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NEED ANALYSIS REPORT

E-BOOK

CAREER MANAGEMENT IN THE AGE OF INDUSTRY 4.0

TRAINING NEEDED ANALYSIS FOR INDUSTRY 4.0 COMPETENCIES

CAREER GUIDE AND MOBILE APPLICATION FOR EMPLOYEES

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TRAINING NEED ANALYSIS FOR INDUSTRY 4.0 COMPETENCIES

Edited by

Zuhal Gök Demir
Mehmet Özer Demir

The research was carried out for the project named “Career Guide and Mobile Application for Employees” which is Funded by the Erasmus+ Program of the European Union. However, European Commission and Turkish National Agency cannot be held responsible for any use which may be made of the information contained therein.

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INTRODUCTION

Background, Context, and Outputs of the Project

Zuhal GÖK DEMİR

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The fact that people now demand products of more quality, information technologies have become wide-spread all over the globe fostering the globalization, intellectuality of human has become of more importance, creativity has become crucial for the business enterprise and the fact that almost everyone agrees upon all these developments mentioned have made it difficult to predict the future perfectly. In today's business life, it is a fact of management science that human beings and their efforts are the essential factors for the success of all organizations. Furthermore, there have been some significant developments regarding how skilled employees consider business relations and what they expect from the organization. It is no longer enough for business enterprises that the employees do the job and therefore they are expected to keep updating themselves develop their skills and get involved in team-work.

Similarly, the factors such as having a promotion, making more money, being initiative, demanding more respect and prestige have become more important for the employees. By improving general knowledge, ability, capability and motive of employees and planning their progress within the organization well; all meaning that building up career strategies, it will be possible for these innovations and developments to become a reality.

Researchers state that career theories and methods of vocational guidance of the 20th century must be modified in accordance with post-modern economy. It is stated that inadequate approaches, which consider career in a conceptual and gradual way must be replaced by new career theories of the 21st century based on

individual features. Accordingly, new career tools should be developed and life-long learning should be emphasized in the fast-changing environment.

In this context, overall objective of the ‘Career Management’ program is to harmonize employees’ needs, abilities and goals with current and future opportunities and obstacles within the organization. In a dynamic environment, to find persons who scroll to the correct destination at the right time without losing the excitement and motivation and perform effectively current and future tasks and to place, maintain and continuously improve them there is a need for a career plan. Businesses as a result of such a career plan, have the opportunity to meet in itself the current and future workforce needs and look to the future with more confidence.

Career management, is one of the most effective methods to be used to fill new positions, to increase efficiency of production, to improve the quality and to provide protection of the current situation. For this reason, career management, developing rapidly in recent years has become one of the important administrative functions of companies. Today’s leaders, if they are guiding putting forth current and future objectives of their subordinates in a planned and systematic manner, have realized both organizations and subordinates will perform their goals. Employees’ desire in any organization to choose a profession best suited to their talents and abilities, a job suitable to work in their chosen profession, to make a career in business life throughout the profession.

In today’s business life, it is a fact of management science that human beings and their efforts are the essential factors for the success of all organizations. Furthermore, there have been some significant developments regarding how skilled employees consider business relations and what they expect from the organization. Tools of career planning with requirements of innovative approaches in this field are an issue which has great importance for our country and therefore needs to be developed. There will be efforts to obtain outputs for the benefit of employees, practicing on the experience and knowledge of the EU within the scope of the project. Our project aims to produce innovative educational materials by which employees are able to plan their careers; to develop applications by which employees will be able to measure their skills and competences. The target group of the project includes all employees and the individuals who are going to start working in near future. Thus, the career guide and the mobile application to be developed within the scope of the project can be useful for all employees and for the individuals who are going to start working in near future. The reason why we have chosen all employees and the individuals who are going to start working in near future as our target group is the fact that career planning is an important need for the people in these statuses.

Tools of career planning with requirements of innovative approaches in this field area an issue which has great importance for European countries and therefore needs to be developed. There will be efforts to obtain outputs for the benefit of employees, practicing on the experience and knowledge of the EU within the scope of the project. Within the scope of our project, named Career Guide and Mobile Application for Employees, need analysis, career planning guide and mobile application towards of employees have been developed. First of all, a literature review and survey have been conducted on the subject of career planning. This book presents both the literature review and the results of the research phase in each partner countries. The research phase also focuses on the need analysis of three levels which are initial (students and graduates), intermediate (employees) and advance (managers and directors) levels in the age of Industry 4.0. Then, based on the results of the needs analysis, a career planning guide at three levels has been prepared. And then, the mobile application has been developed on the basis of the career guide.

The career guide and the mobile application to be prepared within the scope of the project can be for the use of all employees and the individuals who are going to enter into the working life. The career guide has been prepared in a way that it comprises the following three levels: the initial (students and graduates), intermediate (employees) and advanced (managers and directors) career planning. The mobile application has been prepared based on this guide to be produced. The mobile application comprises the options of initial, intermediate and advanced levels as well. The users can select a level based on their current status, and then carry out their career planning. For instance, a newly employed individual can select the initial level in order to develop his/her career plan. Likewise, an employee at the expertise level can select the intermediate level, and a director can conduct his/her career planning by selecting the advanced level in the mobile application. The application also includes an option by which employees will be able to prepare their own CVs. This system will work on the basis of answering the questions asked. You may find more information about the project outputs in project website <http://career-academy.eu/>

The results and impact envisaged and finally the potential longer term benefits of the project can be:

- Employees will have increased awareness about career planning.
- Employees will be made their own career planning.
- Employees will be increased productivity.
- Employees will be increased success in business.
- Employees will be more planned.

- Employees will be created their own CV.
- Employees will be planed easier their careers with mobile apps.
- Employees would understand the importance of career planning.
- Innovative training materials will created related to career planning.
- The employees' compatibility with the labour market as their professional competence and capability of career planning has been enhanced.
- The employees' knowledge, ability and competence on the issue of career planning has improved.
- The employees' participation in learning and training activities has been increased by improving counselling and supporting services in Career Guidance.
- International communication and collaboration in adult training has been developed.
- Various implementations of adult training in the EU countries have been adapted.
- Target groups will be conscious about the future and are career planning.
- Career planning guide and mobile application that individuals and institutions in charge benefited from will be developed for the requirements of Industry 4.0.

CAREER MANAGEMENT IN THE ERA OF INDUSTRY 4.0

Zuhal GÖK DEMİR
Mehmet Özer DEMİR

The concept of Industry 4.0 has become popular topic among industry and academy recently and has been conceptualized as “a new level of value chain organization and management across the lifecycle of products” (Henning, 2013), or as “a collective term for technologies and concepts of value chain organization.” (Hermann et al., 2016). The core concept of “Industry 4.0” is integration of the physical basic system and the software system, integration with other branches and economic sectors, integration with other industries and industry types (Li, 2018). Although, there is no unanimously adopted definition of Industry 4.0 so far, it is regarded as a disruptive transformation of applications and processes in manufacturing and business. Industry 4.0 is the reflection of digital transformation in the industry and refers to smart factories which decide with so-called intelligent systems. It is closely related with the Internet of Things (IoT), Cyber Physical System (CPS), information and communications technology (ICT), Enterprise Architecture (EA), and Enterprise Integration (EI). All these concepts are related to recent technological developments where the internet and supporting technologies (e.g. embedded systems) serve as a backbone to integrate human and machine agents, materials, products, production lines and processes within and beyond organizational boundaries to form a new kind of intelligent, connected and agile value chain (Erol et al., 2016). Use of intelligent systems optimizes the value chain as a result of automatic decisions by analyzing data collected. From manufacturing point of view, Industry 4.0 is the result of research and development efforts (R&D) to increase productivity in which production technologies and information technologies are combined.

Although the primary goal of Industry 4.0 is to achieve a higher level of operational efficiency and productivity with a higher level of automatization in manufacturing (Lu, 2017), it also transforms the way conventional business processes operationalized. Traditional manufacturing business models do not fit with the emerging technologies of Industry 4.0 (Sung, 2018), as it indicates

industrial process of value adding and knowledge management. The Internet of Things refers to cyberphysical systems that communicate and cooperate with each other and with humans in real time via internet services, through which both internal and cross-organizational services are offered and used by participants throughout the value chain (Hermann et al., 2016).

The inevitable effects of Industry 4.0 is the need for human factor is minimized; configuring smart factories. Robots as a form of complex machines are used in manufacturing to support and relieve the human operator, improve productivity, increase flexibility, reduce cost, and increase security. Growing international competition, increasing market volatility, demand for highly individualized products and shortened product life cycles present serious challenges to companies (Hofmann & Rüsçh, 2017).

The term ‘Industry 4.0’ was first introduced at the Hannover Fair in 2011 (Lasi et al., 2014) in Germany (Qin et al., 2016). Since then, the term of Industry 4.0 is one of the most popular manufacturing topics among industry and academia in the world and has also been considered as the fourth industrial revolution with extreme impact on manufacturing in future. It has been widely adopted by other industrial nations within the European Union, and further a field in labor intense markets like China, India, and other Asian countries (Li, 2018; Zhou et al., 2015). It is prospected that industrial will only remain successful if they manage to actively participate in the Industry 4.0 initiative, in another words, by participating in the development, merchandising and operation of autonomous, knowledge- and sensor-based, self-regulating production systems (Kagermann et al., 2013). Industry 4.0 creates many new opportunities for companies, but at the same time several challenges arising from the ongoing automation and digitization (Hecklau et al., 2016).

The Industry 4.0 Characteristics

- 1- **Cyber-physical systems (CPS):** CPS refers to the unprecedented connection via the internet or other distributed ledgers, which brings the physical and the virtual world together (Hofmann & Rüsçh, 2017). Embedded computers and networks monitor and control the physical processes, usually with feedback loops where physical processes affect computations and vice versa. In the manufacturing context, this means that information related to the physical shop floor and the virtual computational space are highly synchronized. CPS realize the integration of these networks through the use of multiple sensors, actuators, control processing units and communication devices.
- 2- **Internet of things (IoT):** The term “internet of things” became popular in the first decade of the 21st century and can be considered an initiator

of Industry 4.0 (Hofmann & Rüsçh, 2017). The IoT refers to an inter-networking world in which various objects are embedded with electronic sensors, actuators, or other digital devices so that they can be networked and connected for the purpose of collecting and exchanging data (Zhong et al., 2017). IoT concept is different from the “ordinary” internet, IoT is a world where basically all (physical) things can turn into so-called “smart things” by featuring small computers that are connected to the internet. Smart, connected products offer exponentially expanding opportunities for new functionality, far greater reliability, much higher product utilization, and capabilities that cut across and transcend traditional product boundaries (Seliger & Stock, 2016).

3- **Internet of services (Io):** Similar to the IoT, an internet of services (IoS) is emerging, based on the idea that services are made easily available through web technologies, allowing companies and private users to combine, create and offer new kind of value-added services (Seliger & Stock, 2016).

4- **Smart factory:** “Smart factory”, is a decentralized production system, in which human beings, machines and resources communicate with each other as naturally as in a social network. In a smart factory, products find their way independently through production processes and are easily identifiable and locatable at any time. It is important to understand that not only production processes but also the roles of employees are expected to change dramatically. Some critics have recently pointed out that the automated and self-regulating nature of the smart factory might cause severe job destruction.

5- **Big Data and Advanced Analysis Techniques**

Ubiquitous sensors and microprocessors have generated a huge source of data with a size beyond traditional scales. Conventional database technology has difficulties in completing the capture, storage, management and analysis of this massive data collection. In terms of management, manufacturing companies need to manage a wide range of data, involving large amounts of structured data and unstructured data, such as product data, operational data, value chain data, and external data. Big data and big data analysis will bring a range of benefits to manufacturing companies, such as optimizing processes, reducing costs, and improving operational efficiencies (Zhou et al., 2015).

The Industry 4.0 changes the way business operating concept, such concepts are meant to capture the latest trends as well as the key requirements for gaining sustainable competitive advantages in the global arena. The capabilities of digital solutions/tools have opened up new opportunities and raised ambitious

challenges for manufacturing systems (Longo et al., 2017). Although a common agreement exists on the necessity for technological advancement of production technologies and business models in the sense of Industry 4.0, a major obstacle lies in the perceived complexity and abstractness which partly hinders its quick transformation into industrial practice (Erol et al., 2016). It is obvious that Industry 4.0 will lead to an increased technical and organizational complexity of manufacturing processes which imposes substantial challenges. Especially to small- and medium-sized manufacturing companies, challenges are not limited to the financial investment required for the acquisition of new technology but are also related to the availability of qualified staff on all organizational levels that is able to cope with the increasing complexity of future production systems (Erol et al., 2016).

- 1- Factory:** The future factory is going to be conscious and intelligent enough to predict and maintain the machines; to control the production process, and to manage the factory system. This kind of future factory is known as a Smart Factory (Qin et al., 2016).
- 2- Business:** Industry 4.0 implies a complete communication network between companies, factories, supplier, logistics, resources, customers, etc. Instead of local optimization, global optimization of customer value chain is aimed in Industry 4.0, and profit is shared among the business network (Qin et al., 2016).
- 3- Products:** I4.0 will introduce smart products, which are embedded with sensors, identifiable components, and processors which carry information and knowledge to convey the functional guidance the customers and transmits the uses feedback to the manufacturing system. With these elements, many functions could be added to the products, for example, measuring the state of products or users, carrying this information, tracking the products, and analysing the results depending on the information. In addition, a full production information log can be embedded with product assisting product developer in optimizing the design, the prediction, and the maintenance (Qin et al., 2016).
- 4- Customers:** Customer expectations have shifted towards a higher level of customization and flexibility (Hecklau et al., 2016). Industry 4.0. will support customers with new purchasing methods which allows customers to order customizable products, customers could change their order and ideas at any time during production, and customer could know the production information in addition to the advice of utilization depending on their own behaviours (Qin et al., 2016). Increased flexibility in manufacturing, along with mass customization, better quality, and improved productivity will

enable companies to cope with the challenges of producing increasingly individualized products with a short lead-time to market and higher quality (Zhong et al., 2017).

Industry 4.0 and Employees

All the industrial revolutions did not influence only the production itself, but also the labor market and the educational system as well. As a result of industrial revolutions, some professions and jobs disappeared. Same is expected in Industry 4.0; it is expected that some professions will be replaced (Benešová & Tupa, 2017). Historically, the rural population has been a major source of low-cost labor. Today, replacing the shortage of low-cost labor is automation (Li, 2018; Qin et al., 2016). Industry 4.0 propagates the idea of workers will focus on creative, innovative and communicative activities. Routine activities which also include monitoring tasks are entirely or partly taken over by machines (Erol et al., 2016). Processes are becoming more complex, which leads to an increase of jobs with higher qualifications and a loss in jobs requiring lower qualifications. To cope with knowledge and competence challenges related to new technologies and processes of Industry 4.0 new strategic approaches for holistic human resource management are needed in manufacturing companies (Hecklau et al., 2016) opening up a range of new business potentials and opportunities. Industry 4.0 will dictate new competencies from the employees. To achieve a positive influence on key performance indicators, organizational approaches to enterprise architecture should not be restricted to purely technical aspects but should instead put the focus firmly on employees (Bauer et al., 2015). Enterprises have a responsibility and obligation to train their employees. It is necessary to establish lifelong learning and continuing professional development programs to help workers cope with new demands from the jobs and skills (Zhou et al., 2015).

CHALLENGES OF I4.0

1- Economic challenges

Ongoing globalization

Intercultural skills, language skills, time flexibility, networking skills, process understanding

Increasing need for innovation

Entrepreneurial thinking, creativity, problem solving, work under pressure, state-of-the-art knowledge, technical skills, research skills, process understanding

Demand for higher service-orientation

Conflict solving, communication skills, ability to be compromising, networking skills

Growing need for cooperative and collaborative work

Ability to be compromising and cooperative, ability to work in a team, communication skills, networking skills

2- Social challenges*Demographic change and changing social values*

Ability to transfer knowledge, accepting work-task rotation and work related change (ambiguity tolerance), time and place flexibility, leadership skills

Increasing virtual work

Time and place flexibility, technology skills, media skills, understanding IT security

Growing complexity of processes

Technical skills, process understanding, motivation to learn, ambiguity tolerance, decision making, problem solving, analytical skills

3- Technical challenges*Exponential growth of technology and data usage*

Technical skills, analytical skills, efficiency in working with data, coding skills, understanding IT security, compliance

Growing collaborative work on platforms

Ability to work in teams, virtual communication skills, media skills, understanding of IT security, ability to be cooperative

4- Environmental challenges*Climate change & resource scarcity*

Sustainable mindset, motivation to protect the environment, creativity to develop new sustainable solutions

5- Political and legal challenges*Standardization*

Technical skills, coding skills, process understanding

Data security & personal privacy

Understanding of IT security, compliance

COMPETENCIES REQUIRED IN I4.0

According to Hecklau et al. (2016) it is possible to aggregate and categorize competencies into four main groups – Technical, Methodological, Social and Personal competencies.

1- *Personal competencies*

Industry 4.0 will lead to an increased automation of routine tasks which implies that workers will have to face the fact that their present tasks will no longer exist in the future. Such a perspective on one's own job future requires the ability to see the bigger picture for society as a whole (the challenges, e.g. resource scarcity, and opportunities, e.g. wealth), the opportunities for one's own development and the commitment to lifelong learning as one's own responsibility. The same applies for managers, they will need the ability to transform their management style from power-driven to value-driven as the teams of the future are diverse both in terms of culture, education and geographical location (Erol et al., 2016)

2- *Social/Interpersonal competencies*

Social competency refers to the fact that an individual embedded in a social context, e.g. an organization, requires the ability to communicate, cooperate and to establish social connections and structures with other individuals and groups. Industry 4.0 requires a mindset that is oriented towards building and maintaining networks of experts to be able to cooperate ad-hoc in finding appropriate solutions for particular problems. Human work will concentrate at the edges of such processes where human flexibility in problem solving and creativity is advantageous. Hence, creative activities will be performed in a distributed social setting, involve heterogeneous interdisciplinary and inter-organizational teams and require the ability to communicate complex problems in different languages as well. Managers must be able to build or act as mediators that enable social processes (also cooperative decision processes) not only within traditional organizational boundaries but for the whole network. Managers, engineers and workers will have to show literacy with the different flavors of technical communication and cooperation systems. (Erol et al., 2016).

3- *Action-related competencies*

It is the ability of an individual to integrate concepts into the its own agenda, to successfully transfer plans into reality, not only on the individual but also on an organizational level. Digitalization of production inevitably will lead to high financial and technological efforts. Strong analytical skills and an ability to find domain-specific and practicable "brown field" solutions without losing the overall goal are key competencies of future engineers. Managers must be able to break down complex concepts into realistic work packages, to find and to assign appropriate people and teams (Erol et al., 2016).

4- *Domain-related competencies*

Domain-related competencies refer to the ability to access and use domain knowledge for a job or a specific task. Domain knowledge includes methodologies, languages, tools that are especially important for a problem or business domain

and reaches beyond the trivial. Digitalized and intelligently managed production processes require workers that are capable to understand the basics of network technologies and data processing. Workers will need to evaluate whether the subsystems are functioning as expected and must be able to interact with such systems through appropriate interfaces. In addition, statistical methods and data mining techniques are key abilities for future workers (Erol et al., 2016).

Category Required Competencies Context Comparative References (Hecklau et al., 2016)

Technical Competencies

- State-of-the-art knowledge
Due to increasing job responsibility, knowledge is getting increasingly important.
- Technical skills
Comprehensive technical skills are needed to switch from operational to more strategic tasks.
- Process understanding
Higher process complexity demands a broader and deeper process understanding.
- Media skills
Increasing virtual work requires employees to be able to use smart media, e.g. smart glasses.
- Coding skills
Growth of digitized processes creates a higher need for employees with coding skills.
- Understanding IT security
Virtual work on servers or platforms obligates employees to be aware of cyber security.

Methodological competencies

- Creativity
- Need for more innovative products, as well as for internal improvements, requires creativity. Entrepreneurial thinking
Every employee with more responsible and strategic tasks has to act as an entrepreneur.
- Problem solving
Employees must be able to identify sources of errors and be able to improve processes.

- Conflict solving
A higher service-orientation increases customer relationships; conflicts need to be solved.
- Decision making
Since employees will own higher process responsibility, they have to make their own decisions.
- Analytical skills
- Structuring and examining large amounts of data and complex processes becomes mandatory. Research skills
Need to be able to use reliable sources for continuous learning in changing environments.
- Efficiency orientation
Complex problems need to be solved more efficiently, e.g. analyzing growing amounts of data.

Social competencies

- Intercultural skills
Understanding different cultures, especially divergent work habits, when working globally.
- Language skills
Being able to understand and communicate with global partners and customers.
- Communication skills
Service-orientation demands good listening and presentation skills, whereas increasing virtual work requires sufficient virtual communication skills.
- Networking skills
Working in a highly globalized and intertwined value chain requires the knowledge networks.
- Ability to work in a team
Growing team work and shared work on platforms expects the ability to follow team rules.
- Ability to be compromising and cooperative.
Entities along a value chain develop to equal partners; every project needs to create win-win situations, especially in businesses with increasing project work.

- Ability to transfer knowledge
Companies need to retain knowledge within the company; especially with the current demographic change, explicit and tacit knowledge needs to be exchanged.
- Leadership skills
More responsible tasks and flattened hierarchies make every employee becoming a leader.

Personal competencies

- Flexibility
Increasing virtual work makes employees become time and place independent; work-task rotation further requires employees to be flexible with their job responsibilities.
- Ambiguity tolerance
Accepting change, especially work related change due to work-task rotation or reorientations.
- Motivation to learn
More frequent work related change makes it mandatory for employees to be willing to learn.
- Ability to work under pressure
Employees involved in innovation processes need to cope with increased pressure, due to shorter product life cycles and reduced time-to-markets.
- Sustainable mindset
As representatives of their companies, employees also need to support sustainability initiatives. Compliance Stricter rules for IT security, working with machine, or working hours.

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INDUSTRY 4.0 COMPETENCIES IN TURKEY FOR CAREER MANAGEMENT

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INTRODUCTION

Turkish economy performed a high rate of economic growth in 2017 and effects of the economic growth in 2017 continued in the first quarter of 2018. Although unemployment rate was 10,9% in 2017, the unemployment rate tended to decrease due to employment incentives. Unemployment rate was as 14.1% for males and 9.4% for females. In 2017, non-agricultural unemployment rate was estimated to be 13%, remained unchanged from 2016. The youth unemployment rate of the 15-24 age group was 20.8% with an increase of 1.2 points and 11.1% in the 15-64 age group in 2017.

In 2017, 28 million 189 thousand people are reported as employed, 984 thousand more than compared to 2016, increasing employment rate by 0.8 points to 47.1%. In 2017, the rate of employment rates for men increased by 0.5 points to 65.6% and in women by 0.9 points to 28.9% compared to 2016.

This 2017, the number of employees in the agricultural sector increased by 159 thousand and the number of employees in non-agricultural sectors increased by 823 thousand. Sectorial analysis of employment statistics suggests that 19.4% of the employees were employed in agriculture, 19.1% in industry, 7.4% in construction and 54.1% in services sector. Statistics suggests a decrease in the share of the services sector by 0.4 points, in construction sector an increase by 0.1 points, in agriculture sector a decreased by 0.1 points and the industry sector a decrease by 0.4 points compared to 2016

In 2017, labor force participation number (the number of people who will participate in the labor force) increased by 1 million 108 thousand to 31 million 643 thousand persons. Statistics suggest that labor force participation rate

increased by 0.8 points to 52.8%. The labor force participation rate for men was 72.5%, while it was 33.6% for females as shown in table 1.

Table 1. Basic workforce indicators, 2016, 2017*

	Total		Male		Female	
	2016	2017	2016	2017	2016	2017
15 and over						
Population	58.720	59.894	29.031	29.649	29.689	30.244
Labor	30.535	31.643	20.899	21.484	9.637	10.159
Employment	27.205	28.189	18.893	19.460	8.312	8.729
Agriculture	5.305	5.464	2.920	2.993	2.384	2.471
Non-agricultural	21.901	22.724	15.973	16.467	5.928	6.258
Unemployed	3.330	3.454	2.006	2.024	1.324	1.431
Non-labor force	28.185	28.251	8.133	8.166	20.052	20.085
Labor force participation rate	52,0%	52,8%	72.0%	72,5%	32,5%	33.6%
Employment rate	46,3%	47,1%	65,1%	65.6%	28.0%	28.9%
Unemployment rate	10,9%	10,9%	9.6%	9.4%	13.7%	14.1%
Non-agricultural unemployment rate	13,0%	13,0%	10.9%	10.7%	18.1%	18,5%
15-64 age group						
Labor force participation rate	57,0%	58,0%	77.6%	78,2%	36,2%	37,6%
Employment rate	50,6%	51,5%	70.0%	70.7%	31,2%	32.2%
Unemployment rate	11,1%	11,1%	9.8%	9.6%	14,0%	14.4%
Non-agricultural unemployment rate	13,0%	13,1%	10.9%	10,8%	18,2%	18,6%
Young population (15-24 years)						
Unemployment rate	19,6%	20,8%	17.4%	17.8%	23,7%	26.1%
What is the rate of employment in education	24,0%	24,2%	14.6%	14.6%	33.5%	34.0%

Source: TUIK, Vol: 27699, 23 Mart 2018, Hour: 10:00

*Numbers are in thousands.

Total employment increased by more than 1 million (net employment) since the second half of 2017 compared to the same period of the previous year. In March 2018, 1,010 thousand additional jobs were created compared to the same period of the previous year. It is considered that employment will continue to increase with the help of the employment incentives in 2018 as well as the high growth performance. It is observed that employment mobilization is effective especially in the employment of the services sector and thus contributes positively to total employment. In addition, since the second half of 2017, industrial employment has provided a strong and positive contribution to total employment.

Since October 2017, there has been a serious downward trend in young unemployment. This development also shows that employment increases are also inclusive. In the first quarter of 2018, it is observed that the labor payments per employment in the sectors other than the agricultural sector decreased slightly compared to the previous quarter.

CURRENT DEVELOPMENTS IN LABOR MARKET IN 2018

According to the results of the Household Labor Force Survey (HLFS) for March 2018, the unemployment rate decreased by 1.6 percentage points to 10.1 percent compared to the same period of the previous year. In 2017, Turkey witnessed a 7,4% economic growth performance and in the quarter of the 2018 unemployment rates benefited from the previous year's economic growth. Economy continues to grow in the first quarter of 2018 by 7,5 point, same as previous year. As the employment incentives continued in 2018, unemployment rates are expected to remain under 10%. In addition to current incentives, the new employment incentives announced for 2018 are expected to increase the impact of incentives on employment figures.

In the first quarter of 2018, the labor force participation rate (LFPR) increased by 0.2 points compared to the previous year as 52.4% (33.4% for women and 71.8% for men). Non-agricultural employment increased by 4.6% compared to the same period of the previous year and agricultural employment decreased by 0.5 percent. During this period, the services sector continued to be the main contributor to total employment growth, while other sectors other than agriculture contributed positively to total employment (T.C. Kalkınma Bakanlığı, 2018).

MACROECONOMIC OUTLOOK AND DEVELOPMENTS IN EMPLOYMENT

The capacity utilization has been recorded as 77.9 percent in May 2018, 0,9 points higher compared to the same period of the previous year (Figure 2). The industrial production index (MD), which displayed an upward trend since the last quarter of 2016, increased by 1.1 percentage points in April 2018 compared to the previous month. It is observed that the developments in the industrial production index reflected the industrial employment in March 2018.

In recent years, contributions to employment growth have continued to predominantly continue from the services sector. In the first quarter of 2018, 1.010 thousand people are employed 70% of whom are employed in service sector. In March 2018, total employment was 28.499 thousand persons.

Although in the first three quarters of 2018, over 1 million net additional employment was created compared to the same period of the previous year, non-agricultural employment increased by 1,038 thousand persons and agricultural

employment decreased by 27 thousand people. Employment in the construction sector increased by 65 thousand people, and industrial employment increased by 272 thousand persons and reached 5,618 thousand persons. When the non-agricultural sectors are analyzed, it is observed that the sector which has the most contribution to the increase in employment is the services sector. When the sub-sectors of the services sector are analyzed, it is seen that 74% of the increase in employment arises from public administration and defense, wholesale and retail trade, human health and social service activities and accommodation and food services sectors (T.C. Kalkınma Bakanlığı, 2018).

Employment

In March 2018, agricultural employment decreased by 55 thousand persons compared to the previous period and amounted to 5,372 thousand persons. Industrial employment increased with the recent incentives and in March 2018 5.618 thousand persons employed. Construction employment (MD) was realized as 2.176 thousand people in the same period. Employment increases in services (excluding construction) continued in March 2018 and services sector's employment increased by 48 thousand persons in the same period compared to the previous month and realized as 15,771 thousand. As a result of these developments, non-agricultural employment (MD) decreased by 5 thousand people in March 2018 period and total employment (MD) decreased by 59 thousand people. Total employment (MD) was 28,877 thousand persons in the mentioned period (Figure 5). Total employment percentages according to the sectors are realized in agriculture as 17,7%, industry as 19,7% and services (including construction) as 62,5%.

The statistics suggest a downward trend in unemployment rates in Turkey because of the incentives in 2017 and their continuing effects in the first quarter of 2018. The youth unemployment rate is measured as higher than total unemployment rate a long time period, and it is following the same decreasing trend in total unemployment. Decrease in unemployment rates are thought to be a result of incentives, in which sustainability of such incentives is questionable.

The sector that provides the most job opportunities remains the service sector, followed by industry and agriculture which fall far behind service sector (T.C. Kalkınma Bakanlığı, 2018).

Public Employment

Public employment decreased by 0.2 points in 2017 compared to the 2016, however an increase is recorded by 4.4 points in the first quarter of 2018 compared to the same period of 2017. As a result of these developments, total public employment was realized as 3.7 million people in the first quarter of 2018.

When the developments in sectorial productivity (partial labor productivity) are analyzed, it is observed that the moderate increases in the services sector since the second half of 2017 following the stagnation observed from 2014 to 2016 continued in the first quarter of 2018 as well. In the industrial sector, after the global crisis, productivity has increased. In addition to the contraction observed in the third quarter of 2016, the productivity of the industrial sector maintained its upward trend in the first quarter of 2018 as well. When the productivity of the agricultural sector is analyzed, it is observed that the agricultural sector productivity index, which followed a sluggish course in the global crisis period and after, has increased from the end of 2014 to the end of 2015, followed by a sluggish course in the following period.

Unemployment-Job Vacancy Relationship BEVERIDGE Curve

A **Beveridge curve** is a graphical representation of the relationship between unemployment and the job vacancy rate, the number of unfilled jobs expressed as a proportion of the labor force. Beveridge curve analysis suggest that there is no relationship between unemployment and job vacancy rates. It is suggested that the main factors that may cause difference in the curve are employees deficiencies in basic and professional skills, change in production models and the difficulty of adapting the labor force to new production models, deficiencies to match the employers and the unemployed, difficulties in working conditions and lack of willingness to be employed in certain jobs by the unemployed, lack of mobility. Beveridge curve in the labor market in Turkey this view be regarded as a reflection of the skills mismatch problem. Despite the high unemployment rate in the economy, some vacancies cannot be filled (T.C. Kalkınma Bakanlığı, 2018).

Unemployment in New Graduates (Youth Unemployment)

In the first quarter of 2018, the youth unemployment rate (MD) was realized as 18.1% with a 0.4 point decrease compared to 2017. It is suggested that incentives proposed in 2017 helped a decrease in youth unemployment. Statistics suggest a youth unemployment problem in Turkey, graphical presentation suggests that youth unemployment rate follows total unemployment rate always been higher by nearly 10% (Figure 1).



Figure 1. Youth Unemployment Rate

Source: TUIK

According to the first quarter of 2018 employment statistics, the highest share who participate to the labor force belongs to the employees with under-high education by 52.4%. Statistics suggest that decrease in total unemployment is a result of under-high education employment in 2017 and first quarter of 2018 period. The share of higher education graduates in total labor force was 23.5% in the first quarter of 2018. As a result of 182 thousand more higher educated graduates are employed in 2018 compared to 2017, the unemployment rate in the higher education graduates group decreased by 1.1% to 11.1% in the first quarter of 2018 compared to same period in 2017 (T.C. Kalkınma Bakanlığı, 2018)

Unemployment rate of under-educated people with the highest share in employment decreased by 1.6 points compared to the previous year and realized as 9.4%. In the same period, the employment of under-educated persons increased by 408 thousand in the last year. This increase is important in terms of explaining the decrease in the unemployment rate in the related education group.

International comparisons suggest a downward trend in unemployment rates in the EU-28, OECD and US economies continues steadily. In the first quarter of

2018, the unemployment rate in the USA was 4.1% and in Germany was 3.4%. International statistics comparisons suggest that unemployment rates in Turkey are higher than EU-28 (7,1%) and OECD (5,4%) averages. In EU-28, only Greece and Spain’s unemployment rates seems to be higher than Turkey, although there is a downward trend in the unemployment rates of these countries (TUIK).

Statistics suggest that in Turkey in January-June period a total number of 53.708 new companies are established and 6.923 companies are stopped functioning. The vast majority of the companies established and stopped are limited companies, suggesting small and medium size companies. The statistics suggests a dynamic business life in Turkey, some new entrepreneurship are being established as well as some are stopped. However, net total of companies is increasing.

Table 2. New Established and Stopped-Functioning Company Numbers

	Corporate Type					Total
	Joint Stocked Company	Unlimited Liability Company	Commandite Company	Limited Company	Cooperatives	
New Established	7.836	7	3	45.209	653	53.708
Stopped Operations	1132	27	1	5.169	594	6.923

Source: TOBB, 2018, <https://www.tobb.org.tr/BilgiErisimMudurlugu/Sayfalar/KurulanKapanan-Sirketistatistikleri.php>, 19/09/2018.

Education System in Turkey (Aslan, 2013)

Formal education is organized by the Ministry of Education in Turkey according to the Principle Law of National Education No. 1739 in charge. The education system consists of two main sections: formal and non-formal education. Formal education consists of preschool education, primary education (primary school, secondary school), secondary education (general, vocational technique) and higher education levels.

1- Preschool Education Institutions

Preschool education institutions may be established as independent kindergartens, or as classes of kindergartens attached to primary schools or where appropriate, as application classes attached to other relevant educational institutions in Turkey. Where and in which aims the preschool education institutions will be opened will be regulated by the Ministry of National Education.

Preschool education provides a wide range of services depending on who opened the institutions. Ministry of Family and Social Policies, especially

Ministry of National Education, can open public institutions, as well as based on Article 191 of the Law no. 657 universities, private enterprises and private pre-school education institutions can operate pre-schools.

Major preschool educational institutions in Turkey include:

- Independent kindergartens (official or private)
- Kindergartens (within official or private primary schools)
- Practice Kindergartens and Kindergartens (within Girls Vocational High Schools)
- Mobile kindergartens (opened under various projects)
- Nurseries
- Kindergartens
- Child care centers
- Children's clubs
- Children's houses etc.

2- Primary Education

According to the Law No. 6287, compulsory education in Turkey is 12 years. According to the law, 4+4+4 years education is given primary, secondary and high school levels. First 4+4 years is called primary education in this paper. Education system is open to private entrepreneurship. State schools are free of charge. The main primary institutions are:

- Primary Schools (Primary, Secondary)
- Primary Boarding Schools (YİBO)
- Primary Education Schools (PIO)
- Transportation Center Primary Schools
- Primary Schools with Combined Classroom Practice
- Primary School for the Deaf
- Primary School for the Visually Impaired
- Orthopedic Handicapped Primary School
- Mentally Handicapped Primary School
- Private Turkish, Foreign, Minority Primary Schools
- Open Primary School

3- Secondary Level/High School Education

Secondary education level comprises all the general, vocational and technical education institutions that are compulsory. It is a four-years compulsory

education following 4+4 years primary education. Those who complete these schools are given a secondary education diploma or high school diploma.

General objectives and basic principles of the high school education are:

- 1- To give the students the consciousness and power to recognize the problems of individuals and society, to search for solutions and to contribute to the economic social and cultural development of the country by giving a minimum common general culture at the secondary level.
- 2- To prepare students for higher education or for profession in accordance with the interests and capabilities of the students.

High School/Secondary Education Institutions

Secondary education consists of high schools applying various programs. Schools that focus on a particular program are given names that determine the branches of education such as high school, technical high school and agricultural vocational high school.

The education period of secondary education institutions is determined by the Ministry of National Education according to the nature of the program implemented. Secondary Education; general and vocational and technical secondary education.

a- General secondary education

The aim of the general secondary education to educate students with general cultural level, to recognize the problems of the society, to contribute to the economic, social and cultural development of the country and to prepare them for higher education. General secondary education consists of high schools that provide at least four years of education on primary education operated under different names and programs. When high schools are classified according to their general directorates, there are the following high school types in general secondary education.

Secondary Schools High Schools

- General High School
- Anatolian High School
- Science High School
- Anatolian Teacher High School
- Anatolian Fine Arts and Sports High School
- Social science High School

High Schools under the General Directorate of Private Education Institutions

- Private Turkish High School (General)
- Minority High School
- International High school
- Foreign High School

High Schools under the General Directorate of Lifelong Learning

- Open Education High School (General)

b- Vocational Technical Secondary Education

Vocational and technical secondary education; In addition to the objectives of general secondary education, education institutions that train labor force in business and vocational fields and prepare students for higher education. In the context of vocational technical secondary education, there are high schools operating with different names and programs. When the high schools are classified according to the general directorates they belong to, there are the following high school types in vocational technical secondary education.

Secondary Schools for General Directorate of Vocational and Technical Education

- Industrial Vocational School
- Anatolian technical high schools
- Technical High School
- Anatolian Vocational High School
- Anatolian Maritime Vocational High School
- Anatolian Maritime Technical High School
- Maritime Vocational High School
- Multi-Program High School
- Anadolu Tapu Cadastre Vocational High School
- Anatolian Agricultural Vocational High School
- Agricultural Vocational High School
- Vocational and Technical Education Center
- Bilateral Vocational Training Center
- Ziraat Technical High School
- Vocational High School for Girls
- Vocational high School

- Anatolian Vocational High School
- Anatolian Vocational High School for Girls
- Anadolu Girls Technical High School
- Girls Technical High School
- Trade Vocational High School
- Anatolian Trade Vocational High School
- Anatolian Hotel and Tourism Vocational High School
- Anatolian Communication Vocational High School
- Vocational High School of Justice
- Health vocational high School

High Schools under the General Directorate of Religious Education

- Imam Hatip High School
- Anatolian Imam Hatip High School

High Schools under the General Directorate of Special Education and Guidance Services

- Vocational High School for the Deaf
- Orthopedic Vocational High School
- Trainable Mentally Handicapped Vocational High School

Types of High Schools Associated with the General Directorate of Private Education Institutions

- Private Turkish High School (Vocational)

High Schools under the General Directorate of Lifelong Learning

- Open Education High School (Occupation)

High Schools Attached to Other Ministries

- Conservatory
- Police College

Higher Education System in Turkey

According to Higher Education Institute (YÖK) 2017-2018 statistics, there are 2.768.757 students attending pre-graduate level education, 4.241.841 graduates, 454.673 in high education, and 95.100 in doctorate level.

In Turkey both private and state universities are present. According to 2017-2018 statistics there are 201 universities in Turkey, 129 are state universities and 72 are foundation universities and 5 foundation vocational high schools.

THE RESEARCH IN TURKEY

The target group of the project consists of three groups; newly employed people or the ones who are going to start working in the near future (level 1), the employees who are currently working at the level of expertise (level 2) and the people who are currently working as managers (level 3). The research aims to find out the training needs of the new industrial revolution also known as industry 4.0 of these 3 target group. We carried out a field study for the first two level by conducting questionnaires and interviews for the managers. A research was carried out with 109 students and 60 employees in Turkey, with purposive sampling. Based on Prifti et. al¹ (2017) Industry 4.0 Competency Model a questionnaire form is used as the data collection tool. The questionnaire form was adopted from Prifti et al. (2017)'s "A Competency Model for Industry 4.0 Employees" which is based on Great 8 competency dimensions. Frequency analysis is conducted in order to determine the training need analysis of students and employees in Turkey. Thus it is aimed to reveal the skill kit required by Industry 4.0 for all the 3 levels. In other words, are the graduates, employees and managers ready for Industry 4.0 with the skills?

FINDINGS FOR GRADUATES IN TURKEY

In this part firstly finding for demographics of the participants has been given. Later the findings of the Great 8 competency dimensions has been given for the graduates.

Demographics

- While %46,8 of the participants are male, %53,2 are female.
- All the participants are graduates
- %27,5 of the participants study in Manufacturing, %35,8 in Education and %36,7 in Service sectors

Findings for Business Trends

- While %13 of the participants report that total revenue is decreasing, %50 declare that total revenue is increasing as shown in table 3.

1 Prifti, L.; Knigge, M.; Kienegger, H.; Krcmar, H. (2017): A Competency Model for "Industrie 4.0" Employees, in Leimeister, J.M.; Brenner, W. (Hrsg.): Proceedings der 13. Internationalen Tagung Wirtschaftsinformatik (WI 2017), St. Gallen, S. 46-60.

Table 3: Business trend in the sector you want to work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Total revenue decreasing	14	12,7	13,0	13,0
	Total revenue increasing	54	49,1	50,0	63,0
	No Change	8	7,3	7,4	70,4
	Dont know	30	27,3	27,8	98,1
	Not applicable	2	1,8	1,9	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

- While %18,3 of the participants report that number of employees decreasing, %56,9 consider that number of employees increasing as shown in table 4.

Table 4. Employment trend in the sector you want to work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Number of employees decreasing	20	18,2	18,3	18,3
	Number of employees increasing	62	56,4	56,9	75,2
	No Change	8	7,3	7,3	82,6
	Not Applicable	19	17,3	17,4	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

- While %1,8 of the participants report that it is very difficult to find a job in the sector they want to work, %22,9 think it is difficult, %55 think it as moderate, %17,4 think it as easy, and only %2,8 think it is as very Easy as shown in table 5.

Table 5. How easy to find a job in the sector you want to work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Difficult	2	1,8	1,8	1,8
	Difficult	25	22,7	22,9	24,8
	Moderate	60	54,5	55,0	79,8
	Easy	19	17,3	17,4	97,2
	Very Easy	3	2,7	2,8	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

- While %1,8 of the participants report that if they cannot find a job in the sector they want to work, to find a another job in another sector is very difficult, %18,3 regard it as difficult, %47,7 think it is as moderate, %27,5 think it easy, and %4,6 think it very Easy (Table 6).

Table 6. If you cannot find a job in the sector you want to work is it possible for you to find a job in another sector

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Difficult	2	1,8	1,8	1,8
	Difficult	20	18,2	18,3	20,2
	Moderate	52	47,3	47,7	67,9
	Easy	30	27,3	27,5	95,4
	Very Easy	5	4,5	4,6	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

SKILL NEED IN INDUSTRY 4.0

Dimensions

Skill set required by industry 4.0 are captured under 20 dimensions which are Deciding and Initial Action, Leading and Supervising, Working With People, Adhering to Principles and Values, Relating and Networking, Persuading and Influencing, Presenting and Communicating Information, Writing and reporting, Applying Expertise and Technology, Analyzing, Learning and Researching, Creating and Innovation, Formulating Strategies, Planning and Organization, Delivering Results and Meeting Customer Expectation, Following Instructions and Procedures, Adopting and Responding to Change, Persuading and Influencing, Achieving Personal Work Goals and Objectives, Entrepreneurial and Commercial Thinking all base on Big Eight dimensions.

Leading and Deciding

Takes control and exercises leadership. Initiates action, gives direction, and takes responsibility.

Supporting and Cooperating

Supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organization.

Interacting and Presenting

Communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner.

Analyzing and Interpreting

Shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing

<p>Creating and Conceptualizing Works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change.</p>
<p>Organizing and Executing Plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards.</p>
<p>Adapting and Coping Adapts and responds well to change. Manages pressure effectively and copes well with setbacks.</p>
<p>Enterprising and Performing Focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement.</p>

LEADING AND DECISION

The Great Eight’s Leading and Decision dimension captures participant’s taking control and exercise leadership, initiates action, gives direction, and takes responsibility skills (Dave, 2005). It is composed of two sub dimension called Deciding and Initial Action (2 item) and Leading and Supervising (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Deciding and Initial Action

Frequency analysis for Deciding and Initial Action items suggest that %55,1 of the Turkish participants evaluate themselves as moderate to strong level of decision making and %71,6 strong to very strong level of taking responsibility.

