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## **NEED ANALYSIS REPORT**

### **CAREER GUIDE AND MOBILE APPLICATION FOR EMPLOYEES”**

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# NEED ANALYSIS REPORT – ROMANIA

## CHAPTER I

### 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, 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**

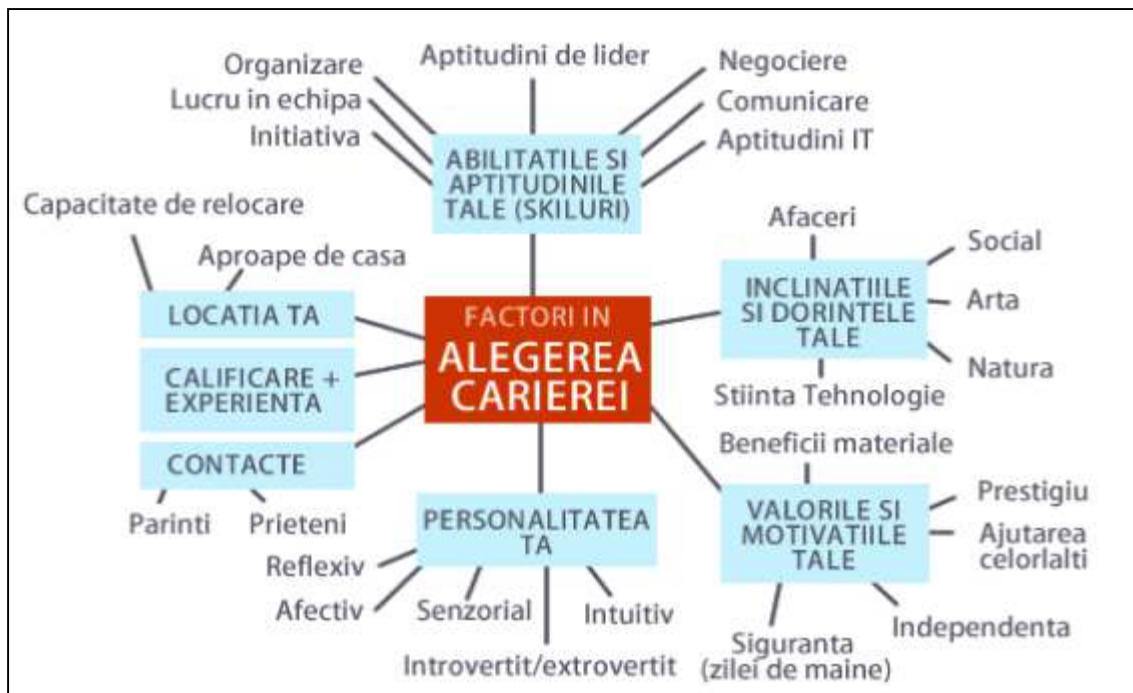
In Romania, counseling and career guidance has begun to benefit from the attention of educational decision makers, becoming a public policy object, along with the reform of education.

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.*



*Factors influencing career choices*

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.

## CHAPTER II

### GENERAL INFORMATION ABOUT THE LABOR 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?**

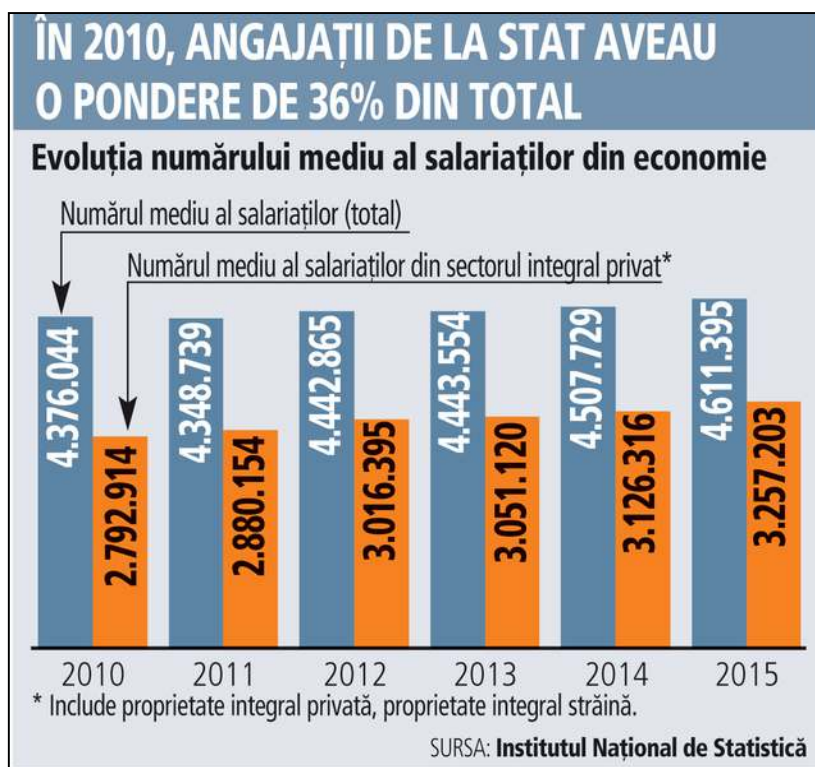
There are just over four million employees in our country, of which 1.2 million are budget members and the other 2.8 million works in the private system.

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.

*Number of unemployed and unemployment rate in 2004-2018*

Seasonally adjusted series						Trend					
Year	Month	Number of unemployed	Year	Luna	Unemployment rate	Year	Luna	Number of unemployed	Year	Month	Unemployment rate
2004	1	881012	2004	1	8,9	2004	1	860789	2004	1	8,7
	2	738016		2	7,5		2	795440		2	8,0
	3	767821		3	7,8		3	798294		3	8,0
	4	801255		4	7,9		4	798847		4	8,0

	5	754219		5	7,7		5	793235		5	8,0
	6	788471		6	7,9		6	792734		6	8,0
	7	783132		7	7,8		7	800350		7	8,0
	8	819137		8	8,2		8	806711		8	8,1
	9	796702		9	8,0		9	803684		9	8,0
	10	787857		10	7,9		10	796566		10	8,0
	11	793616		11	7,9		11	793815		11	7,9
	12	797330		12	7,9		12	794578		12	7,9
2005	1	788159	2005	1	7,9	2005	1	796324	2005	1	8,0
	2	794950		2	8,0		2	798582		2	8,0
	3	795324		3	8,0		3	802518		3	8,0
	4	716322		4	7,2		4	723834		4	7,3
	5	732591		5	7,4		5	729112		5	7,4
	6	729241		6	7,3		6	725631		6	7,4
	7	637227		7	6,6		7	643282		7	6,6
	8	625250		8	6,5		8	634398		8	6,5
	9	610297		9	6,4		9	636751		9	6,6
	10	664821		10	6,7		10	647639		10	6,6
	11	657714		11	6,7		11	653183		11	6,6
	12	643364		12	6,5		12	652644		12	6,6
2006	1	704755	2006	1	7,1	2006	1	705239	2006	1	7,1
	2	722515		2	7,3		2	709153		2	7,1
	3	708000		3	7,0		3	709155		3	7,1
	4	704248		4	7,0		4	708528		4	7,1
	5	709654		5	7,1		5	710177		5	7,1
	6	692635		6	6,9		6	716741		6	7,1
	7	766313		7	7,5		7	742494		7	7,3
	8	744035		8	7,3		8	749459		8	7,4
	9	772211		9	7,6		9	749592		9	7,4
	10	693995		10	7,0		10	705369		10	7,0
	11	697772		11	7,0		11	701355		11	7,0
	12	708503		12	7,1		12	693746		12	6,9
2007	1	659850	2007	1	6,6	2007	1	681110	2007	1	6,8
	2	683830		2	6,8		2	672223		2	6,7
	3	660691		3	6,6		3	667638		3	6,7
	4	672971		4	6,8		4	662257		4	6,6
	5	652091		5	6,6		5	654690		5	6,6
	6	656036		6	6,6		6	645145		6	6,5
	7	631508		7	6,3		7	633024		7	6,3
	8	613808		8	6,1		8	620761		8	6,2
	9	615829		9	6,1		9	610537		9	6,1
	10	580134		10	5,9		10	601072		10	6,0
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	12	582863		12	5,9		12	591448		12	6,0
2008	1	567068	2008	1	5,7	2008	1	571091	2008	1	5,8
	2	561524		2	5,7		2	569382		2	5,8
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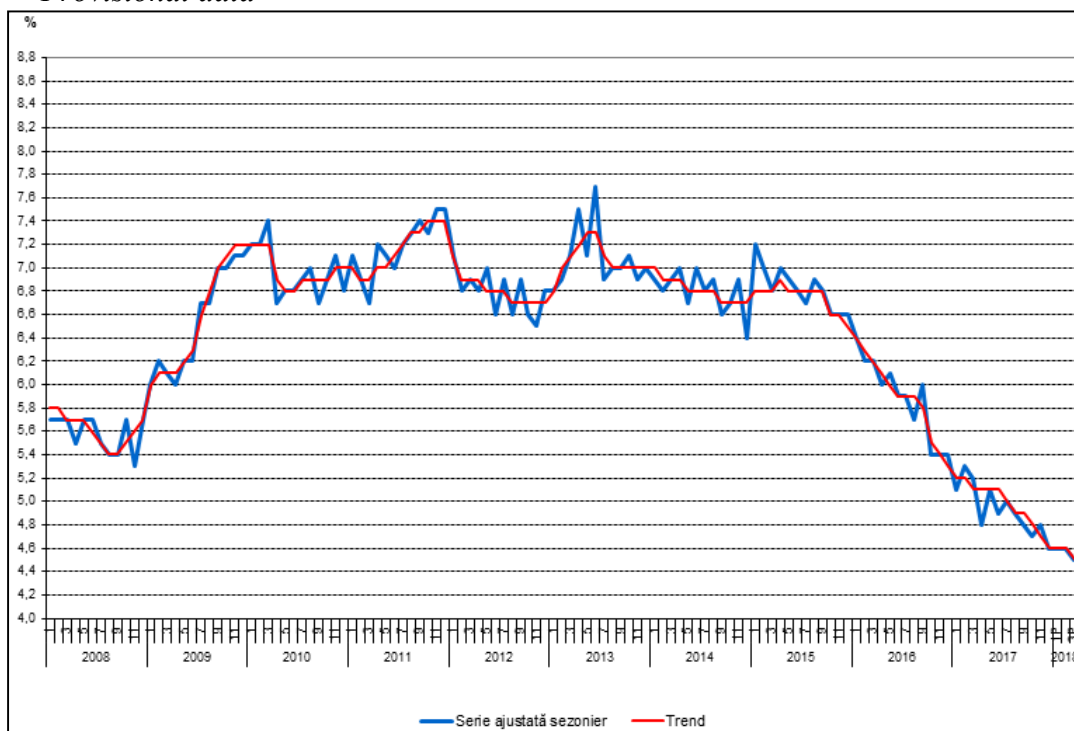
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	10	558673		10	5,7		10	541825		10	5,5
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	12	563153		12	5,7		12	555267		12	5,7
2009	1	579491	2009	1	6,0	2009	1	587219	2009	1	6,0
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	12	661553		12	7,1		12	678160		12	7,2
2010	1	672554	2010	1	7,2	2010	1	677231	2010	1	7,2
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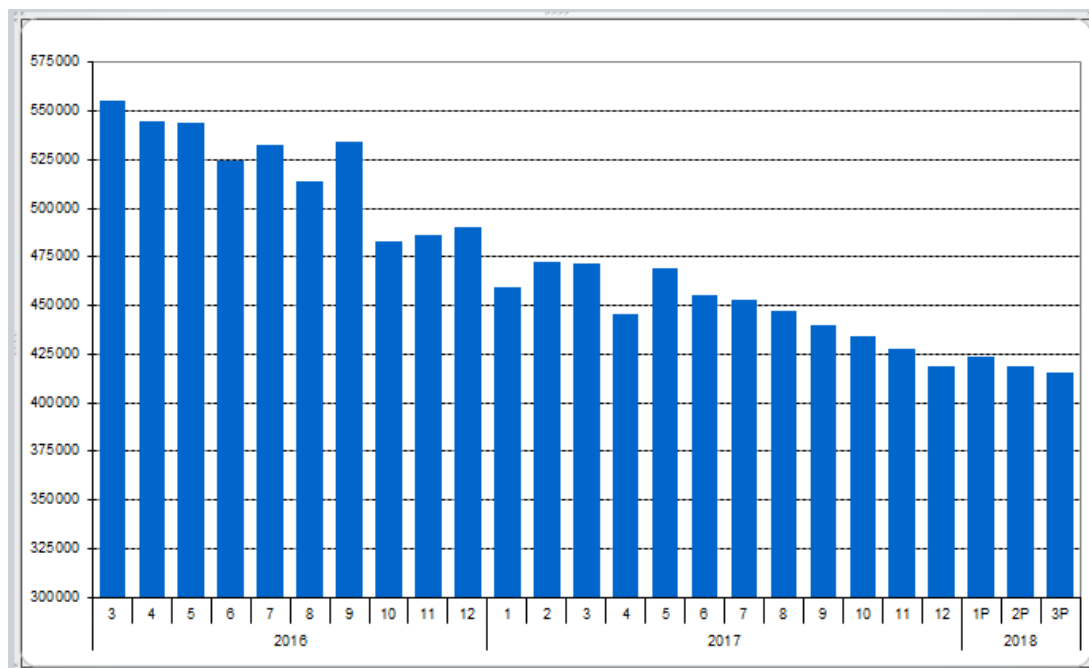
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2013	1	625950	2013	1	6,8	2013	1	631924	2013	1	6,8
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	4	685964		4	7,5		4	666178		4	7,2
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2014	1	641290	2014	1	6,9	2014	1	643650	2014	1	7,0
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	4	636257		4	7,0		4	633566		4	6,9
	5	618042		5	6,7		5	629336		5	6,8
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	11	636051		11	6,9		11	621531		11	6,7
	12	597694		12	6,4		12	618577		12	6,7
2015	1	640125	2015	1	7,2	2015	1	621174	2015	1	6,8
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2015	4	648592		4	7,0		4	628656		4	6,9
2015	5	627254		5	6,9		5	626829		5	6,8
2015	6	624837		6	6,8		6	622660		6	6,8
2015	7	616078		7	6,7		7	622704		7	6,8
2015	8	634511		8	6,9		8	624669		8	6,8
2015	9	621853		9	6,8		9	621544		9	6,8
2015	10	607151		10	6,6		10	606997		10	6,6
2015	11	600529		11	6,6		11	602322		11	6,6
2015	12	601608		12	6,6		12	598260		12	6,5
2016	1	585682	2016	1	6,4	2016	1	578259	2016	1	6,4
2016	2	562959		2	6,2		2	566418		2	6,3
2016	3	555143		3	6,2		3	554490		3	6,2
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	5	544310		5	6,1		5	538084		5	6,0
	6	524225		6	5,9		6	529133		6	5,9
	7	532779		7	5,9		7	529101		7	5,9
	8	513655		8	5,7		8	524842		8	5,9
	9	534182		9	6,0		9	519771		9	5,8
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	11	485919		11	5,4		11	485582		11	5,4

