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**STUDENT COMPETENCES IN THE FIELD OF PROJECT
RISK MANAGEMENT ON EXAMPLE
OF IPMA-STUDENT PROGRAMME**

**KOMPETENCJE STUDENTÓW W ZAKRESIE
ZARZĄDZANIA RYZYKIEM PROJEKTU
NA PRZYKŁADZIE PROGRAMU IPMA-STUDENT**

Abstract: Rapidity and scope of changes of the economy in global and local level is a fundamental challenge for project managers. Changes in the environment make it difficult to

successfully implement many projects. Quick identification and assessment of project opportunities and threats become the key competence of the project manager.

The aim of the article is to present the level of risk management competencies among students who are certified on the IPMA-Student portal. The article uses the literature analysis of the subject as well as the analysis of data obtained from the IPMA Student exam portal.

The main research problems are:

- identification of the level of competence in risk management in projects that have certified students;
- comparison of the level of competence in risk management with other technical competences held by certified students.

The conclusions obtained are of practical significance because they enable the identification of the level of competence, which has a significant impact on the success of implemented projects. The topic discussed allows to indicate competence gaps in project risk management among students.

Keywords: risk, competences, project management, certification, student competences

Streszczenie: Gwałtowność i zakres zmian, jakim podlega gospodarka w skali światowej i lokalnej, stanowią główne wyzwanie dla zarządzających projektami. Przemiany w otoczeniu sprawiają, że realizacja z sukcesem wielu projektów staje pod znakiem zapytania. Szybkie identyfikowanie oraz ocena szans i zagrożeń projektu stają się kluczowymi kompetencjami kierownika projektu.

Celem artykułu jest prezentacja poziomu kompetencji zarządzania ryzykiem wśród studentów zdających certyfikat na portalu IPMA-Student. W artykule wykorzystano analizę literatury przedmiotu, a także analizę danych pozyskanych z portalu egzaminacyjnego IPMA Student.

Główne problemy badawcze to:

- identyfikacja poziomu kompetencji w zakresie zarządzania ryzykiem w projektach, które posiadają certyfikowani studenci;
- porównanie poziomu kompetencji w zakresie zarządzania ryzykiem z innymi kompetencjami technicznymi posiadanymi przez certyfikowanych studentów.

Uzyskane wnioski mają znaczenie praktyczne, ponieważ umożliwiają identyfikację poziomu kompetencji, która ma znaczący wpływ na sukces realizowanych projektów. Podjęty temat pozwala za-sygnalizować braki kompetencyjne w zakresie zarządzania ryzykiem projektu wśród studentów.

Słowa kluczowe: ryzyko, kompetencje, zarządzanie projektem, certyfikacja, kompetencje studentów

Introduction

Risk defined as „the possibility of failure, and in particular the possibility of events going beyond the control of an operating entity, which cannot be accurately predicted and fully prevented, and which - by reducing useful results and / or by increasing expenditure - deprive the action completely or partially of the features of efficiency and economic viability” is an inseparable element of the functioning of every entrepre-

neur conducting business activity and implementing projects¹. Risk management is introduced to business activities, also in the sphere of projects, in order to achieve an acceptable level of risk by entrepreneurs. Entrepreneurs make specific decisions and implement specific actions, using various methods that are widely available².

It is therefore important that the people responsible for project management have appropriate competences to recognize and limit the risk to an acceptable level. The labor market is looking for graduates prepared for work in projects, proficient in basic methods and tools, ready to work in interdisciplinary teams, able to solve problems and deal with unusual situations. The project manager's profession is currently one of the most attractive and promising on the labor market.³ Hence it becomes justified to examine the level of competence in project management among students.

The article presents the IPMA-Student competency model created by the International Project Management Association Polska® (IPMA Polska) to examine the level of competence among university students. The analysis of the results of examinations carried out on the basis of this model will show the level of competence in risk management, as well as compare with other competences in the field of project management owned by students.

1. Competences and their significance

At the beginning, the competences were of a formal nature and indicated the scope of powers to make specific decisions or implement specific tasks⁴. The concept began to gain significance only in the 1980s. Instead of having formal permissions, this concept began to determine the ability to perform tasks, and above all the proper fulfillment of obligations related to the position held⁵. The term was widely used by representatives of both the business and scientific community. Today, it is of great importance for the labor market and has many definitions. Whiddett and Hollyforde refer to them as „a set of characteristics of a person enabling them to stand out effectively performing work-related tasks”⁶. Sajkiewicz indicates that competences are „a set of characteristics of a given person, which consists of elements characteristic for that person, such as motivation, personality traits, skills, self-esteem related to functioning in a group and knowledge that this person has acquired and uses”⁷. Competences are also defined as „predispositions in terms of

¹ T.T. Kaczmarek, *Zarządzanie ryzykiem. Ujęcie interdyscyplinarne*, Difin, Warszawa 2010, p. 171.

