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Introductory Chapter: Human Capital, Knowledge Management and Competences in Project Management

Manuel Otero-Mateo and Andres Pastor-Fernandez

Additional information is available at the end of the chapter

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1. Introduction

Although there are several studies that have researched into the effects behavioral competences have on management and knowledge acquisition, their actual benefits have not been proven yet. Therefore, the aim of this research book is to shed light on such benefits.

The people competence has a strong influence on the strategy of human resources management, affecting daily aspects, thought patterns, and behavioral modes of executive management and its employees. Only when the culture, the organizations, and the strategy of human resources management complement each other, the strategies are effective and can favor the creation of competitive advantages. From a business perspective, there is a strong relationship between human capital and success. The relationship becomes stronger when the tasks to be performed are complex and require highly qualified employees. For an integral development of the human factor in all its dimensions, both personal and professional, social competences must be an important factor.

This challenge is facing the industries currently with the fourth industrial revolution, the so-called Industry 4.0, in which the worker's role moves from a more physical level to a higher level of organization and management (supervisor) of the business system, where interpersonal competences, social skills and of course the knowledge of human capital acquire a new dimension.

To help achieve this business excellence, we propose to use the methodological framework in Project Management and Management, specifically the IPMA Individual Competence Baseline [1]. This model is based on competencies, defining these as the application of Knowledge (collection of information and experience that an individual possesses), Skills (specific technical capabilities that enable an individual to perform a task) and Ability (effective delivery of knowledge and skills in a given context).

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This book intends to provide the reader with a comprehensive overview of the current state-of-the-art in human capital, competences in Project Management, learning strategies and their influence on organizations.

2. Competencies in project management as support for knowledge management

In today's globalized world, knowledge management has become an essential tool for achieving economic growth, corporate development, and competitiveness. Knowledge management must also involve a balance between good practices and productive processes [2]. Therefore, acquisition of knowledge (generation of ideas and opportunities) as well as its implementation in processes, where it can be put into practice, is of great importance [3].

Knowledge can be defined as the combination of experience, know-how, values, information, perception and ideas that create a framework of mind that helps people to assess and generate new ideas, knowledge and experience [4]. Human capital (HC) plays a key role in knowledge since it adds value to the knowledge and competences of the organization's people, and the capacity to generate them is useful to achieve the organization's mission [5, 6].

Generally speaking, HC refers to the knowledge acquired by people increasing their productivity and adding value to his contribution. HC includes the employee's personal contacts and relationships, as well as other individual qualities such as reputation, loyalty, multitasking or flexibility.

Drawing on the International Project Management Association model on Project Management, the study examines different behavioral competence elements. With a project management approach, the book draws on the theoretical notions as well as the professional experience of the stakeholders and mainly on trainers.

Despite being related to the management of knowledge in project management processes and thus to human capital, technical and contextual competencies are somewhat independent of an individual's attitudes and skills in the performance of his or her tasks. While it is indeed necessary to possess knowledge, it is also necessary to know how to transfer it to create value in the organization, and it is here that behavioral competencies play a fundamental role in the value creation chain.

The book presents a modest vision about project-based training and learning and the competence demands of organizations to end with a chapter on the traceability of intra- and interpersonal competences between the training field and the labor market using the guide as a support tool IPMA ICB® [1].

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Chapter 2

Project-Based Learning and its Effects on Freshmen Social Skills in an Engineering Program

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Francisco Moreira and Senhorinha Teixeira

Additional information is available at the end of the chapter

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Abstract

This chapter reports some effects of project-based learning (PBL) on development of social skills on Industrial Engineering freshmen (first-year) students. PBL is an active learning and student-centered methodology that promotes skills development such as the 4C—Critical thinking, Communication, Collaboration and Creativity. These skills should be an integral part of the expected engineering competences needed for professional proficiency, in order to comply with a changeable world and instable marketplaces, which require competences well beyond the technical ones. Through a survey to the first-year students and interviews to recently graduated professionals, some interesting results about the effects of PBL on social skills development were acquired. Some of these results relate to the recognition of acquiring competences during the project development and the usefulness and applicability of these in their daily professional activity. Among others, these encompass the capability to lead projects and produce effective work within multidisciplinary teams, to deal with conflicts, and to provide effective oral and written communication and capability to adapt to different work environments and assuming responsibilities, reflecting and assessing the own learning and the work of others, and to respect the attitudes and work of others.

Keywords: project-based learning, soft skills, engineering education, active learning methodologies, competencies development

1. Introduction

The Fourth Industrial Revolution, promoted by, what is known in the occidental world as Industry4.0, will put some challenges to the new engineers, as alerted by the report of the National Academy of Science and Engineering [1]. It is envisioned that the way work will be

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organized in the future will enable the release of workers doing routine tasks, appealing to their skills for more creative and value-added activities. Additionally, they will be called to develop more complex products and systems and to manage them efficiently through new methods, tools and technologies [e.g., by using, among others, augmented reality (AR), virtual reality (VR), cyber-physical systems (CPS)] and to use transdisciplinary perspectives [2].

Work organization and design changes will imply a total new role of workers, increasing their responsibility and enhancing their personal development. According to the report of the American Management Association [3], the skills to deal with the fast pace of change in businesses are beyond the traditional "Three Rs" of reading, writing and arithmetic to a new set of skills, the "Four Cs": Critical thinking, Communication, Collaboration and Creativity, to enable workers to think critically, solve problems, innovate, collaborate and communicate more effectively.

The changes described require a new thinking about the way prospective workers are trained. This implies modifications in teaching institutions and pedagogical approaches. These modifications must educate the future workers to have more initiative, to possess excellent communication skills and the ability to organize their own work, as recommended by the reports referred above [1, 3] and others [4]. These needed skills fit in the set of the called Social Skills that according to the Business dictionary is the *"Ability to communicate, persuade, and interact with other members of the society, without undue conflict or disharmony"* [5]. Other definitions found are aligned with the one presented above, such as the definition of the Collins dictionary that states: *"the skills that are necessary in order to communicate and interact with others"* [6].

Active learning methodologies are particularly advocated, such as project-based learning (PBL), as methodologies capable of providing such skills [7–9]. Project-based learning is an active learning methodology that engages the students on their own learning, and puts them at the heart of competence development, including technical and transversal ones, like social skills. Indeed, PBL requires that team members ultimately bond with their peers in a student-centered approach, aiming at the development of technical proficiency in a number of subjects, for proposing a meaningful solution for an open-ended challenge. This prolific process requires that team members abandon their passive attitude toward learning and allows them to systematically exercise a number of distinct settings, which enrich their learning experiences. These are key in engineering programs where students are ought to develop competences for future practice, such as solving real-life problems, making convincing arguments (oral and written), leading teams, managing conflicts, working effectively within teams, considering social and environmental issues, interacting with others (e.g., colleagues, partners, clients) and being proactive and innovative.

This chapter discusses the PBL implemented in the Industrial Engineering and Management (IEM) program of first year since 2004–2005 as an effective tool to promote the defined social skills in the freshman. The instruments used to evidence this were the PBL process assessment survey applied in the end of semester to the first-year students and some interviews with the graduates PBL participants.

This chapter is divided into six sections. After the introduction, a brief literature review about PBL and skills is presented in Section 2. The research methodology is introduced in Section 3. Section 4 presents the context study describing the most important aspects of PBL. Section 5 points out the results and main findings and, finally, last section outlines some conclusions.

2. Literature review

According to Schmier [10], teaching is a sacred trust, a heavy responsibility, a privilege not to be taken lightly, a noble mission, a profound opportunity and making in life. This could not be more true when it is taken seriously, and in order to happen, it is necessary to be prepared to teach. This means recognizance and having present powerful ideas in teaching, as introduced by Gibbs and Habeshaw [11]: (1) students construct knowledge; (2) students need to see the whole picture; (3) students are selectively negligent; (4) students are driven by assessment; (5) students often only memorize; (6) students' attention is limited; (7) students can easily be overburdened; (8) adults learn differently; (9) students learn well by doing; (10) students learn well when they take responsibility for their learning and, finally, (11) students have feelings.

How to put in practice such ideas and implement teaching in effective learning? Active learning seems to be the solution. Active learning is defined by Bonwell and Eison [7] as instructional activities involving students in doing things and thinking about what they are doing. These activities are capable of creating excitement in the classroom at such a point that learning would be natural. Active learning activities should be capable to provide six levels of Bloom taxonomy: (1) knowledge, (2) comprehension, (3) application, (4) analysis, (5) synthesis and (6) evaluation and this same, revised [12]. Another taxonomy to be covered by active learning methodologies is Fink's taxonomy levels [13] of significant learning. Fink's view levels are as follows: foundational knowledge, application, integration, human dimensions, caring and learning how to learn. These authors referred that Bloom six-level taxonomy is no longer enough to the transformational learning practice.

Comparing these taxonomies, all are important in education, but, particularly, the last three from Fink' taxonomy, are, maybe, the most fundamental levels in an engineer training. In addition to these, engineer training demanded an holistic development of knowledge (head), dispositions (heart) and application (hands) and competency development of sustainability, systems and ethics provided by a Lean Engineering Education, as advocated by Flumerfelt et al. [14]. Such themes are not easy to teach/learn demanding active learning but also collaborative and cooperative approaches where the students become the center of their own learning. According to Prince [15], collaborative approaches can refer to any instructional method in which students work together in small groups toward a common goal, and cooperative as a structured form of workgroup where students pursue common goals while being assessed individually.

Project-based learning is an active learning methodology that involves collaborative and cooperative approaches. This could have different roots and different moments of interest and renaissance [16]. Nevertheless, it seems that the history of project method was systematically attached to the works of Dewey [17] and Kilpatrick [18, 19]. Both authors agree on the suitability of this method to prepare autonomous, independent and responsible citizens for their active practice social and democratic modes of behavior. These values are learned by the students while constructing the path to their own knowledge, combining theory with practice in a meaningful environment and a purposeful education. Some universities and colleges, such as the Aalborg University in Denmark, are converted to the project method adopting an approach of project (project-based learning) that could go from a single project in a course, the Task project, to a problem project [9].

In an engineering environment, some authors, for example, Powel and Weenk [20], named PBL as Project-Led Engineering Education (PLEE) and defined it as *"Project-led engineering education focuses on team-based student activity relating to learning and to solving large-scale open-ended projects. Each project is usually supported by several theory-based lecture courses linked by a theme that labels the curriculum unit. A team of students tackles the project, provides a solution, and delivers by an agreed delivery time (a deadline) a 'team product', such as a prototype and a team report. Students show what they have learned by discussing with staff the 'team product' and reflecting on how they achieved it."*

By doing such projects, students develop technical competences and transversal (or transferable) competences. Among these are the social skills, referred above, that in essence are related to the ability, as individual, to engage effectively with others. It is this that defines a person in terms of how he/she establishes healthy relations with others. When this happens, there are conditions for the knowledge sharing and growth. An intelligent individual only is recognizable as such if he/she has its recognition by the peers. So, social skills are utmost the trigger for establishing a network of persons and to deal with the transdisciplinary complex systems created [21] by the Fourth Industrial Revolution. The National Academy of Science and Engineering report [1], previously referred, is clear about the training needs of workforce in managing complexity, abstraction and problem-solving. It is expected that they are able to act much more on their own initiative and to possess excellent communication skills and the ability to organize their own work, putting greater demands on employees' subjective skills and potential. Previous reports such as the ones from American Society of Mechanical Engineers (ASME) and Royal Academy of Engineering [22, 23] alerted also to these needs. At the same time, new opportunities in terms of qualitative enrichment of their work, a more interesting working environment, greater autonomy and more opportunities for self-development will be provided.

3. Research methodology

To achieve the objectives of the study described in this chapter, two research instruments were used. Instrument 1 consisted in a questionnaire on the development of social skills, targeting IEM first-year students of the last PBL edition of the Industrial Engineering and Management (PBL-IEM1) program, at University of Minho, Portugal. This was aimed at uncovering the social skills that are developed and exercised in PBL, along with a reflection on its importance for future professional proficiency. Instrument 2 consisted in interviews on the perceived importance of early experiences in PBL for the development of social Skills, targeting a group of young Industrial Engineers currently working in a number of companies. These instruments enable the gathering of different perspectives from different stages of professional development, and the use of multiple research approaches and data types, that is, a quantitative analysis grounded on the questionnaire applied to the PBL-IEM1 students, and a qualitative analysis grounded on the interviews (via email) to IEM recently graduated engineers.

The questionnaire used on instrument 1 is part of a larger annual questionnaire on evaluation of the PBL methodology. Three sections were considered to directly relate to social skills development, which encompassed a total of 25 questions, which were evaluated based on

Section	Code	Question
II. Learning and skills development	Q10	I feel that my participation in the PBL helped to develop my autonomy
	Q11	During the semester, I improved my communication skills (oral and written)
	Q12	Providing feedback to a report from another group was important and allowed to develop my critical thinking
	Q13	The construction of the prototypes stimulated my capacity for initiative and creativity
	Q14	Creating a blog/website was useful to help organize and disseminate the teams' project
	Q15	The blog/website also helped to select and organize contents
III. Teamwork	Q16	Teamwork has helped to increase my motivation for learning
	Q17	I prefer to work in groups than individually
	Q18	During the semester, I played an active role in the group
	Q19	The existence of roles in the group (president, secretary, time manager) was fundamental to understand better those roles
	Q20	During the project, my group held formal meetings and produced meeting minutes
	Q21	I consider that the interpersonal skills that I have developed are important for my future professional activity
	Q22	I shared the results of my tasks and knowledge with the rest of the group
	Q23	I was able to solve the conflicts in the group and face them positively
	Q24	I have applied teamwork supporting techniques that were useful to progress the project
	Q25	I think that I played well as a team member
	Q26	When in disagreement with the other team colleagues, we always came up to an understanding
	Q27	After each meeting and task accomplished, I always left confident and enthusiastic
	Q28	At each team meeting, I tried to understand the feelings of the others colleagues when they were angry, bored or sad
	Q29	When I was not able to fulfill a task assigned to me, I asked for help to other colleagues of the group.
	Q30	When a colleague completes the task correctly, I commend him for the achievement
IV. PBL as teaching/learning methodology	Q48	The PBL facilitated my integration and socialization at the university
	Q50	The PBL has a positive impact on the relationship established with teachers and the department
	Q55	PBL requires excessive effort when compared to any other course of the semester
	Q56	I believe, however, that this effort is rewarded with the skills acquired

Table 1. PBL questionnaire: social skills development.

Position/Company type	IEM1 edition attended (Work experience)	Job responsibility	Role within teams Daily frequency of interaction
Trainee International	2012/2013 (finishing the fifth year)	Times and methods trainee engineer	Work in a multidisciplinary team. In average, work with six workers/day.
Trainee International	2012/2013 (finishing the fifth year)	Times and methods trainee engineer	Work in a multidisciplinary team. In average, work with 20 workers/day.
Trainee National	2012/2013 (finishing the fifth year)	Production	Lead a team of 30 workers In average, work with 10 workers/day.
Trainee National	2012/2013 (finishing the fifth year)	Logistic and warehouse organization	Lead a team of nine workers In average, work with 40 workers/day.
Engineer/Trainee (abroad) International	2010/2011 (2 years)	Time Study and Methods engineer	Work in a multidisciplinary team. In average, work with 20–25 workers/day.
Engineer National (startup)	2010/2011 (2 years)	Industrial Engineering Marketing	Work in a multidisciplinary team. In average, work with five workers/day
Engineer (abroad) International	2007/2008 (5 years)	Capability Acquisition Manufacturing Engineer	Lead one worker indirectly.
Engineer International	2006/2007 (6 years)	Industrial engineer	Work in a multidisciplinary team. In average, work with 50 workers/day.
Engineer International	2006/ 2007 (6 years)	Process quality coordinator	Team moderator, three workers team multidisciplinary.
Engineer International	2004/2005 (8 years)	Logistic projects department responsible	Lead a multidisciplinary team of 8 direct and 16 indirect workers. In average, work with 50 workers/day.

Table 2. Characterization of the interview respondents (young industrial engineers).

5-point Likert-type scale. The students had to indicate the degree of agreement to each question/sentence (where "1" corresponds to "strongly disagree" and "5" to "totally agree"). The questionnaire was made available online, for 2 weeks, after the end of the semester. From the 48 enrolled students, 32 accepted the challenge and answered the questionnaire. The 25 closed questions and the corresponding sections are depicted in **Table 1**.

Regarding the young engineers' opinion on the effects of the PBL methodology on the development of social skills, three main questions were raised and answered by e-mail:

- Did you feel that having carried out a project in the PBL context was relevant to your qualification (IME)? Explain in detail how?
- Do you think it helped you to develop social skills? Which ones? Can you please give examples?

- In the exercise of your professional activity did you feel that you were able to more easily overcome difficulties (or not) due to your knowledge acquired with PBL? Identify some of the difficulties encountered?

Six young engineers and four trainees voluntarily accepted to answer the questions. The sample was defined for convenience purposes, namely easiness and speedy gathering of the information. Concerning the work experience, four of them are having their first experience in an internship program (trainee) in a company, and the remaining ones from 2 to 8 years of work experience. Most respondents were integrated in multidisciplinary teams, with small and medium dimensions, and some of them were in a leading position (three). Two of the interviewees are, currently, working abroad in international company. **Table 2** characterizes the respondents' profile, company type, IEM first year of academic years (edition) attended and number of years of work experience, type of work and if they lead a team and how many workers they lead or work with.

A quantitative analysis of the results on the questionnaire and a qualitative analysis of the answers to the interviews will be explored in more detail using context analysis in Sections 5.1 and 5.2, respectively.

4. Study context

An interdisciplinary PBL approach was implemented in the first year of the Master's Degree on Industrial Engineering and Management (IEM) program, called PBL-IEM1. This approach was firstly employed in the 2004–2005 academic year [24]. The 14th edition of the PBL-IEM1 project was held in the first semester of 2016–2017 and had 49 students enrolled. This approach challenges the teams to develop and fetch knowledge, and skills, from different disciplinary fields, in order to propose a solution for a semester-wide open-ended problem. The class was divided into six teams of eight members each, with the exception of one team, which had nine members. The teams were initially instructed on the general guidelines of PBL and in detailed aspects of its particular implementation at the IEM program at the University of Minho. The dimension of the teams is kept large purposely, as well as for practical reasons, namely due to scarcity of project rooms, a limited number of available kits for prototype development and a limited number of tutors to accompany each one of the teams.

