

PROJECT MANAGEMENT EDUCATION IN CROATIA: A FOCUS ON THE IT SECTOR NEEDS*

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Abstract. *Since today's dynamic and competitive business environment increasingly requires additional level of competence, the project manager is, certainly, a profession whose value and demand is growing. As to reach the project objective, the project manager should have an adequate education, which is the reason why the corporations, especially in the Information Technology (IT) industry, are among leaders in investment to project management education and certification. The aim of this paper is to contribute to the identification and understanding of the project management education model in Croatia and explore possibilities for its improvements, especially in the field of the project management in the IT industry. For that reason, through 2018 and 2019, authors conducted the research on availability of project management education programs in Croatia, opportunities for international certification as well as attitudes of the project management professionals in IT sector on the existing education model. The study suggests that there is a growing trend of project managers'*

certification, especially in the IT industry, as well as a variety of informal programs for project management education. Simultaneously, there is a lack of project management university study programs. Empirical results show that project management study programs lack the practical segment and are, in most cases, offering only fundamental theoretical knowledge. Therefore, authors, on the basis of the literature review and analysis of IT sector needs assessment, provide recommendations of the domains, to be included into future university study programs.

Key words: *project management education, certification in project management, Information Technology (IT) industry*

1. INTRODUCTION

The old economic paradigm did not recognize the dynamic environment and constant changes that are, together with

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challenges they bring, the bases of the economy of the 21st century. That is why the goal of each organization is to keep up with requirements of new knowledge and skills and, through the process of continuous learning, try to reduce the negative impacts of the emerging changes and achieve positive benefits. The classical organizational structure was hierarchically organized and was based largely on the autocratic style of leadership. Today, companies are focusing on contemporary organizational structures and are focused on innovation and teamwork and are project based. This is specially being reflected in the highly sophisticated and technology oriented companies and projects, such as the industry of information technologies (Tomić, 2013). As their production is being based on a project model, the relevance of project management is even higher and it became critical for economic growth and development of businesses (Larson and Gray, 2017). As of fast and constant changes, this industry recognizes the value of continuous upgrade of skills and knowledge, and therefore the value of high-quality education (Sharma et al., 2019) where *“academic programs on project management should be frontrunners in providing diverse and relevant perspectives on project management”* (Silvus and Schipper, 2019:10). Barilović et al. (2013) emphasize the importance of the quality of the project management educational programs, but, there is a question of availability and the quality of project management education.

The purpose of this paper is to contribute to raising awareness on the importance of the project manager occupation in the IT sector and to make contribution to the quality of the project management education in Croatia. The research, whose results were presented in this paper, was conducted using qualitative desk research analysis of available study programs and certifications possibilities in project management, as well as through structured in-depth interviews

with selected representatives of IT businesses. The aim of the paper is to explore possibilities and make contribution to improvements of the project management education model in Croatia, especially in the field of IT.

The following chapters are giving: the literature review, the results of desk research of available study programs in project management and computing; analysis of certification possibilities; the results of in-depth interviews with experts in this field and recommendations for raising the quality of education programs in project management, especially from the standpoint of IT companies.

2. LITERATURE REVIEW

By studying modern scientific and professional literature, it has been found that, at the global level, there is a wealth of literature, dealing with the topic of the quality of the project management education. At the level of the Republic of Croatia, there are papers (Mesarić, 2019; Buzov, 2019; Bjelica, Pavlović, 2018; Valenčić, 2013; Barilović et al., 2013, Uhlir, 2011), dealing with this topic, but there are rare examples of papers that are focused on the needs of the IT sector. This paper aims to contribute to the understanding of the importance of the project management education and the identification of the IT industry needs in the field of the project management.

The following chapters are giving the overview of the literature dealing with project definition and the project management education methodologies, with the aim of determining the range of skills and knowledge, needed for successful project management and the compliance of the project management study programs and certification models in the Republic of Croatia with the needs of the labor market, with an emphasis on the IT sector.

2.1. Project and project management definition

Project management has emerged as a field of practice that is increasingly being used by organizations with the aim of achieving their business plans and overall strategic goals (Kerzner, 2018; Crawford, 2004; Longman and Mullins, 2004; Beer et al. 1990; Smith et al., 1984; Pinto and Kharbanda, 1995). At the same time, it is gaining importance in other sectors, especially in government, where its paradigms are essential in management of capital investments, or even community oriented projects (Ćutić, Pađen, 2019) Although having similar views on the definition of project and project management, authors generally place emphasis on the activities focused on processes and reaching the project result, while in definition of project management, the emphasis is on communication and guidance of teams and stakeholders.

Maylor (1998), together with time dimension, defines a project as a non-repetitive action targeting the previously defined goal, having special resources, measurable results and by its implementing achieves changes in the organization. *“The project is defined as any set of activities and tasks that have a specific goal that must meet certain specifications, have a certain beginning and end, limited resources, spend resources (both human and technical) and are multifunctional”* (Kerzner, 2003: 89). Therefore, according to this approach, the project is a set of different activities, performed by the project team, in a logical sequence, in order to achieve a certain, in advance, defined delivery scope, schedule, cost, quality, i.e. result, where each activity, as well as the whole project, has defined beginning and the end (Kliem and Ludin 1998; Salvendy, 2001).

One of the most known definitions states that a project is a *“temporary endeavor to create a unique product or service”*

(Phillips, 2017: 2) and *“processes that did not exist in the past”* (Kerzner, 2018: 260) with the aim to satisfy a customer’s (Larson and Gray, 2017: 3), social or a company’s needs. In this definition there are two key words: the project is temporary and unique. *“Temporary means that each project is defined by its beginning and end, and unique means that the product or service is in some way different from the similar products or services performed so far”* (Lewis, 1995: 2).