	12	490064		12	5,4		12	478392		12	5,3
2017	1	459678	2017	1	5,1	2017	1	471086	2017	1	5,2
	2	472271		2	5,3		2	466495		2	5,2
	3	471924		3	5,2		3	462618		3	5,1
	4	445261		4	4,8		4	460448		4	5,1
	5	469592		5	5,1		5	461797		5	5,1
	6	455316		6	4,9		6	459875		6	5,1
	7	452953		7	5,0		7	453842		7	5,0
	8	447508		8	4,9		8	447949		8	4,9
	9	439713		9	4,8		9	441144		9	4,9
	10	434422		10	4,7		10	433059		10	4,8
	11	427466		11	4,8		11	425919		11	4,7
	12	418744		12	4,6		12	421515		12	4,6
2018	1P	423907	2018	1P	4,6	2018	1P	419491	2018	1P	4,6
	2P	418823		2P	4,6		2P	418155		2P	4,6
	3P	415173		3P	4,5		3P	415479		3P	4,5

<sup>P</sup> Provisional data





*Unemployment rate by sex (%)*

	2017										2018		
	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan. <sup>P</sup>	Feb. <sup>P</sup>	Mar. <sup>P</sup>
<b>Total</b>													
15-74 years	5,2	4,8	5,1	4,9	5,0	4,9	4,8	4,7	4,8	4,6	4,6	4,6	4,5
15-24 years	19,1	17,3	17,3	17,3	17,8	17,8	17,8	20,0	20,0	20,0	..	..	..
25-74 years	4,2	3,8	4,2	4,0	4,0	4,0	3,9	3,6	3,6	3,5	3,5	3,4	3,4
<b>Male</b>													
15-74 years	5,9	5,5	5,9	5,7	5,6	5,5	5,5	5,3	5,3	5,1	5,0	4,9	4,9
15-24 years	19,4	17,2	17,2	17,2	17,2	16,8	16,8	16,8	19,2	19,2	19,2	..	..
25-74 years	4,8	4,6	5,1	4,9	4,7	4,6	4,6	4,2	4,2	4,0	3,9	3,8	3,8
<b>Female</b>													
15-74 years	4,3	3,8	4,0	3,8	4,1	4,1	4,0	4,0	4,0	4,0	4,1	4,1	4,1
15-24 years	18,5	17,4	17,4	17,4	17,4	19,0	19,0	19,0	20,5	20,5	20,5	..	..
25-74 years	3,3	2,9	3,0	2,8	3,1	3,1	2,9	2,9	2,8	2,8	2,9	2,9	2,8

### 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 ingénieur (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 (Figure 1).

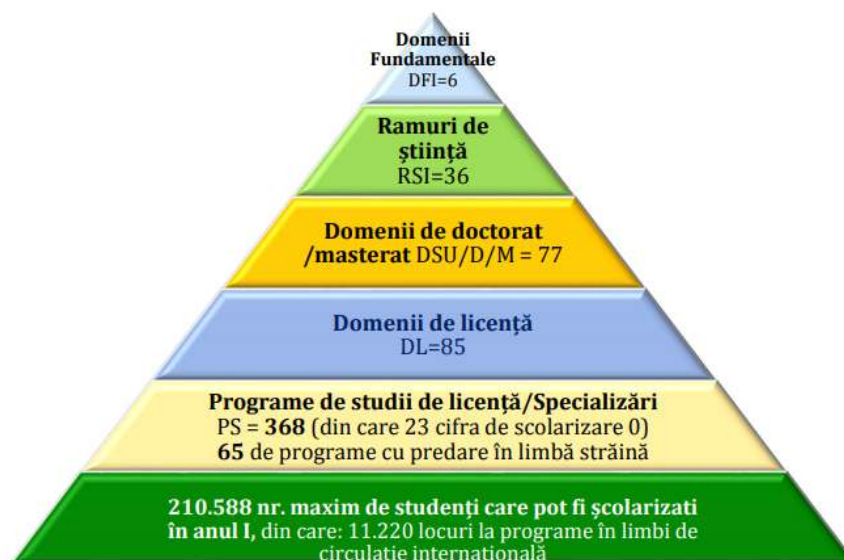


Figure 1 Structure of the university offer in the academic year 2016-2017

Source:

[http://www.aracis.ro/fileadmin/ARACIS/Revista\\_QAR/2015/QAR\\_1\\_2016\\_online.pdf](http://www.aracis.ro/fileadmin/ARACIS/Revista_QAR/2015/QAR_1_2016_online.pdf)

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.



Figure 2. Structure of SNIS by forms of property and university offer in the university year 2016/2017

**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) (Table 1).

*Table 1 Complexity of Higher Education Institutions (IIS) by number of fundamental areas in 2014/2015 and 2016/2017*

Nr. domenii fundamentale	2014-2015			2016-2017		
	IIS de stat	IIS particulare	Total IIS	IIS de stat	IIS particulare	Total IIS
cu toate cele 6 domenii	12	2	<b>14</b>	11	2	<b>13</b>
cu 5 domenii	6	0	<b>6</b>	7	0	<b>7</b>
cu 4 domenii	4	4	<b>8</b>	4	5	<b>9</b>
cu 3 domenii	3	1	<b>4</b>	3	1	<b>4</b>
cu 2 domenii	9	10	<b>19</b>	9	9	<b>18</b>
cu un singur domeniu	21	20	<b>41</b>	21	20	<b>41</b>
<b>Total</b>	<b>55</b>	<b>37</b>	<b>92</b>	<b>55</b>	<b>37</b>	<b>92</b>

*Source: Processing after: GD no. 580/2014, GD no. 376/2016 and GD no. 654/2016*

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. (Tab.2)

*Table 2 Centralizer of Number of Universities by Fundamental Areas and Forms of Ownership in 2014/2015 and 2016/2017*

Co d DFI	Domeniul fundamental (DFI)	2014-2015			2016-2017			Modificare absolută 2016/17 față de 2014/15
		IIS de stat	IIS particulare	Total IIS	IIS de stat	IIS particulare	Total IIS	
10	Matematică și științe ale naturii	23	9	<b>32</b>	23	9	<b>32</b>	<b>0</b>
20	Științe inginerești	35	6	<b>41</b>	34	8	<b>42</b>	<b>1</b>
30	Științe biologice și biomedicale	25	4	<b>29</b>	25	5	<b>30</b>	<b>1</b>
40	Științe sociale	30	33	<b>63</b>	30	27	<b>57</b>	<b>-6</b>
50	Științe umaniste și arte	34	14	<b>48</b>	34	12	<b>46</b>	<b>-2</b>
60	Știința Sportului și Educației Fizice	19	5	<b>24</b>	19	5	<b>24</b>	<b>0</b>
	<b>Total</b>	<b>55</b>	<b>37</b>	<b>92</b>	<b>55</b>	<b>37</b>	<b>92</b>	<b>0</b>

*Source: Processing after: GD no. 580/2014, GD no. 376/2016 and GD no. 654/2016*

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, can be seen in Table 3.

Cod DFI	Domeniul fundamental (DFI)	2014-2015			2016-2017			Modificări absolute 2016/2017 față de 2014/2015			Modificări % 2016/2017 față de 2014/2015		
		IS de stat	IS particulare	Total IS	IS de stat	IS particulare	Total IS	IS de stat	IS particulare	Total IS	IS de stat	IS particulare	Total IS
10	Matematică și științe ale naturii	16382	1810	18192	15857	1465	17322	-525	-345	-870	-3,2	-19,1	-4,8
20	Științe inginerești	51263	2430	53693	53388	2495	55883	2125	65	2190	4,1	2,7	4,1
30	Științe biologice și biomedicale	14320	980	15300	14730	1120	15850	410	140	550	2,9	14,3	3,6
40	Științe sociale	62450	37515	99965	60127	32075	92202	-2323	-5440	-7763	-3,7	-14,5	-7,8
50	Științe umaniste și arte	20940	2725	23665	21834	2555	24389	894	-170	724	4,3	-6,2	3,1
60	Știința Sportului și Educației Fizice	3737	925	4662	4117	825	4942	380	-100	280	10,2	-10,8	6,0
Total nr. maximi de studenți care pot fi scolarizați		16909	46385	21547	17005	40535	21058	961	-5850	-4889	0,6	-12,6	-2,3

## 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](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 synopses 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?*

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## **EMPLOYEE QUESTIONNAIRE ANALYSIS-ROMANIA**

### **Demographics**

Participants participated the research are %35,1 male and %64,9 female (Table 5.1), age ranging from 19 to 66 (Table 5.2). 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 (Table 5.3). %18,9 of participants work in Manufacturing %18,9, %37,8 in Education and %43,2 in Service (Tourism, health, finance IT) (Table 5.4). %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 employee company (Table 5.5). Participants are working years as a professional range from 1-46 years (Table 5.6), participants are working for the same company ranging from 1-35 years (Table 5.7) and participants are working in their current position ranging from 1-34 years (Table 5.8).

Demographic 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.