Leading and Supervising

Frequency analysis for Leading and Supervising items suggest that %62 of the Turkish participants evaluate themselves as moderate to strong level of Leadership Skills.

SUPPORTING AND COOPERATION

The Great Eight’s Supporting and Cooperation dimension captures participant’s supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organization (Dave, 2005). It is composed of two sub dimension called Working With People (3 items) and Adhering to Principles and Values (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Working with People

Turkish participants reported they have high levels of team work skills, %59,6 reported strong and very strong team work skills, %66,9 strong and very strong in Collaborating with Others and %71,6 strong and very strong in Communicating with people skills. Turkish participants evaluate themselves high in working with people dimension.

Adhering to Principles and Values

Turkish participants evaluate themselves high in Respecting Ethics with %76,9 and Environmental Awareness with %73,8 strong and very strong ratings. However, compared to other skills, awareness of ergonomics rated lower, only %49,5 reported strong and very strong.

INTERACTING AND PRESENTING

The Great Eight's Interacting and Presenting dimension captures communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner (Dave, 2005). It is composed of two sub dimension called Relating and Networking (3 items), Persuading and Influencing (2 Items) and Presenting and Communicating Information (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Relating and Networking

Relating and networking competency has three items; compromising, creating business networks and maintaining customer relationships. %71,3 of the Turkish participants rated themselves as strong and very strong compromising skills, %51,3 in creating business networks, and %54,1 in maintaining customer relationships.

Persuading and Influencing

%49,6 of the Turkish participants rated themselves strong and very strong in negotiating skills whereas %71,3 in emotional intelligence skills.

Presenting and Communicating Information

Turkish participant rate themselves with strong and very strong with %53,7 in presenting and communication ability.

ANALYZING AND INTERPRETING

The Great Eight's Analyzing And Interpreting dimension captures shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing (Dave, 2005). It is composed of three sub dimension

called Writing and Reporting (2 items), Applying Expertise and Technology (23 items) and Analyzing (4 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Writing and reporting

%46,8 of the Turkish participants rated strong and very strong in targeted/technical communication skills and %55 strong and very strong in literacy skills

Applying Expertise and Technology

Applying expertise and technology dimension is composed of 23 items.

- Participants rated their skills in IT and technology affinity %56,5 strong and very strong,
- Economics %36,7 strong and very strong,
- Extract business value from social media %42,6 strong and very strong,
- Service orientation/product service offerings %47,7 strong and very strong,
- Business process management %42,2, strong and very strong,
- Business change management %24,8 strong and very strong,
- Understand and coordinate workflows %56,4 strong and very strong,
- Network security %28,7 strong and very strong,
- IT architectures %19,2 strong and very strong,
- Machine learning %33,9 strong and very strong,
- System development %32,1 strong and very strong,
- Integrating heterogeneous technologies %33 strong and very strong,
- Mobile technologies %47,2 strong and very strong,
- Sensors/embedded systems %31,5 strong and very strong,
- Network technology/M2M communication %26,8 strong and very strong,
- Robotics/Artificial intelligence %19,5 strong and very strong,
- Predictive maintenance %32,2 strong only,
- Modelling and programming %26,6 strong and very strong,
- Big data/Data analysis and interpretation %24,8,
- Cloud computing/architectures %20,2 strong and very strong,
- In-memory DBs %22,1 strong and very strong,
- Statistics %29,4 strong and very strong
- Data Security %28,4 strong and very strong.

In general frequency analysis suggest that Turkish participants are not skilled in Applying Expertise and Technology dimension.

Analyzing

Analyzing sub-dimension is composed of 4 items. Participants rated Problem Solving %58,9 strong and very strong, Optimization %33,3, Analytical Skills %45,8 and Cognitive Ability %46,5 . Optimization and analytical skills are below average.

CREATING AND CONCEPTUALIZING

The Great Eight's Creating and Conceptualizing dimension captures works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change (Dave, 2005). It is composed of three sub dimension called Learning and Researching (2 items) and Creating and Innovation (4 items) and Formulating Strategies (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Learning and Researching

Turkish participants reported they have life-long learning skill %69,4 strong and very strong and %60,2 strong and very strong in knowledge management.

Creating and Innovation

Participants rated themselves %44,9 strong and very strong in Innovating; %56 strong and very strong in creativity, %63,9 strong and very strong in Critical Thinking and %45 strong and very strong in Change Management.

Formulating Strategies

%44,9 of participants rate themselves strong and very strong for Business Strategy,

%51,3 of participants rate themselves strong and very strong for Abstract Ability

%48,6 of participants rate themselves strong and very strong for Managing Complexity Turkish participants rated low in formulating strategies.

ORGANIZING AND EXECUTING

The Great Eight's Organizing and Executing dimension captures plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards. It is composed of three sub dimension called Planning and Organization (3 items) and delivering Results and Meeting Customer Expectations(2 items) and Following Instructions and Procedures (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Planning and Organization

Participants rated Planning and Organization dimensions Project management %46,8 strong and very strong, Planning and organizing work %53,2 strong and very strong and % 55 strong and very strong Management Ability.

Delivering Results and Meeting Customer Expectation

Participants rated their Customer Orientation skills %46,5 strong and very strong, Customer Relationship Management skills %51,9 strong and very strong.

Following Instructions and Procedures

Legislation awareness skills %40,3 strong and very strong, Safety awareness skills %55,1 strong and very strong and Individual responsibility skills %70,4 strong and very strong.

ADAPTING AND COPING

The Great Eight's Adapting and Coping captures adapts and responds well to change. Manages pressure effectively and copes well with setbacks. It is composed of two sub dimension called Adopting and Responding to Change (4 items) and persuading and influencing (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Adopting and Responding to Change

Participants rated their Work in interdisciplinary environments skills %59,6 strong and very strong, Intercultural competency skills %50 strong and very strong, Flexibility skills %50,4 strong and very strong and Adaptability and ability to change mind-set skills %63,2 strong and very strong.

Persuading and Influencing

Participants rated their Work Life Balance skills %50 strong and very strong.

ENTERPRISING AND PERFORMING

The Great Eight's Enterprising and Performing captures focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement. It is composed of two sub dimension called Achieving Personal Works Goals And Objectives (1 item) and Entrepreneurial and Commercial Thinking (2 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Achieving Personal Work Goals and Objectives

Participants rate their Self-management and organization skills %71,5 strong and very strong

Entrepreneurial and Commercial Thinking

Participants rated their Business model understanding skills %52,8 strong and very strong and Entrepreneurship skills %55 strong and very strong.

We also calculated mean scores of each 8 dimension in order to find out training needs of graduates in the age of Industry 4.0. While 1 refers to be weak, 5 refers to be strong. Table 7 shows the mean scores of Turkish graduates for all 8 dimensions.

Table 7. Mean Scores of 8 Dimensions of Graduates

DIMENSION	Mean Score	Standard Error
1. Leading and Decision	3,7262	,08300
1.1. Decision and Initial Action	3,7381	,08231
1.2. Leading and Supervising	3,7024	,09844
2. Supporting and Cooperation	3,7599	,05725
2.1. Working with People	3,7262	,07641
2.2. Adhering to Principles and Values	3,7937	,06796
3. Interacting and Presenting	3,6131	,06179
3.1. Relating and Networking	3,6349	,06813
3.2. Persuading and Influencing	3,5893	,09512
3.3. Presenting and Communicating Information	3,5952	,09747
4. Analysing and Interpreting	3,1248	,05917
4.1. Writing and Reporting	3,4345	,07323
4.2. Applying Expertise and Technology	3,0383	,06478
4.3. Analysing	3,4673	,07343
5. Creating and Conceptualization	3,5979	,06714
5.1. Learning and Researching	3,7262	,08694
5.2. Creating and Innovation	3,5833	,07447
5.3. Formulating Strategies	3,5317	,08508
6. Organizing and Executing	3,5134	,07764
6.1. Planning and Organization	3,5159	,09163
6.2. Delivering Results and Meeting Customer Expectations	3,5119	,10542
6.3. Following Instructions and Procedures	3,5119	,07750
7. Adapting and Coping	3,5810	,06686
7.1. Adopting and Responding to Change	3,6012	,06842

7.2. Persuading and Influencing	3,5000	,09042
8. Enterprising and Performing	3,7143	,08086
8.1. Achieving Personal Work Goals and Objectives	3,9524	,09416
8.2. Entrepreneurial and Commercial Thinking	3,5952	,08614

According to table 7, while the weakest dimension is analysing and interpreting, supporting and cooperation dimension is the strongest one. It can be inferred from the table that as all the dimensions captures more than 3 mean score (1 is min, 5 is max and 3 is average), we can say that Turkish graduates evaluates themselves not weak. Although Turkish graduates consider themselves not weak, there are some dimensions need to be trained such as analysing and interpreting, creating and conceptualization, organizing and executing and adapting and coping.

FINDINGS FOR EMPLOYEES IN TURKEY

In this part firstly finding for demographics of the employees has been given. Later the findings of the Great 8 competency dimensions has been given for the employees.

Demographics

- While %33,3 of the employees are male %66,7 are female
- %6,7 of the respondents have Primary School degree, %6,7 Secondary School, %28,3 College, %5 Vocational School, %3,3 Vocational High School, %28,3 Graduate and %21,7 Higher Education
- %28,3 of the participants work in Manufacturing, %36,7 in Education and %35 in Service sectors
- %3,5 of the participants are working in companies with 1-10 employees, %42,1 with 11-50, %3,5 with 51-100, %7 with 101-250, %24,6 with 251-500 and %19,3 with 500 and more employees
- Participants are working years as a professional range from 01-39 years, average Professional working years is 9,88 years
- Participants are working for the same company ranging from 1-20 years, average is 4,37 years.

Demographic represent a participant profile with females, educated, mostly working in manufacturing, education and service sectors equally.

Findings for Business Trends

While %28,3 of the participants report that total revenue decreasing in their sector, %18,3 reported total revenue increasing, %13,3 reported No Change, and 33,3 %don't know and %6,7 state Not applicable. It can be said that Turkish participants report a neutral and negative trend in the sector.

Table 8. What is the business trend in your organization

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Total revenue decreasing	17	28,3	28,3	28,3
	Total revenue increasing	11	18,3	18,3	46,7
	No Change	8	13,3	13,3	60,0
	Dont know	20	33,3	33,3	93,3
	Not applicable	4	6,7	6,7	100,0
	Total	60	100,0	100,0	

SKILL NEED IN INDUSTRY 4.0

LEADING AND DECISION

The Great Eight's Leading and Decision dimension captures participant's taking control and exercise leadership, initiates action, gives direction, and takes responsibility skills (Dave, 2005). It is composed of two sub dimension called Deciding and Initial Action (2 item) and Leading and Supervising (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Deciding and Initial Action

Frequency analysis for Deciding and Initial Action items suggest that %63,3 of the Turkish employees evaluate themselves as moderate to strong level of decision making and %76,7 strong to very strong level of taking responsibility.

Leading and Supervising

Frequency analysis for Leading and Supervising items suggest that %53,4 of the Turkish participants evaluate themselves as moderate to strong level of Leadership Skills.

SUPPORTING AND COOPERATION

The Great Eight's Supporting and Cooperation dimension captures participant's supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organization (Dave, 2005). It is composed of two sub dimension called Working With People (3 items) and Adhering to Principles and Values (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Working with People

Turkish participants reported they have high levels of team work skills, only %4,9 reported very weak and weak team work skills whereas %78,3 reported strong and very strong team work skills, %78 strong and very strong in

Collaborating with Others and %71,7 strong and very strong in Communicating with people skills. Turkish participants evaluate themselves high in working with people dimension.

Adhering to Principles and Values

Turkish participants evaluate themselves high in Respecting Ethics with %72,9 and Environmental Awareness with %72,9 strong and very strong ratings. However, compared to other skills, awareness of ergonomics rated lower like graduates in Turkey, only %49,1 reported strong and very strong.

INTERACTING AND PRESENTING

The Great Eight's Interacting and Presenting dimension captures communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner (Dave, 2005). It is composed of two sub dimension called Relating and Networking (3 items), Persuading and Influencing (2 Items) and Presenting and Communicating Information (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Relating and Networking

Relating and networking competency has three items; compromising, creating business networks and maintaining customer relationships. %80 of the Turkish participants rated themselves as strong and very strong compromising skills, %70,6 in creating business networks, and %66,1 in maintaining customer relationships.

Persuading and Influencing

%46,5 of the Turkish participants rated themselves strong and very strong in persuading influencing skills whereas %61 in emotional intelligence skills. Turkish participants rate low in negotiating.

Presenting and Communicating Information

Turkish participant rate themselves with strong and very strong with %54,3 in presenting and communication ability.

ANALYZING AND INTERPRETING

The Great Eight's Analyzing And Interpreting dimension captures shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing (Dave, 2005). It is composed of three sub dimension called Writing and Reporting (2 items), Applying Expertise and Technology (23 items) and Analyzing (4 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Writing and reporting

%50,9 of the Turkish participants rated strong and very strong in targeted/technical communication skills and %55,2 strong and very strong in literacy skills.

Applying Expertise and Technology

Applying expertise and technology dimension is composed of 23 items.

- Participants rated their skills in IT and technology affinity %54,2 strong and very strong,
- Economics %37,9 strong and very strong,
- Extract business value from social media %46,7 strong and very strong,
- Service orientation/product service offerings %47,5 strong and very strong,
- Business process management %55,2, strong and very strong,
- Business change management %36,2 strong and very strong,
- Understand and coordinate workflows %6,9 strong and very strong,
- Network security %58,3 strong and very strong,
- IT architectures % 20,3 strong and very strong
- Machine learning %41,1 strong and very strong,
- System development % 31 strong and very strong,
- Integrating heterogeneous technologies %33,3 strong and very strong,
- Mobile technologies %39 strong and very strong,
- Sensors/embedded systems %15,5 strong and very strong,
- Network technology/M2M communication %32,2 strong and very strong,
- Robotics/Artificial intelligence %17 strong and very strong,
- Predictive maintenance %26,8 strong only,
- Modelling and programming %18,7 strong and very strong,
- Big data/Data analysis and interpretation %22,4,
- Cloud computing/architectures %3,4 strong and very strong,
- In-memory DBs %11,6 strong and very strong,
- Statistics %21 strong and very strong
- Data Security %21,6 strong and very strong .

In general frequency analysis suggest that Turkish participants are not skilled in Applying Expertise and Technology dimension like graduates.

Analyzing

Analyzing sub-dimension is composed of 4 items. Participants rated Problem Solving %71.9 strong and very strong, Optimization %40,3, Analytical Skills %39 and Cognitive Ability %49,2 . Optimization and analytical skills are below average.

CREATING AND CONCEPTUALIZING

The Great Eight's Creating and Conceptualizing dimension captures works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change (Dave, 2005). It is composed of three sub dimension called Learning and Researching (2 items) and Creating and Innovation (4 items) and Formulating Strategies (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Learning and Researching

Turkish participants reported they have life-long learning skill %60 strong and very strong and %52,3 strong and very strong in knowledge management.

Creating and Innovation

Participants rated themselves %30,3 strong and very strong in Innovating, %42,4 strong and very strong in creativity, %57,7 strong and very strong in Critical Thinking and %40 strong and very strong in Change Management.

Formulating Strategies

Business Strategy %43,1 strong and very strong, Abstract Ability %58,6 strong and very strong, and Managing Complexity %61,1 strong and very strong. Turkish participants rated low in formulating strategies.

ORGANIZING AND EXECUTING

The Great Eight's Organizing and Executing dimension captures plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards. It is composed of three sub dimension called Planning and Organization (3 items) and delivering Results and Meeting Customer Expectations(2 items) and Following Instructions and Procedures (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Planning and Organization

Participants rated Planning and Organization dimensions Project management %43,1 strong and very strong, Planning and organizing work %52,5 strong and

very strong and % 52,6 strong and very strong Management Ability. It can be concluded that planning and organization ability needs to be trained.

Delivering Results and Meeting Customer Expectation

Participants rated their Customer Orientation skills %52,6 strong and very strong, Customer Relationship Management skills %52,6 strong and very strong.

Following Instructions and Procedures

Legislation awareness skills %39,7 strong and very strong, Safety awareness skills %63,3 strong and very strong and Individual responsibility skills %73,2 strong and very strong.

ADAPTING AND COPING

The Great Eight's Adapting and Coping captures adapts and responds well to change. Manages pressure effectively and copes well with setbacks. It is composed of two sub dimension called Adopting and Responding to Change (4 items) and persuading and influencing (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Adopting and Responding to Change

Participants rated their Work in interdisciplinary environments skills %80 strong and very strong, Intercultural competency skills %48,3 strong and very strong, Flexibility skills %53,5 strong and very strong and Adaptability and ability to change mind-set skills %63,3 strong and very strong.

Persuading and Influencing

Participants rated their Work Life Balance skills %56 strong and very strong.

ENTERPRISING AND PERFORMING

The Great Eight's Enterprising and Performing captures focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement. It is composed of two sub dimension called Achieving Personal Works Goals And Objectives (1 item) and Entrepreneurial and Commercial Thinking (2 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Achieving Personal Work Goals and Objectives

Participants rate their Self-management and organization skills %68,9 strong and very strong.

Entrepreneurial and Commercial Thinking

Participants rated their Business model understanding skills %47,5 strong and very strong and Entrepreneurship skills %53,3 strong and very strong. Turkish participant rate below average Entrepreneurial and Commercial Thinking skills.

We also calculated mean scores of each 8 dimension in order to find out training needs of employees in the age of Industry 4.0. While 1 refers to be weak, 5 refers to be strong. Table 9 shows the mean scores of Turkish employees for all 8 dimensions.

Table 9. Mean Scores for 8 Dimensions of Employees

DIMENSION		
1. Leading and Decision	3,9063	,11323
1.1. Decision and Initial Action	4,0469	,12370
1.2. Leading and Supervising	3,6250	,13282
2. Supporting and Cooperation	4,0365	,09892
2.1. Working with People	4,0938	,10608
2.2. Adhering to Principles and Values	3,9792	,12517
3. Interacting and Presenting	3,8073	,11128
3.1. Relating and Networking	3,9063	,11323
3.2. Persuading and Influencing	3,7656	,13467
3.3. Presenting and Communicating Information	3,5938	,16716
4. Analysing and Interpreting	3,0259	,12125
4.1. Writing and Reporting	3,5938	,13552
4.2. Applying Expertise and Technology	2,8818	,13025
4.3. Analysing	3,5703	,14031
5. Creating and Conceptualization	3,6285	,12735
5.1. Learning and Researching	3,8125	,13975
5.2. Creating and Innovation	3,5391	,14641
5.3. Formulating Strategies	3,6250	,13112
6. Organizing and Executing	3,7422	,11799
6.1. Planning and Organization	3,6354	,13417
6.2. Delivering Results and Meeting Customer Expectations	3,6875	,13975
6.3. Following Instructions and Procedures	3,8854	,13604
7. Adapting and Coping	3,7563	,11526
7.1. Adopting and Responding to Change	3,7422	,11419
7.2. Persuading and Influencing	3,8125	,17061

8. Enterprising and Performing	3,7604	,11422
8.1. Achieving Personal Work Goals and Objectives	3,8750	,13282
8.2. Entrepreneurial and Commercial Thinking	3,7031	,12869

According to table 9, while the weakest dimension is analysing and interpreting, supporting and cooperation dimension is the strongest one. This finding is congruent with the findings of the graduates. It can be inferred from the table that as all the dimensions captures more than 3 mean score (1 is min, 5 is max and 3 is average), we can say that Turkish employees evaluates themselves not weak. When compared with graduates, it is seen that the rates of employees is higher than the graduates.

INTERVIEW WITH MANAGERS

Due to the difficulty in getting the managers to fill in the questionnaire, the best solution is considered be to carry out an “In deep interview” in order to find out the views of managers on Industry 4.0. As there are big challenges that are being totally changing the labour conditions in our society, it is aimed to understand and find out whether the business market is ready for the changes in the near future and how the companies deal with the Industrial Revolution 4.0.

With this regard following questions are designed for the interview:

- 1- What is the business trend in your organization (revenue increasing/decreasing, number of employees increasing/decreasing)?
- 2- What is the business trend in your sector (revenue increasing/decreasing, number of employees increasing/decreasing)?
- 3- What is the business trend in economy?
- 4- If you lose your position right now, how easy is it for you to find a new position in the same sector
- 5- If you lose your position right now, how easy is it for you to find a new position in the same position
- 6- If you lose your position right now, how easy is it for you to find a new position in another sector
- 7- Can you work in a lower position?
- 8- What is the biggest challenge for you to continue to work as a manager?
- 9- In which areas do you think you should develop your skill kit in order to continue working as a manager?
- 10- Can automation be a problem for your current position? What do you think about Industry 4 in your sector?

11- Are employees working in lower positions in danger of losing their jobs in your organization, and sector? How will industry 4 effects employment in your organization, and sector

Before starting the interviews with the managers, the aim of the project was told and asked whether the interviewee is already aware of Industry 4.0. If the interviewee does not know I4.0, then the concept of I4.0 is explained with examples.

Interview Summary

We have conducted interviews with 6 managers;

2 managers from service sector: Both of them are general manager in a five star hotel. While one is female at the age of 39, the other is male at the age of 41.

2 managers from education sector: The female is a vice dean in a public university at the age of 36 and the male is a general secretary in a public university at the age of 39.

2 managers from manufacturing sector: Both of them are male. One is a general manager in a Turkish company at the age of 42 and the other is a district manager in an international company at the age of 46.

The interviewees are coded as;

manager A in tourism sector, manager B in tourism sector

manager A in education sector, manager B in education sector

manager A in manufacturing sector, manager B in manufacturing sector

The interviews lasted approximately 20-25 minutes.

Just 2 interviewees are already aware of Industry 4.0; one manager is from service and one manager is from manufacturing know Industry 4.0. The rest of the managers were told about Industry 4.0 before starting the interview.

As there are 3 different sectors, the replies can be varied according to the sector. For this reason we can categorize some of the replies under the sectors.

The Business Trend in the Organization

- Regarding the business trend in their organization, the managers in the service-tourism sector declared that 2015 in Turkey in terms of tourism was a successful year, however tourism sector faced a big crisis in 2016. They said that when they compare today's business trend with 2015 both the revenue and the number of employees are not increasing; but if they compare today's business trend with 2016 both the revenue and the number of employees are increasing these days. One of the manager says:

“2016 was completely a crisis year. The revenue fell down. We had to revise our employee numbers. But in 2017, a better revenue compared to 2016, we have increased the number of employees. Now in 2018 we continue our way with a better revenue and number of employees. However, in 2018 we still can not capture 2015 figures as revenue, we have caught up with the number of guests, but we cannot reach the same revenue as in 2015. Maybe we will catch up next year”

- Regarding the business trend in their organization, the managers in the education sector agree that the number of students have been increasing in their universities. However, while the Manager A says that both the number of employees and the budget is increasing, the Manager B states that the number of employees is not increasing as needed, also he emphasizes that the budget is not sufficient enough to fulfill the requirements and to meet the needs of the students. The Manager B declares that:

“The budget that the state gave to us as a budget is not very high. Even planned investments are always delayed due to insufficient budget. Our budget is low. We are not able to meet student demands in terms of physical competence. New departments are being established. Maybe it is better to focus on the quality of the education. However the current trend in our university tends to give more education to more people.”

- Regarding the business trend in their organization, the managers in the manufacturing sector declared that the revenue is increasing day by day in their organization. The Manger A also says that even there is a crisis in the country, his organization stay stable in terms of revenue.

The Business Trend in Their Sector

- Regarding the business trend in their sector, the managers in the service-tourism sector stressed that there was economic crisis in Turkey in 2016 in tourism sector. However tourism this year is about to overcome the problems of the crisis. One of the manager emphasizes that:

“Tourism has experienced a different situation than all other sectors in Turkey. In November 2015, we have a serious crisis with Russia due to the plane crash. Antalya was greatly influenced by this situation. We have had a problem related to charter flights not allowed by Russia, tour operators forbidding tour sales, and obstacles to the import of agricultural products. Unfortunately, the occurrence of terrorist incidents has affected us very much outside of all other sectors. We had suffered from this crisis. While 12 million tourists visited in 2015, just 6 million tourists arrived in 2016. We’ve lost 50%. Last year we were close to 10 million tourist. This year we aim to exceed 12 million. However, we do not sell to the 2015 figures, so we are far from 2015 revenue’s.”

- Regarding the business trend in their sector, the managers in the education sector states that as Turkey has young population the education sector is increasing each year. They declared that new universities, both state and private, are being founded each year. However, the manager B stresses the need for the staff:

“The education sector is ongoing progress. The budget is not as good as that. In the sense of the number of state employees, the newly established universities are not able to provide personnel as much as they can. Especially new universities which have decided to grow a little faster are becoming victims in this sense like ours. We have a staff problem. We are trying to do business with very few staff.”

- Regarding the business trend in their sector, the managers in the manufacturing sector says that there is a contraction in the sector. The manager states that:

“In general, there is stagnation in the sector and this situation is reflected to the salaries of the staff”

Business Trend in Economy

All the managers states that the economy is not good these days in Turkey. They stress the increase in the unemployment rate. They also emphasize because of the budget most of the companies prefers not to employ new staff, rather the companies try to to use the current existing staff most efficiently as they are cost-oriented due to economic conditions. Furthermore the managers see the increase in the exchange rate as problematic. The manager B in tourism sector states that:

“The exchange rate is the most decisive factor when the economy gets tough. Although not knowing other sectors, there is no positive picture in the general economy.”

To Find a New Position in the Same Sector

- The managers in the tourism sector state if they lose their position right now, it is possible to find a new position in tourism sector, however they stress that they have to wait a little bit, maybe one year to find the same position and same standards as they work now.
- The managers in education sector state if they lose their position right now, the possibility to find a new position as manager in education sector is moderate, not high.
- The managers in manufacturing sector state if they lose their position right now, the possibility to find a new position as manager in manufacturing sector high. Because they stress their experience in the sector.

To Find a New Position in the Same Position

All the managers regardless of the sector stress that they can find a new position in the same position as a manager. Just the manager B in education sector emphasizes if you are appointed as manager in public university you are legally obligatory be a manager. He states that:

“Managers in universities change a bit more according to the political wind. If the position is to be appointed as the manager, it’s legally obligatory to be reappointed as manager. Even if he is assigned to the lower position, he has to make the appointment again as the manager in the same position with the case.”

To Find a New Position in Another Sector

All the managers except manager A from education sector state that they can easily find a new position in another sector. The sectors varies from advertising, real estate industry, geology to education.

To Work in a Lower Position

The manager A tourism strictly says that “NO”. She cannot work in a lower position. On the contrary manager B in tourism states if the conditions are good in terms of social and material, he can work in a lower position in a good hotel.

The managers in education declare that they can both work in a lower position. Also the manager B says that the working environment and the team is much more important than the position.

The manager A in manufacturing sector declare that he does not want, however, if he has to, he can work in a lower position. The manager B says he can work in a lower position.

The Biggest Challenge To Continue To Work As A Manager

- Regarding the biggest challenge to continue to work as a manager, the manager A in the tourism sector declared that as the salaries of the managers are high, lots of bosses believe that his son can manage the hotel, he cannot need a manager during crisis. That’s why manager A considers the biggest challenge as crises and budget. The manager B thinks that the biggest challenge is the knowledge. He states that:

“it is very important to keep up with the pace. We are a manager between two generations who is a little bit older than the new generation and younger than the older generation. But we have also caught up with the new generation, especially the digital technology, the use of internet social media. We are both educated and develop ourselves in this regard.”

- Regarding the biggest challenge to continue to work as a manager, the manager A in the education sector points out the importance of foreign

language. However, the manager B criticizes the system of the public universities as following:

“One must be in compliance with top managers, who will be attached to become a manager in our country. It is not important that you do your job well, but what is important is doing it the way they want. When faced with such a demand, people who can say no to this can come up to a certain extent and can not go beyond that. If you work with your principals, your biggest obstacle is your principles.”

- Regarding the biggest challenge to continue to work as a manager, the managers in the manufacturing sector declares that what is important is not losing the performance. The manager A also points out that:

“Without prejudice, you need to continue to evolve and innovate so that you are fit to the new generation. And you can meet the expectations of your company. You need to innovate and keep up with change and you have to work harder than newly employed.”

The Skill Kit in Order to Continue Working as a Manager

- The managers in tourism sector declares that in order to provide customer satisfaction, one should follow the agenda of tourism sector. Also they stress the importance of fulfilling the requirements of the digital age to continue as a manager.
- The managers in education sector stress the importance of interpersonal communication and the knowledge of foreign language.
- The managers in manufacturing sector declares the importance of presentation skill, anger management, communication skills, knowledge on human resources, good command of subject on law, digital integration, system design, environmental management

Thoughts About Industry 4.0

- Both of the managers in tourism sector says that tourism is the least affected sector by the Industry 4.0. They think that tourism is completely based on service and the service means staff which is human. The manager A states that:

“It is the least affected sector in a place where the human factor is so intense. However, of course, there will be disadvantages. With the introduction of computers into our lives, cell phones have become a reality and our hotel has reduced the number of personnel such as accounting and front office. Automation at the top level does not create any problems. It makes the manager’s job easier. They can not substitute a robot for the manager”.

The manager B also stress the importance of Industry 4.0 as following:

“I guess that will not happen that robots will come and work in all our hotels. Logically, our industry is intertwined with our people. We have a lot of dialogue with our guests to ensure guest satisfaction. So we touch the guests. Guests touch us, we touch the guest, there is reciprocity. For now I do not believe that artificial intelligence or this robotics world will yet affect tourism. I do not believe in the future either. I do not believe it will affect the areas where we are in touch with the customer. Because there will be emotionlessness. I will give an example. When we were in Germany in a fair, one of our hosted guests came to us and asked me if Saban’s child was born. I have a guest contact who is aware of my waiter’s child. Especially this is more in German and European guests. We are always satisfied with our job, maintaining consistency, creating loyalty together. Something related to this feeling. This is related to the contacts with these happiness. At least for now there is some time in this regard.”

- The managers in education sector believes that Industry 4.0 has already affected the universities in terms of administrative staff. They declare that with automation everything is in recorded more systematically without mistake. They also point out the effects of automation for the academic staff with the emergence of online education. The manager B states that:
“I think there will be areas that will absolutely affect. We can serve large quantities with far fewer staff with less cost than the previous one. Especially with the systems providing internet infrastructure, students can register online in 4-5 minutes without coming to the school. We had to recruit 5-6 staff in advance. It used to be a big work for us in the past. The student has not made any expense. In this sense, automations need to produce and disseminate serious ideas.”
- The managers in the manufacturing sector consider automation as needed in order to minimalize the human errors. However they are in the belief that the automation is not a danger for the managers because human factor is important for customer satisfaction and loyalty. Also the manager B states that automation will not kill handicrafts. He suggest that:
“The heavy competition in the sector makes such technological transformations essentially obligatory. Perhaps soon after the sectors like automotive and defense industry, the industrial catering sector will look for itself in front of this transformation. I think that this transformation will lead to an increase rather than a decrease in design and engineering work. I also do not think that the rate of handcrafting will decline as much in other sectors if we consider it to be a boutique and totally non-standard orders

in an important sector in the sector (about 35%). The sector is likely to be divided over time, as standard products and boutique products.”

The Effects of Industry 4.0 for Lower Positions

The managers in tourism sector believes that the Industry 4.0 will have little effect on tourism sector even for the lower positions. They stress the importance of customer satisfaction which can be gained through customer relations. The manager A suggest that:

“In terms of guest relations, hotels that do not adopt to automation become privileged.”

However she points out that the staff who are engaged with the hotel guest or the departments that are directly in contact with the guests will not be affected by automation, however, administrative staff has already affected by it.

The manager B also state that there have been dismissal for administrative staff in their hotel. He says:

“Of course the administrative part will be reduced. In the past, the bills were cut by hand in accounting. Now that we’ve gone electronic. We are doing some programs with foreign tour operators. We do it with the help of software. We are now thinking about new things, trying to make hotel rooms check-in as if they were checking in the planes. We started to make technology and subdivision accordingly.”

- The managers in education sector believes that automation can be a threat for administrative staff of the academics who give lectures on common courses such as Turkish language, history because of online education.
- The managers in manufacturing sector believes that automation has already a threat for lower positions. Manager A states that:

“Due to the order from the internet in our company sub-position, many people were removed from the work. The number of employees decreased. Now 1 staff can easily operate 3 people’s job. The 200 companies we work with are placing 150 online orders, so we have only one person who is interested in ordering.”

The manager B suggest that there will be a division in manufacturing sector and says that:

“I think that the number of the same specialized staff, especially in blue collar personnel in standard product production will decrease, however, the staff who are specialized in handicraft positions in boutique productions will increase.”

To sum up, although the managers in Turkey are in the opinion that Industry 4.0 will be a great threat for the employees rather than the managers, we can classify skill kit in order to continue working as a manager in Turkey as follow:

For service sector: in order to keep the customer satisfaction to keep up to date himself/herself on the sector, in order to capture the requirements of the digital age knowledge on digital media and internet

For manufacturing sector: knowledge on human resources, good command of subject on law, digital integration, system design, environmental management, presentation skills, anger management, communication skills

For education sector: interpersonal communication, knowledge on technology, foreign language

As a conclusion there are some skills to be developed for graduates in order to find a job; there are some skills to be developed for employees in order to continue to work in the current position/sector/job and there are some skills to be developed for in order to continue to work as a manager. The findings for graduates and employees are slightly differ from each other. It can be concluded that both the graduates and employees consider themselves weak in applying expertise and technology skill which is the most important skill for the Industry 4.0. Thus the students or employees who can develop themselves in these kind of skill can find well-paid job easily in this new era.

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INDUSTRY 4.0 COMPETENCIES IN POLAND FOR CAREER MANAGEMENT

Dorota NAWRAT – WYRAZ

1. General information about employees, enterprise and employees

In Poland, economic activity can be carried out in the various legal forms. In the case of individual economic activities and civil law partnerships, the place of registration of activities is the Central Register and Information on Business. In the case of other legal forms, the place of registration is the National Court Register.

At the end of June 2015, the Statistical Information Centre (GUS) estimated the number of entities of the national economy at 4 155 328, including **4 017 103 private companies**. This does not mean, however, that there are currently 4 million active companies in Poland. The GUS statistics include entities that suspended the economic activities, entities that ended their operations, but information about this fact did not reach the Statistical Information Centre and entities that are not entrepreneurs (foundations, associations). For **commercial companies**, the Statistical Information Centre gives the value of 434,523 entities, while only 313,000 are active. The Central Statistical Office includes entities registered in the Commercial Register B, which have not been transferred to the National Council Of The Judiciary and entities appearing in the National Council Of The Judiciary that are not active. From 2016, the process of automatic deletion of inactive entities from Commercial Register B and the National Council Of The Judiciary has started. A similar mechanism applies to **cooperatives**, which, according to the Statistical Information Centre of 17 590, only 9 900 realistically operate. In the case of **foundations and associations**, there are 131 460 entities in the GUS, but only 9 800 entities from this category of legal entities are entrepreneurs. The largest group of entities according to the Statistical Information Centre are **private individuals running a business activity** - there are 2,977,290. However, according to the official register of the Central Register and Information on Business there are only 2 529 000 of such entities, with over

20% of entities being entities with suspended economic activity. Taking into account Central Register and Information on Business statistics, active private individuals running a business activity in Poland is no more than 2 million. The last large group of entities in the national economy are **civil law partnerships** - according to GUS, there are 285 927.

To sum up the above data, we will receive an active number of entrepreneurs by adding up the values for the following legal forms:

- commercial partnerships 313,000
- cooperatives 9,900
- foundations and associations 9,800.
- private individuals running a business activity 2,000,000.

The value obtained is 2 332 700, although it is also slightly overstated. For verification, the value of 2.3 million active entrepreneurs, we can also use information from another state authority. Such a body is the Polish Social Insurance Institution (ZUS), which provides information on the number of entities paying ZUS contributions. There are 1.7 million of such entities. In this **number 120 thousand these are public sector entities** - offices, schools, orphanages, etc. Therefore, there are no more than 1.6 million Social Insurance Institution (ZUS) contribution payers per **entrepreneurs**.

Summing up: the number of active entrepreneurs ranges from 1.7 million to 2.3 million companies.

Number of companies basing on the employment rate ²	
Rate of employment	Number of companies
over 1000	462
250-999	2 453
50-249	17 332
10-49	117 486
1-9	2 000 000

Rate of employment

In the third quarter of 2017, the number of working people in Poland was **16 510 000** and it was the highest result in the history of the study. This number increased by 14 thousand (0.1%) compared to the second quarter of 2017 and by 244 thousand (1.5%) in relation to the third quarter of 2016 - informs the Statistical Information Centre. The historical minimum was recorded in the first quarter of 2003 (13,348,000), which was about 3.1 million employees (23.7%) lower.

2 The list of Polish companies registered in the National Court Register is provided online by the Central Economic Information Center in the form of the INFODESK marketing service together with newly registered individual business activities registered in CEIDG

In Poland, 9.7% of people are employed by the state. Generally, the Polish State employs **1 896 340 people**. Salaries of this group absorb **88 257 470 000 PLN annually**.

According to GUS data on employment in public administration, in Poland last year there were over 5.6 thousand officials. It means that in total there are 444,000 of them, and more than 260,000 people are currently working in local government.

However, the largest professional group paid from taxpayers' money is not officials. The research conducted by the Republican Foundation shows that these are people employed in **the education system**. They were included in general, separate and higher education and kindergartens. The state pays the most jobs in general education - **366,800**. However, these are not the most expensive jobs. The highest wages are employed in **higher education - PLN 11,262,810,000 / year and in kindergartens - PLN 4,906,070,000 / year**.

Employees in education also generate, on average, the largest costs for the state budget. There are PLN 41 341 210 000 from the state budget for 589 770 people, which gives an average of PLN 70 097 per year per person. The second most expensive professional group are employed in **the justice system**. The average annual salary in this sector is PLN 68,848.

In turn, the second largest group are employed in administration. We spend PLN 21 092 730 000 annually on 415,000 people. What in terms of earnings gives third place.

The last place on the podium, in terms of the number of people paid by the state, are employed in **health care**. There are 361,820 physicians and NFZ(National Health Fund) employees. Data regarding earnings are incomplete, because NFZ did not disclose this information.

Unemployment in Poland

The registered unemployment rate as at the end of March 2018 was 6.6 percent.³ The number of unemployed in March 2018 amounted to 1.09 million people. The number of vacancies and places of professional activation reported by employers to labour offices in March 2018 amounted to 147 thousand and compared to February 2018 increased by 17 thousand. (by 13.1%).

The registered unemployment rate is most often confused with **the number of persons employed**. The latter is also calculated on the basis of BAEL(Labour Force Survey), however, we refer to persons employed on the basis of an employment relationship. In the first quarter of 2014, there were 12.2 million of such persons, that is, they constituted barely 78% of all employed.

3 <https://www.mpips.gov.pl/aktualnosci-wszystkie/zatrudnienie-i-przeciwdzialanie-bezrobociu/art,9859,w-marcu-lepiej-na-ryнку-pracy.html>

The unemployment rate among recent graduates⁴ (people who completed education in the last 4 years) of all types of schools in Poland was below the average for the European Union. At the same time, although unemployment among graduates increased between 2007 and 2013, in Poland this increase was weaker than in other EU countries (Poland: an increase of 4 percentage points versus an average increase of 9 percentage points in EU countries).

175,300 - so many unemployed people with higher education were in the statistics of employment offices according to the latest data of the Statistical Information Centre. In total, 13% of the unemployed are people after graduation.

Disturbing is the fact that the unemployment rate among recent graduates was higher than among the total population of people up to 30 years of age (21% versus 18%), which indicates that there are still barriers to enter the labour market in Poland.

In addition, as many as 34% of unemployed graduates remain unemployed for over a year, while the percentage of long-term unemployed among recent graduates from EU countries is less, or 32%. The mismatch in the labour market and the small number of job offers in Poland are the main reasons for this. 60 percent graduates begin their first job after 2 months.⁵

In Poland young people with higher education have the easiest access to job (13% of unemployed among university graduates), whereas people with high education (27% of the unemployed) have more problems with finding it.

Graduates in Poland are twice as likely to work on temporary contracts as their peers from EU countries (52% against 26%). As much as 63 percent of them agree to be employed on temporary contracts due to the lack of permanent jobs while work based on a temporary contract in other Central and Eastern European countries is a rare phenomenon - notes the IBE spokeswoman.

Most often, graduates with secondary or lower than secondary education work on a temporary contract in Poland and in some EU countries (in Poland, rarely anyone stops the education at middle school, but for example in Italy it is about 20 percent, and in Portugal about 35 percent). However, in countries where vocational training is well developed (Austria, Germany, Denmark), graduates with secondary vocational education have a better chance of permanent employment than graduates. (PAP).

4 <http://www.ibe.edu.pl/pl/o-instytucie/aktualnosci/573-bezrobocie-polskich-absolwentow>

5 System Ekonomicznych Losów Absolwentów (ELA),

2. Education system in Poland

Currently, the change of the education system is underway in Poland. The new structure of education in Poland will fully function only from the school year 2022/2023.

It will consist of:

- 8-grade primary school,
- 4-year secondary school,
- 5-year technical school
- a two-stage vocational school (5 years in total):
 - 2-year vocational school
 - 3-year secondary vocational school
- post-secondary schools
- first degree studies
- second degree studies
- doctoral studies

The higher education system is waiting for a reform - it is being prepared by the Ministry of Science and Higher Education.

In 2016, there were 1 348,8 thousand students in **390 higher education** schools of all types.⁶

The population aged 19-24 in 2006-2016 decreased by 30% (1155.4 thousand people). In 2016/17, there were 390 higher education institutions (including the schools of the Ministry of National Defence and internal affairs and administration). **132 of them were public universities** in which 1 034.2 thousand people were educated (76.7% of all students, 76.5% in the previous year), including 265.9 thousand people in the first year of studies. At the beginning of the academic year 2016/2017, there were **258 non-public universities** educating 314.7 thousand students (or 23.3% of all students), including 78.5 thousand for the first year of study. In comparison to the previous year, the number of non-public higher education institutions dropped, and the number of youth studying there decreased by 4.7%. Universities classified as run by religious organizations educated 18.3 thousand students.

At total, there are 1 348 822 students, of whom:

Public schools - 1 034 16 students

Non-public schools - 314,661 students

6 GUS, 2017

3. Career in Poland

In Poland, the legislation on professional careers is subject to three ministries:

- **Ministry of Family, Labour and Social Policy** <https://www.mpips.gov.pl/en/>
- **Ministry of Education** <https://men.gov.pl/>
- **Ministry of Science and Higher Education** <http://www.nauka.gov.pl/>

Institutions that provide services in the field of career counselling are:

- School career adviser - students
- Psychological and pedagogical counselling centres - students
- Centres of Practical Education, Lifelong Learning Centres - students
- Vocational Training Centres - students
- Academic Career Offices - students
- Voluntary Labour Corps - students, youth
- Public employment services - Labour Offices - adults
- Social Welfare Centres – adults
- Non-governmental organizations providing advisory services – adults
- Private career advisory centres and professional advisors running business activity – adults
- Employment agencies, job agencies, personal counselling – adults
- Training institutions – adults

3.1. Career counselling in the education system

It is regulated by the Education Law.

In the Act of 14 December 2016. Education Law:

Article 1. The education system shall ensure in particular:

19) preparing students for the choice of profession and education;

Art. 47. 1. The Minister competent for the educational and pedagogical matters shall determine, by way of a regulation:

3) basic teaching framework for particular types of schools, including:

c) the minimum working hours in the field of career counselling

4) program content in the field of career counselling, conditions and method of implementation and organization of career counselling in schools and facilities referred to in art. 2 point 4, and the requirements for the preparation of persons providing career counselling in schools and facilities referred to in art. 2 point

4, taking into account the role of career counselling in supporting students and students in the process of making educational and professional decisions.