The first semester of the IEM program includes six Project Supporting Courses (PSCs), each of one holding five ECTS. The PSCs pertain to four departments, from two distinct schools, namely Engineering and Sciences, as shown in **Figure 1**. The PSCs are as follows: (1) Introduction to Industrial Engineering and Management (Topics of IEM); (2) Calculus; (3) General Chemistry; (4) Algorithms and Programming; (5) Linear Algebra and (6) Interdisciplinary Project on Industrial Engineering and Management. It involves a team of six lecturers and four tutors (two of the lecturers perform as a tutor as well), which are, simultaneously, the coordination team of the PBL edition.

The PBL-IEM1 lasts for 20 weeks (15 weeks of contact work), 2 weeks for Christmas break, and the remaining weeks are used for assessment purposes and final examination the PSCs. Although social skills can also be learned, regular practice and experience are keys for skills development. The PBL-IEM1 requires a great deal of contact, not only among team mates who

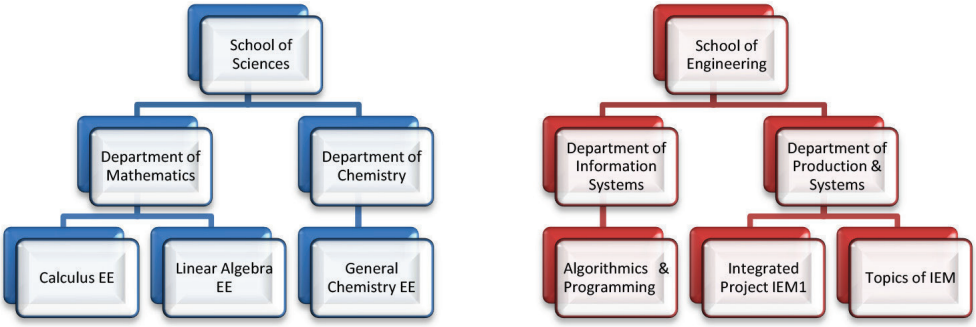

Figure 1. Distribution of IEM courses of first year, first semester by schools and departments [25].

share the same room (the teams' space) during a full semester but also a more frequent than usual interaction with lecturers and tutors. Frequent presentations to big audiences and communication with companies are also exercised during the semester. The teams are instructed as well on the theme that they have to develop [26], on the mechanism of peer assessment, on team working [27] and on conducting presentations.

The project assessment methodology (team related) is intricate, requiring the assessment of multiple items, each of them holding different weights and graded by multiple lecturers. More details on the PBL-IEM1 assessment methodology can be found in Moreira et al. [28–30], Fernandes et al. [31, 32] and Alves et al. [25, 33].

Previous research studies on PBL-IEM1 shown that the motivation to learn represents a prime driving force in Engineering Education which is influenced, not only on the interests and perceived importance of the subjects for the individual, but also on the "fun-factor" and on the inner dynamics of the individual teams, among other aspects [26]. The development of technical and transversal competences based on student-centered work is enabled through the PBL methodology and that the students themselves perceive that they have developed communication and teamwork competences [27], along with conflict management and commitment with others [34]. These findings suggest that active participation in real life should be stimulated during the learning process itself by enabling a meaningful student-centered learning environment. Moreira and Sousa [35] report an increased enthusiasm, cooperation and salutary competition between contending teams in the development of prototypes of production systems within PBL-IEM1. At the same time, teachers and researchers are also deeply involved with PBL process evaluation in a permanent cycle of continuous improvement, concerned with all aspects of PBL process [36].

5. Results and discussion

This section presents the results of application of two distinct approaches to evaluate the PBL effect on development of social skills. The results on the questionnaire, issued to first-year students on the 14th edition of the PBL-IEM1 (2016–2017 academic year), are provided in Section

5.1, while the results on the answers to the interviews, issued to recently graduated engineers, which undertook a prior edition of the PBL-IEM1, is provided in Section 5.2. The discussion on the foregoing matters follows the respective presentation of results on each one of the sections.

5.1. First-year IEM students' belief

Figures 2, **5** and **7** illustrate the distribution of the mean obtained based on first-year IEM students' perceptions regarding the social skills for Section II—Learning and skills development, Section III—Teamwork and Section IV—PBL as teaching/learning methodology, respectively. For all the statements in analysis, the mean obtained is greater than 3, showing a positive agreement. A detailed explication of the results of each figure is given next.

Although practically all the mean values obtained regarding Learning and skills development statement evaluation are around 4 (Agree) (**Figure 2**), the less positive agreement was obtained in Q15 (the blog/website also helped to select and organize contents) with 3.4.

Also, Q14 (creating a blog/website was useful to help organize and disseminate the teams' project) received a relatively low agreement (3.7). By these last two results obtained, it seems that the students do not hold a positive opinion on the use of a blog/website as a tool to improve their critique writing even in a less formal way [37]. **Figure 3** shows one of the blogs created by one team. Here it is possible to observe their concern to create an emotional appealing slogan related with their conceived company to employ an ecological material while denoting some creativity. Thus, they could not totally agree but they were enthusiastic in creating the blog and conveniently disseminate their work in progress. Nevertheless, in the fourth year, when they have PBL again, they recognize this value as they need it to demonstrate, and monitor, the results to teachers and companies [38].

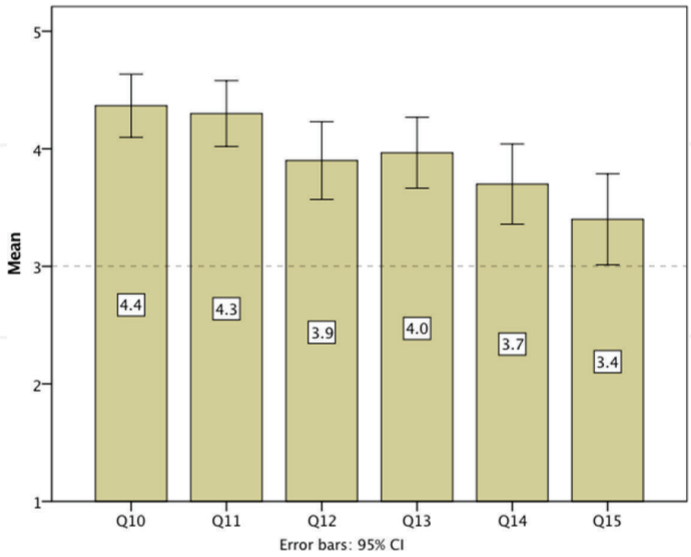

Figure 2. Questionnaire results: Section II—Learning and skills development.

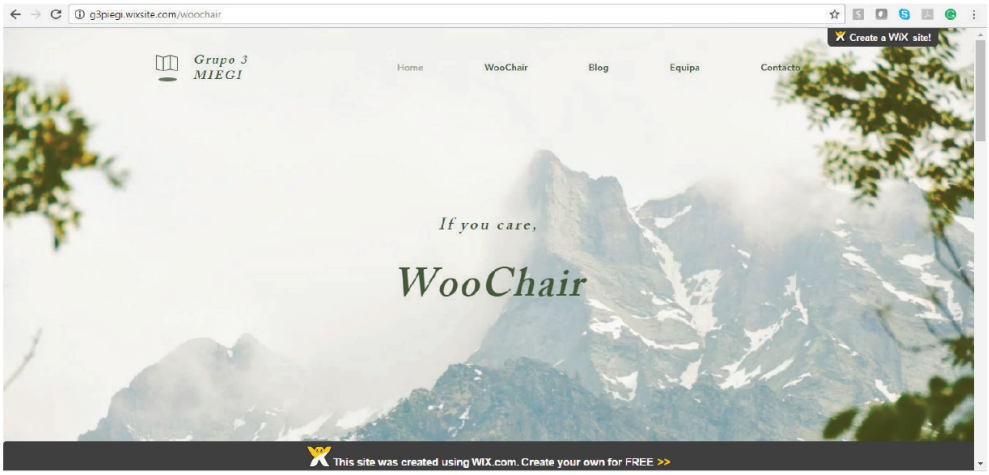

Figure 3. A blog created by one of the teams.

Concerning the Teamwork dimension (**Figure 4** shows two of the teams from 2016 to 2017 edition working in their project room), the graph of **Figure 5** shows that in average the students agree (around 4) with the statements considered, being Q27 (after each meeting and task accomplished, I always left confident and enthusiastic) the one that has received the lower value (3.4). In a way, students filling unconfident and not so keen on the work done indicate a certain inadaptability to adjust to changing situations, persons or/and environments. However, one such behavior could be expected, since it consisted a first-time experience for some of the students, if not for all. When asked about as they like to work, individually or as a group (Q17), students' responses in average show a slight agree. However, they also strongly agree (4.5) to share results of their tasks and knowledge with the rest of the group (Q22). Students in PBL context point out some weaknesses and strengths to teamwork, as discussed in Alves et al. [27].

The questionnaire of the Section IV—PBL as teaching/learning methodology also produced positive results (all of them equal or higher to four: "agree") (**Figure 6**).

The relationship established with the teachers (and other members of the department of production and systems) of the IEM program is so effective that starting in the first year the

Figure 4. Two teams working in their project room (pictures intentionally blurred for privacy purposes; taken by one of the authors).

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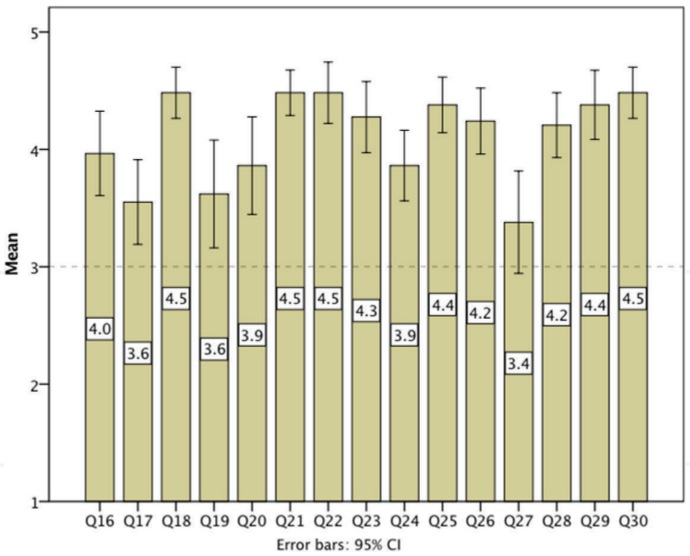

Figure 5. Questionnaire results: Section III—Teamwork.

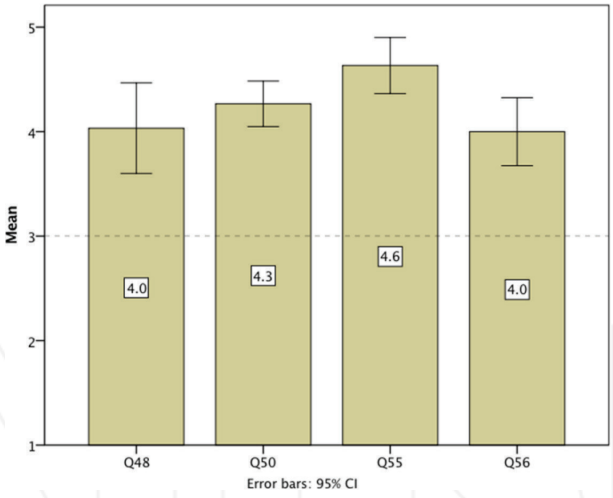

Figure 6. Questionnaire results: Section IV—PBL as teaching/learning methodology.

students are involved in the Department Day event, by presenting their projects (**Figure 7**) and by supporting and participating in the event.

Furthermore, some were even interested in starting their new experience in publishing papers [39] or in publishing their master dissertation final results in conferences and journals. A list of these publications can be seen in Alves et al. [40]. At the same time, their activity in alumni associations shows a dynamism toward to increase their collaboration on the international

Figure 7. First-year students' teamwork presentations in the Department Day (pictures intentionally blurred for privacy purposes; taken by one of the authors).

association of Industrial Engineers students (ESTIEM). Their activity is so intense that they were invited to become the magazine editors, while the number of participants in the international events was never so high.

Also, the mean value near 5 ("Strongly agree") obtained in statement Q55 (PBL requires excessive effort when compared to any other course of the semester) strengthens the difficulty that the students experience in managing time. But, at the same time, they also gave a good grade to the Q56 (I believe, however, that this effort is rewarded with the skills acquired). That is, they noticed that PBL is not equal to other curricular units.

From the 32 responses obtained in the questionnaire, it was also possible to retain some phrases reported by the students in the open question "Positive aspects of participating in the PBL":

- Development of soft skills and better understanding of the complexity of a company/industry, namely, at the level of its production system.
- Development of the spirit of initiative and "gain" more responsibility.
- Socialization with colleagues; learning of transversal competences; similarities to an employment environment (working with large groups and knowing how to manage the work and opinions of each one).
- Teamwork and resolution of various problems in a short time; acquisition of new skills/soft skills; teamwork; acquisition of knowledge that goes far beyond what is given in each course.
- The PBL allowed to develop the soft skills and the ability to work as a team; to adopt a better perspective on the course and future professional reality; to improve our ability to identify and solve problems; and to deal with different opinions.
- Skills acquired in presentations, in writing a report, in group work, in being more autonomous and able to distribute tasks and adapt to conditions.
- To learn to deal with different personalities, and sometimes they clashed with ours; in this sense, in order to keep the group going, we had to grow as people and try to understand the others as much as possible.

- There was greater proximity between teachers and students, which contributed to a better overall environment.
- Personal enrichment, coupled with the development of highly diversified skills.
- The various and different presentations throughout the semester helped us to improve our oral communication and, above all, helped us to face the fear of speaking to many people. Aspects such as creativity and initiative were greatly stimulated, as well as the development of the critical spirit.
- This project was undoubtedly enriching at all levels; however, it should be noted that the initial shock was great, everything at first seemed impossible to materialize! During the semester, the work was arduous and exhausting, but of course there is no finest rewarding sensation than what we felt; it is something that is difficult to explain in words…

5.2. Young engineers' opinions

Regarding the young engineers' written answers to the set of posed questions, the analysis will be presented below.

Attending to the first question: "Did you feel that having carried out a project in the PBL context was relevant to your qualification (IEM)? Explain in detail how?"

The qualitative analysis using the webQDA software [41] produced the result shown in **Figure 8**. It can be seen that projects are important as "*the key to the development of future industrial engineers*" as mentioned by one young engineer with 5 years of work experience in an automobile industry company that holds a recognized and strong brand.

The second question was: "Do you think it helped you to develop social skills? Which? Can you please give examples?" **Figure 9** depicts the results.

To develop and sharing ideas, to acquire different skills, to deal with others feelings, to do the presentations and to develop communication skills, among others, are competencies difficult to achieve in lecture-based classes [15].

Figure 8. Young engineers' most frequent words for the question 1.

Figure 9. Young engineers' most frequent words for the question 2.

Figure 10 presents the results of the third question: "In the performance of your professional activity did you feel that you were able to overcome more easily the difficulties (or not) due to your knowledge acquired with PBL? Identify some of the difficulties encountered?"

In this case, one of the words most identified was "problem," however, with a positive mean. As mentioned by one of the young engineers:

> *"Obtaining relevant information for analysis and problem solving: working in different teams with different personalities and solving problems."*

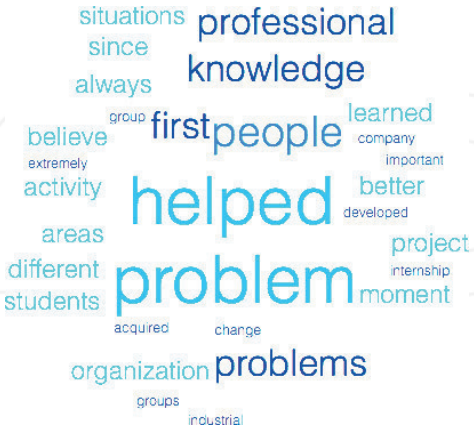

Figure 10. Young engineers' most frequent words for the question 3.

6. Conclusions

This chapter presents a study about the effect of the PBL on social skills development of first-year Industrial Engineering students. The instruments used provided evidence that PBL programs deliver a rich context where social skills can effectively be exercised and enhanced. A number of such skills were identified, and the development process thoroughly discussed, namely, effective team working, conflict management, effective oral and written communication, capacity of adaptation to different work environments, assuming responsibilities, caring about the other's learning, assessing the work of others and of their own, willingness to pertain and work in activities of student and professional associations. The acquired competences allow students to grow and become professionals capable of leading and working in projects and multidisciplinary teams.

Acknowledgements

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Chapter 3

Competences in Project Management: A Case Study in Osaka Institute of Technology

Makoto Katoh, Yutaka Kawata, Toshio Haga, Hiroyuki Kobayashi, Tsutomu Yoshimura, Kazuo Kumamoto, Muneyoshi Iyota and Keiko Natori

Additional information is available at the end of the chapter

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Abstract

This chapter briefly explains the distributed project management of four joint departments for first-grade joint project-based learning (PBL). That is, conventional studies and purpose, capital, competence and ability of four kinds of distributed project management were presented, and relations among them are shown after describing background (included prehistory of PBL in Osaka Institute of Technology (O.I.T.)). Then, consideration and analysis about communication, interaction, cooperation, merit, week-point, effect and inference were discussed. Some case studies were described about open innovation and competences in stakeholder management. They were distinctive and superior in first-grade PBL of O.I.T. Finally, some future themes were presented.

Keywords: project management, competence, case study, open innovation, stakeholder

1. Introduction

First, project-based learnings (PBLs) in Japan, prehistory and outline of PBL in Osaka Institute of Technology (O.I.T.), conventional studies and the contents of each section are described in this section. A project is a job having a new element and a certain period (start and end), a work evolving gradually with a clear purpose to be done, influencing the object, and manipulating the object. Competence has various definitions depending on the field but based on the world standard of competence of project manager here, and it makes unique meaning for each distributed project management. Then, it must be used well in the society.

