

Viktória Horváth

**The relationship between project management competence
and project success in the project-intensive upstream sector of
the oil industry**

Department of Strategy and Project Management

Supervisor: Mihály Görög, DSc

© Viktória Horváth

Corvinus University of Budapest

Ph.D program in Management and Business Administration

**The relationship between project management competence
and project success in the project-intensive upstream sector of
the oil industry**

Ph.D. dissertation

Viktória Horváth

Budapest, 2018

Table of contents

List of tables.....	4
List of figures	6
1. Introduction, aim of the dissertation and the relevance of the research topic	8
2. Literature review	11
2.1. Professional context of the topic: evolution, schools and paradigms of project management	11
2.2. Concept of the project success	18
2.2.1. Defining project success	18
2.2.2. Project success factors.....	20
2.2.3. Project success criteria	21
2.2.4. Hierarchical project success criteria model.....	24
<i>Project triangle</i>	25
<i>Evaluation based on the client (project owner) satisfaction</i>	26
<i>Evaluation based on stakeholder satisfaction</i>	27
2.3. The project management competence	28
2.3.1. Competence and professional competence	28
<i>Professional competence approaches</i>	29
<i>Elements of competence in the attribute-based competence approach</i>	29
<i>Special/professional competence in the model of personality's existential competences</i>	31
2.3.2. Relationship between the managerial competence and leadership style in project environment	32
2.3.3. Different schools of project management leadership and their relationship with competences.....	34
2.3.4. Project management skills.....	39
<i>Specialist versus generalist project manager</i>	43
<i>Relationship amongst project management skills, the authority of the project manager and the organizational structure</i>	43
2.3.5. Different levels of project management competence.....	44
2.3.6. The integrated model of project management competence.....	47
2.4. Project management competence in standards	49
2.4.1. The most significant project management competence standards	49

2.4.2.	The fundamental approach of competence in the project management competence standards	54
2.4.3.	Competence definitions in project management competence standards	56
	<i>Competence definition and fundamental competence levels of the PMCD Framework</i>	<i>56</i>
	<i>Competence definition and fundamental competence levels of IPMA ICB.....</i>	<i>57</i>
	<i>Competence definition and fundamental competence levels of the APM Competence Framework</i>	<i>58</i>
	<i>Competence definition and fundamental competence levels of the AIPM Professional Competency Standards for Project Management</i>	<i>59</i>
2.4.4.	Structure of the project management competence standards and their relevant competence levels	59
	<i>The structure of the PMCD Framework</i>	<i>59</i>
	<i>The structure of IPMA ICB</i>	<i>60</i>
	<i>The structure of the APM Competence Framework.....</i>	<i>62</i>
	<i>The structure of the AIPM Professional Competency Standards for Project Management.....</i>	<i>62</i>
2.4.5.	Knowledge areas of project management in competence standards	65
	<i>Knowledge areas of the PMCD Framework.....</i>	<i>65</i>
	<i>Knowledge areas of the IPMA ICB.....</i>	<i>68</i>
	<i>Knowledge areas of the APM Competence Framework</i>	<i>70</i>
	<i>Knowledge areas of the AIPM Professional Competency Standards for Project Management.....</i>	<i>72</i>
2.4.6.	Qualification systems related to the project management competence standards	74
	<i>Qualification System of the Project Management Institute (PMI) – Project management professional (PMP).....</i>	<i>74</i>
	<i>Qualification System of the IPMA - Four-Level Certification System (IPMA-4-L)</i>	<i>76</i>
	<i>Qualification System of the APM - The APM Registered Project Professional (RPP).....</i>	<i>79</i>
	<i>Qualification System of AIPM - The five-level certification system of AIPM (AIPM RegPM)</i>	<i>81</i>
3.	The empirical research.....	83
3.1.	Theoretical baseline of the research	83
3.2.	Criticism and shortcomings of previous research results	87
3.3.	Research questions and research hypotheses	88

3.4.	Methodology of the empirical research	90
3.5.	Research population, sample and the selected company group	99
3.6.	Research results	106
3.6.1.	Evaluating project success in the upstream sector	106
3.6.2.	The contribution of the project management competence areas to the success measured by different success criteri	109
3.6.3.	The impact of the organisational context on the project management competencies' contribution to project success.....	111
3.7.	Results of the dissertation.....	112
3.7.1.	Evaluating project success in the upstream sector	112
	<i>Generalist and specialist project managers</i>	113
3.7.2.	The contribution of the project management competence areas to the success measured by different success criteria	114
3.7.3.	The impact of the organisational context on the project management competencies' contribution to project success.....	116
3.8.	Evaluating the hypotheses	119
3.9.	Summary	121
3.10.	Limitations.....	124
	Appendix 1: Three competence areas of IPMA ICB v.4.0	126
	Appendix 2. IPMA ICB v 4.0 KPI's	134
	References	138

List of tables

Table 1 - Nine schools of project management.....	14
Table 2 - Link between project management schools and paradigms	16
Table 3 - Management dimensions within the organization	16
Table 4 - Project and project management definitions.....	17
Table 5 - Success rate of the IT projects (2011-2015).....	18
Table 6 - Elements of competence	30
Table 7 - Competence categories	31
Table 8 - Dulewicz and Higgs's managerial competencies and leadership styles based on competence-profiles	34
Table 9 - Leadership styles of project managers.....	35
Table 10 - Leadership schools in project management and their interrelationships with competencies	38
Table 11 - Project manager skills areas.....	41
Table 12 - The PMI Talent Triangle	42
Table 13 - The six levels of objectives in the cognitive domain in Bloom's taxonomy	45
Table 14 - Typology of standards published by Project Management Institute broken down by main standard categories:	51
Table 15 - The most significant international project management standards.....	52
Table 16 - The most well-known project management frameworks and competence standards.....	53
Table 17 - Basic competence approach of project management standards	55
Table 18 - Content of Competence Components in the PMCD Framework	56
Table 19 - Presentation of competence levels of the PMCD framework through an example of a selected competency element	60
Table 20 - Presenting levels of IPMA ICB competence through an example of a key competence indicator for a selected competency element	61
Table 21 - Competencies in the PMCD framework.....	67
Table 22 - IPMA ICB 4.0 competency areas and competency elements.....	69
Table 23 - Competence areas and Competency elements of the APM Competence Framework	71
Table 24 - The competency units of the AIPM Competency Standards for Project Management and related competence elements	72

Table 25 - Relationship between the knowledge areas of the four best-known project management competence standards	73
Table 26 - The Four-Level Certification System of IPMA.....	76
Table 27 - The number of competence elements checked in the IPMA (certification) interview section divided by competence areas	76
Table 28 - Self-assessment taxonomy in the four-level rating system of IPMA	78
Table 29 - APM certification levels	80
Table 30 - Level of certification that can be acquired in the five-level system of AIPM	81
Table 31 - The interoperability of AIPM RegPM to IPMA 4-L international certification at level A, B, C of IPMA	82
Table 32 - Relationship between different levels of project management competence..	85
Table 33 - Horizontal (content) knowledge areas of project management competence .	87
Table 34 - Relationship between horizontal (content) areas of project management competence and IPMA ICB 4.00 competency areas.....	89
Table 35 - Project types in different stages of operation in the upstream (exploration & production) business of the oil and gas industry	100
Table 36 - Companies involved in research	101
Table 37. The sample	105
Table 38 - Ranking of success criteria within the organization	106
Table 39 - RAG Status (Red-Amber-Green) Status analysis of Primary Project Objectives.....	107
Table 40 - Rankings of Competence Elements	107
Table 41 - Ranking of competency areas	109
Table 42 - The relationship between competency elements and success criteria	109
Table 43 - Organizational constraints	111

List of figures

Figure 1. Nine schools of project management.....	11
Figure 2. Interrelationship between project success factors and project success criteria.....	20
Figure 3. Interrelationship between project management competence and success of the organization.....	21
Figure 4. Hierarchical criteria model of project success.....	25
Figure 5. The classical project triangle and improved star model	26
Figure 6. Existential competences model of the personality.....	32
Figure 7. The project management competence levels in Turner's model	45
Figure 8. Cleland's competence elements.....	46
Figure 9. Relationship between the project management (professional) competence and competence of the project manager.....	47
Figure 10. The integrated model of competence.....	49
Figure 11. The three levels of competences in IPMA ICB V.4.0	58
Figure 12. Relation of Competence Levels in Project Management Competence Standards	64
Figure 13. IPMA ICB 4.0 „ <i>Eye of the Competence</i> ”	68
Figure 14. PMI „Talent Triangle”	75
Figure 15. Aspects of self-assessment in the four-level certification system of IPMA ..	77
Figure 16. Scales and minimum averages of the self-assessment.....	79
Figure 17. The relationship and interoperability of the AIPM Five-Level National Qualification System with the IPMA Four-Level International Qualification System...	81
Figure 18. ICB v.4.00 Eye of the Competence	89
Figure 19. The research model.....	90
Figure 20. The process of the empirical research	98
Figure 21. The gender distribution of the sample	103
Figure 22. The line position distribution of the sample	103
Figure 23. Distribution of the sample by qualification (Degree)	104
Figure 24. Distribution of the sample by nationality	104

Figure 25. Distribution of sample by type of projects managed	104
Figure 26. The competency elements and the success criteria.....	115
Figure 27. Organisational constraints	118
Figure 28. The ranking of success criteria within the organisation group	122
Figure 29. Relationship between the project management competence areas and the project success crietria	123
Figure 30. The organisational context's effect on the project management competencies' contribution to the project success	124

1. Introduction, aim of the dissertation and the relevance of the research topic

Today's global and complex economic environment forces organisations into continuous improvement and adjustment, so they implement more and more projects in order to reach their strategic objectives. Projects play a significant role in the economy, which is well-illustrated by the survey of the World Bank, which concluded that the amount of money spent on projects sums up to the 22 % of the world economy's aggregated GDP, so worldwide every fifth produced dollar comes from project-like activity. In some of the developing countries, for example in India this is 39%, while in China even higher, 43%. (*World Bank*, 2008)

In 2017 the Anderson Economic Group made a comprehensive study for the Project Management Institute - the biggest project management professional association - about the current status of the project management profession, in which it highlighted two important phenomena. On one hand, the report concluded that the global economy became more and more project-oriented. Besides the seven, previously identified project-intensive industries (manufacturing, business services, finance and insurance, oil and gas, information services, construction, utilities) project management had a growing role in other industries as well, for example in the health sector. On the other hand, the report forecasted a dramatic increase on the human resources market in the number of those jobs that require project management competencies. According to the survey employers will need 87.7 million workers in the field of project management until 2027 (*Project Management Institute*, 2013).

Project management – being interpreted as a profession or as a relatively young discipline – still includes a lots of questions to solve and many topics to discover. Because of the growing significance of the field both project management professionals and the academic world faced many challenges in the last decades. In the middle of the 20th century, which consider to be the start of the modern project management era, the creation and development of new project management knowledge, tools and methods (e.g. the creation of the work breakdown structure (WBS) or the evaluation of the PERT-program and the belonging review technique) were in the hands of the end-users (Morris, 1997). The US army, the National Aeronautics and Space Administration (NASA) and the construction industry has indisputable merits in the development of project management during this time. From the early 1980-s the biggest international project management professional associations - such as the American Project Management

Institute (PMI), the European rooted International Project Management Association (IPMA), the Association for Project Management (APM) from UK, and the Australian Institute of Project Management (AIPM) - were responsible for the development of the professional project management knowledge. These associations published those project management foundation standards which formed the basics of the professional knowledge. These standards distinguished project management from other research areas and contributed to its acknowledgement as an independent discipline. On the other hand, they serve as a base for the professional associations' project management qualification systems.

Many research highlighted the increasing gap between the supply and demand of skilled project management professionals in the past few years. In parallel, there is a growing attention toward the project managers' competencies within the organisations, especially towards the assessment and development of competencies. *Gareis and Huemann* (2007) considers the development of the relevant competencies as a key of the better performance on individual, group, organizational and social level as well. In *Kendra and Taplin's* (2004) project success model the competencies of the project manager serve as the most important elements of success. *Suikki et al.* (2006) pointed, that the competence development is one of those critical success factors of the projects, which contribute to the successful implementation of them. *Crawford* (2005) considers the competence of the project managers as the key source of the organisations' competitiveness.

Project success is one of the oldest research area of the project management. However, it is still difficult to even define the success itself. Many researchers have analysed the correlation between the project managers' professional competencies and the project or the organisational performance (*Crawford, 2000; Crawford, 2005; Kendra & Taplin, 2004; Koong & Liu, 2006*).

The literature review section firstly provides an overview about the significance and the evolution of project management, then the topic of the project success is presented, which is followed by the introduction of the general model of competence, then management and project management competencies will be defined. At the end of the section the most important project management competence standards are introduced and compared based on multiple dimensions of analysis.

The dissertation aims to provide a comparative overview on the literature of the project management competence and the related terms as well. Besides academic literature, the most important project management competence standards' project management competence definitions are also analysed and compared. The other primary aim of the dissertation is to identify the relationship between the project management competencies and the successful implementation of projects and to understand the related aspects. Based on the hierarchical criteria model of the project success (*Görög, 2013*) there is possibility to analyse the project management competencies' contribution to the project success not only based on the narrowly-defined efficiency, but in the dimension of effectiveness as well.

2. Literature review

2.1. Professional context of the topic: evolution, schools and paradigms of project management

Project management is considered to be a relatively young academic discipline, even so many research initiatives have already aimed to identify the trends, evolution phases, and the schools of the modern-day project management. Since the middle 1980's many researches have been conducted to summarize the possible viewpoints and trends of project management, i.e. to define the schools of project management.

Anbari (1985) differentiated five basic phases in his research: (1) the management science school, (2) the functional school, (3) the behaviour school, (4) the system school, and (5) the contingency school. In the early 2000's *Söderlund* (2002) and *Bredillet* (2004) already mentions seven schools: (1) the optimization school, (2) the transaction cost school, (3) the behaviour school, which is called organizational school by *Bredillet*, (4) the contingency school, (5) the critical success factor school, (6) the decision school and (7) the marketing school.

One of the most comprehensive study in this topic was created by *Turner et al.* (2013), who have identified nine project management schools based on the above approach and they expanded it. Figure 1. illustrates the nine project management schools on a chronological scale.

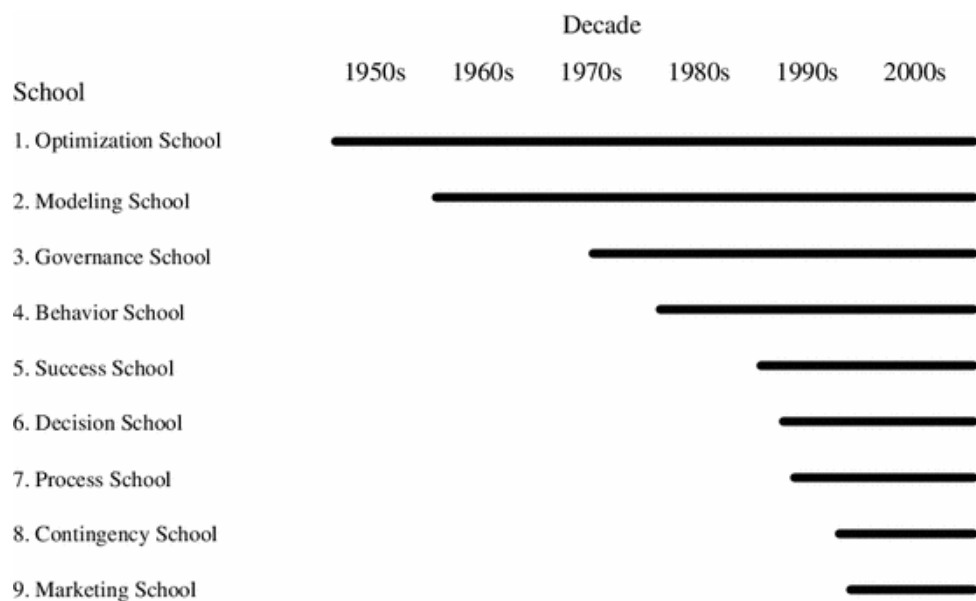


Figure 1
Nine schools of project management
Source: *Turner et al.* (2013, p. 11)

Modern project management roots in the *optimization school*, which began in the late 1940's. The first project management school has its roots in the classical management and decision science and operations research. This school could be identified after World War II and it put the biggest emphasize on the different time planning (scheduling) and optimization methods, in which project tasks were broken down into smaller components, they were scheduled, and finally the related resources were allocated to them. The bar chart, which developed by Gantt in the early 1900's, and the the later developed network diagrams (e.g. MPM and CPM network diagrams) were widely spread at that time to illustrate project time plans. Many of those time-, resource- and cost planning tools and techniques, which are used even today, the so-called project management "hard skills" are derived from this school.

There was growing attention on the so-called primary project objectives (or project constraints) from the beginning of the 1950's. The *modeling school* highlighted one of the main characteristics of the projects, which is their *complexity*. In the classical project constraints theory identified three primary project objectives: time, cost and scope (and quality), these are the elements of the project triangle. *Anbari et al.* (2008) introduces the secondary project constraints: customer expectations, final quality and mitigation of risks. Another innovation of this school is to involving the theory of Soft systems methodology's (SSM) into project management, which focused on the *uncertainty* of the projects, uncertainty of the organizational contexts and the broader project environment and highlighted the importance of change management.

The *governance school* also brought many new viewpoints into the theory of project management. Firstly, the project-oriented organization approach was appeared, mainly at investment projects, in which the projects are defined as legal entities, i.e. the project is defined as an interface between the client (the project owner) and the agency (the contractor). Secondly, this school was spreading the idea of viewing the project as a temporary organization. (*Lundin and Söderholm, 1995; Turner and Müller, 2003*). The theory distinguishes the temporary nature of projects from the permanent nature of the project owner (client) organization.

The *behaviour school* inspired by project as a temporary organization concept highlights the so-called „soft" aspects – primarily the human aspects - of the projects, which are deriving from the organizational features of the project. Based on the discipline of organizational behaviour and human resource management, the school analyses the

optimal operation of the project teams. According to *Turner* (2009) the main focus of project management is leading the people.

The ***success school*** examines the relationship between the project and the business or strategic goals. It has two main research fields: project success factors and project success criteria. Success factors can contribute to the successful implementation of projects, while the success criteria can make it possible to measure the level of project success. *Jugdev and Müller* (2005) gave a comparative overview on the related literature of this school.

The ***decision school***'s main innovation is pointing out the importance of those decision making processes, which are related to the projects. The most important questions are: which are those decisions which can lead to the successful implementation of a project; which certain decisions have to be made in the initiation phase of a project. The role of the information flow and uncertainty are important in this school as well.

The quintessence of the ***process school*** is that projects are tools, which help the organization to reach a desired better position. The project implementation is considered to be the process of this improvement. The concept of project life-cycle and the project maturity are introduced in this school, as well as the model of the project oriented organization. This school points out that different project types require different project processes.

The ***contingency school*** stands closest to my research topic. This school recognizes the existence of different project types. Besides underlining the categorization of the projects, the school highlights that different leadership styles could be effective at different projects and so different management and project management competencies could contribute to the successful completion of the projects.

The ***marketing school*** has double definition for project marketing: on one hand there is great emphasis on analyzing the stakeholders, selecting the most appropriate project organizational arrangement, revealing the relationship between the client and the contributors, focusing on the management acceptance of the projects, understanding the general approval of the project within the client organization. The strategy oriented approach of projects is also underlined here, because it is highly important to link the project objectives to the strategic objectives of the company. On the other hand, it has another interpretation as well, which is selling the project result to the possible clients.

Table 1 introduces the nine schools representing the evolutionary phases of project management. The schools are distinguished based on the dimensions of the applied metaphor for projects, the basic role of project management, the related scientific fields and the key focus points.

Table 1 - Nine schools of project management

The project management school and the applied metaphor for projects	Basic role of project management	Related scientific field (Kwak and Anabari, 2008)	Key variable, focus point of the analysis
Optimization School <i>„The project as machine”</i>	Optimizing project achievement by mathematical processes	Operations research	Time
Modelling School <i>„The project as a mirror”</i>	Project modelling based on hard and soft-systems theory	Performance and quality management	Time, cost, performance, quality, risk
Governance School <i>„The project as legal entity”</i>	Governing (managing) projects and the relationship between project participants	Engineering science contracting/ law	Project results, participants, governance mechanisms
Behavior School <i>„The project as a social system”</i>	Managing the relationships amongst project participants	Organizational behaviour, human resource management	Individuals and the group
Success School <i>„The project as a business objective”</i>	Defining success and failure, case studies	Strategy	Success factors and success criteria
Decision School <i>„The project as a computer”</i>	Information processing through the project life-cycle	IT/ IS	Information, basis of decisions
Process School <i>„The project as an algorithm”</i>	Finding appropriate path to the desired outcome	Technology, innovation	The projects, their processes and sub-processes
Contingency School <i>„The project as a chameleon”</i>	Categorizing the project types to select appropriate systems	-	Factors differentiating the projects
Marketing School <i>„The project as a billboard”</i>	Communicating with all stakeholders to obtain their support	-	Stakeholders and their commitment to the project and project management

Source: own, based on *Turner et al. (2013)* and *Kwak and Anabari (2008)*

The different project management schools applied different approaches and defined projects in different ways, highlighting new aspects of this profession and scientific field. *Kuhn* (1984) highlights the fact, that the paradigm of project management discipline is not a unified and objective framework, but a set of viewpoints accepted by the project management community. *Shenhar and Dvir* (2007) – based on the triple definition of projects - differentiate three main paradigms of project management:

1. project as a process,
2. project as an organization,
3. project as a building block of the organisational strategy.

The classical approach defines the project as a task, in order to reach a certain objective, which has time, cost and quality constraints. The second approach can be linked to the “project as a temporary organization” theory (*Lundin and Söderholm*, 1995; *Turner and Müller*, 2003), which defines projects as a temporary organizations operating within permanent organizations. This approach focuses on the importance of group management and the soft skills of the project managers. *Schmid and Adams* (2008) defines project management as the management of a temporary team. The third theory defines projects as strategical building blocks of the organisations. Besides the organizational embeddedness of the projects this approach underlines the strategic origin of projects, the importance of analysing the operational environment and the project stakeholders. „*The project management is one of the most important tools in how the organization is transformed from one phase to another*” (*Cleland*, 1994, p. 34, cf. *Görög*, 2013, p. 3).

It is important to emphasise, that these paradigms of project management do not deny each other, but they co-exist and highlight different new aspects and features of projects. The introduced nine schools of project management can be linked to the project management paradigms, based on their basic role of project management. Table 2 displays the relationship between the nine schools and the main paradigms of project management.

Table 2 - Link between project management schools and paradigms

Project management schools		Project management paradigms
Optimization School Modeling School Decision School Process School		Project as a process
Governance School Behaviour School	Marketing School	Project as an organization
Success School		Project as a building block of the strategy

It is important to clarify the differences between strategic management and project management and differentiate these management dimensions, especially in case of the third paradigm (the project as a building block of the strategy). *Görög and Smith (1999)* distinguish three management dimensions within the organization: strategic, project and operational management, which he compared based on six aspects (*Görög, 2008*). The differences between the three dimensions are introduced in Table 3.

Table 3 - Management diemnsions within the organization

Aspects of the comparison	STRATEGIC MANAGEMENT	PROJECT MANAGEMENT	OPERATIONAL MANAGEMENT
Time horizon of decision making	Long-term	Middle-term	Short-term
Influence on the entire organization	Decisive on long-term	Decisive on middle-term	Decisive on short-term
Motivating sources	The likely future operational environment	Beneficial change in the expected result, within predefined cost and time	Available resources or/and the actual market
Nature of the task	Complex, innovative	Complex, innovative	Routine-like, standardized
Continuity of the task	Quasi-continuous	One time but recurring	Continuous
Latitude of the activity	The entire organization	The entire organization or more functional units	Functional units

Source: *Görög (2008, p. 20)*

Considering its organizational effect, project management can be found between strategic management and operational management. Regarding their continuity, the projects can be temporary, unique, single (sometimes recurring), while the operational functioning is continuous, such as the strategic management, which is quasi continuous. *Mayor et al. (2006)* besides the above-mentioned factors, points out the importance of the result and the cost and the time constraints of projects.

Labuschagne and Brandt (2005) set the operational functioning against the project tasks, and point out that the result of the project is unique and new outcome, while the operational functioning has repeating outcome. They compare the temporary nature and fixed budget of the projects with the continuousness and periodical (ex. yearly) budget of the operational functioning, the uniqueness of the project which require interdisciplinary knowledge against the routine feature of the daily operation which require mainly specialized knowledge. Based on the above, widely accepted features, it is not surprising, that there are lots of similarities in the definition of projects and project management in the literature.

Table 4 introduces the project and project management definitions of the most common industrial standards.

Table 4 - Project and project management definitions

PROJECT	<i>„A project is a temporary endeavour undertaken to create a unique product, service or result in order to achieve an outcome.” (Project Management Institute, 2012, pp. 13, & Australian Institute of Project Management, 2008, p. 3)</i>
	<i>“A project is a unique, temporary, multi-disciplinary and organised endeavour to realise agreed deliverables within predefined requirements and constraints.” (International Project Management Association, 2015, p. 27)</i>
	<i>“Projects are unique, transient endeavours undertaken to achieve a desired outcome.” (Association for Project Management, 2008, p. 3)</i>
PROJECT MANAGEMENT	<i>“ is a management field, which utilize the information, the resources - especially the members of the project team – and the project management tools to reach a predefined project objective considering the time and cost constraints” (Görög, 2013, p. 10)</i>
	<i>„ the application of knowledge, skills, tools and techniques to project activities to achieve the required project outcome.” (Project Management Institute, 2012, p. 14, & Australian Institute of Project Management, 2008, p. 3)</i>
	<i>“Project management is the process by which projects are defined, planned, monitored, controlled and delivered such that agreed benefits are realised.” (Association for Project Management, 2008, p. 3)</i>

2.2. Concept of the project success

2.2.1. Defining project success

Parallely with the growing importance of project management and the growing number of projects, organizations implement more and more type of projects. Beyond the traditional investment projects new categories of projects came into existence like the organizational development projects, research and development (R&D) projects and the IT projects. Because of the diversity of the projects and the project results - especially the non-quantitative results - project managers and the project client organizations faced with new type of challenges, and success of the projects has become one of the most important questions of the profession.

Carden and Egan (2008) pointed out that there is no unified definition for project success in the project management literature. The relevancy of project success is represented by the fact, that the topic has been mentioned more than ten thousand times in the two most important professional journals - the International Journal of Project Management and in the Project Management Journal - between 1986 and 2004 (*Ika*, 2009). The most recognized organization, which is dealing with project success, is the Standish Group. This independent, international research consultancy firm was founded in 1985 and it publishes a so-called „Chaos Report” based on a database specialized in IT projects every year. The report introduces the percentage of the successfully finished projects, as well as the challenged and the failed ones in the given year. Currently more than 50 000 project’s data can be found in their database, so this considered to be one of the biggest resource pools of this topic in the world. Their annual analysis highlights that there is no significant change regarding the percentage of the successful projects in the recent years. Approximately 70% of the projects are *not* completed according to the plans in every year, as is shown in Table 5.

Table 5 - Success rate of the IT projects (2011-2015)

	2011	2012	2013	2014	2015
Successful	29%	27%	31%	28%	29%
Challenged	49%	56%	50%	55%	52%
Failed	22%	17%	19%	17%	19%

Source: *The Standish Group* (2015)

There is no consensus regarding the definition of the project success in the literature. Görög (2013) defined project success as follows: „*a project may be considered to be successful if the outcome of the project - the project result – contributes to achieving its underlying strategic objective in the organization and both the implementation process of the project and the project result itself are accepted by the stakeholders at the same time*” (p. 35). Understanding project success can be difficult of its own, so the two related terms can contribute to the better understanding of the concept: the definition of the success factor and the success criteria, and understanding the difference between them.

Belassi and Tukel (1996) were the first who pointed out the differences between the success criteria and success factors. To define and to understand the project success it is absolutely necessary to differentiate these two basic terms. In today's project management literature the differentiation of these two components of project success is already accepted (Jugdev and Müller, 2005; Morris and Hough, 1987; Wateridge, 1998; Turner, 1999).

- *Success criteria* make possible to measure project success. These are the objectives or targets and their achievement can be controlled and evaluated after the implementation of the project (Cooke-Davies, 2002). They are dependent variables, which help to measure project success. (Müller and Turner, 2007a).
- *Success factors* are those influencing elements, which directly or indirectly contribute to the project success, i.e. they are the independent variables of success achievement (Bredillet, 2008). Critical success factors are those, which highly contribute in achieving success based on a predefined project success criterion (Fortune and White, 2006).

In his dissertation Blaskovics (2014) introduces the link between these two concepts. In his interpretation the success factors are focusing on the parameters leading to success, so they deal with the input aspect of project success, while the success criteria make it possible to measure project success, so their focus is on the output aspect of it.

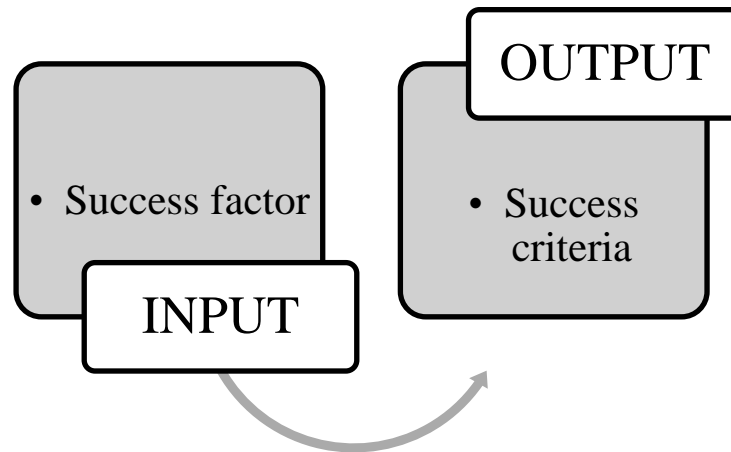


Figure 2
Interrelationship between project success factors and project success criteria
Source: own compilation, based on *Blaskovics* (2014)

In the following sections those aspects of the success factor and success criteria literature will be introduced which are relevant considering the scope of the dissertation.

2.2.2. Project success factors

Deciding which factors contribute to the successful implementation of the projects is strongly linked to the basic project paradigms. The paradigm which interpret *project as a process or a task* consider the successful application of project planning tools and techniques (time, resource and budget planning) as the most important factor; the *project as a temporary organization* paradigm puts human competencies into the focus point. The third paradigm describes the *projects as building blocks of the organisational strategy*, so the emphasis is on the understanding of the project environment and the related industry. The domain knowledge of the project result and the stakeholders' satisfaction are also important factors here.

Project success factors differ from the critical project factors (CPF), which – in *Rockart* (2002)'s interpretation – are those special factors which are mostly increasing the successful completion of the projects.

Pinto and Slevin (1988)'s research is one of the most important in this topic. Based on their questionnaire, which had 418 question elements, they identified ten internal (project mission, top management support, project scheduling/plan, team, technology which supports the projects, client's acceptance, monitoring feedback, communication channels and problem-solving expertise) and four external (characteristics of the leader of the

project team, power and politics, environmental incidences and emergency) critical success factors.

Khang and Moe (2008) distinguish three groups of the success factors: competence-related, motivation-related and project environment-related success factors.

Critical success factors has a broad literature in project management and there is a consensus that the competencies of the project managers have great influence on the project success. “*Project success or failure highly depends on the professional knowledge of the managers responsible for projects and on the knowledge of their colleagues*” (Görög, 2013, p. 39).

Toney (1997) sees the key of project success in selecting the appropriate project manager. Based on many researches (*Beer et al.*, 1990; *Karpin*, 1995; *Smith et al.*, 1984, *Pinto and Kharbanda*, 1995) *Crawford* (2005) revealed a relationship between the competencies of the project team members and the project success achieved, so indirectly they contribute to the successful operation of the organizations.

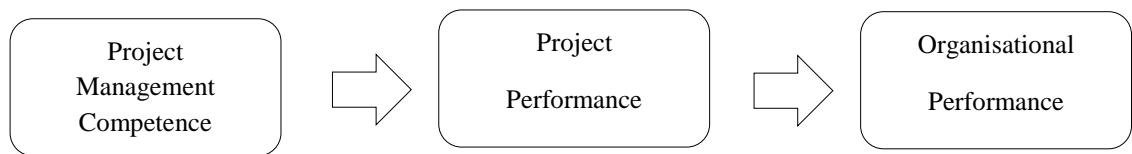


Figure 3
Interrelationship between project management competence and success of the organization

Source: *Crawford* (2005, p. 8)

Crawford's model highlights that project management competences serve as inputs of project success, so there is high demand for professionals possessing the necessary competencies in the field of project management (*Project Management Institute*, 2017a).

