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PROJECT MANAGEMENT EDUCATION IN METALLURGICAL COMPANIES IN THE CZECH REPUBLIC

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Abstract. The paper focuses on the issue of project management education as the tool of positive influence on the success of project implementation in corporate practice. The aim of the authors is to identify the ways of training project managers, project team members and top management members in project management on the basis of interviews with human resources managers of metallurgical companies in the Czech Republic. Based on the findings, recommendations of appropriate measures are formulated at the end of the paper to improve the situation in the area of project management education in metallurgical companies.

Keywords: project management, project management education, project management information system, hard project management skills, soft project management skills, metallurgical industry.

JEL Classification: I25, L61, O15.

Introduction

Ensuring the successful existence of a business, regardless of the scope of activity in the changing environment, is conditioned by the ability to make changes. Changes at the enterprise level are usually implemented in the form of projects. Project management is a tool for successful change management. Many studies have confirmed the benefits of using project management, e.g. de Carvalho, Patah, and Bido (2015), Joslin and Müller (2015), Lappe and Spang (2014), Spalek (2014) and Patanakul, Iewwongcharoen, and Milosevic (2010).

In business practice, a number of projects are implemented in all areas of corporate activities with different impact across the enterprise, and it is possible to record the implementation of different types of projects (Archibald, 2004; Turner & Ledwith, 2009; Pitas et al., 2012; Skalicky, 2010). Regardless of the size or type of the project, it can be stated that the rate of utilization of project management in the different phases of the project life cycle is influenced by the extent of the participants' knowledge of the project management theory and the extent of their experience with projects from previous practice. Therefore, to successfully implement

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project management, it is important in assigning staff to project management and project team to assess their project management competencies (more information in Kostalova, Bednarikova, & Patak, 2018). It is then important to support improving project managers' and project team members' competencies by training in project management and related areas.

Not only project managers and project team members, but also top managers and stakeholders responsible for implementing the effective strategy of the company, among other things through projects grouped in a number of cases into project programmes or portfolios to set the conditions for using project management methods and tools, should be aware of project management issues (Hyväri, 2016; Hermano & Martín-Cruz, 2016).

A high level of use of project management can be expected in fields such as information and communication technologies, construction, and lines of business supplying on the basis of customer requirements in the form of projects. However, the changing environment has an impact on all lines of business and it is, therefore, desirable to focus also on the areas where process management procedures are mainly expected to be used, such as the chemical, food and metallurgical industries, in which project management procedures are increasingly used.

The aim of the research is to assess the approach of metallurgical companies to the education of project managers, project team members and stakeholders or top managers in the area of project management.

1. Literature review

1.1. Usage of Project Management

Generally recognized and used project management practices can be traced in particular within the International Project Management Standards. Standard Project Management Institute (PMI), standard PRojects IN Controlled Environments 2 (PRINCE2) and an international standard of International Project Management Association (IPMA), these the International Project Management Standards. Standards of the three largest industry associations with a global presence in the field of project management are among the most widespread.

Standard PMI, is specified in A Guide to the Project Management Body of Knowledge (PMBOK) (PMI, 2004). Association for Project Management Group (APM) presents standard PRINCE2 in the APM Body of Knowledge (APM, 2012) and IPMA creates an international standard IPMA Competence Baseline (IPMA, 2015b).

With the increasing scope of use of project management, International Project Management Standards also address issues of management and coordination not only of projects but also of project programmes and portfolios and eventual use of project management office (PMO). As part of the organizational structure of the investigator of projects, programmes and project portfolios, PMO provides methodological support and ongoing monitoring of implemented projects or is responsible for planning and managing projects, programmes and portfolios (Hofman, 2014; Unger, Gemünden, & Aubry, 2012; Müller, Glückler, & Aubry, 2013).

The use of project management in practice is also significantly influenced by the use of support in the form of Project Management Information System, the use of software support allows simplification of procedures in project planning, implementation and evaluation, allows data sharing across the project team and the project environment and allows the use of available documentation when planning additional projects (Kostalova, Tetrevova, & Svedik, 2015).

1.2. Project manager competencies

The appropriate range of knowledge of project managers, project team members and top managers responsible for implementing projects, programmes and project portfolios can be found, in particular, in the IPMA standard, which specified the technical, behavioural and contextual competencies of project managers (IPMA, 2015b). But also in PMI, besides defining procedures, they define appropriate project manager competencies (PMI, 2007). It is also possible to use t0he holistic model of competence, which is built on three pillars: the general knowledge pillar, the necessary practical skills and the necessary social (human) competence (Taraba, Kavkova, & Trojan, 2017). Crawford (2005), Shi and Chen (2006), Clarke (2010) or Fisher (2010) further focuses on the issue of defining project managers' competencies. On the national level in the Czech Republic, we can use the database of the National System of Occupations (Národní soustava povolání), defining the scope of the project manager's work activities and recommended qualification requirements in the field of professional skills, general skills and soft skills (Ministry of Social Labor Affairs CZ, 2016).