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Then, project-based learning (PBL) has been spreading into the world of education because the project-based learning method can develop and improve the competence elements for finding problems, understanding problems and solving problems of the students because the overall thought process for learners in active learning by team-based learning (TBL) is important.

For this, the teachers of four departments including one leader in each class room (The parts of the leaders are project managers who show later in Section 2) should make the structure well-defined about major large problems and student missions by using various competences in the project management.

Here, the project management makes the initial purpose to clear and progress so that it gives skill, technique and tools for achieving the requirements (quality, cost, demand and range of products) of the project. It makes the specifications, plans and methods to clear for requirements by many stakeholders. Moreover, project management has a SPDCAF cycle, that is, Start, Plan, Do, Check, Action, Finish. Especially, start phase attached to a known PDCA cycle is important because it moves the project from idea phase to plan phase.

The literatures about PBL in Japan were seen in **Table 1**.

The PBL type learning was introduced to Japan as "Engineering Design" by Accreditation Board for Engineering and Technology (ABET). Japan Accreditation Board for Engineering Education (JABEE) advised in 2004 that the Japanese engineering education had only analytic subject and no subject for synthesizing.

Then, JABEE introduced "Engineering Design" as an essential subject to accept by JABEE accreditation. Japanese university with faculty of engineering has introduced "Engineering Design" since that time. This must be further paid attention as a very effective way for active learning. Here, active learning is a study technique by which the students are able to find problems independently, considering the solution for the problems and solving the problems.

In Mechanical Engineering Department of Osaka Institute of Technology (O.I.T.), JABEE had been examined from 2000, and PBL was introduced as a new subject in the third grade (shown in **Table 2**) in 2008 for recognition of JABEE.

After then, the official PBL was spread to second grade and first grade, although the informal PBL was tried in fourth grade of partial laboratory as shown in **Table 2**.

No.	Affiliation	Contents
[1]	Nitobe School	Results of teaching method for the first-grade since 2015 are presented, and findings through this work were shared. In Nitobe School curriculum, there are another education courses (Start-up, Global Issues, Problem-solving and Problem-finding) as four terms (spring, summer, fall and winter).
[2]	Hokkaido University of Japan	Comparison of student attitude by PBL for radiological technologists was introduced.
[3]	Keio University Media Institution	Education for software engineers through university and industry collaboration was done.

Table 1. Example about PBL in Japan.

Course	Term	Prehistory and outline
First-grade PBL	First grade	This started as four departments joint PBL. The Departments of Mechanical Engineering, Electric Engineering, Electronics Engineering and Robotics Engineering jointly conduct the half-year PBL for freshmen. The theme is robot car with multifunction. It started in 2014.
International PBL	Second grade	This is to establish first international PBL between National Taipei University of Technology and O.I.T. It was carried out since 2013 between Electric, Electronics and Mechanical Departments of O.I.T. and Mechanical Department of NTUT. The program is consisted of 1 week of intensive cooperation with five mixed team of students. The theme was robot car and wind turbine with wind lens.
Engineering Practice	Third grade	Mechanical Engineering Department introduced Engineering Practice as an Engineering Design subject. This subject is designed as the 1 year PBL of the design and manufacturing consist of six topics: electric vehicle, hovercraft, engine and motor cycle, robot, steel can recycle machine, and so on.
Graduation Research	Fourth grade	In partial laboratories of Mechanical Engineering Department, few graduate researches had been done like PBL and TBL before/after starting of Engineering Practice as third-year PBL.

Table 2. Outline of PBL in O.I.T.

The outline of PBL in O.I.T. is summarized in **Table 2**.

Nowadays, a project and program management (P2M) model in PBL has become important. Here, the program is a set of several projects assembled and integrated. Then, all the above-mentioned PBL in four grades had better to be managed as a program.

No.	Authors	Contents
[4]	Baumgardner CR, Shane GS, Grant KP	Leadership competences of sustainable construction project management have been explained in literature. The study has generated a new model to facilitate the process of sustainability in the industry and extends some of the significant components from leadership assessment in the context of construction project management in sustainable building projects.
[5]	Amin Akhavan Tabassi, Kamand M. Roufechaei, Mahyuddin Ramli, Abu Hassan Abu Bakar, Radzi Ismail, A. Hamid Kadir Pakir	It has been considered Architecture Management, Economics Evaluation of Project, Profile of Production & Risk Control, Resource Procurement, Competence of Project Management in Project and Program Management (P2M) in Japanese drug development
[6]	Iwasaki K	Technical competence was perceived to be more important for the management of extremely good teams than it was for the management of reasonably good teams.
[7]	Saito T	"Men, money, and material" is usually pointed out in Japan, as capitals of a general project management. The literature enlarges to five capitals, added "Information and technique" to these. In addition, they showed five competences of "Foreign adjustment competence, risk control competence, internal control competence, construction management competence, and technical improvement competence."

Table 3. Conventional studies about project management.

This section mainly focused on this joint four department PBL and the distributed project management for the Mechanical Engineering Department out of joint four departments. Here, distributed project management is a new management technique by distributed project managers who consigned partially by the main project manager.

Next, **Table 3** presented conventional studies about project management.

The purpose of this chapter is to present about competences of individual distributed project management as in the case of Mechanical Engineering Department. Moreover, it is to show image of an ideal project management as one and a certain kind of ideal distributed project management taking account of the results.

Section 2 explains competences in distributed project management about relation, competences in each (main, sub, boss, next) project management and evaluation.

Section 3 presents consideration and analysis about "communication, interactions and cooperation," "merit, week point and effect, inference," "an Ideal project management as one" and "ideal distributed project management."

Section 4 explains case study of open innovation by teamwork of enlargement meeting obtained as results of the distributed project management.

Moreover, Section 5 shows competences in stakeholder management including the open innovation, weekly report and joint competition. Finally, Section 6 presents the conclusion.

Especially, Refs. [5, 6] are a drug field, P2M is being handled, and its contents are interesting.

2. Competences in distributed project management

This section presents relation, competences and evaluation about distributed project management.

2.1. Distributed project management

2.1.1. Structure of relation on major project management

First of all, aim and purpose of distributed capital project management group (*Boss*, *Main*, *Sub*, *Next*, *Stakeholder*) are defined for future integration and redistribution. Although not all project structures always have the same stakeholders (*Boss*, *Main*, *Sub*, *Next*), stakeholder analysis and leadership described in this section are the most usual relationships. We must justify the relation to stakeholders for open innovation.

Aim: Four *Main* are defined for major management of the project by major project managers of four departments. First, the joint meeting was formed by them. *Sub* is defined for support and assist of major project management by sub project manager. *Next* is defined for project management by next generation project managers in the project. *Boss* is defined for project management by boss of the project who proposed the project.

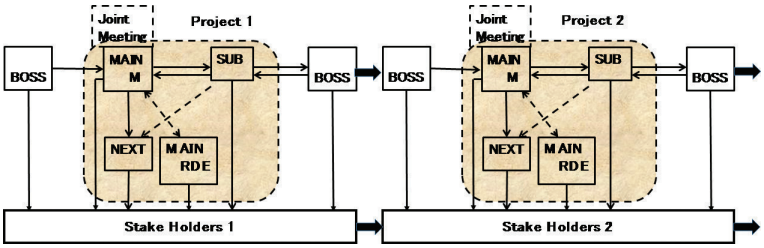

Figure 1. Relation among repeated distributed project management.

Though generally speaking, *boss* of the project or *BOSS* is disappeared from the project after proposing the project, he or it has been appeared again as a general teacher for evaluation and feedback function of the project in this case as shown in **Figure 1**.

Personnel purpose: *Mains* work to lead the project to success cautiously while being afraid of failure, by using power of members in some cases even if it held himself/herself down. *Sub* works to support and assist the main project management and innovates the joint project without fear of failure. *Next* works to learn how the project proposed will be successful. *Boss* works to relearn why the project proposed by him/her was successful.

Figure 1 shows relation among the four kinds of repeated distributed project management (*Boss, Main, Sub, Next, stakeholders i*) by managers (*boss, main, sub, next, stakeholders i*).

Competences (ability to do well) in each distributed project management and relation among repeated distributed project management are explained in the following paragraphs.

2.1.2. Stakeholders management

2.1.2.1. Analysis

For the students in each year, as most important stakeholders changed as every project in this PBL, the individuals of each group decide their roles and group leader through hope by early investigation in the project; then, they have identified their interests by the investigation [8]. Moreover, their interests and influence to the group with students of the other departments can be identified by the teacher's comments in their weekly reports. Original items for the stakeholder analysis are as follows:

- Target of this week (group and individuals).
- Content of execution of the entire group of this week.
- Content of execution of the individuals (inside class time and outside class time).
- Content of discussion in combination meetings.
- Achievement level, reflection point and improvement idea.
- Problem and work schedule for next week.
- Process of the future.

2.1.2.2. Leadership

The definition, purpose and description, and so on of leadership are presented in [8].

Here, the definition of leadership is providing direction and guidance to students and groups. It involves the ability to choose and apply appropriate styles of project management in different situations. Besides displaying leadership with his or her team, the student needs to be seen as a leader in representing the PBL to senior management and other interested parties [8]. Original items for leadership education are indicated in Section 2.6.

2.2. Competences in main project management

Competences in project management for main project managers are at least to seize three pillars of capital "Person, thing and money" and "Personnel right" and "Budget authority", involving the process of executing the responsibility of work allotment to each department. Moreover, they may have competences to present topics in a conference, decide on the schedule, settle the discussion and draw conclusions as chairpersons or sub-chairpersons.

2.3. Competences in subproject management

The project management competences of one subproject manager are based on experience knowledge and through dialogue with other project managers. He understands the purpose and contents of the whole project, proposing the technology necessary for the project competitively with them. He is also preparing explanatory materials for the students until the project gets on track.

2.4. Competences in boss-project management

Competences in project management for boss project manager who conceive the project are personnel ability that can choose talented person who was suitable for content of each project as project manager and are student and teacher's commending abilities, practical work with subproject manager, rich human nature and time management ability.

2.5. Competences in next generation project management

The competences of project management by young next generation project manager can organize the information of the meeting as minutes and can organize the outcome information of the project cleanly without changing its contents and make an external announcement. In consideration to detail, there are also external viewpoints. They were presenting methods of PBL at external meetings [9, 10].

2.6. Competences in stakeholders management

Social basic competences expected in stakeholders of the PBL are taught like the simple followings:

1. Problem solution

The work that fills necessary functions can be made.

2. Team work

They should know members and their ability, and they can help each other.

3. Communication

It puts in two cents hearing others' opinions.

4. Leadership

All members become leaders of something, and their roles are decided for that as the leaders.

5. Creativity

The aspect is changed, and they look at multipronged.

6. Time management

The progress report and the delay measures of the process deciding are managed.

2.7. Evaluation of distributed project management

1. Load reduction of main project manager.

The load of the MAIN increases oppositely, while the load of the SUB has decreased. This might be a result of special circumstances in case of O.I.T.

2. Sufficient number of leaders of classroom.

The member of expansion joint meeting was able to be arranged as at least one leader in each classroom.

3. External sending by various viewpoints.

Three external sending by each different viewpoint have already been done.

4. Effect of feedback by BOSS.

This is not well-understood still.

The next section describes consideration and analysis for the above managements.

3. Consideration and analysis

Moreover, this section adds the following consideration and analysis for the distributed project managements.

3.1. Communication, interactions and cooperation among distributed project management

Interaction, communication, conversation and discussion are not same terms but similar terms [11]. Then, cooperation are noticed as one obtained by human-computer interaction [12]. Here, it is noticed that interactions and communication can draw cooperation.

After observing the proposed method of distributed project manager compared with an ordinary project manager, communication, interaction and cooperation, which are selected as most important matters, were shown in **Table 4**.

3.2. Merit, week point and effect, inference analysis of distributed or decentralized project management method

Effect, inference and yield in failure mode or action mode, and so on were used for analysis of various systems in conventional study [13].

Here, **Table 5** shows merit, week point, effect and inference of proposed method of distributed project management compared with an ordinary project management briefly, although they were old and ordinary methods.

3.3. An ideal project management as one

The following item and six contents, which were integrated as ideal management of one and will cause a lot of main management of project, can be obtained after seeing the project management in which capital, rights and competences were distributed.

Table 6 shows a certain kind of ideal project management as one.

This will be important as a consensus problem in multiagent optimization systems in the future, although these contents do not obtain the consensus [14].

3.4. An ideal distributed project managements

Achieving an ideal abovementioned project management alone is difficult, the example of trying ideal four distributed project management is shown in **Table 7**.

This may be approaching to an optimal distributed project management, although this is not different from real distributed management.

Item	Contents
Interactions	There are both positive and negative interactions among the distributed project managers.
Communication	The chance of conversation between PMR increases, although there is also miss-over order [13] from *Main* or *Sub* to others in their communications.
Cooperation	They can draw cooperation by sharing the same target consideration.

Table 4. Interactions and communication can draw cooperation.

Item	Contents
Merit	There is a possibility that they can do something, which one project management is unable to do. They can reduce the load of main project managers.
Week point	Human cost up. However, it may not be a problem in the special environment like organizations for education.
Effect	*Next* grows up and the evaluation rises.
	All distributed project managers are able to know the project.
Inference	Spread of upper-grade PBL or another PBL after long time.

Table 5. Merit, week point, effect and inference.

Item	Contents
Five capitals	"Persons, objects, time, space and money"
Five rights	"Personnel right, budget authority, scheduling right, space securing right and greeting"
Five abilities	"Innovation of technology, control of information, information sending to inside and outside after taking and settling, agency to various distributed managers, to honor"
Five natures	"Cooperative, competitive, charismatic, responsibility and sympathy"
Five senses	"Selecting themes, material, parts, terms and methods"

Table 6. A certain kind of ideal project management as one.

Item	Boss	Main	Sub	Next/part
Capitals		"Persons, objects and money."	"Time, space" "Information, technology"	
Rights		"Personnel right, budget authority and greeting"	"Scheduling right and space securing right"	
Abilities	"To honor and information sending to outside"	"Control of information, information sending to inside and *"	"Innovation of technology, control of information, information sending to inside and outside after taking and settling, agency to various distributed managers"	"Control of information, information sending to inside and outside after taking and settling"
Natures	"Cooperative, charismatic, sympathy"	"Cooperative, competitive, sense of responsibility, sympathy"	"Cooperative, competitive, sympathy"	"Cooperative, sympathy"

Table 7. A certain kind of ideal four distributed project management.

It seems that repeating while deliberating integration and decentralization like this is useful for the optimization of the system that does not use the expression.

This may be necessary in the future theme as a distributed optimization problem [14].

In the next section, we will explain the open innovation by team works of project managers, including openly distributed departmental and interdepartmental project management.

4. Open innovation by teamwork

This section presents open innovation by teamwork of project managers and stakeholders.

Open innovation is done in teamwork, while closed innovation is done individually.

4.1. Case studies

In multicultural engineering [15], a few open innovations [16] were tried by teamwork in project management. Some case studies are described in the following paragraphs.

4.1.1. Case 1

4.1.1.1. Procedures

1. Awareness of scenario valued for Mechanical Engineering Department team in joint four department of PBL from a symbolic object by subproject management. (Affordance of the object: Slope course like hill excess as shown in **Figure 2**).
2. Proposal of innovation by subproject management.
3. Support of innovation by main project management and stakeholder management (especially for TA).

Examples of products: a mechanical sensor, controller and actuator on a car for throwing a ping pong gem from the box out of the goal wall without electric power source (**Figure 3**).

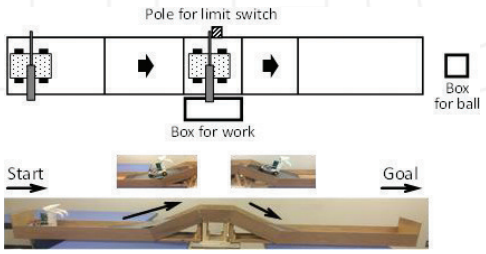

Figure 2. Courses with slope like hill where model cars run.

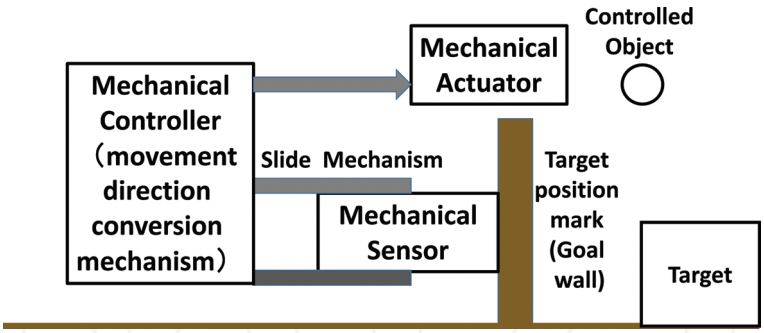

Figure 3. Configuration of mechanical position ON-OFF control with position detecting SW.

4.1.2. Case 2

4.1.2.1. Procedures

1. Motivation of innovation considered load balance by enlarged project management
2. Challenge and change of innovation by subproject management
3. Awareness of culture and value of innovation by main project management (message between the project managers in joint meetings)
4. Support of innovation by main project management and stakeholder management (especially for specialists and experts)

Examples of products: a set of noncontact feeding coils to transmit and receive the high-frequency power for detecting the goal wall (**Figure 4**).

In the next section, competences in stakeholder management are presented including open innovation.

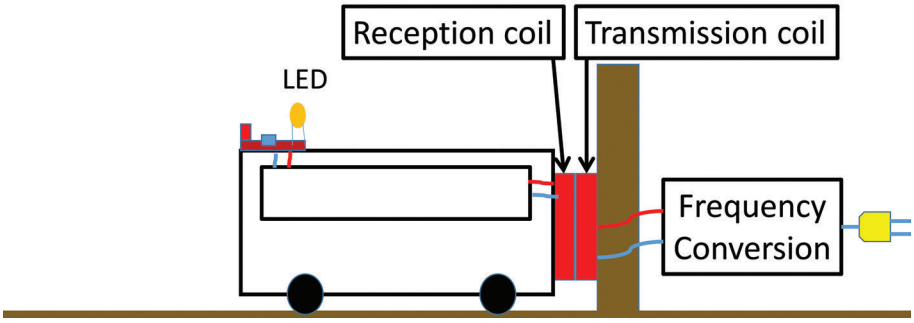

Figure 4. Noncontact feeding twin coil.