2.2.3. Project success criteria

The other dimension of project success analysis are the measuring aspects, which are manifesting in the success criteria. Researchers suggest that the success of project management needs to be distinguished from the success of projects (*De Wit*, 1988; *Baccarini*, 1999). *Jugdev and Müller* (2005) evaluates the success of project management based on the predefined time and cost constraints and to what extent they were met. The authors define it as the *efficiency of the project management*. At the same time, they also

define *the effectiveness of the project result*, which measures the impact of the project result, how the project served the underlying strategic objective of the organization.

Shenhar et al. (2001) – related to the theory of the competitive advantages – determine four basic aspects of project success: (1) efficiency (time and budget constraints, meeting quality requirements), (2) effectiveness (meaning client satisfaction), (3) business success (based on commercial value and market share) and (4) the preparation for future (new technological and operational infrastructure, and market opportunities). Many authors have adopted this model (*Bryde, 2008; Dvir et al., 2006; Jugdev and Müller, 2005*). In their triple success criteria model *Pinto and Mantel (1990)* mention the success of the project's implementation process, the detected understanding of the project and the client (project owner organization) satisfaction. *Atkinson (1999)* also identifies three success criteria elements: success of the process, success of the system (his questionnaire was IT projects related) and the business usefulness/profitability.

Müller and Turner (2007) claims that projects differ from each other in size, uniqueness (character) and complexity, so success evaluation needs to use different criteria systems. *Baccarini (1999)* has pointed out that the priority of project success evaluation can be different depending on the strategic objectives of the organizations: sometimes the key success criterion is to be on time, other times quality becomes a more important criterion. *Baccarini (1999)* describes the relationship between the project management success and the success of the project result. In their interpretation the success of the project management process has an impact on the success of the project result; or success of the project result can justify the success of the project implementation process retrospectively.

Different projects require different type of management and management processes (*Crawford et al. 2005*). The same can be true in case of project success criteria systems. The project sponsor or project manager have to define the success criteria system which is relevant to the needs of the project and they have to point out those success factors, which contribute to the successful completion of projects (*Wateridge, 1995*).

Müller and Turner (2007) phrased the following statements regarding project success:

- (1) *“different success criteria are relevant for different types of projects or for projects from different industries,*
- (2) *different types of project perform differently against the different success criteria,*
- (3) *project managers focus on different success criteria depending on their traits,*

- (4) *project managers perform differently against the different success criteria depending on their traits,*
- (5) *project success varies according to the importance attached to the success criteria.” (Müller and Turner, 2007, p. 299)*

Jugdev and Müller (2005) determined two expectations regarding the project success criteria models: (1) holistic approach: all the relevant criteria needs to be involved in the evaluating model, (2) reality: the criteria-based evaluation should reflect the reality.

Shenhar et al. (2001) claims that the success criteria need to evaluate the success of the project both on short and long term. *Jaafari* (2007) agrees and points out that the efficiency related success criteria can be evaluated basically on short term, while the project result effectiveness related success criteria can mostly be evaluated on the long term.

The 6th edition of the Project Management Body of Knowledge determines the following success criteria (*Project Management Institute, 2017b*):

- compliance with the project’s income/benefit plans,
- compliance with the financial indicators set in the feasibility study defining the business opportunities of the project (NPV, ROI, IRR, PBP, BCR),
- compliance with the non-financial objectives set in the feasibility study defining the business opportunities of the project,
-
- compliance with the expected quality of the project result,
- integration of the project results in the operational environment of the organization,
-
- compliance with the conditions of the contract,
- compliance with the organizational strategy and objectives,
- compliance with the objectives of organizational governance,
- reaching the expected positive changes in the organization,
-
- stakeholder satisfaction,
- customer/end-user satisfaction,
-
- other criteria.

These factors can be divided to four basic competence categories based on their content. The business value-based criteria of project success can be found in the first category. In the literature the appearance of the *value-based approach of project success* or the *evaluation on financial evaluation methods* (cf. *Blaskovics, 2014*) relates to the work of some researchers (*Freeman and Beale, 1992; Gardiner and Stewart, 2000; Yu, 2005*), which authors made an attempt to evaluate project success based a on success criterion

which measure the success against a single, quantitative indicator. Net present value (NPV) theories (*Freeman and Beale, 1992; Gardiner and Stewart, 2000*) only tested the compliance with the client organization's financial objectives and they were only the retrospective versions of the financial feasibility analysis which should have been prepared before the project completion in the feasibility studies. *Angus (2005)* introduces two measurements to evaluate project success: the net present execution cost (NPEC) of the project and the net product operation value (NPOV) of the project result, net. The biggest criticism of the value-based project success approach is that it evaluates projects only based on one single aspect, which is the financial return, so the evaluation of the project implementation process and also stakeholders' aspect is completely ignored (*Görög, 2013*).

Meeting the primary project objectives (time, resource and budget plans, as well as quality) can be found in the second criteria category. The satisfaction of the client (project owner) organization (meeting the organizational objectives) is in the third category, while the fourth category deals with stakeholder satisfaction.

The hierarchical project success criteria model will be presented in the upcoming section. The different stages of the project success evaluation will be intruded at the different criterion levels of the hierarchical model.

2.2.4. Hierarchical project success criteria model

The interrelationship between the previously identified success criteria can be grouped into two approaches. In the one level approach all different evaluation criteria have the same weights, while in the hierarchical models a hierarchy can be detected in their relation (*Görög, 2003*). Based on the literature *Görög (1996)* distinguished three criteria in his hierarchical model based on which project success can be evaluated, these are as follows:

- stakeholder satisfaction,
- client satisfaction,
- project triangle.

The three criteria levels' interrelationships are presented in the hierarchical criteria model, which is presented in Figure 4.

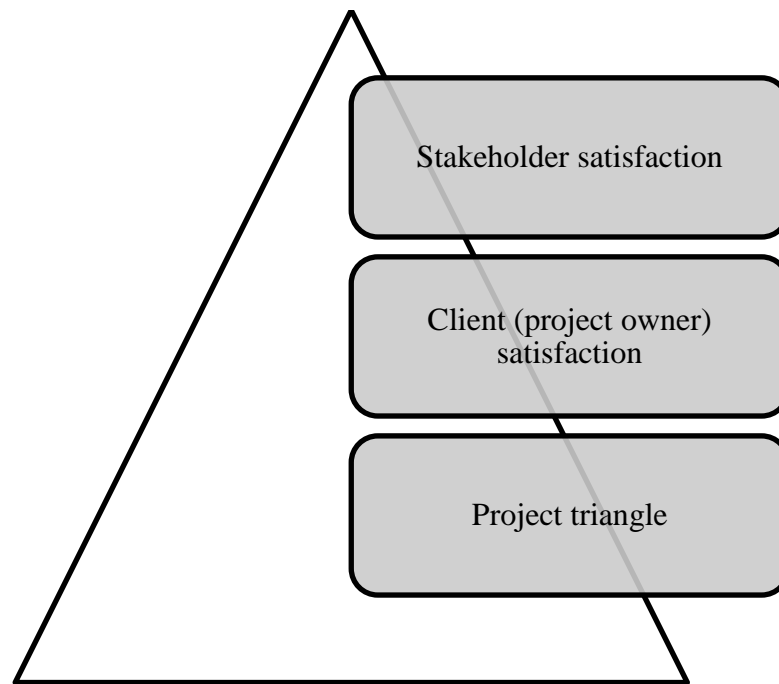


Figure 4
Hierarchical criteria model of project success
Source: own compilation based on Görög (2007)

- *Project triangle*

The origin of the project triangle theory is not clear even today, but the three main constraints of projects can be found in the literature since the 1950's. It also has other names like iron triangle, triple project constraints or primary project objectives. The essence of the project triangle theory roots in the statement that a given project task can always be defined with three main elements: the end result to be achieved, the time and the cost to implement the project. Traditionally, the elements of project triangle are set in triangle shape, because it symbolizes the mutual interdependence of the three elements. None of them can be changed without affecting at least one of the two others. The desired project result can be achieved in shorter time, but this likely leads to growing budget or on the contrary, cost savings can lead to expanding timelines or lower quality end results. Time and cost are stable elements of the model, but the result is often replaced with other terms eg. the quality of project result, goal or product. In the 4th version of Guide to Project Management Body of Knowledge's (PMBOK) (*Project Management Institute, 2009*), the model was extended and illustrated with two triangles. The new model is called as the Project Management Star. Besides the original project constraints risks, resources and quality are also represented. This new model separates the input (defined during planning) project constraints from the constraints arising during the process of project achievement (*Project Management Institute, 2009*). The two project triangle models are shown in *Figure 5*.

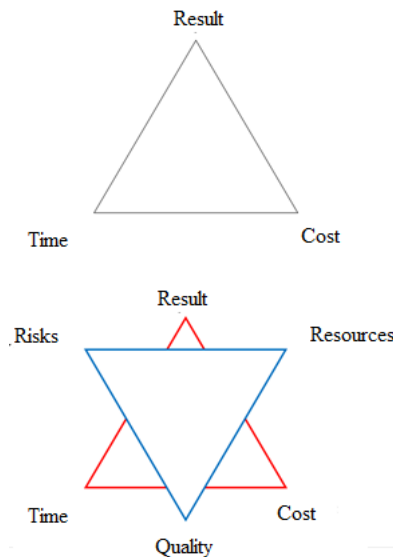


Figure 5
The classical project triangle and improved star model
Source: *Project Management Institute* (2009)

Those strategic decisions of the organisations, which are connected to the elements of project triangle, determine the primary project objectives in every case. Considering the arising project ideas the most appropriate combination of the primary constraints are selected when the organizational project portfolio is determined.

- *Evaluation based on the client (project owner) satisfaction*

Besides the project triangle, project success can be evaluated based on the satisfaction of the client (project owner) organisation. This dimension analyzes the fulfillment of that strategic objective which called the project into existence. *Aubry et al.* (2007) concludes that besides the quantitative aspects of the project's organizational value creation process, the qualitative success aspects also need to be analyzed. Project triangle evaluates the success basically in a quantitative, objective, measurable way, since the satisfaction of project owner organization can be measured against quantitative and qualitative indicators. Usually, the achievement of the organizational objectives can be measured with quantitative methods immediately after the completion of the project, but there are cases, when the measurable target value can be evaluated just after a certain period of time and there are organizational objectives, which can not be evaluated with quantitative methods at all.

- *Evaluation based on stakeholder satisfaction*

In project management literature there is a growing attention towards project stakeholder analysis nowadays (Sutterfield, 2006). Everybody can be considered as a project stakeholder, who is somehow affected by the project Cleland (1994). Görög (2013) gives a more precise definition: “*every individual or one-time or organisational community, whose members has a common (or similar) financial or non-financial stake in the project implementation process or the project result itself, and the members of the group has common or similar attitude and behaviour towards the project*” (Görög, 2013, pp. 124, cf. Sutterfield et al. 2006). Stakeholders of the project implementation process can be distinguished from the stakeholders of the project result (or the operation of the project result). The satisfaction of the stakeholders can be interpreted in two ways: (1) how (to what extent) do the stakeholders accept the result of the project, and (2) how (to what extent) do the stakeholders accept the implementation process of the project. The difference could be interpreted by an example: members of the local community can have a really supportive attitude towards the result of new shopping centre building project, which is close to their homes but they have a hostile attitude towards the implementation process (construction), because of the caused discomfort.

As a summary, the lowest criterion level of the hierarchical success criteria model evaluates the project success based on the efficiency, the upper two levels mostly based on its effectiveness. The model has interdependent hierarchy levels, so the success criterion at the biggest hierarchy level assumes the success of the lower levels, or at least the lower levels’ success can contribute to in the achievement of the higher levels. Success measured against the project triangle has an effect on the satisfaction of the client (project owner) organisation’s satisfaction and they influence the stakeholder satisfaction. It is important to mention the flexibility of the model, that higher levels could be evaluated as a success even if the lowest levels are showing failure. The four fundamental advantages of the model are as follows:

(1) *Efficiency and effectiveness analysis.* The model could analyze project success based on both efficiency (basically the first criterion level) and effectiveness aspects (basically the second and third level).

(2) *Flexibility - evaluation the project success based on the different success criteria.* Thomas and Fernandez (2008) pointed out that it can cause a problems in real situations – both at one-level and at hierarchical models –, that the projects are often successful

based on some of the criteria, but unsuccessful based on others. This highlighted the importance of interpret the levels of the hierarchy model on their own, neglecting the hierarchical structure. *Lindahl and Rehn* (2007) regarding hierarchical models mention, that upper levels – e.g. the satisfaction of the stakeholders – can be achieved, even if the project is not on time and to budget. The client (project owner) organization also can evaluate a project as a success if it meets its strategical objectives, but it can be unsuccessful based on the project triangle. The contrary can also be true. A project can be successful based on efficiency, satisfies the project owner organization, so the first two criteria levels are met, still the stakeholders neglect it.

(3) *Prioritisation of the criteria.* Connecting to the previous point the organization can set a priority – consistent with its strategical objectives – amongst the success criteria of the model.

(4) *Evaluation of project success based on different viewpoints/from different stakeholders' perspective.* Project team members or in broader sense all the stakeholders of the project can evaluate the project success against different criteria.

2.3. The project management competence

2.3.1. Competence and professional competence

Many academic disciplines deal with competencies including human resource management, management science, pedagogy and also psychology. Competence considers to be one of the most contradictory term in organization theories, because different interpretations are related to it, so it is one of the most contradictory term of the literature (*Robotham and Jubb*, 1996). Many researchers have pointed out this problem, there is a lack of consensus and unified definition regarding competence in the literature (*Schippmann et al.*, 2000; *Senghi*, 2004). The intangible character of competence makes it difficult to describe, so its existence can rather be detected indirectly (*Heywood et al.*, 1992). There is no general consensus regarding the term, because it is not a “clear” phenomenon (*Görög*, 2013), it has many components, so the definition can be made from many viewpoints. The Oxford English Dictionary (*Brown ed.*, 1993) has the following description: “*power, ability or capacity (to do, for a task etc.) (p. n.a)*”. Fundamental criticism of the published research results in the topic is that the term is ambiguous, many times mistranslated (*Iles et al.*, 2010). The Pedagogical Lexicon defines competence as:

"basically a mental (cognitive) feature, but motives, abilities and other emotional elements play a very important role in it" (Báthory & Falus ed., 1997, II. book, pp. 266).

Professional competence approaches

The dissertation analyzes competence especially from one profession's aspect (project management), so it is worth defining the professional competence beyond competence in general. The term "competence" has its origins in Latins, and it means "jurisdiction". In the everyday language the term is used in a broader sense, meaning jurisdiction, rights, responsibility or many times skill and expertise (Nagy, 2000). Woodruffe (1992) labels the competence as a collective term, which integrate all terms which relate directly or indirectly to the workplace performance. Professional competence can be viewed from various aspects. A person's knowledge, skills, ability, attitude, personality traits could serve as a starting point. On the other hand, competence can be derived from the expected performance of the given work environment. One of the most important literatures is the book of Heywood and his colleagues in this topic (Heywood et al. 1992). They distinguish two competence approaches:

- the attribute-based approach, where competence is derived from the personal features and traits of the individual,
- the performance-based approach, where competence is interpreted based on the completed activities.

The attribute-based approach can be derived from McClelland (1973)'s psychological personality theory, which has three main elements: the individual's subconscious characteristics, his self-image, and his observed behaviour patterns. Boyatzis (1982) builds on this theory, in his book the "*Competent manager*", in which he focuses explicitly on management competencies, defining competence as follows: "*an underlying characteristic of the person that leads to or causes effective or superior performance*" (Boyatzis, 1982, pp 21).

Elements of competence in the attribute-based competence approach

In McClelland and Boyatzis's approach the competence is a basic underlying characteristic, which contributes to better work performance. One of the biggest problem is, that is difficult to identify the measurable (professional or managerial) components of competence, and then – based on these components – to create a unified and comprehensive professional performance evaluation/development system (Vaishya et al.,

2016). The two most recognized authors of the attribute-based approach are *Spencer and Spencer* (1993), who defined competence, as: “*an underlying characteristic of an individual that is causally related to criterion-referenced effective and/or superior performance in a job or situation*” (*Spencer and Spencer*, 1993, pp. 9).

They have broken down competence to five elements: motive, trait, self-concept, knowledge and skill. Elements of the competence are summarized in table 6.

Table 6 - Elements of competence

Motives	<ul style="list-style-type: none"> ▪ consistent thinking of the individual on what he would like ▪ what motivates, drives his actions ▪ choosing behaviour pattern to reach certain activities or goals
Trait	<ul style="list-style-type: none"> ▪ psychological characteristic ▪ consistent response to certain information or situations
Self-concept	<ul style="list-style-type: none"> ▪ attitude, values and self-image of the individual
Skill	<ul style="list-style-type: none"> ▪ the individual’s information about a certain field, matter
Knowledge	<ul style="list-style-type: none"> ▪ the ability to carry out a physical or mental task.

Source: *Spencer and Spencer* (1993); cf. *Alam et al.* (2008)

Work environment – based competence in the two-dimensional holistic competence model

Delamare Le Deist and Winterton (2005) created a two-dimensional holistic competence model (Table 7), where one axis represents the personal and occupational competencies, and on the other axis represents the conceptual and operational competencies. In terms of these two dimensions, the co-authors differentiate four competence categories: cognitive, functional, social and meta competencies.

The model can be aligned with the KSA model used in training programs (*knowledge, skill, attitude*).

- The knowledge (and the related understanding) implies a cognitive competence.
- The skill implies a functional competence.
- The attitude (as well as behaviour) can be aligned with social competence.

The highest level, which is the meta competence is built on these three, which supposes the existence of the former three competencies and builds on their synergy.

Table 7 - Competence categories

	Conceptual	Operational
Personal	META competence	SOCIAL competence
Occupational	COGNITIVE competence	FUNCTIONAL competence

Source: *Delamare Le Deist és Winterton* (2005), p. 39.

Public education systems' cross-curriculum competence groups

Similarly to the professional qualification systems, also in the public education systems can be detected that the traditional knowledge-based pedagogy is replaced by the competence-based, criterion-oriented pedagogy (Nagy, 2000). In today's educational frameworks – such as the national core curriculum – the competencies are given special attention. The nine cross-curriculum competencies can be grouped in nine categories (Ranschburg, 2004):

- intellectual competencies: use of information, problem solving, critical thinking, creativity,
- methodological competencies: use of effective work methods, information and communication technologies,
- personal and social competencies: identity, co-operation with others,
- communication.

Special/professional competence in the model of personality's existential competences

Nagy (2000, 2007) elaborated the existential competences model of the personality, which differentiates four different types of competence:

- personal competence,
- social competence,
- cognitive competence,
- special/professional competence.

The main goal of the personal competencies is to serve the interests of the individual and to assure his/her biological survival, while social competences serve the interests of the community, and broadly the survival of human kind. These are the basic functions of existence. The cognitive competence supports the other competencies. It is the ability of

problem-solving and information processing, “by using, receiving, coding, transforming, creating, constructing, storing, transferring information” and „by the conscious useage of information constious learning conscious research, conscious thinking” (Nagy, 2010, pp. 11). The special/professional competencies contribute to the efficient fulfilment of “thousands of special functions, different professions, occupations, special activity circles” (Nagy, 2010, 11. p). Figure 6 shows the relationship of competencies in Nagy’s model.

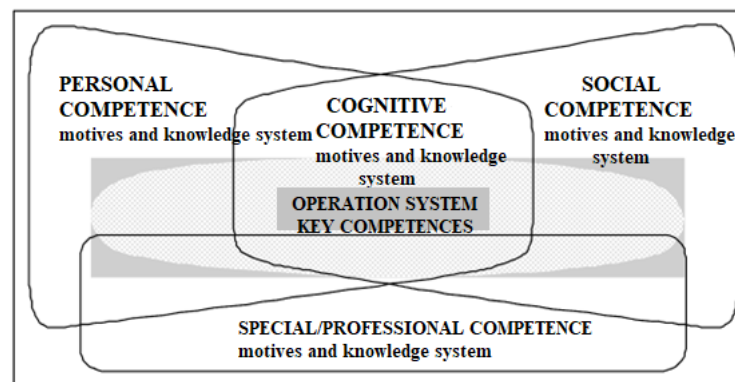


Figure 6
Existential competences model of the personality
Source: Nagy, 2010, p. 12

2.3.2. Relationship between the managarial competence and leadership style in project environment

The managerial competence theories focus on those competences, which can determine the workplace performance of the managers (Kets de Vries and Florent-Treacy, 2002; Marshall, 1991; Zaccaro et al., 2001). One of the earliest researches is related to Barnard (1938) in the topic. In his interpretation a manager has to perform both “cognitive” and “cathetic” tasks. Cognitive functions are:

- guiding,
- directing,
- constraining choices and actions,

while cathetic functions are:

- goal-setting,
- developing faith,
- commitment to a larger moral purpose.

Based on a longitudinal analyses focusing on young managers Schein (1978) distinguished three different managerial competence categories: analytical, emotional and

interpersonal. In his interpretation the analytical competence is the summary of all abilities needed to identify problems, to analyze and to solve them in insecure and information-lacking situations (Schein, 1978; see Csepregi, 2011). The emotional competence makes the manager able to not get crippled by responsibility, and to practice his power without a sense of guilt or embarrassment (Schein, 1978; see Csepregi, 2011). The interpersonal competence is the ability to manipulate, to supervise, to lead and to control people in all levels of the organization, in order to accomplish most effectively the organizational objectives (Schein, 1978; see Csepregi, 2011).

Kets de Vries and Florent-Treacy (2002), Marshall (1991), Zaccaro et al. (2001) altogether they create four managerial competence groups: cognitive, behavioral, emotional and motivational.

Dulewicz and Higgs (2003) based on their comprehensive literature review, distinguished 15 managerial competencies, and divided them into three competence groups: intellectual – IQ, managerial – MQ and emotional – EQ (see Table 8).

- *Intellectual competence* belongs to the cognitive group considering the grouping presented earlier. It focuses basically on intelligence and problem-solving abilities, and it includes three competence dimensions.
- *Managerial competence* implies the knowledge and ability related to the functional management fields and it could be broken down into five further elements.
- *Emotional competence* includes behavioral, emotional and motivational categories, and seven competence dimensions belong to this.

Based on the competence-profiles of managers Dulewicz and Higgs (2003) distinguished different leadership styles. They identified three change levels based on the rate of change detected in organizational transformation projects. They allocated the coherent leadership styles to the organisational change levels, as follows:

- in a radically changing environment the *engaging*,
- in a non-radically changing environment the *involving*,
- in a relative stable environment the *goal-oriented* leadership style.

Two years later, they have generalised their research's result to other types of projects not only organizational transformation projects (Dulewicz és Higgs, 2007).

Müller and Turner (2010) extended the research and besides organizational development projects, ICT and investment projects were also involved. The leadership styles were new applied to new factors, such as: complexity, their strategical importance and the used contract type (see Table 8).

Table 8 - Dulewicz and Higgs's managerial competencies and leadership styles based on competence-profiles

Group	Competence	Goal-oriented	Involving	Engaging
Intellectual (IQ)	1. Critical analysis and judgement	High	Medium	Medium
	2. Vision and imagination	High	High	Medium
	3. Strategic perspective	High	Medium	Medium
Managerial (MQ)	4. Engaging communication	Medium	Medium	High
	5. Managing resources	High	Medium	Low
	6. Empowering	Low	Medium	High
	7. Developing	Medium	Medium	High
	8. Achieving	High	Medium	Medium
Emotional (EQ)	9. Self-awareness	Medium	High	High
	10. Emotional resilience	High	High	High
	11. Motivation	High	High	High
	12. Sensitivity	Medium	Medium	High
	13. Influence	Medium	High	High
	14. Intuitiveness	Medium	Medium	High
	15. Conscientiousness	High	High	High

Source: based on Müller and Turner (2010, pp. 55.) and Dulewicz and Higgs (2005)

2.3.3. Different schools of project management leadership and their relationship with competences

Considerin the main topic of the dissertation it is important to analyze the interrelationship between managerial competences and project management leadership styles.

Leadership style is „that form of managerial behaviour (relationship with the subordinates), through which a leader can influence the subordinates to achieve a predefined goal” (Görög, 2013, pp. 67). Cleland (1995) considers the leadership style of project managers as a critical success factor of the projects.

Based on Frame's work, Turner differentiates leadership styles of the project mangers; laissez-fair, democratic, authoritarian and bureaucratic), which differ from each other in the following three of dimesions (cf. Turner, 1999):

- *Decision making*: to what extent does the project manager involve the members of the project team into the decision making process?
- *Decision taking*: to what extent does the project manager involve the members of the project team into the selection process amongst different options of the implementation?
- *Flexibility*: the project manager's flexibility.

Table 9 illustrates the four basic leadership styles of project managers and they are compared based on these dimensions.

Table 9 - Leadership styles of project managers

Leadership style of the project manager	Analyzed competence		
	Decision making	Decision taking	Flexibility
<i>Laissez-Fair</i>	high	high	high
<i>Democratic</i>	high	low	high
<i>Autocratic</i>	low	low	high
<i>Burocratic</i>	low	low	low

Source: Turner (1999)

The 6th edition of *Project Management Body of Knowledge Guide* (PMBOK) (Project Management Institute, 2017b) distinguishes, even more, six project management leadership styles:

- *laissez-faire or hands-off leadership style*: similar to Turner (1999)'s determination, the leader gives autonomy in decision making to the employees here, so they are free to define their own goals,
- *transactional leadership style*: basically goal-, feedback- and performance-oriented leadership,
- *servant leadership style*: the leader puts others in front of himself, basically relationship- and community-oriented, supports cooperation, less focus is on his his own leading role (cf. Heidrich, 2013),
- *transformational leadership style*: inspiring and motivating employees to innovative, individual thinking and creativity,

- *charismatic leadership style*: with strong belief, confident, inspiring, energetic and motivating leader,
- *interactional leadership style*: combination of the transactional, transformational and charismatic styles.

Many factors can influence the leadership style of a project manager, such as his own managerial features, characteristics of his project co-workers, the organizational and project environment (*Project Management Institute*, 2017a). The applied leadership style has a huge effect on the success of the project. Since the beginning of 2000' many research articles were published which aimed to define the leadership style trends of project managers. *Müller and Turner* (2007 and 2010) distinguished six schools of leadership styles based on the works of *Handy* (1982), *Partington* (2003), *Dulewicz and Higgs* (2003) and *Turner and Müller* (2005), (see Table 10):

- trait school: based on personal traits,
- behavioral school: based on behaviour or situation,
- contingency school: based on contingency or contextual,
- visionary/charismatic school: based on charisma,
- emotional intelligence school: based on emotional intelligence,
- and competency school: based on competence.

There is no consensus that which leadership styles is the most appropriate. The debate is well-illustrated by one of the statements of the contingency school, that the adequate leadership style depends on the given situation, the context (*Görög*, 2013). *Christensen and Walker* (2004) added that different leadership styles are effective in different phases of the project. *Turner and Müller* (2005) highlight that multi-cultural projects require special project management leadership styles.

The competency school is the youngest amongst the schools. Since the early 1990's there is a growing attention on the competencies of the project managers. Many interpreted it as the return of the personal traits-based school, but the two approaches have different viewpoints. The main difference between them is that competence (or at least some of its elements) can be learned and are not congenital. So the competency school could be considered as a summary all of the previous schools, because it says:

- competencies can be congenital,
- competencies can be learned,

- different situations require different combinations of the competencies,
- competence consists of the unit of knowledge, skill and personal traits (and behaviour) (*Müller and Turner, 2010*).

Table 10 - Leadership schools in project management and their interrelationships with competencies

Leadership schools in project management	Competence in focus	Method of obtaining the competence	Managerial behavioural patterns	Main representatives	Period
TRAIT SCHOOL	Human competencies and behavioral patterns	Congenital, cannot be learned	No defined styles	<i>Kirkpatrick and Locke</i> (1991) general management <i>Turner</i> (1999) in the field of project management	From 1930-1940's
BEHAVIOURAL SCHOOL	Human competencies and behavioral patterns	Can be learned and developed	Task-oriented Human-oriented	<i>Blake and Mouton</i> (1978), as well as <i>Hersey and Blanchard</i> (1988)	From the 1940's
CONTINGENCY SCHOOL	Human competencies	Can be learned and developed	Task/result-oriented Participative Managing Supportive	<i>Robbins</i> (1997)	From the 1960's
VISINARY/CHARISMATIC SCHOOL	Human competencies and behavioral patterns	Congenital and can be learned	Task-oriented Human-oriented	<i>Bass</i> (1990)	From the 1980's
EMOTIONAL INTELLIGENCE SCHOOL	Human and social competencies	Congenital and can be learned	Commanding Visionary Affiliative Democratic Pacesetting Coaching	<i>Goleman</i> (1995)	From the end of 1990's
COMPETENCY SCHOOL	Intellectual competencies (IQ) Managerial competencies (MQ) Emotional competencies (EQ)	Congenital and can be learned	Dutiful Involving Engaging	<i>Boyatzis</i> (1982) <i>Crawford</i> (2003) <i>Dulewicz and Higgs</i> (2005)	From the end of years 2000

Source: own, based on *Görög (2013)* and *Müller and Turner (2010)*

2.3.4. Project management skills

Technical and human skills

In the early years (1950-1960's) the classical project management tools (focusing on time, resource and cost planning) stand in the focus of project management, e.g. the ability to prepare the Gantt chart or network diagrams. In the literature these are often called as *technical skills* (El-Sabaa, 2001; *Project Management Institute*, 2015). Olsen (1971) defined project management as the application of certain tools and techniques, in order to complete single and complex tasks within predefined time, cost, quality and resources constraints. However, more authors (Zimmerer and Yasin, 1998; Kloppenborg and Petrick, 1999; Pinto, 2000) have pointed out that the project managements' leadership skills are also important - besides the classicak technical skills - in order to successfully complete the projects. Posner (1987) emphasised, that project managers rather face problems which are not related to the technical skills. His research highlighted that the lack of organizational and management skills has caused the project failure in most of the cases. Sotiriou and Wittmer (2001) distinguished the technical skills from the human skills in project management. It is important to highlight that these authors interpret technical skills not only as the application of the above mentioned, classic project management tools, but also the concept of the technical skills includes the knowledge about the professional content of the project. Gido and Clements (1999) and Mantel et al. (2001) list the following human skills: management skill, team building skill, skill of building relationships, communication skill, negotiation skill, conflict management skill, problem solving skill. Meredith et al. (1995) created six groups for the traits needed by project managers: communication, organizational, team building, leadership, coping and technological skills.

Brousseau (1987) claimed that communication and leadership skills are more important, than the classical technical skills in project management. He suggested that the top management of the organisation should consider the interpersonal (human) skills as the most important selection crietrion when they hire project managers. Focusing on the toolset of project management O'Leary and Williams (2008) pointed out, that there is growing emphasis on the leadership tools, team work and conflict management nowadays. According to Eigelaar (2012) there is a general consensus in the field of project management, that project managers need to have excellent communicational skills.

Models of project management skills

Barnard (1948) introduced the term of conceptual skill, in which the manager interprets the organization as a unitary whole and considers every element of the organisational operation as relevant and related to the whole. *Katz* (1991) divides management skills into three categories, such as:

- technical,
- human,
- and conceptual skills.

He also mentions four elements of the human skills: (1) the skill of recognizing the caused feelings, (2) the skill of re-evaluating the experiences and the ability to learn from them, (3) the skill of understanding others based on their actions and phrases, (4) the skill to phrase ideas and viewpoints efficiently.

El-Sabaa (2001) applied *Katz* (1991) and *Barnard* (1948)'s approach to project management (Table 12) and distinguished the three groups of project management skills.

- The *human skills* are necessary to lead the project group, enabling the effective cooperation between the project and organization, and more broadly, amongst the stakeholder groups of the project.
- The *conceptual and organizing skills* contribute to the understanding of the organizational context and the project environment.
- The *technical skills* basically mean the understanding of the professional content of the project (e.g. knowledge about the construction industry in case of an investment project or knowledge about the information technology in case of an IT project). The knowledge and application of the project management tools and techniques also belongs to this category.

In the model the understanding the project's organisational role and its strategical embeddedness is a new element. The author carried out his research in many industries, and he found, that the human skills have the most significant impact on the project's success. As a surprise, he found that technical skills have the less impact on the project success.