² K. Jajuga (ed.), *Zarządzanie ryzykiem*, PWN, Warszawa 2009, p. 15.

³ www.ipma.pl [access: 29.05.2019].

⁴ M. Butkiewicz (ed.), *Model polskich standardów kwalifikacji zawodowych*, Instytut Technologii Eksploatacji, Warszawa 1995, p. 30.

⁵ R.E. Boyatzis, *Competencies in the 21st century*, „Journal of Management Development” 2008, Vol. 27, p. 8.

⁶ S. Whiddett, S. Hollyforde, *Modele kompetencyjne w zarządzaniu zasobami ludzkimi*, Oficyna Ekonomiczna, Kraków 2003, p. 13.

⁷ A. Sajkiewicz (ed.), *Jakość zasobów pracy. Kultura, kompetencje, konkurencyjność*, Poltext, Warszawa 2002, p. 89.

knowledge, skills and attitudes allowing performing professional tasks at the appropriate level⁸.

Based on the analysis of various definitions of competences, the following set of aspects that appear in them was distinguished⁹: general and specialist knowledge, qualifications (level of education, formal qualifications to practice the profession), abilities, skills, behavior, intelligence (cognitive, emotional etc.), thinking styles, personality traits, attitudes, values, experience, skill, reasoning, motivation, self-image (self-knowledge and / or self-esteem), social roles, temperament and psychophysical features. The multitude of components of the concept shows how broad it is.

In the literature on the subject, as in the definition of the concept itself, there are many classifications of competences. Due to individual competency components the following are distinguished:

1. Competences related to the thinking process – related to the skills of analytical thinking, learning, problem solving.
2. Competences related to the process of feeling – relating to interpersonal skills, building relationships and flexibility in action.
3. Competence related to the process of operation – relating to planning, organizing and directing conducted activities.

Enterprises that achieve success on the market repeatedly create their own sets of competences that employees should have in individual positions. This set is a combination of a number of intangible resources, many times valuable and rare, which is difficult to imitate and which constitute their advantage on the market¹⁰.

In Poland, the development of competences among young people has gained in importance for several years. At universities since 2011 (Act of 18 March 2011 amending the Act - Higher Education Law), there are constant changes aimed at improving the quality of education, and thus the implementation of study programs aimed at achieving students' intended learning outcomes in terms of knowledge, skills and social competence. At the same time, universities place an emphasis on competences that the student will acquire throughout the entire period of study in order to meet market requirements. The students themselves also appreciate the importance of competence and gladly join in the activities of universities in the form of workshops, courses, apprenticeships, language classes or certification.

Having employees in the enterprise with strictly defined competences, useful and essential for the success of the project, is the basis for people managing the organization. Thanks to this, the work of individuals and the entire team brings

⁸ J. Wieczorek, *Efektywne zarządzanie kompetencjami. Tworzenie przewagi konkurencyjnej firmy*, Ośrodek Doradztwa i Doskonalenia Kadr Sp. z o.o., Gdańsk 2008, p. 24.

⁹ Fundacja Obserwatorium Zarządzania, Raport: *Jak w pełni wykorzystać potencjał pracowników?*, Warszawa, p. 13.

¹⁰ E. Masłyk-Musiał (ed.), *Zarządzanie kompetencjami w organizacji*, Oficyna Wydawnicza WSM, Warszawa 2005, p. 29-38.

greater results to the organization. The interest in competences on the part of entrepreneurs, universities and future employees confirms the meaning of this concept in the current reality.

2. IPMA-Student competence model

In practice, many project management standards are used that allow project managers to take action in the most professional manner possible. Among the most widespread standards, there is also ICB created by the International Project Management Association® (IPMA), an international non-profit organization associating and certifying project managers. Part of the organization is IPMA Polska, which deals with supporting people in acquiring knowledge about project management and organizations implementing project management. One of the elements of IPMA Polska's activity is conducting certification in accordance with IPMA guidelines.

The IPMA competence guidelines distinguish three areas of competence¹¹:

1. area of technical competence – covers the basic elements of competence in project management, which is the heart of professional project management, its elements are sometimes referred to as hard.

2. area of behavioral competence – includes personality elements of competence in project management, in particular attitudes and behavior of the project manager, its elements are sometimes referred to as soft.