5. Competences in stakeholder management

This section presents competences in stakeholder management for open innovation, weekly report and joint competition.

5.1. Competences in stakeholder management for open innovation

In Case 1, TAs instructed by a main project management were active as stakeholders.

In case 2, teachers asked by a main project management who did not participated in the project as stakeholders who supported the project management. To summarize, it was recognized that not only teamwork but also stakeholder management including the section manager plays an important role in the success or failure of the project.

5.2. Competences in stakeholder management for weekly report

The weekly report was imposed on the administrators to properly modify the form in each department. By letting students write a report in this form, they can grasp the common problems of all divisions and individual problems of each division and draw out the direction of student behavior for problem solving. Competences for making format of weekly report may be knowledge to teach the PBL and experience for incompleteness of the first-grade students' description matter for past weekly reports.

5.3. Competences in stakeholder management for joint competition

There are two cases of innovative technology by a main project management. In both cases, technical competencies for providing web address to upload word file or excel file, information management for settling important rules and scores of competitions are needed.

5.3.1. Case 1: explanation function of joint competition in orientation

The following specification of action flow chart expression (**Figure 5**) was most innovative and easy to understand for stakeholders including mechanical department.

Grey boxes mean the charge of mechanical department. Competences for making a chart like this chart may be knowledge on sequential flow chart using sequence control.

5.3.2. Case 2: online monitoring of joint mission and recent rules for joint competition

Because the rules for competition were changed by circumstances, they are managed by main project management so that wireless LAN of PC of each classroom may monitor the mission and the rules online though the joint mission and the rule for joint competition were explained in the orientation at first. Competences for making a system like this system may be knowledge about information and communication in PC. An example is shown in **Figure 6**.

5.3.3. Case 3: online monitoring of score book in joint competition

Because the scores of each team of other class rooms in competition were not known, they were managed by main project management so that teachers can change and monitor the

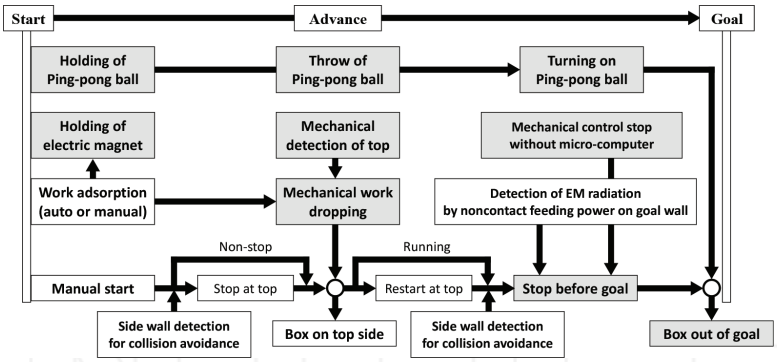

Figure 5. Action flow chart as explanation function of joint competition.

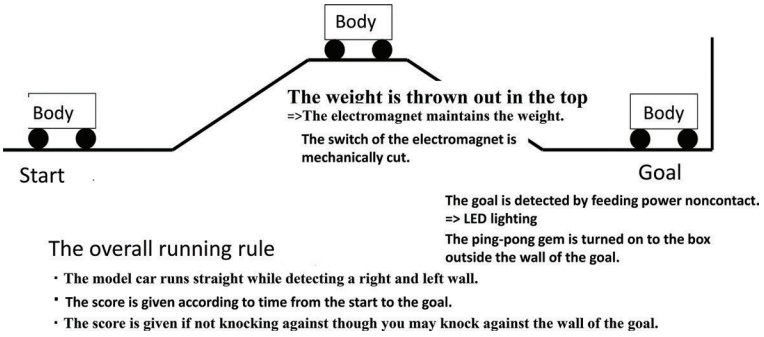

Figure 6. An example of online monitoring of joint mission and recent rules for joint competition.

scores, and other stakeholders will be able to monitor them through wireless LAN of PC in each classroom. Competences for making a system like this system may also be the same as the above system. Specification of online score book is shown in **Table 8** for reference.

Class room	Group and try no		Running time (s)		Work enter in the box	Ping pong gem enter	Penalty at wall		Bonus at goal		Total score
			to top	to goal			Collision to wall	Stop car	Light LED	Stop wheel	
151	1 Group	1									
		2									
	2 Group	1									
		2									

Table 8. Specification of online score book.

6. Conclusion

The distributed project management method for the first-year PBL of joint departments was proposed and considered about some important items after presented each distributed management and shown relations among the distributed managements.

The motivation leading up to this topic is the discovery of the book [14]. The problem of integrating distributed management would be a consensus problem, and there was a speculation that the method of distributed optimization could be used when decentralizing the integrated management.

A large advantage of such a distributed and decentralized project management method mutually supplements various project managements, goes up the perfection, executes a role each other and decreases the load concerning the project if it is compared with a conventional project management method.

It is important that such a new attempt concerning the project management of the Mechanical Engineering Department is the one approved by the management of another department. (It is because those advantages are shared.) Such an attempt does not succeed without fail, and it greatly depends on the competences of the member who participates in the same meeting. Therefore, it does not necessarily succeed even if the same thing is done by another project.

Some case studies were described about open innovation. It was motivated by which the hill excess course of model car makes to associate the blackout measures for accident of nuclear power generation caused by tsunami.

Then, competences in stakeholder management were discussed. They were distinctive and superior in first-grade PBL of O.I.T.

There are some future themes when you examine such context closely as follows:

1. It is necessary to clarify the competences by thinking about the ability of each distributed project management for clarification of conditions for the application of such distributed project management to other projects.
2. Problems derived from optimal controllers of projects ranging from ideal optimized project management to distributed project management [14].
3. Optimal consensus problem for an ideal optimized project management by distributed project management [14].
4. More appropriate lecture about project management may be necessary for first-grade students [17, 18].

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Chapter 4

Project Management and Learning: The Learning Project

Alfonso J. Gil and Mara Mataveli

Additional information is available at the end of the chapter

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Abstract

Learning is the key to project management, for the reason that much of the success of a project lies in adapting to the changing environment of any project. The key to change lies not in individual learning, but in the learning of the group that integrates the project, what would be called project learning. The objective of this work is to propose a learning project, a project that can adapt to the changing environments that are generated in the project management. Following the proposals of the so-called learning organizations, a "learning project" model is proposed, which is based on four key components: project leadership, project culture, project structure, and related to the learning opportunities with the project (training for the project). The work ends with a few recommendations toward the management of human resources in project management.

Keywords: organizational learning, management learning, project learning, culture, leadership, training

1. Introduction

Internationalization, the changing needs of customers, intense competition and technological changes, and, consequently, uncertainty and complexity are outstanding environmental characteristics that are currently faced by project managers. To remain competitive and viable, projects need to adjust to implement changes continually. For [1], there is an organizational need to manage projects correctly, as well as learning from successes and failures, capturing, disseminating, and applying lessons learned in project development, in other words, improving organizational learning in project management. References to organizational learning derive from the strategy theory and refer to the ability an organization has to renew its competencies as a dynamic capability [2]. Organizational learning has also been identified as one

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of many factors of success in project management [3, 4]. Besides, organizational learning is a necessary tool for managing uncertainty in projects [5] and may allow for the accumulation and preservation of experience in project implementation [6].

However, organizational learning in projects does not occur regularly, and when it does, the expected results are not always achieved [7, 8]. The focus of learning is on individual learning but does not lead to project learning.

This work aims at proposing a project model that improves learning. It is intended to indicate some key points that serve as a reference for the development of projects and to lay a foundation from which to generate optimal projects, where people can develop their potential for the success of the project. It is an ideal project and a reference model for managers who intend to make learning an essential element in project management. In other words, it is about moving towards a "learning project". A project learns when the performance of the tasks that its members execute individually or collectively improves continuously, either because they improve the procedures or for a greater use of the resources concerning the objectives of the project, but, also, when this improvement accumulates in the "project memory" to be transferred to other projects or works. For this situation to consolidate, there must be a series of premises or foundations that ensure a sustainable learning such as there is a culture toward learning, there is an atmosphere of cooperation between people, the leadership of change and learning is valued and developed, and there is a comprehensive information system.

This paper addresses first a general reflection on orientation about learning in projects; second, group learning, which can help to recognize how learning occurs in the projects; third, a learning project model that is proposed; and four, the approached work contributions to project management.

2. Learning orientation in project management

Learning orientation has been seen as a value of the organization, which affects not only the organizational development but also the creation and knowledge transfer and the innovation [9, 10]. Strategic management academics consider the orientation of learning as a distinctive type of strategic direction and management philosophy that is viewed as a process in which knowledge and information are communicated and disseminated throughout the organization, which helps employees to improve their skills and abilities [11]. More specifically, the learning orientation toward the learning of members of a team refers to the group members' propensity to focus on learning, acquire new skills, master new situations, and develop competencies [12, 13]. Individuals with a dispositional learning orientation view their competence as malleable and focus on mastery of tasks [14], the disposition learning orientation focuses on distal and general purposes, and goal setting emphasizes the objectives of a task at a particular level [15]. The general learning orientation focuses on distal and general purposes, and goal setting highlights the objectives of a task at a given level.

In the area of project management, it has been pointed out that, although the content of a project may have a temporary characteristic, the organization of the project is the source and the result of learning [16]. In fact, it has been emphasized that learning helps organizations to adapt their governance structures to maximize the performance of their projects [17], especially if it is taken into account that the transfer of learning is of great importance for any organization that aims at improving its capacity to implement interdisciplinary projects [18].

Also, two aspects related to learning orientation and management of project teams have been identified. First, time pressure has been positively associated with the orientation of learning through intrinsic motivation [19]. Ref. [20] indicated that team members could often see the need to do something quickly or make many things happen simultaneously. Under these circumstances, moderate levels of time pressure could be endogenous to the team members' project, which would lead them to feel positively challenged and to be more involved in learning within the project. Second, learning orientation has been associated with creativity through intrinsic motivation as one of the factors that precisely trigger creativity [21, 22]. In fact, learning orientation plays the role of a motivational process through which intrinsically motivated team members can engage in learning activities, resulting in creative outcomes [23]. Therefore, the effect that time pressure has on creativity is assumed to be positively mediated by learning orientation.

3. Team learning and project management: the project learning

Project management involves people who constitute teams or work groups, so before working on learning in project management, reference is made to teamwork and team or group learning because it is a reference for learning development in project management [24].

Working groups or teams have been defined in a number of ways, following [25] as being: "A team is a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems (p. 241)." Team learning is often conceptualized as a continuous process of action and reflection [26] through which teams acquire, combine, and apply knowledge [27]. This process is closely related to activities such as asking questions, seeking feedback, improvising, discussing errors, challenging underlying assumptions, and reflecting on specific outcomes or unexpected results [28]. Team learning, however, also refers to the knowledge that is encoded and embedded in the computer [29], for example, underlining the importance of documenting and reflecting on what has been learned through a process of knowledge codification. Codification involves recording the procedures of teamwork and hence converting tacit knowledge into explicit knowledge so that results can be developed. Repository and retrieval allow learning to persist over time, preserving knowledge and artifacts gained in memory repositories and facilitating team members to find and access them for future use [30].

In the work teams, the importance of team learning has been emphasized, since this learning constitutes a fundamental variable in the effectiveness of the work teams [31, 32].

Also, team or group learning has been identified in different ways by researchers. Authors such as [26, 28, 29] have focused on learning as a process, while others [33] have highlighted learning outcomes. However, group learning could be identified as "an emergent property of the group exerting influence beyond the individual members involved in the original learning process, p. 1043" [34].

The problem that arises is to know how the process of learning in a team is facilitated. In other words, what strategies can be developed to achieve effective group learning and that this is quick and efficient [35]. Building the agile team learning model (ATLM) based on fast task mining, to develop the learning method, shortens the learning period and improves the precision of knowledge acquisition. ATLM divides the whole process of learning into three phases: (1) information acquisition, (2) fast task mining, and (3) team learning.

1. Information acquisitions (IA). The objective of this phase is to acquire more relevant information for the work team. In this sense, all members of the team can collect information from different sources of the company, through experts, through network services, or through training courses.
2. Fast task mining (FTM). Building a shared vision is the third discipline of learning organizations [36]. It is about making the shared learning tasks attractive. It is about activating the team members to get a constant process, instead of a passive dedication and little follow-up.
3. Team learning (TL). As soon as the shared learning task has been built, the TL phase should be started immediately to achieve the learning task quickly and accurately. And so, four crucial steps are proposed.

    a. Use case. Create according to real projects or members' interests. Each use case focuses on describing how to achieve the knowledge points in learning the task.

    b. Practice. Team members should play different roles in each case and try to practice use case through teamwork.

    c. Sharing. Knowledge exchange is a major factor in the development of group learning.

    d. Test. Team members should share achievements and complement skills for each other.

For all these processes to take place, the work of leadership is critical in the development of team learning. Literature has pointed out that leaders can facilitate both individual learning [37, 38] and team learning [39]. In this sense, [28] showed that leaders who train team members and help solve problems influence group norms, encourage team communication, and improve team learning. Also, [40] found that experience in leaders' experience working with teams, solving problems, and challenging group members improves group learning.

Therefore, the key to learning the project lies in the group learning , it is the group contibutes to the development of the project, which means that the group learning in the project corresponds to the "project learning".

4. Generating a "learning project"

Researchers from large institutions (such as universities or national research institutes) will often move from one project to another, creating opportunities for transfer of learning between projects [41]. The problem that arises is not to make learning dependent only on the intervention of individual people but on the actual exercise of the project. The challenge here is to avoid making learning dependent only on the response of certain people, and rather to focus on the real performance of the project. It is about generating "learning projects." A learning project can be defined as a project that is continuously transformed to adapt to changing contexts and move toward opportunities for improvement.

Love et al. [42] argue that to facilitate learning in project-based environments effectively, three conditions must be established. The first one is to have a clear understanding of the unique characteristics of the project and the operational environment in which it is developed. Second, continuous learning must be integrated into the organizational culture and, third, synergies are created through the collective actions of the agents involved in the project in support of learning. All this supports the idea of moving toward learning projects.

In addition to the focus on learning organizations [43–46], but with the uniqueness of project management [42], four key aspects can be proposed for the creation and development of learning projects: leadership project, culture project, structure project, and learning opportunities project (see **Figure 1**).

4.1. Leadership in the learning project

As [47] point out, projects are a form of temporary organization in which the project members (usually staff members) are supported by their affiliated organizations (usual enterprises), which convey specific project-oriented tasks.

The relationship follower-leader can last for a limited period. Besides, project managers feel that there is an "authority gap" while managing and directing project teams, considering that their subordinates perform multiple roles outside the project in question [48]. However, the task of a leader is more meaningful in projects being carried out in a company that is not temporary, that has the purpose of permanence, since he or she becomes a key figure in

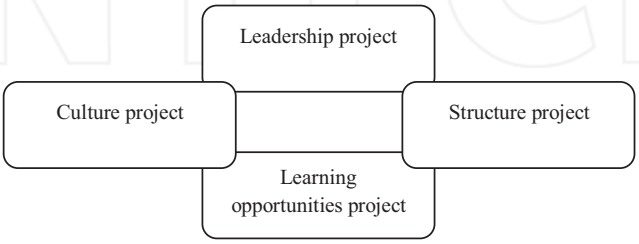

Figure 1. Project as a learning project. Source: Own elaboration.

aligning the members of the project team as to their tasks, which are temporary according to their nature. The problem that arises is to recognize the style of leadership that is more in line with the interests of the project. In general terms, it has been pointed out that person-oriented leadership styles are positively related to team learning behaviors [49].

Thus, it could be said that the leadership style, as a transformational one, could be a better fit in the administration of projects. Other leadership styles such as ethical leadership and values leadership have been identified as appropriate for the management of learning in groups and learning organizations, respectively. For this reason, they are considered suitable for project management, since they represent models through which the agents involved in the project become empowered and become an accurate action guide for the people led.

Research on transformational leadership has attracted considerable academic attention over the past two decades [50–54]. Transformational leadership has been defined as "charismatic, visionary, and inspirational actions that influence followers to broaden their goals and perform beyond the expectations specified in their formal work roles, and job descriptions, p. 286" [52]. Transformational leadership contributes to support behaviors to the team within organizations and acts to improve employee performance, including attitude, behavior, and performance [55–58].

However, leadership in temporary projects may have a different meaning in permanent and temporary organizations. In this sense, transformational leadership, which has been shown to be an effective approach to stimulate high-level commitments in organizations [59], has also been proven to be useful in the context of the project [47].

Ethical leadership has gained attention in recent years, especially the importance of reducing behaviors associated with the lack of ethical conduct from companies and professionals [60]. Interest in ethical leadership comes from the proposition that ethical leadership increases employees' ability to cope with conflict and reduces employee misconduct [61]. Ethical leadership has been positively linked to other behavioral attitudes such as job satisfaction, employee engagement, identification with the organization, and performance of tasks among other behaviors [62]. Ethical leadership is defined as "the demonstration of normatively appropriate conduct through personal actions and interpersonal relationships, and the promotion of such behavior to followers through two-way communication, reinforcement, and decision-making" (p. 120) [63].

Ethical leadership has been singled out as a leadership style that motivates followers to adopt positive psychological states [64] and engage in beneficial behaviors to the organization [65]. Ethical leadership has been associated with group learning, which as pointed out is closely related to learning in projects.

Works such as those by [66] show that ethical leadership fosters the psychological safety of members of work groups. This behavior encourages the proactive participation of followers in decision-making and their propensity to take risks, practices that are fundamental to behavior group learning.

Group learning behavior is defined as "the extent to which [group] members seek opportunities to develop new skills and knowledge, welcome challenging assignments, are willing to take risks on new ideas, and work on tasks that require considerable skill and knowledge (p. 114)" [67]. This behavior allows a rapid adaptation to the current contexts of organizational changes. Therefore, organizations with a proactive behavior of their work teams are more likely to achieve long-term competitive success [68].