Table 11 - Project manager skills areas

Human skill	Mobilizing: Project manager is able to mobilize the mental and emotional energy of his subordinate
	Communication: Project manager is able to listen, persuade, and understand what others mean by their behavior
	Coping with situations: Project manager is flexible, patient, and persistent
	Delegating Authority: Project manager is able to give people the opportunity as group members to participate in making decisions
	Political sensitivity
	High self-esteem
	Enthusiasm
Conceptual and organizational skill	Planning
	Organizing
	Strong goal orientation
	Ability to see the project as a whole
	Ability to visualize the relationship of the project to the industry and the community
	Strong problem orientation
Technical skill	Special knowledge in the use of tools and techniques
	Project knowledge
	Understanding methods, processes, and procedures
	Technology required
	Skills in the use of computer

Source: own based on *El-Sabaa* (2001)

The *Project Management Institute* (2015) also defined a recommended skill-package for project managers, structure them into the so-called Talent Triangle, which divides project management competencies into three categories:

- *Technical project management skills,*
- *Leadership skills,*
- *Strategic and Business Management Skills.*

The Hungarian qualifying organization has defined these three skills as follows:

- **“Technical project management skills** – *Knowledge of project management methodologies and leadership models (life-cycle model, agile process, program and portfolio management) and technics.*
- **Leadership skills** – *Knowledge of leadership and motivation, working methods for teams, coaching, team development, conflict management, active listening, negotiation technic, problem solving, emotional intelligence.*

- **Strategic and Business Management** – *Business models and structures, value creation, competition analysis, customer relationship, knowledge of industry and standards, compliance, market, corporate operation, strategical planing, analysis and match.* ” (www.pmpvizsga.hu, p. n.a)

Table 12 - The PMI Talent Triangle

STRATEGIC & BUSINESS MANAGEMENT (Business oriented skills, applies to all certifications)	TECHNICAL (Domain expertise, certification specific)	LEADERSHIP (Competency in guiding and motivating; applies to all certifications)
1. Benefits management and realization	1. Agile practices	1. Brainstorming
2. Business acumen	2. Data gathering and modelling	2. Coaching and mentoring
3. Business models and structures	3. Earned value management	3. Conflict management
4. Competitive analysis	4. Governance (project, program, portfolio)	4. Emotional intelligence
5. Customer relationship and satisfaction	5. Lifecycle management (project, program, portfolio, product)	5. Influencing
6. Industry knowledge and standards	6. Performance management (project, program, portfolio)	6. Interpersonal skills
7. Legal and regulatory compliance	7. Requirements management and traceability	7. Listening
8. Market awareness and conditions	8. Risk management	8. Negotiation
9. Operational functions (e.g. finance, marketing)	9. Schedule management	9. Problem solving
10. Strategic planning, analysis, alignment	10. Scope management (project, program, portfolio, product)	10. Team building
	11. Time, budget and cost estimation	

Source: *Project Management Institute* (2015), pp. na.

Technical skills (skills related to the classical project management toolset) are not sufficient any more to successfully fulfil projects in today's complex and turbulent global economy. Human skills related to leading and motivating project groups are among leadership skills. Business skills rely on the knowledge of given industry, and of broader organizational and business environment and are needed to understand the broader context of strategic projects.

Similar threefold typology can be detected at Görög (2013), when he distinguishes (1) technical, (2) human and (3) project capabilities. (He calls them capabilities and not skills.)

- *Technical capabilities:* According to the author this is the so-called domain knowledge, knowledge about the industrial, technical and economical content of the project, related to the project result or to the professional features of the project completion process.
- *Human capabilities:* Those skills which are inevitable indispensable to manage stakeholders of the project (organizational management, project team members and other stakeholders of the project or its completion process).
- *Project capabilities:* The knowledge and effective application of the project management toolset.

Specialist versus generalist project manager

The evergreen topic of project management whether the project managers need to be experts in the professional domain (content) of the project. Ferraro (2006) introduces the project manager as a generalist, who has skills in all three project management skill areas: (1) in the interpersonal, soft skills, (2) in the technical (project management tools) skills and (3) in the project result skills (business/industrial knowledge and professional content related to the project result). According to Halman and Burger (2002) it is indispensable for the project manager to understand the professional content and also the business background of the project in order to understand the professional context of the project.

The Project Management Job Growth and Talent Gap Report, which was published by the Project Management Institute, highlighted that in today's complex project environment the required skill-set of project managers include a mixture of the skills presented in the Talent Triangle (Project Management Institute, 2017).

Relationship amongst project management skills, the authority of the project manager and the organizational structure

Gilliard (2009) pointed out, that the interpersonal skills are also important besides the technical skills, because the project manager works in a so-called powerless responsibility situation in most of the organizations. This highlights the phenomena, when in the applied project organization solution, the project manager does not have line authority over the members of the project team, while functional managers possess the line authorities. The

author also highlights that the project managers need to maintain relations with the internal stakeholders working on the different levels within the organizational hierarchy, and with external stakeholders (such as clients), which emphasizes the importance of the effective communication skills.

Pinto (2000) also draws attention to the importance of the human skills besides the technical skills (in his definition it is the knowledge of the project management toolset), and emphasizes that project managers often have only limited formal authorities, i.e. the evaluation and financial motivation of the project team members are out of scope of their authority, which makes their work difficult especially in the classical linear-functional project organizational arrangement. The skill to influence others and also the communication skill, the conflict management and the organizational political skills have a significant role in this situation.

Based on the PMBoK, *Görög* (2013) differentiates three basic project organizational arrangements. Project manager has line authority over the project team only in case of the matrix (divided authority with the functional manager) and the project-oriented project organizational arrangement (complete authority). In the case of the linear-functional project organizational arrangement he does not have authority at all. Basically, in the linear-functional organizational arrangement the project manager performs the project coordinator tasks, and because the flow of information is blocked, and the project decision processes are the slowest in this arrangement, the human skills have a significant role.

Burke (2013) claimed that the project is a human construct, so those organizational arrangement should be selected, which serves the fulfilment of the project requirements the most and which enables the best performance of the project team.

2.3.5. Different levels of project management competence

Project management competence can be analysed based on the content aspects, as it was introduced in the the previous section, but it is also important to analyse the different vertical (depth) levels of the competence, which is a mental phenomenon

Bloom's (1956, 1964) taxonomy could serve as a starting point. The International Competence Baseline, which was published by the International Project Management Association, uses the competence levels of this model to evaluate and develop individual project management competence (*IPMA*, 2015, pp. 413) Bloom created his hierarchical system to express educational learning objectives. He distinguishes three basic domains:

the cognitive, the affective and the psychomotor. The cognitive domain can be broken down to six levels of objectives or competence levels (cf. *IPMA*, 2015), which is introduced in Table 13.

Table 13 - The six levels of objectives in the cognitive domain in Bloom's taxonomy

Levels of objectives	Content
Knowledge	Recognise and reproduct facts, terminology, concepts.
Comprehension	Demonstrating an understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating the main ideas.
Application	Using acquired knowledge—solving problems in new situations by applying acquired knowledge, facts, techniques and rules
Analysis	Examining and breaking information into component parts, determining how the parts relate to one another, identifying motives or causes, making inferences, and finding evidence to support generalizations
<i>Synthesis</i>	Building a structure or pattern from diverse elements; it also refers to the act of putting parts together to form a whole
<i>Evaluation</i>	Building a structure or pattern from diverse elements; it also refers to the act of putting parts together to form a whole

Source: own construction based on *Bloom* (1964) cf. *IPMA* (2015)

Based on his research Turner (1999) distinguished three levels of project management competence in his own model:

- *I know* – the knowledge, which is required for the work.
- *I can do* – the ability that knowledge can be applied in rutin tasks,
- *I adapt and apply* – applying the knowledge in unknown situations and develop new methodologies to solve these situations.

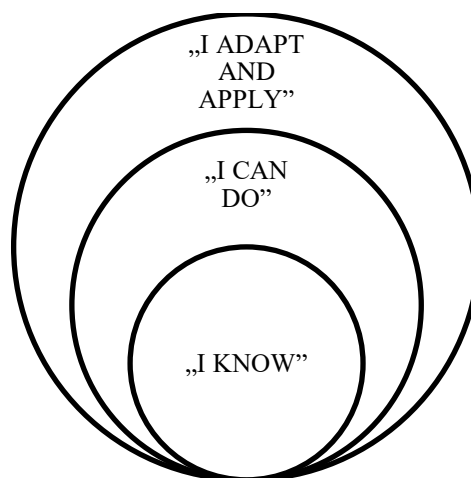


Figure 7

The project management competence levels in Turner's model

Source: *Turner* (1999)

Similarly to this, *Cleland* (1994) also broke project management professional competence into three elements or competence levels (Figure 8), which are as follows:

- knowledge,
- skill,
- and attitude.

Based on *Görög's* (2013) interpretation knowledge includes the knowledge of the project management tools and techniques. Skill assumes knowledge and it is built on that and it means that the project manager can apply the given project management tools and techniques in a real project environment in a real project situation. Personal features are also inevitable to apply the project management tools in an effective way. Attitude includes how the project manager relates to the role of the projects within the organisational operation. According to *Görög* (2013) the attitude as a competence element is not focusing directly on the project management tools and techniques, it is the ability to understand the strategic embeddedment of the projects. Representing this with an example: on knowledge level the project manager recognises the Venn diagram which is used to visualize the project stakeholders. On skill level the project manager could prepare and apply the diagram. At the attitude level the project manager understands how the application of this project management tool contributes to the successful completion of the project and indirectly to the successful organisational performance.

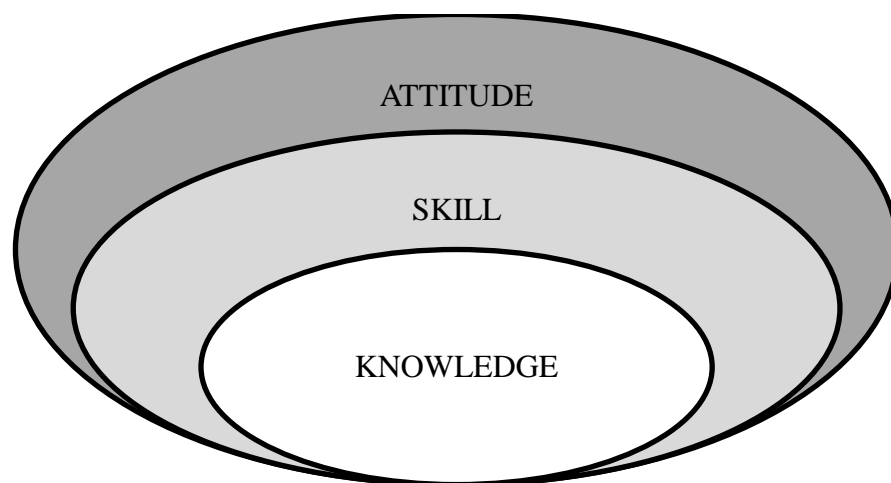


Figure 8
Cleland's competence elements
Source: *Cleland* (1994)

Relationship between the project management (professional) competence and competence of the project manager

The competences related to project management are divided into two categories by Görög (2013):

- project management (professional) competence,
- and the competence of the project manager.

Cleland's (1993) three elements of project management competence (knowledge, skill and attitude) is defined as project management (professional) competence by Görög (2013). He interprets these competence level related terms focusing on the project management tools and techniques. In his model the project manager's competence is considered as a broader concept which also includes the personal features and the leadership style of the project managers. The relationship between the two terms is represented by Figure 9.

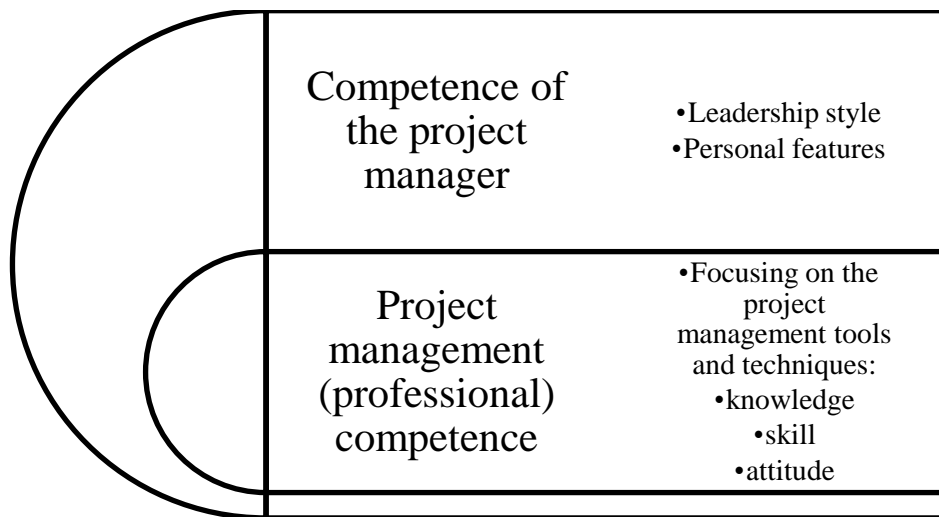


Figure 9
Relationship between the project management (professional) competence and competence of the project manager
Source: Görög (2013)

2.3.6. The integrated model of project management competence

Crawford (2005) integrated the two main competence approaches in her own project management competence model:

- One of the competence approaches is the American *competency model* or as it is also called the *attribute-based approach*, which considers competence as an individual's underlying personal feature. This approach roots mainly in Boyatzis (1982), Heywood et al. (1992) and Spencer and Spencer (1993) works. The name of the approach comes from Heywood et al. (1992), who interprets competence as

an individual attribute, which can be broken down into knowledge, skill, experience), personality traits, attitudes) and behaviours.

- The other competence approach is the so-called *competency standards* approach, which is more common in the United Kingdom, Australia and New-Zeland. This is also called as the *demonstrable performance approach*, which focuses on the workplace performance of the professionals, and interprets competence as the ability to complete the tasks which can be found in given position's job description. This approach serves as a base for the national qualifications systems in the above mentioned countries.

In the following part the elements of Crawford's integrated project management competence model will be introduced. *Spencer and Spencer* (1993) divides competence into five elements: (1) *knowledge* (possessing information in a special field) and (2) *skill* are together called as *surface competencies* – *Finn* (1993) define them as *input competencies* – while (3) *motives*, (4) *traits* and (5) *self-concept* is defined as *core personality characteristics*, which are named as *personal competencies* in Crawford's (2005) model. As we introduced before the demonstrable performance approach focuses on the measurable workplace performance aspect of the competence, these elements are called as output competencies in the model, because they are focusing on the result (workplace performance) aspects of the competence, similarly to the practical implications of the some standards. Figure 10. shows Crawford's integrated project management competence model.

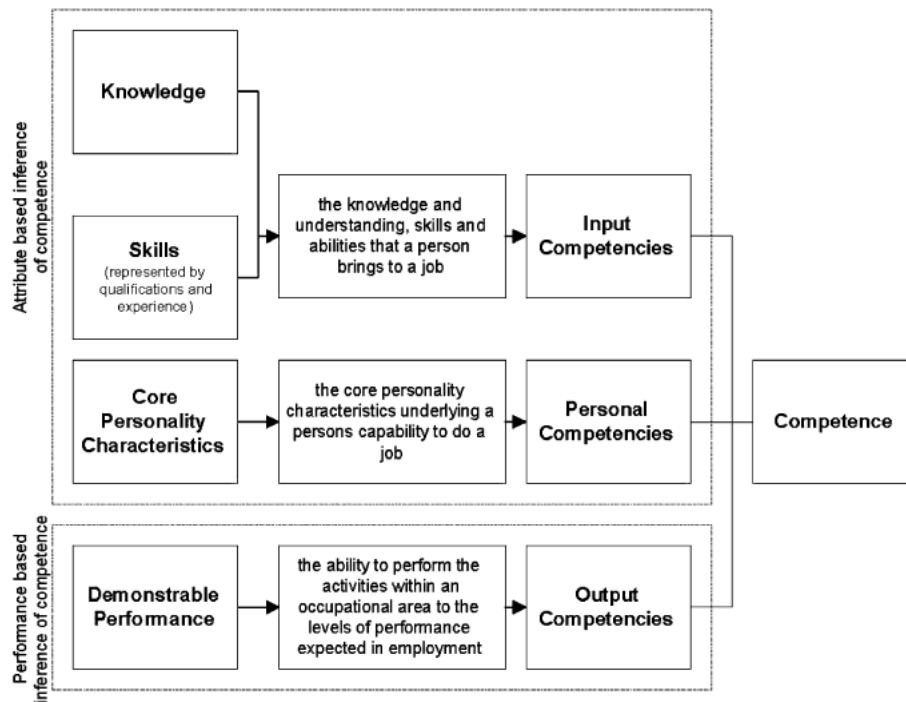


Figure 10
The integrated model of competence
Forrás: Crawford (2005, 9. old.)

2.4. Project management competence in standards

2.4.1. The most significant project management competence standards

The development of project management standards is closely related to the evolution of project management as a profession. The term 'standard' is also mentioned in the following names in the literature: e.g. knowledge collection, repository, framework, knowledge base. In the dissertation, the term standard is used consistently.

From the early 1970s, it has been outlined that it is inevitable to define those competencies that are essential for the successful cultivation of the given profession and edit them in a knowledge collection, into a professional standard. This also facilitated the recognition of project management as an independent profession and, in parallel, the acceptance of project management associations as professional organizations. Project management could be distinguished from other professional areas on the basis of such standards which were issued by the professional associations. It is important to add, that since the 1980s, the professional associations started to elaborate their own project management qualification systems based on these project management standards and they started the belonging trainings.

The professional paper "About standards", which is available at the Project Management Institute's website, sets out the following requirements on project management standards. they should:

- be approved and published by an internationally recognized professional project management association,
- be based on professional consensus,
- provide rules, guidelines or descriptions for the professional activities,
- aim at the achievement of the optimal work performance in a given project context. (Project Management Institute, 2018)

By applying these standards Winter et al. (2006) introduced the term of the *distinctive competence territory*, thus interpreting standards as a framework for knowledge in the project management profession and as basis for a common knowledge base. Based on their content, project management knowledge collections can be divided into five categories:

- ***foundation standards (body of knowledge)***: general, non-industry and project type specific standards,
- ***practice standards***: knowledge collections adapted to a specific project management tool,
- ***frameworks and project management competence standards***: aim to enable the measurement of project management competencies, dealing with a different competence levels and different knowledge areas related to project management competence;
- ***standard extensions***: standard adapted to a specific industry or project type,
- ***glossary***: collection of project management definitions.

Table 14 illustrates these categories through examples.

Table 14 - Typology of standards published by Project Management Institute broken down by main standard categories:

Type	Example(s)
Foundation standards	A Guide to the Project Management Body of Knowledge (PMBOK Guide) – 6 th Edition (2017)
Practice standards	Practice Standard for Project Risk Management (2009) Practice Standard for Earned Value Management, 2 nd . Edition (2011) Practice Standard for Project Configuration Management (2007) Practice Standard for Work Breakdown Structures, 2 nd Edition (2006) Practice Standard for Scheduling, 2 nd Edition (2011) Practice Standard for Project Estimating (2010)
Frameworks and project management competency standards	Project Manager Competency Development Framework, 22 nd Edition (2007)
Standard extensions	Construction Extension to the PMBOK Guide, 3 rd Edition (2016) Software Extension to the PMBOK Guide, 5 th (2013)
Glossary	Combined Standards Glossary – Third Edition. Recognized by ANSI as American National Standard PMI

The literature (*Morris et al.*, 2006) lists only three major foundation standards ("Body of Knowledge"). These standards are universally applicable to all industries, regardless of project type and professional content, and are a collection of knowledge (repository) published by international organizations.

Certainly, there are many other international professional standards in the field of project management (e.g. PRINCE2, ISO21500, GAPPS). In addition, there are standards that focus on special project management areas or guides adapted to the specifics of one project type.

Table 15 shows the best-known project management foundation standards.

Table 15 - The most significant international project management standards

International Professional Organization			Standard		Releases published so far
Name	Abbreviation	Centre	Name	Abbreviation	
Project Management Institute	PMI	USA	A Guide to the Project Management Body of Knowledge (the Guide to the PMBOK or the Guide) <i>Project Management Guidelines - PMBOK® Guide)</i>	PMBOK Guide	v 6.0 (2017) v 5.0 (2013) v 4.0 (2008) v 3.0 (2004) v 2.0 (2000) v 1.0 (1996)
Association for Project Management	APM	UK	APM Body of Knowledge	APM Body of Knowledge	v 6.0 (2012) v 5.0 (n.a) v 4.0 (2000) v.3.0 v 2.0 v 1.0 (1992)
Engineering Advancement Association of Japan és Japanese Project Management Forum	ENAA és JPMF	Japan	ENAA P2M: A guidebook of project and program management for enterprise innovation: Summary translation	P2M	v 1.0 (2002)

Source: own compilation based on Morris et al. (2006)

The limitations of foundation standards (body of knowledge) can be observed in two dimensions: regarding the competence levels and regarding the knowledge areas of project management competence.

As their title suggests, these standards typically deal with knowledge level of project management competence, while less emphasis is placed on higher levels of competence such as (application skills) and attitudes, personality traits and leadership styles.

On the other hand, in terms of knowledge areas, standards have mostly focusing on project skills and much less attention was paid to human and technical skills.

For these limitations, as an addition to foundation standards, several project management competence standards have been published by the most important international professional organizations; where competencies in project-management and project-work-environment had already been interpreted at multiple levels of competence and several previously unexplored areas of knowledge were affected.

The four most considerable project management competency standards are summarized in Table 16.

Table 16 - The most well-known project management frameworks and competence standards.

International Professional Organization			Standard		Releases published so far
Name	Abbreviation	Centre	Name	Abbreviation	
Project Management Institute	PMI	USA	Project Manager Competence Development Framework	PMCDF vagy PMCD framework	v 2.0 (2007) v 1.0 (2002)
International Project Management Association	IPMA	Netherlands	Individual Competence Baseline for Project, Programme & Portfolio Management	IPMA ICB	v 4.0 (2015) v 3.0 (2006) v 2.0b (2001) v 1.0
Association for Project Management	APM	UK	APM Competence Framework	APMCF	v.2 (2015) v.1 (2009)
Australian Institute of Project Management	AIPM	Australia	AIPM Professional Competency Standards for Project Management PART A és C – Introduction and Certified Practising Project Manager (CPPM)	AIPM PCSPM	v1 (2008) v1.12 (2010)

The transformation of standards with a character like this has also been influenced by the growing popularity of qualification systems, because the project management competence standards they served as the main knowledge base (preparatory materials), alone or in combination with a foundation standard for different project management certification systems. The subsequent chapters of the dissertation cover the presentation of the related qualification systems and their competence assessment practices.

The most important benefits of project management competence standards are summarized below (*Association for Project Management, 2009*):

- create common understanding basis for project management competence,
- define the range of competencies required,
- provide basis for multi-level assessment of competences by employers,
- help project managers discover their weaknesses and strengths, as well as the necessary development areas,
- provide basis for professional qualifications,
- provide basis for the organization of corporate training programs, professional competence development decisions,
- can serve as baseline for a company-specific competence model.

Summarizing the above, it can be concluded that the application of these standards can be useful for both the employee (i.e. the project manager) and the employer (i.e. the organization).

The following chapters present and compare the four project management competence standards presented in Table 17 based on several dimensions. The analysis is made by the following comparison criteria:

- First, the standards are grouped according to the basic competence approach described above (see Section 2.4.2).
- Subsequently, the defined competence definitions (see section 2.4.3) are presented.
- The related structure, i.e. the system of competence levels are examined (see chapter 2.4.4).
- Then the content analysis of competencies observable in the standards is carried out, i.e. they are examined in the system of knowledge areas, project management capabilities (see chapter 2.4.5).
- Finally, the standards-related certification systems are discussed and compared (see section 2.4.6).

2.4.2. The fundamental approach of competence in the project management competence standards

Song (2006) distinguishes three fundamental competence approaches related to project management, which can be linked to geographic regions:

- In the United States, the input approach of competence is the most characteristic. According to this approach the knowledge necessary for effective workplace performance, execution skills, and personality traits (behaviours) are the elements of the individual competence (cf. *Görög*, 2013).
- In the United Kingdom, the so-called process approach of competence definition spread, which focuses on project management processes and functions that successful project managers need to be familiar with.
- The output approach of competence is typical of Australia, it focuses on activities and their demonstrable outcomes, the actual performance.

According to *Crawford* (2005) most of the project management standards, such as PMI PMBOK Guide, IPMA ICB - International Competence Baseline, or APM Body of Knowledge, focus on input competencies, mainly on knowledge element, while the Australian Institute of Project Management (AIPM) standard assesses mainly the output competencies. *Alam et al.* (2008) also examined the best-known project management standards in the light of the above-described approaches and found that the standard of Project Management Body of Knowledge (PMBoK) represents the input-approach, by contrast, the International Project Management Association (IPMA) International Competence Baseline is a process approach, while the Australian Institute of Project Management (AIPM) standard sets out an output-approach of the competence. Table 17 illustrates the relationship between the two typology.

Table 17 - Basic competence approach of project management standards

Competence approach (<i>Song</i> , 2006)	Classification of <i>Crawford</i> (2005)	Classification of <i>Alam et al.</i> (2008)
INPUT APPROACH	Project Management Institute PMBoK (Project Management Body of Knowledge) and International Project Management Association (IPMA) International Competence Baseline	Project Management Institute PMBoK (Project Management Body of Knowledge)
PROCESS APPROACH	-	International Project Management Association (IPMA) International Competence Baseline
OUTPUT APPROACH	Australian Institute of Project Management (AIPM) standard	Australian Institute of Project Management (AIPM) standard

Source: own compilation cf. *Crawford* (2005); *Song* (2006); *Alam et al.* (2008)

2.4.3. Competence definitions in project management competence standards

Competence definition and fundamental competence levels of the PMCD Framework

The chapter examines how competence and project management competence are determined by the four best-known project management competence standards.

Founded in 1969 in the United States, Project Management Institute is currently the world's largest professional project management organization, with over 450,000 members worldwide in early 2018. It has units in 280 countries which are called "local chapters". The internationally most popular and well-known project management standard - Guide to the Project Management Body of Knowledge (abbreviation: PMBOK Guide) – is published by the organization, with the sixth edition being released in 2017.

In addition to the Project Management Institute PMBOK Guide, the Project Manager Competency Development Framework was published in 2002 first, of which the second edition was completed in 2007. In this standard the concept of project management competence is interpreted in several competence levels and knowledge areas.

Competence is defined by the PMCD framework as follows: *“As a cluster of related knowledge, attitude, skills, and other personal characteristics that affect a major part of one's job, correlates with performance on the job (e.g. one or more key roles or responsibilities), can be measured against well-accepted standards, and can be improved via training and development.”* (Project Management Institute, 2007, p. 73.) Major components of competencies include: abilities, attitudes, behavior, knowledge, personality and skills.

Table 18 shows the contents of these competence components.

Table 18 - Content of Competence Components in the PMCD Framework

Components of competence	Definition
<i>Abilities</i>	<i>“The quality of being able to do something; the physical, mental, financial, or legal power to perform; a natural or acquired skill or talent.”</i> (Project Management Institute, 2007, p. 73.)
<i>Attitudes</i>	<i>“Relatively lasting feelings, beliefs, and behavior tendencies directed toward specific persons, groups, ideas, issues, or objects. They are often described in terms of three components: (a) an affective component, or the feelings, sentiments, moods, and emotions about some person, idea, event, or object; (b) a cognitive component or the beliefs, opinions, knowledge, or information held by the individual; and (c) a behavioural component or the intention and predisposition to act.”</i> (Project Management Institute, 2007, p. 73.)

<i>Behavior</i>	“The manner in which an individual acts or conducts oneself under specified circumstances.” (<i>Project Management Institute</i> , 2007, p. 73.)
<i>Knowledge</i>	“Knowing something with the familiarity gained through experience, education, observation, or investigation, it is understanding a process, practice, or technique, or how to use a tool.” (<i>Project Management Institute</i> , 2007, p. 74.)
<i>Personality</i>	“A unique organization of a relatively stable set of characteristics, tendencies, and temperaments that define an individual and determine that person’s interaction with the environment.” (<i>Project Management Institute</i> , 2007, p. 74.)
<i>Skills</i>	“Ability to use knowledge, a developed aptitude, and/or a capability to effectively and readily execute or perform an activity.” (<i>Project Management Institute</i> , 2007, p. 75.)

Source: own compilation: based on *Project Management Institute* (2007)

Competence definition and fundamental competence levels of IPMA ICB

The Individual Competence Baseline (IPMA ICB) is the global standard for project management professional competence, which was issued by the European-based International Project Management Association (IPMA), which was founded in 1964. The latest version of the IPMA ICB (Version 4.0 - ICB4) was released in 2015.

The title changed to IPMA Individual Competence Baseline, and two further standards - IPMA Organisational Competence Baseline (IPMA OCB®) and IPMA Project Excellence Baseline (IPMA PEB®) has been released.

IPMA ICB standard is designed for individuals and besides project management it also includes project and portfolio management related chapters as well. According to the authors the standard does not determine “how” to manage projects, si it is not a process-based standard, which describes the different steps of implementation.

The purpose of the standard is as follows: “*to enrich and improve the individual’s competence in project, portfolio and programme management and to provide an inventory of competences that, if fully realised, represent complete mastery of these management domains*” (*International Project Management Association*, 2015, p. 11).

For individual competence, the following definition is given: “*the application of knowledge, skills and abilities in order to achieve the desired results.*” (*International Project Management Association*, 2015, p. 15.).

Here competence is divided into three competency levels by the standard:

- knowledge is the collection of information and experience that an individual possesses,
- (application) skills are specific technical capabilities that enable an individual to perform a task,
- ability is the use of knowledge and skills in a given context.

In its model the three levels of competence mentioned above are built on each other, i.e. the application skill already presupposes the existence of knowledge, while the ability is based on the other two and enables the proper application in practice. Figure 11 illustrates the construction of these elements.

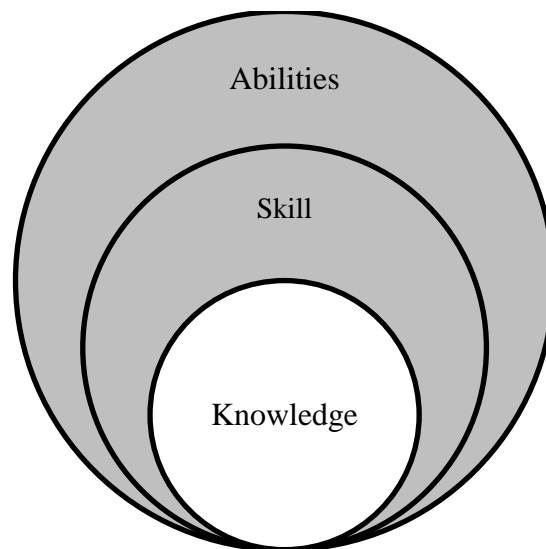


Figure 11

The three levels of competences in IPMA ICB V.4.0

Source: *International Project Management Association* (2015)

Beyond these three competence levels, the standard mentions experience as a key factor, which is considered indispensable to acquire these levels of project management competence.

Competence definition and fundamental competence levels of the APM Competence Framework

This project management competence standard is based on both the 5th edition of the APM Body of Knowledge, which was published by the Association for Project Management in 2006 and the 3rd edition of IPMA ICB.

The standard defines competence as follows: "A *competence articulates the expected outcome or performance standard that is achieved as a result of applying a combination of knowledge, personal attitude, and skills and experience in a certain function. It can be understood to represent the language of performance in an organisation, articulating both the expected outcomes of an individual's efforts and the manner in which these activities are carried out.*" (Association for Project Management, 2009, p. 1).

Competence definition and fundamental competence levels of the AIPM Professional Competency Standards for Project Management

Professional Competency Standards for Project Management, which was published by the Australian Institute of Project Management, distinguished five separate project management competence levels (and the underlying rating system) already determines professional competency:

"The broad concept of professional competency concerns the ability to perform particular tasks and duties to the standard of performance expected in the workplace. Competency in this context is far more than the skills an individual is able to perform in an industry or enterprise; it is equally about the knowledge that an individual brings to the application of those skills. This approach encourages multi-skilling and the ability to transfer competency to new situations leading to improved portability of skills across the workforce" (Australian Institute of Project Management, 2008, p. 6).

All four project management competence standards define competence in a very similar way. The definitions are fundamentally based on the competence levels and elements of theories of Cleland (1994) and Spencer & Spencer (1993).

2.4.4. Structure of the project management competence standards and their relevant competence levels

The structure of the PMCD Framework


Analysing the structure of PMCD framework, we can conclude that it follows the structure of classical professional competence standards and can be divided into the following five competence levels:

- Competence dimension(s): knowledge, performance and personal,
- Units of competence: splitting the three competency dimensions into further segments,

- Elements of competence: each unit of competence can be subdivided into additional elements of competence that present those activities which are expected from the project managers:
 - in case of performance competence dimension these are called as project outcomes,
 - in case of the personal competence dimension these are called project manager behaviours.
- Performance Criteria: it belongs to each elements of competence, and it defines the specific outputs /results (tasks or activities) through which competent performance can be measured.
- Types of Evidence: in case of both the performance and the personal dimension of competence it basically means a list of required documents.

Table 19 illustrates the structure of the PMCD framework.

Table 19 - Presentation of competence levels of the PMCD framework through an example of a selected competency element



Competency dimension		PERFORMANCE
Units of competence		Initiating a project
Elements of competence		High-level risks, assumptions and constraints are understood
Performance criteria	Documentation of expectations and constraints	Identifies, qualifies and quantifies the project's high-level risks
Types of evidence	Documentation of expectations and constraints	Risk register containing identified, qualified and quantified high-level risks

Source: Own compilation based on Project Management Institute (2007)

The structure of IPMA ICB

IPMA ICB distinguishes three areas of competence; perspective (context), people (human) and practice. Each competence area can be divided into additional competence elements. In the case of competency elements, the expected knowledge and related application skills and abilities are also presented.

In this case, knowledge is primarily a list of procedures, theories, and applicable tools.