**Table 5.1: Gender**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	26	35,1	35,1	35,1
Female	48	64,9	64,9	100,0
Total	74	100,0	100,0	

**Table 5.2: Age**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 19,00	1	1,4	1,5	1,5
21,00	2	2,7	2,9	4,4
24,00	3	4,1	4,4	8,8
25,00	4	5,4	5,9	14,7
26,00	1	1,4	1,5	16,2
27,00	3	4,1	4,4	20,6
29,00	2	2,7	2,9	23,5
30,00	1	1,4	1,5	25,0
31,00	1	1,4	1,5	26,5
32,00	1	1,4	1,5	27,9
33,00	2	2,7	2,9	30,9
34,00	2	2,7	2,9	33,8
35,00	2	2,7	2,9	36,8
36,00	1	1,4	1,5	38,2

37,00	1	1,4	1,5	39,7
38,00	4	5,4	5,9	45,6
39,00	4	5,4	5,9	51,5
40,00	6	8,1	8,8	60,3
41,00	3	4,1	4,4	64,7
42,00	4	5,4	5,9	70,6
43,00	2	2,7	2,9	73,5
44,00	1	1,4	1,5	75,0
45,00	2	2,7	2,9	77,9
47,00	3	4,1	4,4	82,4
48,00	1	1,4	1,5	83,8
50,00	1	1,4	1,5	85,3
51,00	2	2,7	2,9	88,2
53,00	2	2,7	2,9	91,2
55,00	1	1,4	1,5	92,6
56,00	1	1,4	1,5	94,1
57,00	1	1,4	1,5	95,6
58,00	1	1,4	1,5	97,1
63,00	1	1,4	1,5	98,5
66,00	1	1,4	1,5	100,0
Total	68	91,9	100,0	
Missing	99,00	6	8,1	
Total	74	100,0		

**Table 5.3: Educational background**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Secondary school	1	1,4	1,4	1,4
vocational school	4	5,4	5,4	6,8
Vocational high school	4	5,4	5,4	12,2
Graduate	47	63,5	63,5	75,7
Higher education (master/Phd)	18	24,3	24,3	100,0
Total	74	100,0	100,0	

**Table 5.4: Sector**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Manufacturing	14	18,9	18,9	18,9
Education	28	37,8	37,8	56,8
Service (Tourism, health, finance IT)	32	43,2	43,2	100,0
Total	74	100,0	100,0	

**Table 5.5: What is the size of the organization?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 51-100	20	27,0	40,0	40,0
101-250	8	10,8	16,0	56,0
251-500	2	2,7	4,0	60,0
500+	20	27,0	40,0	100,0
Total	50	67,6	100,0	
Missing 99,00	24	32,4		
Total	74	100,0		

**Table 5.6: How long have you being working as a professional?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1,00	7	9,5	10,0	10,0
2,00	3	4,1	4,3	14,3
3,00	9	12,2	12,9	27,1
4,00	2	2,7	2,9	30,0
5,00	2	2,7	2,9	32,9
7,00	1	1,4	1,4	34,3
10,00	6	8,1	8,6	42,9
12,00	3	4,1	4,3	47,1
13,00	1	1,4	1,4	48,6
15,00	6	8,1	8,6	57,1
16,00	3	4,1	4,3	61,4
17,00	1	1,4	1,4	62,9
18,00	3	4,1	4,3	67,1
19,00	2	2,7	2,9	70,0
20,00	4	5,4	5,7	75,7
21,00	3	4,1	4,3	80,0

	22,00	1	1,4	1,4	81,4
	23,00	1	1,4	1,4	82,9
	25,00	2	2,7	2,9	85,7
	27,00	2	2,7	2,9	88,6
	30,00	3	4,1	4,3	92,9
	31,00	1	1,4	1,4	94,3
	34,00	2	2,7	2,9	97,1
	41,00	1	1,4	1,4	98,6
	46,00	1	1,4	1,4	100,0
	Total	70	94,6	100,0	
Missing	99,00	4	5,4		
Total		74	100,0		

**Table 5.7: How long have you worked for the company?\*\*\*\*\*TEKRAR HESAPLANACAK\*\*\*\*\***

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1,00	13	17,6	18,1	18,1
	2,00	2	2,7	2,8	20,8
	3,00	10	13,5	13,9	34,7
	4,00	4	5,4	5,6	40,3
	5,00	7	9,5	9,7	50,0
	6,00	1	1,4	1,4	51,4
	7,00	1	1,4	1,4	52,8
	8,00	2	2,7	2,8	55,6
	9,00	2	2,7	2,8	58,3
	10,00	7	9,5	9,7	68,1
	11,00	1	1,4	1,4	69,4
	12,00	2	2,7	2,8	72,2
	15,00	2	2,7	2,8	75,0
	16,00	1	1,4	1,4	76,4
	17,00	1	1,4	1,4	77,8
	18,00	2	2,7	2,8	80,6
	20,00	3	4,1	4,2	84,7
	22,00	1	1,4	1,4	86,1
	24,00	1	1,4	1,4	87,5
	25,00	1	1,4	1,4	88,9

	26,00	1	1,4	1,4	90,3
	27,00	3	4,1	4,2	94,4
	30,00	1	1,4	1,4	95,8
	32,00	1	1,4	1,4	97,2
	35,00	1	1,4	1,4	98,6
	Total	72	97,3	100,0	
Missing	99,00	3	2,7		
Total		74	100,0		

**Table 5.8: How long have you worked in present position?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1,00	18	24,3	25,0	25,0
	2,00	5	6,8	6,9	31,9
	3,00	9	12,2	12,5	44,4
	4,00	4	5,4	5,6	50,0
	5,00	9	12,2	12,5	62,5
	8,00	1	1,4	1,4	63,9
	9,00	1	1,4	1,4	65,3
	10,00	5	6,8	6,9	72,2
	11,00	1	1,4	1,4	73,6
	12,00	2	2,7	2,8	76,4
	13,00	1	1,4	1,4	77,8
	15,00	2	2,7	2,8	80,6
	17,00	1	1,4	1,4	81,9
	18,00	4	5,4	5,6	87,5
	20,00	3	4,1	4,2	91,7
	21,00	1	1,4	1,4	93,1
	22,00	1	1,4	1,4	94,4
	24,00	1	1,4	1,4	95,8
	25,00	1	1,4	1,4	97,2
	32,00	1	1,4	1,4	98,6
	34,00	1	1,4	1,4	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

## 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 (Table 5.9). %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 (Table 5.10). %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 (Table 5.11). %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 (Table 5.12). Romanian participants reported a positive economy profile and finding a job is relatively easy.

**Table 5.9: What is the business trend in your organization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Total revenue increasing	40	54,1	54,8	54,8
	Total revenue decreasing	3	4,1	4,1	58,9
	Without change	21	28,4	28,8	87,7
	Not applicable	9	12,2	12,3	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.10: What is the employment trend in your organization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Number of employees increasing	25	33,8	34,2	34,2
	Number of employees decreasing	21	28,4	28,8	63,0
	Without change	15	20,3	20,5	83,6
	Not applicable	12	16,2	16,4	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.11: 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	9	12,2	12,2	12,2
Difficult	6	8,1	8,1	20,3
Moderate	25	33,8	33,8	54,1
Easy	21	28,4	28,4	82,4
Very Easy	13	17,6	17,6	100,0
Total	74	100,0	100,0	

**Table 5.12: If you loose your job, can you work in another sector?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Difficult	4	5,4	5,4	5,4
Difficult	11	14,9	14,9	20,3
Moderate	22	29,7	29,7	50,0
Easy	16	21,6	21,6	71,6
Very Easy	21	28,4	28,4	100,0
Total	74	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 Personel Work Goals and Objectives, Entrepreneurial and Commercial Thinking all base on Big Eighth dimensions.

#### **GREAT EIGHT DIMENSIONS AND THEIR DEFINITIONS**

**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.

### **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 %84,9 of the Romanian participants evaluate themselves as strong and very strong level of decision making (Table 5.13) and %91,9 strong to very strong level of taking responsibility (Table 5.14).

**Table 5.13: Decision making**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,4	1,4	1,4
Weak	1	1,4	1,4	2,7
Moderate	9	12,2	12,3	15,1
Strong	30	40,5	41,1	56,2
Very Strong	32	43,2	43,8	100,0
Total	73	98,6	100,0	
Missing 99,00	1	1,4		
Total	74	100,0		

**Table 5.14: Taking responsibility**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,4	1,4	1,4
Weak	1	1,4	1,4	2,7
Moderate	4	5,4	5,4	8,1
Strong	16	21,6	21,6	29,7

Very Strong	52	70,3	70,3	100,0
Total	74	100,0	100,0	

### 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 (Table 5.15).

**Table 5.15: Leadership Skills**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,4	1,4	1,4
Weak	2	2,7	2,7	4,1
Moderate	20	27,0	27,4	31,5
Strong	35	47,3	47,9	79,5
Very Strong	15	20,3	20,5	100,0
Total	73	98,6	100,0	
Missing 99,00	1	1,4		
Total	74	100,0		

### 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 (Table 5.16) %93,3 in Collaborating with Others (Table 5.17) and %95,9 in Communicating with People (Table 5.18) respectively. Romanian participants evaluate themselves high in working with people dimension.

**Table 5.16: Team work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,4	1,4	1,4
Moderate	5	6,8	6,8	8,1
Strong	12	16,2	16,2	24,3
Very Strong	56	75,7	75,7	100,0
Total	74	100,0	100,0	

**Table 5.17: Collaborating with others**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,4	1,4	1,4
Moderate	4	5,4	5,4	6,8
Strong	13	17,6	17,6	24,3
Very Strong	56	75,7	75,7	100,0
Total	74	100,0	100,0	

**Table 5.18: Communicating with people**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,4	1,4	1,4
Moderate	2	2,7	2,7	4,1
Strong	14	18,9	18,9	23,0
Very Strong	57	77,0	77,0	100,0
Total	74	100,0	100,0	

**Adhering to Principles and Values**

Romanian participants evaluate themselves %94,9 high as strong and very strong in Respecting Ethics (Table 5.19) and %87,9 in Environmental Awareness (Table 5.20) and awareness of ergonomics rated %84,9 as strong and very strong (Table 5.21).

**Table 5.19: Respecting ethics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,4	1,4	1,4
Moderate	2	2,7	2,7	4,1
Strong	12	16,2	16,2	20,3
Very Strong	59	79,7	79,7	100,0
Total	74	100,0	100,0	

**Table 5.20: Environmental awareness**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,4	1,4	1,4
Weak	2	2,7	2,7	4,1
Moderate	6	8,1	8,1	12,2
Strong	19	25,7	25,7	37,8
Very Strong	46	62,2	62,2	100,0
Total	74	100,0	100,0	

**Table 5.21: Awareness of ergonomics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,7	2,7	2,7
Weak	1	1,4	1,4	4,1
Moderate	8	10,8	11,0	15,1
Strong	20	27,0	27,4	42,5
Very Strong	42	56,8	57,5	100,0
Total	73	98,6	100,0	
Missing 99,00	1	1,4		
Total	74	100,0		

**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 (Table 5.22), %27,4 in creating business networks (Table 5.23), and %78,7 in maintaining customer relationships (Table 5.24). Romanian participant rate themselves with low creating business networks skills.

**Table 5.22: Compromising**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,7	2,8	2,8
	Weak	7	9,5	9,7	12,5
	Moderate	14	18,9	19,4	31,9
	Strong	35	47,3	48,6	80,6
	Very Strong	14	18,9	19,4	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

**Table 5.23: Creating business networks**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	8	10,8	11,0	11,0
	Weak	15	20,3	20,5	31,5
	Moderate	30	40,5	41,1	72,6
	Strong	14	18,9	19,2	91,8
	Very Strong	6	8,1	8,2	100,0
	Total	73	98,6	100,0	

Missing	99,00	1	1,4	
Total		74	100,0	

**Table 5.24: Maintaining customer relationships**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	4	5,4	5,4	5,4
Weak	3	4,1	4,1	9,5
Moderate	8	10,8	10,8	20,3
Strong	28	37,8	37,8	58,1
Very Strong	31	41,9	41,9	100,0
Total	74	100,0	100,0	

### Persuading and Influencing

%69,9 of the Romanian participants rated themselves strong and very strong in persuading influencing skills (Table 5.25) and %74 in emotional intelligence skills (Table 5.26).

**Table 5.25: Negotiating**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	4	5,4	5,5	5,5
Weak	6	8,1	8,2	13,7
Moderate	12	16,2	16,4	30,1
Strong	33	44,6	45,2	75,3
Very Strong	18	24,3	24,7	100,0
Total	73	98,6	100,0	
Missing	99,00	1	1,4	
Total	74	100,0		

**Table 5.26: Emotional intelligence**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,7	2,7	2,7

	Weak	4	5,4	5,5	8,2
	Moderate	13	17,6	17,8	26,0
	Strong	30	40,5	41,1	67,1
	Very Strong	24	32,4	32,9	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

### Presenting and Communicating Information

Romanian participant rate themselves with strong and very strong with %84,9 in presenting and communication ability (Table 5.27).

**Table 5.27: Presenting and communication ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,7	2,7	2,7
	Weak	2	2,7	2,7	5,5
	Moderate	7	9,5	9,6	15,1
	Strong	25	33,8	34,2	49,3
	Very Strong	37	50,0	50,7	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

### 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 (Table 5.28) and %86,3 strong and very strong in literacy skills (Table 5.29).

**Table 5.28: Targeted/Technical Communication**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,7	2,8	2,8
	Weak	3	4,1	4,2	6,9
	Moderate	12	16,2	16,7	23,6
	Strong	28	37,8	38,9	62,5
	Very Strong	27	36,5	37,5	100,0
Total		72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

**Table 5.29: Literacy (Reporting, writing plans, writing letters)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	4	5,4	5,5	5,5
	Moderate	6	8,1	8,2	13,7
	Strong	20	27,0	27,4	41,1
	Very Strong	43	58,1	58,9	100,0
Total		73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

### **Applying Expertise and Technology**

Applying expertise and technology dimension is composed of 23 items. Participants rated their skills in IT and technology affinity %62,2 strong and very strong (Table 5.30), Economics %56,3 strong and very strong (Table 5.31), Extract business value from social media %50,7 strong and very strong (Table 5.32), Service orientation/product service offerings %57,5 strong and very strong (Table 5.33), Business process management %43,8 strong and very strong (Table 5.34), Business change management %34,7 strong and very strong (Table 5.35),

Understand and coordinate workflows %60,2 strong and very strong (Table 5.36), Network security %34,3 strong and very strong (Table 5.37), IT architectures %16,7 strong and very strong (Table 5.38), Machine learning %38,3 strong and very strong (Table 5.39), System development % 21,9 strong and very strong (Table 5.40), Integrating heterogeneous technologies %20,9 strong and very strong (Table 5.41), Mobile technologies %30,2 strong and very strong (Table 5.42), Sensors/embedded systems %21,4 strong and very strong (Table 5.43), Network technology/M2M communication %11 strong and very strong (Table 5.44), Robotics/Artificial intelligence %13,9 strong and very strong (Table 5.45), Predictive maintenance %19,5 strong only (Table 5.46), Modelling and programming %15,1 strong and very strong (Table 5.47), data/Data analysis and interpretation %24,6 (Table 5.48), Cloud computing/architectures %11,2 strong and very strong (Table 5.49), In-memory DBs %16,4 strong and very strong (Table 5.50), Statistics %24,6 strong and very strong (Table 5.51) and Data Security %27,4 strong and very strong (Table 5.52). In general frequency analysis suggest that Romanian participants are not skilled for Applying Expertise and Technology dimension.