Art. 98. 1. The school statute includes in particular:

16) organization of the school's internal career counselling system.

Art. 109. 1. The basic forms of didactic and educational activity of the school are:

5) classes conducted as part of psychological and pedagogical assistance;

7) classes in the field of career counselling.

6. Classes referred to in paragraph 1 point 7, are organized for students in the 7th and 8th grades of elementary school, 1st grade vocational school, high school and technical school.

7. Classes referred to in paragraph 1 point 7, are implemented independently of the help in choosing the direction of education and profession provided to students as part of the classes referred to in paragraph 1 point 5 of the Regulation of the Minister of National Education of March 28, 2017 on framework teaching plans for public schools.

Teaching programme framework:

- For the primary school: since the school year 2017/2018, in grades VII and VIII of the primary school is required a minimum of 20 hours of classes in counselling - for 10 hours in class VII and 10 in class VIII
- For vocational school of the first level- a minimum of 10 hours in the whole cycle of education
- For a general secondary school - a minimum of 10 hours in the whole cycle of education
- For a technical school - a minimum of 10 hours throughout the entire learning cycle

Regulation of the Minister of National Education of 9 August 2017 on psychological and pedagogical assistance in public kindergartens, primary and secondary schools as well as institutions:

§ 6.2 In the school, psychological and pedagogical assistance is provided during ongoing work with the student and through the integrated activities of teachers and specialists, as well as in the form of:

6) classes related to the choice of education and occupation - in the case of primary and secondary school students

§ 18. In the case of a primary school, the vocational school of the first level, a general secondary school and technical school as well as facilities referred to in

art. 2 point 4 of the Act, classes related to the choice of education and occupation complement the activities of the school and establishments in the field of career counselling.

§ 20.2 Teachers, tutors of educational groups and specialists in kindergarten, In particular, the school and the facility conduct:

2) at school:

b) supporting students in choosing the direction of education and occupation during their current work with students.

§ 26.1. **The tasks of a career adviser** include in particular:

- 1) systematic diagnosis of students' demand for educational and vocational information as well as help in planning education and career;
- 2) collecting, updating and providing educational and professional information relevant for a given level of education;
- 3) conducting classes related to the choice of the field of education and profession including recognized strengths, predispositions and interests and the talents of students;
- 4) coordinating information and counselling activities conducted by the school and institution;
- 5) cooperation with other teachers in creating and ensuring continuity of activities in the field of activities related to the choice of education and occupation;
- 6) supporting teachers, tutors of educational groups and other specialists in providing psychological and pedagogical assistance.

2. In the absence of a career adviser in a school or institution, the school head teacher or the facility appoints a teacher, tutor of the educational group or a specialist performing the tasks referred to in paragraph 1.

In the Act of 14 December 2016, the Regulations introducing the Act - Education Law read:

Art. 292. 1. In the 2017/2018 school year, career counselling classes referred to in art. 109 para. 1 point 7 of the Act - Education Law, are implemented on the basis of a program prepared by a teacher implementing these classes and approved for use by the school head teacher, after consulting the pedagogical council.

2. The program referred to in paragraph 1, contains information about occupations, qualifications and positions as well as the possibility of obtaining qualifications in accordance with the needs of the labour market and career predispositions.

In the Act on Educational Law of 14 December 2016:

Art. 47. 1. The Minister competent for the educational and pedagogical matters shall determine, by way of a regulation:

4) **program content in the field of career counselling, conditions and method of implementation and organization of career counselling in schools and facilities** referred to in art. 2 point 4, and the requirements for the preparation of persons providing career counselling in schools and facilities referred to in art. 2 point 4, taking into account the role of career counselling in supporting students and students in the process of making educational and professional decisions.

3.2. Academic Career Offices

Polish legislation binds Academic Career Offices with a system of labour market institutions. The legal framework for the activities of Academic Career Offices is defined in the Act of 20 April 2004 on the promotion of employment and labour market institutions (Journal of Laws 2004 No. 99, item 1001, as amended). In this Act, the definition of an academic career office appears first of all. According to art. 2 para. 1 item 1) “Academic Careers Office is:” an entity acting for the benefit of professional activation of students and graduates of a university, run by a university or student organization, whose tasks include in particular:

- a) providing students and graduates of higher education with information about the labour market and opportunities to improve their professional qualifications,
- b) collecting, classifying and making available job offers, internships and apprenticeships,
- c) maintaining a database of university students and graduates interested in finding a job,
- d) helping employers to find suitable candidates for vacancies and professional internships,
- e) help in active job search;

The amendment to the Act on the Promotion of Employment and Labour Market Institutions, which entered into force on 27 May 2014, introduced new regulations that apply to Academic Career Offices. According to the new regulation of art. 8 sec. 8 point 2a of the Act, the Vocational Career Information and Planning Centres operating within voivodship labour offices, the task was to “develop, update and disseminate professional information in cooperation with Academic Career Offices, in particular in academic career offices and powiat labour offices in the territory the province.” The amendment also introduced a

new loan instrument for business start-ups, available to jobseekers who graduated from university, within 48 months from the date of obtaining a professional title, and final year students (“First business - start-up support”). Career offices may be entrusted with the task of providing consultancy and training services to potential beneficiaries of loans or people who have already benefited from them, and the provisions of the Agency-related Act refer to the career offices operating at the universities registered as employment agencies.

3.3 Labour Market Institutions

Subject to the Ministry of Family, Labour and Social Affairs

The state’s tasks in the area of employment promotion, mitigating the effects of unemployment and occupational activation are implemented by labour market institutions acting to:

- full and productive employment,
- human resources development,
- achieving high quality work,
- strengthening integration and social solidarity

These tasks are carried out on the basis of:

- Act on the promotion of employment and labour market institutions,
- National Action Plan for Employment containing the principles of implementing the European Employment Strategy,
- local government, county, voivodship and social partner initiatives.

Labour market institutions implementing tasks specified in the Act of 20 April 2004 on the promotion of employment and labour market institutions (Journal of Laws No. 99, item 1001, as amended) are:

Public employment services

In Poland, Public Employment Services (PSZ) consist of:

- employment bodies together with poviats and voivodship labour offices,
- minister competent for labour and the office of the minister competent for labour,
- and voivodship offices carrying out tasks defined in the Act of 20 April 2004 on the promotion of employment and labour market institutions (Journal of Laws No. 99, item 1001, as amended).

The objectives of the PSZ are implemented by providing assistance to jobseekers, the unemployed and employers, offering employment services, vocational guidance, training, and implementing professional activation programs.

Provincial level – 16 voivodship employment offices

The Voivodship Employment Office (WUP) are organizational units of the voivodship self-government, they are subject to and act on behalf of the Marshal of the voivodship. They are responsible, among others for defining and coordinating regional labour market policy in relation to the national labour market policy (including through preparation and implementation of the regional action plan for the labour market).

The tasks of the voivodship self-government in the field of labour market policy implemented by voivodship labour offices in the field of vocational guidance include:

- organizing and coordinating and providing career guidance and information services, as well as their development in the province,
- developing, collecting, updating and disseminating vocational information in the voivodship.

Directly vocational guidance and information services for the unemployed and jobseekers are provided by Vocational Career Information and Planning Centres operating within voivodship labour offices.

Centres – (CliPKZ - Vocational Career Information and Planning Centres) are specialized units that provide career guidance services. Career adviser in the centres run career planning services for the unemployed and jobseekers. Centres relying on the classification of professions and specialties have a rich collection of professional information in the form of computer programs, job guides, descriptions and professional characteristics supporting career guidance services. The collection of information on the local, regional and national labour market also includes data on the activities of other labour market institutions, including information on lifelong learning and training of the unemployed. CliPKZ clients have at their disposal computer stations with access to the Internet, professional films, publications and publications related to the methods of personal development and job seeking.

The centres offer psychological services (psychological evaluation) and consultancy in the field of predispositions and professional competences testing, determining the indicated directions of further education and training. They organize thematic workshops for the unemployed and jobseekers regarding:

- getting to know job search techniques,
- conducting an interview,
- preparation of documents related to seeking employment,
- Internet usage,

- acquiring communication and self-presentation skills,
- explaining the rules of taking up employment abroad and using the EURES system and others

Vocational Career Information and Planning Centres cooperate with many institutions and organizations dealing with the development of human resources, and also carry out many projects related to the economic activation of the unemployed and jobseekers.

Job Clubs - activation classes for the unemployed and jobseekers whose aim is to acquire the skills of seeking employment by those who participate in them. Participants form a support group, exchange experiences and support each other and motivate each other to continue active action. It is very important to build an atmosphere of trust and mutual acceptance. All those who take part in the Job Club's classes have the right to free use of all forms of assistance, including:

- in using the database about job offers and workplaces,
- using the knowledge and support of the work club leader,
- individual consultations, used to correct the current method of operation,
- help of a work club leader and other institutional specialists in defining an individual action plan.

Poviat level: Poviat Labour Offices (PUP) as organizational units of poviat self-government are subordinate to starostes / presidents of cities. They are responsible for developing and implementing a job promotion program and activating the local labour market as part of the poviat strategy for solving social problems.

For tasks of poviat self-governments in the field of labour market policy, include helping unemployed people and jobseekers find a job, as well as employers in recruiting employees through job placement and career guidance.

Career counselling is carried out in each poviat labour office by a separate one-person or multi-person organizational unit. The organizational structure of the unit, among others career counselling is defined in the organizational regulations of the poviat labour office.⁷

Municipal Information Centres - facilities targeted at professional and social activation of local communities and the revival of the local labour market by offering access to sources of information on occupations, job offers and other information for job seeking.

Labour market services provided by Public Employment Services (PSZ):

- job placement,

⁷ WUP and PUP addresses are available on the website www.psz.praca.gov.pl

- EURES services and information on living and working conditions in these countries to support mobility on the European labour market⁸,
- career counselling and information,
- training organization,
- help in active job search.

Public employment services may commission local government units, non-governmental organizations, training institutions, trade union organizations, employers' organizations and employment agencies to perform certain tasks specified in the Act of 20 April 2004 on employment promotion and labour market institutions (Journal of Laws No. 99, item 1001 with later amendments). The public employment service is of government and self-government character. Its feature is the independence of each organizational unit.

Voluntary Labour Corps

Voluntary Labour Corps (OHP) is a state unit specialized in activities for the benefit of young people, especially youth at risk of social exclusion, and the unemployed up to the age of 25. Three groups of young people are involved in the activities of the Voluntary Labour Corps:

- neglected youth with reduced life chances, coming from socially maladjusted environments, in a large part of pathological, even criminogenic - from dysfunctional families - incomplete, impoverished, young people seeking institutional support and care, requiring educational and vocational training to make an independent start into adult life
- secondary school graduates (or students of the last grades of these schools), university graduates - educated youth and with some professional qualifications - threatened by unemployment and unemployed,
- upper secondary school students and students who want to work through the OHP during their free time and thus improve their own financial situation.

Voluntary Labour Corps perform tasks in relation to young people in the area of:

- education and upbringing,
- employment and counteracting marginalization and social exclusion.

Tasks in the scope of basic OHP activity include:

- supporting the state's educational system
- social, professional and economic activation of youth in OHP organizational units,

8 <http://www.eures.praca.gov.pl>

- organizing internships at home and abroad,
- undertaking other forms of activity enabling the improvement of professional qualifications or retraining,
- organizing year-round employment of unemployed young people and during the holidays for secondary school youth,
- providing information and career counselling services,
- reimbursement of costs incurred by the employer for remuneration and social security contributions of young workers employed under a contract of employment for the purpose of vocational training,
- initiating and organizing international cooperation of young people and
- implementation of European programs.

The main purpose of OHP's activity is to create the conditions for proper social and professional development - with particular emphasis on disadvantaged youth - by actively building a support system for the most vulnerable groups, organizing and supporting forms of getting out of poverty, unemployment and social pathologies.

Voluntary Labour Corps are an institution that not only educates, retrains, but also conducts career counselling and job placement, and prepares young people to move independently on the labour market. OHP provide opportunities to help young people, using available tools and methods for youth activation combined with modern computer and information technologies. OHP organizational structures cover the entire territory of Poland (*detailed information on OHP structure is available at www.ohp.pl*).⁹

Employment Agency

Employment agencies are non-public organizational units providing services in the field of job placement, job placement abroad with foreign employers, career counselling, personnel counselling and temporary work. Employment agencies included in the provisions of the Act of 20 April 2004 on the promotion of employment and labour market institutions (Journal of Laws No. 99, item 1001, as amended) are: Employment agencies conduct regulated activities within the meaning of the Act of July 2, 2004 on the freedom of economic activity (Journal of Laws No. 173, item 1807, as amended) and are obliged to enter an entry in the register of entities running employment agencies.

Employment agencies may not charge any fees to persons for whom they are seeking employment or other gainful employment. The only exceptions are certain

⁹ More information on OHP can be found in the Act of 20 April 2004 on employment promotion and labor market institutions (Journal of Laws No. 99, item 1001, as amended), the Regulation of the Minister of Economy and Labor on specific tasks and the organization of Volunteer Labor Corps from December 30, 2004 (Journal of Laws of 2005, No. 6, item 41) and on the website www.ohp.pl

fees charged to people sent to work abroad. The agency is obliged to inform the person directed to work abroad about the possibility of paying contributions to the Labour Fund due to employment abroad and the acquisition of employee rights in this respect.¹⁰

Placement agency

- they deal with job placement in Poland and work abroad for foreign employers,
- they provide assistance to the unemployed and jobseekers, including those not registered at the employment office, in obtaining appropriate employment, and employers in finding employees with appropriate qualifications.

The agency may demand from persons, for whom it is seeking employment, only the reimbursement of costs actually incurred related to the referral to work abroad, incurred for getting there and returning of the referred person, issuing a visa, medical examination, and translation of documents.

Personnel consulting agencies provide services for employers in the area of:

- conducting employment analysis,
- determining the qualifications of employees and their professional predispositions and other features necessary to perform a specific job,
- indicating the sources and methods of obtaining candidates for specific positions,
- verification of candidates in terms of expected qualifications and predispositions.

Career guidance agencies provide services consisting in particular of:

- help in choosing the right profession and place of employment,
- providing professional information,
- providing employers with assistance in selecting candidates for jobs requiring specific psychophysical predispositions.

Temporary work agencies guide employees to a user/employer, which may be an employer or an entity that is not an employer within the meaning of the Labour Code.

Performing services in the scope of:

- job placement in Poland,
- job placement abroad with foreign employers,

¹⁰ The list of employment agencies can be found on the website <http://www.kraz.praca.gov.pl/StronaGlowna.aspx>

- personal consulting,
- temporary work,
- career counselling

requires obtaining a certificate of the Minister of Labour and Social Policy - confirming the entry in the register of employment agencies run by the competent voivodship marshal (voivodship labour offices).¹¹

One of the organizations associating the employment agency environment is **the Association of Employment Agencies (SAZ)**, which cares about the further development of the industry and the interests of enterprises associated in it. *The legal basis for the SAZ operation is the provisions of the Act of May 23, 1991 on employers' organizations (Journal of Laws of 1991 No. 55, item 235, as amended)*. The Association of Employment Agencies is a voluntary, self-governing and independent organization in its statutory activities from public and local government administration bodies as well as political, social and professional organizations. The primary purpose of establishing the Association of Employment Agencies is to represent common interests and protect the rights of the associated Members and to guarantee stable rules and security of the employment agencies in Poland.

Training institutions¹²

Training institutions are public and non-public entities that conduct non-school education based on separate regulations.

Types of educational institutions / conducting training activities:

- public schools, facilities or centres,
- non-public schools or facilities,
- high schools,
- other entities providing out-of-school education.

Entry in the register is required from training institutions applying for orders for training of unemployed and jobseekers, financed from public funds, such as, for example, the Labour Fund, the State Fund for Rehabilitation of Disabled Persons, and European Union assistance funds.

¹¹ The procedure of entry into the register and the conditions for running an agency are specified in the Act of 20 April 2004 on the promotion of employment and labor market institutions (Journal of Laws No. 99, item 1001, as amended) and the Regulation of the Minister of Economy and Labor of October 13, 2005 on the entry in the register of entities running employment agencies and information submitted by agencies (Journal of Laws No. 212, item 1770).

¹² Training institutions operate on the basis of art. 20 of the Act of 20 April 2004 on the promotion of employment and labor market institutions (Journal of Laws No. 99, item 1001, as amended), and the Regulation of the Minister of Economy and Labor of October 27, 2004. on the register of training institutions (Journal of Laws No. 236, item 2365).

A training institution wishing to enter an entry in the register shall submit documents in the voivodship employment office competent for the headquarters of this institution.¹³

Summary. Labour market services are:

1. Job placement services, which in particular consist in:
 - providing assistance to the unemployed and jobseekers in obtaining appropriate employment and employers in obtaining employees with sought professional qualifications,
 - obtaining job offers,
 - providing employers with information about job candidates in relation to the submitted job offer,
 - informing the unemployed, jobseekers and employers about the current situation and anticipated changes in the local labour market,
 - initiating and organizing contacts between the unemployed and job seekers with employers (inter alia through job exchanges and job fairs),
 - informing the unemployed about their rights and obligations.
2. EURES services, the European system of international job placement and consultancy in the field of job mobility on the labour market, which include on:
 - providing the unemployed and jobseekers with assistance in obtaining appropriate employment in accordance with the right of free movement of workers in the European Union and countries of the European Economic Area (EEA),
 - providing employers with assistance in acquiring employees with sought qualifications,
 - initiating and organizing contacts between the unemployed and jobseekers with employers (international job fairs, recruitment meetings with foreign employers)
 - information on living and working conditions as well as the situation on the labour markets, taking into account the shortage and surplus professions there (surplus and. via the national EURES website containing job offers submitted to the system by EURES advisers from particular countries).
3. Career counselling and professional information. These services provided by career advisers consist in providing:

¹³ The register of training institutions is available at www.psz.praca.gov.pl

a) **the unemployed and jobseekers** with assistance in choosing the right profession and place of employment by:

- providing information on occupations, the labour market and training and education opportunities,
- providing advice using standardized methods to facilitate the selection of a profession, change qualifications, take up or change employment, including the study of interests and professional talents,
- directing to specialist psychological and medical examinations enabling the issuing of opinions on professional suitability for work and profession or the direction of training,
- initiating, organizing and conducting group career advice.

b) **the employers** with assistance in selecting candidates for work, in particular on providing information and consultancy in this area. Career counselling and career information services are provided in individual and group forms. They are based on the principles of:

- availability
- equality
- freedom of choice of profession and place of employment
- confidentiality and data protection free.

4. Help in active job search. These services consist in preparing unemployed and jobseekers to better cope with finding and taking up employment through:

- participation in training in job search skills,
- participation in activation classes
- access to information and electronic databases for finding job and self-employment skills.

Help in active job search is provided by poviats labour offices within job clubs and by information and career planning centres of voivodship labour offices.

5. Organization of trainings. Training means extracurricular activities aimed at obtaining, supplementing or improving professional and general skills and qualifications necessary to perform work, including the ability to seek employment.

The poviats labour offices deal with the organization and financing of trainings and the targeting of unemployed people and jobseekers.

Source: Act on the promotion of employment and labour market institutions (Journal of Laws of 2004, No. 99, item 1200, as amended)

At present, many programs and projects are being implemented in Poland regarding the planning of professional career and vocational activation, here are examples:

- for school students: <http://doradztwo.ore.edu.pl>
- for students: <http://www.student.lex.pl/czytaj/-/artykul/aktywizacja-zawodowa-glownym-celem-programu-wiedza-edukacja-rozwoj>
- for adults: <http://psz.praca.gov.pl/rynek-pracy/programy-aktywizacyjne-i-projekty>

THE RESEARCH IN POLAND

The target group of the project consists of three groups; newly employed people or the ones who are going to start working in the near future (level 1), the employees who are currently working at the level of expertise (level 2) and the people who are currently working as managers (level 3). The research aims to find out the training needs of the new industrial revolution also known as industry 4.0 of these 3 target group. We carried out a field study for the first two level by conducting questionnaires and interviews for the managers. A research was carried out with 138 students and 94 employees in Poland, with purposive sampling. Based on Prifti et. al¹⁴ (2017) Industry 4.0 Competency Model a questionnaire form is used as the data collection tool. The questionnaire form was adopted from Prifti et al. (2017)'s "A Competency Model for Industry 4.0 Employees" which is based on Great 8 competency dimensions. Frequency analysis is conducted in order to determine the training need analysis of students and employees in Turkey. Thus it is aimed to reveal the skill kit required by Industry 4.0 for all the 3 levels. In other words, are the graduates, employees and managers ready for Industry 4.0 with the skills?

FINDINGS FOR EMPLOYEES IN POLAND

In this part firstly finding for demographics of the participants has been given. Later the findings of the Great 8 competency dimensions has been given for the graduates.

Demographics

Participants participated the research are %16 male and %86 female, age ranging from 26 to 63 and mean age is 45,14. %90,4 of the respondents are higher education, %5,3 are collage, %2,1 are vocational high school, %2,1 are secondary school . %12,8 of the respondents are employed in service (tourism, health, finance, IT) sector, %84 in education and %3,2 in manufacturing. %11,7

¹⁴ Prifti, L.; Knigge, M.; Kienegger, H.; Krcmar, H. (2017): A Competency Model for "Industrie 4.0" Employees, in Leimeister, J.M.; Brenner, W. (Hrsg.): Proceedings der 13. Internationalen Tagung Wirtschaftsinformatik (WI 2017), St. Gallen, S. 46-60.

of the participants are working in companies with 1-10 employees, %30,9 are working in companies with 11-50 employees, %27,7 are working in companies with 51-100 employees, %11,7 are working in companies with 101-250, %5,3 are working in companies with 251-500, and %12,8 are working in companies with 500+ employees. Participants are working years as a professional range from 0-42 years and average working year as professional is 17,87 years, participants are working for the same company ranging from 1-36 years and average working years for the same company is 11,63 years and participants are working in their current position ranging from 1-40 years and average working years in the current position is 10,66 years.

Demographic represent a participant profile as female, in their mid-ages, over-educated, mostly working in education, and experienced employees.

Finding for Business Trends

Business trends reported by the participants %23,4 no change in revenue, %25,5 total revenue increasing, %13,8 of the respondents reported a decreasing total revenue and %37,2 reported not applicable (Table 1).

Table 1: What is the business trend in your organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Total revenue increasing	24	25,5	25,5	25,5
	Total revenue decreasing	13	13,8	13,8	39,4
	Without change	22	23,4	23,4	62,8
	Not applicable	35	37,2	37,2	100,0
	Total	94	100,0	100,0	

%45,7 of the respondents reported that employment trend in their organization is not changing, %20,2 reported increase in the number of the employees, %29,8 reported a decrease in the employee numbers and %4,3 reported as not applicable (Table 2).

Table 2: What is the employment trend in your organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Number of employees increasing	19	20,2	20,2	20,2
	Number of employees decreasing	28	29,8	29,8	50,0
	Without change	43	45,7	45,7	95,7
	Not applicable	4	4,3	4,3	100,0
	Total	94	100,0	100,0	

%23,4 of the respondent reported that it is moderate to find a job in the same sector if they lose their current job, %14,9 reported as easy, %6,4 as very easy, %38,3 as difficult and %17 as very difficult (Table 3).

Table 3: If you lose your current job, is it possible to find a job in the same sector?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Difficult	16	17,0	17,0	17,0
	Difficult	36	38,3	38,3	55,3
	Moderate	22	23,4	23,4	78,7
	Easy	14	14,9	14,9	93,6
	Very Easy	6	6,4	6,4	100,0
	Total	94	100,0	100,0	

%35,1 of the respondent reported that it is moderate to find a job in another sector if they lose their current job, %23,4 reported as easy, %6,4 as very easy, %27,7 as difficult and %7,4 as very difficult (Table 4).

Table 4: If you lose your job, can you work in another sector?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Difficult	7	7,4	7,4	7,4
	Difficult	26	27,7	27,7	35,1
	Moderate	33	35,1	35,1	70,2
	Easy	22	23,4	23,4	93,6
	Very Easy	6	6,4	6,4	100,0
	Total	94	100,0	100,0	

SKILL NEED IN INDUSTRY 4.0

Dimensions

Skill set required by industry 4.0 are captured under 20 dimensions which are Deciding and Initial Action, Leading and Supervising, Working With People, Adhering to Principles and Values, Relating and Networking, Persuading and Influencing, Presenting and Communicating Information, Writing and reporting, Applying Expertise and Technology, Analyzing, Learning and Researching, Creating and Innovation, Formulating Strategies, Planning and Organization, Delivering Results and Meeting Customer Expectation, Following Instructions and Procedures, Adopting and Responding to Change, Persuading and Influencing, Achieving Personal Work Goals and Objectives, Entrepreneurial and Commercial Thinking all base on Big Eight dimensions.

GREAT EIGHT DIMENSION DEFINITION

Leading and Deciding	Takes control and exercises leadership. Initiates action, gives direction, and takes responsibility.
Supporting and Cooperating	Supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organization.
Interacting and Presenting	Communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner.
Analyzing and Interpreting	Shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing
Creating and Conceptualizing	Works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change.
Organizing and Executing	Plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards.
Adapting and Coping	Adapts and responds well to change. Manages pressure effectively and copes well with setbacks.
Enterprising and Performing	Focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement.

Source: (Dave, 2005)

LEADING AND DECISION

The Great Eight's Leading and Decision dimension captures participant's taking control and exercise leadership, initiates action, gives direction, and takes responsibility skills (Dave, 2005). It is composed of two sub dimension called Deciding and Initial Action (2 item) and Leading and Supervising (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Deciding and Initial Action

%75,5 of the Polish employees evaluate themselves as strong and very strong level of decision making and %81,2 strong to very strong level of taking responsibility.

Leading and Supervising

Frequency analysis for Leading and Supervising items suggest that %60,6 of the Polish participants evaluate themselves as strong and very strong level of Leadership Skills.

SUPPORTING AND COOPERATION

The Great Eight's Supporting and Cooperation dimension captures participant's supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organization (Dave, 2005). It is composed of two sub dimension called Working With People (3 items) and Adhering to Principles and Values (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Working With People

Polish participants reported they have high levels of team work skills, %81,9 reported strong and very strong team work skills %84 in Collaborating with Others and %89,6 in Communicating with People respectively. Polish participants evaluate themselves high in working with people dimension.

Adhering to Principles and Values

Polish participants evaluate themselves %94,7 high as strong and very strong in Respecting Ethics, no weak or very weak response and %76,4 in Environmental Awareness skills, awareness of ergonomics rated %53,2 strong and very strong.

INTERACTING AND PRESENTING

The Great Eight's Interacting and Presenting dimension captures communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner (Dave, 2005). It is composed of two sub dimension called Relating and Networking (3 items), Persuading and Influencing (2 Items) and Presenting and Communicating Information (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Relating and Networking

%72,3 of the Polish participants rated themselves as strong and very strong compromising skills, %19,1 in creating business networks, and %64,9 in maintaining customer relationships. Polish participants rate low in Creating Business networks skills.

Persuading and Influencing

%46,8 of the Polish participants rated themselves strong and very strong in persuading influencing skills whereas %75,7 in emotional intelligence skills.

Presenting and Communicating Information

Polish participant rate themselves with strong and very strong with %79,8 in presenting and communication ability.

ANALYZING AND INTERPRETING

The Great Eight's Analyzing And Interpreting dimension captures shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing (Dave, 2005). It is composed of three sub dimension called Writing and Reporting (2 items), Applying Expertise and Technology (23 items) and Analyzing (4 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Writing and reporting

%54,3 of the Polish participants rated strong and very strong in targeted/ technical communication skills and %97,9 strong and very strong in literacy skills.

Applying Expertise and Technology

Applying expertise and technology dimension is composed of 23 items.

- Participants rated their skills in IT and technology affinity %53,2 strong and very strong,
- Economics %80,9 strong and very strong,
- Extract business value from social media %68,1 strong and very strong,
- Service orientation/product service offerings %33 strong and very strong,
- Business process management %13,4 strong and very strong,
- Business change management %33 strong and very strong,
- Understand and coordinate workflows %36,2 strong and very strong,
- Network security %58,5 strong and very strong,
- IT architectures %17 strong and very strong,
- Machine learning %10,6 strong and very strong,
- System development %16 strong and very strong,
- Integrating heterogeneous technologies %19,1 strong and very strong,
- Mobile technologies %25,5 strong and very strong,
- Sensors/embedded systems %9,6 strong and very strong,
- Network technology/M2M communication %8,5 strong and very strong,
- Robotics/Artificial intelligence %5,3 strong and very strong,
- Predictive maintenance %8,5 strong only, Modelling and programming %6,4 strong and very strong,
- Big data/Data analysis and interpretation %13,8,

- Cloud computing/architectures %8,5 strong and very strong,
- In-memory DBs %6,4 strong and very strong,
- Statistics %12,8 strong and very strong
- Data Security %28,7 strong and very strong.

Analyzing

Analyzing sub-dimension is composed of 4 items. Participants rated Problem Solving %59,6 strong and very strong, Optimization %33, Analytical Skills %47,9 and Cognitive Ability %76,6. Optimization and analytical skills are below average.

CREATING AND CONCEPTUALIZING

The Great Eight's Creating and Conceptualizing dimension captures works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change (Dave, 2005). It is composed of three sub dimension called Learning and Researching (2 items) and Creating and Innovation (4 items) and Formulating Strategies (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Learning and Researching

Polish participants reported they have life-long learning skill %94,7 strong and very strong and %76,6 strong and very strong in knowledge management.

Creating and Innovation

Participants rated themselves %57,4 strong and very strong in Innovating (%39,4 moderate and %3,2 weak), %70,2 strong and very strong in creativity, %75,5 strong and very strong in Critical Thinking and %38,3 strong and very strong in Change Management. Polish participants rate low in Change management skill.

Formulating Strategies

Business Strategy %21,3 strong and very strong, Abstract Ability %62,8 strong and very strong, and Managing Complexity %28,7 strong and very strong. Polish participants rated low in formulating strategies and Managing Complexity.

ORGANIZING AND EXECUTING

The Great Eight's Organizing and Executing dimension captures plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to

the agreed standards. It is composed of three sub dimension called Planning and Organization (3 items) and delivering Results and Meeting Customer Expectations(2 items) and Following Instructions and Procedures (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Planning and Organization

Participants rated Planning and Organization dimensions Project management %44,7 strong and very strong, Planning and organizing work %79,2 strong and very strong and %56,4 strong and very strong Management Ability.

Delivering Results and Meeting Customer Expectation

Participants rated their Customer Orientation skills % 74,5 strong and very strong, Customer Relationship Management skills %66 strong and very strong.

Following Instructions and Procedures

Legislation awareness skills %47,9 strong and very strong, Safety awareness skills %55,3 strong and very strong and Individual responsibility skills %85,1 strong and very strong.

ADAPTING AND COPING

The Great Eight's Adapting and Coping captures adapts and responds well to change. Manages pressure effectively and copes well with setbacks. It is composed of two sub dimension called Adopting and Responding to Change (4 items) and persuading and influencing (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Adopting and Responding to Change

Participants rated their Work in interdisciplinary environments skills %55,3 strong and very strong, Intercultural competency skills %48,9 strong and very strong, Flexibility skills %78,7 strong and very strong (%21.3 Moderate, no weak or very weak) and Adaptability and ability to change mind-set skills %68,1 strong and very strong.

Persuading and Influencing

Participants rated their Work Life Balance skills %53,2 strong and very strong.

ENTERPRISING AND PERFORMING

The Great Eight's Enterprising and Performing captures focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement. It is composed of two sub dimension called Achieving

Personal Works Goals And Objectives (1 item) and Entrepreneurial and Commercial Thinking (2 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Achieving Personal Work Goals and Objectives

Participants rate their Self-management and organization skills %74,5 strong and very strong.

Entrepreneurial and Commercial Thinking

Participants rated their Business model understanding skills %30,9 strong and very strong and Entrepreneurship skills %40,4 strong and very strong. Polish participant rate below average Entrepreneurial and Commercial Thinking skills.

We also calculated mean scores of each 8 dimension in order to find out training needs of employees in Poland in the age of Industry 4.0. While 1 refers to be weak, 5 refers to be strong. Table 5 shows the mean scores of Polish employees for all 8 dimensions.

Table 5. Mean Scores for 8 Dimensions of Employees

Descriptives for Employees in Poland		
DIMENSION	Mean	Std. Err.
1. Leading and Decision	3,9468	0,05777
1.1. Decision and Initial Action	4,0585	0,068
1.2. Leading and Supervising	3,7234	0,08061
2. Supporting and Cooperation	4,0745	0,05189
2.1. Working with People	4,1454	0,06369
2.2. Adhering to Principles and Values	4,0035	0,05869
3. Interacting and Presenting	3,6791	0,05373
3.1. Relating and Networking	3,5213	0,06565
3.2. Persuading and Influencing	3,7234	0,06445
3.3. Presenting and Communicating Information	4,0638	0,07684
4. Analyzing and Interpreting	2,8206	0,06643
4.1. Writing and Reporting	4,1223	0,05593
4.2. Applying Expertise and Technology	2,5842	0,07176
4.3. Analyzing	3,5293	0,07993
5. Creating and Conceptualization	3,6939	0,06019
5.1. Learning and Researching	4,2979	0,06251
5.2. Creating and Innovation	3,7739	0,06517
5.3. Formulating Strategies	3,1844	0,08309
6. Organizing and Executing	3,734	0,05438

6.1. Planning and Organization	3,6738	0,06554
6.2. Delivering Results and Meeting Customer Expectations	3,8564	0,07199
6.3. Following Instructions and Procedures	3,7128	0,07264
7. Adapting and Coping	3,683	0,05923
7.1. Adopting and Responding to Change	3,7314	0,06486
7.2. Persuading and Influencing	3,4894	0,09415
8. Enterprising and Performing	3,3936	0,08066
8.1. Achieving Personal Work Goals and Objectives	3,8936	0,08485
8.2. Entrepreneurial and Commercial Thinking	3,1436	0,09282

According to table 5, while the weakest dimension is analysing and interpreting, supporting and cooperation dimension is the strongest one, as in Turkey. It can be inferred from the table that as all the dimensions captures more than 3 mean score (1 is min, 5 is max and 3 is average), we can say that Polish employees evaluates themselves not weak. However there are skills needs to be developed in terms of dimensions such as analysing and interpreting, and enterprising and performing dimensions.

FINDINGS FOR GRADUATES IN POLAND

Participants participated the research are % 20,3 male and %79,7 female, age ranging from 17 to 66 and mean age is 31,56. %2,9 of the respondents are studying higher education, %42,8 graduate, %13 vocational high school, %0,7 vocational school and %40,6 are studying secondary school. %88,4 of the respondents are planning to work in service (tourism, health, finance, IT) sector, %10,1 in manufacturing.

Demographic represent a participant profile with a female, in their thirties, mostly planning to work in service sector.

Finding for Business Trends

Business trends they plan to work in reported by the students is %15,2 no change in revenue, %42 total revenue increasing, %11,6 of the respondents reported a decreasing total revenue and %31,2 reported not applicable (6).

Table 6: What is the business trend in the sector you want to work?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Total revenue increasing	58	42,0	42,0	42,0
	Total revenue decreasing	16	11,6	11,6	53,6
	Without change	21	15,2	15,2	68,8
	Hard to say	43	31,2	31,2	100,0
	Total	138	100,0	100,0	

%15,9 of the respondents reported that employment trend in the sector they plan to work is not changing, %38,4 reported increase in the number of the employees, %19,6 reported a decrease in the employee numbers and %26,1 reported as not applicable (Table 7).

Table 7: What employment possibilities are in the sector you want to work?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Number of employees increasing	53	38,4	38,4	38,4
	Number of employees decreasing	27	19,6	19,6	58,0
	Without change	22	15,9	15,9	73,9
	Hard to say	36	26,1	26,1	100,0
	Total	138	100,0	100,0	

%18,1 of the respondent reported that it is easy and very easy to find a job in the sector they want to work, %37,7 reported as moderate, %42 difficult and %2,2 as very difficult (Table 8).

Table 8: Can you find a job in the sector you want to work?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Difficult	3	2,2	2,2	2,2
	Difficult	58	42,0	42,0	44,2
	Moderate	52	37,7	37,7	81,9
	Easy	21	15,2	15,2	97,1
	Very Easy	4	2,9	2,9	100,0
	Total	138	100,0	100,0	

%40,1 of the respondent reported that it is easy and very easy to find a job in a sector other than they want to work, %43,1 reported as moderate, %15,3 as difficult and %1,5 as very difficult (Table 9).

Table 9: If you cannot find a job in the sector you want to work, is it possible for you to find another job in a different sector?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Difficult	2	1,4	1,5	1,5
	Difficult	21	15,2	15,3	16,8
	Moderate	59	42,8	43,1	59,9
	Easy	44	31,9	32,1	92,0
	Very Easy	11	8,0	8,0	100,0
	Total	137	99,3	100,0	
Missing	System	1	,7		
Total		138	100,0		

SKILL NEED IN INDUSTRY 4.0

Dimensions

Skill set required by industry 4.0 are captured under 20 dimensions which are Deciding and Initial Action, Leading and Supervising, Working With People, Adhering to Principles and Values, Relating and Networking, Persuading and Influencing, Presenting and Communicating Information, Writing and reporting, Applying Expertise and Technology, Analyzing, Learning and Researching, Creating and Innovation, Formulating Strategies, Planning and Organization, Delivering Results and Meeting Customer Expectation, Following Instructions and Procedures, Adopting and Responding to Change, Persuading and Influencing, Achieving Personal Work Goals and Objectives, Entrepreneurial and Commercial Thinking all base on Big Eighth dimensions.

Big Eight Dimensions and definition

<p>Leading and Deciding Takes control and exercises leadership. Initiates action, gives direction, and takes responsibility.</p>
<p>Supporting and Cooperating Supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organization.</p>
<p>Interacting and Presenting Communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner.</p>
<p>Analyzing and Interpreting Shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing</p>
<p>Creating and Conceptualizing Works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change.</p>
<p>Organizing and Executing Plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards.</p>
<p>Adapting and Coping Adapts and responds well to change. Manages pressure effectively and copes well with setbacks.</p>
<p>Enterprising and Performing Focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement.</p>

LEADING AND DECISION

The Great Eight's Leading and Decision dimension captures participant's taking control and exercise leadership, initiates action, gives direction, and takes responsibility skills (Dave, 2005). It is composed of two sub dimension called Deciding and Initial Action (2 item) and Leading and Supervising (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Deciding and Initial Action

Frequency analysis for Deciding and Initial Action items suggest that %58 of the Polish students evaluate themselves as strong and very strong level of decision making, %82,6 strong and very strong level of taking responsibility.

Leading and Supervising

Polish students score themselves %55,8 strong and very strong leadership skills.

SUPPORTING AND COOPERATION

Working With People

%80,4 of the students rate themselves as strong and very strong in team work, %82,6 rate themselves strong and very strong in collaborating with others and %78,3 rate strong and very strong in communicating with people.

Adhering to Principles and Values

%89,1 of the students rate strong and very strong in Respecting ethics, %66,7 strong and very strong in Environmental awareness and %52,2 strong and very strong in Awareness of ergonomics.

INTERACTING AND PRESENTING

Relating and Networking

%69,6 of the students rate strong and very strong in Compromising skills, %19,6 rate strong and very strong in Creating business networks, %62,3 rate strong and very strong in Maintaining customer relationships.

Persuading and Influencing

%47,8 of the students rate strong and very strong in Negotiating and %78,3 strong and very strong in Emotional intelligence.

Presenting and Communicating Information

%55,1 of the students rate strong and very strong in Presenting and communication ability.

ANALYZING AND INTERPRETING

Writing and reporting

%40,6 of the Polish students rate strong and very strong in Targeted/Technical Communication and %92 rate strong and very strong in Literacy.

Applying Expertise and Technology

- %43,5 of the Polish students rate themselves with strong and very strong in IT and technology affinity,
- %32,9 strong and very strong in Economics,
- %38,4 strong and very strong in Extract business value from social media,
- %37 strong and very strong in Service orientation/product service offerings,
- %28,3 strong and very strong in Business process management,
- %31,9 strong and very strong in Business change management,
- %42,8 strong and very strong in Understand and coordinate workflows,
- %58,7 strong and very strong in Network security,
- %18,1 strong and very strong in IT architectures,
- %17,4 strong and very strong in Machine learning,
- %18,8 strong and very strong in System development,
- %22,5 strong and very strong in Integrating heterogeneous technologies,
- %43,5 strong and very strong in Mobile technologies,
- %11,6 strong and very strong in Sensors/embedded systems,
- %13 strong and very strong in Network technology/M2M communication,
- %6,5 strong and very strong in Robotics/Artificial intelligence,
- %14,5 strong and very strong in Predictive maintenance,
- %9,4 strong and very strong in Modelling and programming,
- %18,8 strong and very strong in Big data/Data analysis and interpretation,
- %9,4 strong and very strong in Cloud computing/architectures,
- %9,4 strong and very strong in In memory DBs,
- %10,9 strong and very strong in Statistics ,
- %29 strong and very strong in Data security.

Analyzing

%56,5 of the Polish students rate strong and very strong in Problem Solving, %35,5 strong and very strong in Optimization, %33,3 strong and very strong in Analytical Skills, %56,5 strong and very strong in Cognitive Ability. Optimization and Analytical skills needs improvement.

CREATING AND CONCEPTUALIZATION

Learning and Researching

%80,4 rate strong and very strong in Life-long learning skills, %59,6 rate strong and very strong in Knowledge management skills.

Creating and Innovation

%46,9 rate strong and very strong in Innovating, %72,5 rate strong and very strong Creativity, %65,9 strong and very strong Critical thinking, %39,1 rate strong and very strong Change management. Polish student rate below average in innovating and change management.

Formulating Strategies

%27,5 rate strong and very strong in Business strategy, %46,4 strong and very strong in Abstraction ability, %21,7 strong and very strong in Managing complexity. Business strategy and Abstraction ability skills need improvement. Polish students lack formulating strategies.

ORGANIZING AND EXECUTING

Planning and Organization

%37,7 rate strong and very strong in Project management, %65,2 rate strong and very strong in Planning and organizing work, %55,8 rate strong and very strong in Management ability. Polish students lack Project management skills.

Delivering Results and Meeting Customer Expectation

%52,2 of the Polish students rate their Customer orientation skills as strong and very strong and %57,2 in Customer relationship management.

Following Instructions and Procedures

%30,4 rate strong and very strong Legislation awareness skill, %59,4 strong and very strong in Safety awareness, %73,2 strong very strong in Individual responsibility. Polish Students lack legislation awareness.

ADAPTING AND COPING

Adopting and Responding to Change

%37,7 rate strong and very strong in Work in interdisciplinary environments, %49,3 rate strong and very strong in Intercultural competency, %67,4 rate strong and very strong in Flexibility, %61,6 rate strong and very strong in Adaptability and ability to change mind-set. Polish students lack Work in interdisciplinary environments skills.

Persuading and Influencing

%61,6 of the Polish students rate strong and very strong in Work Life Balance skill.

ENTERPRISING AND PERFORMING

Achieving Personal Work Goals and Objectives

%70,3 of the Polish students rate strong and very strong in Self-management and organization.

Entrepreneurial and Commercial Thinking

%30,4 of the Polish students rate strong and very strong in Business model understanding and %44,9 rate strong and very strong in Entrepreneurship. Polish students lack business model understanding and entrepreneurship skills.

We also calculated mean scores of each 8 dimension in order to find out training needs of graduates in Poland in the age of Industry 4.0. While 1 refers to be weak, 5 refers to be strong. Table 10 shows the mean scores of Polish graduates for all 8 dimensions.