The related application skills indicate the levels of cognitive (or rather, at the competency elements in the field of human competence, it is the affective) competence required for effective practical application of the knowledge listed. Based on these, key competency

indicators already describe the competence expected from the project manager as a kind of task to be accomplished, for each competency element. The measurements provide a specific, (also) task-based checklist for measuring this performance.

Table 20 - Presenting levels of IPMA ICB competence through an example of a key competence indicator for a selected competency element

Competence area	PERSPECTIVE	
Competency elements – Ces	Strategy	Knowledge <ul style="list-style-type: none"> ▪ „Benefits realisation management; ▪ Critical success factors; ▪ Key performance indicators; ▪ Organisational mission; ▪ Organisational vision; ▪ Difference between tactic and strategy; ▪ Diagnostic and interactive control management systems; ▪ Strategic performance management; ▪ Benchmarking; ▪ Management control systems; ▪ Strategic schools of thought.’
		Skills and abilities <ul style="list-style-type: none"> ▪ Analysis and synthesis; ▪ Entrepreneurship; ▪ Reflection of the organisation’s goals; ▪ Strategic thinking; ▪ Sustainable thinking; ▪ Contextual awareness; ▪ Result orientation.
Key competence indicators KCI	Align with organisational mission and vision	
Measures	<ul style="list-style-type: none"> ▪ „Reflects the mission and vision of the organisation; ▪ Aligns the project goals with the mission, vision and strategy by using diagnostic control management systems (top-down approach and pre-set goals); ▪ Controls whether the project’s objectives and benefits are in sync with the mission, vision and strategy; ▪ Develops and implements measures of strategic alignment (e.g. critical success factors, key performance indicators, etc); ▪ Checks whether the project’s organisation is delivering benefits to the organisation.” 	

Source: own compilation based on *International Project Management Association*, 2015, p. 40-41.

Az 1. sz. melléklet tartalmazza eredeti nyelven a részletes, összes ismeret-elemekkel és alkalmazási készség és képességekkel kibővített kompetencia elemet. A 2. sz. melléklet pedig a kompetencia elemekhez kapcsolódó kulcs kompetencia indikátorokat mutatja be.

Appendix 1 contains all the encompassing competency elements with knowledge and application skills and abilities in detail, while Appendix 2 discusses the key competency indicators related to the competency elements.

The structure of the APM Competence Framework

Similarly to the previous ones this standard also distinguishes three competence domains:

- technical,
- behavioural
- and contextual competence areas.

These standards can also be subdivided into competency elements, which can be measured by indicators. Indicators are also interpreted as the tasks, which need to be performed.

However, in the lower levels of competence, the structure of this standard is different from the ones presented earlier, since knowledge and experience associated with each indicator has no (textual) description. Knowledge and experience could be measured with a standard ten-point measurement scale, where: 1-3 represents the low-level, the 4-6 medium level and 7-10 the high level of knowledge and experience.

The structure of the AIPM Professional Competency Standards for Project Management

The structure of AIPM Professional Competency Standards for Project Management is also different from the first two, as it mentions only technical skills and it does not include human and context competence areas. The first structural level in the standard is called as the units of project management. Nine of them could be found in the standard (e.g. Plan, Manage, and Review Scope).

All project management units can be divided into additional competency elements, which currently represent a main activity group (e.g. Plan Scope Management) that has more performance criteria. These performance criteria break down main activities into specific tasks (e.g. Develop a work breakdown structure to reflect the project scope).

Belonging to each project management unit different related range indicators are listed (e.g. prepared work breakdown structure - a cascade of the products and work activities).

In the same way, in the breakdown of project management units, the standard provides the underpinning knowledge and skills (e.g methods to define products and activities, e.g. work, organisation and product breakdown structures), and evidence guides that provide a list of required documents. The relationship between the project management competence standards' competence levels is summarized in Figure 12.

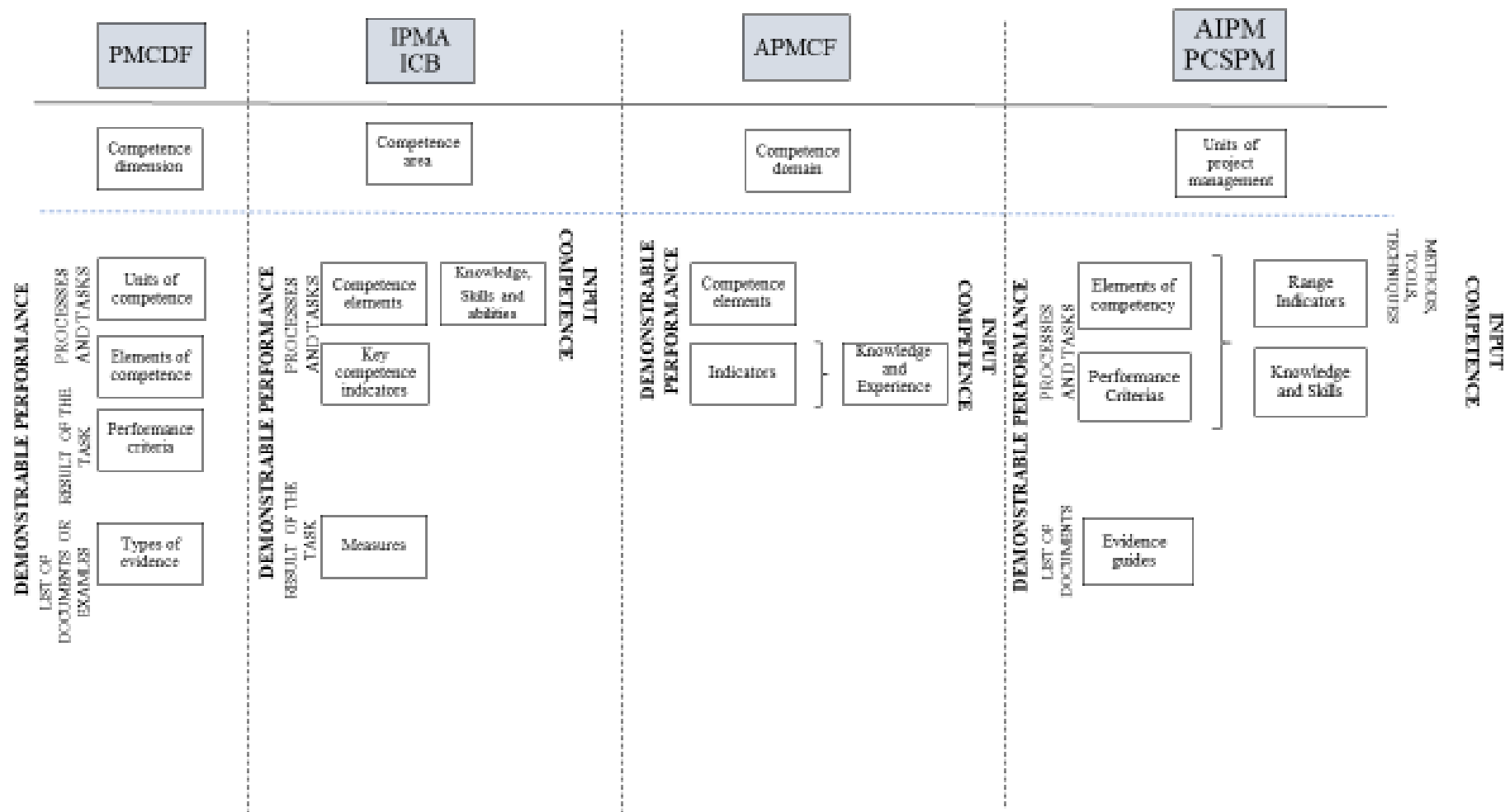


Figure 12
 Relation of Competence Levels in Project Management Competence Standards
 Source: Own compilation

2.4.5. Knowledge areas of project management in competence standards

Knowledge areas of the PMCD Framework

In the PMCD framework, project management competence can be divided into three main competency dimensions: knowledge, personal and performance dimensions.

- *Knowledge competence dimension* includes knowledge of processes, tools, methods and techniques of the project management. In the PMCD framework, this dimension is not explained in details, as elements of competence knowledge are contained in the knowledge areas and processes of the PMBOK Guide.
- The *performance competence dimension* focuses on the context and the technology of projects and on the related competencies.
- *Personal competence dimension* involves project manager behaviour in the process of implementing the project-related activities. In this case, basically, the human capabilities and the project manager's approach and essential personality traits come to the fore.

The personal competency dimension can further be divided into the following six competency units:

- (1) **Communicating** - *"Effectively exchanges accurate, appropriate, and relevant information with stakeholders using suitable methods"* (Project Management Institute, 2007, p. 23),
- (2) **Leading** - *"Guides, inspires, and motivates team members and other project stakeholders to manage and overcome issues to effectively achieve project objectives"* (Project Management Institute, 2007, p. 23),
- (3) **Managing** - *"Effectively administers the project through deployment and use of human, financial, material, intellectual, and intangible resources"* (Project Management Institute, 2007, p. 23),
- (4) **Cognitive ability** - *"Applies an appropriate depth of perception, discernment, and judgment to effectively direct a project in a changing and evolving environment"* (Project Management Institute, 2007, p. 24),

(5) **Effectiveness** - "*Produces desired results by using appropriate resources, tools, and techniques in all project management activities*" (Project Management Institute, 2007, p. 24),

(6) **Professionalism** - "*Conforms to an ethical behavior governed by responsibility, respect, fairness, and honesty in the practice of project management*" (Project Management Institute, 2007, p. 24).

Table 21 shows the units and elements of competence for the performance and personal competency dimension.

Table 21 - Competencies in the PMCD framework

	Unit of Competence	Competence element		Unit of Competence	Competence element
PERFORMANCE COMPETENCE DIMENSION	Initiating a project	Project aligned with organizational objectives and customer needs	PERSONAL COMPETENCE DIMENSION	Communicating	Actively listens, understands, and responds to stakeholders
		Preliminary scope statement reflects stakeholder needs and expectations			Maintains lines of communication
		High-level risks, assumptions and constraints are understood			Ensures quality of information
		Stakeholders identified and their needs are understood			Tailors communication to audience
		Project charter approved		Leading	Creates a team environment that promotes high performance
	Planning a project	Project scope agreed			Builds and maintains effective relationships
		Project schedule approved			Motivates and mentors project team members
		Cost budget approved			Takes accountability for delivering the project
		Project team identified with roles and responsibilities agreed			Uses influencing skills when required
		Communication activities agreed		Managing	Builds and maintains the project team
		Quality management process established			Plans and manages for project success in an organized manner
		Risk response plan approved			Resolves conflict involving project team or stakeholders
		Integrated change control processes defined		Cognitive Ability	Takes a holistic view of project
		Procurement plan approved			Effectively resolves issues and solves problems
		Project plan approved			Uses appropriate project management tools and techniques
	Executing a project	Project scope achieved		Effectiveness	Seeks opportunities to improve project outcome
		Project stakeholders' expectations managed			Resolves project problems
		Human resources managed			Maintains project stakeholder involvement, motivation and support
		Quality managed against plan			Changes at the required pace to meet project needs.
		Material resources managed			Uses assertiveness when necessary
	Monitoring and Controlling a Project	Project tracked and status communicated to stakeholders		Professionalism	Demonstrates commitment to the project.
		Project change is managed			Operates with integrity
		Quality is monitored and controlled			Handles personal and team adversity in a suitable manner
		Risk is monitored and controlled			Manages a diverse workforce
		Project team managed			Resolves individual and organizational issues with objectivity
		Contracts administered			
	Closing a Project	Project outcomes accepted			
		Project resources released			
		Stakeholder perceptions measured and analyzed			
		Project formally closed			

Source: own compilation based on *Project Management Institute* (2007)

Knowledge areas of the IPMA ICB

The 4th edition of the IPMA ICB standard distinguishes three competence areas, which form part of the IPMA “Eye of Competence” model. The standard presents individual competencies in the demolition of the three project management domains (project, program and portfolio management) rather than in terms of specific project management-related jobs (e.g. project manager). According to the aim of the dissertation, only competencies for the project management area are under consideration. There are three knowledge areas:

- **Perspective competences:** methods, tools and techniques related to the environmental, organizational, social, political context of projects.
- **People competences:** individual (personal) and social competences that are essential for successful projects.
- **Practice competences:** it includes practical competencies related to the methods, tools and techniques necessary for successful projects.

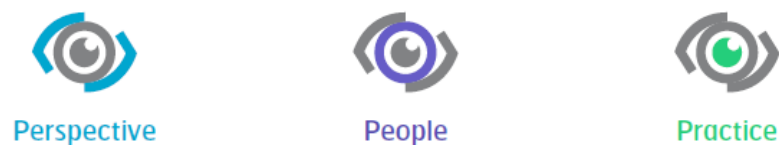


Figure 13
IPMA ICB 4.0 „*Eye of the Competence*”
Source: *International Project Management Association* (2015)

Table 22 introduces the competency areas of the IPMA ICB 4.0, as well as the competency elements belonging to each area.

Table 22 - IPMA ICB 4.0 competency areas and competency elements

Competence area	Comepetence elements	Competence area	Comepetence elements	Competence area	Comepetence elements
PERSPECTIVE	1.Strategy	PEOPLE	1. Self-reflexion and self-management	PRACTICE	1. Project design
	2. Govetrnance, structure and processes		2. Personal integrity and reliability		2. Requirements and objectives
	3. Compliance, standards and regulatios		3.Personal communication		3. Scope
	4. Power and interests		4. Relationships and engegement		4. Time
	5. Culture and values		5. Leadership		5. Organisationa and information
			6. Teamwork		6. Quality
			7. Conflict and crisis		7. Finanace
			8. Resourcefulness		8. Resources
			9. Negotiation		9. Procurement
			10. Results orientation		10. Plan and control
					11. Risk and opportunities
					12. Stakeholder
					13. Change and transformation

Source: *International Project Management Association* (2015)

Knowledge areas of the APM Competence Framework

The APM Competence framework also uses a triple competence breakdown, which will be combined with the Wheel of Competence model:

- technical,
- behavioural
- and contextual competence domains.

The breakdown by knowledge area is summarized in Table 24. It can be observed that the areas of competence and the elements follow strongly the content breakdown of the IPMA ICB.

Table 23 - Competence areas and Competency elements of the APM Competence Framework

Competence domain	Competency elements	Competence domain	Competency elements	Competence domain	Competency elements
TECHNICAL	Concept	BEHAVIOURAL	Communication	CONTEXT	Project sponsorship
	Project Success and Benefit Management		Teamwork		HSE management
	Stakeholder management		Leadership		Project life cycles
	Requirements management		Conflict management		Project finance and funding
	Project risk management		Negotiation skills		Legal awareness
	Estimating		Human resources management		Organizational roles
	Business case		Behavioural characteristics		Organizational structure
	Marketing and sales		Learning & development		Governance og PM
	Project reviews		Professionalism & ethics		
	Definition				
	Scope management				
	Modelling and testing				
	Methods and procedures				
	Project quality management				
	Scheduling				
	Resource management				
	Information management and reporting				
	Project management plan				
	Configuration Management				
	Change control				
	Implementation				
	Technology management				
	Budgeting and cost management				
	Procurement				
	Issue Management				
	Development				
	Value management				
	Earned value management				
	Value engineering				
	Handover and closeout				

Source: Own compilation based on *Association for Project Management* (2009)

Knowledge areas of the AIPM Professional Competency Standards for Project Management

The AIPM Professional Competency Standards for Project Management differs from the abovementioned standards because only technical competence units are included and human or context related skills are completely excluded.

Table 24 - The competency units of the AIPM Competency Standards for Project Management and related competence elements

Units of project management	Competency elements
1. Plan, Manage and Review Scope	1. Plan Scope Management 2. Manage Project Scope 3. Review Scope Management Outcomes
1. Plan, Manage and Review Time	1. Plan time management 2. Manage time and schedule 3. Review time management and schedule outcomes
1. Plan, Manage and Review Cost	1. Plan Cost management 2. Manage budget and cost 3. Review budget and cost outcomes
1. Plan, Manage and Review Quality	1. Plan Quality Management 2. Manage Quality 3. Review quality management outcomes
1. Plan, Manage and Review Project Human resources	1. Plan Project Human Resource Management 2. Manage Project Human Resources 3. Review Project Human Resource Management Outcomes
1. Plan, Manage and Review Communication	1. Plan Communication Management 2. Manage Communications 3. Review Communication Management outcomes
1. Plan, Manage and Review Project Risk	1. Plan Project Risk Management 2. Manage Project Risks, Opportunities and issues 3. Review Project Risk Management outcomes
1. Plan, Manage and Review Procurement	1. Plan Procurement Requirements 2. Manage contract and/or procurement 3. Review Contract and Procurement Management outcomes
1. Plan, Manage and Review Integration	1. Plan Project Integration 2. Manage Project Integration 3. Review Project Integration outcomes

Source: *Australian Institute of Project Management* (2010)

Summary

Table 25 provides an overview of the relationship between the knowledge areas of the four best-known project management competence standards and their relationship to the models presented in Chapter 2.3.4.

Table 25 - Relationship between the knowledge areas of the four best-known project management competence standards

Talent Triangle (Project Management Institute, 2015)	Görög, (2013)	El-Saaba (2011)	Project Manager Competency Development Framework (PMI, 2007)	Individual Competence Baseline for Project, Programme & Portfolio Management (IPMA, 2015)	APM Competence Framework (APM, 2015)	AIPM Professional Competency Standards for Project Management PART A – Introduction (2008) and PART C – Certified Practising Project Manager (CPPM) AIPM (2010)
Strategic & business management <i>(Business oriented skills, applies to all certifications)</i>	Technical capabilities	Conceptual and organizational skill	<i>(Knowledge - in PMBOK Guide)</i> Performance	Perspective	Contextual	
Technical <i>(Domain expertise, certification specific)</i>	Project management capabilities	Technical skill		Practice	Technical	9 competence units
Leadership <i>(Competency in guiding and motivating; applies to all certifications)</i>	Human capabilities	Human skill	Personal	People	Behavioural	

2.4.6. Qualification systems related to the project management competence standards

Qualification System of the Project Management Institute (PMI) – Project management professional (PMP)

As the world's leading professional project management association, PMI focuses on developing, assessing the project management competence of the professionals and creating professional qualification systems for them. The best-known project management qualification is the Project Management Professional (PMP), which was established in the current form in 1999. In 2018, more than 700,000 people worldwide have a PMP certification that has become the most widespread certification. The knowledge base of the certification exam required for the PMP certification (at the level of knowledge) is currently published in the 6th Edition of the Project Management Institute (PMBOK Guide) (*Project Management Institute*, 2017) and the Talent Triangle (*Project Management Institute*, 2015). Project management experience must be verified and a written test must be completed to get the PMP qualification. The application is subject to the following requirements (Project Management Institute, 2017c):

- higher education qualification,
- at least 3 years of project management experience in the last 8 years,
- minimum 4500 hours of project management experience in the last 8 years (justified by previous projects)
- at least 35 hours of project management education within an organized framework (university/college project management, project management training, education, workshop or company training program).

The certification is valid for 3 years during which 60 Professional Development Units (PDUs) need to be earned to renew it. A PDU is equivalent to one hour of work and a total of 60 in three years must be earned, at least 35 (hours) in training and self-training, and at least 25 (hours) in contributing to the development of a project management profession (writing a book or professional material - creating knowledge -, volunteering or working as project manager) need to be fulfilled.

In the case of training and self-training it is, however, stipulated that 8-8 PDUs from each of the three knowledge areas of the Talent Triangle (presented in Section 2.3.4.) should be fulfilled, that is:

- Technical Project Management: a minimum of 8 PDUs (must be earned),
- Leadership: a minimum of 8 PDUs (must be earned),
- Strategic and Business Management: a minimum of 8 PDUs (must be earned).

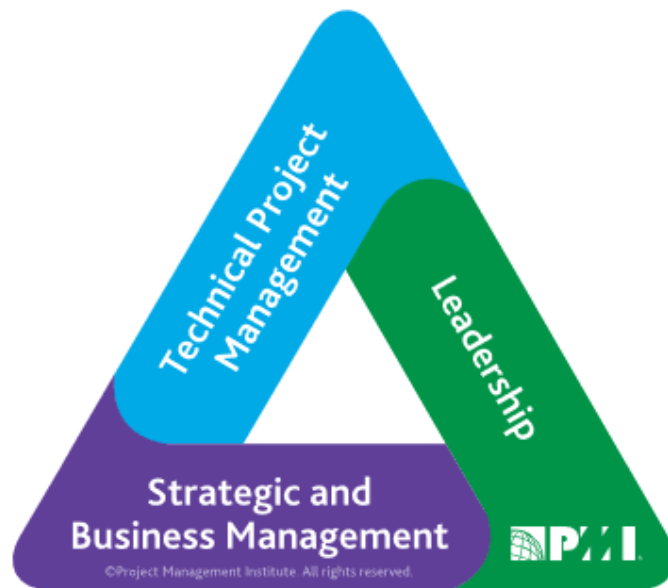


Figure 14
PMI „Talent Triangle”
Source: *Project Management Institute* (2015)

It is clear that the certification is fundamentally based on the knowledge of PMBOK and the PMP Examination Specification. The competence areas required to maintain/extend the certificate have also been defined based on the Talent Triangle, not on the PMCD framework. It is therefore important to highlight that instead of IPMA ICB, which is the knowledge base of the IPMA certification system (see next chapter), the PMCD framework does not play a role in the PMI certification process. Therefore, the question about the actual role of PMCD framework is precise. The framework itself serves as a starting point (benchmark) for the development of enterprise-specific project management competence models, assessment and competence development systems.

Qualification System of the IPMA - Four-Level Certification System (IPMA-4-L)

Az IPMA ICB szabvány jelenti az IPMA szövetség négyszintű (IPMA A, B, C, D) projektmenedzsment minősítési rendszerének (ld. 26. táblázat) tudásbázisát. A korábbi, harmadik kiadás alapján 2018 végéig lehet az IPMA minősítéseket megszerezni, 2019-től azonban már csak az új kiadás alapján. A szabvány általános, így minden projekt típusra alkalmazható, nem iparág specifikus.

The IPMA ICB standard represents the knowledge base of the IPMA four level (IPMA A, B, C, D) project management certification system (see Table 26). Based on the previous third edition, IPMA ratings could only be obtained by the end of 2018, but from 2019 it can only be done on the basis of the new, 4th edition. This standard is also general, not industry specific, it can be applied to all types of projects.

Table 26 - The Four-Level Certification System of IPMA

Level	Related Project Role	Abilities to acquire
IPMA A level	Certified Projects Director	Managing complex project portfolio or object programs
IPMA B level	Certified Senior Project Manager	Managing complex projects
IPMA C level	Certified Project Manager	Managing semi-complex projects
IPMA D level	Certified Project Management Associate	Applying project management knowledge in project work

Source: own compilation based on www.ipmacert.hu

Based on the review of the certification system process the following conclusions can be made:

1. *Relationship between competence areas and certain levels of the certification:* a personal interview is required at certification levels A, B and C. From the analysis of the expectations of the interviews, it could be seen that the three competence areas do not have the same weight as each level.

Table 27 - The number of competence elements checked in the IPMA (certification) interview section divided by competence areas

Level of Certification	Technical Competences (PRACTICE in v.4)	Behavioural Competences (PEOPLE in v.4)	Contextual Competences (PERSPECTIVE in v.4)
-------------------------------	--	--	--

IPMA Level C	Certified Project Manager	6	2	2
IPMA Level B	Certified Senior Project Manager	6	3	3
IPMA Level A	Certified Projects Director	5	4	4

Source: own compilation based on www.ipmacert.hu (n.a.)

Table 28 highlights that the level of attention to the Technical Competences (technical - i.e. project management tools, techniques) decreases at the higher certification positions, while the importance of Behavioural (human) and Contextual competence areas are increasing.

2. *The importance of self-assessment report:* The individual, written self-assessment is a mandatory element of the IPMA Certification, which should be submitted at all levels. It should reflect on the IPMA ICB competence elements. For each competency element, the candidate must evaluate his own competencies on an eleven-point scale, ranging from 0 to 10, where 0 is “no competence” and 10 is “absolute, maximum competence”. As of January 1, 2019, the certification was still based on ICB V.3.0 in Hungary, thus, candidates must evaluate all the elements of competence (i.e. a total of 46 competency elements) of each of the three main areas of competence, in terms of relevance and knowledge and experience, as well as current and future status, that is, according to the following five aspects:

- importance,
- current level of knowledge,
- current level of experience,
- future level of knowledge,
- future level of experience.

Significance	Based on your own experience what significance do you attach to the following elements in project management? (Answers to this question do not affect self-assessment summary.)
Current level of knowledge	Please rate your own knowledge relating to the item.
Current level of experience	Please rate your own experience relating to the item.
Future level of knowledge	To what extent do you intend to improve your own knowledge of the particular item in the following year?
Future level of experience	To what extent do you intend to improve your own experience of the particular item in the following year?

Figure 15

Aspects of self-assessment in the four-level certification system of IPMA

Source: www.ipmacert.hu (n.a)

The average of each competence area should remain within the 3.5 point scale at each certification level, which is as follows:

- at level D: between 2.5 and 6 points, minimum average of 4, recommended between 3-5,
- at level C between 3-6.5 points, minimum average 4.5, recommended 4-6,
- at level B between 4.5-8 points, minimum average 6, recommended 5-8,
- at level A 5.5-9 points, minimum average 7, should be between 7-9.

Table 28 - Self-assessment taxonomy in the four-level rating system of IPMA

Value	Competence	Verbs and Nouns
Points 1-2	<i>„Candidate is capable of recognizing, naming, describing, explaining, defining knowledge, and applying project management situations in low complexity.”</i>	<i>„Verbs: recognize, name, describe, explain, define”</i>
		<i>„Nouns: terminology, definitions, facts, requirements, standards, rules, methods, process, relations, relationship”</i>
Points 3-5 (Level D)	<i>“Candidate can confidently recognize, name, structure, describe, explain, define knowledge, and apply project management situations in varying complexity”</i>	<i>„Verbs: recognise, name, structure, describe, explain, define”</i>
		<i>„Nouns: terminology, definitions, facts, requirements, standards, rules, methods, process, relations, relationship”</i>
Points 4-6 (Level C)	<u>„Knowledge:</u> <i>Candidate has in-depth knowledge and is able to recognize and apply it according to the relevant requirements, and apply it in project management situations with a variety of complexities.</i> <u>Practice:</u> <i>Candidate has an average level of practice and experience in several major projects in the field of project management, in at least one major sector of economic life, and in most phases of projects.”</i>	<i>„Verbs: apply, use, implement, calculate, check, interpret, distinguish, serve.”</i>
		<i>„Nouns: situations, applications, principles, criteria, rules, conclusions.”</i>
Points 5-8 (Level B)	<i>“It means practice in complex projects and the ability to apply knowledge thoroughly, at skill level”</i>	<i>„Verbs: analyse, lead, plan, develop, unite, supervise, create, decide”</i>
Points 7-9 (Level A)	<i>Candidate is able to analyse, manage, plan, develop, merge, supervise, create, decide, in the field of program- and portfolio management, and to manage subproject managers”</i>	<i>„Nouns: conditions, prerequisites, ideas, opinions, cases, models, alternatives, problems, causes, processes, reviews”</i>

Source: own compilation www.ipmacert.hu (n.a.)

Higher qualification levels already require higher level of competence in the certification system. At each certification level, these values are compared with the candidate's written

exam, interview or workshop, possibly with the competence values presented and proved in the SPE. The values of self-evaluation are shown in detail in Figure 16.

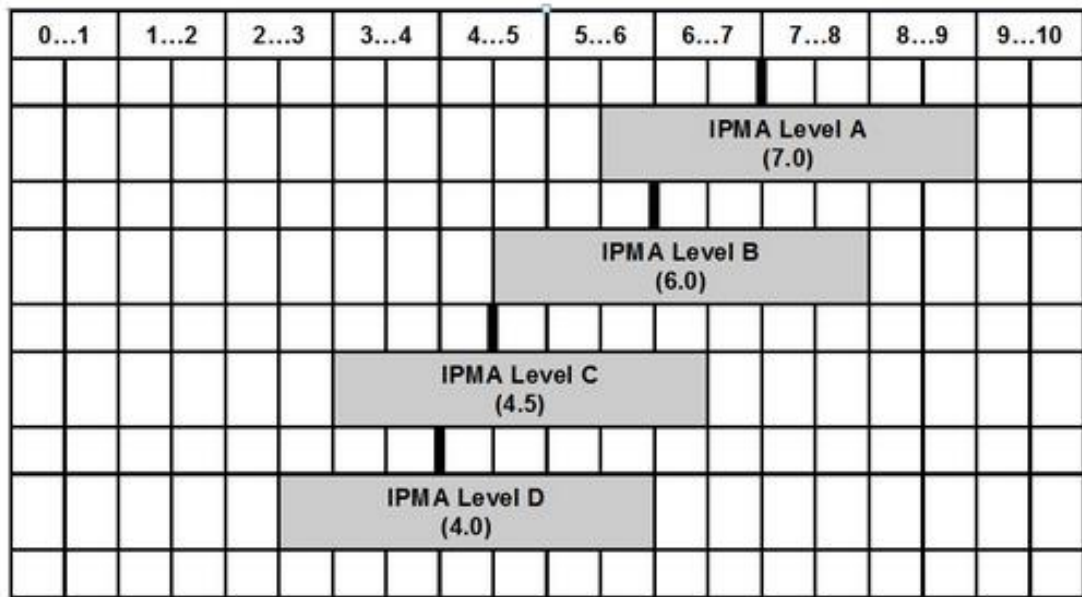


Figure 16
Scales and minimum averages of the self-assessment
Source: www.ipmacert.hu (n.a)

Qualification System of the APM - The APM Registered Project Professional (RPP)

The APM Registered Project Professional (RPP) certification is based on the APM Competence Framework (APM). This qualification requires seven years of project management experience from the candidates and also requires a lower level of qualification such as APM Project Professional Qualification (PPQ) or APM Practitioner Qualification (PQ). The APM Practitioner Qualification (PQ) is accepted as internationally equivalent to IPMA C level certification. This system also has a lower certification level, which is called as APM Project Management Qualification (PMQ). It corresponds to the IPMA D level. For beginners they offer the APM Project Fundamentals Qualification (PFQ). There are no qualifications which are equal to IPMA A and B levels, so the IPMA qualification can be recommended to those, who would like to step further. Qualified RPPs are also required to keep their knowledge up-to-date and perform a four-step competence development. This process, which is called as CPD (continuing professional development) is also based on the APM Competence Framework.

Table 29 provides an overview of the certification levels of the Association for Project Management.

Table 29 - APM certification levels

<i>Title</i>	<i>Abbreviation</i>	<i>IPMA equivalent</i>	<i>Requirements</i>
APM Registered Project Professional	RPP	-	PPQ or PQ certification professional experience min 2 project overviews in the past 7 years practice and knowledge competences test 5 question packs 2 recommendations 35 hours continuing professional development interview
APM Project Professional Qualification	PPQ	-	three core and one elective module - each with a three-hour written exam based on APM Competence Framework
APM Practitioner Qualification	PQ	IPMA Level C	individual work, team work and interview
APM Project Management Qualification	PMQ	IPMA Level D	three hours, paper-based, 16 questions (Participants with PRINCE2 get fewer questions)
APM Project Fundamentals Qualification	PFQ	-	Online exam, 60 minutes, 60 test

Source: own compilation, based on: www.aipm.com.au (n.a)

Qualification System of AIPM - The five-level certification system of AIPM (AIPM RegPM)

Based on the different levels of experience in project management and the associated project management roles, the Australian Institute of Project Management has developed a five-level Australian National Qualification System. AIPM RegPM certification system is currently Australia's leading project manager certification framework. Table 31 shows the range of qualifications that can be obtained in the system.

Table 30 - Level of certification that can be acquired in the five-level system of AIPM

Certification level	Abbreviation
The Certified Practising Project Practitioner	CPPP
The Certified Practising Project Manager	CPPM
The Certified Practising Senior Project Manager	CPSPM
The Certified Practising Project Director	CPPD
The Certified Practising Portfolio Executive	CPPE

Source: own compilation, based on www.aipm.com.au (n.a.)

The first four levels of the AIPM National Certification System - with the exception of the Qualified Practice Project Portfolio Expert – is equivalent to IPMA's previously presented A, B, C, D certification levels. Figure 17 also illustrates this correspondence.