1.3. Project management education

Company education appears as a very significant factor of the success rate and as the necessity for maintaining of required competencies of the employees (Botek, 2016). Project management education is routinely included in study plans at both economic and technical faculties of universities. The lessons are usually designed in accordance with one of the International Project Management Standards and focus on both technical skills and soft skills (Pant & Baroudi, 2008). Professional international associations also offer the opportunity to learn about project management in the form of lifelong learning within a range of courses that can complete with the certification of project managers. Project manager certifications within International Project Management Standards are provided at various levels, both within PRINCE 2 (levels Foundation, Practitioner and Agile), within the standards of the PMI associations (levels Certified Associate in Project Management and Project Management Professional and other certification in area of programme management, project portfolio management, risk management and in project scheduling, business analysis and Agile Project Management) and IPMA (levels D – Certified Project Management Associate, C – Certified Project Manager, B – Certified Senior Project Manager, A – Certified Project Director) (Axelos, 2017; Svirakova, 2014; PMI, 2018; IPMA, 2015a).

The varying scope and focus of the training courses, as well as the different levels of certification, means that the different scope and focus of education in the area of project management is required for different project positions and for project managers dealing with different projects. The requirements for the education of project team members and project managers will be different, taking into account the complexity of the projects and the field of application (Cicmil & Gaggiotti, 2018; Müller & Turner, 2010). Expanding knowledge in project management is also desirable towards top management and stakeholders who are responsible for the planning and implementation of projects.

Ewin, Luck, Chugh, and Jarvis (2017) and Hansen (2004) emphasize the importance of improving mainly soft skills that can make a significant contribution to reducing project

failures. Authors of professional literature criticize a trend still often used in project management education focused on the highly techno-scientific basis of project management knowledge, which is being replaced by an approach base on responsible project management education (Cicmil & Gaggiotti, 2018).

In the area of alternative approach to the general practice of project management, it is possible to mention Agile Management (Beck et al., 2001) and Design Thinking (Ewin et al., 2017). However, it is important to note that the usage assessment of alternative project management methods is possible based on advanced knowledge of project management and evaluation of the type of project, i.e. the Agile Management is beneficial just for special types of projects.

1.4. Conceptual development of project management competencies

In the field of project management education, it is also necessary to mention the fact that in order to achieve maximum efficiency in the training of project team members, project managers as well as representatives of top management and stakeholders, it is not possible to see this area in the short term. In the field of project management education, it is a long-term conceptual staffing work in which we plan to gradually expand the knowledge of the project staff, familiarize them with the latest trends and tools that can be used for project management. From the point of view of effective use of knowledge and experience, it is necessary to plan the use of project managers, which is more demanding in terms of the temporary nature of the work on projects than in the case of functional managers (Turner, Huemann & Keegan, 2008). It is a dynamic work environment in which it is necessary to offer project workers support in their career development (El-Sabaa, 2001; Turner et al., 2008).

The importance of project management education is growing steadily (Kostalova & Bednarikova, 2017). Ramazani and Jergeas (2015) recommend viewing project management education as a multidimensional and complex process. As a key role, they developing of critical thinking for dealing with complexity, developing softer parameters of managing projects, especially interpersonal skills as opposed to just technical skills, and preparing project managers to be engaged within the context of real-life projects (Ramazani & Jergeas, 2015). Pant and Baroudi (2008) also recommend that project management education is approached from a holistic point of view with respect to ethics, logical integrity and emotional acceptance with increasing the human skills emphasis. According to El-Saba (2001), it is beneficial for career development in project management to develop versatile knowledge and skills, accept change and be active in building a career.

2. Methodology of research

Primary research was based on a literature review of expert contributions on personnel management and education of project managers, project team members, and project management training. The literature review was followed by qualitative research in selected metallurgical companies in the Czech Republic. For this research, metallurgical companies

in sectoral associations (Association of Foundries of the Czech Republic (2017) and Steel Federation, Inc. (2017)) were selected. Of the 23 representatives of metallurgical companies approached, members of these associations, responses were received from 11 respondents in a structured questionnaire through in-depth interviews. The sample of respondents was represented by large consortium enterprises (5 respondents), medium (4 respondents) and small (2 respondents) enterprises operating in the metallurgical industry. In each company human resources department staff was interviewed, whose competencies include training in project management.

