings of Shehnar, Dvir et al. (2002a), White and Fortune (2002), Shehnar, Tishler et al. (2002b) and indicate that using project management methodology and appropriate tools and techniques are success factors.

Cockburn (2007) points out that "methodologically successful projects" have the following characteristics:

1) The project was delivered and the product gets used.
2) The leadership staid the same and did not get fired because of their results on the project.
3) The project team would work the same way again.

Many organizations introduce their own project management methodology in order to take into account the peculiarities of their industry, company's structure and internal processes. One of the necessary condition for successful methodology application is alignment with the other company processes (Kerzner, 2001; Charvat, 2003). It is also very important to consider the weaknesses of methodology to make the right choice and decision.

Human resources

The literature has identified human resources management as an important factor towards project success (Zwikael & Unger-Aviram, 2010; Tampoe & Thurloway, 1993; Barcak & Wilemon, 1992; Thamhain, 2004a) and an essential aspect of project management bodies of knowledge (PMI, 2017). Furthermore, it makes the contribution to the success of the company (Huselid, 1995) and generates competitive advantage for the company (Amit & Belcourt, 1999).

Some scholars devoted their works to the issues of leadership and management support, other academics studied the impact of such factors as personnel (recruitment, selection and training), project manager and team competence and communication on project success. Pinto and Prescott (1988) revealed that the "Personnel factor" was the insignificant factor for project success. At the same time, the study of influence of team development practices on project success showed that there is a positive impact only in long projects (Zwikael, 2010). In addition,

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the development of competences in the part of hard skills and soft skills, including the concept of emotional intelligence, becomes actual and very popular in project management to achieve project success as well as organization's success.

Despite the fact that there is a contradiction between different studies on the effect of human factor on project success, the strategic role of human resource management is undeniable.

Management support

Many researchers recognized the importance to include management support to the list of success factors. Furthermore, management support is considered by scholars and practitioners as one of the critical success factors affecting project outcome. The analysis of 63 research works by Fortune and White (2006) showed that clear goals, senior executive support and appropriate resources are the most significant critical success factors. The results of study by Belout and Gauvreau (2004) identified that for three different structures (functional, matrix and project-based) "the management support and trouble-shooting variables were significantly correlated with success".

Hyväry (2006) studied project success and failure factors. The factors are the following: clear objectives, clear job descriptions, effective leadership, ability to coordinate, commitment to the end-user, flexibility with resources, support from upper management, structuring by project, technological developments, and economic environment. The research work revealed that consulting the client, communication, acceptance from the client, project schedule, mission, execution, monitoring and control, staff management, trouble-shooting, and upper management support are critical success factors.

All of the above can lead to the conclusion that management support significantly facilitates any work be it project or even routine tasks.

Legislation and regulation

Legislation and regulation should be considered as the project success factor mostly in developing countries, where there is imperfection and inconsistency with current global requirements of legal and control system. The experience of developed countries shows the necessity and importance of legislation and regulation system in the part of cost and performance control to implement the successful projects. As an example, "legislation relating to controlling and measuring performance began as early as 1993 in USA, with the Government Performance and Results Act" (Kwak, Y-.H. & Anbari F.T., 2012). Additionally, according to the Planning, Budgeting, Acquisition, and Management of Capital Assets guide (OMB, Executive Office of the President, 2008b) "If any of the cost, schedule, or performance variances are a negative 10 percent or more you must provide a complete analysis of the reasons for the variances, the corrective actions that will be taken and the most likely estimate at completion (EAC)". Thus, the responsibility for detailed reporting on the variances from three major measures of project implementation (cost, schedule, scope) and preventive actions can help to increase the chances for success of project.

Conclusion

Project management is a special field that covers so many topics arousing interest and debates. This article provided a comprehensive overview on project management methodology and approach concepts, which have different meanings, but there exist some common perception. In addition, project success that is the final aim of project management methodology

was presented through such factors as methodology, human resources, management support and legislation and regulation.

The decision on selection and application of suitable approach and methodology is not an easy task since both traditional and agile approaches have their pros and cons. Taking into account the organization's type and project characteristics, the decision maker can combine two approaches for one project and within one methodology. Therefore, the main question is how to develop the methodology that will be based on both approaches that can increase the likelihood of success.

Since many works were dedicated to the research of traditional approach, there is the need for studying agile approach application in areas apart from only IT industry and consider the results of these projects (success or failure).

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