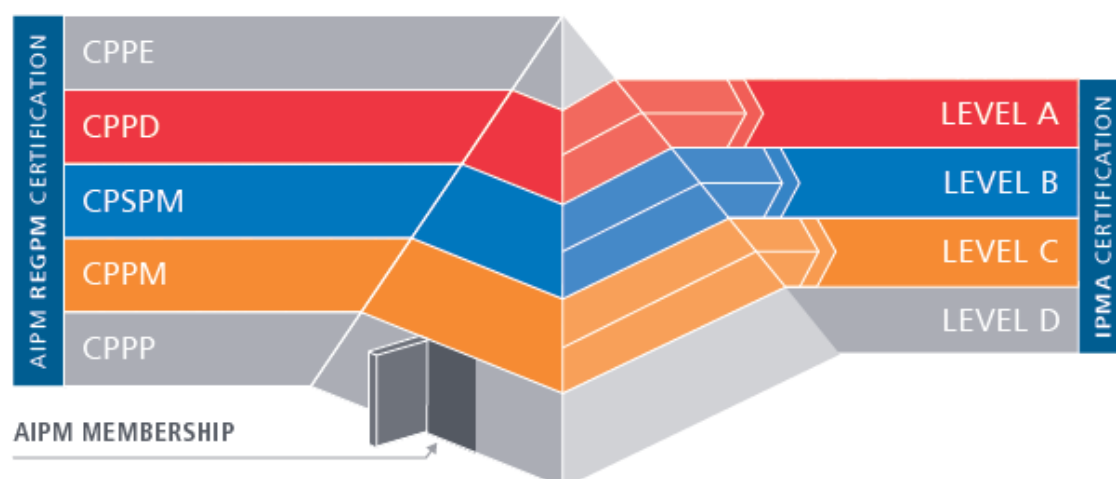


Figure 17

The relationship and interoperability of the AIPM Five-Level National Qualification System with the IPMA Four-Level International Qualification System

Source: www.aipm.com.au (n.a)

Table 31 - The introperability of AIPM RegPM to IPMA 4-L international certification at level A, B, C of IPMA

Name	Abbreviation	Requirements relating to acceptability/ interoperability	Certification system			Expiry
			1 st Step	2 nd Step	3 rd Step	
Certified Practising Project Director	IPMA Level A®	Knowledge + Experience	Application, CV, Self-assessment Plan relating to the Development of Competence Project list	interview	final assessment + feedback	5 years
Certified Practising Senior Project Manager	IPMA Level B®					
Certified Practising Project Manager	IPMA Level C®					

Source: www.aipm.com.au (n.a)

3. The empirical research

3.1. Theoretical baseline of the research

The most important theoretical foundations of the research are presented in this chapter based on the comparative review of the related literature. Based on that, it can be concluded that there is no general interpretation and consensus on the definition of project management competence (as well as related terms and concepts), neither among the members of the academic community nor practicing project management professionals. This results in different phenomena being often described in the same terms or, on the contrary, the same concept often has different meaning in different situations. The problem is further exacerbated by the errors and inconsistencies in the Hungarian translation of international project management standards and journal articles. Most of the contradictions were identified related to the following concepts:

- a) *competence, knowledge, skill, ability, attitude,,*
- b) *capability, project management knowledge areas,*
- c) *project management competence and the competence of the project manager.*

The literature review highlighted that two basic dimensions can be distinguished in order to grasp the essence of project management competence. One dimension separates the different levels of competence, the other concerns the content of competence. The depth dimension of competence levels is identified as the ***vertical dimension of competence***, while the content-knowledge aspect of competence is called ***horizontal dimension*** of competence. This visual splitting gives basis to structure theories presented in the systematic review into a unified model, as well as to clarify the fundamental differences between concepts related to the project management competence phenomenon.

- a) Vertical project management competence dimension differentiates between different levels of (profound) competence of the cognitive knowledge area and between different levels of application of knowledge elements and knowledge related to project management (see section 2.3.5). Considering the cognitive aspects of competence, the first two levels of competence are almost always formed by knowledge and (application) skills in many theories (Cleland, 1994; Turner, 1999; Görög, 2013; Spencer & Spencer, 1995; Crawford, 2005). This division can also be discovered in project management standards. However, some models (see Cleland, 1994 and Project Management Institute, 2007) show significant differences in the interpretation of the term “*attitude*”. While

Cleland (1994) and Görög (2013) interpret the attitude as project managers' concept about the role of projects within the organization. At this competence level project managers see the project in the context of the underlying strategic objective. In terms of project-related tasks, not only what (knowledge) and how (application skills), but also why (attitude) questions could be answered. In this interpretation, the attitude concerns the knowledge of the project's professional content and its organizational and industrial context. Attitude has a special role in the case of the conceptual competence area, which is one of the content-context related categories. The other approach of the term "attitude" is the interpretation of the PMCD Framework of the *Project Management Institute* (2007). It interprets attitude as "*relatively lasting feelings, beliefs, and behavior tendencies directed toward specific persons, groups, ideas, issues, or objects. They are often described in terms of three components: (a) an affective component, or the feelings, sentiments, moods, and emotions about some person, idea, event, or object; (b) a cognitive component or the beliefs, opinions, knowledge, or information held by the individual; and (c) a behavioural component or the intention and predisposition to act*" (Project Management Institute, 2007, pp. 73). In this case, it serves as a transfer between the cognitive components of knowledge (knowledge, information, opinion, beliefs) and the conduct/behavioural component (inclination of action) and further element is the affective competence component (feelings, feelings, moods). According to Görög (2013) personality traits (and the leadership style) are not the elements of the project management competence but they are components of a broader concept, which is the "competence of project manager". Crawford (2005) calls personal traits as personal competences and separates them from the input competencies. Some project management competence standards (Project Management Institute, 2007; Association for Project Management, 2009) also display personality traits as a separate competence level.

Table 33 introduces the vertical dimension of project management competence and the highlights the relationship among the related theories

Table 32 - Relationship between different levels of project management competence

Görög (2013)		Cleland (1994) & Görög (2013)	Turner (1999)	Bloom (1964) & IPMA (2015)	Spencer & Spencer (1995)		Crawford (2005)		PMI (2007) – PMCD framework	IPMA (2015) – ICB v 4.0	APM (2009) - APM competence framework
Project manager/ Project leader competencies (Personal traits and leadership styles also belongs here)	Project manager and project leadership competencies	knowledge	I know	knowledge	knowledge	superficial competencies	knowledge	Finn (1993) input competencies	knowledge	knowledge	knowledge
		skill	I can do	comprehension	skills		skill		abilities	skill	skills
				application							
				analysis							
				synthesis							
	attitude	I adapt and apply	evaluation	motives		core personality characteristics		core personality characteristics		personal competencies	
	traits										
	self-concept										
							performance	output competencies			

b) The various professional-content elements of project management competence are covered by knowledge areas and skills related to project management and they form the horizontal (i.e. professional content) dimension of the project management competence. According to the literature review (Chapter 2.3.4), in relation to project management three main knowledge areas or project management competence can be distinguished.

- The first is commonly called **technical skills**, (Katz, 1991; Sotiriou & Wittmer, 2001; El-Sabaa, 2001; *Project Management Institute*, 2015), which basically means knowledge and application skills of the classical project management tools and techniques. The earliest approaches were focusing only this content knowledge are, Olsen (1971) basically considered project management (and project management capability) to be familiar with the tools and techniques used primarily for time, resource, and cost planning. Numerous names could be found in the literature, Görög (2013) refers to the same term as project capability.
- Interpreting projects as temporary organizations drew attention to the human aspect of the projects and through that to the **human skills**. In many models this capability category appears separately. Essentially, it focuses on the interaction with the stakeholder groups involved in the projects (in the result or the implementation). Human skills are often referred to as *soft skills* in the literature (Pant & Baroudi, 2008), opposing them to technical skills described earlier, which are considered as *hard skills*. Human skills are often confused with the personality traits needed for project management (Gido & Clements, 1999; Mantel et al., 2001).
- The third knowledge area relates to the knowledge of professional content and professional, organizational and industrial context of the project. These are often called **conceptual skills**. However, in the terminology of Görög (2013) it is called *technical skills*. The same category is called Strategic and Business Management skills in the Talent Triangle Model (*Project Management Institute*, 2015). There is an overlap between the technical and conceptual skill categories in the model of several authors (Sotiriou & Wittmer, 2001) while some authors regard them as two separate categories (El-Saaba, 2001; Katz, 1991).

Table 33 illustrates the relation between theories of horizontal elements of project management competence.

Table 33 - Horizontal (content) knowledge areas of project management competence

Görög (2013)	El-Sabaa (2001)	Katz (1991)	Sotiriou és Wittmer (2001)
Project skills	Technical skills	Technical skills	Technical skills
Technical skills	Conceptual and organizational skills	Conceptual skills	
Human skills	Human skills	Human skills	Human skills

c) Related to differences between the definition of project management competence and the competence of the project manager, the interpretation of Görög (2013) is accepted in the dissertation (see Figure 9). The focus of the dissertation is on project management competence.

3.2. Criticism and shortcomings of previous research results

Former practical research on project management competence focused mainly on the relationship between the competences and the project types and on the competences and the related leadership styles (Müller & Turner, 2007a, 2007b, 2010). Former researches, which were investigating the relationship between project success and project management competencies, have three fundamental problems:

- Project success was typically interpreted as a homogenous phenomenon, i.e. project success was not differentiated, and no distinction was made between the different criteria dimensions of success. Project success has primarily been interpreted based on the classic project triangle, and not based on an advanced, multi-level and hierarchical criteria systems. Therefore, the researches were not able to provide a more consistent picture of the issue of project management competence and they were unable to build on each other in a more and more subtle way of presenting the relationship between competence and success.
- From methodological point of view, the main deficiency of the former researches was that the evaluation of the project management competence was mostly subjective, it was based on the self-assessment of the project managers involved into the research. One method for multi-dimensional competence evaluation could be the document analysis of the already closed projects and compare the results with the outcome of interviews with the project managers (and their self evaluation) and conduct a 360 evaluation with their colleagues (line managers).

- The former researches published in the literature in this topic did not address how the organisational context affects project management competencies in the given environment and how this influences their contribution to project success.

3.3. Research questions and research hypotheses

The primary aim of the research is to analyse the relationship between the project management competencies and the different criteria of project success. In order to reach the primary research aim, it is necessary to identify those criteria that are used in the analysed organisations to evaluate the success of the implemented projects. Based on these, as an additional research aim, those organisational circumstances which could influence the contribution of the existing project management competencies to the project success in the analysed sector also needs to be analysed. Bearing in mind the above, the following research questions have been formulated:

RQ1: Which success criteria are basically used to measure the success of projects in the given sector?

RQ2: Which are those project management competencies that contribute to achieve success in terms of different success criteria in the given sector?

- **RQ2A:** Which are those project management competencies that contribute to the efficient completion of the projects, i.e. the success evaluated in terms of the project triangle?

- **RQ2B:** Which are those project management competencies that contribute to achieve client satisfaction, i.e. the extent to which a completed project contributes to realize the beneficial changes implied in the underlying strategic objective?

- **RQ2C:** Which are those project management competencies that contribute to achieve the stakeholder satisfaction, i.e. the extent to which stakeholders are ready to accept the project outcome?

RQ3: Does the organisational context have any influence on the contribution level of the existing project management competencies to achieve project success in the given sector?

The research was built on the 4th edition of the Individual Competence Baseline (IPMA ICB 4.00), which was published by International Project Management Association in 2015. The empirical research of this dissertation was conducted based on the terminology (competence areas and competence elements) of this standard. It is important to

emphasize that the competence areas used correspond to the horizontal dimension competence areas presented by the literature.

Table 34 - Relationship between horizontal (content) areas of project management competence and IPMA ICB 4.00 competency areas

Görög (2013)	El-Sabaa (2001)	Katz (1991)	Sotiriou & Wittmer (2001)	IPMA ICB 4.0 (2015)
Project skills	Technical skills	Technical skills	Technical skills	PRACTICE
Technical skills	Conceptual and organizational skills	Conceptual skills		PERSPECTIVE
Human skills	Human skills	Human skills	Human skills	PEOPLE

In the empirical research the practical elements of competence are marked in green, the human (people) elements are purple and the perspective (contextual) elements are marked in blue being in harmony with the colors of the IPMA ICB's “Eye of the Competence” model.

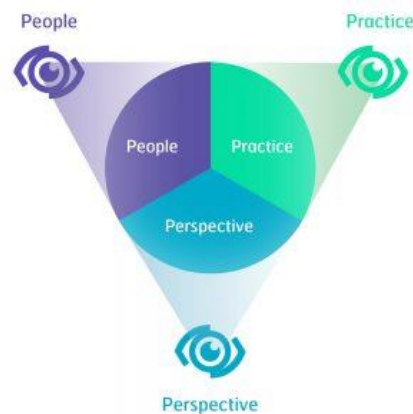


Figure 18
ICB v.4.00 Eye of the Competence
Source (International Project Management Association)

Based on the conclusions of the literature review and the research questions, the following hypothesis are formulated:

H1: The practicing project managers in the sector consider the project triangle as the most important success criterion over the effectiveness success criteria, i.e. the satisfaction of the client organisation and over the stakeholder satisfaction.

H2: In the case of the implemented projects different project management competence areas are contributing to success measured by different success criteria in the analysed sector. This complex hypothesis is divided into the following subhypotheses:

H2A: As to the project management competencies as a whole, primarily the technical capabilities, or in other words. The practical competencies contribute to the efficient completion of a project, i.e. the success measured against the project triangle;

H2B: As to the project management competencies as a whole, primarily the conceptual capabilities, or in other words, the perspective competencies contribute to achieving the beneficial changes implied in the underlying strategic objective;

H2C: As to the project management competencies as a whole, primarily the human abilities, or in other words, (human) competencies contribute to the success measured against the stakeholder satisfaction.

H3: A szervezeti sajátosságok hatással vannak arra, hogy az ágazban dolgozó gyakorló projektmenedzserek meglévő projektmenedzsment kompetenciái milyen mértékben tudnak érvényre jutni a projektsiker elérésében.

Bearing in mind the introduced research aims and the formulated hypotheses the following research model was constructed.

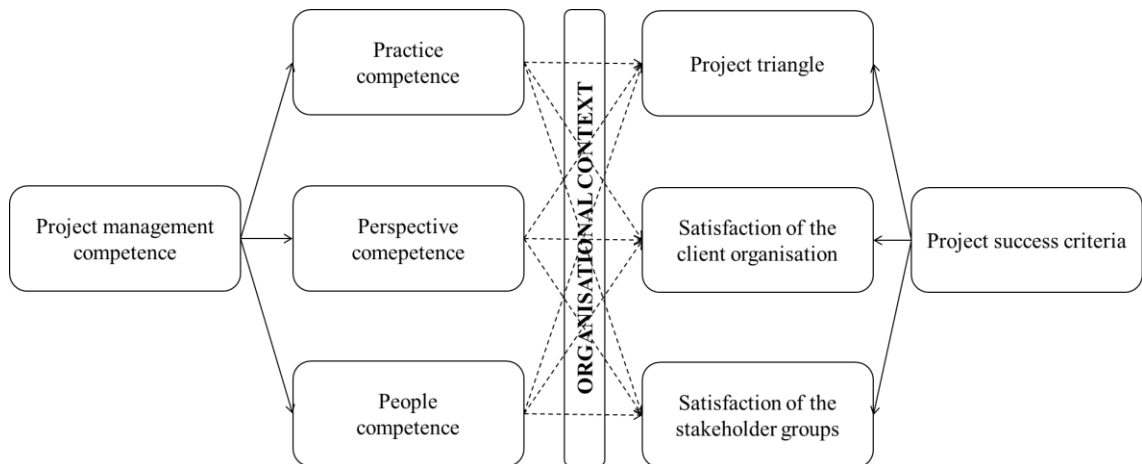


Figure 19
The research model

3.4. Methodology of the empirical research

The best fitting research methodology to verify the hypotheses, which were derived from the formulated research questions, is the explorative research and the mixed research method (Creswell & Clark, 2006). Sogunro (1997) also suggest using mixed

methodology that is the combined use of questionnaire and interview, documentum analysis and direct observation in order to reliably map management competencies. The research implies the following steps: (1) preparation for the empirical research, which consists of (1a) a workshop devoted to introducing the importance of the research, (1b) testing the self-assessment questionnaire, test interviews; (2) data collection: (2a) multilevel competency self-assessment, (2b) semi-structured interviews, (2c) documentum analysis; (3) both data and methodology triangulation; (4) analysis and evaluation of the empirical information (5) formulating research results és corroborating research outcomes; (6) justifying/falsifying research hypotheses.mThe steps of the empirical research are presented in the following.

(1) Preparation for the empirical research

(1A) Workshop devoted to introducing the importance of the research

The research includes personal and sensitive issues, so the basic purpose of the workshop was to build the trust of the research population towards the researcher, and to enable them to dispel their questions, possible reservations, and disagreements regarding the research (*Corbin & Morse, 2003*). Before the data collection of the empirical research, the population (project managers for upstream business of the company group) could get information about the initial research aims and the research process contributors within the framework of an organized forum.

For the project managers of the upstream sector (business unit) of the organization group, a thematic event is traditionally organised semi-annually, when project managers from all companies (belonging to the company group) visit Hungary. As part of this event, a workshop was conducted where the whole research population could participate. After introducing the researcher and explaining the main aim of the research, members of the population had the opportunity to ask about the research process.

1B) Testing the self-assessment questionnaire, test interviews

The workshop pointed out that prior to the actual collection of information, it is advisable to test the planned data collection methods beforehand. Five competency members who were not involved in the final research were tested for self-assessments of competence.

Based on their feedback and experiences gained from the tests, the self-evaluation methodology was further refined, mainly the self-evaluation table was changed.

Experience has shown that (1) the self-assessment table needs to be simplified, (2) the personal supervision of the researcher is essential, (3) the final determination of the time of self-evaluation (120-150 minutes) also based on the test's feedbacks.

With the same 5 project managers, we also prepared test interviews, the results of which (1) contributed to streamline the structure and the questions of the interview, transcribing possible ambiguous questions. It (2) pointed out, that project management terms used in the interviews should be clarified before the interviews. This tests (3) provided a basis for determining the length of the interviews (60-90 minutes) (Zoltayné Paprika, 1999). In addition, a preliminary interview was also conducted with the team leader of the project management group, which was the starting point for determining the population of project managers working for the company group.

(2) Data collection for the empirical research

(2A) Multilevel competency self-assessment

The preparatory steps were followed by the project management competence self-assessment of the project managers, who were being involved into the research. The 4th edition of IPMA ICB serves as a base for the self-assessment. This standard has been chosen because it is the one that is the latest edition and one of the most complex of the four project management competence standards examined before. Based on the self-assessment methods, which were presented earlier at the qualification systems (Project Management Institute, 2007; IPMA, 2015), the multilevel project management competence self-assessment scale developed by the IPMA organization was used to assess the project management competence of the participants. Project managers had to evaluate themselves on a six-point scale, ranging from 0 to 5, where 0 meant no competence, and 5 was equal to absolute, maximum competence. Self-assessments had to be written in excel files, under the supervision of the researcher, in 120-150 minutes, while the researcher was constantly available to answer the questions. The participants in the research had to provide the following values on a six-point scale related to all 28 elements of competence in the three areas of competence (perspective, people and practical):

- the importance of a particular competence element,
- current level of competence,
- and the level of planned competence in the following year.

This assessments served as a starting point for the interviews with project managers.

2B) Semi-structured interviews with project managers

The self-assessment section is followed by semi-structured interviews with project managers over a period of 60-90 minutes (Creswell, 2003). Based on the hierarchical model of project success criteria, project managers match the project management competencies with the single project success criteria. The greatest advantage of semi-structured interviews in an exploratory research is that while the researcher wants to get to know the subject's viewpoint on a specific issue, the flexibility of the method creates potential for the areas that have not been explored so far (Kvale, 1996; Jensen & Holliman, 2009).

It is also an advantage of the method that in the case of uncertain or unclear answers, the interviewer can ask clarifying questions and the more informal form of the method contributes to greater openness and honesty of the respondent (Jensen & Laurie, 2016). The research group did not contribute to the recording of the interviews, so notes were made about them. During the interviews, we were looking for answers to the following questions, which were derived from the following hypotheses:

- *In your opinion, which of the 28 competence elements contribute to project success in terms of efficiency (considering project triangle as a success criterion)?*
- *In your opinion, which of the 28 competence elements contribute to project-success in terms of effectivity (considering the satisfaction of the project owner organization as a success criterion)?*
- *In your opinion, which of the 28 competency elements contribute to the stakeholder satisfaction?*
- *In your opinion, which of the three competence areas (perspective, people, and practice) of IPMA ICB 4.00 contribute most to project success in terms of effectiveness (considering project triangle as a success criterion)? Please explain your answer.*
- *In your opinion, which of the three competence areas (perspective, people, and practice) of ICB 4.00 contribute most to project-success in terms of efficiency (considering the satisfaction of the project owner organization as a success criterion)? Please explain your answer.*
- *In your opinion, which of the three competence areas (perspective, people, and practice) of ICB 4.00 contribute most to project-success measured against the stakeholder satisfaction? Please explain your answer.*

- *What is the order of priority for the three success criteria within your organization? Within the organization - formally - which success criteria are used to measure the project success? Please explain your answer.*
- *Which competence areas (perspective, people or practice) and which competency elements (out of 28) would you improve in the following year? Please explain your answer.*
- *How does the project management competence come into force during the implementation of the projects? - querying all 28 competency elements*
- *Do you consider that the success of your completed projects based on your own interpretation is in line with your success interpretation of the organization?*
- *Which organizational circumstances (context elements) have an impact on how your project management competence could come into force and could contribute to the successful completion of projects? - querying all 28 competency elements*
- *Do you think that there is a correlation among the competence elements?*
- *Do you think that the specialist project manager (rather an expert, typically strong good at perspective competencies, understanding the professional content of the project) or the generalist project manager (rather a project manager, good at project management practice competencies and not an expert on the professional content of the project) could manage projects in a more successful way in the upstream sector of the company group?*

(2C) Documentum analysis

The dissertation continues with the document-based success analysis of completed projects (managed by the project managers who were involved in the research). Document analysis provides opportunity to evaluate the project success criteria system applied by the organization and looking for relationships between project managers' competences and the success of completed projects while examining successful and unsuccessful projects. At the company group a project evaluation report is prepared about the completed projects, which has two types: (1) the one-pager post evaluation report, mandatory for all projects, and (2) the detailed post evaluation report. The latter is only used for challenging or failed projects, and senior management (four senior vice president) decide whether to prepare this detailed (including IRR) report one year after the project closes. In the case of project managers involved in the research, several projects were analyzed. They

differed in levels of complexity (Kim & Wilemon, 2003) and some of them were successful, some challenged and some failed. Projects completed in the last five years were only examined.

(3) Triangulation - multi-point validation of the information

During the evaluation of the actual workplace performance of project managers, the questionnaire-based competence self-evaluations and semi-structured interviews with project managers supervised by the researcher would allow excessive simplification and distortion in themselves. For this reason, the validation of research results, i.e. the multi-faceted validation of the research results, plays a key role in this kind of qualitative research. One of the best known research methodology for this purpose is triangulation. The process and the concept itself were incorporated into science by *Denzin* (1978, 1988). The method got its name after the maritime navigation system which determines the exact position of a location by measuring it from three different directions (*Jick*, 1979). *Bowen* (2009) describes the method of document analysis (or document-based content analysis) as an increasingly widespread method of research that should be applied as a methodology of triangulation. *Cohen and Manion* (2000) see triangulation as mapping and a multi-faceted analysis of the phenomenon. *Altrichter et al.* (2008) presents it as a method for deeper understanding of certain phenomena. In qualitative methodology it is used in four different interpretations (*Szokolszky*, 2004): (1) data triangulation, i.e. collection of research data from several sources, (2) method triangulation, application of several methods to answer a research question, (3) personal triangulation, when several researchers consensus in research, and the (4) triangulation of theory(ies), the joint analysis of contradictory explanations. In this research, data and method triangulation is used combined. The information gathered during the self-assessment and interview-based data collection was triangulated by the semi-structured (60-80-minute-long) interviews with their line managers, project management office (PMO) members and project sponsor (top management representative who supervises the upstream sector's projects). 4 line managers, 5 PMO member, and one project sponsor was involved in the research. The main purpose of the interviews was to verify and, if necessary, correct the information coming from the previous data collection.

(4) Analysis and evaluation of the empirical information

Evaluation of the empirical data regarding the self-assessment completed by the project managers was based on Key Performance Indicators and the associated measurements of competency elements introduced in IPMA ICB 4.0 Standard. The self-assessment data was recorded in Excel. The contribution of the different competency elements to achieving success in terms of different success criteria was evaluated by means of the level of agreement calculated from the information elicited from the participants. The level of agreement, in terms of percentage, expresses the extent to which informants agreed on the importance of a certain competency element in achieving success in terms of a certain success criterion (Görög, 2016). The semi-structured interviews with project managers involved in the research and with their line managers, project office members, and a senior manager were analyzed by content analysis (Birmingham-Wilkinson, 2003).

(5) Formulating research results and corroborating research outcomes

Based on the conclusions drawn from the analysis of empirical information, the primary research results are formulated. To the final formulation, evaluation, and generalization the method of corroboration was applied (Plutchik, 1983; Putnam, 1991). In Popper's (1997) interpretation, corroboration is not equal with justification only it temporarily passed the test of trial, criticism and falsification.

In the interpretation of Stainback and Stainback (1988) corroboration serves to support the credibility and validity of research results in qualitative research by providing reflection and feedback to the primary results of research for those involved in research. The purpose of corroboration in this sense is not to validate the data, but to eliminate any misunderstandings. Boon (1979) draws attention to the importance of repeated testing in connection with corroboration and the importance of new feedback. In order to explain, filter out or dissolve (possibly extreme) research results that are different from the typical, a collaboration was conducted in the framework of a professional forum. This event, which was organized by the company group, served as a closing of the research. The whole population (98 project managers) and the other stakeholders (line managers, PMO members and project sponsor), who were involved in the triangulation of the research, were present. After an overview of the results, the members of the population had the

opportunity to reflect on the presented research results in anonymous (via Slido application - <https://www.sli.do/>) and openly (by holding hands, asking the crowd). Based on these, the final formulation of the hypotheses could be made and this allowed the generalization of the research results.

(6) Justifying/falsifying research hypotheses

In the final phase of the research, *final evaluation of the research hypotheses* will be made on basis of the feedbacks after the workshop, which ends the research.

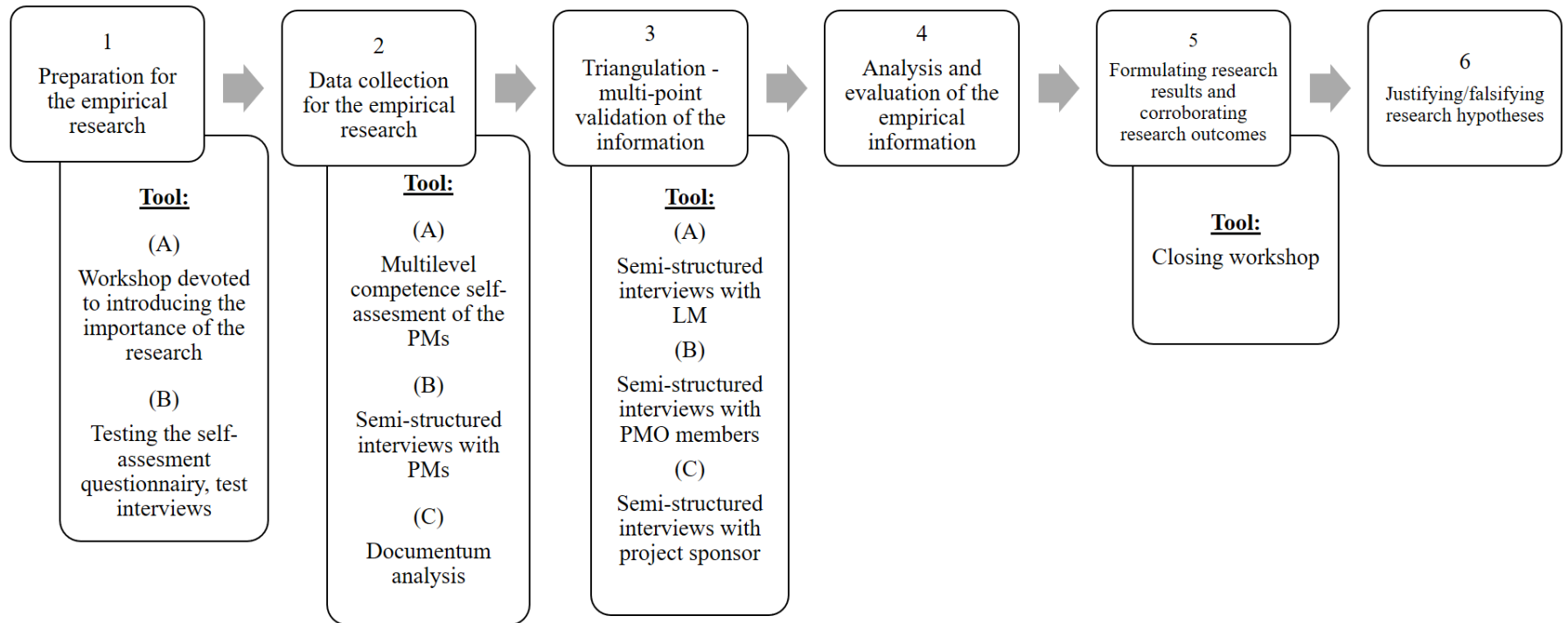


Figure 20
The process of the empirical research

3.5. Research population, sample and the selected company group

Introduction of the selected industry and sector

In the case of empirical research, it was particularly important to select an industry in which project work is typical and widespread. Despite the fact that projects are more and more common nowadays in every industry industry, the Project Management Institute defined the so-called project-intensive industries just a few years ago. Seven sectors were listed in which a significant part of the organizational operation is implemented by projects, these industries are: (1) manufacturing, (2) business services, (3) finance and insurance, (4) oil and gas, (5) IT services, (6) construction and (7) utilities (Projekt Management Institute, 2013). The empirical research was planned to be implemented in one of these project-intensive industries, in which a broad spectrum of projects could be found. Finally, the energy (the oil- and gas) industry - as a classical project-intensive sector - was selected, which considered to be ideal to the project management competence research. The oil and natural gas industry can be divided into three core business segments and three sectors respectively: (1) upstream (exploration & production) (2), midstream and (3) downstream. Upstream sector deals with exploration and extraction of crude oil and natural gas and can be divided into the following business segments: business development, exploration of hydrocarbon fields, field valuation/early extraction, field development, extraction and field abandonment (area restoration). Midstream focuses on the transportation of the raw materials and the refined products (pipelines, water, road, rail). In the organizations, this sector rarely appears on its own, often blends into another business (typically into the downstream). Downstream deals with refining crude oil, processing natural gas, and distributing and selling finished products (Csiszárík-Kocsir, 2015).

The following table, which is based on the documents provided by the company group, shows the variety of project types that appear in the upstream sector of the industry.

Table 35 - Project types in different stages of operation in the upstream (exploration & production) business of the oil and gas industry

Stage level (sectoral typology)	PROJECT TYPE (Literature based project typology)				
	Investment projects			R&D projects	Organisational development projects
BUSINESS DEVELOPMENT	Concession projects, Acquisition projects	HSE projects, Sustainability and maintenance projects	Joint venture projects	Innovation, R&D, laboratories	
EXPLORATION	New ventures, greenfield or brownfield exploration,				Business support projects: Organisational development projects, Process, Improvement projects, Governance projects, IT projects
APPRAISAL/EARLY PRODUCTION	Drilling projects to determine the borders of the oil field and commercial discover projects				
FIELD DEVELOPMENT	Development of new fields, Enhancing recovery at mature fields using advanced technologies				
PRODUCTION	Hydrocarbon production projects				
FIELD ABANDONMENT	Field Abandonment projects				

According to table above, the selected sector covers a wide range of project types known in the literature, thus providing an appropriate basis for achieving the research objectives.

The selected company group

The research was conducted at a Hungarian, multinational Company group's headquarter and at those of its subsidiary companies which are active in production currently. Companies belonging to the group that are currently performing only exploratory drills are excluded. In terms of operation, the organization is presently present in 30 countries, with more than 26,000 employees worldwide, and running a wide range of projects every day. Diversity is not only about the content of the projects, but also about the project organization solutions. The research population includes project managers in the upstream sectors of the companies belonging to the company group. Because of the complexity, size and geographical diversity of upstream sector these organisations, which are involved in the research, implement a wide variety of projects, covering a wide range of project types known in the professional literature (Table 38). Although only one company group has been involved in the research, but the importance of the industry in the group is significantly higher than that of other companies. The average number of larger, more complex projects in the upstream sectors of the company is as many as 350 to 400 per year. Projects in the upstream sector are, by their nature, diverse in complexity and knowledge-intensive, assuming a wide range of project management competencies.

Table 36 - Companies involved in research

COMPANY	REGION
Entreprise (Headquarter)	Global
Subsidiary 1	CEE region - Hungary
Subsidiary 2	CEE region, Croatia (Egypt, Angola)
Subsidiary 3	North Sea Region, United Kingdom
Subsidiary 4	Middle-East, Pakistan
Subsidiary 5	Russia
Subsidiary 6	Iraq

The research population and sample

The number of the population could be determined by several aspects, as there are several approaches within the organization group to define the project managers.