Ethical leaders act as models for their followers by setting clear standards and holding employees accountable to those criteria [63]. Ethical leaders serve as models for their followers by setting clear standards by means of making the employees take the responsibility to go after those criteria. Ethical leadership promotes the behavior of group learning by providing a basis for the development of norms and productive practices of group learning [69]. In this sense, ethical leaders encourage the behavior of group learning by assigning a substantial value to group rules and procedures and by providing members with formal systems and training programs that disseminate actual learning to guide group actions and decisions [60].

Another leadership style that shares perspective with ethical leadership, which has also been identified as suitable for the development of learning organizations, is leadership in values. A development of this type of leadership focused on learning organizations can be followed in the work of [70]. For these authors, the figure of a leader in a learning organization combines two different features: (1) knowledge of oneself and others, which are qualities of emotional intelligence and (2) behavior guided by values, the so-called leadership in values (see **Figure 2**).

At present, it is widely known that there is no consensus on the exact nature of emotional intelligence. Several authors point out different factors that can be included in the concept of emotional intelligence [71–74]. Following [72, 73], emotional intelligence comprises five essential characteristics: (1) emotional awareness, to know one's moods and those of others; (2) self-regulation, for the management of one's attitudes; (3) motivation, to facilitate the achievement of goals; (4) empathy, to be aware of the feelings and needs of others; and (5) social skills, to enable mutual and solidarity in relationships.

Therefore, self-knowledge constitutes an important dimension of emotional intelligence. In short, an emotionally intelligent person, in addition to relating well to others and understanding them (interpersonal skills), knows himself or herself and "relates" well to himself or herself (intrapersonal attributes).

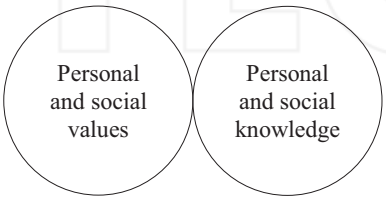

Figure 2. Leadership bases in learning organizations. Source: [66].

The field of emotions, and more specifically to self-knowledge and knowledge of others, has been addressed by leading business leadership experts such as [75–79]. Specifically, [75] who addresses the emotional leadership theme. According to him, the importance of the emotional leader lies in the safety of his or her behaviors (emotional stability). Additionally, the new leader must also be able to create group culture and organizational culture, without overshadowing the ability of each in the collective effort. The foundations of emotional leadership are based on values such as commitment (fostering talent and directing it to the common interest), communication (first of all knowing to listen), integrity (sharing of tensions), etc.

The style of leadership proposed by [80] is based on the leader values: when his or her values are correct, he or she will follow proper actions. The values are references concerning the course of the appropriate action; they are guides for decision-making. The path to leadership has two objectives: (1) an internal one, of personal perfection through practice, and (2) an external one, of social harmony, a result of the leader's behavior.

The first objective, personal perfection, seeks to discover and cultivate its good internal qualities in two different ways: (1) prudent thinking, thinking before acting: the person must be open (see situations from all points of view and without bias), altruistic (doing the right thing without seeking the only personal benefit), and disciplined (assuming one's mistakes); (2) the word prudent: value sincerity first, and (3) conservative actions: be careful with actions. It is about combining simplicity with refinement.

The second objective, social harmony, is reflected in true self-confidence. These are the leader's characteristics: (1) he or she is virtuous: he or she tries to do the right things; (2) he or she grants responsibility to the right people; and (3) he or she identifies himself or herself with the interests and well-being of all.

Specifically, the role of a leader in building learning organizations, and also in the construction of learning projects, is to foster learning environments [81]. The fundamental role of leaders of learning organizations is to promote and coordinate actions, resources, and services that improve the learning conditions of the group members [82].

4.2. The culture of a learning project

The concept of organizational culture has originated in the cultural anthropology and has become popular in the study of organizational behavior and the business management [83]. In general, organizational culture refers to the set of values and beliefs that provide norms of behavior for the members of an organization [84]. Organizational culture can be defined as: "the collection of traditions, values, policies, beliefs, and attitudes that constitute a pervasive context for everything we do and think in an organization (p. 1)" [85].

Empirical evidence suggests that organizational culture plays a significant role in organizational effectiveness [83] and knowledge development [86]. And, culture strongly influences the employees' behavior beyond control systems, procedures, and official authorities [87]. Therefore, the organizational culture becomes a powerful tool to obtain the results that are

expected by the administration [88]. The culture of an organization is a junction of different cultural orientations [89], which allows the analysis of the various types of cultures in organizations. In line with these approaches, project management generates a project culture that develops values that drive the project.

In the words of [90], "great projects create a revolutionary project culture. The execution of great projects often requires a different project culture, which can spread to an entire organization (p. 20)." Project culture facilitates learning and drives innovation and change, which would mean that the project culture has traits of a culture of learning and innovation, but also develops other values such as trust and commitment.

The learning culture has been defined as the culture that is oriented to the promotion and facilitation of workers' learning, to their participation and diffusion, and to their contribution to organizational development and performance [91]. The learning culture has a significant role in the organizational learning development and in mechanisms that reinforce learning [92, 93]. In this sense, literature revision about learning strengthens the idea that a learning culture is critical in spreading the lessons learned [94, 95].

An important aspect that characterizes a learning culture in a project is the acceptance of errors as a learning process. Repeated mistakes are a characteristic of organizational life [96] and generally make part of this. Learning from experience within an organization should be public, a recorded activity. The author is strongly in favor of postproject reviews. In general, the learned lessons about tasks that had major problems are recorded at the end of the projects. The "learned lessons" documented from past projects become an unpriced source of knowledge in project management. It is quite remarkable that these failures, the lessons that were learned, are fed into an appropriate system and available for consultation by the team.

In spite of being considered important, sometimes the registration of mistakes and failures are not recorded. According to studies of [97] also confirmed in Ref. [96], the main reason for this kind of inaction is pointed out as a lack of employee time. But, the author adds more reasons such as lack of management support and lack of incentive, resources, and clear guidelines. Nevertheless, it is recognized that the wise record can provide time and save energy, besides optimizing. Also, it is an outstanding and unparalleled opportunity for project managers to learn from mistakes not only from others but also from their mistakes and, from there on, to act upon the lessons learned.

Innovation is of great importance to project management. In fact, [98] point out that a project is a primary source for implementing changes. According to [99], there is a tendency in the project management literature to equate the project with an innovative organization, which makes innovation management a success factor for the project [100]. For all this, an innovative project develops a culture that stimulates commitment and behavior toward innovation. Innovation is a process of transforming opportunities into practical use [101]. In general, companies with a greater capacity for change will be able to respond more efficiently to changes in the environment and achieve a sustainable competitive advantage [102]. For this reason, [103] point out that companies need to improve their innovative culture so that all members seek new products, services, or processes.

Values that characterize a project culture are related to those benefits of learning and innovation but are also distinguished by the trust [5] and commitment [104], especially if one considers the uncertainty that sometimes surrounds the management of projects. Risk arises from the factors associated with the project [105], for example, uncertainty in the level of performance of project members, the quality and reliability of the work undertaken, and the alignment of the objectives of each part.

4.3. Structure of a learning project

The organizational structure represents a set of expectations about whom, what rules and procedures should be followed, how decisions are made, and what control should be used [106]. A mechanistic structure provides formalized prescriptions about how members relate to each other and complete their work. Overall, differences in organizational structure can range from flexible, informal, loose, and decentralized operations to rigid, formal, restricted, and centralized services [107].

The organizational management of the project comprises the set of essential components for the administration of the project [108, 109]. The management of organizational projects differs from the level of organization, as it covers the entire organization, including all groups, operations, and projects. Corporate design is then present in three tiers [110]: organization, management of organizational projects, and projects. In this research, we focus on project management. In this sense, the organization chart of a project refers to how the project organization is designed, what competencies are involved, how the work is shared, and how responsibility is assigned [111].

In general, contingency theory represents an important pillar in the study of organizational design [112]. The fundamental idea of this theory is that activities should be organized differently depending on certain exogenous contingency factors. The scientific concern is limited to adequate parameters of contingency, as pointed out by [113], and some studies emphasize the environmental dimensions as the market and others focus on the technology used. This theory has also been valid for the design of projects as [114] pointed out, for which the dimension design of the project is divided into three subdimensions:

- Strategy and structure, representing the permanent environment that is temporarily linked to an organization,
- Management project and team project, including methodologies, tools, and standards applied to the project, and.
- Culture and social processes, which encompass relationships and interactions between people working in and with projects, as well as relationships between projects.

At the design stage, especially to significant and complex projects, the primary challenge is to coordinate the many specialist technicians involved [115]. The coordination of a project requires the exchange of information between members [116], which sometimes becomes complex, especially if it involves coordinating multidisciplinary teams [117].

Communication is a significant factor that contributes to the success of the project [118], for example, communication is crucial for controlling time and cost [24]. Poor communication among project members is one of the leading causes of complications arising during the process of a project [119–121]. For this reason, communication management is essential in projects. Management of communication in projects involves activities that facilitate the creation, distribution, and understanding of information [122].

4.4. Learning opportunities in a learning project

The term "learning opportunities" has a broad meaning; in fact, it could encompass culture and leadership as well as the learning structure [123]. However, this concept can be limited to learning opportunities related to training and development. We are referring to on-the-job training.

The importance of training is that employees acquire new knowledge and skills, as well as new ways of working and new tools. Training provides opportunities for employees to learn throughout their lives and also to develop a career path. On the other hand, the importance of training is also due to the increase in competitiveness, productivity, quality around the company, and the management of projects. Also, investment in training is one of the most important aspects when a project is intended to grow since training translates into productive human capital and an instrument that generates greater growth and performance for projects, which impact satisfaction of customers.

Training is one of the most valuable human resource tools for improving the productivity of workers, groups, and organizations as a whole, and it has been emphasized as an important means of learning in organizations [124]. Also, during the change processes, companies demand training to adapt their skills to the new needs arising from the processes of change [125]. In general, it has been noticed that training is a tool that facilitates innovation and change initiatives [126].

Investment in training has been considered as being very beneficial for the development of projects [127]; especially the importance of training for project managers has been emphasized [128]. Notably, two reasons why training project managers of projects are important have been highlighted [129]. The first reason is that basic knowledge of a project is quite broad; it covers an extensive set of areas of particular knowledge of project management; the project manager must have an in-depth understanding of industry, technology, and management issues, which are likely to be found in the projects. The second reason is that project discipline is both theoretical and practical, and it is not enough that the project manager has an abstract and conceptual knowledge of methods, tools, and management practices, and the director should also be able to apply this knowledge in complex operating environments. Therefore, education and training of project managers should be considered as a multidimensional and complex process. The study by [130] identified three main areas of intervention through training; the first is the development of critical thinking to manage complexity; the second is the creation of simple parameters to manage projects; and the third is the management of interpersonal skills rather than technical skills.

Given the unique characteristics of a project such as its duration determined in time and a particular context, sometimes it will be necessary to intervene directly and promptly in a learning problem or a new situation of change. In these cases, training must be immediate and adjusted to the problem and context, and this is what [131] call "just-in-time training" (JIT-T):

JIT-T means "as needed" training rather than accumulating an inventory of know-how that is lost over time. JIT-T indicates not only at the right moment but also just enough training, and in just the right context. JIT-T may also be considered as a rediscovery of on-the-job training in a self-paced manner [131].

Therefore, training and education have traditionally been considered as fundamental elements of project management [132]. Thus, research shows that training is a key factor in the implementation of projects [133].

5. Conclusion

5.1. Some references of human resource management in project management

Whether developing a system-wide strategic plan, promulgating an organizational development (OD) intervention, producing a new training curriculum, or supporting individual learning at work, human resource development (HRD) activities are more often organized in projects [134]. Project work has become increasingly prevalent in organizations around the world and is an important consideration for the success of the organization [135]. Project management has become an essential organizational competence [136]. As a project management research, the methodology and development of the theory have increased, so that corporate and investment in knowledge and project management personnel have improved [137].

"Human capital is of unique importance in today's economy because a growing number of organizations rely on their employee's knowledge-related capabilities versus their physical labor to achieve business goals (p. 4)" [138]. And undoubtedly, one must agree with the author that this is especially applicable and valid for project teams. As [139] point out, the success or failure of projects depends on the people who are involved in it, so human capital in project management is an important issue to analyze in the management of the projects [140].

The purpose of human resources in the project management area is to build a cohesive team to ensure that the project has the sufficient and suitable personnel, with appropriate skills and experience to fully contribute to the achievement and success of the project.

Some questions must be answered in the election of human resources in a project such as which sorts of resources are required, which number of resources is adequate for the tasks and deliverables, or even, the staff required and the time necessary for phase, what kind of skills are needed, how they will be acquired, and when and for how long they will be required.

Another answer that must be replied to is for instance what core skills, competencies, and experience the professionals need to present to occupy a variety of roles during a project.

Developing a human resource plan, acquiring, developing, and managing a project team are steeped and embedded actions in a project. Developing a project team is the process in which the project manager improves the competencies and team performance as a whole. On the other hand, in specific situations, as faced in developing countries, the shortage of human capital at managerial and executive levels may have unfortunate consequences for successful project completion and [141] have summarized the same in their findings. Management in the context of project management comprises actions such as leadership and team building.

5.2. Contributions of the work to the management of the projects

Following the perspective of the learning organization [36], this work has as main objective to propose a model of the learning project. The idea is that workplaces should encourage and motivate learning so that personal and organizational growth is achieved. But for learning to take place, a series of conditions or factors that influence learning should be facilitated. Among these factors, the following were highlighted: progressive leadership, cooperative teams, openness at work, a realistic workload, mechanisms to recognize staff, and participation in decision-making [142]. This work has developed based on these proposals.

The learning project we propose is based on four pillars related to nontangible aspects of strategy, leadership, culture, structure, and learning facilities. Leadership is the project guide that brings together the shared interests of the project and the leader of a project becomes a leader of learning [143]. Also, through leadership, a culture and a project structure are generated and consolidated. At the same time, structure and culture are interrelated, so an effective communication management plan (as part of the structure of a project) fosters a collaborative culture that in turn develops a cohesive project team [144], which in turn promotes participation in decision-making and lays the groundwork for learning in the project [24]. The last pillar of the model is continuous training. Training forms the basis of the model; thanks to the training, a full range of skills are developed that are necessary for the development of the project, which by its very nature is multidimensional.

In short, the model proposed is based on leadership [145]. Leadership drives a culture and a learning structure, and all this is consolidated through continuous training as a powerful means of learning throughout life.

Also, it would be required to consider that, although project management traditionally fits with a positivist epistemological framework, projects are often characterized as separate (to the "regular" organization) and temporary and the tasks that are performed focus on the unique objectives of the project [146]. However, teams are often socially and contextually intertwined beyond their host organizations and often pursue goals (stated or implicit) that

go beyond traditional measures of real projects such as personal learning, knowledge development, career advancement, or organizational cultural changes [147].

All these aspects should be considered in the development of the project, especially if you take into account that the basis for success or failure of projects depends on the people who are involved in it [139, 140]. The search for a balance between the objectives of the project and the interests of their participants can ensure a better outcome of the project.

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Chapter 5

Culture and Values Competence in International Investment Projects: HR Management Approach

Alexandr Kokovikhin

Additional information is available at the end of the chapter

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Abstract

This chapter aimed to identify the impact of labor force diversity on human resource (HR) management (HRM) in multinational enterprises, having investment projects in the countries of Eurasian Economic Union, and to propose recommendations which HR practices are effective in making use of diversity. The chapter shows that institutional theory and resource theory are the theoretical bases of diversity management. In practice, diversity management refers to the 'culture and values' competence, included in the ICB Project Management Knowledge Guide 4.0. Methodology research includes publication research, an in-depth analysis of semi-structure interviews with human resource managers and consultants. Interviews identify approaches and human resource practices in the Russian Federation, Kazakhstan and Belorussia: HR marketing attracts foreign workers mostly under pressure stemming from minority customers and the diversity market. They are predominantly recruited for blue-collar jobs, held rather lower management positions and provided few pro- motion opportunities. Besides, managers have not gotten competencies in diversity management, but they think that it is truly important for managing divers personnel, and they are ready for learning and using diversity management. Findings demonstrate as a business case. Besides, diversity management competences of managers and HR officers are representing as model of competences.

Keywords: culture and values competence, sociocultural diversity, human resource management, diversity management, international investment projects

1. Introduction

There are two main causes of great importance of diversity factor in economic development of Eurasian Economic Union countries such as Russian Federation, Kazakhstan and Belorussia.

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First of all, these countries had sustainable growth of international investment projects from the beginning of the twenty-first century. Second, there is a negative trend for decreasing economically active population. For example, rate of able-bodied population in total population in Russian Federation and such industrial region as Sverdlovsk oblast (4.5 million citizens) decline from 67.6 (64.2) to 64.0 (61.0)%. Unfortunately, it is a long-term trend. On the one hand, this can be explained by falling birth rates as a result of negative economic situation in the early 1990s. Another reason for reducing economically active population is low life expectancy and high incidence of disease, also resulting from the negative effects of transitional reforms (**Figure 1**).

The main human resource management (HRM) problems connected with ethnic and cultural diversity are the following:

(a) Differences in religious and cultural traditions. Different religions have different potentials for integrating into the Russian, European and American business culture. For example, the Hindus demonstrate a high level of tolerance which is preached in Hinduism and Buddhism. As SIETAR research shows that there are an average of 15% fewer conflicts between Hindu employees and Christian employees than the conflicts within the group consisting of only Christians. At the same time, the number of conflicts between Pakistani employees (Muslims by religion) and Christian employees, on the opposite, is 20% bigger than the average [1].

(b) Foreign employees' poor knowledge of the official language.

(c) Inflexible policies of the companies towards ethnic and cultural diversity.

As a result of these problems, potential productivity is not achieved, employee's creativity and innovative activity fall and staff turnover and evasion of performance increase.