Table 10. Mean scores of Polish graduates for all 8 dimensions

Descriptives for Students in Hungary		
DIMENSION	Mean	Std. Err.
1. Leading and Decision	3,8019	0,04904
1.1. Decision and Initial Action	3,9094	0,05045
1.2. Leading and Supervising	3,587	0,07253
2. Supporting and Cooperation	3,9251	0,04068
2.1. Working with People	3,9734	0,04969
2.2. Adhering to Principles and Values	3,8768	0,05178
3. Interacting and Presenting	3,5495	0,04623
3.1. Relating and Networking	3,442	0,0539
3.2. Persuading and Influencing	3,6993	0,05156
3.3. Presenting and Communicating Information	3,5725	0,06967
4. Analyzing and Interpreting	2,9425	0,04936
4.1. Writing and Reporting	3,8877	0,04657
4.2. Applying Expertise and Technology	2,7895	0,05282
4.3. Analyzing	3,3496	0,05883
5. Creating and Conceptualization	3,4936	0,05215
5.1. Learning and Researching	3,8333	0,05475

5.2. Creating and Innovation	3,6214	0,05407
5.3. Formulating Strategies	3,0966	0,06507
6. Organizing and Executing	3,5507	0,05569
6.1. Planning and Organization	3,5411	0,0648
6.2. Delivering Results and Meeting Customer Expectations	3,5507	0,07131
6.3. Following Instructions and Procedures	3,5604	0,06123
7. Adapting and Coping	3,6058	0,05167
7.1. Adopting and Responding to Change	3,587	0,0562
7.2. Persuading and Influencing	3,6812	0,06422
8. Enterprising and Performing	3,4493	0,05794
8.1. Achieving Personal Work Goals and Objectives	3,8478	0,07119
8.2. Entrepreneurial and Commercial Thinking	3,25	0,06571

According to table 5, while the weakest dimension is analysing and interpreting, supporting and cooperation dimension is the strongest one, as in Turkey. It can be inferred from the table that the scores of the graduates are congruent with the scores of the employees in Poland. There is not big difference between them. As all the dimensions captures more than 3 mean score (1 is min, 5 is max and 3 is average), we can say that Polish students evaluates themselves not weak. However there are skills needs to be developed in terms of dimensions such as analysing and interpreting, organising and executing, and enterprising and performing dimensions.

INTERVIEW WITH MANAGERS

In the research 5 people participated to the interview: 3 woman and 2 man

Gender/Age:

Woman: 50, 38, 36

Man: 40, 28

Sectors:

- Automotive branch, HR Manager
- Manager Of The Pedagogy Department, private college
- ICT, position: IT Process Manager
- Manager Of Educational Project, sector: Education
- General Manager, Sector: Finance

1- What is the business trend in your organization (income increase / decreasing, number of employees increasing / decreasing)?

Automotive branch

The organization is increasing. Currently, 670 employees are employed. In the nearest hour, 50 employees are hired. The number of employees has been growing for 5 years. On average, about 25-30% per year.

Manager Of The Pedagogy Department, private college

Although the business trend is increasing, the organization grows, the number of employees decreases. It is due to reorganization and trend to give more duties to the rest of employees.

ICT, position: IT Process Manager

The organization is rather stable, both revenue and number of employees are at similar level.

Manager Of Educational Project, sector: Education

The organization is developing and number of employees is increasing.

General Manager, Sector: Finance

Constantly growing business, increasing number of new employees

2- What is the business trend in your sector (income increase / decreasing, number of employees increasing / decreasing)?

Automotive branch

The industry is growing. The demand for luxury cars is growing in Poland. Society is becoming more and more affluent. Besides, we have a Mazda merger. We currently have 9 branches in Poland. The company "sucks" smaller companies.

Manager Of The Pedagogy Department, private college

Decreasing due to the demographic low. This low is however diminished by the trend in the society to learn, so the studies are substituted by post-gradual courses or other forms of education.

ICT, position: IT Process Manager

IT sector is developing very fast and revenues and number of employees are increasing.

Manager Of Educational Project, sector: Education

HE sector is facing challenges due to declining demographical trends resulting in lower number of students. There is a strong competition in attracting students and only the best universities stays in the market.

General Manager, Sector: Finance

Challenging sector due to increasing number of bpo companies offering finance services on the market now.

3- What is the business trend in economy?

Automotive branch

Of course, trends are growing. Last year, the company generated revenues of 630 million. PLN, and in 2018 plans to exceed one billion revenues. Revenues go up.

Manager Of The Pedagogy Department, private college

Monopolizing, which is disturbing from social point of view.

ICT, position: IT Process Manager

I think business is developing rapidly in Poland right now, which wasn't the case in the near past.

Manager Of Educational Project, sector: Education

Promising. In Poland it was already a positive trend a couple of years ago when Europe was struggling with the global financial and economical crisis.

General Manager, Sector: Finance

Strong competition on the market makes the companies more ambitious and elastic, and the main trend is to expand the services.

4- If you lose your position right now, it is easy to find a new position in the same sector

Automotive branch

Yes, I think so it's rather easy. I am a good expert in process management and controlling.

Manager Of The Pedagogy Department, private college

Not very easy. There's oversupply in the job market.

ICT, position: IT Process Manager

I have high qualifications and skills, so it is quite easy.

Manager Of Educational Project, sector: Education

I have high qualifications and skills, so it is quite easy.

General Manager, Sector: Finance

It is relatively easy, due to shortages of high skilled labour in the market.

5 - If you lose your position right now, how easy is it for you to find a new position in the same position

Automotive branch

This is not so easy because in my position I have access to key, confidential company data and it requires building longer relationships. It is not so easy but yes, I would find a new job easy

Manager Of The Pedagogy Department, private college

Almost impossible.

ICT, position: IT Process Manager

I have short experience on this position, so it might be rather hard.

Manager Of Educational Project, sector: Education

Quite easy thanks to specific skills related to that position

General Manager, Sector: Finance

It is not easy as the employee usually grows and get promoted within the company

6 - If you lose your position right now, how easy is it for you to find a new position in another sector

Automotive branch

It's a bit complicated but I think I would quickly find a new job in another sector.

Manager Of The Pedagogy Department, private college

Quite easy, it depends on how fast I can gain new qualification or reorganize the ones that I already have.

ICT, position: IT Process Manager

With my qualifications it is rather easy.

Manager Of Educational Project, sector: Education

Very easy as project management is a rapidly growing profession.

General Manager, Sector: Finance

It would be easy, but I would have to start from the beginning or from the lower position.

7 -Can you work in a lower position?

Automotive branch

Definitely not.

Manager Of The Pedagogy Department, private college

Of course, yes.

ICT, position: IT Process Manager

Depends on several things but I would like to maintain my position.

Manager Of Educational Project, sector: Education

I would not like to.

General Manager, Sector: Finance

I could if it would be a job in more challenging sector/position connected with job trainings.

8- What is the biggest challenge for you?

Automotive branch

Involvement of people in organization in process management, motivating people, HR.

Manager Of The Pedagogy Department, private college

Lack of group-management culture.

ICT, position: IT Process Manager

High responsibility and large competition.

Manager Of Educational Project, sector: Education

Staff shortages.

General Manager, Sector: Finance

Due to huge demand for the specialists on the market it is very hard to recruit and keep the employee within a company.

9- In which areas do you think you should develop your skill kit in order to continue working as a manager.

Automotive branch

my work-life balance☺.

Manager Of The Pedagogy Department, private college

Project management

ICT, position: IT Process Manager

Human resources manage.

Manager Of Educational Project, sector: Education

Time management, HR

General Manager, Sector: Finance

Successfully recruiting good employees, find time to organize more social activities for teams/departments.

10 - Can automation be a problem for your current position? What do you think about Industry 4 in your sector?

Automotive branch

Yes, process management and personnel controlling, which I deal with are processes and tools based on information technology. That is why ITC competences are very important. I constantly improve them.

Manager Of The Pedagogy Department, private college

I don't have an opinion on that subject.

ICT, position: IT Process Manager

We hire only qualified employees, so they are not in danger of losing job.

Manager Of Educational Project, sector: Education

No. This trend is more visible in manufacturing technologies rather than HE, however we may expect its development also there. For example my organization is involved in a project on Internet of Things in education (Erasmus+ 'Designing a 3D Virtual Environment For Teaching IoT')

General Manager, Sector: Finance

Automation of services won't be a problem in my sector as most of activities performed in finance departments cannot be done by scripts and automatic appliccations as they are concerning important and valuable transactions and must be constantly monitored.

11- Are employees working in lower positions in danger of losing their jobs in your organization, and sector? How will industry 4 effects employment in your organization, and sector?

Automotive branch

Good employees are not afraid of losing their job. I still have to document, especially new technology. The younger goes to better, but the company trains all employees on a regular basis.

Manager Of The Pedagogy Department, private college

I don't have an opinion on that subject.

ICT, position: IT Process Manager

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Manager Of Educational Project, sector: Education

It is difficult to answer that question

General Manager, Sector: Finance

There is no such danger regarding those employees, as the staff needs are higher than the number of employees which we are able to recruit on daily basis.

CONCLUSION

- 1- What is the business trend in your organization (income increase / decreasing, number of employees increasing / decreasing)?

Generally managers said, that their enterprises and sectors are developing. This is related to the good economic and economic situation in Poland. Only one person, who representative ICT industry reiterated that in his organization the situation is unchanged. The ICT industry is constantly evolving, so it may be difficult to see development from the perspective of one organization.

- 2- What is the business trend in your sector (income increase / decreasing, number of employees increasing / decreasing)?

All surveyed managers stated that their sectors are developing and number of employees increasing. In addition, the representative of the financial industry pointed to difficulties in development - related to large and growing competition.

- 3- What is the business trend in economy?

To the main development trends they included: strong competition on the market, which makes the companies more ambitious and elastic, and the main trend is to expand the services.

Negative trends is: the monopolisation of educational services.

- 4- If you lose your position right now, it is easy to find a new position in the same sector

For the majority of managers surveyed, finding a new job is easy or relatively easy, due to their high professional qualifications and shortages of personnel in the labor market. only the educator stated that there is an oversupply of workers in this sector on the market.

- 5- If you lose your position right now, how easy is it for you to find a new position in the same position

Despite the good market situation indicated, the managers said finding a new job with the same position is not so easy. For the factors hindering finding a job in the same position, the respondents indicated the following factors:

- access to key, confidential company data and it requires building longer relationships
- almost impossible (due to the oversupply of employees in the education sector)
- short experience on this position
- the employee usually grows and get promoted within the company.

Only one manager said that is: "Quite easy".

6- If you lose your position right now, it is easy to find a new position in another sector

All respondents believed that they would quickly find work in another sector, which confirms the good situation on the labor market. One of managers said: *"It would be easy, but I would have to start from the beginning or from the lower position"*.

7- Can you work in a lower position?

Two managers definitely not. One stated that yes, but in a more difficult sector that would require development and training and one said, that yes.

8- What is the biggest challenge for you?

The respondents assessed the challenges as:

- *involvement of people in organization in process management, motivating people, HR*
- *lack of group-management culture*
- *high responsibility and large competition*
- *staff shortages*
- *due to huge demand for the specialists on the market it is very hard to recruit and keep the employee within a company.*

9 - In which areas do you think you should develop your skill kit in order to continue working as a manager.

As areas for development, the respondents indicated:

- *work-life balance*
- *project management*
- *Human resources manage*
- *time management, HR*
- *successfully recruiting good employees, find time to organize more social activities for teams/departments.*

10 - Can automation be a problem for your current position? What do you think about Industry 4 in your sector?

In this matter, the opinions of the respondents were divided:

- *Yes, process management and personnel controlling, which I deal with are processes and tools based on information technology. That is why ITC competences are very important. I constantly improve them.*
- *I don't have an opinion on that subject (Educational sector).*

- *We hire only qualified employees, so they are not in danger of losing job.*
- *No. This trend is more visible in manufacturing technologies rather than HE, however we may expect its development also there. For example my organization is involved in a project on Internet of Things in education (Erasmus+ 'Designing a 3D Virtual Environment For Teaching IoT').*
- *Automation of services won't be a problem in my sector as most of activities performed in finance departments cannot be done by scripts and automatic appliccations as they are concerning important and valuable transactions and must be constantly monitored.*

11- Are employees working in lower positions in danger of losing their jobs in your organization, and sector? How will industry 4 effects employment in your organization, and sector?

However, despite the threat of automation, managers are not afraid that their or their employees are going to lose their jobs.

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INDUSTRY 4.0 COMPETENCIES IN HUNGARY FOR CAREER MANAGEMENT

Judit KRISKA JAMBOR

Barbara DUKIC

Employment in Hungary

Labour law:

“Hungarian legislation follows both European legislation and international trends in the field of *labour law* while showing characteristics inherent in national regulation.

Employment relations in Hungary are governed by the Act I of 2012 on Labour Code and other labour law legislation, collective bargaining agreements and individual employment contracts. In the context of labour disputes in Hungary, courts generally protect employees’ rights by interpreting the provisions of the Labour Code, collective bargaining agreements and employment contracts often in favour of the employees. Overall, litigation trends reflect a decrease in the number of lawsuit initiated by blue-collar employees, while more and more white-collar employees, particularly executives and key-employees, are initiating labour disputes against their employers before courts in Hungary.”

“Labour Law and Employment in Hungary – 2018 Guide (PDF)”¹⁵

According to the latest statistics, the population of Hungary is 9,818 million.

The current employment rate is 59.3%.

The number of people employed in Hungary has increased significantly over the past 10 years. In 2007, a total of approximately 3 902 000 people had reported jobs, which rose to 4 421 000 by 2017. Of these, 302,000 people are between the ages of 15 and 24.

According to data from 2017, the unemployment rate is 4.2%, which is 1 917 000 people. The 20-24 year olds have the largest number, about 28,000 young unemployed.

According to the National Office of Vocational Education and Training and Adult Learning – Euroguidance Hungary there is guidance, counselling and information service available for all citizens who study, work or are even unemployed. The services provided by national authorities and their branch offices are free of charge and support lifelong learning and career development. On regional and local level the guidance counselling services in the field of education and labour that are provided by different service providers.

In Hungary guidance activities and development are overseen by both the Ministry for National Economy and the Ministry of Human Resources.

As Euroguidance Hungary reports in the current ministerial structure the Ministry for National Economy is responsible for some elements of active labour market policy, vocational education and adult learning. At the same time the Ministry of Human Resources has responsibility over the fields of youth policy, social inclusion, family policy, primary schools and general secondary education as well as higher education.

The National office for vocational education and adult education (<https://www.nive.hu>) was established in 2015 and is responsible for the development and supervision of lifelong-guidance activities within the field of VET in Hungary.

Under the Social Renewal Operational Programme National guidance developments were carried out in two phases (Developing a Lifelong Guidance System in Hungary 2008-2011 and 2012-2015). within the programme tools and services were developed in guidance and career counselling, and on the training of counsellors (e.g. teachers, social workers, career professionals, etc).

In 2010 the National Guidance Portal (<https://palyaorientacio.munka.hu/>) was launched and is functioning well up till today. it gives career guidance information on different levels starting from elementary school to higher education, adults, parents, and institutions.

The importance of vocational guidance is mentioned in the new National Lifelong Learning Strategy (<http://www.kormany.hu/download/7/fe/20000/Egész%20életen%20át%20tartó%20tanulás.pdf>) for 2014-2020, adopted in 2014.

On country level pedagogical professional services, the chambers of commerce, the government offices and the vocational centres often cooperate to support schools in vocational guidance and orientation.

In elementary and secondary schools there is no separate subject on career guidance but it is a separate field of development according to the

National Core Curriculum (Nemzeti alaptanterv: <http://ofi.hu/nemzeti-alaptanterv>)

As Euroguidance Hungary says, the basic tasks of the *labour departments of county government offices* are not only employment and job-search counselling, guidance, career and psychological counselling, but also information provision on training opportunities. The services are available for both employees and job seekers. The 30/2000 (IX. 15) Ministerial Decree describes labour market services and benefits as well as the qualification requirements of counsellors working within the employment service.

The current National Employment Service has two main branches: the National Employment Service includes the Employment Offices (which are part of the County level Government Offices) and the FIT centres. The counselling services in the FIT centres may be outsourced to NGOs or private sector providers.

FIT centers were established in 1994 as a network of *Employment Information Centres*. The FIT centres offer access to films and information folders on occupations. Currently they are within the county government offices.

FITs, are established through the National Employment Service, at community locations - municipalities, cultural institutions, telehouses, foundations, associations, etc. - and are info points where customers can be informed about the services of the labor organization, can hear about the opportunities for subsidies, or can manage their issues that can help solve their employment problems. The vocational centres provide information on the training programmes of affiliated VET schools as well as on adult education and training possibilities. The activities of the vocational centres are defined by the 2011 CLXXXVII. Act on Vocational Education.

With their information and counselling services the *higher education institutions* should assist the students in career planning during and after their studies and maintain a career tracking system as stated in the 2011 CCIV Act on National Higher Education.

Most higher education Institutions have Career management offices or centers. Besides counselling they also offer career management courses.

There is a Ministerial Decree 18/2016 (VIII.5.) which provides a regulatory framework on the requirements of higher education (bachelor and master programmes). The decree defines the training objectives of the Human Resource Counselling master programme and lists the professional competencies of the counsellors and aims to train the professionals to help clients refine their career plans and make career decisions and to support

stakeholders by evaluating trends in education and labour management.

According to Euroguidance Hungary the Human Resource Counselling master programme is currently run by five universities in Hungary (Szent István University, University of Pécs, University of Debrecen, University of Sopron and Eötvös Loránd University). These universities have developed a consortium and offer focus either on human resources, economics or counselling, depending on the institution's individual profile.

Specific research and analysis is carried out in education and training which include information on guidance by the National Office of Vocational Education and Training and Adult Learning. The data is collected through the integrated labour market system, which is the national database of labour offices.

These data are public and can be downloaded from www.munka.hu

For now there isn't any unified ethical guidelines for practitioners. Euroguidance says that the publication "Unified Guidelines for Guidance Practitioners" published in 2009 by the National Employment and Social Office included references to the counsellors' competencies and professional requirements, as well as some implications to ethical standards and supervision.

Statistics

The number of people aged 15-74, employed by the (highest) level of education is as follows:

20 000 people have less than 8 years of primary school

505,000 people completed the 8 year elementary school

1 230 000 people have successfully completed technical or vocational school

And 5,335,000 people finished gymnasium.

6 754 000 people graduated from college and 4,272,000 finished university.¹⁶

The number of employees in the 3 areas examined is as follows:

IT: 1 099 000 people

Education: 3 247 000 people

Manufacturer: 1 975 800 people

16 https://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_qlf015.html

The Manufacture is divided into the following areas:

Manufacturing industry	Manufacture of food, beverages and tobacco products	Manufacture of textiles, clothing, leather and leather products	Manufacture of wood and paper products,	Manufacture of coke, crude oil processing	Manufacture of chemicals and chemical products	Pharmaceutical manufacturing	Manufacture of rubber, plastic and non-metallic mineral products	Manufacture of basic metals and metal-processing products	Manufacture of computer, electronic and optical products
987 900	145 900	52 600	52 100	6 500	27 100	29 400	92 700	118 500	76 100

Manufacture of electrical equipment	Manufacture of machinery and equipment	Vehicle production	Other manufacturing; installation and repair of industrial machine, equipment
65 000	68 600	167 200	86 200

Altogether the Industrial sector and the services are divided like this:

	industrial sector	services
2007	1 240 000	2 440 200
2017	1 389 800	2 811 500

From 2014 to 2017 the number of public employees has decreased slightly.

2014: 863 600 people

2017: 824 600 people¹⁷

Number of registered companies:

In 2017:

Budapest: 395 910

South Freat Plain: 237 558

Total/country 1 719 601

Out of which the nr. of social enterprise is: 529 608

Self-employed: 1 189 993

In 2013 the total nr. Of registered companies in the country was 1 672 921

Education system

Higher education

¹⁷ https://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_qlf005b.html

year	Insti- tution	teacher	Number of Students out of the students							
			total	full time/ regular student	higher education vocational training		college education		university education	
					total	full time/ regular student	total	full time/ regular student	total	full time/ regular student
99/2000	89	21 249	305 702	177 654	2153	1740	112 216	58 508	166 781	113 104

Act LXXIX of 1993 on Public Education

“The Parliament passes the following Act for the purpose of ensuring the possibility to exercise the right for education provided for in the Constitution of the Republic of Hungary based on equal opportunities, the prevalence of freedom of ideological conviction and religious freedom, the prevalence of patriotic education in public education, the implementation of the right of national and ethnic minorities for education on their mother language, the enforcement of academic freedom, the freedom of teaching and education, the definition of rights and obligations of children, students and employees of public education, and for directing and operating a public education system which provides up-to –date knowledge.”

The Hungarian educational system

Children enter the Hungarian public education at the age of 3, when the kindergarten starts. The compulsory schooling begins after the 6th or 7th year of life, depending on the child’s schooling. They will begin primary school in the school year starting in September. The compulsory schooling lasts until the age of 16 (however, when the 16th year of schooling is still compulsory). In addition to the traditional 8 + 4 years of primary school and secondary schooling, there is an increasing number of 6 + 6 and 4 + 8 years old training, when children enrol to gymnasium not only after 8 years of elementary school, but after 6 or even 4 primary school years.. They spend 12 years altogether in primary and secondary education. When completing secondary schools, students take maturity exam. Instead of secondary grammar schools, they can choose vocational secondary schools where they can learn a profession after 1 or 2 years of 4 years of training.

The primary art education institutions form a special group in the education system.

Higher Education

Higher education has gradually shifted from traditional, unified (unbundled) 3-4 years college and 4-6 year university education to the three-tier system from 2005 onwards. In this system, some 3-4 years of undergraduate training can be

1-2 years (for teachers of 2,5 years) for Master's programs The top level is a 3-year doctoral training.

Entrants who have undivided training do not have a Bachelor's or Master's degree in their studies, but do the education undivided and earn a Bachelor's or Master's degree depending on the location where they are learning. At present there are still 6 courses (doctors, dentists, pharmacists, veterinarians, lawyers, architects) undivided.¹⁸

The 2011 CCIV National Higher Education Act (Nftv.) regulates the operating framework of higher education, scientific research and higher education institutes for the pursuit of artistic creativity.

There is no higher education activity in Hungary in the framework of non-university private education

Non-state (church or private higher education institutions):

Universities operated by ecclesiastical maintainers among state-recognized higher education institutions in Hungary:

- Debrecen Reformed University of Debrecen, Debrecen;
- Evangelical University of Higher Education, Budapest;
- the Károli Gáspár Reformed University, Budapest;
- the National Rabbit Training - Jewish University, Budapest;
- Pázmány Péter Catholic University, Budapest.

Universities operated by the state-recognized higher education institutions of Hungary by a church maintainer or a religious organization registered in Hungary:

- Apol Vilmos Catholic College, Vác;
- Adventist Theological College, Pécel;
- Baptist Theological Academy, Budapest;
- Bhaktivedanta Hittudományi Főiskola, Budapest;
- the Eger College of Higher Education, Eger;
- Esztergom College of Higher Education, Esztergom;
- the Ferenc Gál College, Szeged;
- The Golgota Theological College, Vajta;
- Győr Hittudományi Főiskola, Győr;
- Papal Reformed Theological Academy, Pope;
- Pécs Bishop's College of Higher Sciences, Pécs;
- Pentecostal Theological College, Budapest;

18 https://hu.wikipedia.org/wiki/Magyarorsz%C3%A1g_oktat%C3%A1si_rendszere

- Sapientia College of Religious Sciences, Budapest;
- Sárospatak Reformed Theological Academy, Sárospatak;
- Sola Scriptura Theological College, Budapest;
- the Greek Catholic Church of St. Athanase, Nyíregyháza;
- St. Bernard College of Histology, Zirc;
- the St. Paul Academy, Budapest;
- Veszprém Archbishop's College of Histology, Veszprém;
- Wesley János Parish Teacher College, Budapest.

Higher education institutions that do non-religious education include:

- the Károli Gáspár Reformed University, Budapest;
- Pázmány Péter Catholic University, Budapest;
- Apol Vilmos Catholic College, Vác;
- the Ferenc Gál College, Szeged;
- Veszprém Archbishop's College of Histology, Veszprém;
- Wesley János Parish Teacher College, Budapest.

State-recognized private universities in Hungary:

- Gyula Andrassy German University of Budapest, Budapest
- Central European University, Budapest

state-recognized private colleges:

- Budapest Kortársstánc College, Budapest
- Budapest Metropolitan College, Budapest
- Edutus College, Budapest
- Dénes Gábor College, Budapest
- IBS International Business College, Budapest
- Tomori Pál College, Kalocsa
- Wekerle Sándor Business College, Budapest
- King Zsigmond College, Budapest.

Hungarian higher education institutions may also offer besides full-time education also part-time education.

There is a private higher education institution that organizes trainings in a distant form. The Dénes Gábor College is engaged in economic and IT field, and has distance education.

In Hungary, in 2003/2004, 31 state and 37 private higher education institutions existed (total: 68)¹⁹

Hungary has signed the Bologna declaration in 1999. Gradually the education system has taken over the Bologna system. According to it the bachelors lasts 3 years, the masters 2 years, and the PhD 3 years.

The total number of higher education institutions in Hungary is as follows:

There are 29 Public, 39 private higher education institutions which makes a total of 68 institutions. The statistics for access of population to higher education, inhabitants/university makes 146058 I/U.

The total unemployment is 10,9%.

The level of unemployment among graduates from higher education is 4,5%

The share of unemployment with tertiary education in total unemployment is 41,24%²⁰

Career management education in Hungary

HOW CAN WE PREPARE STUDENTS FOR THE FUTURE? – HANDLING DROPOUT AND INCREASING ATTAINMENT

The labour market perspectives have a really important effect in student's decision to stay in education. Between 2010 and 2014 the unemployment rates of the educational attainment have increased for all levels in Hungary. These rates were below the OECD average in 2014, except for those with less than upper secondary education. In OECD countries Hungary has the 4th largest employment gap between those with less than upper secondary education and those who hold of tertiary education degrees. The 15-29 year-olds (17.5%) who are neither employed nor in education and training (NEETs) is above the OECD average (15.5%). Generally the upper secondary education can be vocational school (szakiskola), upper secondary vocational school (szakközépiskola) or 4-year/6-year/8-year secondary general school (gimnázium). All of these schools prepare students for their final leaving exam, which is obligatory if they would like to apply for tertiary education. Students who study in vocational schools can get vocational qualification and they can enter the labour market at the end of the 3rd year. They have to take a preparatory course (2 years) to pass this exam. It is really important to support the students with equitable opportunities to level up the basic skills in order to succeed. 2014 statistics show that in Hungary most of the 25-34 year-olds (87%) attended upper secondary education. It is a higher number than the OECD average (83%) (Figure 2). They can enter into the labour market easily by vocational education or training. In Hungary, fewer students

19 Ștefan George Manța et al. / Procedia Economics and Finance 32 (2015) 1276 – 1288

20 <https://www.sciencedirect.com/science/article/pii/S2212567115015051>

(26%) than the OECD average (46%) were enrolled in VET programmes at upper secondary level. Rising dropout from vocational schools (30%) is a huge problem in Hungarian education. Only students with secondary school leaving certificate have access to tertiary education. Admittance is competitive, based on entrance scores earned above the minimum scores defined annually by the government. As a Hungarian student you can access tertiary education through universities or colleges. Hungarian students can access tertiary education in both universities (academic focus) and colleges (practical focus). Outstanding universities can be qualified as research universities, and outstanding colleges can be qualified as colleges of applied sciences. The number of the Hungarian young adults (25-34 years-old) (32%) who apply for tertiary education is lower than the OECD average (41%). Tertiary education credentials are rewarded in the labour market: 25-34 year-old degree holders in Hungary can expect to earn on average 78% more than their peers who have only upper secondary education (the average OECD earning premium is 41%).

WHAT IS THE BIGGEST CHALLENGE?

To support students enter the labour market and higher education by helping them to improve their basic skills. The national Higher Education Strategy (2014) (see Spotlight 4) arranges that all students who attend to higher education need to pass a competence test before a beginning of the programme. For students who achieve lower results different courses will be provided (mentoring, coaching, catch-up) to save them from dropping out. Hungary is progressively introducing a Youth Guarantee Implementation Plan – this provides all 15-24 year-olds an offer of employment and a place in further education. This program will be actual in 2018 and will cover training for NEETs. The Career Guidance System (2012-2015) provided development and consecutive updating of national career guidance and training for 4000 counsellors and teachers who are about to provide career guidance.²¹

Most important EU funded projects of the Educational Authority

Social Renewal Operational Programme (TÁMOP)-3.1.1 21st Century School Education (Development and Coordination) Phase 2

Leader of Consortium: Hungarian Institute for Educational Research and Development (OFI) Partners: Educational Authority, Educatio Non-profit Ltd.

Project duration: 1 Aug 2012 – 31 Jan 2015 Total budget: HUF 6,859,990,065
Educational Authority budget: HUF 1,200,000,000

Project general goals:

21 <http://www.oecd.org/education/Hungary-Profile.pdf>

Professional and ICT support and development, quality management and monitoring of the implementation of public education provisions stipulated by the act on National Public Education and new content regulation.

Social Renewal Operational Programme (TÁMOP)-3.1.5/12 Supports for teachers' education and training system

Leader of Consortium: Educational Authority Partners: Educatio Non-profit Ltd, Hungarian Institute for Educational Research and Development (OFI)

Project duration: 1 Aug 2012 – 30 Sept 2015 Total budget: HUF 11,247,000,000
Educational Authority budget: HUF 3,950,000,000

Project general goals:

Renewing the teachers' education and training system in accordance with the new regulations of the National Public Education System, reviewing and auditing of the existing system, in terms of content, structure and development of in-service training programs linked to the teachers' career model. Elaborating and implementing education, training and evaluation system based on teachers' career model and its levels. Renewing the consultancy services for teachers' career development.

Social Renewal Operational Programme (TÁMOP)-3.1.8 Complex quality improvement in public education

Project duration: 15 Nov 2012 – 30 Sept 2015 Total budget: HUF 3,546,000,000

Project general goals:

Improving quality, efficiency and effectiveness of education, and access to high quality education.

Project specific goals:

Improving the methodology toolkit and culture of teachers
increasing the transparency of institutions

Social Renewal Operational Programme (TÁMOP)-3.1.10-11/1 The development of local education management

Leader of Consortium: Educational Authority Partner: Educatio Non-profit Ltd.

Project duration: 1 July 2012 – 30 June 2015 Total budget: HUF 4,891,938,983
Educational Authority budget: HUF 3,391, 938,984

Project general goals:

Improving the structure, administration, management, financing and continuous adjustment of public education system, support for quality improvement

Social Renewal Operational Programme (TÁMOP)- 4.1.3 System's development of services in higher education 2.0

Leader of consortium: Educatio Non-profit Ltd. Partner: Educational Authority

Project duration: 1 March 2012 – 31 Jan 2015 Total budget: HUF 1,570,009,005
Educational Authority budget: HUF 466,989,387

Project general goals:

Quality improvement and widening the roles of higher education in order to improve employability of students and ensuring the linkage between the Hungarian higher education and the European Higher Education Area so as to enhance better competitiveness. Founding flexible education paths following lifelong learning goals, making the education system more transparent and providing higher quality services.

Social Renewal Operational Programme (TÁMOP)-7.2.1 Higher education policy and development policy analysis and surveys for designing European Social Fund developments

Project duration: 17 July 2012 – 30 Apr 2014 Total budget: HUF 269,432,046

Project general goals:

Evidence- based decision support for management of higher education aiming at more sophisticated demand driven resource utilization in the next programming period 2014-2020.

State Reform Operational Programme (ÁROP)- 1.2.18/A-2013 Organisational development for central administrations' organisations

Project duration: 01 Oct 2013 – 30 Apr 2014 Total budget: HUF 27,000,000
Educational Authority budget: HUF 27,000,000

Project general goals:

Regulation and control of internal processes to improve operation efficiency, put into practice performance measurement. Additional goal is exploitation of organisational knowledge to strengthen the adaptive self-improving Authority.

There are lot of projects for higher education supported by the EU under the following programmes:

EFOP, VEKOP, GINOP, Campus Mundi, etc.

There are no specific national co-funded projects for career management except for the Erasmus+ projects.

RESEARCH IN HUNGARY

The target group of the project consists of three groups; newly employed people or the ones who are going to start working in the near future (level 1), the employees who are currently working at the level of expertise (level 2) and the people who

are currently working as managers (level 3). The research aims to find out the training needs of the new industrial revolution also known as industry 4.0 of these 3 target group. We carried out a field study for the first two level by conducting questionnaires and interviews for the managers. A research was carried out with 100 students and 58 employees in Hungary, with purposive sampling. Based on Prifti et. al²² (2017) Industry 4.0 Competency Model a questionnaire form is used as the data collection tool. The questionnaire form was adopted from Prifti et al. (2017)'s "A Competency Model for Industry 4.0 Employees" which is based on Great 8 competency dimensions. Frequency analysis is conducted in order to determine the training need analysis of students and employees in Hungary. Thus it is aimed to reveal the skill kit required by Industry 4.0 for all the 3 levels. In other words, are the graduates, employees and managers ready for Industry 4.0 with the skills?

GREAT EIGHT DIMENSION DEFINITION

Leading and Deciding	Takes control and exercises leadership. Initiates action, gives direction, and takes responsibility.
Supporting and Cooperating	Supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organization.
Interacting and Presenting	Communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner.
Analyzing and Interpreting	Shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing
Creating and Conceptualizing	Works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change.
Organizing and Executing	Plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards.
Adapting and Coping	Adapts and responds well to change. Manages pressure effectively and copes well with setbacks.
Enterprising and Performing	Focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement.

Source: (Dave, 2005)

22 Prifti, L.; Knigge, M.; Kienegger, H.; Krcmar, H. (2017): A Competency Model for "Industrie 4.0" Employees, in Leimeister, J.M.; Brenner, W. (Hrsg.): Proceedings der 13. Internationalen Tagung Wirtschaftsinformatik (WI 2017), St. Gallen, S. 46-60.

FINDINGS FOR EMPLOYEES IN HUNGARY

Demographics

Participants participated the research are %41,7 male and %58,3 female, age ranging from 23 to 60 and mean age is 40,64. %11,9 of the respondents are higher education, %22 are graduates, %18,6 are collage, %10,2 are vocational school, %37,3 are secondary school. %38,3 of the respondents are employed in service (tourism, health, finance, IT) sector, %30 in education and %31,7 in manufacturing. %36,2 of the participants are working in companies with 1-10 employees, %37,9 are working in companies with 11-50 employees, %8,6 are working in companies with 51-100 employees, %5,2 are working in companies with 101-250, %6,9 are working in companies with 251-500, and %5,2 are working in companies with 500+ employees. Participants are working years as a professional range from 1-35 years and average working year as professional is 13,69 years, participants are working for the same company ranging from 1-32 years and average working years for the same company is 9,77 years and participants are working in their current position ranging from 1-26 years and average working years in the current position is 6,86 years.

Demographic represent a participant profile as female, in their mid-ages, diverse in education, equally working in manufacturing, education and service sector, working in SMEs, and experienced employees.

Findings for Business Trends

Business trends reported by the participants %43,3 no change in revenue, %18,3 total revenue increasing, only %4,7 of the respondents reported a decreasing total revenue and %31,7 reported not applicable (table 1).

Table 1: What is the business trend in your organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Total revenue increasing	11	18,3	18,3	18,3
	Total revenue decreasing	4	6,7	6,7	25,0
	Without change	26	43,3	43,3	68,3
	Not applicable	19	31,7	31,7	100,0
	Total	60	100,0	100,0	

%41,7 of the respondents reported that employment trend in their organization is not changing, %6,7 reported increase in the number of the employees, only %23,3 reported a decrease in the employee numbers and %28,3 reported as not applicable (Table 2).

Table 2: What is the employment trend in your organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Number of employees increasing	4	6,7	6,7	6,7
	Number of employees decreasing	14	23,3	23,3	30,0
	Without change	25	41,7	41,7	71,7
	Not applicable	17	28,3	28,3	100,0
	Total	60	100,0	100,0	

%35 of the respondent reported that it is moderate to find a job in the same sector if they lose their current job, %31,7 reported as easy, %11,7 as very easy, %13,3 as difficult and %8,3 as very difficult (Table 3).

Table 3: If you loose your current job, is it possible to find a job in the same sector?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Difficult	5	8,3	8,3	8,3
	Difficult	8	13,3	13,3	21,7
	Moderate	21	35,0	35,0	56,7
	Easy	19	31,7	31,7	88,3
	Very Easy	7	11,7	11,7	100,0
	Total	60	100,0	100,0	

%28,3 of the respondent reported that it is moderate to find a job in another sector if they lose their current job, %34,7 reported as easy, %15 as very easy, %11,7 as difficult and %8,3 as very difficult (Table 4).

Table 4: If you loose your job, can you work in another sector?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Difficult	5	8,3	8,3	8,3
	Difficult	7	11,7	11,7	20,0
	Moderate	17	28,3	28,3	48,3
	Easy	22	36,7	36,7	85,0
	Very Easy	9	15,0	15,0	100,0
	Total	60	100,0	100,0	

Hungarian participants reported a static and negative economy profile. Also, participants suggest that if they loose their current job, it is easier to find another job in another sector according to the frequencies. Still, finding a new job seems to be above average.

SKILL NEED IN INDUSTRY 4.0

Dimensions

Skill set required by industry 4.0 are captured under 20 dimensions which are Deciding and Initial Action, Leading and Supervising, Working With People, Adhering to Principles and Values, Relating and Networking, Persuading and Influencing, Presenting and Communicating Information, Writing and reporting, Applying Expertise and Technology, Analyzing, Learning and Researching, Creating and Innovation, Formulating Strategies, Planning and Organization, Delivering Results and Meeting Customer Expectation, Following Instructions and Procedures, Adopting and Responding to Change, Persuading and Influencing, Achieving Personal Work Goals and Objectives, Entrepreneurial and Commercial Thinking all base on Big Eighth dimensions.

GREAT EIGHT DIMENSIONS AND THEIR DEFINITIONS

<p>Leading and Deciding Takes control and exercises leadership. Initiates action, gives direction, and takes responsibility.</p>
<p>Supporting and Cooperating Supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organization.</p>
<p>Interacting and Presenting Communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner.</p>
<p>Analyzing and Interpreting Shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing</p>
<p>Creating and Conceptualizing Works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change.</p>
<p>Organizing and Executing Plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards.</p>
<p>Adapting and Coping Adapts and responds well to change. Manages pressure effectively and copes well with setbacks.</p>
<p>Enterprising and Performing Focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement.</p>

LEADING AND DECISION

The Great Eight's Leading and Decision dimension captures participant's taking control and exercise leadership, initiates action, gives direction, and takes responsibility skills (Dave, 2005). It is composed of two sub dimension called Deciding and Initial Action (2 item) and Leading and Supervising (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Deciding and Initial Action

Frequency analysis for Deciding and Initial Action items suggest that %53,3 of the Hungarian participants evaluate themselves as strong and very strong level of decision making and %60 strong to very strong level of taking responsibility.

Leading and Supervising

Frequency analysis for Leading and Supervising items suggest that %40 of the Hungarian participants evaluate themselves as strong and very strong level of Leadership Skills. Hungarian employees are below average in leadership skills.

SUPPORTING AND COOPERATION

The Great Eight's Supporting and Cooperation dimension captures participant's supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organization (Dave, 2005). It is composed of two sub dimension called Working With People (3 items) and Adhering to Principles and Values (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Working with People

Hungarian participants reported they have high levels of team work skills, %67,8 reported strong and very strong team work skills; %60 in Collaborating with Others and %65 in Communicating with People respectively. Hungarian participants evaluate themselves high in working with people dimension.

Adhering to Principles and Values

Hungarian participants evaluate themselves %76,7 high as strong and very strong in Respecting Ethics and %65 in Environmental Awareness skills.. However, awareness of ergonomics rated only %35 strong and very strong. Hungarian participants are below average in ergonomics awareness.

INTERACTING AND PRESENTING

The Great Eight's Interacting and Presenting dimension captures communicates and networks effectively. Successfully persuades and influences others. Relates

to others in a confident, relaxed manner (Dave, 2005). It is composed of two sub dimension called Relating and Networking (3 items), Persuading and Influencing (2 Items) and Presenting and Communicating Information (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Relating and Networking

Relating and networking competency has three items; compromising, creating business networks and maintaining customer relationships. %60 of the Hungarian participants rated themselves as strong and very strong compromising skills; %58,3 in creating business networks, and %66,7 in maintaining customer relationships.

Persuading and Influencing

%60 of the Hungarian participants rated themselves strong and very strong in persuading influencing skills whereas %66,7 in emotional intelligence skills.

Presenting and Communicating Information

Hungarian participant rate themselves with strong and very strong with %55 in presenting and communication ability.

ANALYZING AND INTERPRETING

The Great Eight's Analyzing And Interpreting dimension captures shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing (Dave, 2005). It is composed of three sub dimension called Writing and Reporting (2 items), Applying Expertise and Technology (23 items) and Analyzing (4 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Writing and reporting

%58,3 of the Hungarian participants rated strong and very strong in targeted/ technical communication skill and %44,2 strong and very strong in literacy skills. Hungarian participants rated themselves low in literacy skills.

Applying Expertise and Technology

Applying expertise and technology dimension is composed of 23 items.

- Participants rated their skills in IT and technology affinity %42,4 strong and very strong,
- Economics %22 strong and very strong,
- Extract business value from social media %20,3 strong and very strong,
- Service orientation/product service offerings %34,5 strong and very strong,

- Business process management %34,5 strong and very strong,
- Business change management %39,7 strong and very strong,
- Understand and coordinate workflows %56,9 strong and very strong,
- Network security %43,1 strong and very strong,
- IT architectures %13,8 strong and very strong,
- Machine learning %24,1 strong and very strong,
- System development % 17,2 strong and very strong,
- Integrating heterogeneous technologies %17,2 strong and very strong,
- Mobile technologies %22,8 strong and very strong,
- Sensors/embedded systems %12,1 strong and very strong,
- Network technology/M2M communication %8,6 strong and very strong,
- Robotics/Artificial intelligence %5,2 strong and very strong,
- Predictive maintenance %7 strong only,
- Modelling and programming %6,9 strong and very strong,
- Big data/Data analysis and interpretation %15,5 strong and very strong
- Cloud computing/architectures %13,8 strong and very strong,
- In-memory DBs %6,9 strong and very strong,
- Statistics %11,9 strong and very strong
- Data Security %15,8 strong and very strong .

In general frequency analysis suggest that Hungarian participants are not skilled for Applying Expertise and Technology dimension, the lowest reported skills are Network technology/M2M communication, Robotics/Artificial intelligence, Predictive maintenance, Modelling and programming and In-memory DBs.

Analyzing

Analyzing sub-dimension is composed of 4 items. Participants rated Problem Solving %55.9 strong and very strong, Optimization %40,7; Analytical Skills %42,4 and Cognitive Ability %59,3 . Optimization and analytical skills are below average.

CREATING AND CONCEPTUALIZING

The Great Eight's Creating and Conceptualizing dimension captures works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change (Dave, 2005). It is composed of three sub dimension called Learning and

Researching (2 items) and Creating and Innovation (4 items) and Formulating Strategies (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Learning and Researching

Hungarian participants reported they have life-long learning skill %59,7 strong and very strong and %44,8 strong and very strong in knowledge management.

Creating and Innovation

Participants rated themselves %47,5 strong and very strong in Innovating, %58,6 strong and very strong in creativity, %57,6 strong and very strong in Critical Thinking and %55,9 strong and very strong in Change Management .

Formulating Strategies

Business Strategy %32,8 strong and very strong, Abstract Ability %31 strong and very strong , and Managing Complexity %37,9 strong and very strong. Hungarian participants rated low in formulating strategies.

ORGANIZING AND EXECUTING

The Great Eight's Organizing and Executing dimension captures plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards. It is composed of three sub dimension called Planning and Organization (3 items) and delivering Results and Meeting Customer Expectations(2 items) and Following Instructions and Procedures (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Planning and Organization

Participants rated Planning and Organization dimensions Project management %42,4 strong and very strong, Planning and organizing work %57,6 strong and very strong and % 44,2 strong and very strong Management Ability.

Delivering Results and Meeting Customer Expectation

Participants rated their Customer Orientation skills % 64,4 strong and very strong, Customer Relationship Management skills %62,76 strong and very strong.

Following Instructions and Procedures

Legislation awareness skills %16,9 strong and very strong, Safety awareness skills %36,2 strong and very strong and Individual responsibility skills %64,4 strong and very strong.