During the interviews with the PMO members and later with the project managers, several informal project manager types were mentioned: obvious project manager, occasional project manager, external project manager, technical expert project manager. Besides those, who are identified as project managers in their job descriptions, there are more, who manage projects, so it was important to define the criteria by which we define the (research) population. Based on the documents provided and the interview with the PMO leader, a total of five criteria can be distinguished, based on which project managers could be defined: (1) in the job description, the job title is the project manager; (2) it is mentioned in the job description that the individual performs project management tasks; (3) the individual is assigned to the project management job family in the TCL (Technical Career Ladder) system for competence assessment and development; (4) in the Individual performance plan project manager task is assigned and (5) a Key Performance Indicator is assigned to a project management task. Taking into account the above-mentioned aspects the determination of the size of the population in the research was based on the broadest interpretation, so all project managers were taken into account who fulfilled one of criteria (1) - (5), which was 98 people altogether. At the same time, the sample was randomly selected from a more narrow circle (59 people) who fulfilled criteria (1) or (2) or (3). The population was determined based on a multidimensional analysis. In the research sample altogether 25 project managers were selected randomly from the organisations, which comes out at 25,5% of the whole population, so considering the sample size the representativity of the research is confirmed within the organisational group.

A total of 5 female and 20 male project leaders were involved in the research, with an average age of 38.24 years and an average project experience of 5.8 years. According to their current position, 15 of them work as project managers, 9 as experts and one as a leading geologist. With regard to their project management qualification, it can be concluded that 1 person has completed post-graduate training in project management and 3 have the PMP certification, i.e. 16% of the project managers involved in the sample have a project management qualification. Their professional qualifications are varied, as seven geologists (two of whom have a PhD), a geophysicist (also PhD), five economists,

12 engineers (five oil engineers, one chemical engineer, three mechanical engineers, one electric engineer and two did not specified). In terms of nationality, the sample is also very diverse, as 4 Pakistani, one Yemeni, one Croatian, one Polish and 18 Hungarian project leader were randomly selected. Of the investigated project managers, nine are working on field development projects, one for main field development and sustainability projects, six for major exploration projects, four for organizational development projects, one for key organizational development and IT projects, two for maintenance, one for major sustainability, and one for change management and IT projects (based on the project types shown in Table 38).

The project managers in the field development and exploration projects are overrepresented in the sample, but this also shows the proportion of this type of projects in the upstream sector.

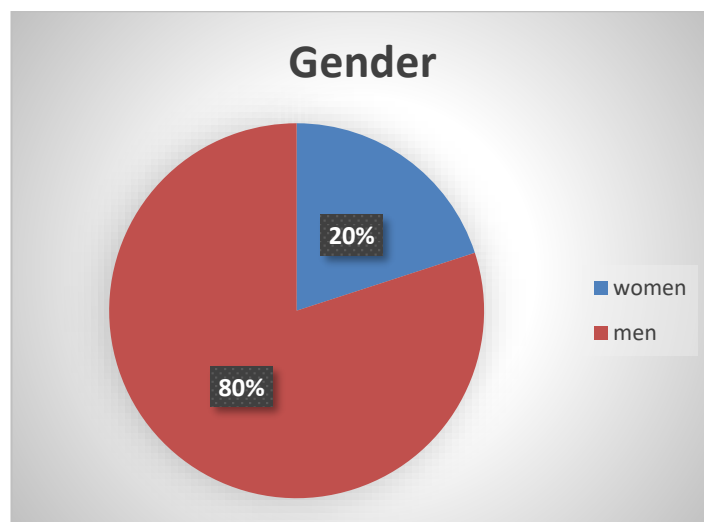


Figure 21
The gender distribution of the sample

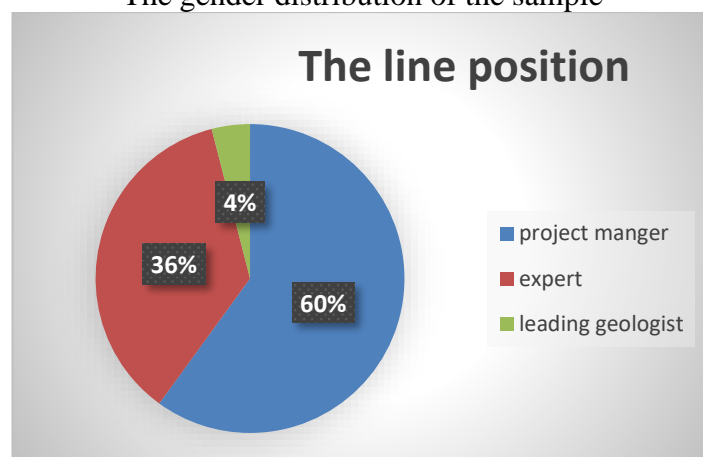


Figure 22
The line position distribution of the sample

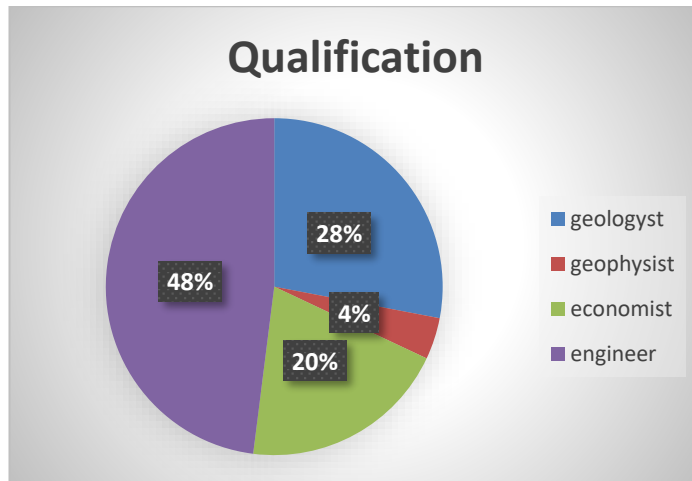


Figure 23
Distribution of the sample by qualification (Degree)

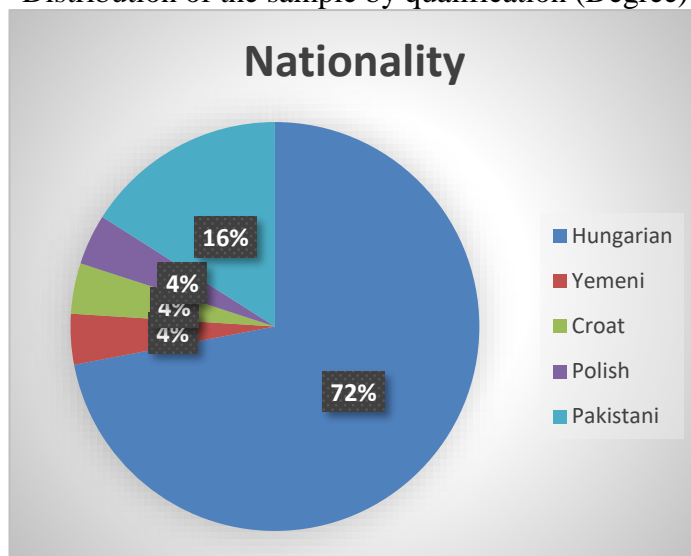


Figure 24
Distribution of the sample by nationality

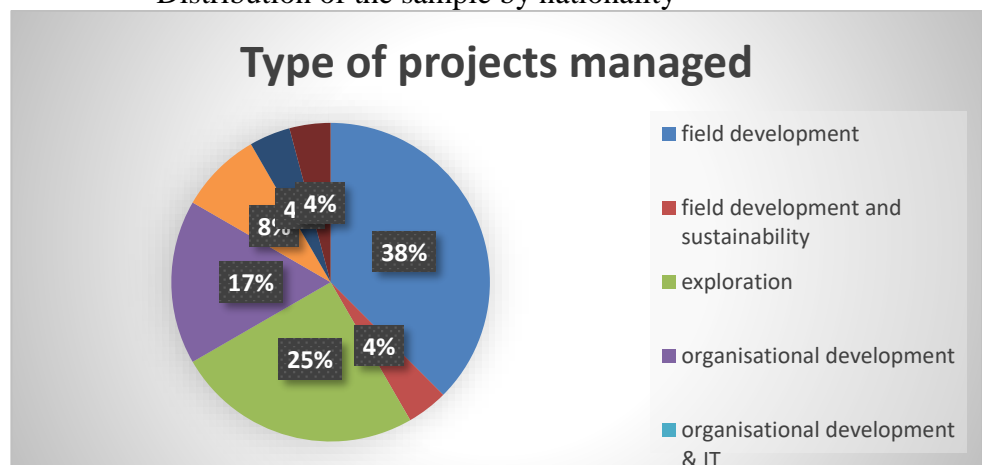


Figure 25
Distribution of sample by type of projects managed

The following table summarizes the main features of a sample of project managers involved in the research.

Table 37. The sample

PM	Gender	Age	PM experience (year)	Degree	Position	Project type	Nationality
#1	female	29	0,5	Economist – M.Sc in investment analyst	Project manager	Field development	Hungarian
#2	male	35	8	Petroleum (oil) engineer	Project manager	Field development	Croatian
#3	male	32	0,5	Petroleum (oil) engineer Project management postgraduate training	Project manager	Field development	Hungarian
#4	male	37	9	Petroleum (oil) engineer	Project manager	Field development	Hungarian
#5	male	29	0,5	Petroleum (oil) engineer	Project manager	Field development and sustainability	Hungarian
#6	male	52	11	Doctorate Degree - Geophysics	Project manager	Exploration projects	Yemeni
#7	female	45	8	Doctorate Degree – Geology	Project manager	Exploration	Hungarian
#8	male	61	13	Geologist	Project manager	Exploration project	Hungarian
#9	male	32	5	Engineer	Project manager	Exploration project	Hungarian
#10	male	35	13	Mechanical engineer (College)	Project manager	Field development	Pakistani
#11	male	39	5	Geologist	Leading geologist	Exploration project	Pakistani
#12	male	35	13	Mechanical engineer	Project manager	Field development	Pakistani
#13	male	28	1,5	Geologist	Expert	Organizational development	lengyel
#14	female	30	2,5	Economist – M.Sc. in International Relations PMP	Expert	Organizational development	Hungarian
#15	male	33	4	Economist - Accountance, PMP	Expert	Change management and IT	Pakistani
#16	male	30	1,5	Doctorate Degree – Geology, PMP	Expert	Organizational development	Hungarian
#17	male	48	1	Electric Engineer	Mechanical expert	Maintenance	Hungarian
#18	male	38	4	Master of Science in Mechanical Engineering, English and Sociology	Mechanical expert	Sustainability projects	Hungarian
#19	male	47	1	Petroleum (oil) engineer	Production expert	Maintenance	Hungarian
#20	male	39	10	Engineer	Project manager	Field development	Hungarian
#21	female	36	1	Economist	Expert	Organizational development	Hungarian
#22	female	45	9	Geologist	Project manager	Exploration project	Hungarian
#23	male	37	3	Chemical engineer	Expert	IT and Organizational development	Hungarian
#24	male	40	10	Geologist	Project manager	Field development	Hungarian
#25	male	44	10	Economist	Project manager	Field development	Hungarian

3.6. Research results

3.6.1. Evaluating project success in the upstream sector

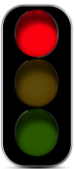

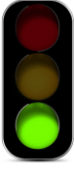
During the semi-structured interviews the project managers had to prioritize each success criterion based on their importance within the organization. Table 39 shows the results obtained.

Table 38 - Ranking of success criteria within the organization

	SUCCESS CIRTERIA		
	Project Triangle	Client (project owner) satisfaction	Stakeholder staistaction
Primary criteria within the organization	92% (23 people)	8% (2 people)	0% (0 people)
Primary criteria within the organization	8% (2 people)	72% (18 people)	20% (5 people)
Primary criteria within the organization	0% (0 person)	20% (5 people)	80% (20 people)

Document analysis highlighted that two types of project evaluation reports (post evaluation reports) are prepared at the organization group in case of closed projects, (1) one-pager post evaluation report (2) and detailed post evaluation report, which is only used for challenging or failed projects. Success in both types of documents is basically evaluated by these primary project objectives, i.e. result, time and cost (i.e. the elements of the project triangle) in these organizations, so the success of the projects is basically assessed by efficiency. The RAG status of the primary project objectives is examined in the one-pager post evaluation report, which is equally suitable for determining the status of unfinished projects as well as for the post-analysis of closed projects.

Table 39 - RAG Status (Red-Amber-Green) Status analysis of Primary Project Objectives

Sign		Tolerated deviation from the planned values	Project success
Red		Above 20%	failed
Amber		10-20%	Performed with challenges
Green		0-10%	Successful

During the competence self-evaluations the project managers had to evaluate the importance (significance) of competence to achieve project success, their current level of competence, their desired level of competence (after a year). Based on the scores obtained for each competency element, the following order was formed. The self-evaluations also partly aimed to get the project managers to learn more about the conceptual content of the 28 competency elements of the three competence areas. Competences are not measured by themselves, but by the related key performance indicators (the 28 competency elements can be splitted into 133 key performance indicators, each with a further 2-8 performance measurements). These provide a detailed description of the content of the competencies, and the researcher's personal presence also allowed them to ask. The colors of the ICB 4.0 competence areas are used in the table. Purple represents people competence area, blue is perspective competence area and green is the practice competence area.

Table 40 - Rankings of Competence Elements

#	IMPORTANCE OF COMPETENCE		CURRENT COMPETENCY LEVEL		DESIRED FUTURE COMPETENCY LEVEL	
1	<i>Personal integrity and reliability</i>	4,22	<i>Personal integrity and reliability</i>	3,80	<i>Personal integrity and reliability</i>	4,20
2	<i>Time</i>	4,05	<i>Self-reflection and self-management</i>	3,55	<i>Self-reflection and self-management</i>	4,06

3	<i>Self-reflection and self-management</i>	3,97	<i>Time</i>	3,47	<i>Power and interest</i>	4,02
4	<i>Finance</i>	3,89	<i>Personal communication</i>	3,44	<i>Time</i>	3,97
5	<i>Scope</i>	3,83	<i>Relationships and engagement</i>	3,22	<i>Requirements and objectives</i>	3,88
6	<i>Results orientation</i>	3,77	<i>Finance</i>	3,21	<i>Personal communication</i>	3,81
7	<i>Teamwork</i>	3,74	<i>Power and interest</i>	3,18	<i>Governance, structure & processes</i>	3,80
8	<i>Requirements and objectives</i>	3,73	<i>Resourcefulness</i>	3,17	<i>Risk and opportunities</i>	3,80
9	<i>Personal communication</i>	3,73	<i>Leadership</i>	3,17	<i>Leadership</i>	3,77
10	<i>Strategy</i>	3,70	<i>Culture and values</i>	3,15	<i>Relationships and engagement</i>	3,66
11	<i>Plan and control</i>	3,70	<i>Risk and opportunities</i>	3,13	<i>Scope</i>	3,62
12.	<i>Leadership</i>	3,70	<i>Governance, structure & processes</i>	3,05	<i>Resourcefulness</i>	3,60
13.	<i>Power and interest</i>	3,68	<i>Teamwork</i>	3,02	<i>Plan and control</i>	3,59
14.	<i>Project design</i>	3,65	<i>Scope</i>	2,98	<i>Finance</i>	3,57
15.	<i>Compliance, standards and regulations</i>	3,62	<i>Results orientation</i>	2,97	<i>Results orientation</i>	3,56
16.	<i>Risk and opportunities</i>	3,57	<i>Plan and control</i>	2,91	<i>Negotiation</i>	3,55
17.	<i>Organisation and information</i>	3,49	<i>Organisation and information</i>	2,90	<i>Teamwork</i>	3,53
18.	<i>Relationships and engagement</i>	3,44	<i>Procurement</i>	2,88	<i>Culture and values</i>	3,45
19.	<i>Resourcefulness</i>	3,43	<i>Compliance, standards and regulations</i>	2,86	<i>Compliance, standards and regulations</i>	3,42
20.	<i>Governance, structure & processes</i>	3,40	<i>Requirements and objectives</i>	2,86	<i>Organisation and information</i>	3,38
21.	<i>Conflict and crisis</i>	3,40	<i>Resources</i>	2,75	<i>Strategy</i>	3,34
22.	<i>Stakeholders</i>	3,39	<i>Project design</i>	2,67	<i>Conflict and crisis</i>	3,34
23.	<i>Procurement</i>	3,31	<i>Negotiation</i>	2,66	<i>Project design</i>	3,33
24.	<i>Resources</i>	3,23	<i>Strategy</i>	2,62	<i>Resources</i>	3,30
25.	<i>Negotiation</i>	3,21	<i>Conflict and crisis</i>	2,60	<i>Stakeholders</i>	3,22
26.	<i>Quality</i>	3,12	<i>Stakeholders</i>	2,58	<i>Procurement</i>	3,10
27.	<i>Culture and values</i>	3,08	<i>Quality</i>	2,45	<i>Quality</i>	3,03

28.	<i>Change and transformation</i>	2,75	<i>Change and transformation</i>	1,74	<i>Change and transformation</i>	2,52
-----	----------------------------------	------	----------------------------------	------	----------------------------------	------

When the results are summarized based on the competence areas, the following ranking could be seen.

Table 41 - Ranking of competency areas

#	SIGNIFICANCE OF COMPETENCE	CURRENT COMPETENCY LEVEL	DESIRED FUTURE COMPETENCY LEVEL
1.	human	human	human
2.	practice	perspective	perspective
3.	perspective	practice	practice

3.6.2. The contribution of the project management competence areas to the success measured by different success criteria

Before the personal interviews, the meaning of the three success criteria was discussed and clarified with the respondents. A simple questionnaire could have led to a distortion regarding the relationship between the competency elements and the success criteria. The primary reason was that the interviewees did not know all terms related to the criteria of project success. To reaching a more reliable level of understanding, the best way to get information was the structured interview. Based on their answers (regarding the contribution of competency elements to the success criteria) the level of agreement (Görög, 2016) was calculated. The following table shows the results that that, according to the respondents, the 28 competency elements tested are primarily successful in terms of success criteria.

Table 42 - The relationship between competency elements and success criteria

			SUCESS CRITERIA		
		COMPETENCY ELEMENT	Project Triangle	Satisfactory of project organization	Satisfactory of Stakeholders
COMPETENCY AREA	PERSPECTIVE	Strategy	0%	100% (25 people)	0%
		Governance, structure and processes	12% (3 people)	88% (22 people)	0%
		Compliance, standards and regulations	24% (6 people)	72% (18 people)	4% (1 person)
		Power and interest	16% (4 people)	72%	12% (4 people)
		Culture and values	8% (2 people)	88% (22 people)	4% (1 person)

	PEOPLE	Self-reflection and self-management	16% (4 people)	72% (18 people)	12% (3 people)
		Personal integrity and reliability	12% (3 people)	0%	88% (22 people)
		Personal communication	4% (1 person)	0%	96% (24 people)
		Relationship and engagement	0%	24% (6 people)	76% (19 people)
		Leadership	24%	0%	76% (19 people)
		Teamwork	0%	0%	100% (25 people)
		Conflict and crisis	0%	0%	100% (25 people)
		Resourcefulness	40% (10 people)	44% (11 people)	16% (4 people)
		Negotiation	20% (5 people)	0%	80% (20 people)
		Results orientation	48% (12 people)	40% (10 people)	12%
	PRACTICE	Project design	96% (24 people)	4% (1 person)	0%
		Requirements and objectives	36% (9 people)	64% (16 people)	0%
		Scope	80% (20 people)	20% (5 people)	0%
		Time	100% (25 people)	0%	0%
		Organisation and information	64% (16 people)	16% (4 people)	20% (5 people)
		Quality	92% (23 people)	8% (2 people)	0%
		Finance	100% (25 people)	0%	0%
		Resources	100% (25 people)	0%	0%
		Procurement	84% (21 person)	8% (2 people)	8% (2 people)
		Plan and control	100% (25 people)	0%	0%
		Risk and opportunity	88% (22 people)	8% (2 people)	4% (1 person)
		Stakeholders	4% (1 person)	0%	96% (24 people)
		Change and transformation	80% (20 people)	16% (4 people)	4% (1 person)

3.6.3. The impact of the organisational context on the project management competencies' contribution to project success

During interviews project managers also mentioned some characteristic organizational (within the organizational group) constraints that influence the enforcement of their existing competencies to achieve project success. Respondents, without exception, identified only organizational constraints (no supportive factors were mentioned). The most frequently mentioned factors being:

1. *Human resources scarcity,*
2. *Lack of line authority over the project team,*
3. *Difficulties to track the project progress,*
4. *Changing organisation and processes.*

The following table shows which are those competencies, whose enforcement was blocked by the organizational constraints according to the respondents and which additional competencies could compensate these blocking effects to some extent.

Table 43 - Organizational constraints

Organizational constraint	Proportion of respondents mentioning factor	Competencies primarily blocked	Other competencies involved
1) Human resources scarcity	100% (25 person)	<i>Resources</i>	<i>Relations & engagement</i>
			<i>Power & interest</i>
			<i>Stakeholders</i>
2) Lack of line authority over the project team	92 % (23 person)	<i>Leadership</i>	<i>Personal communication</i>
			<i>Teamwork</i>
			<i>Negotiation</i>
3) Difficulties to track the project progress	76% (19 person)	<i>Plan & control</i>	<i>Time</i>
			<i>Finance</i>
			<i>Change & transformation</i>
4) Changing organisation and processes	72% (18 person)	<i>Governance, structure & processes</i>	<i>Requirements, objectives & benefits</i>
			<i>Change & transformation</i>
			<i>Compliance, standards & regulations</i>

3.7. Results of the dissertation

3.7.1. Evaluating project success in the upstream sector

This question was analysed from various aspects during the research. During the semi-structured interviews project managers ranked the importance of the success criteria within the sector. After that the project closing documents, presented by the project managers, were analysed. During the self-assessment project managers determined the importance of the competences and reported about their current and future level competence. Besides these, interviews with the project managers' line managers, with five project office employees, and with one top manager who was responsible for projects were conducted to triangulate the data collected before.

At the beginning of the interviews it became obvious that project managers have limited knowledge about the two success criteria beyond the project triangle. After the clarification of the definitions, the majority (92%) of the project managers mentioned the project triangle based success evaluation as number one priority at their organisation. They put in second rank the strategic fitting of the project, i.e. success criteria based on client satisfaction. On the last place came the success based on the stakeholder satisfaction.

The document analysis underlined that the success of the projects is evaluated against the time and cost and quality constraints, i.e. the project triangle. In case of exploration and production projects meeting the HSE (health, safety and environment) criteria is of high importance, so considering this, it could be said that the stakeholder satisfaction based success criteria is also important.

It is worth controlling the consistency of the project managers' answers. Based on the aggregated self-evaluation results, and the competence field's importance order set up during the interviews, the most important competence field for the project managers are the people competence area. Second most important are the practical competencies, and there is the perspective competence on the third place. This result is equal with the results of self-evaluations: 1. people, 2. practice, 3. perspective.

The most important human competencies, in their interpretation, basically contribute to the success based on the stakeholder needs (this will be presented in more details in the next chapter). Contradicts to this, that the stakeholder satisfaction success criteria is the less important success criteria for the project managers. So, the most important

competence elements contribute to the less important success criteria. The three elements of the project triangle (project result, time, finance) are somewhere on the first five most significant places on the competence list made up during self evaluation, so, not in the aggregated results, but in the sequence of the competence elements the classic project triangle project success interpretation is present.

In resolving the contradiction regarding the importance of human competencies, in this phase of the research, the usage of data and methodology triangulation had a dominant role, it was information gathering for the same subject from more sources and methods. It was confirmed during the interviews with line managers, five employees of the project office, and the top manager that project success is basically evaluated on time and cost-based delivery in the organisational group. At the same time, based on the interviews, the contradiction can be released why is still the most important competence the stakeholder satisfaction related human competence. In the past years, to inspire the managers, lots of human competence development trainings were organised for them withing the organisation group. These trainings put strong emphasis on the issue of human competencies, this can explain why the project managers highlighted these regarding importance, as well as a field to be developed.

Generalist and specialist project managers

Focusing on the topic of competency and considering the sectoral specialities, it is inevitable to analyse the educational background of project managers. 80% of the sample project managers graduated as engineers, geologists or geophysicists and only 20% are economists, and only 16% has some kind of project management qualification. Many respondents claimed that they “became project managers accidentally”, because their previous line activities are realised now in the form of projects. In this sector many employees became project managers this way, but basically, they look at themselves as an experts of their field. It is important to analyse, whether the respondents consider the specialist project manager (with more context competence, and with deeper professional knowledge on the content of the project result) or the generalist project manager (who are stronger in the practical competencies, i.e. competencies referring to classic project management tools) more successful. Surprisingly, 67% of the respondents consider the generalist project managers to be more successful and only 33% selected the specialists. This could be explained with the fact, that the responders are more uncertain in competencies regarding the practical competence fields (related to the classic project management toolbox), so they assumed that the other type of project manager should be

more successful. It was evidenced, that the organisation evaluates project success basically on the criteria of efficiency not effectiveness, this also underlines, that the generalist project managers, with strong practical competencies were perceived as more successful.

3.7.2. The contribution of the project management competence areas to the success measured by different success criteria

Most of the responders concluded that the elements of the context competence area checked the primary contribute mainly to the client satisfaction success criteria. In their interpretation, knowledge about the organisational, operational and industrial environment of the projects contributes mainly to the strategic acceptance of the project. Seven competencies out of ten human competencies were related to the success achieved based on the stakeholder satisfaction. Elements of the practice competence area, 11 out of 13, contribute to the success defined by project efficiency, so according to the respondents the classic project management toolbox competencies are related mostly to the project triangle success criteria.

Only one classic practice project management competency was allocated to the stakeholder satisfaction success criterion, it was the stakeholder competence. This is not at all surprising regarding its content.

According to responders reaching the success measured against client satisfaction success criterion is helped by the self-reflection and self-management human competence. In their opinion, that project manager, who is strong in this competence, is able to get his projects across to the organisational management. 40% of the responders underlined the importance of resourcefulness human competence in achieving success measured against the classic project triangle, and 44% of the respondents mentioned it as a contribution to client satisfaction success criterion. Based on the interviews, it could be seen that there are two interpretations of resourcefulness: on one hand, it is seen as the competence in not routinely solving the problems related to professional context of the project and in gaining access to the scarce resources, on the other hand it is the creativity to get the projects accepted. The requirements, goals and results practical competence, because of the knowledge of the goals serving the basis of the project, also contributes to the client satisfaction success criteria.

Only one human competence, the results orientation, was mentioned to contribute mainly to the effectiveness of the project, i.e. the success measured against the project triangle.

At the beginning of the semi-structured interviews with project managers it was useful to clarify the meaning of the different success criteria, because respondents had limited knowledge about the multilevel success criteria concept and considered project triangle as the only success criterion before. Even, when dealing with competences that were not related to the project triangle success based on their answers, they often add that indirectly there is correlation between each competence and the efficiency based success.

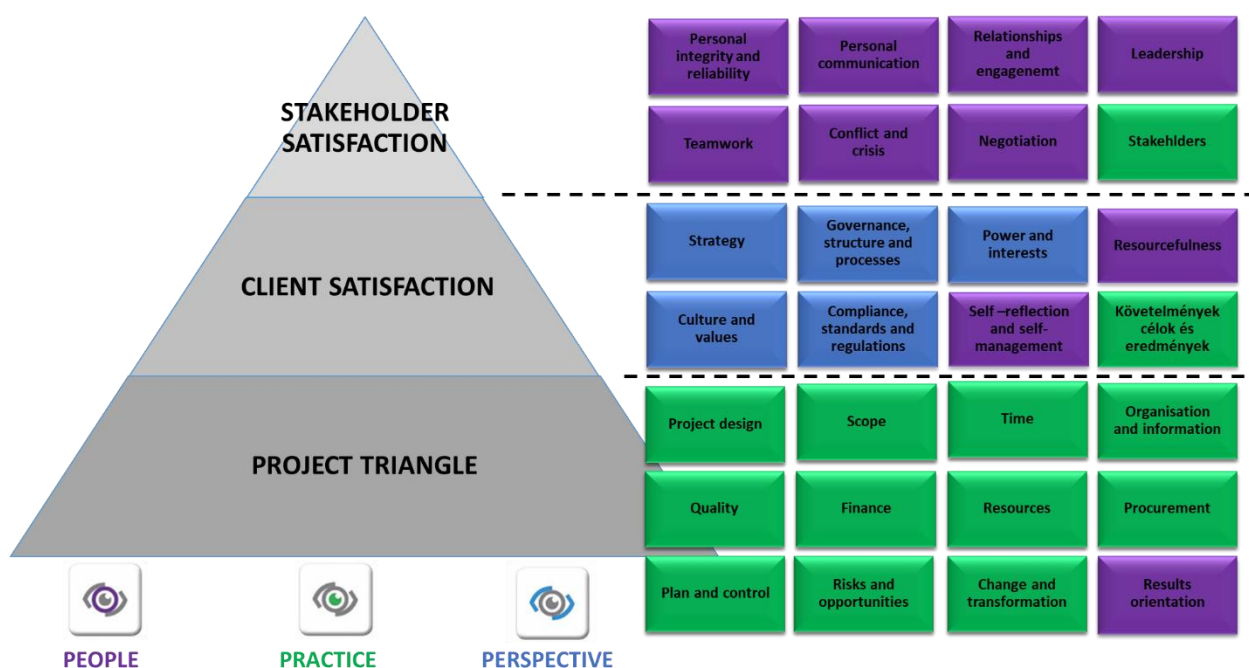


Figure 26
The competency elements and the success criteria

Based on the answers, relationship could be identified between the different project management competence areas and the different project success criteria based success, such as:

- most elements of the people competence area primarily contribute to the stakeholder satisfaction success criteria based interpretation of project success;
- most of the elements of the practical competence area primarily contribute to the project triangle success criteria based interpretation of project success;
- most of the elements of the perspective competence area primarily contribute to the client satisfaction criteria based interpretation of project success.

3.7.3. The impact of the organisational context on the project management competencies' contribution to project success

Based on project managers' answers four important organisational constraints were identified, which influence the project management competencies' contribution to the project success, i.e. to what extent can an existing competence contribute to the achievement of the project success. The related results will be introduced based on the four organisational constraints.

- *Human resources scarcity*

Every respondent, the whole sample size, mentioned one specific organisational constraint, which is crucial in achieving the success of the projects. That is the number of the key human resources, who are necessary to carry out the project activities. The number of these experts are very limited within the organisational group, so in case of multiple parallel projects, the project managers often face the lack the important expertise, so despite of their own existing resource management competencies budget and time overflow would occur in their projects. Most of the respondents mentioned three competence elements (one from people, one from perspective, and one from the practical competence area) that are able to partially compensate the effect of this organisational constraint. These are as follows: relations and engagement (mentioned by 21); power and interest (mentioned by 15) and the stakeholder competencies (mentioned by 10). These are those competencies, which help the project manager to represent the interests of his own projects in the "battle" for scarce resources.

- *Lack of line authority over the project team*

Due to the fact, that the organisational group basically implement its projects in a weak matrix project organisational arrangement, i.e. the authority over the members of the project team belong to a line manager, as a result the classical leadership competence can be applied with limitations, especially in those situations, when the project tasks and the daily line tasks conflict. This organisational constraint could be identified in every organisation, which implements its projects in linear-functional or weak matrix project organisational arrangement. Based on the respondents' answers three people competence elements could resolve the block of the leadership competence, these are: the personal communication (mentioned by 23), teamwork (mentioned by 21) and negotiation (mentioned by 18). The first is one of the most important project management competence

elements, the second contributes to the efficient management of the project team's work, and the third helps to resolve the organisational constraint by helping the communication about the human resources with the line manager.

- *Difficulties to track the project progress*

76 % of the project managers involved in the research (19 managers) confirmed, that they face problems during the accomplishment of the planning and even during the project control phase, because they do not have direct access to the systems that register the actual projects spending, so the real cost reports arrive (often late) from the finance department. Because the financial and project clearing systems are not integrated in the organisational group, the accomplishment of the project control is highly dependent on another organisational unit. Some respondents – 17 and 16 project managers – appointed the time and finance competences could compensate this situation. A precise time and cost plan can help in monitoring the spendings of the project, and it could be the resolution of the above situation. 15 project managers underlined that the change and transformation (practical) competence could also be important in managing the frequent changes, such as the managing the acceptance process of the project deadline or budget extension.

- *Changing organisation and processes*

The organisational changes, and the related transforming processes, the changing templates make it difficult to reach the project triangle based success within the organisation group as well as the client satisfaction based project success. 18 of the 25 project managers had difficulties in understanding the complex environment of the projects, their embeddedness in the strategic and organisational context, the related governance. The governance, structural and process competency is blocked by this constraint, which can also lead to time and budget overflow of the projects. In this situation, that project manager is considered successful, who can precisely define the requirements, objectives (mentioned by 16), and those who have good change and transformation competencies (mentioned by 15) and are well-informed in the legal and regulatory environment issues, which is covered by the compliance, standards and regulations perspective competence element (mentioned by 15).

