

## THE LEVEL OF COMPETENCE OF POST-GRADUATE STUDENTS IN PROJECT MANAGEMENT. CASE STUDY OF IPMA STUDENT

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**Purpose:** The aim of the article is to present the results of research conducted using the statistical method on the results of project management certification exams (IPMA-Student). The purpose of the research was to determine which elements of post-graduate students' competences are best developed.

**Design/methodology/approach:** In the study, the statistical method and the individual case method were used. The data came from the IPMA-Student portal, from the results of the exam in electronic version. MS Excel 2013 software was used to prepare the results of the analysis. Basic statistical analyses were made. In addition, the analysed groups were compared due to the IPMA-Student's exam result. One-factor analysis of variance was used for this purpose.

**Findings:** In the course of the work, the level of management competence in the various areas of technical, behavioural and contextual competence was identified.

**Practical implications:** The results of the research and conclusions can be used as material to indicate which elements of project management competence require support and can be useful in the formulation of training programmes both at universities and in training companies.

**Originality/value:** The research is based on the actual results of business certification exams carried out by an international independent professional association. Therefore, the result of the research is not based on a declarative description of students' competences, but on the real results of the exam.

**Keywords:** project management skills, education, skills development, certification in project management.

**Category of the paper:** Case study.

## 1. Introduction

Projects are implemented in various sectors (Turner et al., 2010; Winter et al., 2006) and the awareness of the importance of effective project management is constantly growing (Bakker, 2010). Managing many projects caused the necessity of organisational changes as well as development of a new approach to project management (Morris et al., 2011b; Packendorff, 1995). Such changes make it necessary to find managers with suitable competences to run projects. This need is perceived by both educators and business organisations (Farashah et al., 2019). In the Manpower Report "Solving the Talent Shortage Build, Buy, Borrow and Bridge" (Manpower Report, 2018), the project manager was ranked eighth, behind such professions as: drivers, engineers and financial and IT employees. It is worth noting that the combination of technical and project management skills can give a clear advantage in the competitive labour market. How to recruit competitive employees? The way to solve this problem can be certification of competences.

Certification gives the possibility to verify the competence of employees. The research indicates that certification is positively correlated with professionalism; certified managers demonstrated higher levels of professionalism (Farashah et al., 2019). So that is why certification is one of the basic factors facilitating the recruitment of employees.

Another question is how to improve the level of your individual competences? How to prepare yourself to verify the level of your competences?

H. Kerzner (2010) states that managers can be trained through on-the-job learning (60%), education and training (20%), seminars and educational activities for professionals (10%), and reading (10%).

## 2. IPMA-Student Competence model

In Poland, cooperation between universities and business, with the support of IPMA Poland - a professional project management association, allowed to develop a competence model for students - a set of competences, which on the one hand are sought after by the labour market related to project management, and on the other hand included possibilities of education and practical preparation within the framework of educational programmes at universities. The competence model can occur both in the sense of a set of professional competences needed by an organisation and a set of competences characterising a professional role (Bartkowiak, 2011).

The IPMA Student model is based on IPMA Competence Baseline (ICB), which presents the definitions of individual competences that are necessary for effective project management.

The IPMA Competence Guidelines distinguish 3 areas of competence (ICB IPMA, 2006):

- Technical competence includes the basic elements of competence in project management, which are at the heart of professional project management, sometimes referred to as hardcore elements.
- Behavioural competence area includes personal competence elements in project management, in particular the attitude and behaviour of a project manager; its elements are sometimes referred to as “soft”.
- Contextual competence includes elements relating to the project context, in particular the organisation's strategy, the relationship between the project and operational activity, the relationship of the project manager and the project management team with the line management and business management of the organisation, and to functioning within a project, programme and portfolio oriented organisation.

Each competence element in each area is defined by a name, content description, list of topics covered, list of possible actions, key competences required for each of the four levels of IPMA certification, key terms and key relations with other competence elements.

The IPMA Competence Guidelines form the basis for certification, run by the certification bodies of the member associations.