ADAPTING AND COPING

The Great Eight's Adapting and Coping captures adapts and responds well to change. Manages pressure effectively and copes well with setbacks. It is composed of two sub dimension called Adopting and Responding to Change (4 items) and persuading and influencing (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Adopting and Responding to Change

Participants rated their Work in interdisciplinary environments skills %47,4 strong and very strong, Intercultural competency skills %49,2 strong and very strong, Flexibility skills %57,6 strong and very strong and Adaptability and ability to change mind-set skills %47,5 strong and very strong.

Persuading and Influencing

Participants rated their Work Life Balance skills %33,9 strong and very strong.

ENTERPRISING AND PERFORMING

The Great Eight's Enterprising and Performing captures focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement. It is composed of two sub dimension called Achieving Personal Works Goals And Objectives (1 item) and Entrepreneurial and Commercial Thinking (2 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Achieving Personal Work Goals and Objectives

Participants rate their Self-management and organization skills %54,2 strong and very strong.

Entrepreneurial and Commercial Thinking

Participants rated their Business model understanding skills %37,9 strong and very strong and Entrepreneurship skills %44,6 strong and very strong. Hungarian participant rate below average Entrepreneurial and Commercial Thinking skills.

We also calculated mean scores of each 8 dimension in order to find out training needs of employees in Hungary in the age of Industry 4.0. While 1 refers to be weak, 5 refers to be strong. Table 5 shows the mean scores of Hungarian employees for all 8 dimensions

Table 5. Mean Scores of 8 Dimensions of Employees in Hungary

Descriptives for Employees in Hungary		
DIMENSION	Mean	Std. Err.
1. Leading and Decision	3,4422	0,12387
1.1. Decision and Initial Action	3,5714	0,13041
1.2. Leading and Supervising	3,1837	0,12934
2. Supporting and Cooperation	3,6224	0,11952
2.1. Working with People	3,6871	0,13164
2.2. Adhering to Principles and Values	3,5578	0,11999
3. Interacting and Presenting	3,6088	0,12854
3.1. Relating and Networking	3,6054	0,12511
3.2. Persuading and Influencing	3,6939	0,14567
3.3. Presenting and Communicating Information	3,449	0,1572
4. Analyzing and Interpreting	2,7319	0,11071
4.1. Writing and Reporting	3,3878	0,1599
4.2. Applying Expertise and Technology	2,5652	0,11245
4.3. Analyzing	3,3622	0,13424
5. Creating and Conceptualization	3,4308	0,13112
5.1. Learning and Researching	3,4694	0,15251
5.2. Creating and Innovation	3,6173	0,141
5.3. Formulating Strategies	3,1565	0,13081
6. Organizing and Executing	3,3393	0,12742
6.1. Planning and Organization	3,3946	0,13527
6.2. Delivering Results and Meeting Customer Expectations	3,7041	0,14647
6.3. Following Instructions and Procedures	3,0408	0,13973
7. Adapting and Coping	3,3265	0,13699
7.1. Adopting and Responding to Change	3,352	0,14796
7.2. Persuading and Influencing	3,2245	0,15503
8. Enterprising and Performing	3,4354	0,1365
8.1. Achieving Personal Work Goals and Objectives	3,6122	0,15923
8.2. Entrepreneurial and Commercial Thinking	3,3469	0,13771

According to table 5, while the weakest dimension is analysing and interpreting as in all countries within this project, supporting and cooperation dimension is the strongest one. It can be inferred from the table that as all the dimensions captures more than 3 mean score (1 is min, 5 is max and 3 is average), we can say that Hungarian employees evaluates themselves not weak. Although Hungarian

employees consider themselves not very weak, there are some dimensions need to be trained such as analysing and interpreting, creating and conceptualization, organizing and executing and adapting and coping.

FINDINGS FOR GRADUATES IN HUNGARY

Demographics

Participants participated the research are % 42 male and %58 female, age ranging from 17 to 34 and mean age is 22,76. %12 of the respondents are studying higher education, %33 are studying graduate and %10 are studying collage, %4 are studying vocational school, %41 are studying secondary school. %61 of the respondents are planning to work in service (tourism, health, finance, IT) sector, %21 in education and %18 in manufacturing.

Demographic represent a participant profile with a female, in their twenties, mostly planning to work in service sector.

Findings for Business Trends

Business trends they plan to work in reported by the students is %28 no change in revenue, %44 total revenue increasing, %4 of the respondents reported a decreasing total revenue and %24 reported not applicable (Table 6).

Table 6: What is the business trend in the sector you want to work?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Total revenue increasing	44	44,0	44,0	44,0
	Total revenue decreasing	4	4,0	4,0	48,0
	Without change	28	28,0	28,0	76,0
	Hard to say	24	24,0	24,0	100,0
	Total	100	100,0	100,0	

%18 of the respondents reported that employment trend in the sector they plan to work is not changing, %49 reported increase in the number of the employees, %19 reported a decrease in the employee numbers and %14 reported as not applicable (Table 7).

Table 7: What employment possibilities are in the sector you want to work?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Number of employees increasing	49	49,0	49,0	49,0
	Number of employees decreasing	19	19,0	19,0	68,0
	Without change	18	18,0	18,0	86,0
	Hard to say	14	14,0	14,0	100,0
	Total	100	100,0	100,0	

%66 of the respondent reported that it is easy and very easy to find a job in the sector they want to work, %27 reported as moderate, %5 difficult and %2 as very difficult (Table 8)

Table 8: Can you find a job in the sector you want to work?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Difficult	2	2,0	2,0	2,0
	Difficult	5	5,0	5,0	7,0
	Moderate	27	27,0	27,0	34,0
	Easy	48	48,0	48,0	82,0
	Very Easy	18	18,0	18,0	100,0
	Total	100	100,0	100,0	

%47,5 of the respondent reported that it is easy and very easy to find a job in a sector other than they want to work, %32,3 reported as moderate, %18,2 as difficult and %2 as very (Table 9).

Table 9: If you cannot find a job in the sector you want to work, is it possible for you to find another job in a different sector?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Difficult	2	2,0	2,0	2,0
	Difficult	18	18,0	18,2	20,2
	Moderate	32	32,0	32,3	52,5
	Easy	31	31,0	31,3	83,8
	Very Easy	16	16,0	16,2	100,0
	Total	99	99,0	100,0	
Missing	System	1	1,0		
Total		100	100,0		

Skill Need in Industry 4.0

Dimensions

Skill set required by industry 4.0 are captured under 20 dimensions which are Deciding and Initial Action, Leading and Supervising, Working With People, Adhering to Principles and Values, Relating and Networking, Persuading and Influencing, Presenting and Communicating Information, Writing and reporting, Applying Expertise and Technology, Analyzing, Learning and Researching, Creating and Innovation, Formulating Strategies, Planning and Organization, Delivering Results and Meeting Customer Expectation, Following Instructions and Procedures, Adopting and Responding to Change, Persuading and Influencing, Achieving Personal Work Goals and Objectives, Entrepreneurial and Commercial Thinking all base on Big Eight dimensions.

Big Eight Dimensions and definition

<p>Leading and Deciding Takes control and exercises leadership. Initiates action, gives direction, and takes responsibility.</p>
<p>Supporting and Cooperating Supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organization.</p>
<p>Interacting and Presenting Communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner.</p>
<p>Analyzing and Interpreting Shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing</p>
<p>Creating and Conceptualizing Works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change.</p>
<p>Organizing and Executing Plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards.</p>
<p>Adapting and Coping Adapts and responds well to change. Manages pressure effectively and copes well with setbacks.</p>
<p>Enterprising and Performing Focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement.</p>

LEADING AND DECISION

The Great Eight’s Leading and Decision dimension captures participant’s taking control and exercise leadership, initiates action, gives direction, and takes responsibility skills (Dave, 2005). It is composed of two sub dimension called Deciding and Initial Action (2 item) and Leading and Supervising (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Deciding and Initial Action

Frequency analysis for Deciding and Initial Action items suggest that %64 of the Hungarian students evaluate themselves as strong and very strong level of decision making; %68 strong and very strong level of taking responsibility.

Leading and Supervising

Hungarian students score themselves %50 strong and very strong leadership skills.

SUPPORTING AND COOPERATION

Working With People

%75 of the students rate themselves as strong and very strong in team work, %81 rate themselves strong and very strong in collaborating with others and %76 rate strong and very strong in communicating with people.

Adhering to Principles and Values

%73 of the students rate strong and very strong in Respecting ethics, %65 strong and very strong in Environmental awareness and %40 strong and very strong in Awareness of ergonomics. Hungarian students score low in awareness of ergonomics like employees scores.

INTERACTING AND PRESENTING

Relating and Networking

%81 of the students rate strong and very strong in Compromising skill, %76 rate strong and very strong in Creating business networks, %78,7 rate strong and very strong in Maintaining customer relationship.

Persuading and Influencing

%60 of the students rate strong and very strong in Negotiating and %75,8 strong and very strong in Emotional intelligence.

Presenting and Communicating Information

%70 of the student's rate strong and very strong in Presenting and communication ability.

ANALYZING AND INTERPRETING

Writing and reporting

%73 of the Hungarian students rate strong and very strong in Targeted/ Technical Communication and %76 rate strong and very strong in Literacy.

Applying Expertise and Technology

- %58 of the Hungarian students rate themselves with strong and very strong in IT and technology affinity,
- %30.3 strong and very strong in Economics,
- %14 strong and very strong in Extract business value from social media,

- %39 strong and very strong in Service orientation/product service offering,
- %27 strong and very strong in Business process management,
- %27 strong and very strong in Business change management,
- %63 strong and very strong in Understand and coordinate workflows,
- %33 strong and very strong in Network security,
- %29 strong and very strong in IT architectures,
- %31 strong and very strong in Machine learning,
- %29,6 strong and very strong in System development, ,
- %15 strong and very strong in Integrating heterogeneous technologies,
- %44 strong and very strong in Mobile technologies,
- %16 strong and very strong in Sensors/embedded systems,
- %16 strong and very strong in Network technology/M2M communication,
- %15 strong and very strong in Robotics/Artificial intelligence,
- %16,2 strong and very strong in Predictive maintenance,
- %22 strong and very strong in Modelling and programming,
- %33 strong and very strong in Big data/Data analysis and interpretation,
- %20,2 strong and very strong in Cloud computing/architectures,
- %12 strong and very strong in In memory DBs,
- %25 strong and very strong in Statistics,
- %26 strong and very strong in Data security.

Analyzing

%77 of the Hungarian students rate strong and very strong in Problem Solving, %54,5 strong and very strong in Optimization , %42 strong and very strong in Analytical Skills, %71 strong and very strong in Cognitive Ability. Analytical skills needs improvement.

CREATING AND CONCEPTUALIZATION

Learning and Researching

%65 rate strong and very strong in Life-long learning skills, %52 rate strong and very strong in Knowledge management skills.

Creating and Innovation

%65 rate strong and very strong in Innovating, %82 rate strong and very strong Creativity, %62,2rate strong and very strong Critical thinking, %70,7 rate strong and very strong Change management.

Formulating Strategies

%34 rate strong and very strong in Business strategy, %39 strong and very strong in Abstraction ability, %50 strong and very strong in Managing complexity. Business strategy and Abstraction ability skills need improvement.

ORGANIZING AND EXECUTING

Planning and Organization

%50,5 rate strong and very strong in Project management, %66 rate strong and very strong in Planning and organizing work, %62 rate strong and very strong in Management ability.

Delivering Results and Meeting Customer Expectation

%60 of the Hungarian students rate their Customer orientation skills as strong and very strong and %60 in Customer relationship management.

Following Instructions and Procedures

%27 rate strong and very strong Legislation awareness skill, %49 strong and very strong in Safety awareness, %62 strong very strong in Individual responsibility. Hungarian Students lack legislation awareness.

ADAPTING AND COPING

Adopting and Responding to Change

%44 rate strong and very strong in Work in interdisciplinary environments, %46 rate strong and very strong in Intercultural competency, %71 rate strong and very strong in Flexibility, %61 rate strong and very strong in Adaptability and ability to change mind-set.

Persuading and Influencing

%57 of the Hungarian students' rate strong and very strong in Work Life Balance skill.

ENTERPRISING AND PERFORMING

Achieving Personal Work Goals and Objectives

%60,6 of the Hungarian students rate strong and very strong in Self-management and organization.

Entrepreneurial and Commercial Thinking

%38,4 of the Hungarian students rate strong and very strong in Business model understanding and %73,6 rate strong and very strong in Entrepreneurship. Hungarian students lack business model understanding skills.

We also calculated mean scores of each 8 dimension in order to find out training needs of graduates in Hungary in the age of Industry 4.0. While 1 refers to be weak, 5 refers to be strong. Table 10 shows the mean scores of Hungarian graduates for all 8 dimensions.

Table 10. Mean Scores of 8 Dimensions of Graduates

Descriptives for Graduates in Hungary		
DIMENSION	Mean	Std. Err.
1. Leading and Decision	3,7739	0,08574
1.1. Decision and Initial Action	3,8736	0,08813
1.2. Leading and Supervising	3,5747	0,10293
2. Suporting and Cooperation	3,9157	0,07477
2.1. Working with People	4,1533	0,08457
2.2. Adhering to Principles and Values	3,6782	0,08879
3. Interacting and Presenting	3,9521	0,07442
3.1. Relating and Networking	3,9425	0,08429
3.2. Persuading and Influencing	3,9368	0,08488
3.3. Presenting and Communicating Information	4,0115	0,09028
4. Analyzing and Interpreting	2,9473	0,0752
4.1. Writing and Reporting	4,0057	0,08554
4.2. Applying Expertise and Technology	2,7281	0,08392
4.3. Analyzing	3,6782	0,08465
5. Creating and Conceptualization	3,6564	0,07749
5.1. Learning and Researching	3,6839	0,10016
5.2. Creating and Innovation	3,9454	0,08321
5.3. Formulating Strategies	3,2529	0,08634
6. Organizing and Executing	3,5302	0,08644
6.1. Planning and Organization	3,728	0,09968
6.2. Delivering Results and Meeting Customer Expectations	3,6494	0,1136
6.3. Following Instructions and Procedures	3,2529	0,09021
7. Adapting and Coping	3,6345	0,08209
7.1. Adopting and Responding to Change	3,6523	0,0893
7.2. Persuading and Influencing	3,5632	0,09631
8. Enterprising and Performing	3,5977	0,08585
8.1. Achieving Personal Work Goals and Objectives	3,7701	0,09349
8.2. Entrepreneurial and Commercial Thinking	3,5115	0,09944

According to table 10, while the weakest dimension is analysing and interpreting, interacting and presenting dimension is the strongest one, although supporting and cooperation dimension can be regarded as a strong one. The results can be interpreted more or less the same with the employees. As in employees, the students also perceives themselves very weak in analysing and interpreting dimension. It can be inferred from the table that as all the dimensions captures more than 3 mean score (1 is min, 5 is max and 3 is average), we can say that Hungarian graduates evaluates themselves not weak. Although Hungarian graduates consider themselves not weak, there are some dimensions need to be trained such as analysing and interpreting, creating and conceptualization, organizing and executing and adapting and coping.

INTERVIEW WITH MANAGERS

Introduction text for the interview was:

“Career management is conscious planning of one’s activities and engagements in the jobs one undertakes in the course of his life for better fulfilment, growth and financial stability. It is a sequential process that starts from an understanding of oneself and encompasses occupational awareness.

In our project we would like to understand whether the business market is ready for the changes in the near future? Do companies deal with the Industrial Revolution 4.0?

info:

https://en.wikipedia.org/wiki/Industry_4.0

We are working on the creation of a Career Management Mobile Application in which we advise employees what skills can they develop to meet the market trends and challenges. In the first round we would like to ask managers how much do their businesses deal with the changing market needs, the 4th Industrial Revolution, and what impact these changes have on their own work.”

Interview summary:

We have conducted interviews with 10 managers.

4 managers from Education (rector, 2 vice-rectors, 2 head of department)

3 from manufacturing (commercial director, 2 owners)

3 from Service providers companies (campaign head manager, 2 HR managers)

All the managers in the manufacturing and service sectors were either owners or top managers of the company. In the education sector we have talked with one Rector and vice-rectors, deans (head of departments).

Regarding the revenue of the business trend in the organization were increasing, even in the education sector. Not significantly, but still revenue increasing can be shown.

Also the number of employees in all the interviewed institutions is increasing. The most significant increase is in 2 Universities, due to opening of new departments and a doctoral school (Bioinformatics Research Center)

The answers for the business trends in economy in Hungary were all the same. The answer is increasing. Slow, but still increasing. The Service sector said that the competition is high and this is one of the reasons why the increasement is slow. The role of the service sector in the Hungarian economy is growing; there has been a huge amount of investment in freight transport and other service sectors over the past fifteen years. In Hungary, almost two thirds of GDP is generated by the service sector. The domestic share of the service industry accounts for 65% of Hungarian GDP.

Logistics makes up 6.5 percent of Hungary's gross domestic product.

For the manufacture sector, Hungary is a moderately developed, industrial-agrarian, foreign-sensitive country. The industry, which relies mainly on the processing industry, produces about a quarter of the total national product. Relatively low, 4-5 percent is the share of agriculture and the construction industry.

For the question: "If you lose your position right now, how easy is it for you to find a new position in the same sector?,,

All the managers answered that it would be easy, (8 said very easy). They all were confident leaders and good professionals. As some of them said unfortunately there is lack of professionals in Hungary at the moment.

Also for the same reason (lack of professionals) the answer to find a new position in another sector was almost the same, except for the education sector – the rector said that there is no rectorial position in another sector.

For the question if they could work in a lower position the answer was yes, but they do not wish to work in lower positions. The explanation was that there is possibility now to choose jobs in the same position.

For the questions "What is the biggest challenge for you to continue to work as a manager? and „In which areas you think you should improve/develop your skills?,, the answers were: to keep up with technology, and to keep up with new information. Straight and direct communication with employees, commitment and loyalty, understanding common vision and mission (having employees understand it), managing talents, having a good mentoring programme, life long learning and development of skills like leadership, time management, problem

solving, change management were among the answers, and in manufacturing sector international distribution and „Less details, more overview” were also answers.

For the following question:

“Can automation be a problem for your current position? What do you think about Industry 4 in your sector?” the answers were partly yes and partly no.

The ones who answered yes, (service sector) said that there is a problem with Industry 4 since more details will be automatized, so there will be less humanresources needed for the jobs to be done.

In the education sector at the moment there are no threats (according to the answers)

Interestingly the answer from the manufacturing sector was: Not really. Industry 4 is already present and for sure will be in the future too. They said that there will be changes, but also new challenges, where human resources will be needed. They need to be re-trained.

“Are employees working in lower positions in danger of losing their jobs in your organization, and sector? How will industry 4 effect employment in your organization, and sector”

All the answers were mutual, but in general there were two answers:

“Part of the work is automated, fewer people will be needed. The process has already started” (service sector)

“No, the sector is stable. / The Industry 4 will bring development in quality/ quantity, but will not affect the personal in global” (manufacturing)

“the education sector is stable, but we need to adjust to the new educational needs” (education)

All the answers were yes to the question if the company is focused on improving the employees skills.

The skills they are developing were:

Communication, integration with the digital world, IT skills, digital skills, marketing skills, management skills, co-working skills (team building), e-working skills, tele-communication, networking skills, time management.

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INDUSTRY 4.0 COMPETENCIES IN ROMANIA FOR CAREER MANAGEMENT

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CAREER MANAGEMENT

When deciding to choose a domain, every one of us wishing to practice a certain profession also thinks about his **career**. This is regarded as its **own professional development reported at the level of its entire active life**.

Besides individual evolution, **the career can be considered under three aspects: economic, sociological and psychological**.

Economically, career is a succession of professional positions occupied by a person.

Sociologically, this is regarded as a succession of roles, every role being the basis of the following.

Psychologically, choosing a career and professional success refer to the individual's skills, interests, values, needs, previous experience and aspirations.

1.1. Career management - a transversal process

Although essentially **career management** is a process that we associate to a person's individual aspirations in the context of competition and globalization, it tends to become a transversal process of functions in the Human Resources activity of an organization.

The key role of this process is to identify employees' career needs and aspirations, relying on their transferable and specific skills, to support the

development of medium and long-term competence development within the organization.

Therefore, he is the necessary link in order to achieve **the employee's professional development goals together with the needs of the organization** and also a fundamental component of the valuable proposition that the employer presents to the candidates in the labor market.

According to Holland's theory, career guidance should be based on one of the personality patterns of the individual;

1. **Conventional people** mostly prefer organized activities subject to internal rules and procedures. It is usually about activities that involve the organization of written or numerical information, analyses using algorithms and generally standard procedures that have been pre-defined in advance. These people are conformist, orderly, efficient and practical, but lack imagination and creativity.
2. **Artistic individuals** are totally opposed to conventional ones, preferring non-systematic activities involving expressive forms of verbal or visual writing and expression. Most are imaginative, intuitive, independent, but at the same time disordered, emotional, impractical.
3. **Investigators** are targeted at predominantly intellectual activities, which involve solving problems and theoretical situations, explaining the causes and nature of the phenomena. They prefer to deal with the abstract aspects in their professional world and they are in a constant search for truth. They prefer abstract ideas, less concrete tasks with skills in mathematical and scientific fields;
4. **Realists** always engage in physical manipulation of objects, demonstrating spontaneity, stability, practical sense. But they are shy, conformed and lack intuition.
5. **Social people** are opposed to realists. They engage in activities that involve informing, helping, developing others. They are communicative, friendly, kind, diplomatic, so they are unlikely to feel well in orderly, systematized, regulated, rigid and predictable activities.
6. **Entrepreneurs** are people who prefer teamwork, but they tend to control and lead their colleagues being focused on organizational and economic goals. As positive aspects we find: self-confidence, ambition, energy, and extraversion. The less pleasant part is dominance, thirst for power and impulsivity.

1.2. Career management objectives

Career management is a point of interest for both the employee and the employer. It is a process of designing and implementing goals, strategies, and plans that enable the organization to meet its human resource needs and individuals to pursue their career goals.

According to the Americans, **career management is carried out on two distinct levels:**

- **planning of the organizational career** that aims to integrate human resource needs in the short and long term and to develop an individual career plan and
- **individual career planning based** on the assessment of capabilities, personal interests, recording organizational opportunities, setting career goals, and developing a strategy for achieving them.

We can distinguish as the main objectives in career management:

- supporting a proper career development stratagem which is in line with the nature of the activity carried out, as well as with the individual and organizational needs and possibilities;
- merging individual needs and goals into organizational needs and objectives;
- accomplishing organizational needs and enhancing the image of the organization by recognizing the training and development needs of employees;
- recognizing and retaining the best employees or those with a clear professional potential by satisfying short and long-term personal needs and aspirations;
- drafting of career plans or the introduction of special promotional schemes for competent employees but for which no suitable positions are available;
- guiding and supporting competent staff to achieve personal goals in accordance with their potential, needs and aspirations, as well as with their contribution to the organization,
- employee support in identifying the qualifications and skills required for both current and future jobs - provide training and development to employees to enable them to cope with any level of responsibility provided they have the potential or ability to attain it;
- finding and applying career development methods for guiding individuals in as many directions as possible;

- professional stimulation of employees showing a certain stagnation or limiting of their careers;
- obtaining mutual benefits for both the organization and its employees.

1.3. Stages and career strategies

Career stages can be defined as general patterns of progress, essential obligations and changes in the activities undertaken by an individual throughout his or her active life. These successive stages are: *exploration, stabilization, advancement, maintaining, and career end*.

In the first phase, that of exploitation each individual faces the transposition of the visions formed in adolescence into the real world. It is the period of experimentation, the time when talents, abilities, interests, values are discovered and developed. It is an important moment in shaping professional identity and choosing a field of activity.

Stabilization is the stage where the acquired notions are deepened, each looking for improving in the chosen field after the exploration process.

Advancement and maintaining are a natural continuation of stabilization, each individual, by human nature, having the desire to surpass themselves, to obtain moral and material benefits.

The end of the career may represent a period of continuous increases in status and influence in the organization, or a period spent at the highest level of responsibility and status.

Career management involves choosing at individual level strategies that allow each person to anticipate problems that may arise in professional development and make long-term planning. Some of these strategies are:

- **self-knowledge** - it is important to carry out a careful analysis of your career orientation, your weaknesses / strengths, the place you occupy in the company;
- **knowledge of the professional environment** - knowing the environment, economic issues, competing companies, you can anticipate both unpleasant events and opportunities;
- **preserving the best reputation** - is to emphasize your skills and achievements, everything that sets you apart, showing special qualities, the ability to invest and the ability to complete projects;
- **flexibility, availability, continuing training** - means the pursuit of the correspondence between personal competences and the ones searched for on labor market, of those easily transferable skills;

- **documenting your own achievements** - means to be able to prove what you have achieved, identifiable results and achievements are more valuable in the labor market;
- **preparing a backup plan** - it is important to always have a trump card and always be ready to act;
- **maintaining a professional and socially comfortable status** - if you maintain yourself in a good financial and mental form it means that you always have a base, comfort and balance on a professional and social level.

At the level of a society, investing in people is the most sustainable investment and the investment in education, the most effective, with long-term effects. Continuous professional development of teachers and access to modern, flexible, accessible tools linked to changes in society are the guarantee of the added value in education.

1.4. Policies and practices in the context of Romanian education

In Romania, counseling and career guidance has begun to benefit from the attention of educational decision makers, becoming a public policy object, along with the reform of education.

In Romanian education, counseling and school and professional orientation are present, defined and regulated at the level of the legal norms.

As educational approach and educational practice, counseling and schooling and professional guidance activities are carried out in several ways:

- 1. Within the psycho-pedagogical assistance offices in schools, through individual counseling and / or group counseling activities, conducted by school counselors-teachers.*
- 2. In the curriculum, through the counseling and guidance classes, by the form teachers;*
- 3. Through projects developed by various educational institutions in partnership with the community, represented by non-governmental organizations and / or local and national authorities and institutions that assume the role of counseling young people in their careers.*

Many adolescents are undecided about their career and are looking for help to decide. There are many factors involved in the decision making process: family, school, friends, media, etc.

In a knowledge-based society, **key competences** in the form of knowledge, skills and attitudes appropriate to each context have a fundamental role for each individual. They provide added value for the labor market, social cohesion

and active citizenship, providing flexibility and adaptability, satisfaction and motivation.

As everyone should acquire them, this recommendation proposes a reference tool for the European Union (EU) countries to ensure the full integration of these key competences into the strategies and infrastructures of the countries concerned, especially in the context of lifelong learning life.

The development of key competences for lifelong learning is outlined in Recommendation 2006/962 / CE of the European Parliament and of the Council of 18th December 2006. Key competences for lifelong learning are a combination of knowledge, skills and attitudes appropriate to every context.

These are especially necessary for personal fulfillment and development, for social inclusion, active citizenship and employment. Key competences are essential in a knowledge-based society and guarantee more flexibility in terms of workforce, allowing it to adapt more quickly to the constant changes that occur in an increasingly interconnected world.

These competencies are also a major factor in innovation, productivity and competitiveness and contribute to employee motivation and satisfaction as well as to the quality of work. Key competences should be acquired by: young people at the end of the compulsory education and training period; key competences would prepare them for adult life, especially for the workforce, and it is also a basis for further learning; adults in their lives pass through a process of developing and updating skills.

GENERAL INFORMATION ABOUT THE LABOUR MARKET IN ROMANIA

General information on the number of employees and businesses

Romania currently has 6,060,000 employees and 5,137,162 retirees, being for the first time in the last three years when the number of those working with individual labor contracts exceeds that of pensioners.

How many businesses do you have in your country?

Trade Registry: There are **1.4 million firms in Romania, of which only 1.2 million** are active. Most insolvencies and deregistration are recorded in trade, construction and transport.

The difference of up to 1.4 million, of about 200,000 companies, is represented by companies in dissolution, liquidation, suspension of activity.

Some of the 200,000 companies are returning to the commercial circuit and are back in operation, and part of the companies is going to be removed from the Trade Register.

Companies that are insolvent are from areas of activity that are constantly kept in recent years, from commerce, retail, construction, transport, hotel and restaurant, processing and very little of other services provided to businesses .

These areas are generally responsible for generating insolvencies, dissolutions, liquidations or business suspensions. This ranking of domains remains relatively constant over time, even if sometimes the order of domains changes.

How many employees? How many of them work for the state / government / public and how many of them work privately?

There are just over four million employees in our country, of which 1.2 million are budget members and the other 2.8 million works in the private system.

More than 1.35 million Romanian workers, that is 30% of the total number of employees in the economy, worked in the state sector in 2015, either in public administration or state-owned companies or self-financed state authorities.

Thus, out of the total of 4.61 million employees in the economy, only 3.25 million people worked in the private sector, that is in companies owned by Romanian entrepreneurs or in foreign companies, according to data published by the National Institute of Statistics. The information is presented in the publication “Romanian Statistical Yearbook - 2016 edition”.

However, the number of employees in the state apparatus has decreased in recent years, considering the fact that in 2010 Statistics registered 1.58 million employees working in the state system. Of these, the number of “public workers”, that is employees in health, education and public administration, has been constantly maintained around 1.2 million employees.

From 2010-2015, the lowest number of employees in Romanian and multinational private companies was registered in 2010, the year when the effects of the financial crisis were most felt on the labor market. Private companies were then forced to make significant cuts in costs to keep their businesses alive, and so the number of private employees dropped to 2.79 million.

In 2015, a year of growth, the number of employees in the private sector was 16% higher than in 2010, with private companies managing to create over 460,000 jobs in the analyzed period.

In contrast, in the year with the fewest private employees (between 2010 and 2015), the state had a record staff of 1.58 million employees, accounting for 36% of all employees in the economy.

Subsequently, the share of state employees fell to 34% of the total (in 2011), to 32% in 2012, to 31% in 2013, to 30.6% in 2014 and 29.3% in 2015.

As a rule, when talking about state employees, the most frequently targeted are budget workers (that is 1,2 million civil workers employed in education and health), those who consume annually 7-8% of GDP for wage costs.

In fact, an attempt to restructure the budgetary apparatus took place in 2010, when the number of budget workers fell by about 200,000 (from 1.4 to 1.2 million people), through measures to “freeze” the new hiring (the rule of a new hiring to seven dismissals).

What is the unemployment rate in general?

Unemployment rate is the share of the unemployed in the active population.

What is the unemployment rate for new graduates?

The employment rate of the working age population (15-64 years) was 65.5% in the second quarter of 2017, 4.3 percentage points above the previous quarter, mainly driven by seasonal character in agriculture.

The employment rate was higher for males (73.2% compared to 57.7% for women) and for rural persons (66% vs. 65.1% in urban areas). The employment rate of young people (15-24 years old) was 27.3%”.

Every year, after graduation, more and more young people are seeking unemployment benefits instead of entering the labor market. In the examinations month (July), young unemployed under the age of 25 represent 12.05% of the total unemployment rate registered at national level.

By gender, the difference between the two unemployment rates was 2.1 percentage points (5.7% for men versus 3.6% for women) and 0.2% for residential areas (4.9) % in rural areas compared to 4.7% in urban areas).

In the second quarter of 2017, the occupancy rate of the 20-64 year-old population was 70.5%, exceeding the national target of 70% set in the context of the Europe 2020 Strategy by 0.5 percentage points.

According to National Institute of Statistics, in the second quarter of 2017, Romania’s active population was 9,418 million people, of which 8,967 million were occupied and 451,000 were unemployed.

The unemployment rate was highest (18.3%) among young people (15-24 years).

By gender, the difference between the two unemployment rates (2017/2016) was 1.6 percentage points (5.6% for men versus 4% for women), and for residence percent of 0.9 percentage points (5.4% in rural versus 4.5% in urban areas).

Unemployment has affected the graduates of low and medium education, for which the rate was 6.8% and 5.1% respectively.

The unemployment rate was only 2.4% for people with higher education, according to National Institute of Statistics.

The long-term unemployment rate (in one year and over) was 2%, and the incidence of long-term unemployment (the share of unemployed persons over one year and over in total unemployed) was 41.4%.

For young people (15-24 years), the long-term unemployment rate (6 months and over) was 11.1% and the long-term youth unemployment rate of 60.4%.

What is the education system in your country?

According to the Law on National Education no.1 / 2011, the Romanian education system is regulated by the Ministry of Education, Research and Youth (MERY). Every level has its own form of organization and it is subject to the legislation in force. Kindergarten is optional between 3 and 6 years. The preparatory class, which became mandatory in 2012, generally begins at the age of 6; schooling is compulsory until the tenth grade (usually corresponding to the age of 16 or 17). Primary and secondary education is divided into 12 or 13 classes. Higher education is aligned with the European Higher Education Area.

Ever since the 1989 Romanian Revolution, the Romanian education system has been in a continuous reorganization process that has been both praised and criticized.

Basic organization

The Romanian educational system is divided into two levels:

1. Pre-university education, Pre-university education is structured in 5 cycles:

- 1.1 Preschool education (or Kindergarten) - is conducted over three years, consisting of three groups: Little children Group, Middle Age Children Group and Big Children Group.
- 1.2 Primary education (Primary School) - grades 0 (preparatory) -IV
- 1.3 Secondary education (Gymnasium) - grades V-VIII
- 1.4.1 High-school education (high school) - four or five classes (grades IX-XII / XIII)
- 1.4.2 Vocational Education (School of Arts and Crafts), which can continue or replace the High School in preparing students for careers based on manual or practical activities.
- 1.5 Post-secondary education may take between 2 and 5 years.

2. Higher education (higher education studies) has been reorganized to conform to the principles of the Bologna process, which aims at building the European Higher Education Area.

The Bologna Process is a commitment to ensure a common framework for higher education in Europe by 2010.

The Bologna process does not involve the uniformity of higher education in different countries, but its harmonization according to the following principles:

- a two-step structure;
- degree of undergraduate studies of 3 to 4 years;
- degree of university studies of masters, 1 - 2 years, followed simultaneously or later by the doctorate;
- a common transferable study credit (ECTS) system for studying equivalence, allowing for the widest possible student mobility;
- a diploma supplement to allow for the comparison of diplomas to foster the integration of European citizens into the labor market and to improve the competitiveness of European higher education worldwide.

The two steps are inspired by Anglo-Saxon education and correspond to the *undergraduate and (post)graduate* courses respectively.

The commitment was signed by 46 countries, including Turkey and Russia, except Belarus, Monaco, San Marino and Kosovo:

Higher education has the following four components:

- 2.1. Bachelor's Degree Studies (Graduate) 3-4 years, for most disciplines 3 years (since 2005)
- 2.2. Master studies (1-2 years) for most subjects 2 years (since 2008)
- 2.3. Doctoral studies (Doctorate) last for at least 3 years (PhD student) (since 2006).
- 2.4. Lifelong learning (postgraduate courses, continuous training).

Which are career management opportunities supported by government / state education institutions and private education institutions?

The first modern universities in Romania were:

- University of Iasi (1860)
- University of Bucharest (1864)
- University of Cluj (1919)

In Romania, after 1990, universities were the first type of institutions in which reforms of democratization of education began. They gained autonomy,

an impossible goal during the communist regime. Many universities offer this autonomy for each department. Thus, there are huge differences between universities and even between individual faculties within a university.

In 2016, 531,586 students were enrolled in the 97 higher education institutions in Romania (of which 56 were public) in all three cycles of study (bachelor, master and doctorate). Of these, 464,642 were students in the public university system, and 66,944 in the private system. The largest university centers are Bucharest (172,038 students), Cluj-Napoca (67,262 students) and Iași (53,174 students).

Teachers tried to adapt to a curriculum similar to that of their counterparts in North America or Western Europe. After 1990, Romania started several projects supervised by countries in the European Union and also in collaboration with the USA, obtaining projects and scholarships.

The main purpose of the country was to adapt to the European Higher Education System. Notable was also the effort to recognize Diplomas issued in Romania by other European countries and to develop international programs such as **Tempus**, **CEEPUS**, **Socrates / Erasmus**, **Copernicus**, **Monet**, and **eLearn**. With the US, the **Fulbright** program has been developed.

Tempus is a cooperation program in the field of higher education started between EU Member States and partner countries. There were four sub-programs (Tempus I, Tempus II, Tempus II-bis and Tempus III between 2000 and 2006).

Tempus III is, in fact, a commitment to cooperation in the field of higher education, which requires deepening cooperation in higher education, strengthening the whole existing structure of relations between the peoples of Europe. The program allows for fruitful exchanges of views and facilitates multinational activities in the scientific, cultural, artistic, economic and social spheres.

Specifically, the Tempus program seeks to establish consortia. The consortia implement joint European projects with a clear set of objectives, partially funded by this program, for a maximum of three years. Development is taken into account in small steps- small successful projects.

Tempus also provides Individual Mobility Grants (IMGs) at faculties to help them improve their work. In addition, non-governmental organizations, business companies, industry and public authorities can receive financial support from **Tempus**, **CEEPUS**, **Central European Exchange Program for university studies**, was founded in 1994 by EU and EU candidate countries. The program offers scholarships for students, graduates and university professors participating in intensive courses, networks, and excursions.

The eLearn project is developed by European countries with the aim of accelerating and sharing in their e-learning strategies. Monet is a project aimed at facilitating the introduction of European integration studies in universities. The term “European integration studies” represents the construction of the European Community and institutional, legal, political, economic and social links.

- Community law
- European economic integration
- European political integration
- History of the European construction of the process

Erasmus Mundus is a co-operation program designed to support high-quality European Masters Courses.

The Lisbon Convention refers to the Recognition of Qualifications in Higher Education in the European Region. Typically, Romanian university degrees (more specifically, four or five years of university studies) are awarded in the Netherlands without the *baccalaureus* (bc.) or *ingenieur* (ing.), which are specific to the greater Dutch training (called HBO).

FEANI grants the title of European Engineer (Eur. Ing.) through its Romanian member (AGIR), to AGIR members who have graduated from a faculty recognized by FEANI and have had at least two years of engineering activity.

Private education

Since 1990, private and religious education at all levels has been accepted and partly funded by the State, through the Ministry of Education, Research and Innovation, provided they comply with certain ministerial guidelines. It is impossible to open a school without following the guidelines and the curriculum - so that, in practice, all Romanian schools get at least a limited part of state funding.

In addition, there has been a great change since the collapse of the communist system - especially in terms of organizing the system.

How many universities are there? How many of them are private and how many are public?

How many students are there in the universities in your country?

According to GD no. 376/2016 and GD no. 654/2016, the offer of the National Higher Education System (SNIS0) is structured in 6 fundamental fields, where there are 36 branches of science, which make up 85 domains, where 368 specializations can be found.

A process can be optimized only if it can be quantified or correlated with the activities with which it interacts and in this sense it uses / designs analysis and correlation tools. To this end, two years ago, ARACIS designed and developed a statistical tool for analyzing and correlating the activity of the National Higher Education System (SNIS) in a matrix format.

The periodic analyzes conducted by ARACIS in recent years and presented in a transparent and comparable manner the structure, level and dynamics of the SNIS offer aim to provide management structures, regardless of their level, size or form of ownership, a set of annual and coherent information, in order to reduce the risks, increase the efficiency and increase the quality of the system.

The statistical information is presented in tabular form and / or graphical representations. Here, by university offer, we refer broadly to the structure of higher education institutions as presented annually in the Government Decisions Annex 1 - Nomenclature of domains and specializations / programs of university studies and Annex 2- Structure of public higher education institutions, the undergraduate study fields and the accredited or authorized to function temporarily specializations / study programs, the geographical locations of the studies, the number of transferable study credits for each university program, the form of education and the language of instruction, as well as the maximum number of students who can be enrolled.

In the academic year 2016-2017, the 368 specializations generated 2,640 bachelor degree programs, where the maximum number of students who can and are enrolled in the first year is 210,588 places, of which 65 taught programs in a foreign language (English, French or German), a maximum of 11,220 students can be enrolled.

It is necessary to specify that the size of the tuition capacity at the level of each Bachelor's degree program is also determined by regular external evaluation processes (usually by ARACIS). At present, the level of university supply to many study programs is higher compared to demand (in that many study programs were evaluated four or five years ago when the number of enrolled students was higher).

The primary objective of this study is the transparency and comparability of data at the level of the whole SNIS, which provides a systemic picture of the balances / imbalances of the university offer, respectively the existing discrepancies.

A first filter of the statistical matrix query focused on the number of fundamental domains by ownership, resulting in the following **distribution**: out of a total of 92 accredited institutions, 13 of which have study programs in

all 6 core areas (IIS comprehensive) of which 2 are private institutions. Most universities have specializations ranging from one single domain (41 institutions, of which 21 are public).

The fundamental domain most commonly encountered in the analysis is Social Sciences, which is found in 57 IIS, out of which 30 state institutions, followed by the Humanities and Arts Sciences field of 46 Institutions and Biology and Biomedical Sciences 30 IIS.

In the academic year 2016-2017, SNIS schooling / tuition capacity is of 210588 places, of which approximately 92,202 places in Social Sciences, followed at a great distance by Engineering Sciences of 55,883 places. Biology and Biomedical Sciences have 15,850 places. An absolute and relative dynamics of this indicator relative to the academic year 2014-2015, at the level of each fundamental domain.

Which are regional, local and national regulations, career management legislation in your country?

The counseling activity was designed in a form close to its current meaning in the Romanian educational system through Order 7895/1991 regarding the “Establishment and status of Centers of Psycho-pedagogical Assistance”.

The configuration of the activities specific to the specialists employed within the County Centers of Psycho-pedagogical Assistance and of the school counselors within the Psycho-pedagogical Assistance Offices was carried out three years later, in 1994, when the Inter-school Offices for Psycho-Pedagogical Assistance (by Order 31314 / 10.05.1994) and their operating rules were established.

The definition of the defining characteristics of career counseling and career guidance has also been influenced by **several key decisions** for education reform adopted in the last decade of the last millennium:

- the re-establishment in 1990 of the Institute of Educational Sciences, which receives attributions in the field of psycho-pedagogical research and the methodological coordination of psycho-pedagogical assistance centers and offices;
- the organization by the National Employment Agency of the Centers for Information and Professional Orientation in all the counties of the country;
- the launch of a Career Information and Career Project by the Romanian Government in 1997, having as main objectives: developing occupational profiles, organizing courses for the training of counselors and career guidance staff, adapting some specific psychological tools to school and professional work activities, endowment of institutions or offices specialized in the orientation of the career with equipment, tests etc.,

editing of publications with information regarding school and professional orientation.

In 2005, the County Centers for Resource and Educational Assistance were set up to provide integrated counseling services, career guidance, school mediation, speech therapy, support for the integration of students with Special Educational Requirements in mass schools, methodological support and educational counseling for teachers, counseling parents and others.

The County Centers for Resource and Educational Assistance (CJRAE) include the County Centers and Psycho-pedagogical Assistance Offices in schools, Inter-school Logopaedic Centers, Assessment and Orientation School and Professional Service (SEOSP). Career guidance and counseling activity becomes an attribution of the County Resource Centers and Educational Assistance.

In more detail, the specific responsibilities of the field of counseling and career guidance understood in an integrative way become the proposal and organization of career guidance programs for pupils in educational establishments, the elaboration of psychosocial studies regarding the options of pupils of the final grades for vocational qualifications through high school education and professional, etc.

Specific Legislation

The most important **current regulations** in the field of student orientation and counseling are:

- Law 1 / 2011- Law on National Education;
- The MECTS Order no. 5555 / 2011- Regulation on the organization and functioning of Bucharest/ the county centers of resources and educational assistance;
- MEC Order no.6552 / 2011 on evaluation, psycho-educational assistance, school orientation and professional orientation of children, pupils and young people with special educational needs;
- MEN 3064/2000 Order on School and Professional Orientation in Education in Romania;
- MEN 4683/1998 Order on the Establishment of a New Curricular Area, “Counseling and Guidance”.

Which are the regional, local and national projects related to career management in your country.

Both by accessing online resources and by using the psychological tutor’s cabinet, students can obtain precious information that can highlight their character traits, skills and strengths. Obviously, if they continue to feel confused, undecided, it is necessary to contact a career counseling cabinet.

Useful information can be obtained by consulting: **<http://europass.cedefop.europa.eu/en/home>** **Europass** which provides you with the five documents with which skills and qualifications can be clearly and easily understood in Europe, Europass opens the doors to study and work in Europe. **EURES** is the European Employment mobility portal: **<https://ec.europa.eu/eures>**.