In previous definitions, there is a clear emphasis on the task and result, while on the other hand, Graham (1985) highlights the dimension of team work and defines project management in terms of managing the set of people and other, object-oriented resources, most often with fixed finance and time constraints (cited according to Field & Keller, 1998). By Larson and Gray (2017) project management is a *“results-oriented management style that places a premium on building the collaborative relationships among a diverse cast of characters”* (Larson and Gray, 2017: 3), where communication and soft skills have a great importance (Ewin, 2017). Regardless of whether it is an approach that analyzes processes and results, or communication and team management, it is clear that project management is a discipline that evolves and changes in line with contemporary technological, communication and economic changes. According to (Cicmil et al., 2006: 675): *„researching the actuality of projects means focusing on social process and how practitioners think in action, in the local situation of a living present.“*

According to Pant and Baroudi (2008) the job of the project manager is demanding, complex and varied requiring the juggling of several issues concurrently. The authors find human skills as most important for a project manager (Ewin, 2017; Ruuska and Vartiainen, 2004; Mantel et al., 2004; Katz, 1991; El-Sabaa, 2001; Kloppenborg and Patrick, 1999; Belzer, 2001; Thite, 1999; Zimmerer and

Yasin, 1998; Turner, 1999) as technical skills are easier to deal with when compared to the soft skills in general (Carbone and Gholstone, 2004; Yen et al., 2001).

Here, the gap between the project management education and its application in concrete situations is created (Ramazani, Jergeas, 2015). The results of the research carried out by Standish Group, revealed that *“only 30% of the projects that were implemented met all the foreseen goals. Of the remaining ones, 45% ends with larger or smaller deviations from set goals, while as much as 25% of the projects represent a complete flaw”* (Barilović et al., 2013: 78). Regardless of the scope and character, projects are risky and complex endeavors (Kerzner, 2018) that is proven by numerous project failures occurred in the past (Hermano, Martín-Cruz, 2018; Stewart, Nassif, Stewart Obe, 2018; Ewin, 2017) and, therefore, they should be managed by well educated, trained and experienced staff. As of results of the conducted research of project failure rates and reasons, numerous authors found the project management not being up to the task and are proposing changes in the project management education processes (Ramazani, Jergeas, 2015; Ewin, 2017; Cicmil and Gaggiotti, 2017; Nijhuis, 2017; Bjelica, Pavlović, 2018; Stewart, Nassif, Stewart Obe, 2018; Silvius, Schipper, 2019). Following chapters are giving the overview of the most important project management education and certification possibilities available in the Republic of Croatia.

2.2. Project management education and certification

As the project management was defined as the *„art and science of converting vision into reality“* (Turner, 1996: 6; as cited by Davis and Pharro, 2003: 3), it is clear that the project leaders have to be well educated, qualified, communicative and multidisciplinary oriented. Project manager, unlike any other, must have knowledge in different areas as their

work will vary - from very simple to complex projects. Each new project requires new knowledge and skills, so the basic knowledge of project management acquired through regular education, mainly university education programs, can be upgraded through practice and non-formal learning.

The regular education in project management can be conducted through various university study programs on BA, MA, MBA or PhD level or through courses that are integral part of the study programs in other fields (often in Construction, Electrical Engineering and Computing, Information and Communication technologies, Management etc.). *„The focus of most project management trainings, in the context of universities, has been on the technical skills deemed essential to achieve project success, that being primarily the iron triangle of time, cost and quality“*. (Pant and Baroudi, 2008: 126) At the same time, large companies are developing internal educational programs focused on technical skills and behavior change. According to Baljkas and Mikić (2002: 102), education that appears in most organizations relates to:

- **Professional education** which includes knowledge of definitions and basic concepts in the project management, and the use of basic tools that will enable the candidate to track and record the project progress.
- **General knowledge**, involving knowledge of project finances, recognition of potential risks and their identification as well as change management.
- **Personal knowledge** refers to time, goals and stress management.
- **Interpersonal skills** are related to communication with others. It is important that the project manager has good interpersonal skills as he will spend most of his working time in communication with team members or stakeholders.

Buzov (2019) analyses the problems of the need to introduce software in teaching project management. Selection of software is not easy, as each study program, in which project management is taught has its own specific goals. There is, also, a huge difference in teaching the project management in a, for example, Computer science study program and in Project management study program, although both fields are highly interconnected, especially in the IT industry. So, there is a question of the extent to which the study programs meet the needs of the companies for quality project managers that can, in short time, be involved in solving complex problems in the IT industry.

As of the obvious unmet need in the labor market there is a growing number of non-formal, continuous learning programs. "In 1999, the International Project Management Association (IPMA) initiated

a number of Global Working Parties, one of which was dedicated to Project Management education. The outcome of which highlighted the need to change the way project management was taught. A criticism of the Global Working Party was that it did not provide direction about how to improve the education, it simply stated the issues." (Ewin et al., 2017: 506).

2.3. The technique and structure of project managers' education

Education of future managers is mainly based on the following form: university education and later systematic work on knowledge and skills in management, leadership, human resources or other fields the manager is responsible for. The choice of optimal learning content, the choice of methods, i.e. learning channels, is crucial. Figure 1 shows Dale's cone of experience.



Figure 1. Dale's Cone of Experience

Source: Oktaweri et al. (2019: 3)

By Dale's cone of experience, it is evident that students are less aware of what they read, and most of what they do, therefore, it is easy to conclude that the project management education should be based on learning through practice (Turner, Huemann, 2000). Additionally, the project management education should be based on developed innovative curricula, content and educational processes that follow the trends and advances in practice, in order to keep dynamics with the changing times (Anderson, 2018).

There are numerous new education techniques, as well as opportunities and ways to acquire additional education, such as: seminars, workshops, e-learning, webinars, webcast, coaching. Online training become a common way of learning among project managers (Bjelica and Pavlović, 2018).