**Table 5.30: IT and technology affinity**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,7	2,7	2,7
Weak	6	8,1	8,1	10,8
Moderate	20	27,0	27,0	37,8
Strong	21	28,4	28,4	66,2
Very Strong	25	33,8	33,8	100,0
Total	74	100,0	100,0	

**Table 5.31: Economics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,7	2,7	2,7
Weak	7	9,5	9,6	12,3
Moderate	23	31,1	31,5	43,8
Strong	29	39,2	39,7	83,6

	Very Strong	12	16,2	16,4	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.32: Extract business value from social media**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	4,1	4,1	4,1
	Weak	8	10,8	11,0	15,1
	Moderate	25	33,8	34,2	49,3
	Strong	18	24,3	24,7	74,0
	Very Strong	19	25,7	26,0	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.33: Service orientation/product service offerings**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,7	2,7	2,7
	Weak	6	8,1	8,2	11,0
	Moderate	23	31,1	31,5	42,5
	Strong	19	25,7	26,0	68,5
	Very Strong	23	31,1	31,5	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.34: Business process management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	5,4	5,5	5,5

	Weak	13	17,6	17,8	23,3
	Moderate	24	32,4	32,9	56,2
	Strong	25	33,8	34,2	90,4
	Very Strong	7	9,5	9,6	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.35: Business change management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	8,1	8,3	8,3
	Weak	11	14,9	15,3	23,6
	Moderate	30	40,5	41,7	65,3
	Strong	18	24,3	25,0	90,3
	Very Strong	7	9,5	9,7	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

**Table 5.36: Understand and coordinate workflows**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	5,4	5,5	5,5
	Weak	6	8,1	8,2	13,7
	Moderate	19	25,7	26,0	39,7
	Strong	25	33,8	34,2	74,0
	Very Strong	19	25,7	26,0	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.37: Network security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	17	23,0	23,3	23,3
	Weak	11	14,9	15,1	38,4
	Moderate	20	27,0	27,4	65,8
	Strong	17	23,0	23,3	89,0
	Very Strong	8	10,8	11,0	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.38: IT architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	26	35,1	36,1	36,1
	Weak	17	23,0	23,6	59,7
	Moderate	17	23,0	23,6	83,3
	Strong	8	10,8	11,1	94,4
	Very Strong	4	5,4	5,6	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

**Table 5.39: Machine learning**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	11	14,9	15,1	15,1
	Weak	14	18,9	19,2	34,2
	Moderate	20	27,0	27,4	61,6
	Strong	15	20,3	20,5	82,2
	Very Strong	13	17,6	17,8	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.40: System development**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	24	32,4	32,9	32,9
	Weak	17	23,0	23,3	56,2
	Moderate	16	21,6	21,9	78,1
	Strong	10	13,5	13,7	91,8
	Very Strong	6	8,1	8,2	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.41: Integrating heterogeneous technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	20	27,0	27,8	27,8
	Weak	19	25,7	26,4	54,2
	Moderate	18	24,3	25,0	79,2
	Strong	11	14,9	15,3	94,4
	Very Strong	4	5,4	5,6	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

**Table 5.42: Mobile technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	20	27,0	27,4	27,4
	Weak	9	12,2	12,3	39,7
	Moderate	22	29,7	30,1	69,9
	Strong	11	14,9	15,1	84,9
	Very Strong	11	14,9	15,1	100,0

	Total	73	98,6	100,0
Missing	99,00	1	1,4	
Total		74	100,0	

**Table 5.43: Sensors/embedded systems**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	21	28,4	30,0	30,0
	Weak	14	18,9	20,0	50,0
	Moderate	20	27,0	28,6	78,6
	Strong	8	10,8	11,4	90,0
	Very Strong	7	9,5	10,0	100,0
	Total	70	94,6	100,0	
Missing	99,00	4	5,4		
Total		74	100,0		

**Table 5.44: Network technology/M2M communication**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	32	43,2	43,8	43,8
	Weak	14	18,9	19,2	63,0
	Moderate	19	25,7	26,0	89,0
	Strong	4	5,4	5,5	94,5
	Very Strong	4	5,4	5,5	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.45: Robotics/Artificial intelligence**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	31	41,9	43,1	43,1
	Weak	12	16,2	16,7	59,7
	Moderate	19	25,7	26,4	86,1
	Strong	7	9,5	9,7	95,8

	Very Strong	3	4,1	4,2	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

**Table 5.46: Predictive maintenance**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	24	32,4	33,3	33,3
	Weak	21	28,4	29,2	62,5
	Moderate	13	17,6	18,1	80,6
	Strong	10	13,5	13,9	94,4
	Very Strong	4	5,4	5,6	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

**Table 5.47: Modelling and programming**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	33	44,6	45,2	45,2
	Weak	12	16,2	16,4	61,6
	Moderate	17	23,0	23,3	84,9
	Strong	7	9,5	9,6	94,5
	Very Strong	4	5,4	5,5	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.48: Big data/Data analysis and interpretation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	32	43,2	43,8	43,8

	Weak	13	17,6	17,8	61,6
	Moderate	10	13,5	13,7	75,3
	Strong	13	17,6	17,8	93,2
	Very Strong	5	6,8	6,8	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.49: Cloud computing/architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	40	54,1	56,3	56,3
	Weak	10	13,5	14,1	70,4
	Moderate	13	17,6	18,3	88,7
	Strong	5	6,8	7,0	95,8
	Very Strong	3	4,1	4,2	100,0
	Total	71	95,9	100,0	
Missing	99,00	3	4,1		
Total		74	100,0		

**Table 5.50: In-memory DBs**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	38	51,4	52,1	52,1
	Weak	12	16,2	16,4	68,5
	Moderate	11	14,9	15,1	83,6
	Strong	9	12,2	12,3	95,9
	Very Strong	3	4,1	4,1	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.51: Statistics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	18	24,3	24,7	24,7
	Weak	19	25,7	26,0	50,7
	Moderate	18	24,3	24,7	75,3
	Strong	13	17,6	17,8	93,2
	Very Strong	5	6,8	6,8	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.52: Data security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	25	33,8	34,2	34,2
	Weak	18	24,3	24,7	58,9
	Moderate	10	13,5	13,7	72,6
	Strong	13	17,6	17,8	90,4
	Very Strong	7	9,5	9,6	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

### Analyzing

Analyzing sub-dimension is composed of 4 items. Participants rated Problem Solving %71,3 strong and very strong (Table 5.53), Optimization %54,8 (Table 5.54), Analytical Skills %60,3 (Table 5.55) and Cognitive Ability %67,1 (Table 5.56).

**Table 5.53: Problem Solving**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	6,8	6,8	6,8
	Weak	4	5,4	5,5	12,3
	Moderate	12	16,2	16,4	28,8

	Strong	28	37,8	38,4	67,1
	Very Strong	24	32,4	32,9	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.54: Optimization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	8	10,8	11,0	11,0
	Weak	8	10,8	11,0	21,9
	Moderate	17	23,0	23,3	45,2
	Strong	27	36,5	37,0	82,2
	Very Strong	13	17,6	17,8	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.55: Analytical Skills**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,7	2,7	2,7
	Weak	12	16,2	16,4	19,2
	Moderate	15	20,3	20,5	39,7
	Strong	28	37,8	38,4	78,1
	Very Strong	16	21,6	21,9	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.56: Cognitive Ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Weak	6	8,1	8,2	8,2
	Moderate	18	24,3	24,7	32,9
	Strong	29	39,2	39,7	72,6
	Very Strong	20	27,0	27,4	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

## 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 (Table 5.57) and %84,9 strong and very strong in knowledge management (Table 5.58).

**Table 5.57: Life-long learning**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	2	2,7	2,7	2,7
	Moderate	7	9,5	9,6	12,3
	Strong	26	35,1	35,6	47,9
	Very Strong	38	51,4	52,1	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.58: Knowledge management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	3	4,1	4,1	4,1
	Moderate	8	10,8	11,0	15,1
	Strong	30	40,5	41,1	56,2
	Very Strong	32	43,2	43,8	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Creating and Innovation**

Participants rated themselves %63,4 strong and very strong in Innovating (Table 5.59), %72,6 strong and very strong in creativity (Table 5.60), %69,8 strong and very strong in Critical Thinking (Table 5.61) and %55,5 strong and very strong in Change Management (Table 5.62).

**Table 5.59: Innovating**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	4,1	4,2	4,2
	Weak	3	4,1	4,2	8,5
	Moderate	20	27,0	28,2	36,6
	Strong	30	40,5	42,3	78,9
	Very Strong	15	20,3	21,1	100,0
Total		71	95,9	100,0	
Missing	99,00	3	4,1		
Total		74	100,0		

**Table 5.60: Creativity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	6,8	6,8	6,8
	Weak	2	2,7	2,7	9,6
	Moderate	13	17,6	17,8	27,4

	Strong	33	44,6	45,2	72,6
	Very Strong	20	27,0	27,4	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.61: Critical thinking**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	6,8	6,8	6,8
	Weak	1	1,4	1,4	8,2
	Moderate	16	21,6	21,9	30,1
	Strong	25	33,8	34,2	64,4
	Very Strong	26	35,1	35,6	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.62: Change management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	6,8	6,9	6,9
	Weak	9	12,2	12,5	19,4
	Moderate	18	24,3	25,0	44,4
	Strong	26	35,1	36,1	80,6
	Very Strong	14	18,9	19,4	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

### Formulating Strategies

Business Strategy %38,4 strong and very strong (Table 5.63), Abstract Ability %47,9 strong and very strong (Table 5.64), and Managing Complexity %55,6 strong and very strong (Table 5.65). Romanian participants rated low in formulating strategies.

**Table 5.63: Business strategy**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	8,1	8,2	8,2
	Weak	17	23,0	23,3	31,5
	Moderate	22	29,7	30,1	61,6
	Strong	21	28,4	28,8	90,4
	Very Strong	7	9,5	9,6	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.64: Abstraction ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,7	2,7	2,7
	Weak	11	14,9	15,1	17,8
	Moderate	25	33,8	34,2	52,1
	Strong	26	35,1	35,6	87,7
	Very Strong	9	12,2	12,3	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.65: Managing complexity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	4,1	4,2	4,2
	Weak	11	14,9	15,3	19,4
	Moderate	18	24,3	25,0	44,4
	Strong	26	35,1	36,1	80,6
	Very Strong	14	18,9	19,4	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

## 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 (Table 5.66), Planning and organizing work %67,6 strong and very strong (Table 5.67) and %35,2 strong and very strong Management Ability (Table 5.68). Romanian participants lack Project management and Project management skills.

**Table 5.66: Project management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	8	10,8	11,1	11,1
	Weak	16	21,6	22,2	33,3
	Moderate	24	32,4	33,3	66,7
	Strong	12	16,2	16,7	83,3
	Very Strong	12	16,2	16,7	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

**Table 5.67: Planning and organizing work**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,7	2,8	2,8
	Weak	4	5,4	5,6	8,5
	Moderate	17	23,0	23,9	32,4
	Strong	22	29,7	31,0	63,4

	Very Strong	26	35,1	36,6	100,0
	Total	71	95,9	100,0	
Missing	99,00	3	4,1		
Total		74	100,0		

**Table 5.68: Management ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	8,1	8,2	8,2
	Weak	10	13,5	13,7	21,9
	Moderate	24	32,4	32,9	54,8
	Strong	19	25,7	26,0	80,8
	Very Strong	14	18,9	19,2	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

### **Delivering Results and Meeting Customer Expectation**

Participants rated their Customer Orientation skills % 58,3 strong and very strong (Table 5.69), Customer Relationship Management skills %61,1 strong and very strong (Table 5.70)

**Table 5.69: Customer orientation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	4,1	4,2	4,2
	Weak	8	10,8	11,1	15,3
	Moderate	19	25,7	26,4	41,7
	Strong	16	21,6	22,2	63,9
	Very Strong	26	35,1	36,1	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

**Table 5.70: Customer relationship management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	4,1	4,2	4,2
	Weak	6	8,1	8,3	12,5
	Moderate	19	25,7	26,4	38,9
	Strong	19	25,7	26,4	65,3
	Very Strong	25	33,8	34,7	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

**Following Instructions and Procedures**

Legislation awareness skills %63 strong and very strong (Table 5.71), Safety awareness skills %86,3 strong and very strong (Table 5.72) and Individual responsibility skills %90,3 strong and very strong (Table 5.73).