3. area of contextual competence – includes elements relating to the context of the project, in particular organizational strategy, the relationship between the project and the operational activities, the relationship of the project manager and project management team with the line management and business management of the organization, and to operate within a project-oriented organization, programs and portfolios.

In each area, elements of competence have been distinguished, which are defined by name, description of content, list of issues covered by the subject, list of possible activities, key competences required at each level of IPMA certification, key terms and key relationships with other elements of competence.

Certification based on the above guidelines is addressed not only to managers (IPMA D, IPMA C, IPMA B and IPMA A certificates), but also to students and graduates (IPMA-Student certificate). The IPMA-Student certificate is a summary of academic education in project management and is an objective and recognizable by employers' certificate of competences that are universal and independent of the industry. The IPMA-Student competency model based on the three areas of competence presented, within each of them distinguishes elements of competence that are presented in Table 1.

¹¹ B. Dałkowski, L. Staśto, M. Zalewski (ed.), *Polskie wytyczne kompetencji IPMA 3.0*, Stowarzyszenie Project Management Polska, Warszawa 2009, p. 11-12.

Table 1. Elements of competences IPMA-Student

Tabela 1. Elementy kompetencji IPMA-Student

Elements of technical competence	Elements of behavioral competence	Elements of contextual competence
1.01 Successful project management 1.02 Stakeholders 1.03 Requirements and goals of the project 1.04 Risk: threats and opportunities 1.05 Quality 1.06 Project organization 1.07 Teamwork 1.08 Troubleshooting 1.09 Project structures 1.10 Scope and partial products 1.11 Time and stages (phases) of the project 1.12 Resources 1.13 Costs and financial resources 1.15 Changes 1.16 Control and reports 1.18 Communication 1.19 Getting started 1.20 Closing	2.01 Leadership 2.02 Engagement and motivation 2.04 Assertiveness 2.07 Creativity 2.08 Results orientation 2.09 Efficiency 2.12 Conflicts and crises 2.13 Credibility 2.14 Appreciating value 2.15 Ethics	3.01 Project orientation 3.05 Solid organization structures 3.08 Human resource management

Source: internal materials of IPMA Poland.

Within the area of technical competence 20 elements are examined, including Risk: threats and opportunities. This element consists of five components under which candidates should demonstrate the knowledge in the field of risk management. They include:

1. Risk: threats and opportunities – including: risk category, risk-sharing structure, sources of risk, effects of risk;
2. Tools and techniques for recognizing threats and opportunities – including: analysis of assumptions, checklist analysis, SWOT analysis, experience reviews, documentation reviews, brainstorming, interviews, expert opinions, diagram-based techniques (including cause and effect diagrams);
3. Tools and techniques for qualitative assessment of threats and opportunities – including: probability, effect, risk value, risk information card, project risk register, project risk map, project risk profiles;

4. Strategies and plans for response to threats and opportunities – including: response strategies (avoidance, acceptance, prevention, transfer), conditional response strategies (contingency plans);

5. Tools and techniques for quantitative assessment of threats and opportunities.

The model takes into account the best practices and needs of the labor market, which at the same time is the basis for universities to adapt and develop their curricula. The model, which was developed on the basis of exchange of knowledge and experience of the scientific and business environment, forms the basis of the IPMA-Student certification system. Thus, the certificate obtained by students increases their chances on the labor market, and gives entrepreneurs confirmation of the candidate's competence.

The IPMA-Student accreditation system is a transparent and universal model of competence requirements in the field of project management. The IPMA-Student program, which includes certification, has been implemented at 23 faculties of universities in Poland that have been accredited by IPMA-Student. The curricula of accredited universities include content related to education in the field of project management at the level enabling students to acquire competence in project management. These faculties have confirmed the compliance of their curricula with the requirements of IPMA-Student or have launched new programs based on the effects of IPMA-Student education.

3. Level of competence in project management, based on the IPMA-Student e-Exam

The examination of students' competences in the field of project management was carried out on the basis of data obtained from the electronic examination platform - the IPMA-Student portal. The study used a statistical method to perform which was used MS Excel 2016 software. The research sample includes students of accredited universities who in the period from 2015 to the first half of 2019 took the IPMA-Student certification exam in an electronic version. Due to the fact that some universities use the paper version of the exam, the analysis does not include all certified persons. The students included in the research in various fields as well as specialties not only related to management, are both first and second cycle students.