**Table 1.**

*Competence in the IPMA-Student Model*

Technical competence elements	Behavioural competence elements	Contextual competence elements
1.01 Project management success 1.02 Interested parties 1.03 Project requirements & objectives 1.04 Risk & opportunity 1.05 Quality 1.06 Project organisation 1.07 Teamwork 1.08 Problem resolution 1.09 Project structures 1.10 Scope & deliverables 1.11 Time & project phases 1.12 Resources 1.13 Cost & finance 1.15 Changes 1.16 Control & reports 1.18 Communication 1.19 Start-up 1.20 Close-out	2.01 Leadership 2.02 Engagement 2.04 Assertiveness 2.07 Creativity 2.08 Results orientation 2.09 Efficiency 2.12 Conflict & crisis 2.13 Reliability 2.14 Values appreciation 2.15 Ethics	3.01 Project orientation 3.05 Permanent organisation 3.08 Personnel management

The use of the model gives universities the opportunity to identify the competence gap and take action to reduce it.

- Knowledge (knowledge of terms, definitions, models, facts, criteria, standards, methods, processes, relationships);
- Understanding (ability to interpret terms, definitions, models, facts, criteria, standards, methods, processes, relationships);
- Skills - "Simple" application (for a specific scenario, recognition and use of a proper method, technique and tools, interpretation of results, conclusions);
- Skills - "Complex" application (for a specific scenario, combining different areas and criteria, choosing the right method, techniques and tools, interpreting the results and choosing the best solution) - level not required for IPMA Student certification.

### **3. Analysis of student certification results**

The research was conducted on the basis of data obtained from IPMA Student certification exams. The IPMA Student exam includes the above mentioned elements of project management competence. The examination consists of 100 questions, including 70 in the area of technical competence, 15 in the area of behavioural competence and 15 in the area of contextual competence. The format of multi-choice questions is the same as in quizzes. Exam time limit: 100 min.

The IPMA Student certification exam is conducted on paper and online, in accredited computer labs under supervision of an IPMA Student Coordinator.

The exam is available only for students and graduates admitted by IPMA Polska CERT, i.e. those who have been registered by the accredited Faculty as entitled to apply for IPMA-Student certification (they have passed the path of accredited subjects) and have paid certification fee to IPMA Poland.

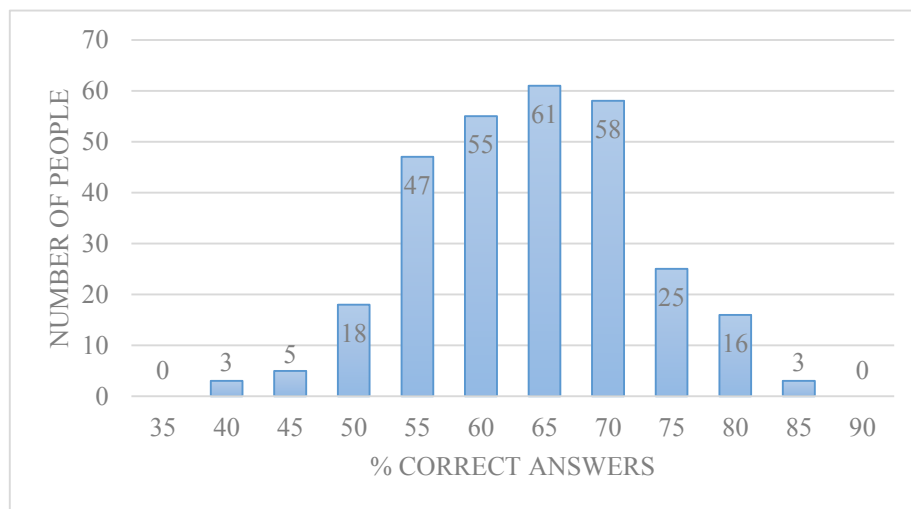
Passing rate of the Test is minimum 50% of total points. Passing the Test is not a prerequisite for taking the IPMA Student certification exam.

Statistical analysis of the results of the IPMA Student e-Examination is presented in Table 2. The results of the examinations conducted in the electronic form - 291 examinations – were used for the study.

**Table 2.***Statistical analysis of the results of the IPMA Student e-Examination*

Item	e-Exam IPMA-Student
Total number of exams taken	291
Average assessment of all exams taken	61%
Median	61%
Standard Deviation	9%
Asymmetry coefficient	-0,14
Kurtosis	-0,3
Internal cohesion coefficient	77%

The distribution of the results obtained on the IPMA Exam is presented in Figure 1. The minimum score in the scale of 100 is 36, the maximum is 81 (Figure 1). The distribution of the results is approximated according to the normal distribution.