PLOTEUS is the existing portal of learning opportunities in the European area, it aims to help students, job seekers, workers, parents, guidance counselors and teachers to learn about education in Europe.

On the portal http://ec.europa.eu/ploteus/home_en.htm, we can find information on learning opportunities and training opportunities available in the European Union. The site contains links to university websites and higher education institutions, databases of schools and adult education and training courses.

To make informed choices, this portal contains links that provide complete information about:

- traveling to another European country
- websites with descriptions and explanations on European education training systems;
- websites with information on cost of living, study fees, accommodation, legal framework and other general information for European countries;
- exchange and grant programs (Comenius, Leonardo da Vinci, Grundtvig, Youth in Action, Erasmus +) available in European countries;
- contact details, subscription procedure for scholarships, etc.

PLOTEUS helps students, jobseekers, workers, parents, counselors, trainers to find out about ways to study in Europe: learning opportunities and training opportunities available in the European Union; education and training systems; exchange programs and grants; everything you need to know when moving to another European country. PLOTEUS, the European Education Offers Portal created by the European Commission's Directorate-General for Education and Culture, offers a wide range of accessible information using the "Search for Education Offers" engine.

The selection and updating of the information is done by the EUROGUIDANCE network. The integration of the education offerings provided by PLOTEUS into the EURES portal is in line with the conclusions of the European Council meetings in Lisbon and Stockholm (March 2000 and March 2001), which called on the Commission and the Member States to create an information service at European level availability of jobs and study. The purpose of PLOTEUS, like that

of EURES, is to put into practice the right to free movement for European citizens by providing the necessary information.

In addition to the education offers available on EURES, the PLOTEUS website also contains information about national education, training, European exchange programs, and relevant contacts for further information. EUROGUIDANCE is the network of National Centers for Information on Vocational Training, <http://euroguidance.eu/>.

Key Features:

- Provides information on education and training opportunities in Europe, especially for guidance professionals who need to make the information available to the general public;
- Supports the exchange of quality information on education and training systems and qualifications in the European Union, the European Economic Area and the countries of Central and Eastern Europe;
- Supports the Ploteus portal; Euroguidance is a network of centers linking career guidance systems across Europe, promoting mobility, helping guidance counselors and individuals to better understand the opportunities available to European citizens in Europe. ERASMUS + is the education and training program launched in January 2014, a program that provides funding for 200,000 students annually to study and work abroad. In addition, Erasmus finances cooperation between higher education institutions in Europe. The program supports students, teachers or university staff who want to teach abroad, enterprise staff.

Selective exemplification of projects with European funding:

- *The Integrated and Innovative Continuous Vocational Training Program of IT & S (ICT and Teaching Strategy) of Teaching Staff in the Bucharest-Ilfov and South-Muntenia Regions, financed by the Sectoral Operational Program for Human Resources Development, POSDRU / 87 / 1.3 / S / 61515 .*
 - *“Career success in pre-university education through the implementation of innovative training programs” POS DRU / 87 / 1.3 / S / 61602*
1. Improving the access and participation of teachers from pre-university education in the South-Muntenia and South-West regions to continuous training opportunities in priority areas of education reform (ICT, curricular and psycho-pedagogical abilities), through a multi-county, innovative program, based on digital resources and sustained initiation of continuous training program management tools.

Developing an innovative multiregional digital-based training program for improving the professional competencies of the pre-university education teachers in the S-Muntenia and S-V regions.

2. Strengthening the professional skills of 6040 teachers by participating in a multi-region continuous training program in priority areas of education reform (ICT, curricular and psycho-pedagogical skills), with the potential to extend lifelong learning;
3. Acquiring by 24 teachers of the professional competences of trainers of trainers within the multiregional program of continuous training in e-learning format
4. Developing an online teacher education online community hosting flexible and accessible learning resources and communities to support the continuous training of teachers in the field of student knowledge, effective management of community resources to ensure quality education.
5. Improving the management of the multiregional training program by developing / implementing specific quality assurance tools and practices

How many businesses do you have in your country?

Trade Registry: There are 1.4 million firms in Romania, of which only 1.2 million are active. Most insolvencies or deregistrations are recorded in trade, construction and transport.

There are 1.4 million companies in Romania, of which only 1.2 million are active, with the difference of 200,000 being dissolved, being de-registered or liquidated companies according to the general manager of the National Office of Trade Registry (ONRC).

Most insolvencies deregistrations are recorded in the trade, construction, transportation, hotels and restaurants sectors.

We were pleasantly surprised to see an increase in the number of legally active firms in the last period, that is they are not subjected to any incident, namely dissolution, liquidation, judicial reorganization, insolvency or bankruptcy, so we have about 1.2 millions of active companies out of a total of about 1.4 million companies.

The difference of up to 1.4 million, of about 200,000 companies are in dissolution, liquidation, suspension of activity.

Some of the 200,000 companies are returning to the commercial circuit and are back in operation, and part of the companies are going to be removed from the Trade Register according to the head of the ONRC.

Companies that are insolvent are from areas of activity that are constantly kept in recent years, from commerce, retail, construction, transport, hotel and restaurant, processing and very little of other services provided to businesses .

These areas are generally responsible for generating insolvencies, dissolutions, deregistrations or business suspensions. This ranking of domains remains relatively constant over time, even if sometimes the order of domains changes.

We have a significant decrease in the number of companies subject to Insolvency Law 85/2014, so somewhere in 2016 we had about 8,000 companies, unlike a few years ago when we registered about 30,000 companies in insolvency.

There was an increase in the number of registrations by 25%, according to the ONRC.

At the moment, according to the latest statistics, there have been an improvement in the activity of establishing societies, the activity of amending constitutive acts. There is a stagnation or even an increase in operations in the business divisions on dissolution, liquidation, suspension and entry into insolvency according to ONRC.

As referring to the areas where Romanians choose to set up their businesses, agriculture has become attractive in recent years.

Agriculture starts to grow, light industry, IT industry, and service area represent the area where registrations are increasing.

Also, at the end of March 2018, **less than 10% of all Romanian businesses were owned by young people under the age of 30, according to the ONRC, this being the lowest level of the last five years.**

The Bucharest Stock Exchange (BVB) together with the National Trade Register Office (ONRC) and Prime Transaction brokerage company started a pilot project that wants to bring Romanian entrepreneurs closer to the opportunities in the capital market. The project targets Bucharest in the first instance and it is part of a general partnership agreement signed by the three institutions.

The pilot project involves placing an information stand at the ORCTB headquarters, which is visited daily by more than 2,000 professionals. They will be able to obtain information about the Bucharest Stock Exchange, its activity, as well as the financing and investment alternatives offered by its entrepreneurs and investors. A representative of the Prime Transaction brokerage company will be permanently on site during the Registry's work schedule to provide additional assistance.

It is believed that this cooperation with the ONRC creates new chances to be closer to entrepreneurs for financial intermediaries.

The Trade Registry, the Bucharest Stock Exchange and Prime Transaction consider that an essential part of their mission is to help Romanian entrepreneurs to thrive and develop. The partnership is based on the idea of serving this goal and further promote the sustainable growth of the local economic environment.

This project proves that both the National Trade Register Office and BSE are institutions that aim to support entrepreneurs and provide them with the information they need to make better decisions in their work.

CONCLUSIONS

The challenges of the contemporary world require a series of reorganizations of various educational aspects, especially those concerning the balance between formative and informative, the permanence of educational action, the equalization of chances, the enhancement of the prospective character of education, the need to prepare young people for socio-professional insertion.

In this context, youth career guidance is a pillar of resilience of effective education by ensuring continuity, by extending school and professional orientation to all levels of training through sustainable curricular empowerment, with the help of digital tools, by adapting the curriculum to student needs, through ensuring adequate methodological resources.

Choosing a profession is an important moment in every individual's life, being one of the major prerequisites for social inclusion, but it takes place in a wider context in which personal, educational, economic, contextual factors are involved. For this reason, career **planning involves steps such as: school orientation, professional orientation, career counseling, each with its own specificity.**

Career management has **the following role as an integrated process in organizations:**

- **Establishing Goals:** Perhaps the most difficult part is often the understanding of what we want to achieve, both as an organization and as a professional. In **the career management process**, we investigate these aspects from both perspectives: the employee's and the organization's. Thus, the career destination becomes a joint project of the organization and the employee, with activities, roles and responsibilities through which, on a temporary basis, the joint development goals can be achieved.
- **Monitoring progress:** On the journey to success in achieving career goals, the progress monitoring strategy offers satisfaction and prevents the evolutionary process from being left behind. Many times, in the implementation of training and development actions, a monotony is created, the motivation to acquire new skills decreases, and this phenomenon

is a consequence of the lack of a final destination and a pathway with both immediate and observable achievements in the daily activity in the organization, and with long-term benefits in individual development.

- **Correcting the route to objectives:** The organization's objectives and individual objectives are a dynamic element of the process, evolving on the originally established route. Each step along this route will bring clarity into understanding the personal evolution and the motivations that support the achievement of goals. This way, new paths emerge to evolve and new career paths.

The benefits of career management:

Additionally, it has to be said that a **well-planned and implemented career path** benefits both the employee and the organization:

For the employee - professional career gains a meaningful role in the whole of his life:

- Provides support for his / her personal development and achievement of individual objectives such as financial stability, career security, personal development needs (eg. the foundation and support of a family, maintaining a balance between work and relaxation, etc.), professional status;
- It creates the opportunity to evolve in accordance with his/her aspirations throughout life;
- Provides satisfaction of professional success by associating performance with personal and professional development;
- It enables self-knowledge and self-evaluation of professional potential.

For the organization - this process becomes a transversal human resource management tool:

- Predictably secures the needs of professionals with skills and competencies adapted to the requirements of the organization;
- Reduces the enormous costs involved in recruitment and selection processes;
- Considerably diminishes the financial and time investments that the organization makes in adapting to organizational culture and internal processes;
- Limits the risks of accelerated internal promotion or the mismatch between the skills and abilities of the promoted employee and those needed for the new role ('The Peter Principle');

- Makes flexible the integration options in the same organization of several generations simultaneously whose aspirations, motivations, professional goals and individual are different;
- Supports commitment and involvement of employees in achieving the organization's current goals and staff retention;
- Ensures consistency in the value proposition made by the employer to the candidates.

With all the questions and syncopes that can be generated by the implementation of a new process, until it is correlated with all other human resources systems, **career management** becomes a current answer to important questions such as:

- (1) *How do I add value to my employer brand?*
- (2) *How do I keep my commitment in the organization?*
- (3) *How to satisfy the expectations of evolving of the employees from different generations?*
- (4) *How do I keep in the organization and offer opportunities for promoting to valuable employees?*

RESEARCH IN ROMANIA

SKILLS NEED IN INDUSTRY 4.0

Dimensions

The Skills set required by industry 4.0 are captured under 20 dimensions which are Deciding and Initial Action, Leading and Supervising, Working With People, Adhering to Principles and Values, Relating and Networking, Persuading and Influencing, Presenting and Communicating Information, Writing and reporting, Applying Expertise and Technology, Analyzing, Learning and Researching, Creating and Innovation, Formulating Strategies, Planning and Organization, Delivering Results and Meeting Customer Expectation, Following Instructions and Procedures, Adopting and Responding to Change, Persuading and Influencing, Achieving Personal Work Goals and Objectives, Entrepreneurial and Commercial Thinking all based on Big Eight dimensions.

GREAT EIGHT DIMENSIONS AND THEIR DEFINITIONS

<p>1.LEADING AND DECIDING Takes control and exercises leadership. Initiates action, gives direction, and takes responsibility.</p>
<p>2.SUPPORTING AND COOPERATING Supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organization.</p>
<p>3.INTERACTING AND PRESENTING Communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner.</p>
<p>4.ANALYZING AND INTERPRETING Shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing</p>
<p>5.CREATING AND CONCEPTUALIZING Works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change.</p>
<p>6.ORGANIZING AND EXECUTING Plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards.</p>
<p>7.ADAPTING AND COPING Adapts and responds well to change. Manages pressure effectively and copes well with setbacks.</p>
<p>8.ENTERPRISING AND PERFORMING Focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement.</p>

Part I

EMPLOYEE QUESTIONNAIRE ANALYSIS- ROMANIA

Demographics

Participants who participated in the research were 35, 1% male and 64, 9% female, age ranging from 19 to 66. Participants' education distribution is secondary school 1, 4 %, vocational school 1, 4%, vocational high school 5, 4%, graduate 63% and higher education (master/PhD) 24.3%. 18,9 % of participants work in Manufacturing 18,9%, 37,8 % in Education and 43,2% in Service (Tourism, health, finance IT). 40% of the participants work in companies with 51-100 employees, 16% in 101-250, 4 % in 251-500 and 40% in 500 and more employees company. Participants are working years as a professional range from 1-46 years, participants are working for the same company ranging from 1-35 years and participants are working in their current position ranging from 1-34 years.

Demographics represent a participant profile as female, in their mid-ages, graduates, heavily working in education and service sector, working in big companies in the name of employee and experienced employees.

Business Trends

Business trends reported by the participants is 54,8 % Total revenue increasing, 4,1 % Total revenue decreasing, 28,8 % Without change and 12,3 % Not applicable. 34, 2 % of the participants reported Number of employees increasing, 28,8 % Number of employees decreasing, 20,5 % Without change and 16,4 % Not applicable. 12,2 % of the participants responded they will find a new job in the same sector Very Difficult, 8,1 % Difficult, 33,8 % Moderate, 28,4 % Easy and 17,6 % Very Easy. 5,4 % of the participants responded they will find a new job in another sector Very Difficult, 14,9 % Difficult, 29,7 % Moderate, 21,6% Easy and 28,4 % Very Easy..

Romanian participants reported a positive economy profile and finding a job is relatively easy.

1. LEADING AND DECIDING

The Great Eight's Leading and Decision dimension captures participant's taking control and exercise leadership, initiates action, gives direction, and takes responsibility skills (Dave, 2005). It is composed of two sub dimension called Deciding and Initial Action (2 item) and Leading and Supervising (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Deciding and Initial Action

Frequency analysis for Deciding and Initial Action items suggest that %84,9 of the Romanian participants evaluate themselves as strong and very strong level of decision making and %91,9 strong to very strong level of taking responsibility.

Leading and Supervising

Frequency analysis for Leading and Supervising items suggest that %68,4 of the Romanian participants evaluate themselves as strong and very strong level of Leadership Skills.

2. SUPPORTING AND COOPERATION

The Great Eight's Supporting and Cooperation dimension captures participant's supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organization (Dave, 2005). It is composed of two sub dimension called Working With People (3 items) and Adhering to Principles and Values (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Working with People

Romanian participants reported they have high levels of team work skills, 91,9% reported strong and very strong team work skills 93,3% in Collaborating with Others and 95,9% in Communicating with People respectively. Romanian participants evaluate themselves high in working with people dimension.

Adhering to Principles and Values

Romanian participants evaluate themselves 94,9 % high as strong and very strong in Respecting Ethics and 87,9% in Environmental Awareness and awareness of ergonomics rated 84,9 % as strong and very strong.

3. INTERACTING AND PRESENTING

The Great Eight's Interacting and Presenting dimension captures communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner (Dave, 2005). It is composed of two sub dimension called Relating and Networking (3 items), Persuading and Influencing (2 Items) and Presenting and Communicating Information (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Relating and Networking

Relating and networking competency has three items; compromising, creating business networks and maintaining customer relationships. 68 % of the Romanian participants rated themselves as strong and very strong compromising skills, 27,4 % in creating business networks, and 78,7 % in maintaining customer relationships. Romanian participant rate themselves with low creating business networks skills.

Persuading and Influencing

69,9 % of the Romanian participants rated themselves strong and very strong in persuading influencing skills and 74 % in emotional intelligence skills.

Presenting and Communicating Information

Romanian participant rate themselves with strong and very strong with 84,9 % in presenting and communication ability.

4. ANALYZING AND INTERPRETING

The Great Eight's Analyzing and Interpreting dimension captures shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing (Dave, 2005). It is composed of three sub dimension called Writing and Reporting (2 items), Applying Expertise and Technology (23 items) and Analyzing (4 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Writing and reporting

76,4 % of the Romanian participants rated strong and very strong in targeted/ technical communication skills and 86,3 % strong and very strong in literacy skills.

Applying Expertise and Technology

Applying expertize and technology dimension is composed of 23 items.

- Participants rated their skills in IT and technology affinity 62,2 % strong and very strong,
- Economics 56,3 % strong and very strong,
- Extract business value from social media 50,7 % strong and very strong,
- Service orientation/product service offerings 57,5 % strong and very strong,
- Business process management 43,8% strong and very strong,
- Business change management 34,7% strong and very strong,

- Understand and coordinate workflows 60,2% strong and very strong,
- Network security 34,3 % strong and very strong,
- IT architectures 16,7 % strong and very strong,
- Machine learning 38,3% strong and very strong,
- System development 21,9% strong and very strong,
- Integrating heterogeneous technologies 20,9% strong and very strong,
- Mobile technologies 30,2% strong and very strong,
- Sensors/embedded systems 21,4% strong and very strong,
- Network technology/M2M communication 11% strong and very strong,
- Robotics/Artificial intelligence 13,9% strong and very strong,
- Predictive maintenance 19,5% strong only,
- Modelling and programming 15,1 % strong and very strong,
- data/Data analysis and interpretation 24,6%,
- Cloud computing/architectures 11,2% strong and very strong,
- In-memory DBs 16,4% strong and very strong,
- Statistics 24,6% strong and very strong
- Data Security 27,4% strong and very strong.

In general frequency analysis suggests that Romanian participants are not skilled for Applying Expertise and Technology dimension.

Analyzing

Analyzing sub-dimension is composed of 4 items. Participants rated Problem Solving 71,3 % strong and very strong, Optimization 54,8%, Analytical Skills 60,3% and Cognitive Ability 67,1%.

5. CREATING AND CONCEPTUALIZING

The Great Eight's Creating and Conceptualizing dimension captures works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change (Dave, 2005). It is composed of three sub dimension called Learning and Researching (2 items) and Creating and Innovation (4 items) and Formulating Strategies (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Learning and Researching

Romanian participants reported they have life-long learning skill 87,7% strong and very strong and 84,9% strong and very strong in knowledge management.

Creating and Innovation

Participants rated themselves 63,4% strong and very strong in Innovating, 72,6% strong and very strong in creativity, 69,8% strong and very strong in Critical Thinking and 55,5 % strong and very strong in Change Management.

Formulating Strategies

Business Strategy 38,4% strong and very strong, Abstract Ability 47,9% strong and very strong, and Managing Complexity 55,6% strong and very strong. Romanian participants rated low in formulating strategies.

6. ORGANIZING AND EXECUTING

The Great Eight's Organizing and Executing dimension captures plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards. It is composed of three sub dimension called Planning and Organization (3 items) and delivering Results and Meeting Customer Expectations(2 items) and Following Instructions and Procedures (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Planning and Organization

Participants rated Planning and Organization dimensions Project management 33,4% strong and very strong, Planning and organizing work 67,6% strong and very strong and 35,2% strong and very strong Management Ability. Romanian participants lack Project management and Project management skills.

Delivering Results and Meeting Customer Expectation

Participants rated their Customer Orientation skills 58,3% strong and very strong, Customer Relationship Management skills 61,1% strong and very strong.

Following Instructions and Procedures

Legislation awareness skills 63% strong and very strong, Safety awareness skills 86,3% strong and very strong and Individual responsibility skills 90,3% strong and very strong .

7. ADAPTING AND COPING

The Great Eight's Adapting and Coping captures adapts and responds well to change. Manages pressure effectively and copes well with setbacks. It is

composed of two sub dimension called Adopting and Responding to Change (4 items) and persuading and influencing (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Adapting and Responding to Change

Participants rated their Work in interdisciplinary environments skills 68,5 % strong and very strong, Intercultural competency skills 65,8 % strong and very strong, Flexibility skills 76,4% strong and very strong and Adaptability and ability to change mind-set skills 75,3 % strong and very strong.

Persuading and Influencing

Participants rated their Work Life Balance skills 76,7 % strong and very strong.

8. ENTERPRISING AND PERFORMING

The Great Eight's Enterprising and Performing captures focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement. It is composed of two sub dimension called Achieving Personal Works Goals And Objectives (1 item) and Entrepreneurial and Commercial Thinking (2 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Achieving Personal Work Goals and Objectives

Participants rate their Self-management and organization skills 70,9% strong and very strong.

Entrepreneurial and Commercial Thinking

Participants rated their Business model understanding skills 47,9% strong and very strong and Entrepreneurship skills 41,7% strong and very strong. Romanian participant rate below average Entrepreneurial and Commercial Thinking skills.

We also calculated mean scores of each 8 dimension in order to find out training needs of employees in Romania the age of Industry 4.0. While 1 refers to be weak, 5 refers to be strong. Table 1 shows the mean scores of Romanian employees for all 8 dimensions.

Table 1. Mean scores of Romanian employees for all 8 dimensions

Descriptives for Employees in Romania		
DIMENSION	Mean	Std. Err.
1. Leading and Decision	4,2667	0,08672
1.1. Decision and Initial Action	4,4583	0,08917
1.2. Leading and Supervising	3,8833	0,09827
2. Supporting and Cooperation	4,625	0,06259
2.1. Working with People	4,7056	0,06243
2.2. Adhering to Principles and Values	4,5444	0,08309
3. Interacting and Presenting	3,8167	0,09203
3.1. Relating and Networking	3,5944	0,09993
3.2. Persuading and Influencing	3,9083	0,11053
3.3. Presenting and Communicating Information	4,3	0,11473
4. Analyzing and Interpreting	2,9707	0,1046
4.1. Writing and Reporting	4,2417	0,09395
4.2. Applying Expertise and Technology	2,7261	0,11312
4.3. Analyzing	3,7417	0,11476
5. Creating and Conceptualization	3,8093	0,09945
5.1. Learning and Researching	4,3583	0,09289
5.2. Creating and Innovation	3,8375	0,11443
5.3. Formulating Strategies	3,4056	0,1162
6. Organizing and Executing	3,8188	0,10212
6.1. Planning and Organization	3,4778	0,13028
6.2. Delivering Results and Meeting Customer Expectations	3,8	0,14468
6.3. Following Instructions and Procedures	4,1722	0,0972
7. Adapting and Coping	4,04	0,09301
7.1. Adopting and Responding to Change	4,0042	0,10197
7.2. Persuading and Influencing	4,1833	0,09653
8. Enterprising and Performing	3,4611	0,12096
8.1. Achieving Personal Work Goals and Objectives	4,05	0,11256
8.2. Entrepreneurial and Commercial Thinking	3,1667	0,15204

According to table 7, while the weakest dimension is analysing and interpreting, supporting and cooperation dimension is the strongest one. The results are similar to Turkey's results, however Romanian employees regard themselves more competent in supporting and cooperation dimension than Turkish. Also, although

both countries bad at analysing and interpreting dimension, it can be said that Romanian mean scores on analysing is better than Turkish. It can be inferred from the table that as all the dimensions captures more than 3 mean score (1 is min, 5 is max and 3 is average), we can say that Romanian employees evaluate themselves not weak. Although Romanian employees consider themselves not weak, there are some dimensions need to be trained such as analysing and interpreting dimension, and enterprising and performing dimension.

Part II

STUDENT QUESTIONNAIRE ANALYSIS-ROMANIA

Demographics

Participants participated the research are 54,4% male and 45,6 % female, age ranging from 16 to 48. 3,3% of the participants study Secondary school, 1,1% vocational school, 72,2% Vocational high school, 20 % Graduate, 3,3 % education (master/PhD). 20% of the participants want to work in Manufacturing, 14,4% in Education and 65,6 % in Service (Tourism, health, finance IT).

Demographics represents a participant profile with a relatively equal male/female ratio, mostly planning to work in service sector.

Business Trends

Business trends they plan to work in reported by the students is 33,3% Total revenue increasing, 1,1 % Total revenue decreasing, 4,4% Without change and 61,1% Hard to say. 72,2% of the students report Number of employees increasing in the sector they want to work, 20% reported Number of employees decreasing, 5,6% Without change and 2,2% Hard to say. 7,8 % of the students suggest that finding a job in their desired sector is Very Difficult, 26,7% Difficult, 32,2% Moderate, 24,4% Easy and 8,9% Very Easy. 40 % suggest that if they cannot find their desired work finding a job in another sector is Very Difficult, 17,8% rate Difficult, 16,7% rate Moderate, 14,4% Easy and 11,1 % rate Very Easy.

1. LEADING AND DECIDING

Deciding and Initial Action

Frequency analysis for Deciding and Initial Action items suggest that 58,9 % of the Romanian students evaluate themselves as strong and very strong level of decision making, 82% strong and very strong level of taking responsibility .

Leading and Supervising

Romanian students score themselves 38,2 % strong and very strong leadership skills. Romanian students lack leading and supervising skills.

2. SUPPORTING AND COOPERATION

Working with People

81,1 % of the students rate themselves as strong and very strong in team work, 81,1 % rate themselves strong and very strong in collaborating with others and 83,4 % rate strong and very strong in communicating with people.

Adhering to Principles and Values

86,6 % of the students rate strong and very strong in Respecting ethics, 75,5 % strong and very strong in Environmental awareness and 77,8 % strong and very strong in Awareness of ergonomics.

3. INTERACTING AND PRESENTING

Relating and Networking

44,9 % of the students rate strong and very strong in Compromising skills, 14,6 % rate strong and very strong in Creating business networks, 39,8 % rate strong and very strong in Maintaining customer relationships. Romanian students rate themselves with low relating and networking skills, creating business networks being the lowest.

Persuading and Influencing

38,6 % of the students rate strong and very strong in Negotiating and 51,7 % strong and very strong in Emotional intelligence. Romanian students lack negotiating skills.

Presenting and Communicating Information

62,5 % of the students rate strong and very strong in Presenting and communication ability.

4. ANALYZING AND INTERPRETING

Writing and reporting

54 % of the Romanian students rate strong and very strong in Targeted/ Technical Communication and 64% rate strong and very strong in Literacy.

Applying Expertise and Technology

- 52,8 % of the Romanian students rate themselves with strong and very strong in IT and technology affinity,
- 39,3 % strong and very strong in Economics,
- 38,2 % strong and very strong in Extract business value from social media,
- 51,2 % strong and very strong in Service orientation/product service offerings,

- 23,9 % strong and very strong in Business process management,
- 23,6% strong % and very strong in Business change management,
- 49,6 % strong and very strong in Understand and coordinate workflows,
- 21,6% strong and very strong in Network security,
- 18,2 % strong and very strong in IT architectures,
- 30,6% strong and very strong in Machine learning,
- 22,7 % strong and very strong in System development,
- 15,7% strong and very strong in Integrating heterogeneous technologies,
- 21,4 % strong and very strong in Mobile technologies,
- 16,9 % strong and very strong in Sensors/embedded systems,
- 13,5% strong and very strong in Network technology/M2M communication,
- 12,5% strong and very strong in Robotics/Artificial intelligence,
- 11,3% strong and very strong in Predictive maintenance,
- 11,3% strong and very strong in Modelling and programming,
- 14,8% strong and very strong in Big data/Data analysis and interpretation,
- 8,9% strong and very strong in Cloud computing/architectures,
- 7,8 % strong and very strong in In memory DBs,
- 12,4% strong and very strong in Statistics,
- 14,8 % strong and very strong in Data security.

Analyzing

57,3% of the Romanian students rate strong and very strong in Problem Solving, 22,5% strong and very strong in Optimization, 34,9 % strong and very strong in Analytical Skills, 46,1% strong and very strong in Cognitive Ability. Optimization and Analytical skills needs improvement.

5. CREATING AND CONCEPTUALIZATION

Learning and Researching

73,8 % rate strong and very strong in Life-long learning skills, 58,4 % rate strong and very strong in Knowledge management skills.

Creating and Innovation

41,5 % rate strong and very strong in Innovating, 48,9 % rate strong and very strong Creativity, 47,1% rate strong and very strong Critical thinking, 28,4 % rate strong and very strong Change management. Romanian students lack creating and innovation skills, change management being the lowest.

Formulating Strategies

17,9 % rate strong and very strong in Business strategy, 27,5 % strong and very strong in Abstraction ability, 29,6 % strong and very strong in Managing complexity. All formulating strategy skills need improvement.

6. ORGANIZING AND EXECUTING

Planning and Organization

18,2% rate strong and very strong in Project management, 45,4% rate strong and very strong in Planning and organizing work, 25,8% rate strong and very strong in Management ability. Romanian students lack planning and organization skills.

Delivering Results and Meeting Customer Expectation

34,8 % of the Romanian students rate their Customer orientation skills as strong and very strong and 34,8 % in Customer relationship management. Romanian students rate low in Delivering Results and Meeting Customer Expectation skills.

Following Instructions and Procedures

48,3% rate strong and very strong Legislation awareness skill, %70,8 strong and very strong in Safety awareness, 80,5% strong very strong in Individual responsibility.

7. ADAPTING AND COPING

Adapting and Responding to Change

45,5 % rate strong and very strong in Work in interdisciplinary environments, 38,2 % rate strong and very strong in Intercultural competency, 49,2 % rate strong and very strong in Flexibility, 51,1% rate strong and very strong in Adaptability and ability to change mind-set. Romanian students rate low in Work in interdisciplinary environments and Intercultural competency skills.

Persuading and Influencing

40,4 % of the Romanian students rate strong and very strong in Work Life Balance skill. Romanian students rate low in work-life balance skills.

8. ENTERPRISING AND PERFORMING

Achieving Personal Work Goals and Objectives

34,9 % of the Romanian students rate strong and very strong in Self-management and organization. Romanian students rate low in Self-management and organization skills.

Entrepreneurial and Commercial Thinking

25,8 % of the Romanian students rate strong and very strong in Business model understanding and 16,9% rate strong and very strong in Entrepreneurship. Romanian students lack business model understanding and entrepreneurship skills.

We also calculated mean scores of each 8 dimension in order to find out training needs of graduates in Romania in the age of Industry 4.0. While 1 refers to be weak, 5 refers to be strong. Table 2 shows the mean scores of Romanian graduates for all 8 dimensions.

Table 2. Mean scores of Romanian graduates for all 8 dimensions

Descriptives for Graduates in Romania		
DIMENSION	Mean	Std. Err.
1. Leading and Decision	3,7333	0,10697
1.1. Decision and Initial Action	4,0385	0,10302
1.2. Leading and Supervising	3,1231	0,15583
2. Suporting and Cooperation	4,3641	0,08072
2.1. Working with People	4,4462	0,09078
2.2. Adhering to Principles and Values	4,2821	0,08747
3. Interacting and Presenting	3,3256	0,12084
3.1. Relating and Networking	3,0872	0,13039
3.2. Persuading and Influencing	3,3923	0,14231
3.3. Presenting and Communicating Information	3,9077	0,1235
4. Analyzing and Interpreting	2,6488	0,12537
4.1. Writing and Reporting	3,5846	0,11735
4.2. Applying Expertise and Technology	2,4642	0,13631
4.3. Analyzing	3,2423	0,12488
5. Creating and Conceptualization	3,265	0,1259
5.1. Learning and Researching	3,9769	0,11728
5.2. Creating and Innovation	3,2654	0,14707
5.3. Formulating Strategies	2,7897	0,13147
6. Organizing and Executing	3,2673	0,11804
6.1. Planning and Organization	2,7333	0,14233
6.2. Delivering Results and Meeting Customer Expectations	3,0846	0,16208
6.3. Following Instructions and Procedures	3,9231	0,10884
7. Adapting and Coping	3,5015	0,12428

7.1. Adopting and Responding to Change	3,5385	0,1195
7.2. Persuading and Influencing	3,3538	0,16027
8. Enterprising and Performing	2,7744	0,14873
8.1. Achieving Personal Work Goals and Objectives	3,2308	0,16521
8.2. Entrepreneurial and Commercial Thinking	2,5462	0,16251

According to table 2, while the weakest dimension is analysing and interpreting, supporting and cooperation dimension is the strongest one. It can be seen from the table that enterprising and performing dimension is also quite weak. When compared with employees' mean scores, the students in Romania perceives their competencies less than the employees. The students evaluates weaker than the employees. There are some dimensions need to be trained such as analysing and interpreting, enterprising and performing, creating and conceptualization, organizing and executing and adapting and coping.

Part III

INTERVIEW WITH MANAGERS

As a general assessment, we can assert that the quality of life in Romania is not very high and the statement for the indicators of living conditions is even more valid, starting with the economic standard, from the macroeconomic indicators of the living standard (GDP per capita, consumption fund of the population), household incomes and up to life expectancy indicators at birth.

The current trend in their organization (increasing / decreasing revenue, increasing / decreasing of the number of employees)

63% of managers estimate revenue growth at the same time as a moderate increase in the number of employees;

25% of managers estimate lower incomes and decrease of the number of employees

12 % of managers did not express an opinion about this.

The current trend in their field (increasing / decreasing revenue, increasing / decreasing the number of employees)

The number of organizations and the level of employment show a tendency to stabilize in the areas of the respondents.

The trend of their domain in the economy

The tendency is the development, relatively easy growth in the field.

If they lose their job right now, how easy can it be to find a new job in the same field of activity

The answers to this question was consistently the same: hard and difficult.

If they lose their position right now, how easy can it be to find a new position with the same function

The answers of the managers to this question was the same: hard and difficult.

If they lose their job right now, how easy can it be to find a new job in another field of activity

The answers to this question was the same as in the previous two questions: hard, difficult.

Can they work on a lower rank in the hierarchy than their current position

The answer was 90% yes.

The biggest challenge for them to continue working as a manager

The challenge is for the manager to think and act on how, when talking to the team, he can say:

“I’m not your boss because I’m better than you. I did not look for you so that I can be better than you, I’ve looked for you to be better than me, at least everyone in his field, if not more. I would not enjoy anything more than having one or more of you who can replace me, because then it means I did my job and built something sustainable. It also means that I can move a step further and do new things.

I do not want to tell you what to do. My purpose is to give you enough information and enough autonomy so that you can take almost all the decisions without me. The ability to make people grow/develop, to gradually delegate responsibilities, to give them autonomy, to tolerate mistakes, to learn from them, is probably the most important quality of a manager who wants to move from the level of manager of a small business, where nothing moves without him, to the real management.”

Areas where they think they should develop their qualifications to continue working as a manager

The domain with the highest frequency response was the IT domain.

Digitization has both a horizontal and a vertical impact on the value chain. This implies that, on the one hand, companies need to integrate and digitize their vertical data flow, from product development and procurement to processing and transport logistics. And, on the other hand, it involves a horizontal collaboration with key suppliers, customers and other partners in the value chain, for example by using product identification and monitoring solutions. For companies, these issues involve the creation of complex digital solutions.

In addition, companies are developing new products and services with digital features that cover the entire life cycle of the product and therefore facilitate close contact with end-users. Companies also invest in digital services and create complete solutions tailored to their customers' ecosystems, often in collaboration with partners in the value chain.

Developing a healthy expertise in data analysis and digitization within your own company is a wise decision. Individual experts collecting and evaluating data are not enough to successfully implement Industry 4.0 related strategies. In order to be able to use them as a basis in the decision-making process, companies need databases, algorithms and recommendations that can be implemented professionally.

Another prerequisite for a successful digitization in data security.

Can automation be a problem for their current position? What do they think about Industry 4.0 in their domain?

Industrial companies in all sectors at national level are going through a fourth industrial revolution, which could be called "Industry 4.0".

The transition to this new digital industrial reality is underway all over the world: about one third of companies are already assessing the level of digitization as high and this level is expected to increase in average from 33% to 72% over the next 5 years.

Leaders of industrial companies digitize essential activities within their own vertical chain of value and also in their relationship with horizontal partners in the supply chain. In addition, they improve their product portfolio by introducing digital functionality and innovative data services.

Globally, companies are planning to invest approximately 5% of their digital sales revenue each year.

Based on industry survey managers, 5% of revenue from digital sales corresponds to a total investment of \$ 907 billion.

These investments will mainly focus on the development of digital technologies such as sensors or connection devices, software and applications such as processing systems. Moreover, companies invest in employee training and implementing the necessary organizational change.

Companies expect digitization to bring huge benefits and, consequently, invest big amounts in this process.

Our study shows that this transition takes place equally in all analyzed countries, not only in industrialized countries. If at least half of the expectations for Industry 4.0 materialize, this will fundamentally change the competitive environment over the next five years.

At the end of this transformation process, successful industrial companies will genuinely become digital businesses with basic physical products, complemented by digital interfaces and innovative data services. These digital businesses will work with customers and suppliers in digital industrial ecosystems.

Data analysis is the engine for Industry 4.0

More than 80% of companies expect data analysis methods to have a significant impact on decision-making processes over the next five years.

Lack of expertise: a barrier to Industry 4.0

The problems identified by the companies analyzed in the implementation of Industry 4.0 are rather those related to the lack of culture, visions or internal training in the digital domain, as well as the lack of specialists, than those related to the acquisition of the necessary technology.

Are there employees who work in lower positions and who are in danger of losing their job in their organization / field of activity? How will “Industry 4” affect their employment in their organization / field of activity?

The Romanian managers think that the most important skill kit in order to continue work as a manager is the IT skill. Another prerequisite for a successful digitization is data security. Digital eco-systems can only work if all participants can trust that their data will not reach the wrong hands. This requires considerable effort on the part of companies, substantial investment in system security and clear data protection standards.

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INDUSTRY 4.0 COMPETENCIES IN SPAIN FOR CAREER MANAGEMENT

Amador ORDONEZ PUIME
Raul GONZALEZ CASTRO

Before the economic crisis started in 2007, Spain's economy was one of the most thriving in the European Union, but since it was severely hit and officially entered recession in 2009, gross domestic product / GDP growth in Spain has been struggling to recover. The amount of money banks have been lending to Spain due to the euro crisis is enormous, but the country still has a long way to go. There is still a vast difference between government revenue and spending in Spain, with spending being significantly higher than revenue.

Today, a look at a comparison of GDP and national debt in selected euro countries reveals that Spain's GDP is higher than that of other countries which were severely affected by the economic crisis, i.e. Greece, Portugal and Ireland. However, when looking at the national debt in the European Union, Spain's national debt is still one of the highest.

The rate of employment has been decreasing constantly since the crisis, while the unemployment rate in Spain has been increasing dramatically and still continues to rise. Just as in other affected countries, many people are losing their jobs while the younger generation graduating from universities are struggling to find employment.

Spain's employed persons were reported at 18874.20 people in December 2017. It recorded a decrease from the previous number of 19049,200 people from September 2017.

Number of employees in Spain between 2002 and 2017 (thousands of people)

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
16991	17740	18490	19509	20195	20717	20055	18890	18674	18153	17339	16135	17569	18094	18508	18998

The number of unemployed in Spain between 2002 and 2017 (thousands)																
2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
2232	2276	2176	1,860	1819	1,942	3206	4335	4702	5287	6021	5935	5457	4779	4237	3766.7	

Tab 1. Evolution of the number of employees and unemployed

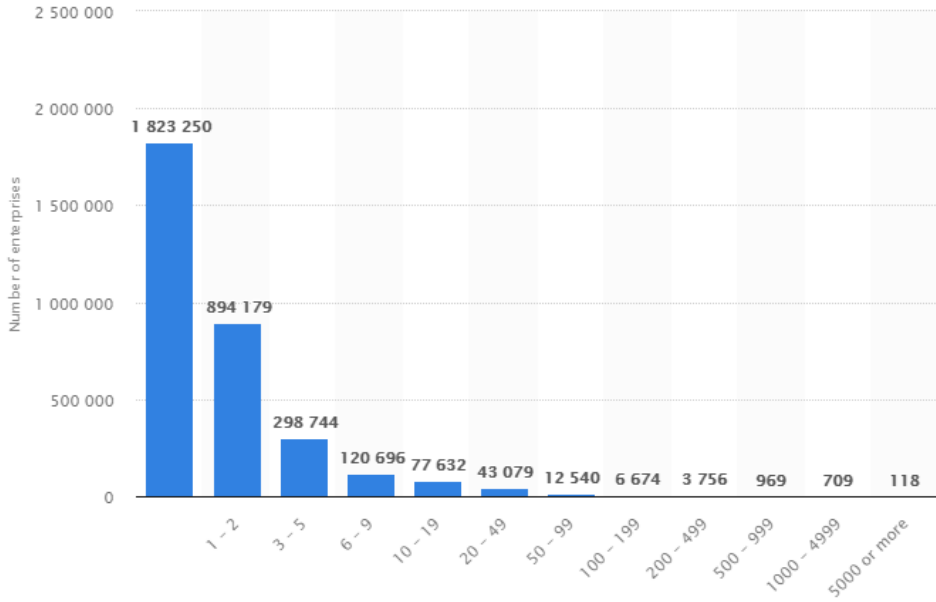


Fig. 1. Number of enterprises in Spain in 2017, by number of employees

Número de empresas activas

A 1 de enero de 2016

		Variación interanual %
Total	3.236.582	1,6
Industria	195.619	-1,2
Construcción	406.682	0,2
Comercio	757.537	-0,8
Resto de servicios	1.876.744	3,2

Employment in the public sector increased in 2018 quarter by 12,700, while in the private sector it decreased by 63,500. In the last 12 months, employment has increased by 401,600 people in the private sector and by 88,600 in the public sector.

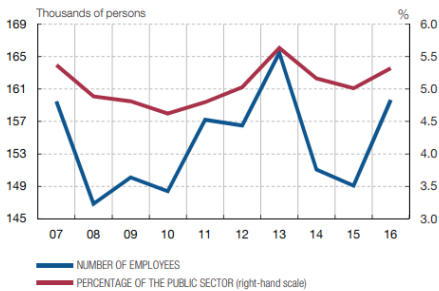
	Value (annual average) Thousands of persons.	Variation (%)
Total	15,715.1	3.2
Private sector	12,686.5	3.8
Public sector	3,028.6	0.9
Men	8,202.1	3.2
Private sector	6,854.5	3.8
Public sector	1,347.6	-0.1
Women	7,512.9	3.2
Private sector	5,832.0	3.7
Public sector	1,681.0	1.8

Employees. By hiring sector and sex - Spain. 2017
Source: INE. Active Population Survey.

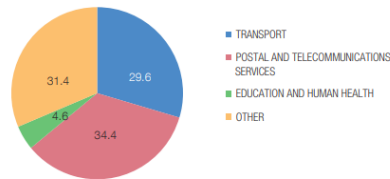
EMPLOYMENT IN PUBLIC CORPORATIONS

CHART 7

1 NUMBER OF EMPLOYEES AND PERCENTAGE OF THE PUBLIC SECTOR (a)



2 SECTORAL DISTRIBUTION IN 2016



Source: Spanish Labour Force Survey (INE).

Employment in the public sector and the private sector

Employment Rate in Spain decreased to 62.07 percent in the first quarter of 2018 from 62.57 percent in the fourth quarter of 2017.

The unemployment rate in Spain increased to 16.74 percent in the first three months of 2018 from a 16.55 percent in the previous period and above market expectations of 16.20 percent. Among regions, Extremadura (25.94 percent), Andalucía (24.74 percent) and Castilla-La Mancha (20.68 percent) recorded the highest jobless rates while Navarra (10.54 percent), País Vasco (10.76 percent) and La Rioja (11.03 percent) the lowest. In Catalonia, the unemployment rate was 12.19 percent and in Madrid 13.40 percent. Unemployment Rate in Spain averaged 16.56 percent from 1976 until 2018, reaching an all time high of 26.94

percent in the first quarter of 2013 and a record low of 4.41 percent in the third quarter of 1976.

The employment rates of young people in Spain (those aged 20–34 years) who have recently graduated from either upper secondary or tertiary levels of education decreased to 35 percent in March from 35.70 percent in February of 2018.

The Education System in Spain

Schooling in Spain is state funded and compulsory between the ages of six and sixteen, given that no courses are repeated. Although non-university education in state-funded schools is free in Spain, parents must pay for books, materials, and sometimes uniforms for their children.

Education in Spain is regulated by the Ley Orgánica 8/2013, de 9 de diciembre, para la mejora de la calidad educativa (LOMCE, Organic Law for the improvement of educational quality) that expands upon Article 27 of the Spanish Constitution of 1978. Education is compulsory and free for all children aged between 6 and 16 years and is supported by the national government together with the governments of each of the country's 17 autonomous communities.