**Table 5.71: Legislation awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	5,4	5,5	5,5
	Weak	7	9,5	9,6	15,1
	Moderate	16	21,6	21,9	37,0
	Strong	29	39,2	39,7	76,7
	Very Strong	17	23,0	23,3	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.72: Safety awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Very Weak	2	2,7	2,7	2,7
	Weak	1	1,4	1,4	4,1
	Moderate	7	9,5	9,6	13,7
	Strong	29	39,2	39,7	53,4
	Very Strong	34	45,9	46,6	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.73: Individual responsibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,4	1,4	1,4
	Moderate	6	8,1	8,3	9,7
	Strong	18	24,3	25,0	34,7
	Very Strong	47	63,5	65,3	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

## 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 %68,5 strong and very strong (Table 5.74), Intercultural competency skills %65,8 strong and very strong (Table 5.75), Flexibility skills %76,4 strong and very strong (Table 5.76) and Adaptability and ability to change mind-set skills %75,3 strong and very strong (Table 5.77).

**Table 5.74: Work in interdisciplinary environments**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	4,1	4,1	4,1
	Weak	4	5,4	5,5	9,6
	Moderate	16	21,6	21,9	31,5
	Strong	26	35,1	35,6	67,1
	Very Strong	24	32,4	32,9	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.75: Intercultural competency**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	4,1	4,1	4,1
	Weak	5	6,8	6,8	11,0
	Moderate	17	23,0	23,3	34,2
	Strong	28	37,8	38,4	72,6
	Very Strong	20	27,0	27,4	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.76: Flexibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	5	6,8	6,9	6,9
	Moderate	12	16,2	16,7	23,6
	Strong	30	40,5	41,7	65,3
	Very Strong	25	33,8	34,7	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

**Table 5.77: Adaptability and ability to change mind-set**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,4	1,4	1,4
	Weak	6	8,1	8,2	9,6
	Moderate	11	14,9	15,1	24,7
	Strong	29	39,2	39,7	64,4
	Very Strong	26	35,1	35,6	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

### **Persuading and Influencing**

Participants rated their Work Life Balance skills %76,7 strong and very strong (Table 5.78).

**Table 5.78: Work-life Balance**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,4	1,4	1,4
	Weak	3	4,1	4,1	5,5
	Moderate	13	17,6	17,8	23,3
	Strong	33	44,6	45,2	68,5
	Very Strong	23	31,1	31,5	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

### **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 (Table 5.79).

**Table 5.79: Self-management and organization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,4	1,4	1,4
	Weak	7	9,5	9,7	11,1
	Moderate	13	17,6	18,1	29,2
	Strong	29	39,2	40,3	69,4
	Very Strong	22	29,7	30,6	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

### **Entrepreneurial and Commercial Thinking**

Participants rated their Business model understanding skills %47,9 strong and very strong (Table 5.80) and Entrepreneurship skills %41,7 strong and very strong (Table 5.81). Romanian participant rate below average Entrepreneurial and Commercial Thinking skills.

**Table 5.80: Business model understanding**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	5,4	5,5	5,5
	Weak	17	23,0	23,3	28,8
	Moderate	17	23,0	23,3	52,1
	Strong	26	35,1	35,6	87,7

	Very Strong	9	12,2	12,3	100,0
	Total	73	98,6	100,0	
Missing	99,00	1	1,4		
Total		74	100,0		

**Table 5.81: Entrepreneurship**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	14	18,9	19,4	19,4
	Weak	11	14,9	15,3	34,7
	Moderate	17	23,0	23,6	58,3
	Strong	21	28,4	29,2	87,5
	Very Strong	9	12,2	12,5	100,0
	Total	72	97,3	100,0	
Missing	99,00	2	2,7		
Total		74	100,0		

## **STUDENT QUESTIONNAIRE ANALYSIS-ROMANIA**

### **Demographics**

Participants participated the research are %54,4 male and %45,6 female (Table 6.1), age ranging from 16 to 48 (Table 6.2). %3,3 of the participants study Secondary school, %1,1 vocational school, %72,2 Vocational high school, 20 %Graduate, %3,3 education (master/Phd) (Table 6.3). %20 of the participants want to work in Manufacturing, %14,4 in Education and %65,6 in Service (Tourism, health, finance IT) (Table 6.4).

Demographic represent a participant profile with an relatively equal male/female ratio, mostly planning to work in service sector.

**Table 6.1: Gender**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	49	54,4	54,4	54,4
Female	41	45,6	45,6	100,0
Total	90	100,0	100,0	

**Table 6.2: Age**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 16,00	3	3,3	3,8	3,8
17,00	9	10,0	11,4	15,2
18,00	26	28,9	32,9	48,1
19,00	20	22,2	25,3	73,4
20,00	2	2,2	2,5	75,9
21,00	3	3,3	3,8	79,7
23,00	1	1,1	1,3	81,0
24,00	3	3,3	3,8	84,8
26,00	2	2,2	2,5	87,3
27,00	2	2,2	2,5	89,9
29,00	1	1,1	1,3	91,1
33,00	1	1,1	1,3	92,4
39,00	3	3,3	3,8	96,2
42,00	1	1,1	1,3	97,5
47,00	1	1,1	1,3	98,7
48,00	1	1,1	1,3	100,0
Total	79	87,8	100,0	
Missing 99,00	10	11,1		
System	1	1,1		
Total	11	12,2		
Total	90	100,0		

**Table 6.3: Level of study**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Secondary school	3	3,3	3,3	3,3
vocational school	1	1,1	1,1	4,4

Vocational high school	65	72,2	72,2	76,7
Graduate	18	20,0	20,0	96,7
Higher education (master/Phd)	3	3,3	3,3	100,0
Total	90	100,0	100,0	

**Table 6.4: In which sector do you plan to work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Manufacturing	18	20,0	20,0	20,0
Education	13	14,4	14,4	34,4
Service (Tourism, health, finance IT)	59	65,6	65,6	100,0
Total	90	100,0	100,0	

### 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 (Table 6.5). %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 (Table 6.6). %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 (Table 6.7). %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 (Table 6.8).

**Table 6.5: What is the business trend in the sector you want to work?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Total revenue increasing	30	33,3	33,3	33,3
Total revenue decreasing	1	1,1	1,1	34,4
Without change	4	4,4	4,4	38,9
Hard to say	55	61,1	61,1	100,0
Total	90	100,0	100,0	

**Table 6.6: What employment possibilities are in the sector you want to work?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Number of employees increasing	65	72,2	72,2	72,2
Number of employees decreasing	18	20,0	20,0	92,2
Without change	5	5,6	5,6	97,8
Hard to say	2	2,2	2,2	100,0
Total	90	100,0	100,0	

**Table 6.7: Can you find a job in the sector you want to work?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Difficult	7	7,8	7,8	7,8
Difficult	24	26,7	26,7	34,4
Moderate	29	32,2	32,2	66,7
Easy	22	24,4	24,4	91,1
Very Easy	8	8,9	8,9	100,0
Total	90	100,0	100,0	

**Table 6.8: 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	36	40,0	40,0	40,0
Difficult	16	17,8	17,8	57,8
Moderate	15	16,7	16,7	74,4
Easy	13	14,4	14,4	88,9
Very Easy	10	11,1	11,1	100,0
Total	90	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 Eighth dimensions.

**Big Eight Dimensions and definition**

<p><b>Leading and Deciding</b></p> <p>Takes control and exercises leadership. Initiates action, gives direction, and takes responsibility.</p>
<p><b>Supporting and Cooperating</b></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><b>Interacting and Presenting</b></p> <p>Communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner.</p>
<p><b>Analyzing and Interpreting</b></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><b>Creating and Conceptualizing</b></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>

**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 suggest that %58,9 of the Romanian students evaluate themselves as strong and very strong level of decision making (Table 6.9), %82 strong and very strong level of taking responsibility (Table 6.10).

**Table 6.9: Decision making**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	3,3	3,3	3,3
Weak	11	12,2	12,2	15,6
Moderate	23	25,6	25,6	41,1
Strong	34	37,8	37,8	78,9
Very Strong	19	21,1	21,1	100,0
Total	90	100,0	100,0	

**Table 6.10: Taking responsibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	9	10,0	10,1	10,1
	Moderate	7	7,8	7,9	18,0
	Strong	35	38,9	39,3	57,3
	Very Strong	38	42,2	42,7	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

### Leading and Supervising

Romanian students score themselves %38,2 strong and very strong leadership skills (Table 6.11). Romanian students lack leading and supervising skills.

**Table 6.11: Leadership Skills**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	20	22,2	22,5	22,5
	Weak	12	13,3	13,5	36,0
	Moderate	23	25,6	25,8	61,8
	Strong	25	27,8	28,1	89,9
	Very Strong	9	10,0	10,1	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

### SUPPORTING AND COOPERATION

#### Working With People

%81,1 of the students rate themselves as strong and very strong in team work (Table 6.12), %81,1 rate themselves strong and very strong in collaborating with others (Table 6.13) and %83,4 rate strong and very strong in communicating with people (Table 6.14).

**Table 6.12: Team work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	4	4,4	4,4	4,4
Moderate	13	14,4	14,4	18,9
Strong	24	26,7	26,7	45,6
Very Strong	49	54,4	54,4	100,0
Total	90	100,0	100,0	

**Table 6.13: Collaborating with others**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	3	3,3	3,3	3,3
Moderate	14	15,6	15,6	18,9
Strong	25	27,8	27,8	46,7
Very Strong	48	53,3	53,3	100,0
Total	90	100,0	100,0	

**Table 6.14: Communicating with people**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	2	2,2	2,2	2,2
Moderate	13	14,4	14,4	16,7
Strong	25	27,8	27,8	44,4
Very Strong	50	55,6	55,6	100,0
Total	90	100,0	100,0	

**Adhering to Principles and Values**

%86,6 of the students rate strong and very strong in Respecting ethics (Table 6.15), %75,5 strong and very strong in Environmental awareness (Table 6.16) and %77,8 strong and very strong in Awareness of ergonomics (Table 6.17).

**Table 6.15: Respecting ethics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	3	3,3	3,3	3,3
Moderate	9	10,0	10,0	13,3
Strong	22	24,4	24,4	37,8
Very Strong	56	62,2	62,2	100,0
Total	90	100,0	100,0	

**Table 6.16: Environmental awareness**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	5	5,6	5,6	5,6
Moderate	17	18,9	18,9	24,4
Strong	37	41,1	41,1	65,6
Very Strong	31	34,4	34,4	100,0
Total	90	100,0	100,0	

**Table 6.17: Awareness of ergonomics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	6	6,7	6,7	6,7
Moderate	14	15,6	15,6	22,2
Strong	35	38,9	38,9	61,1
Very Strong	35	38,9	38,9	100,0
Total	90	100,0	100,0	

**INTERACTING AND PRESENTING****Relating and Networking**

%44,9 of the students rate strong and very strong in Compromising skills (Table 6.18), %14,6 rate strong and very strong in Creating business networks (Table 6.19), %39,8 rate strong and very strong

in Maintaining customer relationships (Table 6.20). Romanian students rate themselves with low relating and networking skills, creating business networks being the lowest.

**Table 6.18: Compromising**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	7	7,8	7,9	7,9
	Weak	13	14,4	14,6	22,5
	Moderate	29	32,2	32,6	55,1
	Strong	26	28,9	29,2	84,3
	Very Strong	14	15,6	15,7	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.19: Creating business networks**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	27	30,0	30,3	30,3
	Weak	18	20,0	20,2	50,6
	Moderate	31	34,4	34,8	85,4
	Strong	6	6,7	6,7	92,1
	Very Strong	7	7,8	7,9	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.20: Maintaining customer relationships**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	8	8,9	9,1	9,1
	Weak	15	16,7	17,0	26,1
	Moderate	30	33,3	34,1	60,2
	Strong	16	17,8	18,2	78,4

	Very Strong	19	21,1	21,6	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

### Persuading and Influencing

%38,6 of the students rate strong and very strong in Negotiating (Table 6.21) and %51,7 strong and very strong in Emotional intelligence (Table 6.22). Romanian students lack negotiating skills.

**Table 6.21: Negotiating**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	9	10,0	10,2	10,2
	Weak	15	16,7	17,0	27,3
	Moderate	30	33,3	34,1	61,4
	Strong	19	21,1	21,6	83,0
	Very Strong	15	16,7	17,0	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

**Table 6.22: Emotional intelligence**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	17	18,9	19,1	19,1
	Weak	14	15,6	15,7	34,8
	Moderate	12	13,3	13,5	48,3
	Strong	26	28,9	29,2	77,5
	Very Strong	20	22,2	22,5	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

## Presenting and Communicating Information

%62,5 of the students rate strong and very strong in Presenting and communication ability (Table 6.23).