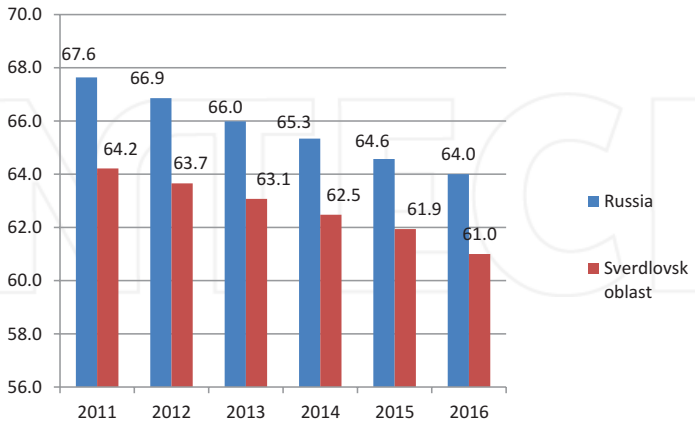

Figure 1. Rate of able-bodied population in total population (%).

The experience of solving these problems in the tradition of American and European management is represented by the concepts of managing social and cultural diversity (diversity management) and intercultural management (cross-cultural management). The research in the theory and practice of social and cultural diversity management held in the Sverdlovsk oblast became the basis for this article. The objective is taking into account the experience of the European Union countries to determine the prospects for developing practices of social and cultural diversity management in the organizations of the Sverdlovsk oblast which use foreign labor.

The tasks to be solved to achieve this goal are:

- Identifying the approaches in sociocultural diversity management and the types of managerial competencies required by employers who face sociocultural diversity of staff in the Russian Federation, Kazakhstan and Belorussia.
- Working out proposals and recommendations for the development of social and cultural diversity management practices in the organizations and culture and values competencies [2] of managers in international investment projects.

2. Theoretical basics of using the competence approach in the management of sociocultural diversity (diversity management)

The theoretical basis of social and cultural diversity management (diversity management) is the institutional theory, the resource theory [3] and the concept of 'competence approach' (competency-based management) [4].

Competence approach has a relatively short history of development—about 150 years; however, today it is the basis of the most advanced education systems, for example, the system of European education. Using the concept of competencies in HR management goes back to the early 1980s of the last century and is a response to organizational changes and the move towards higher levels of performance. Today, the use of competency approach in HR management (competency-based management) is a recognized method of management.

Competence-based approach is an approach to the description, assessment and development of the person within which the behavior of the person is considered to be the manifestation of his competences. In foreign scientific literature, there are three main directions of competence-based approach: American (behavioral), English (functional) and integration in France, Germany and Austria. The common things in these directions help to define 'competences' as behavioral characteristics which the individual must have or which he must acquire to effectively cope with the work [5].

Referring to sociocultural diversity management, the competence approach provides methods of evaluation, development, motivation and stimulation of the required competences of employees and managers. Describing the state of research in the field of sociocultural

diversity, it should be noted that the sociocultural diversity management is a relatively young industry, known little in Russia and in Eastern Europe. Its development is of great interest, because of the current problem for some ethnic groups to integrate in the Russian society and the issues of interaction with labor migrants, foreign partners in the WTO and foreign investors [6]. The management of sociocultural diversity (diversity management) as a separate direction in the personnel management (human resource management) originated in the USA and was a reaction to a common situation, when the company's staff consists of employees of different ages, nationalities, races, religions, etc. It is based on the principle that differences between people should not prevent their joint work [7].

'Diversity' may relate to various aspects: gender, age, color, religion, cultural differences, etc. In this article the focus is on cultural diversity and its specifics connected with employing foreigners and representatives of ethnic and religious minorities. Sociocultural diversity management is seen by many studies as the key strategic aspect of international companies. For example, in the work of the Canadian scientist of Indian origin Srinivas, it is noted that 'one of the key factors for the success and growth of global companies is that they have a global type of thinking, which includes such skills as curiosity, interest, recognition of the complexity and attention to diversity, the search for new opportunities, belief in progress, continuous improvement, long-term perspective and systematic thinking' [7]. In the work of Barkema, Baum and Mannix, the management of sociocultural diversity is considered as 'challenge of the time, the response to which will help companies to cope with diversity in international business, especially if the companies are able to cope with the undesirable consequences of diversity, such as interpersonal conflicts' [8].

Das and Parker note that there is no single correct or best way to manage sociocultural diversity. The authors prove the hypothesis that there are internal and external factors which define what approach to managing sociocultural diversity will be selected by the company, involved in international business. These authors propose the following typology of approaches to diversity management:

- Resistance—denying diversity and the need to manage it.
- Discrimination and fairness—discrimination of specific groups in the name of justice for all.
- Access and legitimacy—access to new markets is complicated without involving employees with different cultural, social and other characteristics; legitimacy refers to the trust that people have towards someone who looks and/or behaves in the same way as they do.
- Learning and effectiveness—forming the attitude to diversity in organizations that allows to incorporate different points of view of employees to improve the efficiency of individual decisions, strategies and rules helps to redefine the mission and change the corporate culture. In this approach, it is recognized that often the choices made by workers and the way they implement these decisions depend on their social and cultural background [9].

In the work of Shtykhno, there is a classification of methods of diversity management, based on the approaches Dass and Parker:

(a) Sustaining homogeneity

(b) Assimilating individuals

(c) Celebrating difference

(d) Acculturation and pluralism [1]

Thus, the higher the external pressure on the organization is and the higher it prioritizes diversity, the better this organization integrates diversity management into other organizational and production processes. The success of diversity management implementation depends on the corporate culture, business strategy and HR policy, which develop internal communications and affect the exchange of information and creativity. This has a positive impact on the employees' performance and, consequently, the performance of the company.

Kohan, Bezrukova and others' works describe the results of researches done to identify the effects of using the methods of diversity management:

- The efficiency of innovative management is directly proportional to the degree of racial diversity and gender balance.
- Staff development policy, including coaching, open communications and consultations with employees, reduces the negative impact of cultural differences on teamwork.
- In some areas intercultural diversity contributes to the business. Companies giving importance to the integration and training on the diversity management are more successful than homogeneous organizations that do not practice staff upgrade training.
- The effectiveness of the approach depends on the size of the group. In large groups or organizational units, diversity matters more than in small ones.
- Contrary to popular belief, the diversity in the team does not necessarily help to attract diverse customers [10].

Analysing the experience of German companies, Ziegert notes that 'an acute shortage of competencies in the field of intercultural communication is mainly experienced by companies operating internationally' [11]. The role of intercultural competences is considered within a separate concept of management—'intercultural management'. Intercultural management issues refer to those organizations that 'employ foreign workers, as management needs to take into account their motivation system' and 'transnational corporations… which should take into account the cultural specifics of different countries in adapting the management style practiced by the company headquarters' [12]. An ability to effectively interact with different cultures is an important criterion for highly qualified specialists and, as a consequence, the success factor in creating innovation and the growth of economic well-being, entering new markets and preserving the existing markets. Based on the above-mentioned results of the research in the USA, Florida introduces a new formula for economic growth, 'describes it as the so-called "Three Ts": Technology, Talent and Tolerance, which contribute to economic development, market attractiveness and competitiveness' [13].

3. Study of sociocultural diversity management practices in the Russian Federation, Kazakhstan and Belorussia

A study of administrative practices in the organizations of the Russian Federation, Kazakhstan and Belorussia experiencing sociocultural diversity was held in the first half of 2017. The researchers used the methodological approach proposed by Professor Dvořáková [14]. The methods included the accumulation of data and information using multiple methods: analyzing scientific publications and conducting semi-structured interviews and observation. The data included both historical and present-day information about the given social sphere. The reasons for using specified methods are connected with studying the social phenomena: national culture, values, behavior and HR management practices. Thus, the collection, selection and analysis done by using the methods of interpretation (reveal ideas (meanings) generated in human economic activity show the sphere for their implementation) provide the basis for achieving visible results and developing recommendations. These methods are used in the in-depth analysis of data obtained from semi-structured interviews with managers and HR specialists to explore approaches and practices in the field of diversity management in the national cultural environment as in the business model.

The object of the research on diversity management practices in the Russian Federation, Kazakhstan and Belorussia was the 74 organizations involved in the three types of activity that provide employment to more than 80% foreign workers (**Table 2**):

- Manufacturing—14 organizations (number of employees over 1000 people)
- Construction—24 organizations (number of employees over 100 people)
- Wholesale and retail trade—26 organizations (number of employees over 200 people)
- Other community, social and personal services—10 organizations (number of employees over 200 people)

If respondents from Kazakhstan and Belorussia were all countries location, than such from Russian Federation were locate in Sverdlovsk oblast. Sverdlovsk oblast is traditionally an industrial region with diversified economy and developed labor market. Structure and dynamics of Sverdlovsk oblast labor market are such as structure and dynamics of Russian labor market. In terms of ethnic diversity, Sverdlovsk oblast holds one of the leading positions in Russia. There are 160 ethnic groups living in the region. According to the all-Russian census of 2010, the Russians make up the significant majority in the population of the Sverdlovsk oblast (3,684,843 people)—85.7% of all the local population, that is, 90.6% of those people who identified their ethnicity. The second largest ethnic community in the region is the Tatars (143,803 people)—3.3% of all the local population in the region. The third largest ethnic community is the Ukrainians (35,563 people)—0.8% of all the local population in the region. The Bashkirs make up the fourth largest community. There are 31,181 representatives of this ethnic group living in the Sverdlovsk oblast. The Mari people take the fifth position; their number is 23,801 people. These are followed by the Azerbaijani, Udmurts, Belarusians, Armenians, Tajiks, Chuvashes, Kirghiz, Mordovians, Jewish, Germans and others.

Three cultures defined the ethnocultural distinctness of the Sverdlovsk oblast—Finno-Ugric (Mansi, Udmurts, Mari, Mordovians), Turkic (Tatars, Bashkirs) and Slavic (Russians, Ukrainians, Belarusians). Besides, Sverdlovsk oblast is one of the multireligious regions of the Russian federation. As for 01.01.2016, there are 770 religious organizations which represent 20 world religious denominations. There are also more than 100 ethnocultural organizations and 22 ethnocultural autonomies. From 2011 to 2014, there was an annual growth in the number of non-resident labor force in the Sverdlovsk oblast. So in 2011, the number of non-resident labor force was 61,757, and in 2014 this figure was 80,169 (an increase of 129.8%). There was such an increase due to the growing number of non-residents working in the Sverdlovsk oblast on the patents (from 16,133 people in 2012 to 56,446 people in 2014) (**Table 1**).

In 2015, the number of patents granted to work decreased to 46,000 (by 28%). But it should be taken into account that in 2015–2016 the previously granted work permits are still valid: some categories of people continue working in Russia on permission. There are also some people who chose not to formalize their employment because of the cost of procedure (13.2 thousand roubles) and problems with law. Taking into account all the above-mentioned categories of people, the Federal Immigration Service Office in the Sverdlovsk oblast registered 313,621 foreign citizens in 2015 (337,955 in 2014). Mostly, these are citizens of Tajikistan, Uzbekistan, Kyrgyzstan, Vietnam and China.

The respondents were 82 line managers and HR managers who filled in questionnaires or took part in semi-structured interviews on the questionnaire. The questionnaire aims to identify HR management practices which are used when the staff consists of foreign workers and native citizens from ethnic and religious minorities. Besides, it measures managerial competences in the field of diversity management and cross-cultural management, as well as understanding the need to acquire (deepen) these competencies (**Table 2**).

The study showed prevailing practices of recruiting citizens of Russia coming from ethnic and religious minorities for jobs that require both unskilled and highly skilled labors. One hundred percent of employers confirmed the use of such practices. None of the respondents mentioned the cases of any conflicts related to sociocultural differences between the citizens of the Russian Federation.

The results of our study are consistent with the results of a study conducted by the centre for the promotion of ethnocultural associations under the Urals State Mining University in 2012. The research theme was 'The attitude of members of ethnic and cultural public associations to the development of ethno-religious relations in the Sverdlovsk oblast'. Of the 388 respondents representing 70 ethnic and cultural associations of the Sverdlovsk oblast, 94% of respondents assessed the level of relations between the representatives of different peoples in the Sverdlovsk oblast as 'satisfactory', 'good' or 'very good' [15].

The results of the studies conducted in the Russian Federation, Kazakhstan and Belorussia differ significantly from the results of the study on diversity management practices organized by the group of Professor Korgova in the republics of the North Caucasus. The study revealed that 80% of organizations work under multinational management teams. However, 92% of CEOs prefer to choose the management team and employees representing one ethnicity [16].

Indicator	All foreign workers and people/share of employment in the economy (%)				Deviation (%)		
	2011	2012	2013	2014	2012–2011	2013–2012	2014–2013
The number of foreign workers residing in the Sverdlovsk oblast	61,757 (2.79)	62,872 (2.93)	63,056 (2.93)	80,169 (3.74)	101.81	100.29	127.14
By types of activity							
Agriculture, hunting and forestry	2545 (2.45)	978 (1.34)	795 (1.42)	1431 (2.12)	38.43	81.29	180.00
Mining	—	—	69 (0.11)	6 (0.01)	—	—	8.70
Manufacturing	6320 (1.26)	4834 (0.99)	5289 (1.11)	4480 (0.93)	76.49	109.41	84.70
Construction	13,640 (10.04)	9168 (6.88)	9148 (6.88)	5298 (3.99)	67.21	99.78	57.91
Wholesale and retail trade; repair of motor vehicles, motorcycles, household goods and personal utensils	13,601 (3.84)	7248 (2.16)	4999 (1.48)	5956 (1.77)	53.29	68.97	119.14
Transport and communications	2647 (1.24)	2140 (1.02)	2381 (1.15)	1920 (0.95)	80.85	111.26	80.64
Financial activities			3 (0.01)	6 (0.02)	—	—	200.0
Education	—	—	17 (0.01)	10 (0.01)	—	—	58.82
Other community, social and personal services	6871 (10.16)	5165 (7.63)	5618 (6.91)	4576 (5.94)	75.17	108.77	81.45
The number of foreign workers engaged in labor activities in the Sverdlovsk oblast on the basis of a patent	16,133	33,339	34,639	56,446	206.65	103.90	162.96
Individuals	16,133	33,339	34,639	56,446	206.65	103.90	162.96
Legal entities	—	—	—	—	—	—	—

Source: http://www.sznural.ru/content/статистика%20и%20аналитика.

Table 1. Dynamics in the number of foreign workers who received work permit or a patent in the Sverdlovsk oblast in 2011–2014.

Meanwhile, the majority of managers and HR specialists (90%) do not consider it necessary to address the special social and cultural competences in managing employees who are the citizens of the Russian Federation representing ethnic and religious minorities. This result may be explained by insignificant differences in labor and consumer behavior of the Russian Federation citizens representing different ethnic and religious groups.

No	Questions
1	Are foreign workers of only one ethnic group or different ethnic groups recruited for unskilled/skilled/highly skilled jobs?
2	Were special social and cultural competences taken into account when deciding to recruit foreign workers?
3	Are foreign workers' special social and cultural competences considered in your organization's foreign labor management?
4	Were there any cases of conflicts in your organization caused by social and cultural differences of foreign workers?
5	Does your organization provide unskilled/skilled/highly skilled jobs to the Russian Federation citizens representing ethnic and religious minorities?
6	Are special social and cultural competences taken into account in the management of the Russian Federation citizens representing ethnic and religious minorities?
7	Were there any cases of conflicts caused by the social and cultural differences of the Russian Federation citizens representing ethnic and religious minorities?
8	What is the most challenging management problem related to staff diversity? What management functions were carried out to solve this problem?
9	Are social and cultural diversity values part of your organization strategy?
10	What is the willingness of the heads of departments to take effective decisions which take into account sociocultural diversity of the staff?
11	What experience (competencies) have you received, working with the representatives of another culture?
12	Are you familiar with the methods of diversity management and cross-cultural management? What activities did you organize (participated in) to create the competencies and understanding of sociocultural diversity problems?
13	Do you consider it necessary to deepen professional knowledge in the field of diversity management and cross-cultural management?

Table 2. Questions for analyzing the diversity management practices in the Russian Federation, Kazakhstan and Belorussia.

The situation with foreign workers is radically different: 100% of respondents recruit foreign workers for unskilled jobs, only 30% hire foreign workers for skilled jobs and none of the respondents confirmed hiring foreign workers for highly skilled jobs.

Sixty-seven percent of respondents spoke about the past or present conflicts between managers and foreign employees as well as conflicts between foreign workers and nationals of the Russian Federation caused by sociocultural differences of the foreign workers. This result is also consistent with the research data of the centre for the promotion of ethnocultural associations under the Urals State Mining University, in which 58% of respondents assessed the impact of the inflow of migrant workers on ethnic and confessional relations as 'increasing tension' and 'bringing a lot of harm'.

However, 54% of respondents noted taking into account particular social and cultural competencies when deciding to employ foreign workers. The proportion of foreign workers employed in construction was 80%, and the proportion of those employed in sales was 67%. Foreign workers employed in the utilities and manufacturing industries accounted for less than 50%.

All respondents agreed on the necessity of and confirmed the fact of taking into account foreign workers' special social and cultural competences in the organization's management practices.

Among the most serious management challenges related to staff diversity, there were organizing internal communications (poor knowledge of the Russian language by foreign workers, lack of work contact with the employees who are the citizens of the Russian Federation), increasing the loyalty of foreign workers. Among the measures being taken, there were organizing trainings of foreign workers in the Russian language and culture (required by the Russian legislation).

Eight respondents (10%) proved to be familiar with diversity management methods and cross-cultural management. However, no special events aimed to create competences and understand sociocultural diversity challenges which were held in the organization. The values of sociocultural diversity were not part of the organization's strategy.

All the respondents noted the need to deepen professional knowledge in the field of diversity management and cross-cultural management.

4. Culture and values competence of managers

Eight respondents, which were competent in diversity management, note that competences are important for managers in organizations with sociocultural diversity of staff (**Table 3**).

No.	Group of competences	Competences	Respondents (%)
1	Managerial competence	• Recruitment and selection of staff, taking into account sociocultural competences	100
		• Controlling and assessing sociocultural diversity of staff	100
		• Motivation and stimulation of sociocultural competencies	100
2	Basic social competence (soft skills)	• Openness and interest in the new	50
		• Flexibility and respect for other people and other cultures	100
		• The ability to adjust themselves to the changing circumstances of another culture	75
		• The ability to act successfully in a new cultural context	75
3	Communicative competence	• The ability and desire to communicate effectively, taking into account the sociocultural diversity of the staff	100
		• Style of communication, taking into account sociocultural diversity of the staff	75
4	Knowledge of national culture (hard cultural skills)	• Knowledge about the national characteristics	100

Table 3. Culture and values competence of managers in international investment projects.

http://dx.doi.org/10.5772/intechopen.72183

Results of this researching show that competences in nowadays management of diversity are more important for managers and HR specialists (75–100% of respondents) than competences in development of diversity (50–75% of respondents).