Metallurgical industry in the Czech Republic is an important position, the production is determined for the national market, mainly for such types of industry as automotive, engineering etc., but important part of the production is exported. All-important metallurgical areas are presented in the Czech Republic. It is possible to find iron, steel, non-ferrous metallurgy, including aluminium, tin, lead, nickel or mercury here, but there are presented also other metals processing areas – gold, silver and platinum processing. Among the top 100 companies in the Czech Republic are 10 metallurgical companies (5 of which were represented in the framework of selection as representatives of large companies).

3. Results and discussion – project management in metallurgical companies

Respondents from metallurgical companies in the Czech Republic expressed their views on two main areas – what is the nature of the organization and what project activities are being implemented in the company and how, and to what extent training in project management and other personnel work with project staff is taking place.

3.1. Conceptual development of project management competencies

Metallurgical companies implement various types of projects. In 6 metallurgical companies, medium-sized projects are implemented, which can be characterized as projects with a larger budget, more time-consuming, providing a more robust project output with more complex planning. However, in 4 enterprises smaller projects are implemented more often, which can be characterized as projects with a smaller budget, less time-consuming, with a low level of complexity in the planning and implementation of project outputs. In terms of project focus, investment projects (9 respondents), customer projects (8 respondents), R&D projects (3 respondents) and projects focused on organizational change and restructuring (2 respondents) are implemented.

The projects are solved both in a matrix across the organization and within individual organizational units. Only two companies use the PMO support. The support in the form of a project management information system is not very widespread either, only 4 respondents declared to use it.

The scope of project management application in the practice of respondents was assessed on the basis of selected activities based on International Project Management Standards. Table 1 shows the extent to which individual activities are used by the respondents.

Table 1. Activities carried out as part of project management in the metallurgical companies surveyed (source: Authors)

Project activities	Number of Cases
Project management at all stages – initialization, planning, implementation, monitoring and reporting, handover, evaluation and closure	8
Coordination and cooperation in the creation of input analyses of the subject matter and objectives of the project	7
Collaboration in the tendering and contracting of the project	7
Determining the schedule and financial plan of the project implementation	7
Assembling, leading and managing the project team	7
Managing communication in the project, supporting and stimulating project members for effective performance	6
Coordination of work processes and continuity of activities in individual tasks	6
Managing all available resources in the project	5
Reporting the state of implementation of the project to the project team and towards the project owner and management of the companies concerned	5
Project change management	5
Ensuring the transfer of project outputs and their acceptance by stakeholders	4
Managing and checking complete project documentation	4
Project financial resources, costs, revenues and cash-flow management	4
Project risk and opportunities analysis and management	3
Project quality management, including hygiene and work safety inspections	3
Collection of project ideas across the organization	1
Programme management, project portfolio management	1

From the above data, it can be stated that the metallurgical companies surveyed use project management in the basic scope (time management, finance management, output range management, including continuous monitoring throughout the life cycle of the project). There is less use of activities related to the management and coordination of multiple projects, programmes or project portfolios, which corresponds to the predominant type of implemented projects and their integration into the organizational structure.

3.2. Project management education in companies surveyed

In the field of higher education, respondents most often as project managers require a bachelor or higher education (7 respondents). Respondents also prefer technical or combined (engineering, economics, management) studies, which is closely related to the companies' business in metallurgy.

As far as project management education is concerned, half of the respondents confirmed they were providing training to its staff in project management. Preferred forms of training are lecturing training (in 4 cases). The other forms mentioned include participation in conferences (3 cases), coaching (2 cases), cooperation with an external project manager (2 cases) and training related to the subsequent certification in project management (2 cases). This is related to very low familiarity with the certification system within International Project Management Standards. Research has actually shown that the majority of respondents (8 cases) have not yet come across this type of certification. In two cases, the knowledge of PRINCE2 and/or PMI was ascertained. None of the respondents knew the IPMA certification. In addition to the International Project Management Standards, one of the respondents also mentioned the international standard ISO 10006 Quality management – Guidelines to quality in project management and 21500 Guide on project management. This is related to the fact that the ISO international standards are commonly used especially in technical fields such as metallurgy.