**Table 6.23: Presenting and communication ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	10	11,1	11,4	12,5
	Moderate	22	24,4	25,0	37,5
	Strong	31	34,4	35,2	72,7
	Very Strong	24	26,7	27,3	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

## ANALYZING AND INTERPRETING

### Writing and reporting

%54 of the Romanian students rate strong and very strong in Targeted/Technical Communication (Table 6.24) and %64 rate strong and very strong in Literacy (Table 6.25).

**Table 6.24: Targeted/Technical Communication**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	11	12,2	12,4	12,4
	Weak	18	20,0	20,2	32,6
	Moderate	12	13,3	13,5	46,1
	Strong	32	35,6	36,0	82,0
	Very Strong	16	17,8	18,0	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.25: Literacy (Reporting, writing plans, writing letters)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	11	12,2	12,4	13,5
	Moderate	20	22,2	22,5	36,0
	Strong	39	43,3	43,8	79,8
	Very Strong	18	20,0	20,2	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

### Applying Expertise and Technology

%52,8 of the Romanian students rate themselves with strong and very strong in IT and technology affinity (Table 6.26), %39,3 strong and very strong in Economics (Table 6.27), %38,2 strong and very strong in Extract business value from social media (Table 6.28), %51,2 strong and very strong in Service orientation/product service offerings (Table 6.29), %23,9 strong and very strong in Business process management (Table 6.30), %23,6 strong and very strong in Business change management (Table 6.31), %49,6 strong and very strong in Understand and coordinate workflows (Table 6.32), %21,6 strong and very strong in Network security (Table 6.33), %18,2 strong and very strong in IT architectures (Table 6.34), %30,6 strong and very strong in Machine learning (Table 6.35), %22,7 strong and very strong in System development (Table 6.36), %15,7 strong and very strong in Integrating heterogeneous technologies (Table 6.37), %21,4 strong and very strong in Mobile technologies (Table 6.38), %16,9 strong and very strong in Sensors/embedded systems (Table 6.39), %13,5 strong and very strong in Network technology/M2M communication (Table 6.40), %12,5 strong and very strong in Robotics/Artificial intelligence (Table 6.41), %11,3 strong and very strong in Predictive maintenance (Table 6.42), %11,3 strong and very strong in Modelling and programming (Table 6.43), %14,8 strong and very strong in Big data/Data analysis and interpretation (Table 6.44), %8,9 strong and very strong in Cloud computing/architectures (Table 6.45), %7,8 strong and very strong in In memory DBs (Table 6.46), %12,4 strong and very strong in Statistics (Table 6.47), %14,8 strong and very strong in Data security (Table 6.48).

**Table 6.26: IT and technology affinity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	9	10,0	10,1	10,1
	Weak	18	20,0	20,2	30,3
	Moderate	15	16,7	16,9	47,2
	Strong	28	31,1	31,5	78,7
	Very Strong	19	21,1	21,3	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.27: Economics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	6,7	6,7	6,7
	Weak	23	25,6	25,8	32,6
	Moderate	25	27,8	28,1	60,7
	Strong	27	30,0	30,3	91,0
	Very Strong	8	8,9	9,0	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.28: Extract business value from social media**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	15	16,7	16,9	16,9
	Weak	14	15,6	15,7	32,6
	Moderate	26	28,9	29,2	61,8
	Strong	21	23,3	23,6	85,4
	Very Strong	13	14,4	14,6	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.29: Service orientation/product service offerings**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	5,6	5,7	5,7
	Weak	17	18,9	19,3	25,0
	Moderate	21	23,3	23,9	48,9
	Strong	27	30,0	30,7	79,5
	Very Strong	18	20,0	20,5	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

**Table 6.30: Business process management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	24	26,7	27,3	27,3
	Weak	12	13,3	13,6	40,9
	Moderate	31	34,4	35,2	76,1
	Strong	11	12,2	12,5	88,6
	Very Strong	10	11,1	11,4	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

**Table 6.31: Business change management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	24	26,7	27,0	27,0
	Weak	19	21,1	21,3	48,3
	Moderate	25	27,8	28,1	76,4
	Strong	10	11,1	11,2	87,6
	Very Strong	11	12,2	12,4	100,0
	Total				

	Total	89	98,9	100,0
Missing	99,00	1	1,1	
Total		90	100,0	

**Table 6.32: Understand and coordinate workflows**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	12	13,3	13,5	13,5
	Weak	15	16,7	16,9	30,3
	Moderate	18	20,0	20,2	50,6
	Strong	33	36,7	37,1	87,6
	Very Strong	11	12,2	12,4	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.33: Network security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	35	38,9	39,8	39,8
	Weak	17	18,9	19,3	59,1
	Moderate	17	18,9	19,3	78,4
	Strong	8	8,9	9,1	87,5
	Very Strong	11	12,2	12,5	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

**Table 6.34: IT architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	45	50,0	51,1	51,1
	Weak	13	14,4	14,8	65,9
	Moderate	14	15,6	15,9	81,8

	Strong	8	8,9	9,1	90,9
	Very Strong	8	8,9	9,1	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

**Table 6.35: Machine learning**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	29	32,2	33,0	33,0
	Weak	17	18,9	19,3	52,3
	Moderate	15	16,7	17,0	69,3
	Strong	15	16,7	17,0	86,4
	Very Strong	12	13,3	13,6	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

**Table 6.36: System development**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	46	51,1	52,3	52,3
	Weak	9	10,0	10,2	62,5
	Moderate	13	14,4	14,8	77,3
	Strong	11	12,2	12,5	89,8
	Very Strong	9	10,0	10,2	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

**Table 6.37: Integrating heterogeneous technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Very Weak	44	48,9	49,4	49,4
	Weak	10	11,1	11,2	60,7
	Moderate	21	23,3	23,6	84,3
	Strong	10	11,1	11,2	95,5
	Very Strong	4	4,4	4,5	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.38: Mobile technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	44	48,9	49,4	49,4
	Weak	11	12,2	12,4	61,8
	Moderate	15	16,7	16,9	78,7
	Strong	8	8,9	9,0	87,6
	Very Strong	11	12,2	12,4	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.39: Sensors/embedded systems**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	29	32,2	33,3	33,3
	Weak	21	23,3	24,1	57,5
	Moderate	22	24,4	25,3	82,8
	Strong	9	10,0	10,3	93,1
	Very Strong	6	6,7	6,9	100,0
	Total	87	96,7	100,0	
Missing	99,00	3	3,3		
Total		90	100,0		

**Table 6.40: Network technology/M2M communication**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	55	61,1	61,8	61,8
	Weak	8	8,9	9,0	70,8
	Moderate	14	15,6	15,7	86,5
	Strong	9	10,0	10,1	96,6
	Very Strong	3	3,3	3,4	100,0
	Total	89	98,9	100,0	
	Missing	99,00	1	1,1	
Total		90	100,0		

**Table 6.41: Robotics/Artificial intelligence**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	36	40,0	40,9	40,9
	Weak	24	26,7	27,3	68,2
	Moderate	17	18,9	19,3	87,5
	Strong	7	7,8	8,0	95,5
	Very Strong	4	4,4	4,5	100,0
	Total	88	97,8	100,0	
	Missing	99,00	2	2,2	
Total		90	100,0		

**Table 6.42: Predictive maintenance**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	38	42,2	42,7	42,7
	Weak	20	22,2	22,5	65,2
	Moderate	21	23,3	23,6	88,8
	Strong	7	7,8	7,9	96,6
	Very Strong	3	3,3	3,4	100,0
	Total	89	98,9	100,0	
	Missing	99,00	1	1,1	

Total	90	100,0		
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**Table 6.43: Modelling and programming**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	56	62,2	63,6	63,6
	Weak	7	7,8	8,0	71,6
	Moderate	15	16,7	17,0	88,6
	Strong	4	4,4	4,5	93,2
	Very Strong	6	6,7	6,8	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

**Table 6.44: Big data/Data analysis and interpretation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	58	64,4	65,9	65,9
	Weak	5	5,6	5,7	71,6
	Moderate	12	13,3	13,6	85,2
	Strong	7	7,8	8,0	93,2
	Very Strong	6	6,7	6,8	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

**Table 6.45: Cloud computing/architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	61	67,8	68,5	68,5
	Weak	5	5,6	5,6	74,2
	Moderate	15	16,7	16,9	91,0
	Strong	6	6,7	6,7	97,8

	Very Strong	2	2,2	2,2	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.46: In-memory DBs**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	60	66,7	67,4	67,4
	Weak	6	6,7	6,7	74,2
	Moderate	16	17,8	18,0	92,1
	Strong	5	5,6	5,6	97,8
	Very Strong	2	2,2	2,2	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.47: Statistics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	23	25,6	25,8	25,8
	Weak	38	42,2	42,7	68,5
	Moderate	17	18,9	19,1	87,6
	Strong	8	8,9	9,0	96,6
	Very Strong	3	3,3	3,4	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.48: Data security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	38	42,2	43,2	43,2

	Weak	20	22,2	22,7	65,9
	Moderate	17	18,9	19,3	85,2
	Strong	6	6,7	6,8	92,0
	Very Strong	7	7,8	8,0	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

### Analyzing

%57,3 of the Romanian students rate strong and very strong in Problem Solving (Table 6.49), %22,5 strong and very strong in Optimization (Table 6.50), %34,9 strong and very strong in Analytical Skills (Table 6.51), %46,1 strong and very strong in Cognitive Ability (Tabel 2.52). Optimization and Analytical skills needs improvement.

**Table 6.49: Problem Solving**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	7	7,8	7,9	7,9
	Weak	7	7,8	7,9	15,7
	Moderate	24	26,7	27,0	42,7
	Strong	38	42,2	42,7	85,4
	Very Strong	13	14,4	14,6	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.50: Optimization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	21	23,3	23,6	23,6
	Weak	20	22,2	22,5	46,1
	Moderate	28	31,1	31,5	77,5
	Strong	11	12,2	12,4	89,9

	Very Strong	9	10,0	10,1	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.51: Analytical Skills**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	11	12,2	12,4	12,4
	Weak	20	22,2	22,5	34,8
	Moderate	27	30,0	30,3	65,2
	Strong	20	22,2	22,5	87,6
	Very Strong	11	12,2	12,4	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.52: Cognitive Ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	4,4	4,5	4,5
	Weak	13	14,4	14,6	19,1
	Moderate	31	34,4	34,8	53,9
	Strong	28	31,1	31,5	85,4
	Very Strong	13	14,4	14,6	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

## CREATING AND CONCEPTUALIZATION

### Learning and Researching

%73,8 rate strong and very strong in Life-long learning skills (Table 6.53), %58,4 rate strong and very strong in Knowledge management skills (Table 6.54).

**Table 6.53: Life-long learning**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	3,3	3,4	3,4
	Weak	5	5,6	5,7	9,1
	Moderate	15	16,7	17,0	26,1
	Strong	34	37,8	38,6	64,8
	Very Strong	31	34,4	35,2	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

**Table 6.54: Knowledge management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	3,3	3,4	3,4
	Weak	9	10,0	10,1	13,5
	Moderate	25	27,8	28,1	41,6
	Strong	30	33,3	33,7	75,3
	Very Strong	22	24,4	24,7	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Creating and Innovation**

%41,5 rate strong and very strong in Innovating (Table 6.55), %48,9 rate strong and very strong Creativity (Table 6.56), %47,1 rate strong and very strong Critical thinking (Table 6.57), %28,4 rate strong and very strong Change management (Table 6.58). Romanian students lack creating and innovation skills, change management being the lowest.

**Table 6.55: Innovating**

		Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Very Weak	12	13,3	13,5	13,5
	Weak	13	14,4	14,6	28,1
	Moderate	27	30,0	30,3	58,4
	Strong	27	30,0	30,3	88,8
	Very Strong	10	11,1	11,2	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.56: Creativity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	13	14,4	14,8	14,8
	Weak	17	18,9	19,3	34,1
	Moderate	15	16,7	17,0	51,1
	Strong	24	26,7	27,3	78,4
	Very Strong	19	21,1	21,6	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

**Table 6.57: Critical thinking**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	14	15,6	15,7	15,7
	Weak	17	18,9	19,1	34,8
	Moderate	16	17,8	18,0	52,8
	Strong	23	25,6	25,8	78,7
	Very Strong	19	21,1	21,3	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.58: Change management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	19	21,1	21,6	21,6
	Weak	15	16,7	17,0	38,6
	Moderate	29	32,2	33,0	71,6
	Strong	17	18,9	19,3	90,9
	Very Strong	8	8,9	9,1	100,0
	Total	88	97,8	100,0	
	Missing	99,00	2	2,2	
Total		90	100,0		

**Formulating Strategies**

%17,9 rate strong and very strong in Business strategy (Table 6.59), %27,5 strong and very strong in Abstraction ability (Table 6.60), %29,6 strong and very strong in Managing complexity (Table 6.61). All formulating strategy skills need improvement.