In Spain, elementary school and middle school are considered basic education. These are Primaria (six years, starting the year you are 6 years old), which is the Spanish equivalent of elementary school and middle school, and Secundaria, or ESO (Educación Secundaria Obligatoria, starting the year you are 12), the Spanish equivalent of high school. After the financial crisis in 2008, leaving many people, especially children in poverty, there have been many attempts to recover. In 2014, a bill was passed to increase the number of annual exams in order to fund schools. In the following years, the cost of higher education increased due to cuts in the education budget. In 2016, further studies were conducted to best assess education inequality, inclusiveness and diversity. Spain is also working towards reforming vocational education and modernizing education to improve the rising unemployment rates.

Preschool for children under the age of 6 is encouraged. There are two cycles of preschool which are divided by age; 0-3 year olds and 3-6 year olds. The first cycle is often held in daycare centers or preschools, and most of the time it isn't free for students, although some city councils offer scholarships for their public preschool centers with limited places. The second cycle is free for all students enrolled in public schools that offer Educación Infantil (early childhood education). The second cycle of preschool in public schools focuses in on emotional development, movement and control of body habits, communication and language, and positive body image. The documents required for public

registration include proof of residence, passport or residence card, or child’s birth certificate, and, in some areas, proof of the child’s vaccinations and a medical certificate of health.

The structure of the Spanish education system

The Spanish education system is divided into four stages, two of which are compulsory:

- Nursery and preschool (*educación infantil*) – optional
- Primary (*educación or escuela primaria*) – compulsory
- Compulsory secondary education (*educación secundaria obligatoria*)
- Upper secondary education (*bachillerato*) – optional

Kindergarten	(0 – 3 yrs)
Pre-Scholar/Infantil	(3 – 6 yrs)
Primary	(6 – 12 yrs) Compulsory
E.S.O.	(12 – 16 yrs) Compulsory
Bachillerato/ Ciclos Formativos de Grado Medio	(16 – 18 yrs)
University (Diplomatura 3 yrs) Ciclos Formativos de Grado Superior	(18 – 21 + yrs)
University (Licenciatura 2 yrs) University Post Degree (2 yrs)	(18 – 22 + yrs)

At public schools, the language which classes are taught depends on the region. In Barcelona or Valencia, classes are taught in Catalan and Valencian respectively and in Galicia and Basque Country, Gallego and Basque respectively. Some public schools are bilingual. Classes are taught in Spanish or the regional language in some schools. And English, French or German may be taught as a second language, depending the school. State schools in Spain have improved and have qualifications towards student studying abroad; however they are not on the same level as private institutions.

Private schools in Spain vary, some of the schools teach entirely in Spanish, some are Catholic schools, others are private schools and are bilingual and some are international schools which place emphasis on a second language, generally English. Private schools that are state subsidized (*educación concertada*) are required to follow the Spanish syllabus, while international schools are free to follow other curriculums typically from other countries such as the US or UK. Private schools tend to be more costly especially in Barcelona or Madrid. Fees include tuition as well as school supplies and uniform.

According to summary data for the year 2008-2009 from the ministry, state schools educated 67.4%, private but state funded schools 26.0%, and purely private schools 6.6% of pupils the preceding year.

All non-university state education is free in Spain, but parents have to buy all of their children's books and materials. This, nominally at least, also applies to colleges *concertos*. Many schools are *concertos*, state-funded up to the end of *Primaria* but purely private for the high school years. This drop in the fraction of pupils in *educación concertada* is matched by increases of approximately equal size in the fraction in both state and purely private education for *ESO* and *Bachillerato*. There are private schools for all the range of compulsory education. At them, parents must pay a monthly/termly/yearly fee. Most of these schools are run by religious orders, and also include single-sex schools.

In accordance with the European Commission of Education and Training, Spanish higher education consists of: Bachelor degrees (*Grado*) for four-year programs, Master's degrees for two-year post-graduate programs, and Doctorates for post-master's education. There are many internationally recognized Spanish universities such as Complutense University of Madrid, the University of Barcelona, the University of Seville, the University of Granada, and the University of Valencia, among many others. Other historically important and reputable Spanish universities include the University of Salamanca and the University of Alcala.

The Spanish University System comprises 78 universities, 50 of which are public, while 28 are under private ownership, making for proportions of 64.1% and 35.9%, respectively.

In academic year 2009-2010, student numbers at all levels of the Spanish University System (bachelor, master and doctoral) increased by 3.5% to 1,556,377. 203,352 are bachelor's students – 11 times more than in the previous academic year – 1,200,763 are undertaking pre-EHEA first- and second-cycle studies (this has been the second year of the process of discontinuation, such that the former model saw an 11.6% reduction in student numbers with respect to the

previous year), 81,840 were master's students (64.3% more than in 2008- 2009) and 70,422 were doctoral students.

A list of universities in Spain:

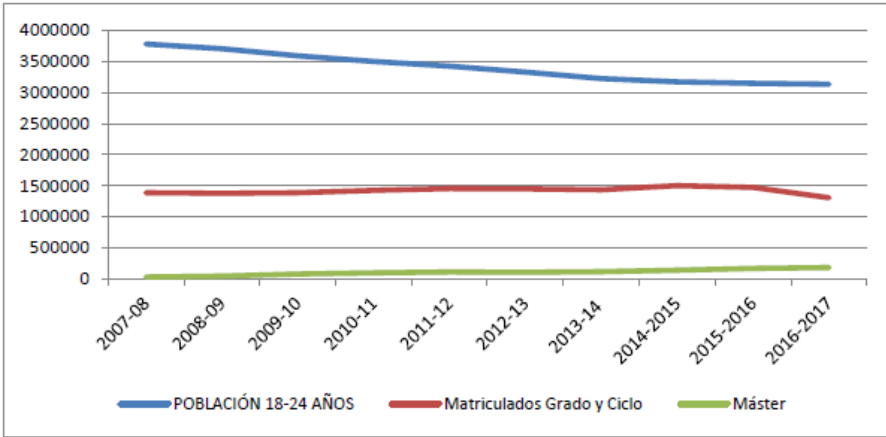
ANDALUCIA		
Public: University of Almeria (UAL) University of Granada (UGR) University of Malaga (UMA) International University of Andalucía (UNIA) University of Cordoba (UCO)	University of Jaen (UJAEN) University of Sevilla (US) University of Cadiz (UCA) University of Huelva (UHU) Pablo of Olavide University (UPO) International Univ. Menendez Pelayo (UIMP)	Private: University of Marbella School of Industrial Organization (EOI) School of Management and Marketing (ESIC) ETEA Institution University of the Society of Jesus
ARAGON	ASTURIAS	BALEARIC ISLANDS
Public: University of Zaragoza (UNIZAR) Private: University San Jorge (USJ) School of Management and Marketing (ESIC)	Public: University of Oviedo (UNI-OVI)	Public: University of Balearic Islands (UIB) Private: School of Design of Balears Islands
CANARIAS	CASTILLA Y LEÓN	
Public: University of Laguna (ULL) University of Palmas of Gran Canaria (ULPGC)	Public: University of Leon (UNI-LEON) University of Valladolid (UVA) University of Salamanca (USAL) University of Burgos (UBU)	Private: Catholic University of Avila (UCAV) IE University European University Miguel de Cervantes (UEMC) Inter. University of Castilla and Leon (UNICYL)
CANTABRIA	CASTILLA - LA MANCHA	EXTREMADURA
Public: University of Cantabria (UNICAN) International Univ. Menendez Pelayo (UIMP)	Public: University of Castilla la Mancha (UCLM) International Univ. Menendez Pelayo (UIMP)	Public: University of Extremadura (UNEX)

<p>CATALUÑA</p> <p>Public: Autonomous University of Barcelona (UAB) University of Lleida (UDL) Polytechnical University of Catalunya (UPC) Rovira i Virgili University (URV) International Univ. Menendez Pelayo (UIMP) University of Girona (UDG) Pompeu Fabra University (UPF) College of Music of Catalunya (ESMUC) University of Barcelona (UB)</p>	<p>Private: International University of Catalunya (UIC) University School of Hotel and Tourism (CETT) University Foundation of Bages (FUB) Ramon Llull University (URL) University Abat Oliba CEU (UAO) EAE Business School School of Design (ESDI) University of VIC (UVIC) ESADE Law & Business School Center for Financial Studies (CEF) Polytechnic College of Mataro (EUPMT) International Trade School (ESCI) EADA High School Management and Administration Foundation IQS</p>
MADRID	
<p>Public: University of Alcalá de Henares (UAH) Autonomous University of Madrid (UAM) Complutense of Madrid University (UCM) Rey Juan Carlos University (URJC) Carlos III of Madrid University Polytechnical University of Madrid (UPM) International Univ. Menendez Pelayo (UIMP)</p>	<p>Private: Pontifical University of Comillas University of Saint Louis Alfonso X El Sabio University (UAX) Camilo Jose Cela University (UCJC) Francisco of Vitoria University (UFV) Pontifical University of Salamanca (UPSA) University of San Pablo-CEU ESADE Law & Business School School of Industrial Organization (EOI) G. Center for Studies of Business Adm. (CEPADE) Antonio of Nebrija University European University of Madrid (UEM) European Business School (EEN) EAE Business School</p>
	<p>E. School of Management and Business (EUDE) School of Management and Marketing (ESIC) University Center Villanueva Institution of Higher Learning Felipe II Center for Financial Studies (CEF)</p>

GALICIA	MURCIA	PAÍS VASCO (EUSKADI)
Public: University of Coruña (UDC) University of Santiago de Compostela (USC) University of Vigo (UVIGO) International Univ. Menendez Pelayo (UIMP)	Public: Polytechnical University of Cartagena (UPCT) University of Murcia (UM) Private: Catholic University of San Antonio (UCAM)	Public: University of Pais Vasco Private: Mondragon University University of Deusto
NAVARRA		RIOJA
Public: Public University of Navarre (UNAVARRA)	Private: University of Navarre (UNAV) School of Management and Marketing (ESIC)	Public: University of Rioja (UNIRIOJA)
VALENCIA		
Public: University of Alicante (UA) Jaume I University (UJI) Polytechnical University of Valencia (UPV) International Univ. Menendez Pelayo (UIMP) Miguel Hernandez University (UMH) University of Valencia (UV)	Private: Center for Financial Studies (CEF) School of Management and Marketing (ESIC) Catholic University of Valencia S.V. Martir (UCV) Florida Training Centre Cardenal Herrera-CEU University	

In the 2016/2017 academic year, the number of enrollments in the Spanish university rose slightly to 1,558,685 in undergraduate, first and second cycle, master's and doctoral studies¹. There is an increase in the grade to 1,291,188, that is, an increase of 15,500 students. The positive thing is the increase in the master's degree to 184,745 enrolled, therefore it grows in 13,702 students, that is 8%. In doctorate there is an increase in 10,851, from 55,628 to 6,679 students. On the other hand, in the first and second cycle studies, which are in the process of being extinguished and replaced by the Degree and Master's studies, only 16,273 remain, which represents a decrease of 29,737 students. The total aggregate increase in the university is 10,316 enrolled.

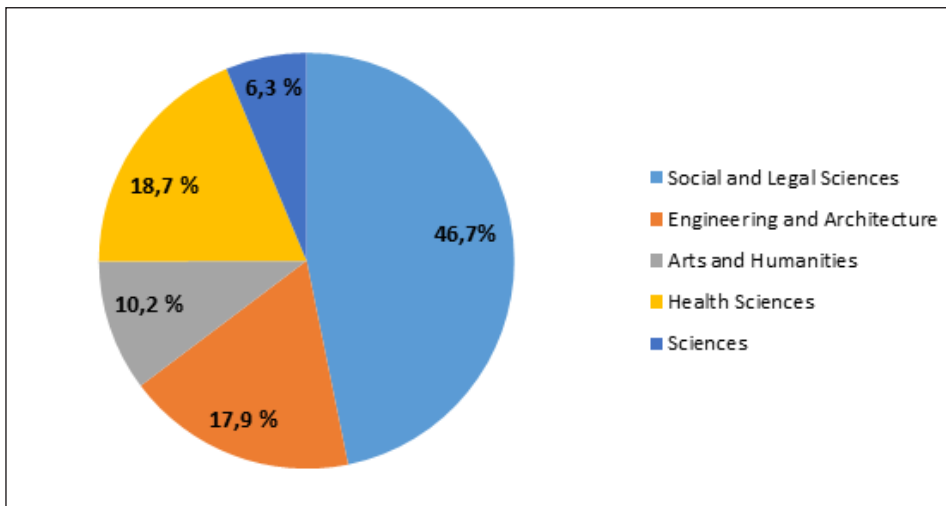
Evolution of enrolments in the universities in Degree, Cycle and Master



With 39.4% of youth unemployment, a dropout rate of 20% and 35% of young people between 25 and 34 who have not finished compulsory secondary education, the contract for training and apprenticeship should be the essential instrument for training and access to work for young people who now lack qualifications and employment.

In Spain, however, the ambiguity of the new regulations and the diversity of interpretation that each administration makes of the legal precepts has generated great legal insecurity for companies, students / workers and the training entities and has caused this type of contracts to fall. in 73% in a single year. In 2016, 46384 apprenticeship contracts were formalized, compared to 174923 in 2015, according to data from the public Publish service.

Enrolled in grade of the different branches 2016/2017



Number of students in the school year 2016-2017

	Total	Degree	Bachelor degree	Master’s degree	PhD
Total	1.548.369	1.275.688	46.010	171. 043	55.628
Frequency courses	1.314.129	1.082.952	41.357	135.976	53.844
Non-frequency courses	234.240	192.736	4.653	35.067	1.784
Public university	1.311.826	1.101.331	41.892	115.409	53.194
Frequency courses	1.154.066	958.553	39.285	104.545	51.683
Non-frequency courses	157.760	142.778	2.607	10.864	1.511
Private university	236.543	174.357	4.118	55.634	2.434
Frequency courses	160.063	124.399	2.072	31.431	2.161
Non-frequency courses	76.480	49.958	2.046	24.203	273

Career development can help with retention because employees can develop a sense of loyalty for employers who are willing to invest in them. Likewise, when it is time to hire new employees, career development programs can be attractive to job-seekers.

The company can develop its own unique career development programs to increase employee retention—and hopefully, increase productivity and profits. Organization leaders can use the following strategies to guide the development of its program.

Some business cultures are more open to the inclusion of the Project in the field of work than others. Senior managers who plan to introduce the discipline of Project Management, or who wish to improve the performance of the existing project, should pay attention to the cultural, structural, practical and institutional elements that condition the various areas of application.

Decent and stable work is today one of the most important demands of today’s society. However, jobs have been reduced significantly and many of the existing suffer a generalized precariousness, a problem that particularly affects young people, with added difficulties for those who live in situations of social exclusion. The experience of the Initial Professional Qualification Programs (PCPI), aimed at young people who drop out and fail at school, provides data of interest to take into account for the great task of socio-labor insertion, in which they must also be involved. all social educators. As experts and facilitators of the socio-educational task, within the framework of the community, at the same time that they collaborate with the school system, they mobilize the different contexts in which adolescents and young people develop, with the aim of supporting their work project.

Situation of young people between 25-29 years

According to the data of the INE of the second quarter of this year, there is currently a total of 2,2 million assets with ages between 25 and 29 years; of this figure, 628,000 are unemployed, which represents a rate of 28,4%.

Of the 628,000 unemployed, 245,000 - 39% - have been unemployed for 2 years or more and 20% between 1 and 2 years. According to the degree of qualification and training, unemployment among this population is decreasing; thus, young people between 25 and 29 who have completed primary education have an unemployment rate of 48.5%; those who have remained in the first stage of secondary school of 38.3%; with the ESO completed, the percentage stands at 28.7%; baccalaureate or similar the 23,6% and with higher education the rate of unemployment descends until 20,1% (inferior to 22.4% of unemployment rate of the whole of the Spanish economy). Probed by the type of working day they seek, 64% say "the one they find", 14% full time and 5,2% part time.

In this section on the labor market in Spain and Vocational Training, analyzes the evolution of Social Security affiliates since 2009, by professional families, the companies registered in the different activities economic activities, and the offer of professional training in each province, in order to a reference of the degree of correlation between both variables.

The relationship between companies as economic activities and occupations aims to offer indicators that allow us to assess the magnitude of employment of different sectors. In this way, it will be possible to monitor the evolution of qualifications linked to each productive sector in relation to the competences and main characteristics of the occupations described, apart from being able to differentiate the different scenarios in which the occupation develops, thus allowing specify occupational profiles for different sectors.

Men and women graduates have increased in population, activity, occupation and have decreased in underemployment and unemployment; the rates of activity, occupation and unemployment are better than those of the total population of working age. But, on the other hand, the inactive have increased in absolute terms, those who neither work nor seek work. That is to say, the labour market of our Spain continues to be incapable of absorbing this group, as has been systematically pointed out in previous EPA analyzes.

In comparison with the total population, the group of graduates have an activity rate that is 22 percentage points higher than the total, an occupation rate about seven percentage points above and a seven point unemployment rate below, which confirms the best employment situation of university graduates.

Nowadays, Vocational Training is the professional studies closest to the reality of the labor market and responds to the need for qualified personnel

specialized in the different professional sectors to respond to the current demand for employment.

If we analyze their high labor insertion we can affirm that the FP has already been transformed into a training that responds to the real demand for employment, now is the time of change in Spanish society.

Vocational Training offers more than 150 training cycles within 26 professional families, with theoretical and practical content suitable for various professional fields.

Vocational Training is the set of teachings that, within the education system, enable you to perform a qualified job of the different professions offered.

In the Middle Grade Vocational Training Cycles, the degree obtained is that of Technician of the profession corresponding to the cycle completed. This qualification allows access to other formative cycles of intermediate level, to the baccalaureate or to higher education training cycles, provided that you meet the requirements established by the educational administrations.

The objectives of the intermediate-level training cycles are:

Carry out tasks of manipulation of tools and application of techniques that require minimum levels of skill. Requires technical and scientific knowledge of the activity and capabilities of application and understanding of the process.

Achieve all those attitudes that allow students to adapt to present and future work situations and assume responsibilities in a particular profession.

This technical-practical training leads you to a mid-level qualification, current and future, which prepares you for middle management tasks. The graduates obtain the necessary qualification to perform technical work of the profession

The objective of higher education training cycles is that you can achieve all those skills that allow you to adapt to present and future work situations, and assume responsibilities for coordination and programming in a given profession, as well as planning the work of people and doing the corresponding verifications and evaluations. The official qualification obtained is that of Technical or Higher Technician of the corresponding profession.

The higher education training cycles are aimed at students who are looking for practical higher education, which qualifies them to enter the working world.

This technical-practical training leads to a higher level qualification, current and future, which will prepare you for intermediate tasks. You will obtain the necessary qualification to carry out technical work typical of the profession but also to assume planning, organization and coordination responsibilities.

Thus, you can plan your own work, but also schedule and take responsibility

for the work of others, taking into account the necessary resources, the methods to be applied, the verifications to be carried out and the corresponding economic evaluations. In short, you will get an overview of the system in which you work and the different elements that make it up.

All people must have the possibility of training throughout life, inside and outside the education system, in order to acquire, update, complete and expand their skills, knowledge, skills, abilities and skills for personal and professional development .

Knowing the different training options and the existing itineraries is key to enable them to organize and guide the learning experience, making time and effort profitable.

This Ministry has made available to the public a portal so they can know the option and training that best fits their personal, family and professional reality. It also incorporates a collection of materials and resources to support your learning process that can also be used by families, professionals and anyone related to training and education.

Acquiring personal and professional skills is essential for improving the quality of life of people.

It is always time to learn, so there are currently modalities and training offers within the reach of most of the personal, family and professional realities of the population.

The inFórmate tool is designed to accompany people in the orientation and counseling process with the intention of showing the variety of existing itineraries. It is therefore an informative complement; but undoubtedly, to receive a personalized and complete orientation, the interested persons have at their disposal the network of counselors that exist in public institutions related to education, employment and social affairs

The regional, local and national projects related to career management in Spain

In Spain, a study called ‘Labor insertion’ has been carried out, which analyses, from the Survey of Labour Insertion of University graduates of the INE (EILU, 2016), four groups of variables that determine the labour insertion of graduates: training received, personal characteristics, methods of job search and influence of the environment.

The key of the best universities for employment is to reorient their careers quickly with respect to the reality of the changing labour world and to establish an employability policy.

The university where one studies influences when it comes to finding a job. According to this study there are aspects of training, on which the university influences, which mark differences of up to 26.7 percentage points in the employability of the graduates.

Although the success in the labour insertion depends on many factors not linked to the university (such as personal characteristics, acquired competences, the environment or the economy), many others can be promoted from the university centers. This is the case of the quality and reputation of the university; institution and its teaching staff; collaboration with companies and institutions; promote mobility among their students; or they develop formative activities so that their students know the labour market and learn to manage their insertion and their professional career.

Most of the analysed institutions already consider among their strategies the promotion of employability, however, once again, the rule in the Spanish university system is heterogeneity. Thus, according to the analysis carried out in 2017, the institutions most active in actions to promote the labour insertion of their students doubled the number of actions of other universities.

The study indicates that the main line of action of a university to improve the employability of students is the reorientation of their offer of qualifications and training content to the reality of the changing labour world. In this study, up to 1,425 actions or programs to promote employability have been identified, which in turn can be grouped in these ten areas: 1) Pre-university guidance service; 2) Sensitization; 3) Information; 4) Training; 5) Professional and work orientation; 6) practices; 7) Employment; 8) Entrepreneurs; 9) Observatory; 10) Quality indicators.

The highest employment rates, above 80%, correspond to the branches of Health Sciences and Engineering, within which some qualifications such as Medicine and Electronic Engineering border on full employment (97.7% and 98%, respectively) . The lowest employment rates are found in Arts and Humanities, a branch whose average is 64.3%, with cases such as French Philology, with an employment rate of only 50.6%. For this reason, universities that have specialized in qualifications that demand more in the labour market obtain better results

The environment is another factor that conditions the insertion largely, due to the notable territorial differences in rates of job creation. It is confirmed by the labour insertion trajectories according to the autonomous community in which graduates studied in the 2009-2010 academic year, evaluated during the five years after graduation. In percentage of graduates employed, the differences range from 82.8% in Catalonia to 66.9% in the Canary Islands.

Unemployment rates (percentage of active graduates who do not have a job) range from 11% in Catalonia to 26.1% in Andalusia. Galicia is the autonomy in which university students need more time to find a job: 32.9% take more than 12 months, while in Catalonia only 13.3% exceed that term.

In relation to the existing relocation plans in Spain, we can highlight that most of the workers enrolled in relocation plans find work in less than a year. Specifically, in less than twelve months, 85% find a job. This is what a report by Lee Hecht Harrison, consultant of the Adecco group specializing in relocation, says. In more detail, 33% have needed between six and twelve months to have a new job; 44% have been slow to get it less than six months; and 8% between three and six months. In the last year, among the candidates who have participated in relocation plans, the average time of job search has been at 6.3 months, a much shorter time than that registered in 2017, which stood at 15.8 months. People who have continued working, 74.1% have continued with their professional career, while 25.9% have preferred training (39%) or early retirement (28%). In addition, of all the people who have continued working, 86% have done it for others and 14% for their own account. On the other hand, the report shows that the repositioned candidate usually has an average of 43 years on average and a technical professional profile (61%), Madrid (32.4%) and Catalonia (25.6%) stand out as both regions in which a greater number of relocation programs are carried out.

In fact, between the two make up more than half of these initiatives. Behind, followed by Andalusia (12.1%), Castilla y León (8.9%), Navarra (3.8%), Comunidad Valenciana (3%), Galicia (2.6%), Asturias and Castilla-La Mancha (1.8% in both), Aragón (1.6%), Cantabria and País Vasco (1.46%), Extremadura (1%), Canarias and Murcia (0.66%), Balearic Islands (0, 5%) and La Rioja (0.33%). The number of collective dismissals falls in the last year, the number of companies affected by procedures of collective dismissals, suspension of contract and reduction of working hours has been 2,615 cases, which has had an impact on about 57,500 workers. However, procedures have been reduced by 35% and workers by 33.6%. For several years, the number of Employment Regulation Records (ERE) in Spain has been reduced considerably. According to this consultant of the Adecco group, this has been thanks to the economic improvement and the growth of employment. Relocation programs are accompaniment processes for all those professionals who, due to different circumstances, are forced to disassociate themselves from the organizations. In addition, the main objective of these programs is to guide professionals in their new stage, define their objective or enhance their employability.

Projects:**European Career Development Programme for University students***Erasmus+ Programme*

The objective of the Individual Career Development-ICARD Program is the development of common contents for the development of the professional career of university students. In this way they are working on promoting those skills that facilitate professional and labor insertion in a European market instead. At the same time, a common platform is developed where all the contents will be hosted in English and in the language of each of the partners, available both for each participating partner and for any university that wants to use them.

The project is based on a program developed by the University of Queensland with the idea of generating new contents common to different universities and in different European and international markets.

For the director of the Service of Professional Insertion, Practice and Employment, Mili Pizarro, programs like this “allow the students of the University of Salamanca to know and train in the same professional skills as students from different European universities, that is, to access the market in equal conditions”.

THE RESEARCH IN SPAIN

The target group of the project consists of three groups; newly employed people or the ones who are going to start working in the near future (level 1), the employees who are currently working at the level of expertise (level 2) and the people who are currently working as managers (level 3). The research aims to find out the training needs of the new industrial revolution also known as industry 4.0 of these 3 target group. We carried out a field study for the first two level by conducting questionnaires and interviews for the managers. A research was carried out with 90 students and 61 employees in Spain, with purposive sampling. Based on Prifti et. al²³ (2017) Industry 4.0 Competency Model a questionnaire form is used as the data collection tool. The questionnaire form was adopted from Prifti et al. (2017)'s “A Competency Model for Industry 4.0 Employees” which is based on Great 8 competency dimensions. Frequency analysis is conducted in order to determine the training need analysis of students and employees in Spain. Thus it is aimed to reveal the skill kit required by Industry 4.0 for all the 3 levels. In other words, are the graduates, employees and managers ready for Industry 4.0 with the skills?

23 Prifti, L.; Knigge, M.; Kienegger, H.; Krcmar, H. (2017): A Competency Model for “Industrie 4.0” Employees, in Leimeister, J.M.; Brenner, W. (Hrsg.): Proceedings der 13. Internationalen Tagung Wirtschaftsinformatik (WI 2017), St. Gallen, S. 46-60.

FINDINGS FOR EMPLOYEE IN SPAIN

In this part firstly finding for demographics of the participants has been given. Later the findings of the Great 8 competency dimensions has been given for the employees.

Demographics

- Participants participated the research are %45,2 male and %54,8 female,
- age ranging from 18 to 62 and mean age is 40,24.
- %40,3 of the respondents are higher education, %24,2 are graduates and %24,2 are vocational high school, %6,5 are vocational school, %3,2 secondary school and %1,6 are uneducated.
- %51,6 of the respondents are employed in service (tourism, health, finance, IT) sector, %45,2 in education and %3,2 in manufacturing.
- %44,6 of the participants are working in companies with 1-10 employees, %30,4 are working in companies with 11-50 employees, %17,9 are working in companies with 51-100 employees, %6,5 are working in companies with 500+ employees.
- Participants are working years as a professional range from 0-38 years and average working year as professional is 16,56 years, participants are working for the same company ranging from 0-38 years and average working years for the same company is 12,8 years and participants are working in their current position ranging from 0-35 years and average working years in the current position is 9,49 years.

Demographic represent a participant profile with a balanced male female ratio, in their mid-ages, educated, mostly working in service sector, working in SMEs, and experienced employees.

Findings for Business Trends

Business trends reported by the participants %35 no change in revenue, %30,6 total revenue increasing, only %4,8 of the respondents reported a decreasing total revenue and %29 reported not applicable. %43, 5 of the respondents reported that employment trend in their organization is not changing, %22,6 reported increase in the number of the employees, only %8,1 reported a decrease in the employee numbers and %25, 8 reported as not applicable.

%43,5 of the respondent reported that it is moderate difficult/easy to find a job in the same sector if they lose their current job, %25,8 reported as easy, %9,7 as very easy, %12,9 as difficult and %8,1 as very difficult. %33,9 of the respondent reported that it is moderate difficult/easy to find a job in another sector if they lose

their current job, %21 reported as easy, %14,5 as very easy, %21 as difficult and %9,7 as very difficult.

Spanish participants reported neutral and positive trend in the name of sector revenue, only %4,8 of the participants reported a decreasing revenue trend. Although, participants reported more negative trends in the name of employment, the Spanish participants still report positive employment trends. Similar to the business trends, Spanish participants also reported positive perceptions when it comes to find a new job in the same sector, and although more negative compared to find a job in the same sector, they are positive to find a new job in another sector. Still, the numbers should be interpreted carefully because the participant profile is heavily employed in service sector. The numbers reported do not represent employment in manufacturing sector.

SKILL NEED IN INDUSTRY 4.0

Dimensions

Skill set required by industry 4.0 are captured under 20 dimensions which are Deciding and Initial Action, Leading and Supervising, Working With People, Adhering to Principles and Values, Relating and Networking, Persuading and Influencing, Presenting and Communicating Information, Writing and reporting, Applying Expertise and Technology, Analyzing, Learning and Researching, Creating and Innovation, Formulating Strategies, Planning and Organization, Delivering Results and Meeting Customer Expectation, Following Instructions and Procedures, Adopting and Responding to Change, Persuading and Influencing, Achieving Personel Work Goals and Objectives, Entrepreneurial and Commercial Thinking all base on Big Eighth dimensions.

<p>Leading and Deciding Takes control and exercises leadership. Initiates action, gives direction, and takes responsibility.</p>
<p>Supporting and Cooperating Supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organization.</p>
<p>Interacting and Presenting Communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner.</p>
<p>Analyzing and Interpreting Shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing</p>

Creating and Conceptualizing

Works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change.

Organizing and Executing

Plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards.

Adapting and Coping

Adapts and responds well to change. Manages pressure effectively and copes well with setbacks.

Enterprising and Performing

Focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement.

LEADING AND DECISION

The Great Eight's Leading and Decision dimension captures participant's taking control and exercise leadership, initiates action, gives direction, and takes responsibility skills (Dave, 2005). It is composed of two sub dimension called Deciding and Initial Action (2 item) and Leading and Supervising (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Deciding and Initial Action

Frequency analysis for Deciding and Initial Action items in Spain for employees suggest that %90,3 of the Spanish participants evaluate themselves as moderate to strong level of decision making and %79,1 strong to very strong level of taking responsibility. Only %4,8 of the participants evaluated themselves as very weak and very strong in decision making skill. However, Spanish participants evaluate themselves more positive in taking responsibility.

Leading and Supervising

Frequency analysis for Leading and Supervising items suggest that %85,5 of the Spanish participants evaluate themselves as moderate to strong level of Leadership Skills.

SUPPORTING AND COOPERATION

The Great Eight's Supporting and Cooperation dimension captures participant's supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and

staff. Behaves consistently with clear personal values that complement those of the organization (Dave, 2005). It is composed of two sub dimension called Working With People (3 items) and Adhering to Principles and Values (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Working With People

Spanish participants reported they have high levels of team work skills, only %4,9 reported very weak and weak team work skills whereas %75,4 reported strong and very strong team work skills. The similar pattern is also visible in Collaborating with Others and Communicating with People dimensions, only %3.2 of the participants reported themselves as weak and %4,8 as very weak and weak respectively. Spanish participants evaluate themselves high in working with people dimension.

Adhering to Principles and Values

Spanish participants evaluate themselves higher in Respecting Ethics and Environmental Awareness skills. %93,6 of the participants rated themselves strong and very strong in respecting ethics and %82 in environmental awareness. However, compared to other skills, awareness of ergonomics rated lower, only %59,1 reported strong and very strong whereas %32,8 rated themselves as moderate.

INTERACTING AND PRESENTING

The Great Eight's Interacting and Presenting dimension captures communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner (Dave, 2005). It is composed of two sub dimension called Relating and Networking (3 items), Persuading and Influencing (2 Items) and Presenting and Communicating Information (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Relating and Networking

Relating and networking competency has three items; compromising, creating business networks and maintaining customer relationships. %93,3 of the Spanish participants rated themselves as strong and very strong compromising skills, whereas only %27,9 in creating business networks, and %55,7 in maintaining customer relationships. The frequency analysis suggest that Spanish participants rate themselves low in creating business networks skill.

Persuading and Influencing

%54,1 of the Spanish participants rated themselves strong and very strong in persuading influencing skills whereas %67,2 in emotional intelligence skills

Analysis suggest that %45,9 of the participants rate themselves as moderate and weak in negotiating skills.

Presenting and Communicating Information

Spanish participant rate themselves with strong and very strong with %52,5 in presenting and communication ability, %47,5 very weak, weak and moderate.

ANALYZING AND INTERPRETING

The Great Eight's Analyzing And Interpreting dimension captures shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing (Dave, 2005). It is composed of three sub dimension called Writing and Reporting (2 items), Applying Expertise and Technology (23 items) and Analyzing (4 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Writing and reporting

%85,5 of the Spanish participants rated themselves as moderate and strong in targeted/ technical communication skills, only %8,1 rated very strong and %73,7 moderate and strong in literacy skills and only %19,7 very strong Spanish participants rated themselves low in targeted and technical communication skills.

Applying Expertise and Technology

Applying expertize and technology dimension is composed of 23 items.

- Participants rated their skills in IT and technology affinity %55,7 strong and very strong,
- Economics %48,3 strong and very strong,
- Extract business value from social media %24,6 strong and very strong,
- Service orientation/product service offerings %31,7 strong and very strong,
- Business process management %33,9 strong and very strong,
- Business change management %30 strong and very strong,
- Understand and coordinate workflows %46,7 strong and very strong,
- Network security %32,3 strong and very strong,
- IT architectures %26,2 strong and very strong,
- Machine learning %45,9 strong and very strong,
- System development % 21,3 strong and very strong,
- Integrating heterogeneous technologies %26,2 strong and very strong,
- Mobile technologies %39,3 strong and very strong,

- Sensors/embedded systems %28 strong and very strong,
- Network technology/M2M communication %18,3 strong and very strong,
- Robotics/Artificial intelligence %8,2 strong and very strong,
- Predictive maintenance %15,3 strong only,
- Modelling and programming % 21 strong and very strong,
- Big data/Data analysis and interpretation %16,1 strong and very strong
- Cloud computing/architectures %18 strong and very strong,
- In-memory DBs %18,6 strong and very strong,
- Statistics %19,7 strong and very strong
- Data Security % 26,2 strong and very strong.

In general frequency analysis suggest that Spanish participants are not skilled for Applying Expertise and Technology dimension, the lowest reported skills are Robotics/Artificial intelligence, Predictive maintenance and Big data/Data analysis and interpretation.

Analyzing

Analyzing sub-dimension is composed of 4 items. Participants rated Problem Solving %68,7 strong and very strong, Optimization %53,3, Analytical Skills %51,8 and Cognitive Ability %50.

CREATING AND CONCEPTUALIZING

The Great Eight's Creating and Conceptualizing dimension captures works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change (Dave, 2005). It is composed of three sub dimension called Learning and Researching (2 items) and Creating and Innovation (4 items) and Formulating Strategies (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Learning and Researching

Spanish participants reported they have life-long learning skill %72,3 strong and very strong and %54,1 strong and very strong in knowledge management.

Creating and Innovation

Participants rated themselves %56,7 strong and very strong in Innovating, %55 strong and very strong in creativity, %70,5 strong and very strong in Critical Thinking and %47,4 strong and very strong in Change Management.

Formulating Strategies

Business Strategy %33,3 strong and very strong, Abstract Ability %67,4 strong and very strong, and Managing Complexity %42,4 strong and very strong.

ORGANIZING AND EXECUTING

The Great Eight's Organizing and Executing dimension captures plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards. It is composed of three sub dimension called Planning and Organization (3 items) and delivering Results and Meeting Customer Expectations(2 items) and Following Instructions and Procedures (3 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Planning and Organization

Participants rated Planning and Organization dimensions Project management %48,3 strong and very strong, Planning and organizing work %59,7 strong and very strong and % 54,1 strong and very strong Management Ability.

Delivering Results and Meeting Customer Expectation

Participants rated their Customer Orientation skills % 49,2 strong and very strong, Customer Relationship Management skills %42,6 strong and very strong.

Following Instructions and Procedures

Legislation awareness skills %41 strong and very strong, Safety awareness skills %41.7 strong and very strong and Individual responsibility skills %78,3 strong and very strong. No participant rated individual responsibility as weak or very weak.

ADAPTING AND COPING

The Great Eight's Adapting and Coping captures adapts and responds well to change. Manages pressure effectively and copes well with setbacks. It is composed of two sub dimension called Adopting and Responding to Change (4 items) and persuading and influencing (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Adopting and Responding to Change

Participants rated their Work in interdisciplinary environments skills %50,8 strong and very strong, Intercultural competency skills %46,7 strong and very strong, Flexibility skills %70,5 strong and very strong and Adaptability and ability to change mind-set skills %73,3 strong and very strong.

Persuading and Influencing

Participants rated their Work Life Balance skills %57,4 strong and very strong.

ENTERPRISING AND PERFORMING

The Great Eight’s Enterprising and Performing captures focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement. It is composed of two sub dimension called Achieving Personal Works Goals And Objectives (1 item) and Entrepreneurial and Commercial Thinking (2 items) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Achieving Personal Work Goals and Objectives

Participants rate their Self-management and organization skills %69,9 strong and very strong.

Entrepreneurial and Commercial Thinking

Participants rated their Business model understanding skills %50,8 strong and very strong and Entrepreneurship skills %33,8 strong and very strong.

We also calculated mean scores of each 8 dimension in order to find out training needs of employees in Spain in the age of Industry 4.0. While 1 refers to be weak, 5 refers to be strong. Table 1 shows the mean scores of Spanish employees for all 8 dimensions.

Table 1. Mean Scores of 8 Dimensions of Employees in Spain

Descriptives for Employees in Spain		
DIMENSION	Mean	Std. Err.
1. Leading and Decision	3,6525	0,06645
1.1. Decision and Initial Action	3,7979	0,08691
1.2. Leading and Supervising	3,3617	0,09338
2. Supporting and Cooperation	4,1028	0,07813
2.1. Working with People	4,0922	0,10021
2.2. Adhering to Principles and Values	4,1135	0,08619
3. Interacting and Presenting	3,6738	0,08632
3.1. Relating and Networking	3,6809	0,10287
3.2. Persuading and Influencing	3,6596	0,10872
3.3. Presenting and Communicating Information	3,6809	0,143

4. Analyzing and Interpreting	2,8995	0,10446
4.1. Writing and Reporting	3,6915	0,09068
4.2. Applying Expertise and Technology	2,7262	0,11509
4.3. Analyzing	3,5	0,11431
5. Creating and Conceptualization	3,5887	0,09273
5.1. Learning and Researching	3,6383	0,11552
5.2. Creating and Innovation	3,7447	0,10244
5.3. Formulating Strategies	3,3475	0,11994
6. Organizing and Executing	3,5372	0,09943
6.1. Planning and Organization	3,6312	0,12672
6.2. Delivering Results and Meeting Customer Expectations	3,4149	0,14691
6.3. Following Instructions and Procedures	3,5248	0,10074
7. Adapting and Coping	3,6681	0,08863
7.1. Adopting and Responding to Change	3,6755	0,09646
7.2. Persuading and Influencing	3,6383	0,15032
8. Enterprising and Performing	3,461	0,10267
8.1. Achieving Personal Work Goals and Objectives	3,8298	0,12658
8.2. Entrepreneurial and Commercial Thinking	3,2766	0,12523

According to table 1, while the weakest dimension is analysing and interpreting, supporting and cooperation dimension is the strongest one as in Turkey. It can be inferred from the table that as all the dimensions except from analysing and interpreting, capture more than 3 mean score (1 is min, 5 is max and 3 is average), we can say that Spanish employees evaluate themselves not weak. Although Spanish employees consider themselves not weak, there are some dimensions need to be trained such as analysing and interpreting, creating and conceptualization, organizing and executing.

FINDINGS FOR GRADUATES IN SPAIN

In this part firstly finding for demographics of the students has been given. Later the findings of the Great 8 competency dimensions has been given for the students.

Demographics

- Participants participated the research are % 44,1 male and %55,9 female.
- age ranging from 16 to 51 and mean age is 23,86.

- %5,4 of the respondents are studying higher education, %10,8 are studying graduate and %45,2 are studying vocational high school, %8,6 are studying vocational school, %2,8 are studying secondary school and %2,2 are studying primary school.
- %74,6 of the respondents are planning to work in service (tourism, health, finance, IT) sector, %8,6 in education and %17,2 in manufacturing.

Demographic represent a participant profile with a balanced male female ratio, in their twenties, mostly planning to work in service sector.

Findings for Business Trends

Business trends they plan to work in reported by the students is %22,6 no change in revenue, %48,4 total revenue increasing, %6,5 of the respondents reported a decreasing total revenue and %22,6 reported not applicable. %25,8 of the respondents reported that employment trend in the sector they plan to work is not changing, %40,9 reported increase in the number of the employees, only %12,9 reported a decrease in the employee numbers and %20,4 reported as not applicable.

%22,6 of the respondent reported that it is easy and very easy to find a job in the sector they want to work, %33,3 reported as moderate, %33,3 difficult and %10,8 as very difficult. %33,3 of the respondent reported that it is easy and very easy to find a job in a sector other than they want to work, %38,7 reported as moderate, %20,4 as difficult and %7,5 as very.

SKILL NEED IN INDUSTRY 4.0

Dimensions

Skill set required by industry 4.0 are captured under 20 dimensions which are Deciding and Initial Action, Leading and Supervising, Working With People, Adhering to Principles and Values, Relating and Networking, Persuading and Influencing, Presenting and Communicating Information, Writing and reporting, Applying Expertise and Technology, Analyzing, Learning and Researching, Creating and Innovation, Formulating Strategies, Planning and Organization, Delivering Results and Meeting Customer Expectation, Following Instructions and Procedures, Adopting and Responding to Change, Persuading and Influencing, Achieving Personal Work Goals and Objectives, Entrepreneurial and Commercial Thinking all base on Big Eight dimensions.

Big Eight Dimensions and definition

<p>Leading and Deciding</p> <p>Takes control and exercises leadership. Initiates action, gives direction, and takes responsibility.</p>
<p>Supporting and Cooperating</p> <p>Supports others and shows respect and positive regard for them in social situations. Puts people first, working effectively with individuals and teams, clients, and staff. Behaves consistently with clear personal values that complement those of the organization.</p>
<p>Interacting and Presenting</p> <p>Communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner.</p>
<p>Analyzing and Interpreting</p> <p>Shows evidence of clear analytical thinking. Gets to the heart of complex problems and issues. Applies own expertise effectively. Quickly takes on new technology. Communicates well in writing</p>
<p>Creating and Conceptualizing</p> <p>Works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with innovation and creativity. Thinks broadly and strategically. Supports and drives organizational change.</p>
<p>Organizing and Executing</p> <p>Plans ahead and works in a systematic and organized way. Follows directions and procedures. Focuses on customer satisfaction and delivers a quality service or product to the agreed standards.</p>
<p>Adapting and Coping</p> <p>Adapts and responds well to change. Manages pressure effectively and copes well with setbacks.</p>
<p>Enterprising and Performing</p> <p>Focuses on results and achieving personal work objectives. Works best when work is related closely to results and the impact of personal efforts is obvious. Shows an understanding of business, commerce, and finance. Seeks opportunities for self-development and career advancement.</p>

LEADING AND DECISION

The Great Eight's Leading and Decision dimension captures participant's taking control and exercise leadership, initiates action, gives direction, and takes responsibility skills (Dave, 2005). It is composed of two sub dimension called Deciding and Initial Action (2 item) and Leading and Supervising (1 item) in a competency model for industry 4.0 employees (Prifti et al., 2017).

Deciding and Initial Action

Frequency analysis for Deciding and Initial Action items suggest that %50,5 of the Spanish students evaluate themselves as strong and very strong level of decision making, but very strong is only %5,4, and %66,7 strong and very strong level of taking responsibility. Although, Spanish student score themselves with high decision making, they do not rate very strong.