**Figure 1.** The distribution of the results obtained on the IPMA Exam.

The study also included comparative analyses of general assessments of the IPMA Student exam for two groups: group I – full-time and part-time students, and group II – post-graduate students.

The comparison was made using ANOVA (Analysis of Variance). Average results of both analysed groups are very similar; for group I students: 60.7% (standard deviation: 8%), for group 2 students: 61.7% (standard deviation: 10). The results are shown in Table 3. The table shows that the value of F (Fisher) is significantly lower than the theoretical value of the *F*-test, while the level of *p*-value is high (usually taken as less than 0.05). It follows that the two analysed groups of full-time and part-time students and postgraduate students do not differ in a statistically significant way in terms of the result of the examination evaluation.

**Table 3.**

*Comparison of general examination grades for full-time and extramural students vs. postgraduate students - analysis of variance (ANOVA)*

Groups	Number of persons	Total	Average	Variation	Standard deviation	
group I – full-time and part-time studies	201	12,872	60.71698	64.21336	8.013324	
group II – post-graduate students	90	5,550	61.66667	106.2697	10.30872	
<b>ANOVA</b>						
Variation source	SS	df	MS	F	p-value	Test F
between groups	56.98113	1	56.98113	0.743005	0.389388	3.872642
within groups	23007.02	290	76.69006			
Total	23,064	291				

The next analysis contains a comparison of assessments of particular areas of competence for two analysed groups of students. The results of the comparison are presented in Table 4. It can be noted that the results for particular areas of competence do not differ significantly, what is more, for many areas the difference does not exceed several percentage points. This confirms the previous conclusion from Table 3 that there is no statistical difference between the results in these groups. Table 4 shows that only for some competence areas the analysed groups (full-time and part-time students and postgraduate students) differ in results by more than 10%:

- 1.08 Problem resolution.
- 1.15 Changes.
- 2.12 Conflicts and crises.

**Table 4.**

*Average percentage of correct answers in each group of students*

Item	Average percentage of correct answers		
	group I – full-time and part-time studies	group II – post-graduate students	difference
<b>Technical competence elements</b>	58.47%	59.92%	1.45%
1.01 Project management success	68.25%	67.95%	-0.29%
1.02 Interested parties	71.09%	71.97%	0.88%
1.03 Project requirements & objectives	70.14%	64.77%	-5.37%
1.04 Risk & opportunity	33.02%	38.26%	5.24%
1.05 Quality	47.16%	43.47%	-3.69%
1.06 Project organisation	67.49%	65.68%	-1.81%
1.07 Teamwork	56.30%	59.09%	2.79%
1.08 Problem resolution	85.79%	69.89%	-15.90%
1.09 Project structures	52.76%	54.92%	2.16%
1.10 Scope & deliverables	48.15%	49.09%	0.94%
1.11 Time & project phases	44.79%	47.39%	2.60%
1.12 Resources	61.29%	68.94%	7.65%
1.13 Cost & finance	66.55%	72.08%	5.53%
1.15 Changes	56.87%	71.59%	14.72%
1.16 Control & reports	70.62%	72.05%	1.43%
1.18 Communication	82.46%	84.85%	2.39%

<b>Behavioural competence elements</b>	76.37%	75.23%	-1.14%
2.01 Leadership	58.77%	54.55%	-4.22%
2.02 Engagement	97.87%	92.05%	-5.82%
2.04 Assertiveness	94.31%	95.46%	1.15%
2.07 Creativity	74.72%	69.32%	-5.40%
2.08 Results orientation	89.57%	95.45%	5.88%
2.12 Conflict & crisis	49.05%	64.78%	15.73%
2.13 Reliability	91.94%	87.50%	-4.44%
2.14 Values appreciation	83.89%	75.00%	-8.89%
2.15 Ethics	91.47%	89.77%	-1.70%
<b>Contextual competence elements</b>	55.96%	56.36%	0.41%
3.01 Project orientation	49.17%	52.84%	3.67%
3.05 Permanent organisation	52.37%	51.89%	-0.48%
3.08 Personnel management	65.69%	64.55%	-1.14%

A significant difference between groups of full-time and part-time students and post-graduate students arises when one analyses the possibility of passing the exam itself (Table 5). Passing the IPMA Student exam means exceeding the threshold of the overall score of 50%.