As regards the training of project managers, soft skills and training of project management information system usage are preferred. The training of project team members is focused on the basics of project management, the development of soft skills and the training of project management information system usage. In the training of top managers, the training of project management information system usage and development of soft skills are preferred. As preferable soft skills, for which is required the development via project management education are: self-reliance, cooperation and collaboration, active approach, workload management, resistance, effective communication, problem-solving, flexibility, information management, leadership, creativity, self-education, relationship-building.

The respondents were also asked about conceptual work with workers in project management. Only 3 respondents prepare a career plan for these workers. The other respondents do not address this issue. This is probably due to the fact that a large number of the project managers manage small and medium-sized projects as part of their functional position in a permanent organizational structure and therefore they are not under such a strong pressure in terms of temporary involvement in the implemented projects.

4. Recommendations

Based on the facts found in the companies of metallurgical industry surveyed, it can be stated that project management education is at a relatively low level. Therefore, recommendations can be formulated to improve the status of these companies and to increase the knowledge of project staff. These recommendations can also be used in general terms in business practice, especially of those industries that have similar features to the metallurgical industry.

In the area of project management education, it is, therefore, possible to recommend the companies to:

- consider the possibility of comprehensive training, in particular, of project managers with the use of back-testing in the form of certification under one of the International Project Management Standards;
- use different forms of training and dissemination of knowledge and experience in project management and related areas (such as e-learning, access to professional education servers, collaboration with external consultants, project managers, membership of project management associations etc.);
- familiarize project managers with new trends in project management (Agile Management, Design Thinking, responsible project management education etc.);
- elaborate methodical procedures for the conceptual work of the career development of the personnel involved in project implementation;
- together with project managers on a personal level, in accordance with methodological procedures, plan and continuously consult individual career development.

Generally, in the field of project management, it is desirable to make more use of the theoretical know-how that can be drawn from International Project Management Standards. Due to the lower expansion of project change management and quality management activities, it would be advisable to focus on expanding the knowledge, especially in these areas. Similarly, there was also a lack of use of communication-based activities in projects, stimulating project staff for effective performance, collecting project incentives, analyzing and preparing project planning documents. Here too, it is desirable to expand existing knowledge and put these techniques into practice.

Prospectively, in the event of a growing number of projects and with a higher need for coordination of more implemented projects, it is desirable to start to be interested in the management of programmes and portfolios of projects or to consider the concentration of methodical support into an organizational unit in the form of PMO. Consideration should also be given to an increased use of project management information systems, both in the form of stand-alone project management support applications (such as Microsoft Project) and in the form of integrated modules to support planning, project management and project documentation management within complex Enterprise Resource Planning systems.

Conclusions

Project management education can make a significant contribution to increasing the project implementation success rate and reducing project failures. It is therefore important to compare the extent to which project management education is realized in the practice of project implementers.

The results of the research present the situation of metallurgical companies in the Czech Republic in the area of project management education. Based on the findings, it is possible to assess the situation in the companies and the trends in the field of project management education.

In practice, the companies under consideration implement small and medium-sized projects; in order to increase their success rate, it would be desirable to extend the conceptual

work to the development of the career managers of project managers, to make more use of different forms of training in project management and the related areas. One of the possible forms of comprehensive training in project management is the preparation and certification of staff within International Project Management Standards.

It is important to allow especially project managers to keep up to date with new trends in project management. Due to the nature of the involvement of project managers, not temporarily but usually in addition to being included in the functional organizational structure, career planning is not a necessity in terms of the temporality of involvement in projects, but it is important for the improvement of workers in the scope of their knowledge and experience. Training support should be aimed not only at project managers but also at project team members, with regard to the form of their involvement in the project, and at stakeholders and top management members responsible for project supervision. For this group of workers, it is particularly beneficial to provide training in the combination of project management with strategic management of businesses. Applying these changes will also affect staff in human resources management.

The limiting factor of the article is the limited number of companies surveyed. The authors of the article conducted a similar pilot research among chemical companies in the Czech Republic, too (Kostalova & Bednarikova, 2017). For further research, it would be desirable to focus on other related industrial areas and to compare the situation in the field of project management education as well as in other areas using a larger sample of respondents.

Nevertheless, despite the above limitations, it is possible to deduce tendencies and trends in the companies' project management education practice from respondents' answers and, on this basis, to get an overview of the issues in the metallurgical industry. The contribution of the article is an overview of the state and tendencies in the area of project management education in one of the industrial sectors where, unlike in areas such as ICT, R&D, event management, different requirements for project management education can be expected based on the character of production. As Cicmil and Gaggiotti (2018) Müller and Turner (2010) declare the requirements for the education of project team members and project managers will be different in the different field of application.

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