5. Recommendations for diversity management in the organization

Based on the labor legislation, experience of managing sociocultural diversity in leading multinational companies and research into diversity management practices in the Sverdlovsk region, we recommend taking into account the following measures to develop diversity management practices:

- To include the sociocultural diversity management in the HR policy of the organization (**Figure 2**)
- To conduct an audit of HR policies and processes to avoid discriminatory conditions
- To collect and analyze information about the sociocultural environment in the organization
- To develop the policies and techniques of diversity management (including them in the planning, recruitment, selection, training and development of the staff and in the performance management, motivation and stimulation, wage and labor relations)
- To organize staff training in the issues of sociocultural diversity
- To provide information support to the initiatives in the field of diversity management

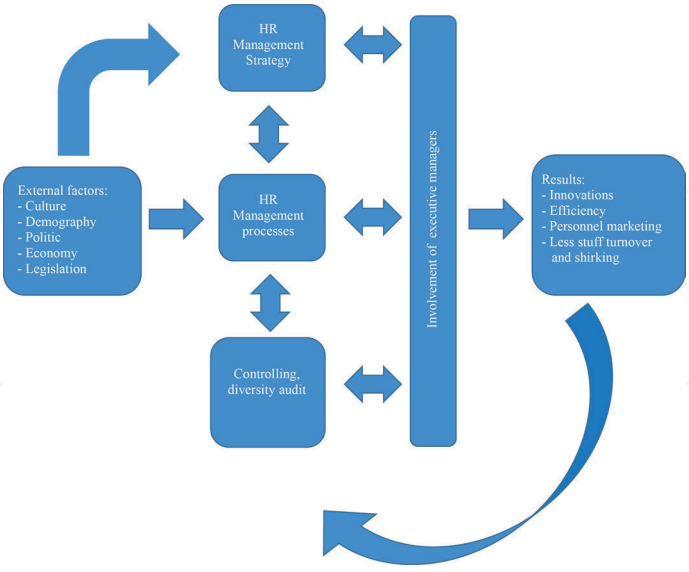

Figure 2. Sociocultural diversity in HR management system.

- To increase the involvement of employees representing ethnocultural minorities, through special training and organizing intra-network of communications
- To organize the popularization of diversity management practices using informal internal communications

6. Conclusion

The desire to respect and to strengthen cultural diversity in the company is motivated not only by ethical but also purely rational considerations, a direct count on success. It comes to those companies who understand that competitive challenge in dynamic global markets requiring constant innovation and creativity, organizational flexibility and adaptive capacity should better be responded by combining the experience and knowledge of the multinational team.

Such a strategy becomes a powerful motivating tool that can greatly facilitate the implementation of the diversity management system in the enterprise. The task of management is to create the framework conditions in which the enterprise could live and work on the principles of respect for human dignity and respect for human rights and recognition of people of a different culture as equal partners. Diversity management requires, on the one hand, to recognize the value of the 'diversity' phenomenon and, on the other hand, to be prepared for 'cultural transformation', for creating and strengthening the corporate culture which stimulates the differences.

A study of management practices in organizations of the Sverdlovsk oblast showed the absence of conflicts related to sociocultural differences between citizens of the Russian Federation representing ethnic and religious minorities. None of the respondents spoke to them. At the same time, the study revealed conflicts between managers and foreign employees, as well as between foreign workers and workers who are citizens of the Russian Federation. All the respondents agreed on the necessity of and the fact of taking into account special social and cultural competences of foreign workers when developing management practices in the organization.

Among the most serious management challenges related to staff diversity, the respondents identified organizing internal communication (foreign workers' poor knowledge of the Russian language, lack of worker contact with the employees who are the citizens of the Russian Federation), increasing the loyalty of foreign workers.

A study of management practices in socially and culturally diverse organizations of the Sverdlovsk oblast revealed the managers' and specialists' lack of knowledge in the field of diversity management. At the same time, managers and professionals realize the importance of the problems to be solved using the methods of diversity management and the need to deepen the knowledge in this area and put it into practice.

The diversity management within the framework of traditional HR management processes provides a significant economic effect. Thus, an important objective of diversity management is developing the methods of HR management based on the use of staff diversity. The use of these methods in practice makes the staff diversity management one of the directions of the organization's HR policy.

Further research in the field of diversity management requires the surveys of foreign workers' opinions on the management methods. It requires building the models and profiles of socio-cultural competences of managers and specialists as well as in-depth studying the specific processes of managing socially and culturally diverse staff.

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Chapter 6

Traceability of Intra- and Interpersonal Skills: From Education to Labor Market

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Additional information is available at the end of the chapter

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Abstract

Both educators and employers agree there is a growing gap between competences that labor market expects from its new employees and skills they own. Literature review holds that a set of nontechnical, professional abilities and intra- and interpersonal attitudes are required to close this gap and indicates that more training of soft skills is needed to access employment and success in work life. Although these skills are theoretically included in educational stages, project management approach can be incorporated to improve students and new employees' practical curricula. The methodology consists of the critical review of the competency frameworks established by the DeSeCo and Tuning projects, confronting them against the requirements currently demanded by labor market, based on the reports of Deloitte, PwC, EY, and KPMG, to detect inconsistencies between educational and professional stages and check if project management standards, by PMI and IPMA, cover them. Compiling these weaknesses, actions can be established aimed at solving them, based on project management proposals. The incorporation of project management concepts into educational stages, especially the vision by competences, contributes to improve the employability by highlighting those transverse but essential skills that lead to versatile and successful professionals. To achieve this, it is necessary to care for human competences.

Keywords: intrapersonal competences, interpersonal competences, soft skills, twenty-first century skills, DeSeCo project, Tuning project, IPMA ICB, PMI PMCDF

1. Introduction

In the knowledge society, as van Laar et al. expose [1], organizations operate in a global economy characterized by an intense competition, interdependence, and collaboration.

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For Sliter [2], economic, demographic, and technological changes have ushered in a revolution of globalization and rapid innovation, needing a method of describing requirements to accommodate this unpredictability.

Besides, as Neubert et al. hold [3], in modern organizational work environments, the classic career approach has broadly been replaced by new paradigms that minimize organizational factors and stress the importance of an individual set of skills, including transversal ones.

In this environment, as Rodriguez et al. argue [4], competency modeling's inherent adaptability allows it to easily adapt complex, changeable positions, and the nonroutine and interactive tasks required therein. For Bonilla [5], the competence-based education (CBE) has multiple applications for the development of people, organizations, and society, as a whole, highlighting the link between education and labor.

Education programs aim to prepare students for the workplace, as Rainsbury et al. conclude [6], by developing generic and specific competencies useful to students and employers.

2. Scope

This chapter studies the traceability of intra- and interpersonal skills demanded by labor market from educational stages, investigating how project management by competencies approach can help to correct the gaps detected through continuous formation programs, ready to success into the labor market in a dynamic and changing context.

The research is focused on the Latin America countries, Portugal, and Spain, from their regulatory frameworks to practical research studies.

2.1. Objectives

The main objective is to establish a traceable sequence of every intra- and interpersonal skill demanded by the workplace, checking if it is legally collected during learning phases, developed in training and properly applied to working life, like **Figure 1** shows. Likewise, other goals are:

- To contrast that focusing on competency project management approaches is an effective method to implement transversal skills in students and new employees, improving their satisfaction, productivity, and efficiency
- To establish a theoretical framework of intra- and interpersonal skills, which should be taken into account in order to currently succeed into the labor market, ready to be collated, by statistical study and/or case study in future research.

2.2. Methodology

The methodology consists of the critical review of the competency frameworks established by scientific literature, from three points of view: education, project management, and workplace.

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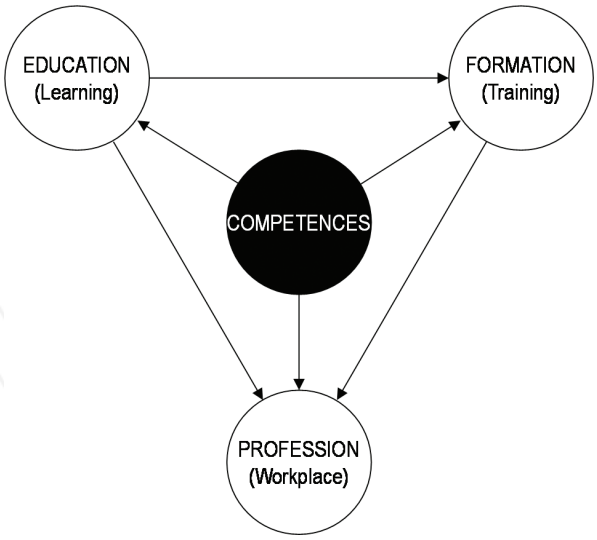

Figure 1. Research framework.

In educational stages, Definition and Selection of Competencies (DeSeCo) Project of the Organization for Economic Co-operation and Development (OECD), during the preuniversity period, and the Tuning project for the European Higher Education Area (EHEA) and América Latina Formación Académica (ALFA), at the university stage, offer and develop the legal framework in which stakeholders have to act. These approaches will be compared and contrasted to topic researches.

Project management by competencies, in this investigation, has a double meaning. On the one hand, it is an emerging profession and, on the other, thanks to its intrinsic transverse and humanistic condition, it covers management requirements in any sector. From the analysis of standards, baselines, knowledge bodies, and frameworks of the two oldest organizations in project management, both the International Project Management Association (IPMA) and the Project Management Institute (PMI), intra- and interpersonal skills and competences are collected and prioritized according to topic researches.

Based on the reports of the most prestigious consulting firms, Deloitte, PricewaterhouseCoopers (PwC), Ernst & Young (EY), and KPMG, the intra- and interpersonal skills most demanded by labor market are filtered and endorsed by topic researches.

With this method, inconsistencies between educational and professional stages are detected, so that improvement actions can be proposed from project management.

3. State of the art

Cleary et al. define employability skills as generic capabilities, key skills which play a significant role in contributing an individual's effective and successful participation in the workplace [7].

In this context, for Gibb [8], generic skills are essential for employment and personal development, fulfillment, community life, and active citizenship. These skills must own, in order to be useful, these characteristics:

- Preparing for employment
- Emerging at entry levels within industry, thanks to be generic
- Equipping individuals to participate effectively in workplaces and adult life
- Being able to be learned
- Being amenable to credible assessment

3.1. Concept of intra- and interpersonal skills

Hard skills can be defined as the specific knowledge and abilities required for a job. However, soft skills are much more difficult to define and measure. They are the interpersonal (people, social) skills that help oneself to successfully interact with others in the workplace, and interpersonal (human, individual) skills that allow oneself to know, understand, and manage own cognition and emotions. In **Table 1**, some definitions from literature are presented:

In summary, soft skills are social abilities and individual attributes, which can also be called as twenty-first century skills by many authors, such as Kraiger [14], Gibb [8], Nealy [15], Gewertz [16], Ziegenfuss [17], Hodge and Lear [18], Suto [19], Soland et al. [20], Hayes [21], Davis [22], Neubert et al. [3], Su et al. [13], Schooner et al. [23], or Ali et al. [24].

For the Collins English Dictionary, Desirable qualities for certain forms of employment that do not depend on acquired knowledge, among are included the common sense, the ability to deal with people, and a positive flexible attitude.
For the Oxford Dictionary, Personal attributes that enable someone to interact effectively and harmoniously with other people.
For Rainsbury et al. Behavioral skills required for the application of hard skills and knowledge in organizations.
For Perreault, Personal qualities, attributes, or the level of commitment that allow an individual to distinguish from others who may have similar skills and experience.
For James and James, Set of abilities or talents that an individual can bring to the workplace.
For Bonilla, Application of practical knowledge through physical and intellectual skills and abilities, with respect to criteria or standards of expected performance.
For Su, Golubovich, and Robbins, Group of constructs that are used to refer to important predictors of readiness and success in the workplace across multiple domains of individual differences and beyond the knowledge acquired in formal education.
Extract of [5, 6, 9–13].

Table 1. Definition of soft skills.

3.2. Soft skills in educational stages

In the educational context, Cullen defines competence as complex integrated capacities, in different degrees, in which education must train individuals so that they can operate as responsible subjects in different situations and contexts of their social and personal life, knowing how to see, do, act, and enjoy properly, assessing alternatives, choosing appropriate strategies, and taking responsibility for the decisions taken [25].

Besides, as Ali et al. highlight [24], education requires the integration of relevant content, skills, and instructional support to enhance knowledge processes in line with twenty-first century employability requirements. However, authors, such as Gewertz [16], Bronson [26], Klaus [27], Mitchell et al. [28], or Tan et al. [29], among others, conclude that current students (future employees) do not have the set of soft skills they need to be successful in workplace.

In fact, the lack of soft skills may truncate promising careers with technical abilities and professional expertise but with no human qualities like Klaus affirms [27]. Likewise, as Nabi and Bagley expose [30], recent graduates tend to rate the importance of generic transferable skills more highly than their own ability in those ones.

Even the International Youth Foundation (IYF) publishes the gap among students' characteristics and employers' demands is increasing, due to the lack of soft skills, which is avoiding the achievement and success of the majority of entry-level candidates [31].

Soft-skills education has been overshadowed by the quantitative focus in most educative programs, despite the weak relationship found between curricula and career success, as Laud and Johnson asseverate [32]. Likewise, as Hassan et al. conclude [33], soft skills have been very difficult to embed in teaching and learning courses.

However, as Low et al., Vázquez and Liesa discuss [34, 35], through a review of academic programs, it is possible to improve the acquisition of these transversal skills students are going to need in their professional and personal lives. In this regard, Tito and Serrano remark the importance that universities prepare students in soft skills and graduate with tools that add a differentiating advantage that allows them to compete in the labor market and generally maintain a high sense of well-being with themselves [36].

3.2.1. DeSeCo project for preuniversity stage

The DeSeCo project of the OECD defines competencies as the abilities to successfully meet complex demands in a particular context, implying the mobilization of knowledge, cognitive, and practical skills, as well as social and behavior components such as attitudes, emotions, and values and motivations [37].

In a holistic notion, according to the conceptual framework of DeSeCo, if competency is not reduced to its cognitive dimension, it has a broader meaning than a skill.

Key competencies shown in **Table 2**, as OECD remarks [37], are not determined by arbitrary decisions about what personal qualities and cognitive skills are desirable, but by a careful consideration of the factors required for a successful life and a well-functioning society.

Use tools interactively	Interact in heterogeneous groups	Act autonomously
Use communication skills effectively	Be empathetic	Understand patterns
Access adequate information sources	Manage emotions	Have an idea of the system
Evaluate the value of information	Present ideas and listen to others	Identify action consequences
Organize knowledge and information	Understand debate	Choose among available options
Use technology	Construct tactical alliances	Define projects and set goals
—	Negotiate	Evaluate necessary resources
—	Make decisions	Balance resources to meet goals
—	Analyze issues and interests	Learn from past actions
—	Identify areas of agreement	Monitor progress
—	Reframe the problem	Understand own interests
—	Prioritize needs and goals	Know rules and principles
—	—	Construct arguments
—	—	Suggest alternative solutions

Extract of [37].

Table 2. Key competencies of DeSeCo project.

DeSeCo also sets a conceptual context for assessment by the Programme for International Student Assessment (PISA), considering their criticity according to three criteria:

- Contribution to highly valued outcomes at an individual and societal level
- Instrumentation for meeting important, complex demands and challenges
- Importance for all individuals, not just for specialists

In the Latin America, Portugal, and Spain contexts, only Chile, Colombia, Mexico, Spain, and Portugal are members of the OECD, being Brazil a partner and Costa Rica a guest. However, an OECD regional initiative covers the whole Latin American region.

In **Table 3**, OECD PISA 2015 results are shown [38]. It´s observed a level of performance and resilience below the average, which contradicts with the levels of motivation, interest, and enjoyment.

3.2.2. Tuning project for university stage

Tuning project defines a competence, into an integrated approach, as the capability to execute the degree of preparation, sufficiency, and/or responsibility for certain tasks [39]. Also defines it as a dynamic combination of knowledge, understanding, skills, abilities and values [40] and as the capacities that all humans need to resolve the situations that arise in their lives effectively and autonomously [41]. To understand this concept of competence properly, it is necessary to include knowing how to:

- Understand: theoretical knowledge of an academic field
- Act: practical and operational application of knowledge to certain situations
- Be: values as an integral element of the way of living in a social context

EHEA and ALFA Tuning projects propose a methodology [40, 41], whose framework is designed to understand and compare the curricula, based on these five approaches:

1. Generic competences
2. Specific competences
3. Learning, teaching, assessment, and performance
4. Role of European Credit Transfer System (ECTS) as an accumulation system
5. Role of quality enhancement in the educational process

Within this context, Tuning classifies generic competences, as **Table 4** shows into three groups:

- Instrumental (cognitive abilities, methodological capacities, linguistic skills, and technological capabilities)
- Interpersonal (individual abilities and social skills)
- Systemic (abilities and skills concerning whole systems)

Rank		Performance	Efficacy	Enjoyment	Interest	Motivation	Resilience
—	OECD average	49%	24%	60%	53%	65%	29%
23	Portugal	50%	31%	73%	66%	72%	38%
30	Spain	49%	23%	61%	58%	68%	39%
38	Argentina	47%	31%	52%	—	66%	15%
44	Chile	44%	19%	67%	54%	68%	15%
47	Uruguay	43%	23%	64%	54%	72%	14%
53	Trinidad and Tobago	42%	37%	71%	—	78%	13%
55	Costa Rica	42%	24%	78%	60%	77%	9%
57	Colombia	41%	24%	79%	67%	78%	11%
58	Mexico	42%	27%	76%	70%	80%	13%
63	Brazil	40%	27%	77%	62%	81%	9%
64	Peru	39%	29%	79%	71%	85%	3%
70	Dominican Republic	34%	36%	84%	80%	82%	1%

Extract of [38].