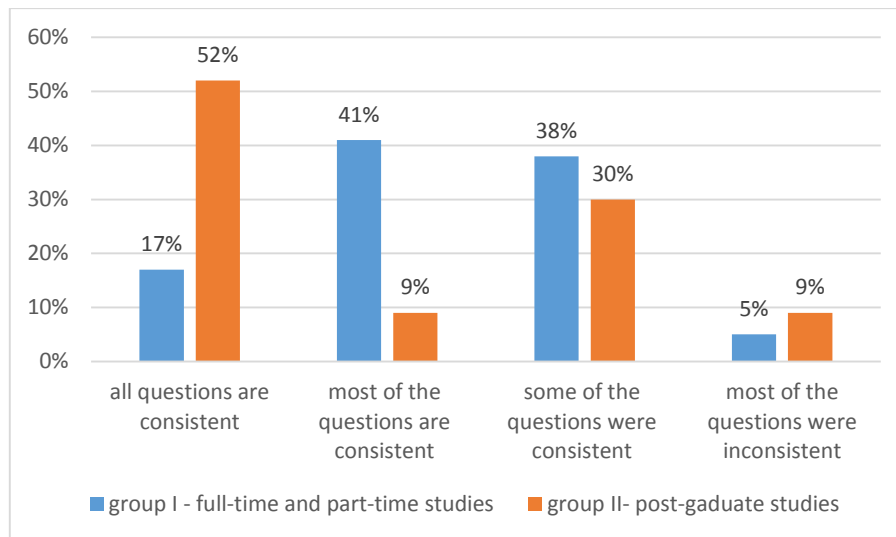
**Table 5.**

*Comparison of results of passing exams of full-time and part-time studies and post-graduate students*

Item	percentage of passed exams
group I - full-time and part-time studies	93%
group II - post-graduate students	87%

Table 5 shows that the percentage score for passed IPMA Student exams is high, thus we can conclude that universities are effective in preparing students for exams. At the same time, analysing the average exam score of 62%, we can assume that the students have a wide range of knowledge at a level that can be improved, and the effectiveness of training should be improved.

The research analysed the answers to the student satisfaction questionnaire completed after the exam was passed. Answers to selected questions concerning the compatibility of the subject matter of the questions and terminology used in the IPMA-Student examination with that used in the didactic process at the university were analysed. The results of the survey were presented in a comparative analysis for two analysed groups of students: full-time and part-time students and post-graduate students (Figure 2).



**Figure 2.** Compliance of terminology and scope of education at universities with the IPMA – Student Model.

Figure 2 shows that the majority of students believe that the terminology used in classroom teaching and the scope of education are in line with the IPMA Student Model. This is the result of the unification of syllabuses of subjects accredited by universities. Nevertheless, there is room for improvement in this area. Some students notice significant differences in terminology and scope of education. It is possible that improving curricula and terminology could significantly increase the average student performance on IPMA Student certification exams.

#### 4. Conclusions

The research presented in the article was based on a sample of 452 students of Polish universities who were certified on the IPMA-Student electronic platform. The analysis was based on real examinations, which indicates a high level of objectivity of the data presented in the article. This is indicated by the results of the analysis:

- the average result of the examination in both groups is at the level of 61%,
- accredited universities (in both studied groups) achieve the highest results in terms of behavioural competences, lower in the area of technical competences, and the weakest in contextual competences,
- all elements of behavioural, technical and contextual competences are developed at a high level of over 50% (IPMA Student pass level),
- post-graduate students have higher technical and contextual competences,
- students with less professional experience have lower results in technical and contextual competences but higher results in behavioural competences,



- results in individual technical competencies differ significantly, mostly in the area of 'Problem resolution' and 'Communication'; both elements are more developed in the group of post-graduate students,
- the least developed technical competence in both groups is 'Risk & opportunity',
- results in individual behavioural competencies differ significantly, mostly in the area of 'Conflict & crisis', it is more developed in the group of post-graduate students,
- results in individual contextual competencies do not differ significantly in the groups,
- the least developed element of contextual competences is the 'Understanding of project orientation' (the score is less than 50% in the group of full-time and part-time students),
- the results of examinations of both groups of students do not differ in a statistically significant way,
- there is room for improvement of student education in the scope of work on a uniform vocabulary for project management and complementing the content of courses. Students notice gaps between the implemented curricula and the scope of the IPMA Student Model developed in cooperation with business.

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