**Table 6.59: Business strategy**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	29	32,2	32,6	32,6
	Weak	17	18,9	19,1	51,7
	Moderate	27	30,0	30,3	82,0
	Strong	10	11,1	11,2	93,3
	Very Strong	6	6,7	6,7	100,0
	Total	89	98,9	100,0	
	Missing	99,00	1	1,1	
Total		90	100,0		

**Table 6.60: Abstraction ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	14	15,6	16,1	16,1
	Weak	21	23,3	24,1	40,2

	Moderate	28	31,1	32,2	72,4
	Strong	17	18,9	19,5	92,0
	Very Strong	7	7,8	8,0	100,0
	Total	87	96,7	100,0	
Missing	99,00	3	3,3		
Total		90	100,0		

**Table 6.61: Managing complexity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	20	22,2	22,7	22,7
	Weak	17	18,9	19,3	42,0
	Moderate	25	27,8	28,4	70,5
	Strong	18	20,0	20,5	90,9
	Very Strong	8	8,9	9,1	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

## ORGANIZING AND EXECUTING

### Planning and Organization

%18,2 rate strong and very strong in Project management (Table 6.62), %45,4 rate strong and very strong in Planning and organizing work (Table 6.63), %25,8 rate strong and very strong in Management ability (Table 6.64). Romanian students lack planning and organization skills.

**Table 6.62: Project management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	39	43,3	44,3	44,3
	Weak	21	23,3	23,9	68,2
	Moderate	12	13,3	13,6	81,8
	Strong	10	11,1	11,4	93,2
	Very Strong	6	6,7	6,8	100,0

Total	88	97,8	100,0
Missing 99,00	2	2,2	
Total	90	100,0	

**Table 6.63: Planning and organizing work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	6	6,7	6,8	6,8
Weak	19	21,1	21,6	28,4
Moderate	23	25,6	26,1	54,5
Strong	28	31,1	31,8	86,4
Very Strong	12	13,3	13,6	100,0
Total	88	97,8	100,0	
Missing 99,00	2	2,2		
Total	90	100,0		

**Table 6.64: Management ability**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	25	27,8	28,1	28,1
Weak	21	23,3	23,6	51,7
Moderate	20	22,2	22,5	74,2
Strong	17	18,9	19,1	93,3
Very Strong	6	6,7	6,7	100,0
Total	89	98,9	100,0	
Missing 99,00	1	1,1		
Total	90	100,0		

### **Delivering Results and Meeting Customer Expectation**

%34,8 of the Romanian students rate their Customer orientation skills as strong and very strong (Table 6.65) and %34,8 in Customer relationship management (Table 6.66). Romanian students rate low in Delivering Results and Meeting Customer Expectation skills.

**Table 6.65: Customer orientation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	15	16,7	16,9	16,9
	Weak	19	21,1	21,3	38,2
	Moderate	24	26,7	27,0	65,2
	Strong	17	18,9	19,1	84,3
	Very Strong	14	15,6	15,7	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.66: Customer relationship management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	16	17,8	18,0	18,0
	Weak	21	23,3	23,6	41,6
	Moderate	21	23,3	23,6	65,2
	Strong	17	18,9	19,1	84,3
	Very Strong	14	15,6	15,7	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Following Instructions and Procedures**

%48,3 rate strong and very strong Legislation awareness skill (Table 6.67), %70,8 strong and very strong in Safety awareness (Table 6.68), %80,5 strong very strong in Individual responsibility (Table 6.69).

**Table 6.67: Legislation awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,2	2,2	2,2
	Weak	16	17,8	18,0	20,2
	Moderate	28	31,1	31,5	51,7

	Strong	34	37,8	38,2	89,9
	Very Strong	9	10,0	10,1	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.68: Safety awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	10	11,1	11,2	12,4
	Moderate	15	16,7	16,9	29,2
	Strong	30	33,3	33,7	62,9
	Very Strong	33	36,7	37,1	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.69: Individual responsibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	7	7,8	8,0	9,2
	Moderate	9	10,0	10,3	19,5
	Strong	22	24,4	25,3	44,8
	Very Strong	48	53,3	55,2	100,0
	Total	87	96,7	100,0	
Missing	99,00	3	3,3		
Total		90	100,0		

## **ADAPTING AND COPING**

### **Adopting and Responding to Change**

%45,5 rate strong and very strong in Work in interdisciplinary environments (Table 6.70), %38,2 rate strong and very strong in Intercultural competency (Table 6.71), %49,2 rate strong and very strong in

Flexibility (Table 6.72), %51,1 rate strong and very strong in Adaptability and ability to change mind-set (Table 6.73). Romanian students rate low in Work in interdisciplinary environments and Intercultural competency skills.

**Table 6.70: Work in interdisciplinary environments**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	8	8,9	9,1	9,1
	Weak	12	13,3	13,6	22,7
	Moderate	28	31,1	31,8	54,5
	Strong	27	30,0	30,7	85,2
	Very Strong	13	14,4	14,8	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

**Table 6.71: Intercultural competency**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,2	2,2	2,2
	Weak	15	16,7	16,9	19,1
	Moderate	38	42,2	42,7	61,8
	Strong	20	22,2	22,5	84,3
	Very Strong	14	15,6	15,7	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.72: Flexibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,2	2,3	2,3
	Weak	14	15,6	16,1	18,4

	Moderate	28	31,1	32,2	50,6
	Strong	28	31,1	32,2	82,8
	Very Strong	15	16,7	17,2	100,0
	Total	87	96,7	100,0	
Missing	99,00	3	3,3		
Total		90	100,0		

**Table 6.73: Adaptability and ability to change mind-set**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	3,3	3,4	3,4
	Weak	10	11,1	11,4	14,8
	Moderate	30	33,3	34,1	48,9
	Strong	25	27,8	28,4	77,3
	Very Strong	20	22,2	22,7	100,0
	Total	88	97,8	100,0	
Missing	99,00	2	2,2		
Total		90	100,0		

### Persuading and Influencing

%40,4 of the Romanian students rate strong and very strong in Work Life Balance skill (Table 6.74).

Romanian students rate low in work-life balance skills.

**Table 6.74: Work-life Balance**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	10	11,1	11,2	11,2
	Weak	19	21,1	21,3	32,6
	Moderate	24	26,7	27,0	59,6
	Strong	19	21,1	21,3	80,9
	Very Strong	17	18,9	19,1	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

## 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 (Table 6.75). Romanian students rate low in Self-management and organization skills.

**Table 6.75: Self-management and organization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	10	11,1	11,2	11,2
	Weak	22	24,4	24,7	36,0
	Moderate	26	28,9	29,2	65,2
	Strong	15	16,7	16,9	82,0
	Very Strong	16	17,8	18,0	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

### Entrepreneurial and Commercial Thinking

%25,8of the Romanian students rate strong and very strong in Business model understanding (Table 6.76) and %16,9 rate strong and very strong in Entrepreneurship (Table 6.77). Romanian students lack business model understanding and entrepreneurship skills.

**Table 6.76: Business model understanding**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	22	24,4	24,7	24,7
	Weak	23	25,6	25,8	50,6
	Moderate	21	23,3	23,6	74,2
	Strong	10	11,1	11,2	85,4
	Very Strong	13	14,4	14,6	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

**Table 6.77: Entrepreneurship**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	35	38,9	39,3	39,3
	Weak	18	20,0	20,2	59,6
	Moderate	21	23,3	23,6	83,1
	Strong	8	8,9	9,0	92,1
	Very Strong	7	7,8	7,9	100,0
	Total	89	98,9	100,0	
Missing	99,00	1	1,1		
Total		90	100,0		

## QUESTIONNAIRE INTERPRETATION FOR ROMANIA

Target group: MANAGERS

PROJECT: Career Guide and Mobile Application for Employees

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.

1- What is the current trend in your 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.

2- What is the current trend in your 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.

3. What is the trend of your domain in the economy?

The tendency is the development, relatively easy growth in the field.

4 - If you lose your job right now, how easy can you find a new job in the same field of activity?

The answers to this question was consistently the same: hard and difficult.

5 - If you lose your post right now, how easy can you find a new position with the same function?

The answers of the managers to this question was the same: hard and difficult.

6- If you lose your job right now, how easy can you 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.

7. Can you work on a lower rank in the hierarchy than your current position?

The answer was 90% yes.

8 - What is the biggest challenge for you 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. "

9 - In which areas do you think you should develop your 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.

10 - Can automation be a problem for your current position? What do you think about Industry4 in your 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 analysed 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 analysed 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.

11- Are there employees who work in lower positions and who are in danger of losing their job in your organization / field of activity? How will "Industry 4" affect your employment in your organization / field of activity?

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.

# NEED ANALYSIS REPORT – HUNGARY

## Literature Review for Hungary

### Employment in Hungary – 2018

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)”<sup>1</sup>***

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.

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<sup>1</sup> <https://accace.com/labour-law-and-employment-in-hungary>

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 \(https://palyaorientacio.munka.hu/\)](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](http://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.<sup>2</sup>

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

The Manufacture is divided into the following areas:

Manufacturing industry	Manufacture of food, beverages	Manufacture of textiles, clothing,	Manufacture of wood and	Manufacture of coke, crude oil	Manufacture of chemicals and	Pharmaceutical	Manufacture of rubber, plastic and	Manufacture of basic metals and metal-	Manufacture of computer, electronic
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<sup>2</sup> [https://www.ksh.hu/docs/hun/xstadat/xstadat\\_eves/i\\_qlf015.html](https://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_qlf015.html)

	and tobacco products	leather and leather products	paper products,	processi ng	chemical products	manufa cturing	non-metallic mineral products	processing products	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 people<sup>3</sup>

Number of registered companies:

<sup>3</sup> [https://www.ksh.hu/docs/hun/xstadat/xstadat\\_eves/i\\_qlf005b.html](https://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_qlf005b.html)

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

year	Institution	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

Years	Education form	Age
3–4	kindergarten	From 3 years old
4–6–8	<a href="#">elementary</a> school	6 years old
8–6–4 vagy 4–5–6	gymnasium or secondary vocational school	10-12-14 years old
3–4	Higher Education B.Sc.	after graduation; usually from 18
2–1	higher education master's degree	
4	PhD	

### 1. table: education system in Hungary<sup>4</sup>

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,

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<sup>4</sup> [https://en.wikipedia.org/wiki/Education\\_in\\_Hungary](https://en.wikipedia.org/wiki/Education_in_Hungary)

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. <sup>5</sup>

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;

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<sup>5</sup> [https://hu.wikipedia.org/wiki/Magyarorsz%C3%A1g\\_oktat%C3%A1si\\_rendszere](https://hu.wikipedia.org/wiki/Magyarorsz%C3%A1g_oktat%C3%A1si_rendszere)

- 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;
- 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 Andrásy 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)<sup>6</sup>

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<sup>6</sup> Ștefan George Manța et al. / Procedia Economics and Finance 32 ( 2015 ) 1276 – 1288

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%<sup>7</sup>

## 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 (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

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<sup>7</sup> <https://www.sciencedirect.com/science/article/pii/S2212567115015051>

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.<sup>8</sup>

## **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:

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<sup>8</sup> <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.

## **EMPLOYEE QUESTIONNAIRE ANALYSIS-HUNGARY**

### **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)**

## **EMPLOYEE QUESTIONNAIRE ANALYSIS-SPAIN**

### **Demographics**

Participants participated the research are %41,7 male and %58,3 female (Table 3.1), age ranging from 23 to 60 and mean age is 40,64 (Table 3.2). %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 (Table 3.3). %38,3 of the respondents are employed in service (tourism, health, finance, IT) sector, %30 in education and %31,7 in manufacturing (Table 3.4). %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 (Table 3.5). Participants are working years as a professional range from 1-35 years and average working year as professional is 13,69 years (Table 3.6), participants are working for the same company ranging from 1-32 years and average working years for the same company is 9,77 years (Table 3.7) 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 (Table 3.8).

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.