Most authors claim that project management study programs provide only a basic coverage of project management tools, rather than an in-depth study of innovative project management methodologies (Akhmetshin et. al., 2019; Bjelica and Pavlović, 2018; Cha, Newman and Winch, 2018; Cicmil and Gaggiotti: 2017, Zimmer, Chen and Bellah 2018). As a solution, Akhmetshin et. al. (2019) are proposing an upgrade of the study programs, with inclusion of the models, such as PRINCE2, CPM and the in depth study of the PMBoK. Bjelica and Pavlović (2018) suggest Web-based learning, as they claim that it provides better project results and performance. Cha, Newman and Winch (2018) offer project management courses to cover the combination of two models: MoP framework (Morris 2013, as cited by Pinto and Winich, 2015) and the Three Domains model (Winch, 2014). With the aim of developing project management skills among student population in library

and information science education, Walther (2018: 92) developed Personal Course Plans (PCPs) which offer the students *the "ability to self-monitor their performance on completing project deliverables, meeting expectations of supervisors, and judging their own performance."* Cicmil and Gaggiotti (2017) introduced Principles of Responsible Management Education and Erwin (2017) proposed the design thinking approach, which should be embraced by the universities and incorporated in project management courses curricula. In the endeavor to develop the project management tool, Zimmer, Chen and Bellah (2018) developed the learning project management tool that was tested by the students in solving their case-studies, where they found that software application, although in testing phase, already affected the students' learning outcomes.

It is clear that the authors are unanimous in their assessment that university study programs cannot meet the needs of the project management profession and, therefore, there are numerous suggestions for its improvement whether in technical or soft skills. The gap in IT sector is even larger, as here high technical skills are required from each team member, while the interpersonal skills are essential, as of long process of team development and a risk of understanding the "end user" needs is essential. While, on the one hand, there are university study programs that are developing the technical knowledge and, on the other, the ones that develop management skills, there are rare examples of those that are combining both. Consequently, the need for non-formal learning in this sector is even higher, where there is a domination of certified project managers in IT in Croatia, in relation to all other sectors (Uhlir, 2011; PMI Croatia 2, 2019).

To contribute to this discussion, with the emphasis on the analysis of the situation in the Republic of Croatia and its IT sector, this paper presents the results of the analysis of the formal and non-formal project management education possibilities as well as results of in-depth interviews with experts from IT industry.

2.4. Research questions

In this study, the concepts of project and project manager has been analyzed and the possibilities of education, especially in the framework of internationally certified programs, that are being offered to project managers in the Republic of Croatia. By analyzing the literature in this field, it was found that most authors are, with more or less concrete action plans, suggesting the change in the education process. As the aim of this paper is to contribute to the understanding of the importance of the project management education and the identification of the IT industry needs in the field of the project management, the following research question was addressed:

RQ: Are the university programs in the Republic of Croatia meeting the needs of the IT sector labor market in the field of competences and knowledge that students are gaining?

According to the previous research, the authors anticipated that in the Republic of Croatia the study programs in project management are not able to meet the IT sector labor market needs. Therefore, the following hypotheses were proposed:

H1: Project management education programs are mainly theoretically oriented and lack practical segment.

For that reason, the experts from practice evaluate the study programs as

insufficient and not being able to meet the needs of the business organizations in the IT sector.

H2: Investments in the non-formal learning of project managers are increasing.

Although the project manager in the Republic of Croatia is relatively new and still not established occupation, it becomes recognized as a profession and the deficiencies in the formal system are to be compensated through non-formal education that is expected to be especially significant in the IT sector.

3. METHODOLOGY AND RESULTS OF THE RESEARCH

The research on the availability of project management education programs was conducted during 2018 and 2019 by analyzing secondary research and information, published on the official Web sites of the Agency for Science and Higher Education of the Republic of Croatia - the MOZVAG (Module for higher education) information system. In addition, authors analyzed attitudes of the professionals in the project management field towards the quality of the available education programs. This information was collected by in-depth interviews conducted with three project management professionals in the IT sector. The interviews followed the tree model structure, with questions, covering the following domains:

- Challenges and difficulties - most often encountered in the IT project management practice,
- IT sectors' requirements - specialized project management knowledge that students and employees should have,

- The quality of project management education model in Croatia.

3.1. Possibilities of education in project management on the national level

By analyzing the secondary information and reviewing the official Web pages of the educational institutions and associations, the authors found numerous different types of education models - from university study programs, trainings, seminars, on-line learning offers, etc. The majority refers to private schools and entrepreneurs in the

area of short trainings, seminars and on-line learning. There are 1.153 undergraduate, graduate and integrated university study programs in the Republic of Croatia, run by universities, polytechnics and colleges (Agency for Science and Higher Education of the Republic of Croatia, 2019). As the focus of this paper are the programs offered by the Higher Education Institutions (HEIs) on the bachelor level (BA), integrated and masters study programs (MA), following figures present the distribution of BA and MA study programs, related to project management education and education in computing and information sciences.