In total, 468 people took the electronic version of the exam in the analyzed period. The examination set of 100 questions, in accordance with the competency requirements of IPMA-Student, includes 70 questions regarding technical competences, 15 questions - behavioral competences and 15 questions - contextual competences.

The analysis of the IPMA-Student exam results covered a period of almost five years, during which 468 approaches were recorded in the system. The largest group of students took the exam in 2018, it was 207 people. Both the average rating and

the median of results in the analyzed years oscillate around 60%. The highest average grade obtained by students in 2017 was 62%, and the lowest in 2015 - 58%. The highest median at 62% was in 2018 and the lowest in 2016 (57%). In all the analyzed years there is a relatively small variation in results, which is confirmed by the standard deviation. The exact results of the analysis of the results of the IPMA-Student e-Exam per years are presented in Table 2.

Table 2. Results of exams IPMA-Student in years 2015-2019

Tabela 2. Wyniki egzaminów IPMA-Student w latach 2015-2019

	2015	2016	2017	2018	1st half 2019	Total
Total number of exams	69	35	52	207	89	468
Average rating of all approaches	58%	59%	62%	61%	61%	61%
Median	58%	57%	60%	62%	60%	61%
Standard deviation	10%	9%	9%	9%	8%	9%
Asymmetry factor (Biases)	0,41	0,1	-0,14	-0,25	-0,09	-0,08
Kurtosis	0,14	-0,21	-0,26	-0,27	0,21	-0,23

Source: own research.

The IPMA-Student certificate covers three key areas of competence in project management. Figure 1 presents the percentage share of correct answers that students gave in individual areas of IPMA competence broken down into the years studied. The analysis of the data presented in Figure 1 clearly indicates that technical competences, including risk management skills, are not the students' strong point. The results in the area of behavioral competences are statistically significantly the best.

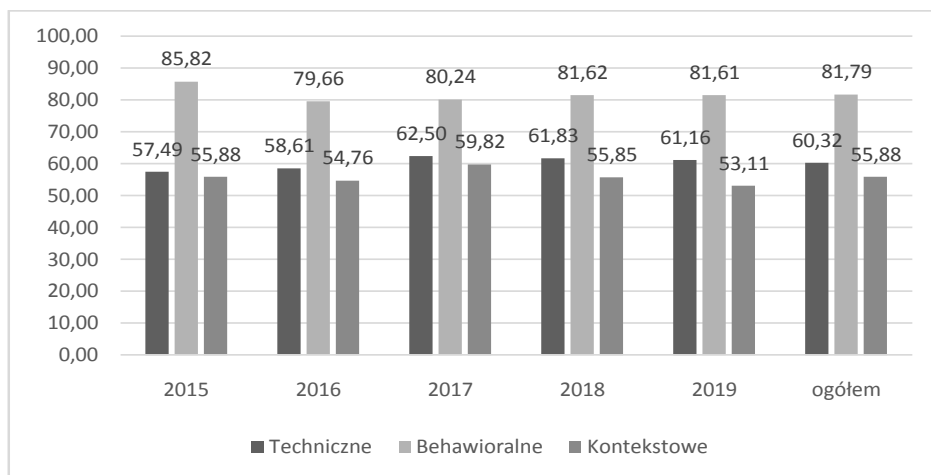


Figure 1. Percentage of correct answers to questions in individual areas of IPMA competence in the analysed years

Rysunek 1. Udział procentowy poprawnych odpowiedzi na pytania w poszczególnych obszarach kompetencji IPMA w analizowanych latach

Source: own research.

The analysis of responses in the area of technical competence indicates that Risk: threats and opportunities element in 2016-2019 is distinguished by the lowest level of knowledge among students. In 2015, students provided the least correct answers regarding Getting started (only 18.84%) and questions about Risk: threats and opportunities (32.61%). The exact data on the correct answers in individual elements of technical competence are presented in Table 3. The analysis shows that Risk: threats and opportunities element is an element that is at a very low level in relation to the other elements of technical competence and requires more work on the part of students.