Leading and Supervising,

Spanish students score themselves %47,3 strong and very strong leadership skills, but very strong is only %7,5. Students seem to exhibit low leadership skills, it may be because of lack of experience.

SUPPORTING AND COOPERATION

Working With People

%71 of the students rate themselves as strong and very strong in team work, %69,9 rate themselves strong and very strong in collaborating with others and %64,5 rate strong and very strong in communicating with people.

Adhering to Principles and Values

%80,6 of the students rate strong and very strong in Respecting ethics, %66,3 strong and very strong in Environmental awareness and %46,2 strong and very strong in Awareness of ergonomics. Spanish students score low in awareness of ergonomics.

INTERACTING AND PRESENTING

Relating and Networking

%81,5 of the students rate strong and very strong in Compromising skills, %34,8 rate strong and very strong in Creating business networks, %61,1 rate strong and very strong in Maintaining customer relationships. Spanish students rate themselves low in creating business networks.

Persuading and Influencing

%49,5 of the students rate strong and very strong in Negotiating and %72,5 strong and very strong in Emotional intelligence. Spanish students rate low in negotiating.

Presenting and Communicating Information

%53,8 of the students rate strong and very strong in Presenting and communication ability.

ANALYZING AND INTERPRETING

Writing and reporting

%43,7 of the Spanish students rate strong and very strong in Targeted/ Technical Communication and %45,6 rate strong and very strong in Literacy. Spanish students report low Targeted/Technical Communication and Literacy (Reporting, writing plans, and writing letters).

Applying Expertise and Technology

- %59,9 of the Spanish students rate themselves with strong and very strong in IT and technology affinity,
- %33 strong and very strong in Economics,
- %39,3 strong and very strong in Extract business value from social media,
- %31,5 strong and very strong in Service orientation/product service offerings,
- %28,4 strong and very strong in Business process management,
- %21,8 strong and very strong in Business change management,
- %39,8 strong and very strong in Understand and coordinate workflows,
- %33,3 strong and very strong in Network security,
- %19,3 strong and very strong in IT architectures,
- %43,3 strong and very strong in Machine learning,
- %15,9 strong and very strong in System development,
- %21,3 strong and very strong in Integrating heterogeneous technologies,
- %54,4 strong and very strong in Mobile technologies,
- %25,8 strong and very strong in Sensors/embedded systems,
- %17 strong and very strong in Network technology/M2M communication,
- %16,5 strong and very strong in Robotics/Artificial intelligence,
- %11,8 strong and very strong in Predictive maintenance,
- %18,9 strong and very strong in Modelling and programming,
- %18,2 strong and very strong in Big data/Data analysis and interpretation,
- %17 strong and very strong in Cloud computing/architectures,
- %12,5 strong and very strong in In memory DBs,
- %22,5 strong and very strong in Statistics
- %25,8 strong and very strong in Data security

Analyzing

%48,9 of the Spanish students rate strong and very strong in Problem Solving, %37,8 strong and very strong in Optimization, %41,1 strong and very strong in Analytical Skills, %42,2 strong and very strong in Cognitive Ability. Analyzing skills are higher than Applying Expertise and Technology skills, but still needs improvement.

CREATING AND CONCEPTUALIZATION**Learning and Researching**

%57,1 rate strong and very strong in Life-long learning skills, %52,9 rate strong and very strong in Knowledge management skills.

Creating and Innovation

%48,1 rate strong and very strong in Innovating, %56,7 rate strong and very strong Creativity, %62,2 rate strong and very strong Critical thinking, %44,7 rate strong and very strong Change management. Innovating and change management skills are slightly below average.

Formulating Strategies

%29,8 rate strong and very strong in Business strategy, %46 strong and very strong in Abstraction ability, %43,8 strong and very strong in Managing complexity. Although all items are below average, Business strategy skill is rated lowest.

ORGANIZING AND EXECUTING**Planning and Organization**

%44,9 rate strong and very strong in Project management, %58,4 rate strong and very strong in Planning and organizing work, %45,5 rate strong and very strong in Management ability.

Delivering Results and Meeting Customer Expectation

%41,1 of the Spanish students rate their Customer orientation skills as strong and very strong and %47,2 in Customer relationship management.

Following Instructions and Procedures

%33,3 rate strong and very strong Legislation awareness skill, %40,4 strong and very strong in Safety awareness, %65,6 strong very strong in Individual responsibility. Spanish Students lack legislation awareness and safety awareness skills.

ADAPTING AND COPING

Adopting and Responding to Change

%47,2 rate strong and very strong in Work in interdisciplinary environments, %48,3 rate strong and very strong in Intercultural competency, %70,5 rate strong and very strong in Flexibility, %67,8 rate strong and very strong in Adaptability and ability to change mind-set.

Persuading and Influencing

%58,4 of the Spanish students rate strong and very strong in Work Life Balance skill.

ENTERPRISING AND PERFORMING

Achieving Personal Work Goals and Objectives

%56 of the Spanish student's rate strong and very strong in Self-management and organization.

Entrepreneurial and Commercial Thinking

%47,8 of the Spanish students rate strong and very strong in Business model understanding and %50,6 rate strong and very strong in Entrepreneurship.

We also calculated mean scores of each 8 dimension in order to find out training needs of students in Spain in the age of Industry 4.0. While 1 refers to be weak, 5 refers to be strong. Table 2 shows the mean scores of Spanish students for all 8 dimensions.

Table 2. Mean Scores of 8 Dimensions of Students in Spain

Descriptives for Students in Spain		
DIMENSION	Mean	Std. Err.
1. Leading and Decision	3,5956	0,09157
1.1. Decision and Initial Action	3,7213	0,08942
1.2. Leading and Supervising	3,3443	0,12344
2. Supporting and Cooperation	3,959	0,10291
2.1. Working with People	3,9781	0,10623
2.2. Adhering to Principles and Values	3,9399	0,12357
3. Interacting and Presenting	3,7022	0,09237
3.1. Relating and Networking	3,7486	0,10502
3.2. Persuading and Influencing	3,7295	0,10749
3.3. Presenting and Communicating Information	3,5082	0,13352

4. Analyzing and Interpreting	2,9384	0,09455
4.1. Writing and Reporting	3,4262	0,11967
4.2. Applying Expertise and Technology	2,8282	0,09876
4.3. Analyzing	3,3279	0,11637
5. Creating and Conceptualization	3,4772	0,10487
5.1. Learning and Researching	3,5738	0,11016
5.2. Creating and Innovation	3,6066	0,11912
5.3. Formulating Strategies	3,2404	0,11482
6. Organizing and Executing	3,416	0,10506
6.1. Planning and Organization	3,4262	0,11214
6.2. Delivering Results and Meeting Customer Expectations	3,4836	0,12802
6.3. Following Instructions and Procedures	3,3607	0,12401
7. Adapting and Coping	3,6361	0,11693
7.1. Adopting and Responding to Change	3,6475	0,12319
7.2. Persuading and Influencing	3,5902	0,14291
8. Enterprising and Performing	3,5301	0,10975
8.1. Achieving Personal Work Goals and Objectives	3,5902	0,12884
8.2. Entrepreneurial and Commercial Thinking	3,5	0,1163

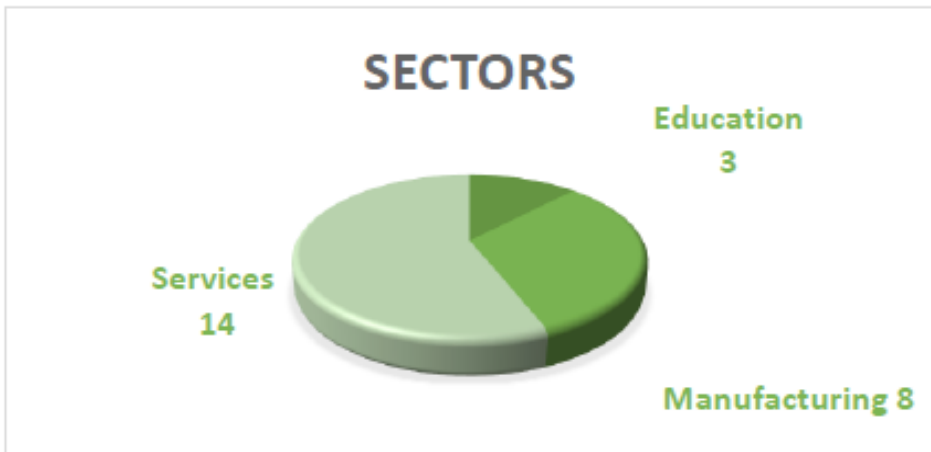
Table 2 indicates that, while the weakest dimension is analysing and interpreting as in all countries, supporting and cooperation dimension is the strongest one. It can be inferred from the table that the mean scores are more or less similar to the findings of the employees in Spain. The weakest and the strongest dimensions are the same both for the students and employees. As all the dimensions except from analysing and interpreting, capture more than 3 mean score (1 is min, 5 is max and 3 is average), we can say that Spanish students evaluate themselves not weak. Although Spanish students consider themselves not weak, there are some dimensions need to be trained such as analysing and interpreting, enterprising and performing, organizing and executing.

INTERVIEW WITH MANAGERS

To begin with, we will analyse the results obtained from the enquire made to managers from businesses related to the project “Career Guide and Mobile Application for Employees”. These enquires have been done with the objective of knowing the current situation of the work market for, subsequently, creating a complete guide and a mobile application. It is composed of fifteen questions related to business trend in different areas, in the business itself, in the sector they

belong to and the global economy. It also includes questions related to the current market perception and to its current situation.

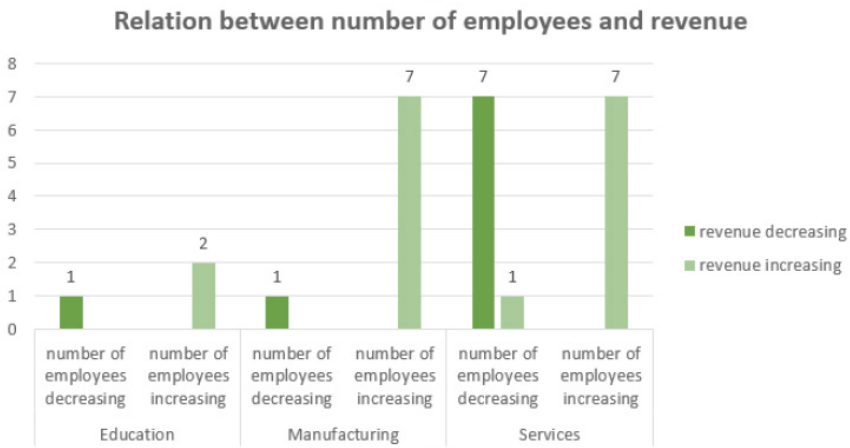
A total of 26 enquires were made. This, has been grouped in three sectors (*graphic 1*), education (3 cases), services (14 cases) and manufacturing (8 cases). We will have to take into account the short number of cases related educational sector. This classification in three different sectors will be useful as a basis for the analyses of the executed surveys. Thanks to this, a more exhaustive analysis of the real situation of the target study groups could be carried out.



Graphic 1: Sectors

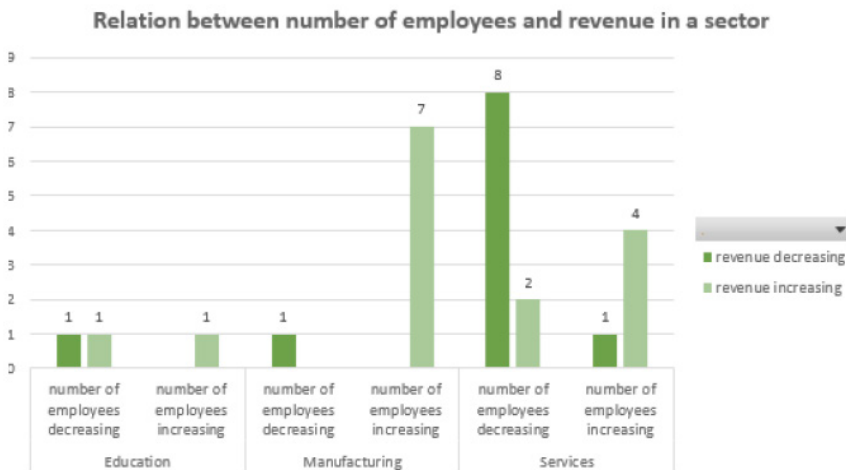
The respondents, in the first group of question, were asked about their perception of the real situation in three different levels: the business, the sector and the global economy.

First of all, we will analyse the business trend of the company of each one of the respondents. On the following *graphic (2)*, generated from the obtained data, we can observe the horizontal axle in which the three sectors are differentiated by the movement trend of the employees. The vertical axle shows the data related to the revenues. This representation shows that tendency is, in most of the cases, to increase the earnings and this is directly proportional to an increase in the number of employees hired. It is relevant in the cases of manufacturing and services where, as you can see in the graphic, they back for it. On the other hand, it has to be mentioned that services sector, in most of the cases, is looking for a decrease in the entries and consequently, in their employees.



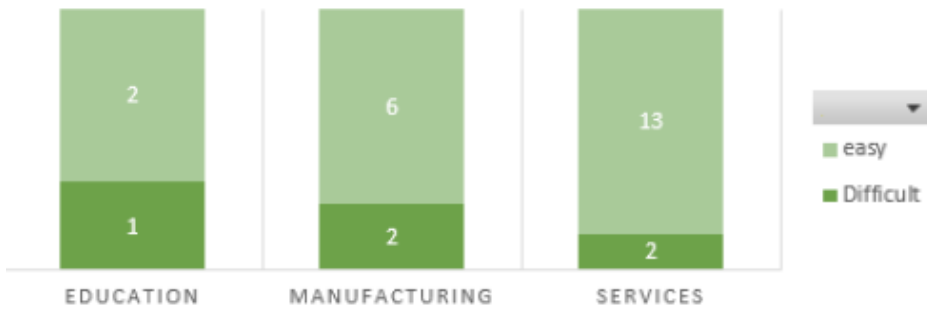
Graphic 2: Relation between number of employees and revenue in companies

The responders were asked about their perspective as managers of the current situation of the sector in which they work. The shown data reveals small variations regarding the companies’ situation (*graphic 3*). The most representative change reveals a negative tendency in the number of employees and the revenue of the services sector, on the other hand, the manufacture sector maintains their increasing tendency.



Graphic 3: Relation between number of employees and revenue in a sector

PERCEPTION OF FINDING A NEW JOB IN THE SAME SECTOR



Graphic 4: Perception of finding a new job in the same sector

Related to the global economy, in third place, we find a wide range of answers. Most of the respondents agreed that the global tendency is positive (12 cases) but, on the other hand 8 cases affirm that the economy tendency is failing. It is important to express that some of them tell that subcontracts or fusion of enterprises are new forms of global economy tendencies.

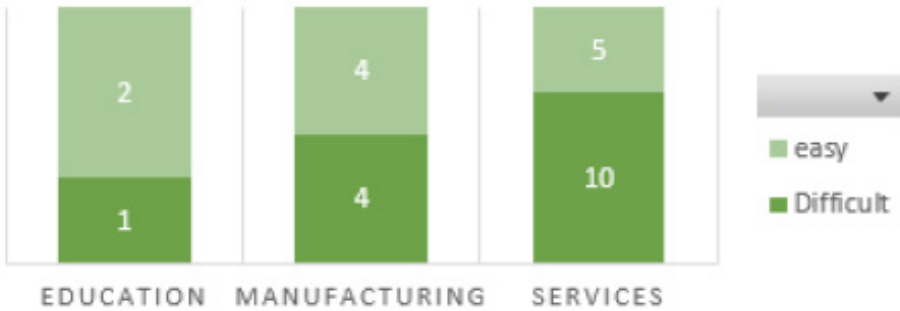
A new group of questions related to human resources ask about the potential change of job and how surveyed will deal with the situation.

Concerning the situation of each sector, respondents recognize that it won't be very difficult to find another job with the same conditions, the less difficult will be for services sector and the most for the educational sector because of its running as it can be seen in the graphic number 4.

Regarding their perception of finding a job in the same position, answers change a bit. It decreases the numbers of surveyed that find it easy against those who find it difficult. All of them agree in the same answer, if it would be necessary, they would agree to work in a lower position regardless of their background.

Related to their personal motivations, we could arrange a wide range of responses. Most of them are related to new projects regarding the market opportunities and to compete in a very changeable and fickle market. When they were asked about the areas where develop their skills in order to continue working as a manager, the answers were “*online*”, “*technologies*”, “*innovation*”, “*commercial*”, we couldn't establish a pattern.

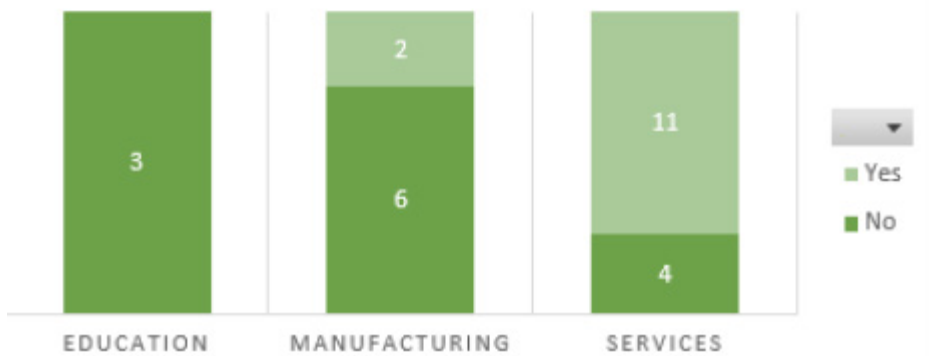
PERCEPTION OF FINDING A NEW JOB IN A SIMILAR POSITION



Graphic 5: Perception of finding a new job in a similar position

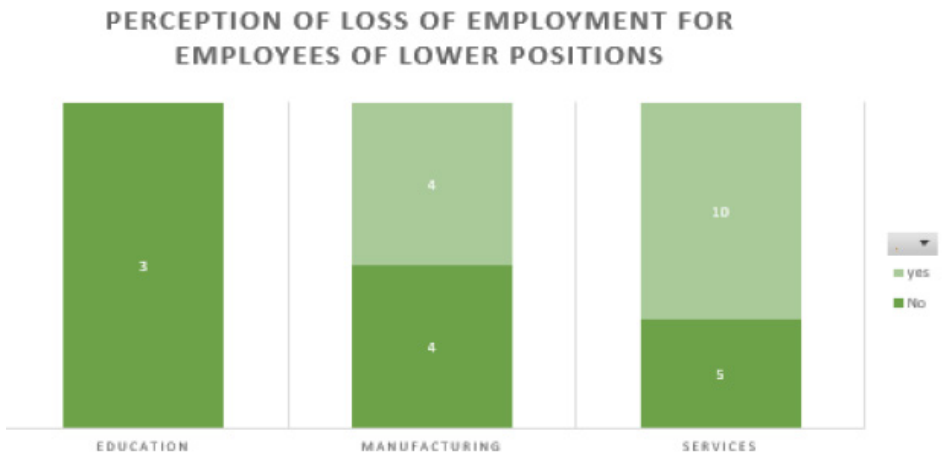
Technology is at the moment getting more importance in certain sectors, *graphic 6*. Managers don't consider it as a problem in education but, on the other hand, in services sector is becoming a new reality. This problem is still not as relevant in manufacturing.

PERCEPTION OF AUTOMATION AS A PROBLEM



Graphic 6: Perception of automation as a problem

Related to human resources, the arrival of industry 4.0 will lead to a job loss, this problem will affect employees of all the positions and not only to the lower ones as it reveals *graphic number 7*. It will be advantageous for the company but it will cause a loss of employment or a conversion of those staff, as a respondent explains “*I think that the sector would benefit since the data that would be handled would be up-to-date, and in relation to employment it would force employees without specific training in the sector to be updated through training courses.*”



**Graphic 7: Perception of loss of employment
for employees of lower positions**

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CONCLUSION REMARKS – SUGGESTION FOR CAREER PATHS TO INDUSTRY 4.0

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The projects aims to determine training needs of the students as potential employees and the employees. As we are in a transformation phase in digitization of manufacturing processes, the study takes training needs of the new industrial revolution also known as industry 4.0. First industrial revolution is the use of steam power, second industrial revolution of electric motors, and the third is the programmable logic controllers or CNCs in manufacturing. The fourth industrial revolution adheres to the connecting computers and allowing machines communicate with each other to make decisions without human involvement, also known as internet of things, allowing smart factories. The new paradigm shift in manufacturing processes requires new skills, as current education system is designed for previous production, the study proposes that employees and students may need training to adopt themselves for new production pattern.

Conclusion for Students and Employees

The study took place in Spain, Poland, Hungary, Romania and Turkey. Data is collected from 90 students and 61 employees in Spain, 89 students and 73 employees in Romania, 100 students and 58 employees in Hungary, 138 students and 94 employees in Poland and 109 students and 60 employees in Turkey, with purposive sampling. Based on Prifti et. al. (2017) Industrie 4.0 Competency Model a questionnaire form is used as the data collection tool. Frequency analysis is conducted in order to determine the training need analysis of students and employees in each country. While table 1 shows the findings for students, table 2 shows the results for employees in 5 partner countries.

Table 1. Statistics for Students in 5 Countries

Descriptives for Students			
DIMENSION	COUNTRY	MEAN	STD. ERROR
1. Leading and Decision	SPAIN	3,5956	,09157
	ROMANIA	3,7333	,10697
	HUNGARY	3,7739	,08574
	POLAND	3,8019	,04904
	TURKEY	3,7262	,08300
	TOTAL	3,7425	,03481
1.1. Decision and Initial Action	SPAIN	3,7213	,08942
	ROMANIA	4,0385	,10302
	HUNGARY	3,8736	,08813
	POLAND	3,9094	,05045
	TURKEY	3,7381	,08231
	TOTAL	3,8621	,03503
1.2. Leading and Supervising	SPAIN	3,3443	,12344
	ROMANIA	3,1231	,15583
	HUNGARY	3,5747	,10293
	POLAND	3,5870	,07253
	TURKEY	3,7024	,09844
	TOTAL	3,5034	,04710
2. Supporting and Cooperation	SPAIN	3,9590	,10291
	ROMANIA	4,3641	,08072
	HUNGARY	3,9157	,07477
	POLAND	3,9251	,04068
	TURKEY	3,7599	,05725
	TOTAL	3,9617	,03054
2.1. Working with People	SPAIN	3,9781	,10623
	ROMANIA	4,4462	,09078
	HUNGARY	4,1533	,08457
	POLAND	3,9734	,04969
	TURKEY	3,7262	,07641
	TOTAL	4,0330	,03546
2.2. Adhering to Principles and Values	SPAIN	3,9399	,12357
	ROMANIA	4,2821	,08747
	HUNGARY	3,6782	,08879
	POLAND	3,8768	,05178
	TURKEY	3,7937	,06796
	TOTAL	3,8904	,03598

3. Interacting and Presenting	SPAIN	3,7022	,09237
	ROMANIA	3,3256	,12084
	HUNGARY	3,9521	,07442
	POLAND	3,5495	,04623
	TURKEY	3,6131	,06179
	TOTAL	3,6303	,03388
3.1. Relating and Networking	SPAIN	3,7486	,10502
	ROMANIA	3,0872	,13039
	HUNGARY	3,9425	,08429
	POLAND	3,4420	,05390
	TURKEY	3,6349	,06813
	TOTAL	3,5693	,03874
3.2. Persuading and Influencing	SPAIN	3,7295	,10749
	ROMANIA	3,3923	,14231
	HUNGARY	3,9368	,08488
	POLAND	3,6993	,05156
	TURKEY	3,5893	,09512
	TOTAL	3,6839	,04025
3.3. Presenting and Communicating Information	SPAIN	3,5082	,13352
	ROMANIA	3,9077	,12350
	HUNGARY	4,0115	,09028
	POLAND	3,5725	,06967
	TURKEY	3,5952	,09747
	TOTAL	3,7057	,04393
4. Analyzing and Interpreting	SPAIN	2,9384	,09455
	ROMANIA	2,6488	,12537
	HUNGARY	2,9473	,07520
	POLAND	2,9425	,04936
	TURKEY	3,1248	,05917
	TOTAL	2,9342	,03408
4.1. Writing and Reporting	SPAIN	3,4262	,11967
	ROMANIA	3,5846	,11735
	HUNGARY	4,0057	,08554
	POLAND	3,8877	,04657
	TURKEY	3,4345	,07323
	TOTAL	3,7138	,03762

4.2. Applying Expertise and Technology	SPAIN	2,8282	,09876
	ROMANIA	2,4642	,13631
	HUNGARY	2,7281	,08392
	POLAND	2,7895	,05282
	TURKEY	3,0383	,06478
	TOTAL	2,7821	,03712
4.3. Analyzing	SPAIN	3,3279	,11637
	ROMANIA	3,2423	,12488
	HUNGARY	3,6782	,08465
	POLAND	3,3496	,05883
	TURKEY	3,4673	,07343
	TOTAL	3,4190	,03853
5. Creating and Conceptualization	SPAIN	3,4772	,10487
	ROMANIA	3,2650	,12590
	HUNGARY	3,6564	,07749
	POLAND	3,4936	,05215
	TURKEY	3,5979	,06714
	TOTAL	3,5098	,03569
5.1. Learning and Researching	SPAIN	3,5738	,11016
	ROMANIA	3,9769	,11728
	HUNGARY	3,6839	,10016
	POLAND	3,8333	,05475
	TURKEY	3,7262	,08694
	TOTAL	3,7678	,03936
5.2. Creating and Innovation	SPAIN	3,6066	,11912
	ROMANIA	3,2654	,14707
	HUNGARY	3,9454	,08321
	POLAND	3,6214	,05407
	TURKEY	3,5833	,07447
	TOTAL	3,6236	,04021
5.3. Formulating Strategies	SPAIN	3,2404	,11482
	ROMANIA	2,7897	,13147
	HUNGARY	3,2529	,08634
	POLAND	3,0966	,06507
	TURKEY	3,5317	,08508
	TOTAL	3,1862	,04170

6. Organizing and Executing	SPAIN	3,4160	,10506
	ROMANIA	3,2673	,11804
	HUNGARY	3,5302	,08644
	POLAND	3,5507	,05569
	TURKEY	3,5134	,07764
	TOTAL	3,4782	,03705
6.1. Planning and Organization	SPAIN	3,4262	,11214
	ROMANIA	2,7333	,14233
	HUNGARY	3,7280	,09968
	POLAND	3,5411	,06480
	TURKEY	3,5159	,09163
	TOTAL	3,4368	,04511
6.2. Delivering Results and Meeting Customer Expectations	SPAIN	3,4836	,12802
	ROMANIA	3,0846	,16208
	HUNGARY	3,6494	,11360
	POLAND	3,5507	,07131
	TURKEY	3,5119	,10542
	TOTAL	3,4839	,04898
6.3. Following Instructions and Procedures	SPAIN	3,3607	,12401
	ROMANIA	3,9231	,10884
	HUNGARY	3,2529	,09021
	POLAND	3,5604	,06123
	TURKEY	3,5119	,07750
	TOTAL	3,5157	,03971
7. Adapting and Coping	SPAIN	3,6361	,11693
	ROMANIA	3,5015	,12428
	HUNGARY	3,6345	,08209
	POLAND	3,6058	,05167
	TURKEY	3,5810	,06686
	TOTAL	3,5954	,03618
7.1. Adopting and Responding to Change	SPAIN	3,6475	,12319
	ROMANIA	3,5385	,11950
	HUNGARY	3,6523	,08930
	POLAND	3,5870	,05620
	TURKEY	3,6012	,06842
	TOTAL	3,6040	,03765

7.2. Persuading and Influencing	SPAIN	3,5902	,14291
	ROMANIA	3,3538	,16027
	HUNGARY	3,5632	,09631
	POLAND	3,6812	,06422
	TURKEY	3,5000	,09042
	TOTAL	3,5609	,04552
8. Enterprising and Performing	SPAIN	3,5301	,10975
	ROMANIA	2,7744	,14873
	HUNGARY	3,5977	,08585
	POLAND	3,4493	,05794
	TURKEY	3,7143	,08086
	TOTAL	3,4406	,04232
8.1. Achieving Personal Work Goals and Objectives	SPAIN	3,5902	,12884
	ROMANIA	3,2308	,16521
	HUNGARY	3,7701	,09349
	POLAND	3,8478	,07119
	TURKEY	3,9524	,09416
	TOTAL	3,7241	,04722
8.2. Entrepreneurial and Commercial Thinking	SPAIN	3,5000	,11630
	ROMANIA	2,5462	,16251
	HUNGARY	3,5115	,09944
	POLAND	3,2500	,06571
	TURKEY	3,5952	,08614
	TOTAL	3,2989	,04703

Table 2. Statistics for Employees in 5 Countries

Descriptives for Employees			
DIMENSION	COUNTRY	MEAN	STD. ERROR
1. Leading and Decision	SPAIN	3,6525	,06645
	ROMANIA	4,2667	,08672
	HUNGARY	3,4422	,12387
	POLAND	3,9468	,05777
	TURKEY	3,9063	,11323
	TOTAL	3,8735	,04133

1.1. Decision and Initial Action	SPAIN	3,7979	,08691
	ROMANIA	4,4583	,08917
	HUNGARY	3,5714	,13041
	POLAND	4,0585	,06800
	TURKEY	4,0469	,12370
	TOTAL	4,0142	,04549
1.2. Leading and Supervising	SPAIN	3,3617	,09338
	ROMANIA	3,8833	,09827
	HUNGARY	3,1837	,12934
	POLAND	3,7234	,08061
	TURKEY	3,6250	,13282
	TOTAL	3,5922	,04820
2. Supporting and Cooperation	SPAIN	4,1028	,07813
	ROMANIA	4,6250	,06259
	HUNGARY	3,6224	,11952
	POLAND	4,0745	,05189
	TURKEY	4,0365	,09892
	TOTAL	4,1135	,03920
2.1. Working with People	SPAIN	4,0922	,10021
	ROMANIA	4,7056	,06243
	HUNGARY	3,6871	,13164
	POLAND	4,1454	,06369
	TURKEY	4,0938	,10608
	TOTAL	4,1702	,04380
2.2. Adhering to Principles and Values	SPAIN	4,1135	,08619
	ROMANIA	4,5444	,08309
	HUNGARY	3,5578	,11999
	POLAND	4,0035	,05869
	TURKEY	3,9792	,12517
	TOTAL	4,0567	,04308
3. Interacting and Presenting	SPAIN	3,6738	,08632
	ROMANIA	3,8167	,09203
	HUNGARY	3,6088	,12854
	POLAND	3,6791	,05373
	TURKEY	3,8073	,11128
	TOTAL	3,7098	,03958

3.1. Relating and Networking	SPAIN	3,6809	,10287
	ROMANIA	3,5944	,09993
	HUNGARY	3,6054	,12511
	POLAND	3,5213	,06565
	TURKEY	3,9063	,11323
	TOTAL	3,6217	,04339
3.2. Persuading and Influencing	SPAIN	3,6596	,10872
	ROMANIA	3,9083	,11053
	HUNGARY	3,6939	,14567
	POLAND	3,7234	,06445
	TURKEY	3,7656	,13467
	TOTAL	3,7518	,04701
3.3. Presenting and Communicating Information	SPAIN	3,6809	,14300
	ROMANIA	4,3000	,11473
	HUNGARY	3,4490	,15720
	POLAND	4,0638	,07684
	TURKEY	3,5938	,16716
	TOTAL	3,8901	,05679
4. Analyzing and Interpreting	SPAIN	2,8995	,10446
	ROMANIA	2,9707	,10460
	HUNGARY	2,7319	,11071
	POLAND	2,8206	,06643
	TURKEY	3,0259	,12125
	TOTAL	2,8736	,04306
4.1. Writing and Reporting	SPAIN	3,6915	,09068
	ROMANIA	4,2417	,09395
	HUNGARY	3,3878	,15990
	POLAND	4,1223	,05593
	TURKEY	3,5938	,13552
	TOTAL	3,8883	,04822
4.2. Applying Expertise and Technology	SPAIN	2,7262	,11509
	ROMANIA	2,7261	,11312
	HUNGARY	2,5652	,11245
	POLAND	2,5842	,07176
	TURKEY	2,8818	,13025
	TOTAL	2,6685	,04612

4.3. Analyzing	SPAIN	3,5000	,11431
	ROMANIA	3,7417	,11476
	HUNGARY	3,3622	,13424
	POLAND	3,5293	,07993
	TURKEY	3,5703	,14031
	TOTAL	3,5452	,04983
5. Creating and Conceptualization	SPAIN	3,5887	,09273
	ROMANIA	3,8093	,09945
	HUNGARY	3,4308	,13112
	POLAND	3,6939	,06019
	TURKEY	3,6285	,12735
	TOTAL	3,6478	,04293
5.1. Learning and Researching	SPAIN	3,6383	,11552
	ROMANIA	4,3583	,09289
	HUNGARY	3,4694	,15251
	POLAND	4,2979	,06251
	TURKEY	3,8125	,13975
	TOTAL	4,0018	,05083
5.2. Creating and Innovation	SPAIN	3,7447	,10244
	ROMANIA	3,8375	,11443
	HUNGARY	3,6173	,14100
	POLAND	3,7739	,06517
	TURKEY	3,5391	,14641
	TOTAL	3,7287	,04724
5.3. Formulating Strategies	SPAIN	3,3475	,11994
	ROMANIA	3,4056	,11620
	HUNGARY	3,1565	,13081
	POLAND	3,1844	,08309
	TURKEY	3,6250	,13112
	TOTAL	3,3038	,05061
6. Organizing and Executing	SPAIN	3,5372	,09943
	ROMANIA	3,8188	,10212
	HUNGARY	3,3393	,12742
	POLAND	3,7340	,05438
	TURKEY	3,7422	,11799
	TOTAL	3,6516	,04265

6.1. Planning and Organization	SPAIN	3,6312	,12672
	ROMANIA	3,4778	,13028
	HUNGARY	3,3946	,13527
	POLAND	3,6738	,06554
	TURKEY	3,6354	,13417
	TOTAL	3,5721	,04981
6.2. Delivering Results and Meeting Customer Expectations	SPAIN	3,4149	,14691
	ROMANIA	3,8000	,14468
	HUNGARY	3,7041	,14647
	POLAND	3,8564	,07199
	TURKEY	3,6875	,13975
	TOTAL	3,7252	,05531
6.3. Following Instructions and Procedures	SPAIN	3,5248	,10074
	ROMANIA	4,1722	,09720
	HUNGARY	3,0408	,13973
	POLAND	3,7128	,07264
	TURKEY	3,8854	,13604
	TOTAL	3,6820	,05061
7. Adapting and Coping	SPAIN	3,6681	,08863
	ROMANIA	4,0400	,09301
	HUNGARY	3,3265	,13699
	POLAND	3,6830	,05923
	TURKEY	3,7563	,11526
	TOTAL	3,7028	,04344
7.1. Adopting and Responding to Change	SPAIN	3,6755	,09646
	ROMANIA	4,0042	,10197
	HUNGARY	3,3520	,14796
	POLAND	3,7314	,06486
	TURKEY	3,7422	,11419
	TOTAL	3,7154	,04628
7.2. Persuading and Influencing	SPAIN	3,6383	,15032
	ROMANIA	4,1833	,09653
	HUNGARY	3,2245	,15503
	POLAND	3,4894	,09415
	TURKEY	3,8125	,17061
	TOTAL	3,6525	,05880

8. Enterprising and Performing	SPAIN	3,4610	,10267
	ROMANIA	3,4611	,12096
	HUNGARY	3,4354	,13650
	POLAND	3,3936	,08066
	TURKEY	3,7604	,11422
	TOTAL	3,4681	,04917
8.1. Achieving Personal Work Goals and Objectives	SPAIN	3,8298	,12658
	ROMANIA	4,0500	,11256
	HUNGARY	3,6122	,15923
	POLAND	3,8936	,08485
	TURKEY	3,8750	,13282
	TOTAL	3,8652	,05327
8.2. Entrepreneurial and Commercial Thinking	SPAIN	3,2766	,12523
	ROMANIA	3,1667	,15204
	HUNGARY	3,3469	,13771
	POLAND	3,1436	,09282
	TURKEY	3,7031	,12869
	TOTAL	3,2695	,05734

Findings suggest that in each country studied, both the students and the employees lack “analyzing and interpreting skills” which involves mostly IT and machine learning skills. This dimension is found as the weakest dimension of all 8 dimensions. In each partner countries participants are not skilled for Applying Expertise and Technology dimension, the lowest reported skills are Robotics/Artificial intelligence, Predictive maintenance and Big data/Data analysis and interpretation. Mostly participants are found to be weak in these areas: Legislation awareness, Creating business networks, Economics, Extract business value from social media, Service orientation/product service offerings, Business process management, Business change management, Network security, IT architectures, System development, Integrating heterogeneous Technologies, Sensors/embedded systems, Network technology/M2M communication, Robotics/Artificial intelligence, Predictive maintenance, Modelling and programming, Big data/Data analysis and interpretation, Cloud computing/architectures, In-memory DBs, Statistics, Data security, Business strategy. It can be concluded that both the students and the employees lack these skills regardless of the country.

When the dimensions are evaluated separately, it is seen that the first dimension, leading and decision dimension is rated by students as 3.74 and

3.87 by employees. There is no difference among countries in terms of students. However, there is a difference in employees; Romanian employees can be said that they are the strongest in leading and decision dimension by rated 4.26.

When supporting and cooperation dimension has been investigated, it is seen that this dimension is rated by students as 3.96 and 4.11 by employees. This dimension is the strongest dimension among 8 dimensions. The reason why employees feel themselves better in this dimension than students can be the experience of the employees. There is a difference among countries in supporting and cooperation dimension. Romanian students and employees declares that they are strong in this dimension.

When interacting and presenting dimension is studied, it can be seen that this dimension is rated by students as 3.63 and 3.70 by employees. There is not such difference between students and employees in general. While Hungarian students are the strongest who rated 3.95 for this dimension, Romanian employees are the strongest who rated 3.81 for this dimension.

When analyzing and interpreting dimension has been evaluated it is seen that this dimension is rated by students as 2.93 and 2.87 by employees. There is no difference between students and employees in terms of scores. However, employees have higher scores than students in other dimensions. In analyzing and interpreting dimension students are found to be slightly higher than employees. The reason for the fact that students has higher scores than the employees may result from their age. Because new generation is born with technology. When the countries are compared, Turkey is found to have highest scores in this dimension. Turkish students rate as 3.12 and Turkish employees rate as 3.02. This dimension has 3 sub-dimensions; writing and reporting, applying expertise and technology and analyzing. The weakest sub-dimension is found to be applying expertise and technology both for students and employees.

When the fifth dimension, creating and conceptualization is evaluated it is seen that this dimension is rated by students as 3.50 and 3.64 by employees. It can be suggested that there is no difference between two groups. When the countries are compared, Hungary is the country found strongest in this dimension for students and Romania is the country found strongest in this dimension for employees. Hungarian students are found to be the highest scores as 3.65 and Romanian employees rated themselves as 3.80.

When the sixth dimension organizing and executing dimension is evaluated, it is seen that this dimension is rated by students as 3.47 and 3.65 by employees. When the countries are compared, Poland is the country found strongest in this dimension for students (Hungarian scores are slightly differ than Polish one) and

Romania is the country found strongest in this dimension for employees. Polish students are found to be the highest scores as 3.55 and Romanian employees rated themselves as 3.81.

When the seventh dimension adapting and coping dimension is evaluated, it is seen that this dimension is rated by students as 3.59 and 3.70 by employees. When the countries are compared, Spain and Hungary are the countries found strongest in this dimension for students and Romania is the country found strongest in this dimension for employees.

When the last dimension enterprising and performing dimension is evaluated, it is seen that this dimension is rated by students as 3.44 and 3.46 by employees. When the countries are compared, Turkey is the country found strongest in this dimension both for students (3.71) and for employees (3.76).

To sum up the findings, it can be infer that while analyzing and interpreting dimension is found to be the weakest dimension both for students and employees, supporting and cooperation dimension is found to be the strongest dimension both for students and employees in five countries. Employees have more scores than students in all dimensions except analyzing and interpreting dimension which is related to technology. In general Romanian employees are better than other countries' employees except two dimensions; analyzing and interpreting dimension and enterprising and performing dimension. In these two dimensions both Turkish students and employees are found to have highest scores.

In the light of this research, it can be suggested that employees need additional training in these areas:

- Analyzing and interpreting
 - Applying expertise and technology
- Creating and Conceptualizing
 - Formulating strategies
- Enterprising and Performing
 - Entrepreneurial and commercial thinking

In the light of this research, it can be suggested that students need additional training in these areas:

- Analyzing and interpreting
 - Applying expertise and technology
 - Analyzing
- Creating and Conceptualizing

- Formulating strategies
- Organizing and Executing
 - Planning and organization
 - Delivering results and meeting customer expectations
- Enterprising and Performing
 - Entrepreneurial and commercial thinking

The findings of the study suggests that employees and students are aware of the changing business dynamics. However, they have difficulties in adapting themselves to new business styles. They know making money dynamics is changing, but they do not know how to make money in this new era. Every person should not need to be a software expert, but should know how to do business with this new business styles. Thus, the authors suggest that, employees and students should be trained in the areas that sharpens their entrepreneurial skills.

Conclusion for Managers

As the project targets also the managers, the research focuses on the managers. As it is quite difficult to conduct a questionnaire to the managers, it is preferred to conduct in-deep interview. Due to the difficulty in getting the managers to fill in the questionnaire, the best solution is considered be to carry out an “In deep interview” in order to find out the views of managers on Industry 4.0. As there are big challenges that are being totally changing the labour conditions in our society, it is aimed to understand and find out whether the business market is ready for the changes in the near future and how the companies deal with the Industrial Revolution 4.0. Each five country have conducted semi-structured interview with the managers from the sectors of education, service and manufacture. Before starting the interviews with the managers, the aim of the project was told and asked whether the interviewee is already aware of Industry 4.0. If the interviewee does not know I4.0, then the concept of I4.0 is explained with examples.

- **Findings for new position in another sector:**

Turkish managers state that they can easily find a new position in another sector. The sectors varies from advertising, real estate industry, geology to education. . Polish managers and Spanish are in the opinion that it is rather easy. All the managers in Hungary answered that it would be easy, because Hungarian managers all are confident leaders and good professionals. As some of them said unfortunately there is lack of professionals in Hungary at the moment. But Romanian managers think that it is hard to find a new position in another sector.

- **Findings for preserving working as manager:**

All Turkish managers regardless of the sector stress that they can find a new position in the same position as a manager. Hungarian managers think that it is quite easy to find a new job as manager again. But Romanian and Polish managers think that it is hard and difficult to find a new position in the same position.

The Skill Kit in Order to Continue Working as a Manager:

For service sector: in order to keep the customer satisfaction to keep up to date himself/herself on the sector, in order to capture the requirements of the digital age knowledge on digital media and internet, digitalization and IT, ICT, time management, having a good mentoring programme, life long learning and development of skills like leadership

For manufacturing sector: knowledge on human resources, good command of subject on law, digital integration, system design, environmental management, presentation skills, anger management, communication skills, digitalization and IT, work-life balance, ICT, having a good mentoring programme, life long learning and development of skills like leadership

For education sector: interpersonal communication, knowledge on technology, foreign language, digitalization and IT, having a good mentoring programme, life long learning and development of skills like leadership

- **The Effects of Industry 4.0 for Lower Positions:**

Turkish managers have different opinion about the effects of Industry 4.0 for lower positions. The managers in tourism sector believes that the Industry 4.0 will have little effect on tourism sector even for the lower positions because service sectors rely on human interaction. The managers in education sector believes that automation can be a threat for administrative staff and the academics who give lectures on common courses such as Turkish language, history because of online education. The managers in manufacturing sector believes that automation has already a threat for lower positions. Polish managers, despite the threat of automation, are not afraid that their or their employees are going to lose their jobs. Hungarian managers think that Industry 4.0 is already present and for sure will be in the future too. They said that there will be changes, but also new challenges, where human resoruces will be needed. They need to be re-trained. Spanish managers think that related to human resources, the arrival of industry 4.0 will lead to a job loss.