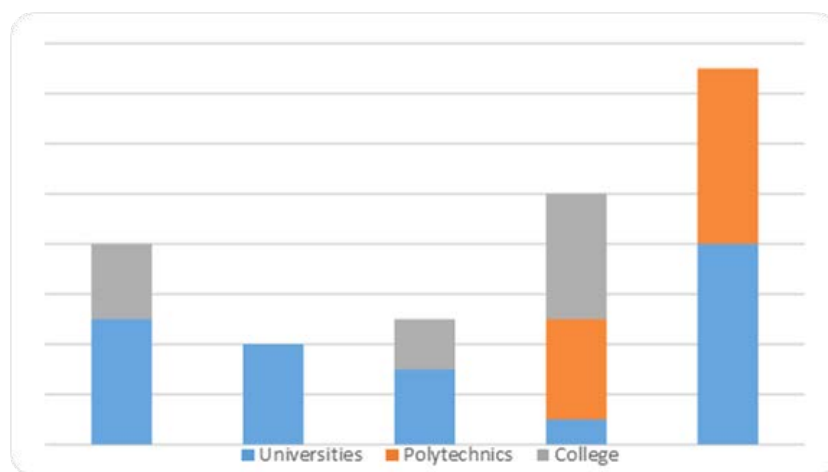


Figure 2. Distribution of the BA study programs related to computing and information sciences

Source: Authors (according to data published by Agency for Science and Higher Education of the Republic of Croatia, 2019)

In the academic year 2019/2020, there were 545 BA study programs that were run by universities, polytechnic and colleges, but neither of them in the field of project management, while 49 of them were in computing and information technologies or information-communication sciences. In the academic year 2019/2020, there were

608 MA and integrated study programs, but only 2 MA study programs, available in project management field which are held in the Central and Northern and Eastern Croatia, while 47 in computing and information technologies and information and communication sciences.

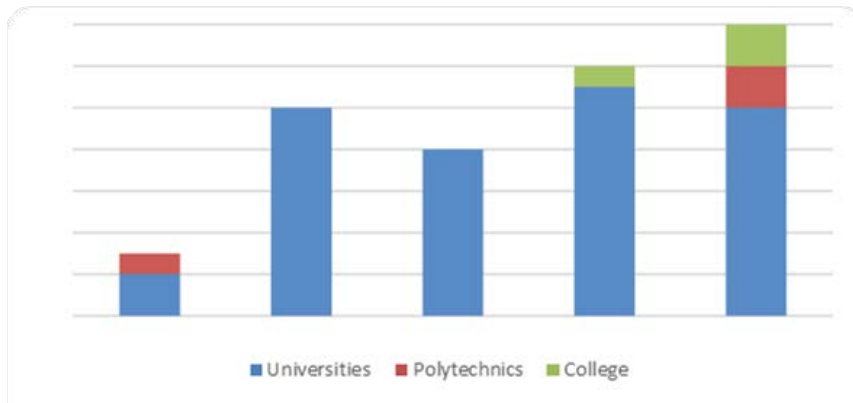


Figure 3. Distribution of the MA study programs related to computing and information sciences

Source: Authors (according to data published by Agency for Science and Higher Education of the Republic of Croatia, 2019)

It has to be emphasized that there are 11 postgraduate study programs in computing and information technologies available, but none in project management. By analyzing the geographical distribution, these programs are rather concentrated in Zagreb, Central and Northern Croatia, but they are available throughout the country.

Except BA, MA and integrated study programs, there are different life-long learning educational programs in project management run by different private schools and businesses, such as: Project Management Academy, Algebra Business School, Croatian Institute for Finance, Experta Business School, Institute for management, Business office PBIRO, Educentar, Mirakul, Centre for international projects (CMP) and numerous other entities. Therefore, the possibilities of gaining either basic, theoretical or additional knowledge in project management field exist at a rather broad range.

3.2. International certification of project managers

Project managers in Croatia have the possibility to obtain international certificates

at the Croatian Association for Project Management (HUUP) or the Project Management Institute Croatia (PMI Croatia). Employers in the IT sector mainly require IT certifications in the categories of Project Management and Information Security. Specifically, the top IT certification in Project Management is PMP by Project Management Institute (Schartz, 2018: 59)

International Project Management Association (IPMA) is a non-profit project management organization and one of the two most important organizations in the certification of the project management education programs. The certification is conducted by independent examiners and it confirms the ability of certificate holders to perform tasks, according to project managers' level of certification, where following levels are recognized and approved in the Croatian branch certifications:

- Level A: Certified Projects Director / Certified Project Manager / Project Manager / Project Portfolio Manager - there are 10 approved certificates,

- Level B: Certified Senior Project Manager / Certified Senior Project Leader / Complex Project Manager - there are 130 approved certificates,
- Level C: Certified Project Manager - there are 478 approved certificates,
- Level D: Certified Project Management Associate - there are 1,011 approved certificates (Croatian Association for Project Management, 2019a).

The certification is being conducted through National Competence Baseline (NCB), consisting of 46 elements for evaluation of knowledge and experience in project management, from which 20 in technical competence elements, 15 in behavioral competence elements and 11 contextual competence elements. Its structure is shown in Figure 4.

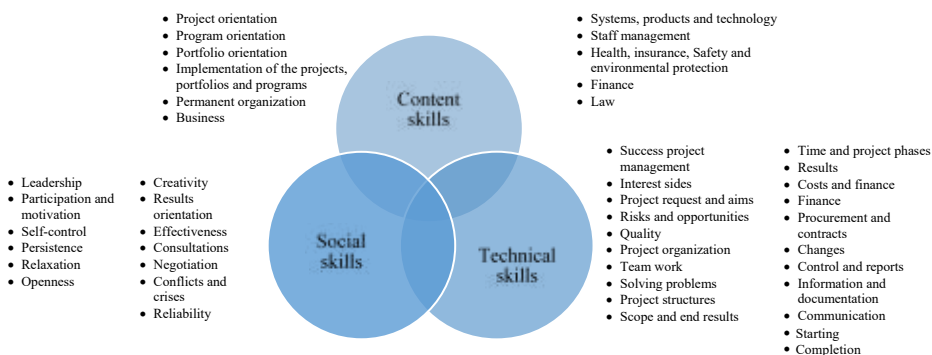


Figure 4. Social, content and technical abilities

Source: Authors, according to Croatian association for project management (2018)

Through certification, project managers prove their strategic abilities, and it is particularly important to emphasize social, content and technical abilities, that are most promoted through IPMA certification. Certified project managers acquire skills that are valued in all industries – therefore,

demand for experienced project managers, with project-related competencies is increasing. Figure 5 shows the growing trend of Certified IPMA certificated Project Managers in the Republic of Croatia, from 2005 to 2019, within presented levels.