Table 3. The average percentage of correct answers in the area of technical competence on the IPMA-Student exam

Tabela 3. Średni procent poprawnych odpowiedzi w obszarze kompetencji technicznych na egzaminie IPMA-Student

Elements of technical competence	2015	2016	2017	2018	I poł 2019	Ogółem
1.01 Successful project management	37,32	48,57	65,38	68,60	69,44	57,86
1.02 Stakeholders	75,36	78,57	71,15	70,85	71,91	73,57
1.03 Requirements and goals of the project	68,84	71,43	67,95	66,99	62,55	67,55
1.04 Risk: threats and opportunities	32,61	39,52	37,18	33,17	35,58	35,61
1.05 Quality	72,46	55,71	49,52	45,53	42,70	53,19
1.06 Project organization	49,28	53,88	66,15	67,25	66,52	60,61
1.07 Teamwork	63,29	55,24	55,77	56,14	63,82	58,85
1.08 Troubleshooting	86,67	78,86	78,85	82,37	73,03	79,95
1.09 Project structures	57,49	57,14	61,54	51,69	56,18	56,81
1.10 Scope and partial products	64,49	52,86	51,15	48,89	48,09	53,10
1.11 Time and stages (phases) of the project	39,28	45,71	43,46	46,91	42,13	43,50
1.12 Resources	53,62	52,14	67,31	62,96	64,79	60,17
1.13 Costs and financial resources	67,87	66,67	67,31	69,15	67,90	67,78
1.15 Changes 1	68,12	50,00	65,38	63,77	56,18	60,69
1.16 Control and reports	55,07	57,14	69,23	72,27	73,48	65,44
1.18 Communication	66,67	87,14	82,69	82,77	84,27	80,71
1.19 Getting started	18,84	45,71	-	-	-	32,28

Source: own research.

Analysis of the elements of technical competences showed that the element Risk: threats and opportunities should be strengthened in the future among students. However, it is important to know which components of the element students should work on the most. In 2015-2016, the scope of questions covered only two of the five components of the element of competence, which is Risk: threats and opportunities. Of the two analyzed questions the students were much worse at answering. They were strategies and plans for responding to threats and opportunities (about 30%). In 2017-2019, the scope of questions was expanded and allowed to check students' knowledge of all five components of the competence element. In the years 2017-2019 the students responded poorly to questions about tools and techniques for quantitative assessment of threats and opportunities, as well as tools and techniques for recognizing threats and opportu-

nities. For both components, the weakest results were achieved by students in 2019 and they were 10.48% and 16.19% respectively. It is worth noting that students' knowledge of tools and techniques for qualitative assessment of threats and opportunities is at a level similar to other elements of technical competence and in 2019 was 55%.

Table 4. The average percentage of correct answers in the technical competence element - Risk: threats and chances at the IPMA – Student exam

Tabela 4. Średni procent poprawnych odpowiedzi w elemencie kompetencji technicznych – Ryzyko: zagrożenia i szanse na egzaminie IPMA – Student

Year	Risk: threat, opportunity	Tools and techniques for recognizing threats and opportunities	Tools and techniques for qualitative threat and opportunity assessment	Strategies and plans for responding to threats and opportunities	Quantitative threat and opportunity assessment tools and techniques
2015	-	-	44,93	26,45	-
2016	-	-	58,57	30,00	-
2017	52,88	21,15	40,38	32,69	23,08
2018	46,62	19,32	43,96	27,54	14,98
2019	45,25	16,19	55,24	35,24	10,48

Source: own research.

Analysis of the results achieved by students in the field of technical competence shows that knowledge about risk management in the project is at a very low level and requires improvement. First of all, the scope of tools and techniques for quantitative assessment of threats and opportunities, as well as tools and techniques for recognizing threats and opportunities needs strengthening.

Conclusions

Efficient project implementation very often determines the „to be or not to be” enterprises in today's dynamic economy. To manage the project effectively, it is necessary to have a staff with appropriate competences. One of the key competences is risk management, which allows recognizing and limiting risk to an acceptable level.

The analysis of data presented in the article included a sample of 468 students of Polish universities who approached certification on the IPMA-Student electronic platform. The research was based on actually conducted examinations, which indicates a high level of objectivity of the presented data. The results of the analysis indicate that:

- ✓ technical competence, which includes risk management, is not the strong-

est point of the students. The results in the area of behavioral competences are statistically significantly the best,

- ✓ in the area of technical competences, students' strength is a high level of communication and problem-solving competences, while the weakness are risk-related competences,

- ✓ the level of technical competences possessed by students changes in particular years, however, there is no upward trend,

- ✓ students of accredited universities, regardless of the year analyzed, obtained the weakest results in terms of the element of technical competence - Risk: threats and opportunities,

- ✓ within the competence element Risk: threats and opportunities, the scope of tools and techniques for quantitative assessment of threats and opportunities, as well as tools and techniques for recognizing threats and opportunities need to be strengthened.

The analysis presented very clearly showed competency deficiencies among future employees entering the market. This is a clear signal for universities which element of competence must be strengthened in the developed education programs for students. Only a properly prepared education system will allow reducing competency gaps and prepare future managerial staff who will skillfully manage projects.

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