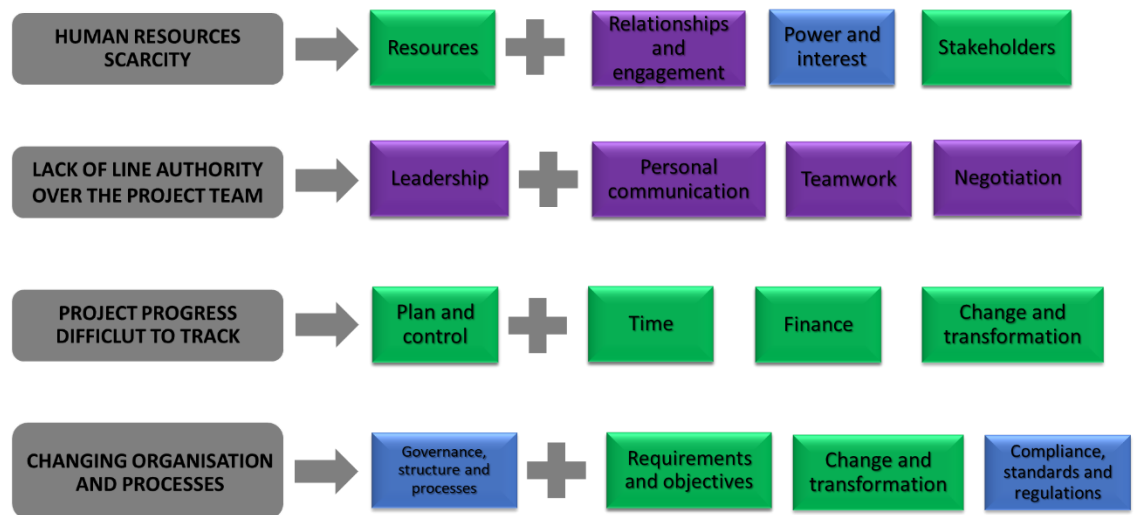


Figure 27
Organisational constraints

Based on the above, it can be concluded, that the contribution of the project management competencies to the project success could be affected by the organisational context. During the self-assessment respondents evaluated their current competence level – regarding the competence elements identified as mostly affected elements by the organisational constraints- as follows: leadership (9. place); company governance, structure and processes (12. place), planning and control (16. place) and resources (21. place). These competencies are ranked in the middle section in the self-assessment, which means that the project managers current competency level – based on their own evaluation - is satisfactory in these competencies. Bearing this in mind, we could not assume, that the lack of competencies caused the lower level of performance in the above-mentioned cases, but the organisational constraints. This conclusion can be important for the client organisations. In case of lower project management achievement organisations should consider whether it is coming from organisational constraints or it is caused by the lack of project management competence before they organise competence development programs. If the problem is caused by organisational constraints the competence development training could be inefficient and waste of money and time. Thinking this further, these organisational constraints can lead to the project managers' frustration, to the feeling, that despite of their existing or developing competence they cannot achieve project success. This could be a possible explanation of the project managers' high fluctuation, and it could explain why are relatively so many young and unexperienced project managers within the organisation group.

The respondents mentioned only organisational constraints during the interviews, but it could be assumed, that enforcing factors also exist. During this research such organisational factors were not discovered, so it could be discussed in a future research focusing on that special topic.

The results highlighted that despite of the organisational constraints, the existing competencies altogether could “compensate” these situations. Although it was not the primary objective of this research, and related hypothesis was not determined in the dissertation, but the results of the research explored the interrelationship between the project management competencies. The basic relation between the competence elements are shown on the right side of the 22. figure, for example the coexistence and the interrelationship between relationships and engagement (people), the power and interest (perspective) and the stakeholder (practical) competence elements could ease the access the limited human resources. There could be cases when competence elements belonging to different competence areas are affecting or when the joint effect of different competence elements from the same competence could compensate the blocking of an other competence element. More specific aspects of the competence element interrelationships could be revealed in a future research.

3.8. Evaluating the hypotheses

Based on the outcome of analysing the information collected in the course of the research it might be stated that project managers acting in the upstream sector of the group primarily consider project success in line with efficiency criteria, i.e. the project triangle. In this way the statement implied in H1 hypothesis is considered to be a true statement, consequently the following thesis might be formulate:

T1: The practicing project managers in the sector consider the project triangle as the most important success criterion over the effectiveness success criteria, i.e. the satisfaction of the client organisation and also over the stakeholder satisfaction.

Based on the outcome of analysing the information collected in the course of the research it might be stated that 80% of the (11 out of 13) practice competencies contributes to achieving project success in terms of the project triangle. In this way the statement implied in H2A hypothesis is considered to be a true statement, consequently the following thesis might be formulated:

T2A: As to the project management competencies as a whole, primarily the technical capabilities, or in other words, the practical competencies contribute to the efficient completion of a project, i.e. the success measured against the project triangle.

Based on the outcome of analysing the information collected in the course of the research it might be stated that each of the five perspective competence elements unanimously contribute to achieving success in terms of client satisfaction, i. e. the extent to which the completed project outcome contributes to achieving the underlying strategic objective. Thus, the statement implied in H2B hypothesis is considered to be a true statement, consequently the following thesis might be formulated:

T2B: As to the project management competencies as a whole, primarily the conceptual capabilities, or in other words, the perspective competencies contribute to achieving the beneficial changes implied in the underlying strategic objective.

Based on the outcome of analysing the information collected in the course of the research it might be stated that 70 % (7 out of 10) of the human competence elements contributes to achieving success in terms of stakeholder satisfaction. Thus, the statement implied in H2B hypothesis is considered to be a true statement, consequently the following thesis might be formulated:

T2C: As to the project management competencies as a whole, primarily the human abilities, or in other words, human competencies contribute to the success measured against the stakeholder satisfaction.

Bearing in mind the statements implied T2A, T2B and T2C, it might be stated that H2 hypotheses could be considered to be a justified statement, thus the following thesis could be formulated:

T2: In the case of the implemented projects different project management competence areas are contributing to success measured by different success criteria in the analysed sector.

Based on the outcome of analysing the information collected in the course of the research it might be stated that the identified organisational features have an impact on the contribution level of the existing project management competencies to achieve project

success in the given sector. Thus, the statement implied in H3 hypothesis is considered to be a true statement, consequently the following thesis might be formulated:

T3: The organisational context influences how the existing project management competencies could manifest themselves from the point of view of achieving project success in the given sector.

3.9. Summary

The research methodology deployed in this research has turn to be appropriate from the point of view of achieving the research aim, since (1) the variety of collecting information made it possible to conduct a multidimensional analysis; (2) the use of data and methodology triangulation resulted in more reliable information; (3) the use of corroboration resulted in the a more reliable generealization of the research outcomes; (4) due to the reliable generalization the hypotheses could be unanimously justified. Bearing in mind the research outcomes it could be stated that the predefined research aim is achieved, and these research outcomes implies practical implications for the company group that provided an organisational context for this reseach.

(1) The research highlighted that project success is primarily evaluated against the project triangle within the company group. However, there are signs predicting the openness of the top management for considering the importance of human competence area besides the practical competence area. The increasing number of human competence development programs initiated by the top management clearly shows this likely future trend.

The research outcomes, at the same time, imply managerial, i.e. practical implications for the organisations as well, which are as follows:

- The company group should consider evaluating their projects not only against the project triangle, but against other success criteria as well. The new criteria should have an effect on the project evaluation processes, on the project documentation, besides the evaluation of the project managers (key performance indicators) should be modified based on them.
- The sample selection highlighted that there is no consensus about the project manager profession (position as a job) within the company group. It should be

clarified who considers to be a project manager within the group, because currently project managers could be determined by various aspects.

- In case of the specialist project managers the professional identity should be strengthen and consider their special situation in case of professional training programmes.
- Because of the low level of project management qualification (only 16% of the sample has a professional project management qualification), it could be beneficiary for the organisation group to encourage and support project managers to gain these certifications.

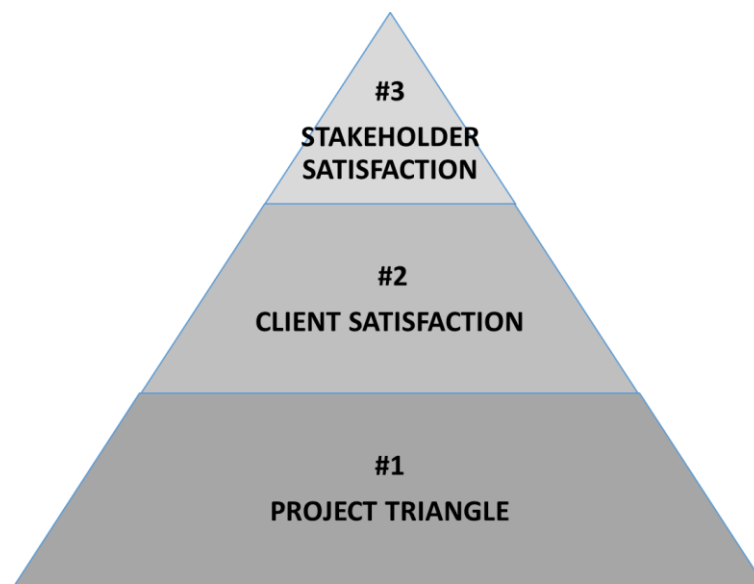


Figure 28
The ranking of success criteria within the organisation group

(2) The explorative, qualitative research revealed the relationship between the competence areas and the success criteria. The competence elements of the practice competence area primarily contribute to the success achieved in terms of the project triangle, while the elements of the perspective competence area contribute to the success achieved in terms of the client satisfaction, and the human competence area contributes to the success achieved in terms of the satisfaction of the stakeholder groups. The research also highlighted the role of self-reflection, self-management and resourcefulness competencies to get the project across to the organisational project acceptance processes and ease the client acceptance and contribute to the client satisfaction.

The research outcomes, at the same time, imply managerial, i.e. practical implications for the organisations as well, which are as follows:

- If the organisation group plans to evaluate the project success achieved mainly against the project triangle in the future, it should focus mainly on the development of the practice competence area.
- If the organisation would like to evaluate its projects not only against the classical project triangle but against other criteria as well (like client satisfaction or stakeholder satisfaction) in the future, in this case the revealed relationship between the competence areas and the different success criteria could provide a great starting point of elaborating a new success evaluation system and it could also help in planning the training and competence development programmes for project managers.

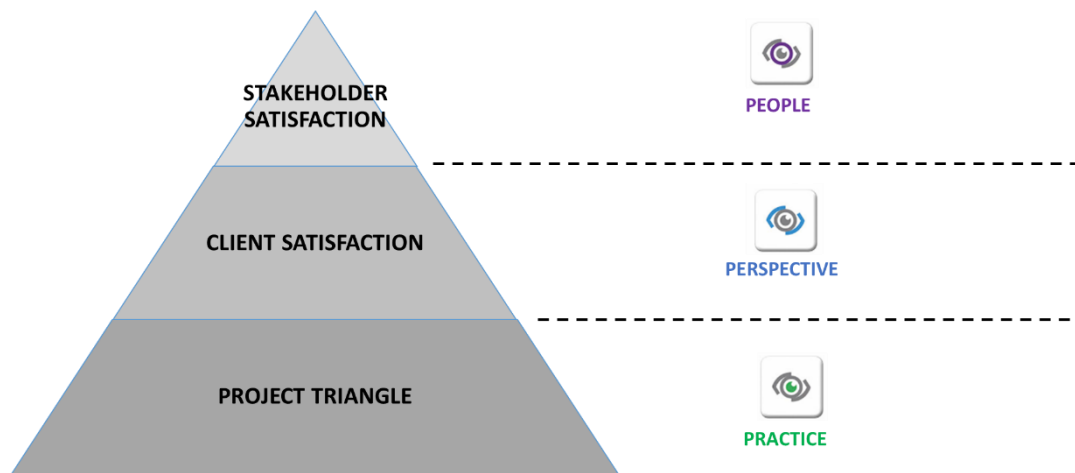


Figure 29

Relationship between the project management competence areas and the project success criteria

(3) The research also revealed that the organisational context influences the project management competencies' contribution to achieving project success because the organisational constraints could block the competencies contribution to the successful workplace performance. The result also highlighted that other competencies could compensate this negative effect. The understanding further aspects of the relationship between the project management competencies and the features of the organisational context could be the primary aim of a future research, which could reveal the details of this topic.

The research outcomes, at the same time, imply managerial, i.e. practical implications for the organisations as well, which are as follows:

- Not necessarily the lack of the project management competence is the reason of the underperformance and the project failures within the organisation group.
- Organisations should put a bigger emphasis on mapping and revealing the organisational constraints and resolve them.
- During the planning phase of the competency development programs it should be mapped which are root causes of the underperformance/project failure, because both organisational constraints and also the lack of competence could cause them. If it is coming from constraints, the organisation should resolve that problem and it should not invest into competency development programs.

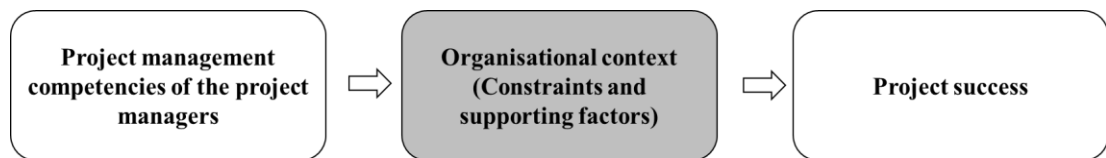


Figure 30

The organisational context's effect on the project management competencies' contribution to the project success

3.10. Limitations

As to the generalisation of the research outcome, it might be remarked that the entire research was implemented within one sector (upstream) of company group (headquarter and six subsidiaries) which operate globally. However, the complexity of the core activity within the upstream sector, and at the same time the multivariety of the initiated and completed projects and the high number of simultaneously completed projects provide a reliable basis for generalizing the research outcomes reliably. In this way, these results could be utilized in other sectors of the gas and oil industry, and these potential practical implications could be beneficial for other companies operating in other project-intensive industries as well.

At the same time, the success of PhD theses relied on one-company based research in the management domain (Gelei, 2002; Toarniczky, 2012) justifies the appropriateness of those researches which are one company or one company group in case of a qualitative research. Unlike to quantitative researches, where the size of the sample and the associated statistical analysis could be decisive as to the reliability of the research outcomes, the reliability of the qualitative research primarily relies on the appropriateness of the case company (Bokor, 1999).

There search outcomes at the same time imply potentials for further research. The primary aim of this research was to reveal the fundamental relationship between competency elements and success criteria. Besides this, the research pointed out some organisational constraints regarding the manifestation of existing project management competencies, however, further research might focus on revealing those organisational features that could support those project management competencies to achieve success against each success criteria. At the same time, a research focusing on the likely relationship between competency elements could result in a more sophisticated research outcome. The relationship between project types and competencies, and also the assumed correlation between the competencies and the cultural aspects of the project managers were out of scope of this research, although these topics could be considered to be aims of further researches as well.

In sum, it might be concluded that the outcomes of this dissertation could serve as a starting point for a few new further researches related to the topic of project management competence. These future researches could highlight further aspects of this topic, which could contribute to the development of the project management academic literature and the profession itself.

Appendix 1: Three competence areas of IPMA ICB v.4.0

Competence area	Competence elements	Knowledge	Skills and abilities
Perspective	1. Strategy	<ul style="list-style-type: none"> Benefits realisation management Critical success factors Key performance indicators Organisational mission Organisational vision Difference between tactic and strategy Diagnostic and interactive control management systems Strategic performance management Benchmarking Management control systems Strategic schools of thought 	<ul style="list-style-type: none"> Analysis and synthesis Entrepreneurship Reflection of the organisation's goals Strategic thinking Sustainable thinking Contextual awareness Result orientation
	2. Governance, structures and processes	<ul style="list-style-type: none"> Basic principles and characteristics of management by projects Basics of portfolio management Basics of programme management Basics of organisational design and development Formal organisation and informal interrelationships of project, programme and portfolio management (staff, line, etc.) in the organisation Governance Organisation and business theories 	<ul style="list-style-type: none"> Leadership Reporting, monitoring and control Communication planning and executing Design thinking
	3. Compliance, standards and regulations	<ul style="list-style-type: none"> Law regulation systems involved Autonomous professional regulation Professional standards and norms, e.g. IPMA standards, ISO standards (e.g. ISO2100 guidance on project management) Sustainability principles Benchmarking theory Benchmarking tools and methods Knowledge management Codes of ethics Codes of business conduct Differences between law theories 	<ul style="list-style-type: none"> Critical thinking Benchmarking Adapting standards to specific organisations Szabványok és szabályok kommunikációja Leading by example
	4. Power and interest	<ul style="list-style-type: none"> Formal organisation (staff, line, etc) versus informal structures Informal decision-making processes Formal and informal power and influence Difference between power and authority Reach of influence 	<ul style="list-style-type: none"> Observing and analysing psychological processes Recognising and using influence Using power when appropriate Discovering values Revealing stakeholders' interests

		<p>Sources of interests</p> <p>Conformity</p> <p>Bases of power</p> <p>Project psychology</p> <p>Organisational culture and decision-making</p> <p>Power theories</p>	
	5. Culture and values	<p>Relevant cultural traits, values, norms and admissible behaviour</p> <p>Organisational mission and vision</p> <p>Mission statements</p> <p>Corporate values and policies</p> <p>Quality policies</p> <p>Ethics</p> <p>Corporate social responsibility (CSR)</p> <p>Green project management</p> <p>Theories and culture</p>	<p>Values awareness</p> <p>Cultural awareness</p> <p>Respect for other cultures and values</p> <p>Aligning to and working within different cultural environments</p> <p>Dealing with issues related to cultural aspects</p> <p>Bridging different cultures and values to achieve the project, programme or portfolio objectives</p>
People	1. Self-reflection and self-management	<p>Reflection and self-analysis techniques</p> <p>Stress management of self and others</p> <p>Relaxation techniques and methods</p> <p>Pace of work</p> <p>Feedback rules and techniques</p> <p>Prioritisation techniques</p> <p>Personal time management</p> <p>Checks of progress</p> <p>Formulation of objectives e.g. SMART method</p> <p>Effectiveness theories</p>	<p>Awareness of own work styles and preferences</p> <p>Awareness of instances that lead to personal distractions</p> <p>Self-reflection and self-analysis</p> <p>Controlling emotions and focusing on tasks, even when provoked</p> <p>Self-motivation</p> <p>Delegating tasks</p> <p>Setting meaningful and authentic individual goals</p> <p>Carrying out regular checks of progress and results</p> <p>Dealing with mistakes and failure</p>
	2. Personal-integrity and reliability	<p>Codes of ethics/codes of practice</p> <p>Social equity and sustainability principles</p> <p>Personal values and moral standards</p> <p>Ethics</p> <p>Universal rights</p> <p>Sustainability</p>	<p>Development of confidence and building of relationships</p> <p>Following own standards under pressure and against resistance</p> <p>Correcting and adjusting personal behaviour</p>
	3. Personal communication	<p>Differences between information and message</p> <p>Different methods of communicating</p> <p>Different questioning techniques</p> <p>Feedback rules</p> <p>Facilitation</p> <p>Presentation techniques</p> <p>Communication channels and styles</p> <p>Rhetoric</p> <p>Characteristics of body language</p> <p>Communication technologies</p>	<p>Use different ways of communicating and different styles for effective communication</p> <p>Active listening</p> <p>Questioning techniques</p> <p>Empathy</p> <p>Presentation and moderation techniques</p> <p>Effective use of body language</p>

	4. Relationships and engagement	Intrinsic motivation Motivation theories Handling resistance Values, traditions, individual requirements of different cultures Network theory	Use of humour as icebreaker Appropriate ways of communicating Respectful communication Respecting others and being aware of ethnical and cultural diversity Trusting own intuition
	5. Leadership	Leadership models Individual learning Communication techniques Coaching Sense-making and sense-giving Bases of power Decision taking consensus, democratic/majority, compromise, authority, etc.	Personal self-awareness Listening skills Emotional strength Capacity to express a set of values Dealing with mistakes and failure Sharing values Creating team spirit Methods and techniques for communication and leadership Management of virtual teams
	6. Teamwork	Project organisation Team role models Team lifecycle models	Recruiting and personnel selection skills Interview techniques Building and maintaining relationships Facilitation skills
	7. Conflict and crisis	De-escalation techniques Creativity techniques Moderation techniques Scenario techniques Conflict stage models Value of conflicts in team building Crisis plan Worst case scenarios	Diplomatic skills Negotiation skills, finding a compromise Moderation skills Persuasiveness Rhetorical skills Analytical skills Stress resistance
	8. Resourcefulness	Techniques to solicit views of others Conceptual thinking Abstraction techniques Strategic thinking methods Analytic techniques Convergent and divergent thinking Creativity methods Innovation processes and techniques Coping methods Lateral thinking Systems thinking Synergy and holistic thinking Scenario analysis SWOT technique	Analytical skills Facilitating discussions and group working sessions Choosing appropriate methods and techniques to communicate information Thinking 'outside the box' - new ways of doing things Imaging an unknown future state Being resilient Dealing with mistakes and failure Identifying and seeing different perspectives

		PESTLE analysis Creativity theories Brainstorming techniques e.g. lateral thinking Converging techniques comparative analysis, interview techniques	
	9. Negotiation	Negotiation theories Negotiation techniques Negotiation tactics Phases in negotiations BATNA best alternative to a negotiated agreement Contract templates and types Legal and regulatory provisions associated with contracts and agreements Analysis of cultural aspects and tactics	Identification of the desired outcomes Assertiveness and drive to reach desired outcomes Empathy Patience Persuasion Establishing and maintaining trust and positive working relationships
	10. Results orientation	Organisation theories Efficiency principles Effectiveness principles Productivity principles	Delegation Efficiency, effectiveness and productivity Entrepreneurship Integration of social, technical and environmental aspects Sensitivity to organisational do's and don'ts Management of expectations Identifying and assessing alternative options Combining helicopter view and attention to essential details Total benefit analysis
Practice	1. Project Design	Critical success factors Success criteria Lessons learned Benchmarking Complexity Project, programme and portfolio success Project, programme and portfolio management success Project, programme and portfolio management tools Leadership styles Strategy	Contextual awareness Systems thinking Result orientation Improvements by/incorporation of lessons learned Structure decomposition Analysis and synthesis
	2. Requirements and objectives - Goals, objectives and benefits	Temporary and permanent organisation Expectations, need and requirements Project charter Project sponsor (owner) Fit for use, fit for purpose Value management Acceptance criteria Benefits mapping Goal analysis	Corporate strategy Stakeholder relationships Knowledge elicitation Workshop facilitation Interviewing Formulation of objectives (e.g. SMART-method) Synthesis and prioritisation

		Strategy setting	
	3. Scope	Configuration management Hierarchical and non-hierarchical structures Planning packages Scope definition (with exclusions) Scope gathering methodologies, e.g. use case scenarios, history writing Scope creep Constraints Deliverable design and control methods Work breakdown structure (WBS) Work packages WBS dictionary	Scope configuration Prioritisation Defining a WBS Defining a PBS Using a WBS dictionary Agile development
	4. Time	Planning types Estimation methods Levelling Scheduling methods (e.g. Gantt chart, Kanban charts) Resource allocation Network analysis Baselines Critical path planning Crashing the schedule Time boxing Phases Milestones Fast modelling and prototyping Spiral/iterative/agile development process	Define activities from work packages Define dependencies Sequence components Estimate activity resources and duration
	5. Organisation and information	Organisational models WBS as a base for project organisation Document management systems Information and documentations systems Information plan Regulatory requirements Information security Ways to organise governance for projects and programmes	Involve/convince others Staffing of organisation Task delegation Management of interfaces to other parts of the organisation Dealing with project software tools in the office Preparation techniques for official documents Information management planning
	6. Quality	Validation and verification Process quality management tools (e.g. Lean, Six Sigma, Kaizen) Product quality management Cost of quality Quality management standards (e.g. TQM, EFQM, Theory of Constraints, Deming Cycle)	Analysing the impact of quality management on projects and people Implementing a standard (process and people) Adapting a quality standard Correcting people's and the group's behaviours with a wide variety of interventions

		<p>Organisational Quality analysis tools</p> <p>Standard operating procedures</p> <p>Policies implementation</p> <p>Design for testing</p> <p>Utilising indicators</p> <p>Inspection methods and techniques</p> <p>Risk-based testing</p> <p>Testing techniques, including, for example, automated testing</p> <p>Continuous integration</p> <p>Software application for handling and managing tests and defects</p>	<p>Developing and executing quality plans</p> <p>Conducting quality assurance procedures</p>
	7. Finance	<p>Financial accounting basics (cash flow, chart of accounts, cost structures)</p> <p>Cost estimating methods (e.g. single or multi-expert estimations (Delphi method), historical data analogies, effort models, parametric estimations (function point method), three point estimation)</p> <p>Cost calculation techniques (e.g. direct, indirect calculation, activity-based costing, etc.)</p> <p>Design-to-cost/target costing</p> <p>Processes and governance for cost management</p> <p>Methods for monitoring and controlling expenditures</p> <p>Performance indicators (earned value)</p> <p>Reporting standards</p> <p>Forecasting methods (linear, parametric, velocity analysis)</p> <p>Financing options</p> <p>Funding sources</p> <p>Financial management concepts and terms, such as (but not limited to) cash flow, debt-asset ratio, return on investment, rates of return</p> <p>Contingency approaches</p> <p>Relevant conventions, agreements, legislation and regulations, including (but not limited to) taxation, currency exchange, bilateral or regional trade agreements, international commercial terms, World Trade Organisation determinations</p>	<p>Convincing/negotiating with sponsors</p> <p>Scenario techniques</p> <p>Interpreting and communicating the actual cost situation</p> <p>Developing financial forecasts and models</p> <p>Writing skills</p> <p>Presentation skills</p> <p>Reading financial statements</p> <p>Interpreting financial data and identifying trends</p> <p>Financial management approach analysis</p> <p>Developing a project budget</p> <p>Setting frameworks for resource project cost estimation</p> <p>Directing and authorising cost strategies and cost management plans</p> <p>Developing and maintaining cost management systems</p> <p>Conducting analysis, evaluating options an implementing responses to project cost variations</p>
	8. Resources	<p>Resource allocation methods</p> <p>Resource assessment</p> <p>Resource utilisation calculations and collection techniques</p> <p>Competence management</p> <p>Procurement processes, supply and demand concepts</p> <p>Training</p>	<p>Resource planning, allocation and management</p> <p>Identifying and classifying different ways of working</p> <p>Developing resources skills matrix -identifying skills and documenting individual skills gaps</p> <p>Prioritising and allocating resources, given multiple competing priorities</p>
	9. Procurement	<p>Sourcing strategies</p> <p>Make/buy analysis</p> <p>Supplier development methodologies</p>	<p>Tactical know-how</p> <p>Presentation skills</p> <p>Contract administration</p>

		<p>Organisational procurement policies, procedures and practices</p> <p>Procurement methods (e.g. RFI, RFP, RFQ)</p> <p>Contract types (e.g. firm fixed price, time and materials, cost plus)</p> <p>Claim management processes, methods and tools</p> <p>Tender procedures and practices</p> <p>Contractual judicial knowledge</p> <p>Contractual terms and conditions</p> <p>Supply chain management</p>	
	10. Plan and control	<p>Phase/stage transitions</p> <p>Reporting</p> <p>Project office</p> <p>Deming cycle (plan-do-check-act)</p> <p>Request for change</p> <p>Management by objectives</p> <p>Management by exception</p> <p>Lessons learned report</p> <p>Phase/stage/sprint/release planning</p> <p>Request for change</p> <p>Decision to fund and make or buy</p> <p>Exception reports</p> <p>Issue reports</p> <p>Project management plan</p> <p>Project (phase) evaluation</p> <p>Discharge</p> <p>Decision-making authority</p>	<p>Progress control meetings</p> <p>Change management</p> <p>Reporting</p> <p>Negotiation of change requests</p> <p>Start-up workshop</p> <p>Kick-off meeting</p> <p>Close-out meeting</p> <p>Issue management</p> <p>Change management</p> <p>Earned value analysis</p> <p>Slip charts</p>
	11. Risk and opportunity)	<p>Strategies for managing risk and opportunity</p> <p>Contingency plans, fallback plans</p> <p>Cost and duration contingency reserves</p> <p>Expected monetary value</p> <p>Qualitative risk assessment tools and techniques</p> <p>Quantitative risk assessment tools and techniques</p> <p>Risk and opportunity response strategies and plans</p> <p>Risk identification techniques and tools</p> <p>Scenario planning</p> <p>Sensitivity analysis</p> <p>Strengths, weaknesses, opportunities, threats analysis (SWOT)</p> <p>Risk exposure, appetite, aversion and tolerance</p> <p>Project or programme risks and business risks and opportunities</p> <p>Residual risk</p> <p>Risk and opportunity probability, impact and proximity</p> <p>Risk owner</p>	<p>Risk and opportunity identification techniques</p> <p>Risk and opportunity assessment techniques</p> <p>Developing risk and opportunity response plans</p> <p>Implementing, monitoring and controlling risk and opportunity response plans</p> <p>Implementing, monitoring and controlling overall strategies for risk and opportunity management</p> <p>Monte Carlo analysis</p> <p>Decision tree (e.g. Ishikawa analysis)</p>

		Risk register Sources of risk and opportunity	
	12. Stakeholders	Stakeholder interests Stakeholder influence Engagement strategies Communication plan Collaborative agreements and alliances External environment scanning relating to social, political, economic and technological developments	Stakeholder analysis Analysis of contextual pressures Demonstrating strategic communication skills
	13. Change and transformation	Learning styles for individuals, groups and organisations Organisational change management theories Impact of change on individuals Personal change management techniques Group dynamics Impact analysis Actor analysis Motivation theory Theory of change	Assessing an individual's, group's or organisation's change capacity and capability Interventions on behaviour of individuals and groups Dealing with resistance to change
	14. Select and balance	Not relevant at project management	

Forrás: *International Project Management Association* (2015)

Appendix 2. IPMA ICB v 4.0 KPI's

Competence area	Competence elements	Key competence indicators
Perspective	1. Strategy	<ol style="list-style-type: none"> 1. Align with organisational mission and vision 2. Identify and exploit opportunities to influence organisational strategy 3. Develop and ensure the ongoing validity of the business/organisational justification 4. Determine, assess and review critical success factors 5. Determine, assess and review key performance indicators
	2. Governance, structures and processes	<ol style="list-style-type: none"> 1. Know the principles of project management and the way in which they are implemented 2. Know and apply the principles of programme management and the way in which they are implemented 3. Know and apply the principles of portfolio management and the way in which they are implemented 4. Supporting functions 5. Align the project with the organisation's decision-making and reporting structures and quality requirements 6. Align the project with human resource processes and functions 7. Align the project with finance and control processes and functions)
	3. Compliance, standards and regulations	<ol style="list-style-type: none"> 1. Identify and ensure that the project complies with all relevant legislation 2. Identify and ensure that the project complies with all relevant health, safety, security and environmental regulations (HSSE) 3. Identify and ensure that the project complies with all relevant codes of conduct and professional regulation 4. Identify and ensure that the project complies with all relevant sustainability principles and objectives 5. Assess, use and develop professional standards and tools for the project 6. Assess, benchmark and improve the organisational project management competence
	4. Power and interest	<ol style="list-style-type: none"> 1. Assess the personal ambitions and interests of others and the potential impact of these on the project 2. Assess the informal influence of individuals and groups and its potential impact on the project) 3. Assess the personalities and working styles of others and employ them to the benefit of the project)
	5. Culture and values	<ol style="list-style-type: none"> 1. Assess the culture and values of the society and their implications for the project 2. Align the project with the formal culture and corporate values of the organisation 3. Assess the informal culture and values of the organisation and their implications for the project
People	1. Self-reflection and self-management	<ol style="list-style-type: none"> 1. Identify and reflect on the ways in which own values and experiences affect the work 2. Built self-confidence on the basis of personal strengths and weaknesses 3. Identify and reflect on personal motivations to set personal goals and keep focus 4. Organise personal work depending on the situation and own resources 5. Take responsibility for personal learning and development

	2. Personal-integrity and reliability)	<ol style="list-style-type: none"> 1. Acknowledge and apply ethical values to all decisions and actions 2. Promote the sustainability of outputs and outcomes 3. Take responsibility for own decisions and actions 4. Act, take decisions and communicate in a consistent way 5. Compete tasks thoroughly in order to build confidence with others
	3. Personal communication	<ol style="list-style-type: none"> 1. Provide clear and structured information to others and verify their understanding 2. Facilitate and promote open communication 3. Choose communication styles and channels to meet the needs of the audience, situation and management level 4. Communicate effectively with virtual teams 5. Employ humour and sense of perspective when appropriate
	4. Relationships and engagement	<ol style="list-style-type: none"> 1. Initiate and develop personal and professional relationships 2. Build, facilitate and contribute to social networks 3. Demonstrate empathy through listening, understanding and support 4. Show confidence and respect by encouraging others to share their opinions or concerns 5. Share own vision and goals in order to gain the engagement and commitment of others
	5. Leadership	<ol style="list-style-type: none"> 1. Initiate actions and proactively offer help and advice 2. Take ownership and show commitment 3. Provide direction, coaching and mentoring to guide and improve the work of individuals and teams 4. Exert appropriate power and influence over others to achieve the goals 5. Make, enforce and review decisions
	6. Teamwork	<ol style="list-style-type: none"> 1. Select and build the team 2. Promote cooperation and networking between team members 3. Support, facilitate and review the development of the team and its members 4. Empower teams by delegating tasks and responsibilities 5. Recognise errors to facilitate learning from mistakes
	7. Conflict and crisis	<ol style="list-style-type: none"> 1. Anticipate and possibly prevent conflicts and crises 2. Analyse the causes and consequences of conflicts and crises and select appropriate response(s) 3. Mediate and resolve conflicts and crises and/or their impact 4. Identify and share learning from conflicts and crises in order to improve future practice
	8. Resourcefulness	<ol style="list-style-type: none"> 1. Stimulate and support an open and creative environment 2. Apply conceptual thinking to define situations and strategies 3. Apply analytic techniques to analysing situations, financial and organisational data and trends 4. Promote and apply creative techniques to find alternatives and solutions 5. Promote a holistic view of the project and its context to improve decision-making
	9. Negotiation	<ol style="list-style-type: none"> 1. Identify and analyse the interests of all parties involved in the negotiation 2. Develop and evaluate options and alternatives with the potential to meet the needs of all parties 3. Define a negotiation strategy in line with own objectives that is acceptable to all parties involved 4. Reach negotiated agreements with other parties that are in line with own objectives 5. Detect and exploit additional selling and acquisition possibilities
	10.	1. Evaluate all decisions and actions against their impact on project success and the objectives of the organisation