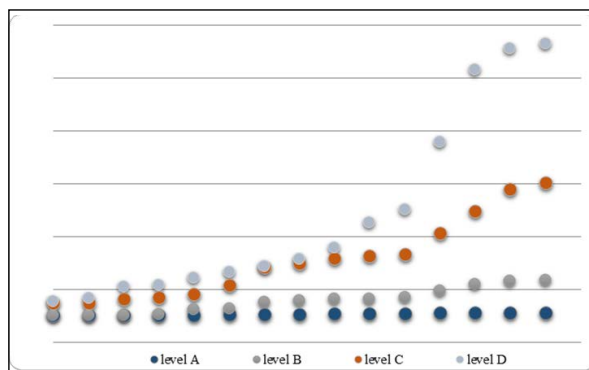


Figure 5. The change in number of certified project managers by HUUP-CERT (2005 to 2019)

Source: Authors, from data published by HUUP (2018)

The number of certified project managers shows a stable positive trend. The highest growth and the largest number of certified project managers in the Republic of Croatia are in Certified Project Management Associate category (level D). One of the reasons why this level is most popular is the fact that it can be requested, regardless of previously acquired experience and education. For that reason, Level D is the most accessible, while the A, B and C level certifications are designed for experienced project managers, directors, program managers and portfolio managers for investment, development and research projects, IT and telecom projects, as well as business improvement projects and reorganization (Croatian Association for Project Management, 2019a). Re-certification is necessary every five years (Croatian Association for Project Management, 2019b). The certification price ranges from EUR 500 for the lowest (D level) up to EUR 2,000 for the highest (A level). It was found that the difference in rise of number of approved certificates by level is not proportional to the price growth rate for different certificates. This indicates the participants are favoring more affordable options.

Project management institute (PMI) is a non-profit project management organization whose aim is to improve the practice, science and level of professionalism of project management in the world, in a conscientious and proactive way. PMI organization is considered “*the largest organization in the area of project management in the world*” (PMI Croatia, 2017a). A standard called the PMBOK® Guide to the Project Management Body of Knowledge is defined as a standard for managing global projects within PMI association (PMI Croatia,

2017a). Through the years the PMBOK® Guide became one of the “*world’s leading standards and it is used as a basis for the certification of project management professionals*” (Hermano, Martín-Cruz, 2018:31).

PMI developed its certification program with seven levels of certification where there are 1,449,482 issued certificates globally, 515 of which in Croatia (PMI Croatia, 2019a). The structure of issued certificates in Croatia is the following (PMI Croatia, 2019a):

- Certified Associates’ Project Management (CAPM) - 10,
- Project Management Professionals (PMP) - 469,
- Program Management Professionals (PgMP) - 2,
- Portfolio Management Professional (PfMP) - 1,
- PMI Agile Certified Practitioner (PMI-ACP) - 22,
- PMI Risk Management Professional (PMI-RMP) - 2 and
- PMI Scheduling Professional (PMI-SP) - 9.

Number of certified project managers, expansion of branches of PMI Croatia and numerous successful organizations of various events, seminars and conferences are indicators that project management is becoming more and more sought after where certification became important element of validation of project management skills on the labor market. Table 1 shows the ranking of countries in the Central and Eastern Europe (CEE) by membership numbers.

Table 1. Membership in the PMI - Comparison by country in the CEE region

	Central Europe PMI chapter membership in 2015				Rank Number of PMI members per capita
	Number of the PMI members	Rank by number of PMI members	Population (Mil.)	PMI members in '000	
PMI Croatia	261	4	4.2	6.21	1
PMI Serbia	264	3	7.1	3.7	2
PMI Slovenia	57	9	2.7	2.7	3
PMI Poland	644	1	38.5	1.67	4
PMI Hungary	133	6	9.8	1.35	5
PMI Bulgaria	128	7	7.2	1.8	6
PMI Czech	145	5	10.5	1.8	7
PMI Romania	301	2	19.9	1.5	8
PMI Slovakia	64	8	5.4	1.19	9
PMI Bosnia and Hercegovina	28	1	3.8	0.7	10
Total CE	2,025		109.1	1.85	

Source: Adapted from Bajica (2016, 10)

Presented results show that in 2016 PMI Croatia contributed to CEE PMI membership with 12.9%, with a further increase in PMI Croatia membership by 49%, to 389 members in 2019. The IT companies in the Republic of Croatia are increasingly recognizing the importance of project manager professionals that bring multiple benefits to

organizations. Companies with the largest number of PMI members employed in the Republic of Croatia are corporations within the IT industry, which account for more than 41% of the total PMI Croatia membership. Table 2 presents the structure of PMI Croatia membership by industry.

Table 2. Structure of PMI Croatia membership in June 2019

Sector	Members	Share in total PMI membership
IT	163	41.9%
Telecommunications	80	20.6%
Consulting	39	10.0%
Financial Services	29	7.5%
Energy	18	4.6%
Management	6	1.5%
Educational Homes	6	1.5%
Other (Pharmacy, Hospitality, Crafts, Mining, Healthcare etc.)	48	12%
Total PMI membership	389	100%

Source: Authors, from PMI Croatia data (2019a)

The largest number of certificated members are employed by the following corporations: Ericsson Nikola Tesla, Croatian Telecom, King ICT, Dekod, Altima, IN2 and Microsoft. This structure is rather similar to the global trend, where companies with the largest number of PMI certificated employees are coming from the ICT industry. This applies to 9,123 certificated project managers, as well, where the leading companies are: IBM, Hewlett Packard and Siemens (PMI Croatia, 2017b).