Table 3. OECD PISA 2015 results.

Instrumental	Interpersonal	Systemic
Analysis and synthesis	Criticism and self-criticism	Applying knowledge in practice
Organization and planning	Teamwork	Research
Basic general knowledge	Interaction with technical experts	Learning
Communication	Working in heterogeneous teams	Adaptation to new situations
Elementary computing	Appreciation of diversity	Creativity
Information management	Working in international context	Leadership
Problem solving	Ethical commitment	Judgment of cultures and customs
Decision making	Motivation	Working autonomously
—	Cooperation	Project design and management
—	—	Initiative and entrepreneurial spirit
—	—	Concern for quality
—	—	Will to succeed

Extract of [39].

Table 4. EHEA and ALFA tuning project competences.

Tuning EHEA includes Portugal and Spain and Tuning ALFA counts with the participation of Argentina, Brazil, Bolivia, Colombia, Costa Rica, Cuba, Chile, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.

3.3. Soft skills in project management

Projects, as Jensen et al. affirm [42], have become omnipresent not only in economy but also in society. In fact, both DeSeCo in the preuniversity stage (defining projects and setting goals) and Tuning in the university stage (designing and managing projects) include projects in all students' curricula.

The importance of both hard skills (relating to processes) and soft skills (dealing with people) is widely recognized in project management (PM), as Azim et al. and Ahern et al. explain [43, 44], being managers, individually, responsible for balancing and optimizing their application. Chipulu et al., in the context of PM, extract six dimensions for them [45]:

1. Industry-specific and generic skills over project management knowledge/expertise
2. PM knowledge/expertise over industry-specific and generic skills
3. Managerial (senior) skills
4. Personal (positive) traits
5. Project management methodology experience and professional qualifications
6. Risk management over a project life cycle

For Ojiako et al. [46, 47], to learn properly about social and behavioral skills is critical in order to complete the role transformation from technicians to managers. Azim et al. advice that project managers and senior executives have to realize the significance of managing people [43]. In this context, soft skills are increasing their influence, being not only required but also important to manage teams. Pant and Baroudi identify soft skills as the missing link critical for achieving project success and advice the lack of emphasis placed on this within the context of university education [48]. Strang concludes that managing projects requires a series of skills, including interpersonal abilities, technical competencies, cognitive aptitudes, the capability to understand both context and people, and the integration of leadership behaviors [49]. Posner argues that rather than technical skills, intrapersonal and interpersonal competences are the most critical to solve problems in project management [50]. Likewise, for Chipulu et al., both managerial skills and personal traits are critical to manage complex environments characterized by rapid changes and uncertainty [45].

In summary, in the context of project management, there are a lot of studies that highlight the impact of soft skills on project success, as Strang [49], Pant and Baroudi [48], Awan et al. [51], López et al. [52], Kandelousi et al. [53], Cousillas et al. [54], Koutsikouri et al. [55], Camilleri [56], Davis [22], or Carmona-Chaves [57], among others, expose.

3.3.1. IPMA approach

IPMA is the World's first project management association (in particular, a federation of 68 national PM associations), founded in 1965, that offers unique, role-specific competence development guidelines, for improved project success.

IPMA competence baseline (ICB) is a global standard that defines the competences required by individuals working in the field of PM, to train (and certify) future professionals, who will probably work in distributed environments with overlapping and conflicting stakeholder interests, shaped by real-time data and performance management tools, challenged with too much information and not enough communication, and judged by their ability to deliver outcomes that align with short- and long-term strategies [58]. IPMA organizes the profession into three competence areas:

- People: Personal and interpersonal competences required to succeed in projects
- Practice: Technical aspects of managing projects
- Perspective: Contextual competences that must be navigated within environment

Table 5 shows people competences, as well as skills related to them.

3.3.2. PMI approach

PMI is the world's leading professional membership association for PM, founded in 1969, with over half a million members and certification holders in 185 countries. The guide to the project management body of knowledge (PMBOK) provides guidelines for managing individual projects and defines PM-related concepts, as methods, processes, and practices [59].

People competences	Skills related
Communication	Facilitation, empathy, moderation, promotion
Conflict and crisis	Creativity, moderation, persuasiveness, prevention
Integrity and reliability	Confidence, consistency, equity, ethics, professionalism, responsibility, trustworthiness
Leadership	Awareness, coaching, commitment, decision making, empowerment, flexibility, influence, learning, managing, mentoring, proactivity, team building
Negotiation	Assertiveness, empathy, patience, persuasion, attitude
Relations and engagement	Commitment, confidence, diversity, empathy, encouragement, engagement, facilitation, intuition, motivation, networking, resistance, team building
Resourcefulness	Critical thinking, decision making, creativity, facilitation, innovation, problem solving, resilience
Results orientation	Balance, delegation, effectiveness, efficiency, entrepreneurship, organization, productivity, sensitivity
Self-reflection & self-management	Awareness, confidence, delegation, effectiveness, focusing on goals, motivation, organization, prioritization, relaxation, responsibility
Teamwork	Cooperation, delegation, empowerment, facilitation, networking, organization, recruitment, time management, team building

Extract of [58].

Table 5. IPMA ICB People competences and skills related.

However, understanding and applying tools and techniques recognized as good practice are not enough to be effective. In addition to specific skills and general management proficiencies required for a project, it is necessary to domain the three competency dimensions, as PMI proposes in the project manager competency development framework (PMCDF) [60]:

- Knowledge: Knowing about PM
- Performance: Accomplishing while applying PM knowledge
- Personal: Behaving when performing the project or related activities

Table 6 Shows interpersonal skills (from PMBOK) and personal competences (from PMCDF).

3.4. Soft skills in workplace

Employability includes an array of technical and nontechnical skills, as well as knowledge, management, and experience, in order to ensure that a student is able to put them into practice, reason why they should be included into the educational stages, as Sangwan and Garg hold [61]. In the same way, Robles states that executives consider soft skills a very important attribute in job applicants [62]. According to Sutton, soft skills are extremely important for job hires in many occupations [63]. Besides, Truong et al. reveal that major employers value the potential role that soft skills can play in maximizing business success [64].

Interpersonal skills	Personal competences
Awareness	—
Coaching	—
—	Cognitive ability
Communication	Communicating
Conflict management	—
Decision making	—
—	Effectiveness
Influencing	—
Leadership	Leading
—	Managing
Motivation	—
Negotiation	—
—	Professionalism
Team building	—
Trust building	—

Extract of [59, 60].

Table 6. PMI PMBOK and PMCDF interpersonal skills and personal competences.

For Mitchell et al. [28], in the twenty-first century, organizations seek versatile individuals, even for entry-level jobs. The integration of soft skills into students' curriculum also promotes their hiring in today's workforce, and their proficiency is important to potential employers. Lindsey and Rice recapitulate that successful graduates should possess a high ratio of emotional-social intelligence against book smarts [65]. In fact, as many authors as Saravanan [66], Ramlall and Ramlall [67] or Alismail and McGuire [68], among others, resume, employers are increasingly demanding a greater range of soft skills. In fact, as Robles holds [62], candidates, who add value with their soft skills, have the ability to make the difference in obtaining and retaining the jobs for which they have been prepared.

Pittenger et al. or Nealy consider soft skills a factor of equal importance to hard skills in career success [69, 15]. Other authors, as Wats and Wats or Klaus, claim that soft skills account for individual success more than hard skills [70, 27]. It is incontestable that soft skills play an integral role in success, as Bennett [71], Gibb [8], Schultz [72], Weber et al. [73], Sheikhy and Shafiee [74], Truong et al. [64], Tito Maya and Serrano Orellana [36], Holtzman and Kraft [75], or Nusrat [76], among others, remark.

From the studies published by Deloitte, EY, KPMG, and PwC, also known as the Big Four because they are the largest professional networks that offer their services in management consulting to majority of public and private companies all around the world, a compilation of the most demanded soft skills in the labor market is made.

Once the assemblage is collected, then only those that are repeated are transferred to **Table 7**, discarding other soft skills for employability, such as assertiveness, balance, coaching, commitment, compliance, confidence, conflict resolution, empowerment, encouragement, endurance, engagement, esteem, facilitation, honesty, illusionment, inclusiveness, judgment, monitoring, participation, perceptiveness, positive attitude, reasoning, recruitment, responsiveness, sociability, technology, and training.

Skills	**Labor market demands**			
	Deloitte	**EY**	**KPMG**	**PwC**
Adaptability	X		X	X
Appreciation		X	X	
Awareness	X		X	
Collaboration	X			X
Communication	X	X	X	X
Control		X	X	
Cooperation		X	X	
Coordination	X			X
Creativity	X			X
Critical thinking	X		X	X
Customer service	X	X		X
Decision making	X		X	X
Diversity		X		X
Ethics	X	X	X	
Flexibility	X	X	X	
Influence			X	X
Initiative	X		X	
Innovation	X			X
Integrity		X		X
Leadership	X	X	X	X
Learning	X		X	
Management	X	X	X	
Mentoring	X	X		
Motivation			X	X
Negotiation	X	X	X	X
Networking		X	X	X
Organization		X	X	

Skills	Labor market demands			
	Deloitte	EY	KPMG	PwC
Persuasion	X		X	X
Planning		X	X	
Problem solving	X	X	X	X
Professionalism	X		X	
Sensitivity	X		X	
Teamwork	X		X	X
Time management			X	X
Trustworthiness		X		X

Extract of [77–82].

Table 7. Essential skills for labor market demands by Big Four.

4. Comparative analysis

Table 8 Summarizes the whole collection of soft skills from the literature review, but those skills that have only appeared on a single occasion have been eliminated, such as agility, appearance, authority, balance, citizenship, coaching, cooperation, coordination, directiveness, independence, investigation, loyalty, marketing, opportunity, patience, persistence, persuasion, proactivity, reliability, sensibility, and training.

5. Discussion

Comparative analysis from literature review made in **Table 8** has to be contrasted against Big Four's compilation. Then, once the most demanding skills have been selected, it is necessary to check if PM frameworks chosen incorporate them, in order to establish a model of practical implementation during the formative stages, especially the university.

Firstly, there are soft skills that are highlighted almost unanimously: communication, teamwork, problem solving and/or conflict resolution, critical thinking, self-reflexion and self-management, and leadership.

Secondly, other soft skills are emphasized by the majority of authors, educators, trainers, practitioners, consultants, and employers: ethics and/or integrity, creativity, active learning, motivation, attention to diversity, and professionalism and/or reliability.

Thirdly, it is convenient to accentuate other soft skills that are very present among consultants, PM frameworks, and educational projects, which have hardly been studied, in general, by authors and researchers: decision making, result orientation, influence and/or persuasion, coaching and mentoring, negotiation, and coordination and/or cooperation.

Skills	Educational stages								Project management								Workplace								
	[30]	[6]	[72]	[17]	[32]	[34]	[21]	[64]	[50]	[83]	[43]	[19]	[46]	[51]	[75]	[1]	[7]	[73]	[28]	[18]	[31]	[67]	[62]	[76]
Adaptability													X	X			X							
Awareness	X	X	X				X			X		X				X					X			
Collaboration				X						X		X				X								
Commitment		X					X										X	X						
Communication	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X
Confidence		X			X		X							X										
Courtesy			X														X	X				X	X	
Creativity			X	X		X			X	X		X				X				X		X		
Critical thinking		X	X	X		X		X		X		X	X		X	X			X	X	X			X
Customer service		X			X												X		X					
Decision making						X				X		X									X			
Delegation									X		X			X										
Development		X												X										
Diversity	X		X			X									X			X	X		X			
Empathy			X					X	X															
Entrepreneurship			X														X							
Enthusiasm														X	X		X	X						
Ethics			X		X			X							X	X			X	X	X	X	X	
Flexibility	X	X						X	X					X	X	X						X	X	
Honesty			X														X	X			X			
Influence		X																X						
Initiative	X	X		X													X							

Skills	Educational stages								Project management								Workplace								
	[30]	[6]	[72]	[17]	[32]	[34]	[21]	[64]	[50]	[83]	[43]	[19]	[46]	[51]	[75]	[1]	[7]	[73]	[28]	[18]	[31]	[67]	[62]	[76]
Innovation				X						X		X					X			X				
Integrity			X		X												X	X			X		X	
Leadership		X		X	X	X	X	X			X			X	X				X	X		X		X
Learning		X							X	X		X	X			X	X				X			
Motivation					X				X		X				X		X	X			X			X
Negotiation			X					X																
Networking					X			X							X									
Planning	X	X	X						X				X		X						X			
Positive attitude								X													X	X	X	
Problem solving			X	X		X	X	X		X		X	X	X		X	X		X	X	X			X
Professionalism								X							X			X		X	X	X	X	
Responsibility			X	X				X		X	X	X								X	X	X	X	
Result orientation		X					X		X															X
Self-organization	X	X	X			X	X	X	X				X		X	X	X		X		X			X
Socialization			X				X			X		X	X	X	X			X		X	X	X	X	X
Teamwork	X	X	X			X	X	X	X	X	X	X		X	X		X		X	X	X	X	X	X
Technology	X	X								X			X			X	X			X				

Table 8. Twenty-first century skills from literature review in education, PM, and workplace.

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Later, it is opportune to rescue other soft skills whose interest grows over time, finding more and more references in recent literature: competitiveness, customer service, initiative and/or entrepreneurship, marketing and publicity, and sustainability.

To conclude, from the compilation of the soft skills developed, it is opportune to discuss how these skills can be grouped, for which how the authors have organized them is analyzed.

Cheng, Dainty and Moore, and Le Deist and Winterton, in the context of human resources management, classify competences into three groups [84, 85]:

- Functional (job-specific skills)
- Cognitive (knowledge and understanding)
- Social (behavioral and attitudinal)

In the same vein, Binkley et al. organize twenty-first century skills into three groups [83]:

- Ways of thinking
- Ways and tools for working
- Living in the world

Similarly, Onisk classifies generic soft skills into three broad categories [86]:

- Behavioral development: improving (or enhancing) the underlying social behaviors and influencing capabilities
- Professional development: obtaining (or maintaining) a professional certification or accreditation
- Compliance: helping employers become legally compliant with legislated standards

According to classifications studied, selected skills are organized in **Table 9**.

Intrapersonal		**Interpersonal**
Cognitive	**Individual**	**Social**
Active learning	Competitiveness	Attention to diversity
Communication	Empathy and/or sensitiveness	Coordination and/or cooperation
Creativity	Ethics and/or integrity	Customer service
Critical thinking	Initiative and/or entrepreneurship	Influence and/or persuasiveness
Decision making	Leadership	Marketing and publicity
Problem solving and/or conflict resolution	Motivation	Mentoring and/or training
Results orientation	Professionalism and/or reliability	Negotiation
Self-reflection and self-management	Sustainability	Teamwork

Table 9. Traceability of intra- and interpersonal skills from education to labor market.

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6. Conclusions

Despite there are different definitions for intra- and interpersonal skills' set, a general consensus about its main characteristics can be made: they are social abilities, individual attributes, and cognitive attitudes. They are also called as twenty-first century skills, essential skills, human skills, professional skills, and/or soft skills.

Intra- and interpersonal skills are currently essential for both individual careers and organizational success, being identified by many employers as the number one differentiator, regardless of the type of organization. Importance of intra- and interpersonal skills has increased more and more over last years among new employees.

The gap between skill levels that employers need from recent graduates and new employees versus skill development grade they own is growing. To decrease the contrast between supply and demand, the implementation of training programs throughout all educational stages is required, from high school to university.

Into a knowledge-based economy, with abundant unskilled human resources, it is time to train recent graduates with properly employable skills. It is necessary to emphasize that education should focus not only on core academic subject mastery, but also on intra- and interpersonal skills development.

Labor market demands that employees acquire and/or improve their intra- and interpersonal skills around three dimensions:

- Cognitive skills: being creative, communicating, focusing on results, learning actively, making decisions, resolving conflicts, solving problems, self-managing and self–reflecting, and thinking critically
- Individual skills: being competitive, entrepreneurial, ethic, integrous, professional, reliable and sensitive, empathizing, leading, motivating, promoting sustainability, and taking the initiative
- Social skills: attending to diversity, being persuasive, coordinating, cooperating, influencing, marketing, mentoring, negotiating serving customers, training, and working as a team

PM competencies approach can be used to develop and perfect intra- and interpersonal skills of employees, through formation programs that train how to be aware culturally and politically, be effective, integrous, professional, related, reliable and resourceful, build trust, coach, communicate, engage, influence, lead, make decisions, manage, motivate, negotiate, orientate to results, resolve conflicts, and work as a team.

Training practices of PM by competencies can be introduced in education. In fact, PM proposals are included on theoretical educational frameworks exposed (defining, designing and managing projects and setting goals, besides balancing, executing, evaluating, interacting, monitoring, organizing, planning, prioritizing, among other actions intrinsically related to leading projects).

In the context of Portugal, Spain, and Latin America countries, the theoretical frameworks that cover the different educational stages include most of the soft skills selected:

- During the preuniversity stage, DeSeCo Project by OECD tries to instill that students assert rights and duties, communicate, conduct plans and projects, construct alliances, cooperate, empathize, make decisions, negotiate, recognize merits, resolve conflicts, be self-aware, suggest alternatives, support others, and take responsibility, among other skills
- At the university stage, EHEA and ALFA Tuning Projects ensure that future graduates analyze, appreciate diversity, are competitive, be creative and critical, commit, communicate, lead, learn, make decisions, motivate, solve problems, synthesize, take initiative, and work as a team, among other skills

7. Future research

Once it has been proven that, from a theoretical point of view, most of the soft skills demanded by the labor market are present in education (including to direct and manage projects), it is mandatory to ask right now what is wrong. There are two nonexclusive possibilities:

- Learning and training of soft skills is not done or done weakly

(subordinating them to hard skills)

- Assessment of soft skills' performance is not done or done incorrectly

(avoiding their application's improvement)

To answers these questions, further research is needed:

- Launching a questionnaire in Portugal, Spain, and Latin American countries, directed to recent graduates and new employees, to check the importance given by the system to soft skills they have perceived during their education and contrast the importance they think soft skills are going to reach, in order to measure the gap between educational criticity and workplace impact
- Analyzing assessment methods and checking if they are adequate and effective, proposing improvements

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