	Results orientation	2. Balance needs and means to optimise outcomes and success 3. Create and maintain a healthy, safe and productive working environment 4. Promote and 'sell' the project, its processes and outcomes 5. Deliver results and get acceptance
Practice	1. Project Design	1. Acknowledge, prioritise and review success criteria 2. Review, apply and exchange lessons learned from and with other projects 3. Determine complexity and its consequences for the approach 4. Select and review the overall project management approach 5. Design the project execution architecture
	2. Requirements and objectives - Goals, objectives and benefits	1. Define and develop the project goal hierarchy 2. Identify and analyse the project stakeholder needs and requirements 3. Prioritise and decide on requirements and acceptance criteria
	3. Scope	1. Define the project deliverables 2. Structure the project scope 3. Define the work packages of the project 4. Establish and maintain scope configuration
	4. Time	1. Establish the activities required to deliver the project 2. Determine the work effort and duration of activities 3. Decide on schedule and stage approach 4. Sequence project activities and create a schedule 5. Monitor progress against the schedule and make any necessary adjustments
	5. Organisation and information	1. Assess and determine the needs of stakeholders relating to information and documentation 2. Define the structure, roles and responsibilities within the project 3. Establish infrastructure, processes and systems for information flow 4. Implement, monitor and maintain the organisation of the project
	6. Quality	1. Develop and monitor the implementation of and revise a quality management plan for the project 2. Review the project and its deliverables to ensure that they continue to meet the requirements of the quality management plan 3. Verify the achievement of project quality objectives and recommend any necessary corrective and/or preventive actions 4. Plan and organise the validation of project outcomes 5. Ensure quality throughout the project
	7. Finance	1. Estimate project costs 2. Establish the project budget 3. Secure project funding 4. Develop, establish and maintain a financial management and reporting system for the project 5. Monitor project financials in order to identify and correct deviations from the project plan
	8. Resources	1. Develop strategic resource plan to deliver the project 2. Define the quality and quantity of resources required

		3. Identify the potential sources of resources and negotiate their acquisition 4. Allocate and distribute resources according to defined need 5. Evaluate resource usage and take any necessary corrective actions
	9. Procurement	1. Agree on procurement needs, options and processes 2. Contribute to the evaluation and selection of suppliers and partners 3. Contribute to the negotiation and agreement of contractual terms and conditions that meet project objectives 4. Supervise the execution of contracts, address issues and seek redress where necessary
	10. Plan and control	1. Start the project and develop and get agreement on the project management plan 2. Initiate and manage the transition to a new project phase 3. Control project performance against the project plan and take any necessary remedial actions 4. Report on project progress 5. Assess, get agreement on and implement project changes 6. Close and evaluate a phase or the project
	11. Risk and opportunity	1. Develop and implement a risk management framework 2. Identify risks and opportunities 3. Assess the probability and impact of risks and opportunities 4. Select strategies and implement response plans to address risks and opportunities 5. Evaluate and monitor risks, opportunities and implement responses
	12. Stakeholders	1. Identify stakeholders and analyse their interests and influence 2. Develop and maintain a stakeholder strategy and communication plan 3. Engage with the executive, sponsors and higher management to gain commitment and to manage interests and expectations 4. Engage with users, partners, suppliers and other stakeholders to gain their cooperation and commitment 5. Organise and maintain networks and alliances
	13. Change and transformation	1. Assess the adaptability to change of the organisation(s) 2. Identify change requirements and transformation opportunities 3. Develop change or transformation strategy 4. Implement change or transformation management strategy
	14. Select and balance	Not relevant at project management

Forrás: *International Project Management Association (2015)*

References

1. Aissa, A. (2004). *Formalisation et quantification de processus de gestion des interactions des projets*. MSc thesis, Laboratoire Génie Industriel, Ecole Centrale Paris, Chatenay-Malabry.
2. Alam, M. – Gale, A. – Brown, M. – Kidd, C. (2008). The development and delivery of an industry led project management professional development programme: A case study in project management education and success management, *International Journal of Project Management*, 26(3), 223-237.
3. Altrichter, H. – Feldman, A. – Posch, P. – Somekh, B. (2008). *Teachers investigate their work; An introduction to action research across the professions* (2nd edition). Routledge.
4. Aubry, M. – Hobbs, B. – Thuillier, D. (2007). A new framework for understanding organisational project management through the PMO. *International Journal of Project Management*, 25(4), 328-336.
5. Anbari, F. T. (1985). A systems approach to project evaluation. *Project Management Journal*, 16(3), 21-26.
6. Anbari, F. T. – Carayannis, E. G. – Voetsch, R. J. (2008). Post project reviews as a key project management competence. *Technovation: The International Journal of Technological Innovation, Entrepreneurship and Technology Management*, 28(10), 633-643.
7. Angus, G. Y. – Flett, P. D. – Bowers, J. A. (2005): Developing a value-centred proposal for assessing project success. *International Journal of Project Management*, 23(6), 428-436.
8. Australian Institute of Project Management (2010): AIPM Professional Competency Standards For Project Management - Part A – Introduction, [(accessed December 31, 2017)., available at: <https://nsfsakai.nthsydney.tafensw.edu.au/access/content/group/0f4ea869-0e76-4936-b16e-7407f58a3a5d/ProjectManagement/DipProjectManagement/CertIVProjectSite/Project%20Management%20Standards/June-2008-PM-Comp-Stds-Part-A-Intro-Approved-Version-1.0.pdf>]
9. Australian Institute of Project Management (2010): AIPM Professional Competency Standards For Project Management - Part C – Certified Practising Project Manager (CPPM), [(accessed December 31, 2017), available at: https://aipm.com.au/documents/aipm-key-documents/aipm_project_manager_professional_competency_stand.aspx]
10. Association for Project Management (2009). APM Competence Framework, Egyesült Királyság.
11. Atkinson, R. (1999). Project management: cost, time and quality, two best guesses and a phenomenon, it's time to accept other success criteria. *International Journal of Project Management*, 17(6), 337-342.

12. Baccarini, D. (1999): The Logical Framework Method for Defining Project Success. *Project Management Journal* 30(4), 25-32.
13. Barnard C. (1948). *Functions of the executive*. Harvard University Press, Cambridge.
14. Báthory Z. (edt: Falus, I.) (1997). *Pedagógiai lexikon*. Keraban, Budapest.
15. Beer M.R. – Eisenstat, R. – Spectre B. (1990). *The critical path to corporate renewal*. Harvard Business School Press, Boston.
16. Belassi, W. – Tukel, O. I. (1996). A new framework for determining critical success/failure factors. *International Journal of Project Management*, 14(3), pp. 141-151.
17. Birmingham, P. – Wilkinson, D. (2003). *Using research instruments: A guide for researchers*. Routledge, London.
18. Blaskovics, B. (2014). *Az ITC szektorban működő projektvezetők személyes jellemzőinek hatása a projektsiker alakulására*. Doktori értekezés, Gazdálkodástani Doktori Iskola, Budapesti Corvinus Egyetem, Budapest.
19. Bloom, B. S. (1956). *Taxonomy of Educational Objectives: The Classification of Educational Goals*. Longmans Green, New York.
20. Bloom, B. S. (1964). *Stability and change in human characteristics*. John Wiley & Sons Ltd, New York.
21. Boyatzis, R. E. (1982). *The competent manager: a model for effective performance*. Wiley, New York.
22. Burke, R. (2013). *Project Management Techniques* (2nd ed.). Everbest Burke Publishing, London.
23. Bredillet, C. N. (2004). *Theories and research in project management: Critical review and return to the future*. Doktori értekezés, Lille School of Management ESC, Lille
24. Bredillet, C. N. (2007). From the Editor - Exploring Research in Project Management: Nine Schools of Project Management Reserach (Part 2). *Project Management Journal*, 38 (2), 3-5.
25. Bredillet, C. N. (2008). From the Editor - Exploring Research in Project Management: Nine Schools of Project Management Reserach Part (4). *Project Management Journal*, 39 (1), 2-6.
26. Brousseau, J. (1987). Project Management: People Are The Key Resources. *Computing Canada*, 2, 17-19.

27. Bokor, A. (1999): *Szervezeti kultúra és tudásintegráció: a termékfejlesztés problémája*. PhD dissertation-plan, Gazdálkodástani Doktori Iskola, Corvinus University of Budapest
28. Boon, L (1979). Repeated Tests and Repeated Testing: How to Corroborate Low Level Hypotheses. *Zeitschrift für allgemeine Wissenschaftstheorie / Journal for General Philosophy of Science*, Vol. 10, No. 1, pp. 1-10.
29. Bowen, G. A. (2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal*, 9(2), 27-40.
30. Brown L. (szerk.) (1993). *The new shorter Oxford English dictionary on historical principles* (5. kiadás). Clarendon Press, Oxford.
31. Bryde, D. J. (2008). Perceptions of the impact of project sponsorship practices on project success. *International Journal of Project Management*, 26(8), 800-809.
32. Calinescu, A. – Efstathiou, J. – Schimand, J. – Bermejo, J. (1998). Applying and assessing two methods for measuring complexity in manufacturing. *Journal of Operational Research Society*, 49(7), 723-733.
33. Carden, L. – Egan, T. (2008). Does Our Literature Support Sectors Newer to Project Management? The Search for Quality Publications Relevant to Nontraditional Industries. *Project Management Journal*, 39(3), 6-27.
34. Christenson, D. – Walker, D. H. T. (2004). Understanding the role of "vision" in project success. *Project Management Journal*, 35(3), 39-52.
35. Cleland, D. I. (1995). Leadership and the project management body of knowledge. *International Journal of Project Management*, 13(2), 83-88.
36. Cleland, D. I. (1994). *Project Management Strategic Design and Implementation* (2. kiadás), McGraw-Hill, New York.
37. Clements, J. P. – Gido, J. (2006). *Effective Project Management*. South-Western, Mason.
38. Cohen, L. – Manion, L. (2000). *Research methods in education* (5. kiadás). Routledge, New York.
39. Cooke-Davies, T. (2002). The "real" success factors on projects. *International Journal of Project Management*, 20(3), 185-190.
40. Corbett, L.M. – Brockelsby, J. – Campbell-Hunt, C. (2002). *Tackling industrial complexity*. Friozelle, G. – Richards, H. (szerk). *Tackling Industrial Complexity*, Institute for Manufacturing, Cambridge, 83-96.
41. Corbin, J., Morse, J. (2003). The Unstructured Interactive Interview: issues of Reciprocity and Risks When Dealing With Sensitive Topics. *Qualitative Inquiry*, 9(3), 335-354.

42. Crawford, L. (2000). *Profiling the competent project manager*. Proceedings of PMI Research Conference, Newton Square, PA: Project Management Institute, 3-15.
43. Crawford, L. (2005). Senior management perceptions of project management competence. *International Journal of Project Management*, 23(1), 7-16.
44. Crawford, L. – Hobbs, B. – Turner, J. R. (2005). *Project Categorization Systems*. Project Management Institute, Newton Square.
45. Creswell, J. W. (2003). *Research design*. John Willey, New York.
46. Creswell, J. W. – Clark, V. L. P. (2006). *Designing and conducting mixed methods research*, Sage Publications, Thousand Oaks.
47. Csepregi, A. Cs. (2011). *The Knowledge Sharing and Competences of Middle Managers*. Doktori értekezés, Gazdálkodás- és Szervezéstudományok Doktori Iskola, Pannon Egyetem, Veszprém.
48. Csiszárík-Kocsir, Á. (2015). Szponzorok az olaj-és gázipari beruházások projektfinanszírozásban a 2014-es adatok alapján. Tanulmánykötet-Vállalkozásfejlesztés a XXI. században V., 247-266.
49. De Wit, A. (1988). Measurement of project success. *International Journal of Project Management*, 6(3), 164-170.
50. Delamare Le Deist, F. – Winterton, J. (2005). What Is Competence? *Human Resource Development International*, 81(1). 27-46.
51. Denzin, N. K. (1978). Triangulation: A case for methodological evaluation and combination. *Sociological methods*, 339-357.
52. Denzin, N. K. (1988). *Triangulation*. JP Keeves. Educational research, methodology and measurement: an international handbook.
53. Dulewicz, V. – Higgs, M. J. (2003). Design of a new instrument to assess leadership dimensions and styles. Henley Working Paper Series, Henley Management College.
54. Dulewicz, V. – Higgs, M. J. (2005). Assessing leadership styles and organisational context. *Journal of Managerial Psychology*, 20(2), 105-123.
55. Dvir, D. – Sadeh, A. – Malach-Pines, A. (2006). Projects and project managers: the relationship between project managers' personality, project types, and project success. *Project Management Journal*, 37(5), 36-48.
56. Eigenaar, A. J. (2012). *An analysis of industry relevance of acquired project management skills within a university of technology*. Doktori disszertáció, Cape Peninsula University of Technology, Fokváros
57. El-Sabaa, S. (2001). The skills and career path of an effective project manager. *International Journal of Project Management*, 19(1), 1-7.

58. Ferraro, J. (2006). *Project manager as generalist: project manager as obsolete*. Paper presented at PMI® Global Congress 2006 - North America, Seattle, WA. Newtown Square, PA: Project Management Institute.
59. Finn, R. (1993). *A synthesis of current research on management competencies*. HWP 10/93, Henley Management College
60. Freeman, M. – Beale, P. (1992). Measuring project success, *Project Management Journal*, 23(1), 8-17.
61. Fortune, J. – White, D. (2006). Framing of project critical success factors by a systems model. *International Journal of Project Management*, 24(1), 53-65.
62. Gardiner, P. D. – Stewart, K. (2000): Revisiting the golden triangle of cost, time and quality: the role of NPV in project control, success and failure. *International Journal of Project Management*, 18(4), 251-256.
63. Gareis, R. – Huemann, M. (2007). *Maturity models for the project oriented company*. J. R. Turner (szerk.), *The Gower Handbook of Project Management* (4th ed.), 183–208, Gower, Aldershot.
64. Gelei, A. (2002): *A szervezeti tanulás interpretatív megközelítése: a szervezetfejlesztés esete*. Doktori (PhD) értekezés, Budapesti Corvinus Egyetem, Gazdálkodástani Doktori Iskola.
65. Gido J. – Clements, J. P. (1999). *Successful project management*. South western College Publishing International (Thomas Publishing), Cincinnati.
66. Gilliard, S. (2009). Soft Skills and Technical Expertise of Effective Project Managers. *Issues in Informing Science and Information Technology*, 6, 723-729.
67. Görög, M. – Smith, N. J. (1999). *Project Management for Managers*. PMI Publications, Newtown Square.
68. Görög, M. (1996). *Általános projektmenedzsment*. Aula Kiadó, Budapest.
69. Görög, M. (2003). *A projektvezetés mestersége*. Aula kiadó, Budapest.
70. Görög, M. (2007). *A projektvezetés mestersége*. Aula Kiadó, Budapest.
71. Görög, M. (2008). *Projektvezetés*. Aula Kiadó, Budapest.
72. Görög M. (2013). *Projektvezetés a szervezetekben*. Panem Kiadó, Budapest.
73. Görög, M. (2016). Market positions as perceived by project-based organisations in the typical project business segment. *International Journal of Project Management*, 34(2), 187-201.
74. Halman, J. I. M. – Burger, G. T. N. (2002). Evaluating effectiveness of project start-ups: an exploratory study. *International Journal of Project Management*, 20(1), 81-89.

75. Handy, C. B. (1982). *Understanding organizations*. Penguin, London.
76. Heywood L. – Gonczi, A. – Hager, P. (1992). *A guide to development of competency standards for professions*. Australian Government Publishing Service, Canberra.
77. Heidrich, B. (2013). Alkalmazottak vezetése, online tankönyv, [(Accessed: December 31, 2016), available at: http://www.tankonyvtar.hu/hu/tartalom/tamop412A/0007_e6_alkalmazotti_vezes_scorm/borito_2prWEPBgrxZniklg.html]
78. Iles, P. – Preece, D. – Chuai, X. (2010). Talent management as a management fashion in HRD: Towards a research agenda. *Human Resource Development International*, 13(2), 125-145.
79. Ika, L. A. (2009): Project Success as a Topic in Project Management Journals. *Project Management Journal*, 40(4), 6-19.
80. International Project Management Association (2015). *IPMA International Competence Baseline (4. kiadás)*. International Project Management Association (IPMA), Amsterdam.
81. Jaafari, A. (2007). Project and Program diagnostics: A systemic approach. *International Journal of Project Management*, 25(8), 781-790.
82. Jensen, E. A. – Holliman, R. (2009). Investigating science communication to inform science outreach and public engagement. In Holliman, R.; Whitelegg, E.; Scanlon, E.; Smidt, S. and Thomas, J. (Eds.), *Investigation science communication in the information age: Implications for public engagement and popular media* (pp. 55-71). Oxford: Oxford University Press.
83. Jensen, E. A. – Laurie, C. (2016). *Doing real research*. Thousand Oaks, CA: Sage Publications.
84. Jick, T. D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative science quarterly*, 24(4), 602-611.
85. Judgev, K. – Müller, R. (2005): A Retrospective Look at Our Evolving Understanding of Project Success. *Project Management Journal*, 36(4), 19-31.
86. Karpin, D. C. (1995): *Enterprising nation: renewing Australia's managers to meet the challenges of the Asia-Pacific Century*. Canberra: Australian Government Publishing Service (AGPS).
87. Katz, R. I. (1991). Skills of an effective administer. *Harvard Business Review*, Business Classics: Fifteen Key Concepts for Managerial Success.
88. Kendra, K. M. – Taplin, L. J. (2004). Project success: A cultural framework. *Project Management Journal*, 35(1), 30-45.

89. Kets de Vries, M. F. R. – Florent-Treacy, E. (2002). Global Leadership from A to Z: Creating High Commitment Organizations. *Organizational Dynamics*, 30(4), 295-309.
90. Khang, D. B. – Moe, T. L. (2008). Success Criteria and Factors for International Development Projects: A Life-Cycle-Based Framework. *Project Management Journal*, 39(1), 72-84.
91. Kim, J., & Wilemon, D. (2003). Sources and assessment of complexity in NPD projects. *R&D Management*, 33(1), 15-30.
92. Kloppenborg, T. – Petrick, J. (1999). Leadership in project lifecycle and team character development. *Project Management Journal*, 30(2), 8-13.
93. Koong, K. S. – Liu, L. C. (2006). A Study of Project Management Job Descriptions. In The Proceedings of ISECON, 23, 31-23.
94. Koivu, T. – Nummelin, J. – Tukiainen, S. – Tainio, R. – Atkin, B. (2004): Institutional complexity affecting the outcomes of global projects. VTT Working Papers 14, VTT, Espoo.
95. Kuhn, T. (1984): *A tudományos forradalmak szerkezete*. Gondolat Kiadó, Budapest.
96. Kvale, S. (1996). Interview Views: An Introduction to Qualitative Research Interviewing. Thousand Oaks, CA: Sage Publications.
97. Kwak, Y. H. – Anbari, F. T. (2008). *Impact on project management of allied disciplines: Trends and future of project management practices and research*. Project Management Institute, Newtown Square.
98. Labuschagne, C. – Brent, A. C. (2005). Sustainable Project Life Cycle Management: the need to integrate life cycles in the manufacturing sector. *International Journal of Project Management*, 23(1), 159-168.
99. Laurikkala, H. – Puustiner, E. – Pajarre, E. – Tanskanen, K. (2001). *Reducing complexity of modelling in large delivery projects*. Proceedings of the International Conference on Engineering Design, ICED'01, Glasgow, Vol. 1, Professional Engineering Publishing, Bury St Edmunds, 165-172.
100. Lindahl, M. – Rehn, A. (2007). Towards a theory of project failure. *International Journal of Management Concepts and Philosophy*, 2(3), 246-254.
101. Lundin, R. A., – Söderholm, A. (1995): A theory of the temporary organization. *Scandinavian Journal of Management*, 11(4), 437-455.
102. Mantel Jr. S. J. – Meredith, J. R., – Shafer, S. M. – Sutton, M. M. (2001). *Project management in practice*. John Wiley & Sons, New York.
103. Marshall, K. (1991). NVQs: an assessment of the 'outcomes' approach to education and training. *Journal of Further and Higher Education*, 15(3), 56-64.

104. Mayor, H. – Brady, T. – Cooke-Davies, T. – Hodgson, D. (2006). From projectification to prgrammification. *International Journal of Project Management*, 24(8), 663-674.
105. McClelland, D. C. (1973). Testing for Competence Rather than Intelligence. *American Psychologist*. 28(1). 1-14.
106. Meredith, R. – Posner, B.Z. – Mantel, S. J. Jr. (1995): *Project management: a managerial approach*. John Wiley, New York.
107. Morris, P. W. G. – Hough, G. H. (1987): *The Anatomy of Major Projects: A Study of the Reality of Project Management*. John Wiley & Sons Ltd., Chichester.
108. Morris, P. W. G. (1997). *The management of projects (2. kiadás)*. Thomas Telford, London.
109. Morris, P.W.G., Crawford, L., Hodgson, D., Shepherd, M.M., Thomas, J. (2006): Exploring the role of formal bodies of knowledge in defining a profession – The case of project management, *International Journal of Project Management*, 24 8), pp 710-721.
110. Mullaly, M. (2006). *Longitudinal analysis of project management maturity*. Project Management Institute, Newton Square.
111. Müller, R. – Turner, R. J. (2007a). The influence of project managers on project success criteria and project success by type of project. *European Management Journal*, 25(4), 298-309.
112. Müller, R. – Turner, R. J. (2007b). Matching the project manager's leadership style to project type. *International Journal of Project Management*, 25(1), 21-32.
113. Müller, R. – Turner, R. (2010). Leadership competency profiles of successful project managers. *International Journal of Project Management*, 28(7), 437-448.
114. Nagy J. (2000). *XXI. század és nevelés*. Osiris Kiadó, Budapest.
115. Nagy J. (2007). *Kompetencia alapú, kritérium-orientált pedagógia*. Mozaik Kiadó, Szeged.
116. Nagy J. (2010). A személyiség kompetenciái és operációs rendszere. *Iskolakultúra*, 7-8., 3-21.
117. O'Leary, T. – Williams, T. (2008). Making a difference? Evaluating an innovative approach to the project management Centre of Excellence in a UK government department. *International Journal of Project Management*, 26(5), 556-565.
118. Olsen, R. P. (1971). Can project management be defined? *Project Management Quarterly*, 2(1), 12-14.

119. Pant, I. – Baroudi, B. (2008). Project management education: The human skills imperative. *International Journal of Project Management*, 26(2), 124-128.
120. Partington, D. A. (2003). *Managing and leading*. Turner, J. R. (szerk.), People in project management, Gower, Aldershot.
121. Pinto, J. K. – Slevin, D.P. (1988). Critical success factors across the project life cycle. *Project Management Journal*, 19(3), 67-75.
122. Pinto, J. K. – Mantel, S. J. (1990). The causes of project failure, *IEEE Transactions on Engineering Management*, EM(37), 269-276.
123. Pinto J. K. – Kharbanda, O. P. (1995). Lessons for an accidental profession. *Bus Horizons*, 38(2), 41–51.
124. Pinto, J. K (2000): Understanding the role of politics in successful project management. *International Journal of Project Management*, 18(2), 85-91.
125. Plutchik, R. (1983): Foundations of Experimental Research. Harper's Experimental Psychology Series, Joanna Cotler Books, New York.
126. Popper, K. (1997): A tudományos kutatás logikája, Európa Kiadó, Budapest
127. Posner, B. Z. (1987): What it takes to be a good project manager. *Project Management Journal*, 18(1), 51–54.
128. Project Management Institute (2007). *Project Manager Competency Development Framework*. Project Management Institute, Newton Square.
129. Project Management Institute (2009). *A Guide to the Project Management Body of Knowledge: PMBOK Guide*. Project Management Institute, Newton Square.
130. Project Management Institute (2012). *PMI Lexikon of Project Management Terms V 2.0*. Project Management Institute, Newton Square. [(accessed: December 31, 2017), available at: <https://pmi.hu/index.php/publikaciok/pm-tudastar>]
131. Project Management Institute (2013). *Project Management Talent Gap Report*. Project Management Institute, Newton Square. [(accessed: December 31, 2017),, available at: <https://www.pmi.org/learning/thought-leadership/pulse/talent-gap-2020>]
132. Project Management Institute (2015). *The PMI Talent Triangle – Your Angle on Success*, Project Management Institute, Newton Square. [(accessed: December 31, 2017), available at: <https://www.pmi.org/-/media/pmi/documents/public/pdf/certifications/talent-triangle-flyer.pdf>]
133. Project Management Institute (2017a). *Project management Job Growth and Talent Gap 2017–2027*. Project Management Institute, Newton Square.

[(accessed: December 31, 2017),, available at: <https://www.pmi.org/-/media/pmi/documents/public/pdf/learning/job-growth-report.pdf>]

134. Project Management Institute (2017b). *A Guide To The Project Management Body Of Knowledge (PMBOK Guide)* (6. kiadás). Project Management Institute, Newton Square.
135. Project Management Institute (2017c). PMP® - Project Management Professional. Project Management Institute, Newton Square. [Letöltve: 2017.12.31, available at: <https://pmi.hu/index.php/pmi-tagsag/minositese/pmp>]
136. Project Management Institute (2018). *About standards*. Project Management Institute, Newton Square. [Letöltve: 2017.12.31, available at: <https://www.pmi.org/pmbok-guide-standards/about>]
137. Putnam, H. (1991). The “corroboration” of theories. The philosophy of science, 121-137.
138. Ranschburg, Á. (2004). Az iskolák értékelési-mérési gyakorlata és a kompetenciák. *Új Pedagógiai Szemle*, 54(3), 52-68.
139. Robotham D. – Jubb, R. (1996). Competences: measuring the immeasurable. *Management Development Review*, 9(5), 5.
140. Rockart, J. F. (2002): Critical Success Factors: A 2002 Retrospective. [Letöltve: 2017. 12. 31]. Elérhető: <http://web.mit.edu/>
141. Sherwood, J. B. – Anderson, P. (2005). *Diversity as a determinant of system complexity*. GIST Technical Report G 2005-1, paper presented at the 2nd Workshop on Complexity in Design and Engineering.
142. Shippmann, J. – Ash, R. A. – Batjtsta, M. – Carr, Eyde, L. D. – Hesketh, B. – Kehoe, J. – Pearlman, K. – Prien, E. P. – Sanchez, J. (2000): The Practice of Competency Modeling. *Personnel Psychology*, 53(3), 703 - 740.
143. Senghi, S. (szerk.) (2004). *The Handbook of Competency Mapping. Understanding, Designing and Implementing Competency models in Organizations, India*. Sage Publications, New Delhi.
144. Schmid, B. – Adams, J. (2008): Motivation in Project Management: The Project Manager’s perspective. *Project Management Journal*, 39(2), 60-71.
145. Smith J. E. – Carson, K. P. – Alexander, R. A. (1984). Leadership: it can make a difference. *Academy of Management Journal*, 27(4), 765-776.
146. Song S. (2006). *Developing Project Managers in China*. Doktori értekezés, MACE, The University of Manchester, Manchester.
147. Sogunro, O. A. (1997). Impact of training on leadership development: Lessons from a leadership training program. *Evaluation Review*, 21(6), 713–737.

148. Sotiriou, D. – Wittmer, D. (2001): Influence methods of project managers: Perceptions of team members and project managers. *Project Management Journal*, 32(3), 12-20.
149. Stainback, S. B. – Stainback, W. C. (1988): *Understanding and Conducting Qualitative Research*. Council for Exceptional Children, Dubuque.
150. Suikki, R. – Tromstedt, R. – Haapasalo, H. (2006). Project management competence development framework in turbulent business environment. *Technovation*. 26(5-6). 723-738.
151. Sutterfield, J. S. – Friday-Stroud, S. S. – Shivers-Blackwell, S. L. (2006): A case study of project and stakeholder management failures: Lessons learned. *Project Management Journal*, 37(5), 26-35.
152. Shein, E. H. (1978). *Career Dynamics: Matching Individual and Organizational Needs*. Addison-Wesley Publishing Company, Boston.
153. Shenhar, A.J. – Dvir, D. – Levy, O. – Maltz, A.C. (2001). Project success: a multidimensional strategic concept. *Long Range Planning*, 34(6), 699-725.
154. Shenhar, A. – Dvir, D. (2007). Project management research: the challenge and opportunity. *Project Management Journal*, 38(2), 93-99.
155. Söderlund, J. (2002). On the development of project management research: Schools of thought and critique. *Project Perspectives*, 8(1), 20-31.
156. Spencer, L. M. – Spencer, S. M. (1993). *Competence at work*. John Wiley & Sons, New York.
157. Standish Group (2015). *The Standish Group Report – Chaos*. The Standish Group, West Yarmouth.
158. Szokolszky, Á. (2004). *Kutatómunka a pszichológiában*. Osiris, Budapest
159. Thomas, G. – Fernández, W. (2008): Success in IT projects: A matter of definition? *International Journal of Project Management*, 26(7), 733-742.
160. Toarniczky, Andrea (2012). *Szocializáció multikulturális szervezetben = Socialization within multicultural organization*. Doktori (PhD) értekezés, Budapesti Corvinus Egyetem, Gazdálkodástani Doktori Iskola.
161. Toney F. (1997). What the Fortune 500 know about PM best practices. *PM Network*, 11(2), 30-34.
162. Turner, J. R. (1999). *Handbook of Project-based Management: Improving the Process for Achieving Strategic Objectives* (2. kiadás), McGraw-Hill, London.
163. Turner, J. R. – Müller, R. (2003). On the nature of the project as a temporary organization. *International Journal of Project Management*, 21(1), 1-8.

164. Turner, J. R. – Müller, R. (2005, June). The project manager's leadership style as a success factor on projects: A literature review. *Project Management Institute*.
165. Turner, J. R. – Müller, R. (2006). *Choosing Appropriate Project Managers: Matching their leadership style to the type of project*. Project Management Institute, Newton Square.
166. Turner, J. R. (2009). *Handbook of project based management: Leading strategic changes in organizations* (3. kiadás). McGraw-Hill Professional, New York.
167. Turner, J. R. – Anbari, F. – Bredillet, C. (2013). Perspectives on research in project management: the nine schools. *Global Business Perspectives*, 1(1), 3-28.
168. Vaishya, R. – Jha, S. – Srivastava, D. K. (2016): Revisiting Managerial Competencies-Literature Review. *International Journal of Innovative Research and Development*, 5(4).
169. Van Maanen, J. – Schein, E. H. (1979). Toward a theory of organizational socialization. Staw, B. M. (szerk.), *Research in organizational behavior*, 209-264. Greenwich.
170. Vidal, L. – Marle, F. (2008). Understanding project complexity: implications on project management. *Kybernetes*, 37(8), 1094-1110.
171. Wateridge, J. H. (1995). IT projects; a basis for success. *International Journal of Project Management* 13 (3), 169-172.
172. Wateridge, J. (1998). How can IS/IT projects be measured for success? *International Journal of Project Management*, 16(1), 59-63.
173. Winter, M. – Smith, C. – Morris, P. W. G. – Cicmil, S. (2006). Directions for future research in project management: the main findings of the EPSRC Research Network. *International Journal of Project Management*, special issue 2006.
174. Woodruffe, C. (1991). Competent by Any Other Name. *Personnel Management*. 23(9). 30-33.
175. World Bank (2008). *Little Data Book*. International Bank for Reconstruction and Development/The World Bank, Development Data Group, Washington.
176. Zaccaro, S. J. – Rittman, A. L. – Marks, M. A. (2001): Team leadership. *The Leadership Quarterly*, 12(4), 451-483.
177. Zimmerer, T. W. – Yasin, M. M. (1998): A leadership profile of American project managers. *Project Management Journal*, 29(1), 31-38.

178. Zoltayné Paprika, Z. (1999). A stratégiai döntéshozatal módszertani kérdései (PhD dissertation, University of Budaoest).