Except the mentioned certifications, there are numerous other certifications available, which can be acquired through online education, such as: CompTIA Project+, managed by the CompTIA, Associate in Project Management (APM), managed by the Global Association for Quality Management, Master Project Manager (MPM), managed by the American Academy of Project Management etc.

Presented results of Croatian Association for Project Management (with a growth of membership by 49.04% in the last three years) and PMI Croatia (with a growth of issued certificates by 56.16% in the last three years) clearly show the growing number of certified project managers in Croatia, during the observed period. Therefore, *the research hypothesis H2 is confirmed, stating that investments in the non-formal learning of project managers, where the IT sector is dominant, has been increasing.*

3.3. Research through in-depth interviews

For the purpose of analyzing attitudes of professionals in the project management field towards the quality of available education programs, three in-depth interviews

were conducted with professionals in the IT industry project management. The aim was to present the assessment of the current formal education system in project management quality and to provide an insight into the needs of companies, for the purpose of improving the project management education, rather than offering conclusions on the topic (as suggested by Crouch and McKenzie, 2006).

Respondent A is a project manager working in the IT company, which provides e-Commerce solution services, from design, development and optimization of the existing online store, to migration to other platforms, as well as creating brand new online stores. Respondent A has up to 100 different completed projects. Furthermore, the respondent has attended a series of courses, such as: Leadership skill training program, Gustav Käser Training International; numerous company training programs, such as: Claim Management; Commercial tasks in Operational Project Management; Requirements Engineering; Junior Promotion Curriculum etc.

Respondent B, project manager in the IT company, has over 20 successfully completed projects and is currently attending the micro master program for Project Management at an American business school.

Respondent C is the project manager in the IT company, dealing with the development of software solutions for financial institutions and has dozens of successfully completed projects. Respondent C has attended several specialist seminars and prepares a seminar for the required 35 PDU points, in order to access the PMP certification at the Project Management Academy program, in a Croatian computer science school.

The responses were categorized in the following categories:

- Project team expertise – skills and characteristics required,
- Challenges in project management,

- Specialized project management knowledge that students should have after completing formal education,
- Existing study programs quality.

The following table presents the respondents' answers according to defined criteria.

Table 3. Structured responses of the interviewed project managers in the IT sector

Project team expertise – skills and characteristics required:		
Respondent A	Respondent B	Respondent C
<p>Project team members should have the following characteristics and skills:</p> <ul style="list-style-type: none"> • Communication and understanding of basic planning principles and risk management • Maintaining consistency of the expectations of all stakeholders. • To be familiar with the nature of each individual's work in the sense that he needs to understand what needs to be done and what risks and opportunities are there. • Confidence as a basis for successful teamwork. Project manager cannot control every detail of each team member's work, but it is clear that some team members need more, and some less control. <p>“Most teams are completely independent, some need guidance, and very rarely, for certain individuals, more detailed verification of the results of their work. It is essential for such individuals to offer them help to improve their work or to find work which they would be able to run independently.”</p>	<p>Characteristics and skills in project implementation are demonstrated by:</p> <ul style="list-style-type: none"> • Communication • Competence • Enthusiasm • Delegation ability • Project planning • Conflict resolution skills. <p>It is desirable for the project manager to be familiar with at least the basics of the work of each individual.</p> <p>“My project teams are capable of performing tasks independently however, with such a type of project implementation there are problems with additional costs, postponing the agreed dates etc. Depending on the complexity of the project, the cooperation within the team is needed and the project manager needs to establish a proper balance.”</p>	<p>Project team members should have the following characteristics and skills:</p> <ul style="list-style-type: none"> • Expertise in the field of the project • Team management • Dedication to the project • Adaptability as each project is distinct and different from another <p>“Although each individual can be an expert in his work and have responsibility in their work, for larger projects it is necessary that there is a dedicated person who manages them (a project manager). For smaller projects, most commonly, a team member is set up as a team leader responsible for coordinating other team members.”</p>

Challenges in the project management:		
Respondent A	Respondent B	Respondent C
<p>Large group of problems emerges from misguided expectations. “Perhaps the client was initially promised too much, perhaps the process was unclearly explained or the team understands the project differently from the client, and so on. Then there are problems with the scale, with deadlines, with the costs.</p> <p>The second group of problems is of a technical nature – were some tasks are not in line with the limitations team has. Deadlines are a common problem, whether for too optimistic estimates, or because of the unavailability of people. External dependencies often also result in difficulties: a client or a third party is late in delivering information or doing their part, outsourcing systems that need to be integrated do not work as agreed, etc.”</p>	<p>The greatest challenges and difficulties project manager faces in project management are time and volume of work.</p> <p>“Problems arise when a client requires change within the project, but at the same time has no understanding of the potential extension of agreed deadlines.”</p>	<p>“The projects I worked on are from the IT domain so I could apply the already acquired knowledge and skills. Also, each project brings new challenges, requires new necessary knowledge and skills and for that reason each project needs to be approached in a unique way.”</p>
Specialized project management knowledge that students should have after completing formal education:		
Respondent A	Respondent B	Respondent C
<p>The specialized project management knowledge that students and employees need to have if they are planning to deal with project management includes:</p> <ul style="list-style-type: none"> • Planning Basics, • Demand Management, • Volume and Changes, • Work Breakdown structure (WBS), • Network Diagrams, • Gantt Charts, • Estimation Techniques, • Identification and Risk Management Basics, • Team Dynamics. <p>“If we think specifically about project management education, the project manager needs to understand the work of each team member, each team member needs to know the basics of project management. This reduces the likelihood of misunderstanding, enhances the understanding and acceptance of decisions made by the project manager, improves the working atmosphere and team performance, and enhances the project’s success.”</p>	<p>“Students with completed formal education or employees planning to engage in project management should know:</p> <ul style="list-style-type: none"> • The terminology of project management, • The project lifecycle, • The main factors of each phase and how the project is implemented through each phase, • Management and management of people, • Risk management, • Negotiating abilities, • Organization skills.” 	<p>Education of the project manager should be permanent, especially in the field of the project. It is not necessary for the project manager to be “fully” acquainted with the nature of each individual’s work, but it is important that he has sufficient knowledge of the activities concerning the project.</p> <p>Additional training in project management is not essential to all team members, though of course, it is useful for a better understanding of the role of a project leader and future challenges. From a specialist’s point of view, it is important for the project leader to be an expert at least in “one” area, while the most important skills include “human resources management”.</p>

Formal study programs quality:		
Respondent A	Respondent B	Respondent C
<p>“Current study programs are largely lacking practical experiences. The cause lies in profiles of lecturers, who rarely come from the industry, are mostly from academia without industry experience. “... “A person who wants to be a project manager must be capable of acquiring skills himself. The role of the education is to provide basic knowledge about project management - anyone who comes directly from the faculty I would not let to run projects independently, regardless of the quality of the study they completed.”</p> <p>One does not become a Project manager by education but rather through the progress made at work. Education is necessary but essentially not a sufficient condition for Project management.</p>	<p>“The system lacks a modern approach to learning. For this approach, it is essential to learn theory and practice through case studies. University students cannot acquire adequate knowledge and skills that are the key to project management, but those can be gained through additional education and work experience gained within the project team. Also, courses related to project management should be taught by professionals who are experienced in this field and have gained experience through years of work as project leaders in major international organizations.”</p> <p>There are enough organizations on the Croatian market that offer various formal and non-formal education programs as well as certification programs for project management, but the content they offer is not within the framework of best practice.</p>	<p>Points out that the formal education that he gained was in no case sufficient to adequately run the project, which is just the first step in a long journey.</p> <p>“After completing education, students should have basic theoretical knowledge of project management.</p> <p>All the rest comes through the years of hard work and constant education.”</p>

Source: Authors, based on in-depth interviews

Due to presented results of in-depth interviews, the hypothesis H1, on the insufficient practical orientation of the existing project management education programs and their incompatibility with the needs of the business organizations in IT sector, is accepted. Namely, all respondents stated that the study programs in Croatia currently do not offer practical experiences, while their lecturers do not have the practical experience. At the same time all respondents state that students need to develop their skills and knowledge through work experience and through continuous education.

4. DISCUSSION

By analyzing the issues of project managers' education, it becomes apparent that the education of project managers needs to be focused on the practice-oriented knowledge and skills, which have not yet been acquired by project managers. This is consistent with the findings of Ramazani and Jergeas (2015). Hence, a project manager must constantly acquire new and improve existing knowledge, which also required the education programs in this field to be constantly revised, with new development from business practice. Today, there are numerous methods of teaching, where state-of-the-art

techniques are based on practical learning through work (Baharun et al. 2012). There are numerous opportunities and ways of gaining additional education. Managers have to choose which form is most appropriate for them. E-learning can offer a number of advantages, including spatial and temporal flexibility, adapting to personal style, collaborative learning, etc. It represents an excellent choice for managers, who are in constant contact with dynamic surroundings.

Valenčić, Radovan and Gligora (2013) state that the study programs in IT should be based on PMI standards and complying with the PMI certification, in order to increase efficiency and competence of future project managers through different processes. Mesarić (2019) evaluated the curricula of the courses, offered by universities in Slovenia and Croatia, as satisfactory and emphasized the importance of the practical experience of the teaching staff, as well. On the other hand, Hermano and Martín-Cruz (2018:19) have found, by analyzing the PMBOK® processes, that project management standards are generic and abstract and there is still the need to explore how to use them in a way, providing satisfactory results, in terms of reducing the proportion of failed projects (Hermano and N. Martín-Cruz, 2018:19).

Stewart, Nassif and Stewart Obe (2018) conclude that, in the past, little was learned from failed project case studies and that universities will not be able to meet the needs of the industry. Therefore, the project managers need to turn their attention to continuous learning, education and gaining of certification by one of the eminent associations. The results of the analysis of the project manager study programs in the Republic of Croatia show that the number of university study programs in project management is not increasing, while the number of certificated

project managers (by IPMA and PMI methodologies), especially in the IT industry, shows significant increase.

A step further was done by the University of Memphis, which joined forces with the local chapter of the PMI and started an undergraduate project management minor program. This example shows that *“advanced deep-learning can move beyond the case study experience by partnering with industry to facilitate activities that require the application of class concepts to project management issues in an actual organizational setting”* (Poston, Richardson, 2019:62).

“Project management looks to design, develop and implement solutions, yet projects fail” (Ewin, 2017:509) because of poor relationships between the project team and key stakeholders. A possible solution can be found in development of soft skills among project management practitioners and in embedding design thinking in project management curriculum (ibid.), while Alverenga et al. (2019) find communication, commitment and leadership as the three most relevant aspects of project success. Although in-depth interviews didn't indicate leadership, as the field to which the emphasis should be placed, they strongly pointed out communication among soft skills. Ramazani, Jergeas (2015) formulated three main areas, which educational institutions should consider, while developing and preparing future project managers: 1) developing critical thinking for dealing with complexity, 2) developing softer parameters of managing projects, especially interpersonal skills and leadership as opposed to just technical skills, and 3) preparing project managers to be engaged within the context of real life projects (Ramazani, Jergeas, 2015:41).

In the Republic of Croatia, there is a significant offer of formal and non-formal

education programs and project management certifications opportunities, but the quality of education and its connection with the practice based learning remains to be a problem. In the current system of project management education in the Republic of Croatia, introduction of learning, based on practice and previous experience, needs to be introduced. In the opinion of project management professionals in the IT sector, this is almost completely lacking currently. The findings of literature review and analysis of in-depth interviews with the IT sector project managers' show that the future university study programs should include the following domains:

- The project management fundamentals (including project lifecycle, terminology, project management planning, etc.);
- The project management techniques (including time management, estimation techniques, risk management techniques, etc.);
- Communication and presentation skills for project managers (including negotiation techniques, organization, internal and external crisis communication, basics of management of human resources, etc.);
- Basics of the industry technology - in this case, the information communication technologies (including concepts, methodologies, tools, applications etc.), where education should include the appropriate software (as suggested by Buzov, 2019 and Mesarić, 2019), used by the industry. This would lead to an easier integration of students to working processes in a short time, which would be valuable for the IT industry. Moreover, as suggested by Schartz (2018), academic IT departments should strongly consider implementing the Project Management certification

pathway for IT majors within their curriculum, although its operational cost may be significant.

Findings of this research show that the IT industry experts in project management consider theoretical knowledge gained through formal education only an entry ticket to the world of project management. However, the lack of project-based learning and previous experience of teaching staff are problems, which suggest that project managers, after completion of their studies, are not immediately competent for independent work. It seems that, at this point of time, only by gaining specific work experience, project managers acquire skills, necessary to meet labor market needs/expectations, which they are facing on a daily basis. In addition, it should be noted that, concerning the lack of experienced workforce in project management field, with its constantly growing demands, the IT firms in Croatia are often amongst the first to make their contribution to the development of education processes, as concerning the transfer of practical knowledge and promoting non-formal education and certification.

It seems that decision on which model to use *“requires a deeper, focused analysis in the future, given the institutional ambition of universities offering management education to be rooted in the real world of business, providing a practical insight into the key issues facing organizations today and delivering applied business education and key methodologies relevant to the real world.”* (Cicmil and Gaggiotti, 2017).

5. CONCLUSION

Each project manager should have general and specific technical knowledge and master specific soft-skills. The year-to-year growth figures show that the specialized

project management skills are required worldwide in all industries, especially in the IT industry, where organizations use project-oriented methods, with employment of qualified project managers considered as essential.

Project managers in Republic of Croatia have the opportunity to upgrade their knowledge on one of numerous, privately owned or public educational institutions, through university study programs, online learning or different seminars and trainings, or by gaining one of international certificates. Therefore, the availability of education in project management in Croatia can be evaluated as satisfactory.

The considered point of inadequate theoretical knowledge, which is obtained by students and professionals through formal and, even, non-formal learning, applies to problems in independent work and practical implementation of projects. Therefore, the current education system should be adapted, as to meet the expectations of business practice. This could be done by introducing the models of learning, based on practical work, i.e. acquiring practical experiences through the learning process and introducing professional practice into education programs. In such courses, participants could learn from the lecturers' experience, as well as by working on contemporary projects, with the software support, required by industry. This would, certainly, increase the quality of education/training and value of the project manager profession.

Limitations of this study include the limitation of the sample, as respondents were the project managers in the IT industry. Consequently, assessment of the activities, knowledge, and attitudes in project management field and educational system, are based on their subjective assessment. The quality of the study programs in Croatia

was not examined by structural analysis, within the scope of this research, but by in-depth interviews with experts from practice.

Recommendations for future research include the need for conducting a comprehensive research on the IT industry needs and analysis of the quality of the available formal educational programs, in order to develop recommendations for designing contemporary university study programs in the field of project management, specialized for the IT industry.

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**OBRAZOVANJE IZ PODRUČJA UPRAVLJANJA
PROJEKTIMA U HRVATSKOJ:
FOKUS NA POTREBE IT SEKTORA**

Sažetak. *Budući da današnje, dinamično i konkurentno poslovno okruženje, sve više zahtijeva dodatnu razinu kompetencija, projektni menadžer je, svakako, profesija čija vrijednost raste, kao i potražnja za njom. Za postizanje projektnog cilja, projektni menadžer treba imati odgovarajuću naobrazbu, zbog čega su korporacije, posebno u industriji informacijskih tehnologija (IT), među vodećim investitorima u obrazovanje i certificiranje svojih zaposlenika u području upravljanja projektima. Cilj ovog rada je pridonijeti identificiranju i razumijevanju modela obrazovanja iz područja projektnog menadžmenta u Hrvatskoj i istražiti mogućnosti za njegova poboljšanja, posebno u području upravljanja projektima u IT industriji. Zbog toga su autori, tijekom 2018. i 2019. godine, proveli istraživanje o dostupnosti obrazovnih programa za upravljanje projektima u Hrvatskoj, mogućnostima međunarodne certifikacije projektnih*

menadžera, kao i o stavovima profesionalaca u projektnom menadžmentu IT sektora o kvaliteti postojećeg obrazovnog modela. U okviru ovog istraživanja utvrđen je rastući trend broja certificiranih projektnih menadžera, posebno u IT industriji, kao i postojanje brojnih neformalnih programa za obrazovanje u upravljanju projektima, međutim, nedostaje sveučilišnih studijskih programa. Također, empirijski rezultati pokazuju da studijskim programima iz područja projektnog menadžmenta nedostaje praktični segment te da u većini slučajeva nude samo osnovna teorijska znanja. Stoga autori, na osnovu analize literature i procjene potreba IT industrije, predlažu područja, koja je potrebno uključiti u buduće sveučilišne studijske programe.

Ključne riječi: *obrazovanje iz projektnog menadžmenta, certificiranje u projektnom menadžmentu, sektor informacijskih tehnologija (IT)*