**Table 3.1: Gender**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	25	41,7	41,7	41,7
Female	35	58,3	58,3	100,0
Total	60	100,0	100,0	

**Table 3.2: Age**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 23,00	1	1,7	1,8	1,8
24,00	3	5,0	5,3	7,0
25,00	5	8,3	8,8	15,8
26,00	2	3,3	3,5	19,3
27,00	1	1,7	1,8	21,1
29,00	2	3,3	3,5	24,6
32,00	1	1,7	1,8	26,3
33,00	1	1,7	1,8	28,1
34,00	1	1,7	1,8	29,8
35,00	3	5,0	5,3	35,1
36,00	1	1,7	1,8	36,8
37,00	1	1,7	1,8	38,6
40,00	6	10,0	10,5	49,1
43,00	1	1,7	1,8	50,9
44,00	2	3,3	3,5	54,4
45,00	5	8,3	8,8	63,2
47,00	2	3,3	3,5	66,7
49,00	4	6,7	7,0	73,7
50,00	2	3,3	3,5	77,2

	51,00	5	8,3	8,8	86,0
	52,00	2	3,3	3,5	89,5
	55,00	4	6,7	7,0	96,5
	58,00	1	1,7	1,8	98,2
	60,00	1	1,7	1,8	100,0
	Total	57	95,0	100,0	
Missing	System	3	5,0		
Total		60	100,0		

**Table 3.3: Educational background**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Secondary school	22	36,7	37,3	37,3
vocational school	6	10,0	10,2	47,5
Collage	11	18,3	18,6	66,1
Graduate	13	21,7	22,0	88,1
Higher education (master/Phd)	7	11,7	11,9	100,0
Total	59	98,3	100,0	
Missing System	1	1,7		
Total	60	100,0		

**Table 3.4: Sector**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Manufacturing	19	31,7	31,7	31,7
Education	18	30,0	30,0	61,7
Service (Tourism, health, finance IT)	23	38,3	38,3	100,0
Total	60	100,0	100,0	

**Table 3.5: What is the size of the organization?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1-10	21	35,0	36,2	36,2
11-50	22	36,7	37,9	74,1

	51-100	5	8,3	8,6	82,8
	101-250	3	5,0	5,2	87,9
	251-500	4	6,7	6,9	94,8
	500+	3	5,0	5,2	100,0
	Total	58	96,7	100,0	
Missing	99,00	2	3,3		
Total		60	100,0		

**Table 3.6: How long have you being working as a professional?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1,00	5	8,3	8,5	8,5
	2,00	3	5,0	5,1	13,6
	3,00	3	5,0	5,1	18,6
	4,00	1	1,7	1,7	20,3
	5,00	5	8,3	8,5	28,8
	6,00	2	3,3	3,4	32,2
	7,00	3	5,0	5,1	37,3
	9,00	1	1,7	1,7	39,0
	10,00	1	1,7	1,7	40,7
	11,00	2	3,3	3,4	44,1
	12,00	1	1,7	1,7	45,8
	13,00	1	1,7	1,7	47,5
	14,00	1	1,7	1,7	49,2
	15,00	5	8,3	8,5	57,6
	16,00	2	3,3	3,4	61,0
	17,00	2	3,3	3,4	64,4
	18,00	1	1,7	1,7	66,1
	19,00	1	1,7	1,7	67,8
	20,00	7	11,7	11,9	79,7
	23,00	1	1,7	1,7	81,4
	24,00	2	3,3	3,4	84,7
	25,00	2	3,3	3,4	88,1
	26,00	1	1,7	1,7	89,8
	27,00	2	3,3	3,4	93,2
	28,00	1	1,7	1,7	94,9
	32,00	2	3,3	3,4	98,3
	35,00	1	1,7	1,7	100,0

Total	59	98,3	100,0
Missing	1	1,7	
Total	60	100,0	

**Table 3.7: How long have you worked for the company?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1,00	9	15,0	15,8	15,8
2,00	6	10,0	10,5	26,3
3,00	3	5,0	5,3	31,6
4,00	2	3,3	3,5	35,1
5,00	5	8,3	8,8	43,9
6,00	1	1,7	1,8	45,6
7,00	3	5,0	5,3	50,9
9,00	1	1,7	1,8	52,6
10,00	3	5,0	5,3	57,9
11,00	5	8,3	8,8	66,7
12,00	1	1,7	1,8	68,4
13,00	1	1,7	1,8	70,2
15,00	1	1,7	1,8	71,9
16,00	4	6,7	7,0	78,9
17,00	1	1,7	1,8	80,7
19,00	1	1,7	1,8	82,5
20,00	4	6,7	7,0	89,5
21,00	1	1,7	1,8	91,2
22,00	1	1,7	1,8	93,0
25,00	2	3,3	3,5	96,5
28,00	1	1,7	1,8	98,2
32,00	1	1,7	1,8	100,0
Total	57	95,0	100,0	
Missing 99,00	3	5,0		
Total	60	100,0		

**Table 3.8: How long have you worked in present position?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1,00	12	20,0	20,3	20,3

2,00	7	11,7	11,9	32,2
3,00	4	6,7	6,8	39,0
4,00	3	5,0	5,1	44,1
5,00	7	11,7	11,9	55,9
6,00	3	5,0	5,1	61,0
7,00	2	3,3	3,4	64,4
8,00	1	1,7	1,7	66,1
9,00	3	5,0	5,1	71,2
10,00	5	8,3	8,5	79,7
11,00	2	3,3	3,4	83,1
12,00	1	1,7	1,7	84,7
13,00	1	1,7	1,7	86,4
14,00	1	1,7	1,7	88,1
16,00	1	1,7	1,7	89,8
20,00	5	8,3	8,5	98,3
26,00	1	1,7	1,7	100,0
Total	59	98,3	100,0	
Missing	1	1,7		
Total	60	100,0		

### 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 3.9). %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 3.10).

%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 3.11). %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 3.12).

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.

**Table 3.9: 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	

**Table 3.10: 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	

**Table 3.11: 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	

**Table 3.12: 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	

## **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.

### **GREAT EIGHT DIMENSIONS AND THEIR DEFINITIONS**

#### **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.

**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 (Table 3.13) and %60 strong to very strong level of taking responsibility (Table 3.14).

**Table 3.13: Decision making**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	12	20,0	20,0	20,0
Moderate	16	26,7	26,7	46,7
Strong	24	40,0	40,0	86,7
Very Strong	8	13,3	13,3	100,0
Total	60	100,0	100,0	

**Table 3.14: Taking responsibility**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	5	8,3	8,3	8,3
Moderate	19	31,7	31,7	40,0
Strong	19	31,7	31,7	71,7
Very Strong	17	28,3	28,3	100,0
Total	60	100,0	100,0	

### **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 (Table 3.15). Hungarian employees are below average in leadership skills.

**Table 3.15: Leadership Skills**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,7	1,7	1,7
Weak	12	20,0	20,0	21,7
Moderate	23	38,3	38,3	60,0
Strong	19	31,7	31,7	91,7
Very Strong	5	8,3	8,3	100,0
Total	60	100,0	100,0	

### 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 (Table 3.16) %60 in Collaborating with Others (Table 3.17) and %65 in Communicating with People (Table 3.18) respectively. Hungarian participants evaluate themselves high in working with people dimension.

**Table 3.16: Team work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	9	15,0	15,3	15,3
Moderate	10	16,7	16,9	32,2
Strong	25	41,7	42,4	74,6
Very Strong	15	25,0	25,4	100,0
Total	59	98,3	100,0	
Missing System	1	1,7		
Total	60	100,0		

**Table 3.17: Collaborating with others**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,7	1,7	1,7
Weak	7	11,7	11,7	13,3
Moderate	16	26,7	26,7	40,0
Strong	21	35,0	35,0	75,0
Very Strong	15	25,0	25,0	100,0
Total	60	100,0	100,0	

**Table 3.18: Communicating with people**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	7	11,7	11,7	11,7
Moderate	14	23,3	23,3	35,0
Strong	22	36,7	36,7	71,7
Very Strong	17	28,3	28,3	100,0
Total	60	100,0	100,0	

### **Adhering to Principles and Values**

Hungarian participants evaluate themselves %76,7 high as strong and very strong in Respecting Ethics (Table 3.19) and %65 in Environmental Awareness (Table 3.20) skills.. However, awareness of ergonomics rated only %35 strong and very strong. Hungarian participants are below average in ergonomics awareness.

**Table 3.19: Respecting ethics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,7	1,7	1,7
Weak	5	8,3	8,3	10,0
Moderate	8	13,3	13,3	23,3
Strong	27	45,0	45,0	68,3
Very Strong	19	31,7	31,7	100,0
Total	60	100,0	100,0	

**Table 3.20: Environmental awareness**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	8	13,3	13,3	13,3
Moderate	13	21,7	21,7	35,0
Strong	26	43,3	43,3	78,3
Very Strong	13	21,7	21,7	100,0
Total	60	100,0	100,0	

**Table 3.21: Awareness of ergonomics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	6	10,0	10,0	10,0
Weak	11	18,3	18,3	28,3
Moderate	22	36,7	36,7	65,0
Strong	16	26,7	26,7	91,7
Very Strong	5	8,3	8,3	100,0
Total	60	100,0	100,0	

## 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. %60of the Hungarian participants rated themselves as strong and very strong compromising skills (Table 3.22), %58,3 in creating

business networks (Table 3.23), and %66,7 in maintaining customer relationships (Table 3.24).

**Table 3.22: Compromising**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,0	5,0
	Weak	4	6,7	6,7	11,7
	Moderate	17	28,3	28,3	40,0
	Strong	33	55,0	55,0	95,0
	Very Strong	3	5,0	5,0	100,0
	Total	60	100,0	100,0	

**Table 3.23: Creating business networks**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	8	13,3	13,3	13,3
	Moderate	17	28,3	28,3	41,7
	Strong	22	36,7	36,7	78,3
	Very Strong	13	21,7	21,7	100,0
	Total	60	100,0	100,0	

**Table 3.24: Maintaining customer relationships**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	10	16,7	16,7	18,3
	Moderate	9	15,0	15,0	33,3
	Strong	23	38,3	38,3	71,7
	Very Strong	17	28,3	28,3	100,0
	Total	60	100,0	100,0	

**Persuading and Influencing**

%60 of the Hungarian participants rated themselves strong and very strong in persuading influencing skills (Table 3.25) whereas %66,7 in emotional intelligence skills (Table 3.26).

**Table 3.25: Negotiating**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	3,3	3,3	3,3
Weak	7	11,7	11,7	15,0
Moderate	15	25,0	25,0	40,0
Strong	25	41,7	41,7	81,7
Very Strong	11	18,3	18,3	100,0
Total	60	100,0	100,0	

**Table 3.26: Emotional intelligence**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,7	1,7	1,7
Weak	8	13,3	13,3	15,0
Moderate	11	18,3	18,3	33,3
Strong	21	35,0	35,0	68,3
Very Strong	19	31,7	31,7	100,0
Total	60	100,0	100,0	

### **Presenting and Communicating Information**

Hungarian participant rate themselves with strong and very strong with %55 in presenting and communication ability (Table 3.27).

**Table 3.27: Presenting and communication ability**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	3,3	3,3	3,3
Weak	10	16,7	16,7	20,0

Moderate	15	25,0	25,0	45,0
Strong	24	40,0	40,0	85,0
Very Strong	9	15,0	15,0	100,0
Total	60	100,0	100,0	

## 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 skills (Table 3.28) and %44,2 strong and very strong in literacy skills (Table 3.29). Hungarian participants rated themselves low in literacy skills.

**Table 3.28: Targeted/Technical Communication**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	4	6,7	6,7	6,7
Weak	8	13,3	13,3	20,0
Moderate	13	21,7	21,7	41,7
Strong	26	43,3	43,3	85,0
Very Strong	9	15,0	15,0	100,0
Total	60	100,0	100,0	

**Table 3.29: Literacy (Reporting, writing plans, writing letters)**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	7	11,7	11,9	11,9
Weak	5	8,3	8,5	20,3

Moderate	15	25,0	25,4	45,8
Strong	22	36,7	37,3	83,1
Very Strong	10	16,7	16,9	100,0
Total	59	98,3	100,0	
Missing System	1	1,7		
Total	60	100,0		

### 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 (Table 3.30), Economics %22 strong and very strong (Table 3.31), Extract business value from social media %20,3 strong and very strong (Table 3.32), Service orientation/product service offerings %34,5 strong and very strong (Table 3.33), Business process management %34,5 strong and very strong (Table 3.34), Business change management %39,7 strong and very strong (Table 3.35), Understand and coordinate workflows %56,9 strong and very strong (Table 3.36), Network security %43,1 strong and very strong (Table 3.37), IT architectures %13,8 strong and very strong (Table 3.38), Machine learning %24,1 strong and very strong (Table 3.39), System development %17,2 strong and very strong (Table 3.40), Integrating heterogeneous technologies %17,2 strong and very strong (Table 3.41), Mobile technologies %22,8 strong and very strong (Table 3.42), Sensors/embedded systems %12,1 strong and very strong (Table 3.43), Network technology/M2M communication %8,6 strong and very strong (Table 3.44), Robotics/Artificial intelligence %5,2 strong and very strong (Table 3.45), Predictive maintenance %7 strong only (Table 3.46), Modelling and programming %6,9 strong and very strong (Table 3.47), Big data/Data analysis and interpretation %15,5 (Table 3.48), Cloud computing/architectures %13,8 strong and very strong (Table 3.49), In-memory DBs %6,9 strong and very strong (Table 3.50), Statistics %11,9 strong and very strong (Table 3.51) and Data Security %15,8 strong and very strong (Table 3.52). 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.

**Table 3.30: IT and technology affinity**

	Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Very Weak	7	11,7	11,9	11,9
	Weak	9	15,0	15,3	27,1
	Moderate	18	30,0	30,5	57,6
	Strong	20	33,3	33,9	91,5
	Very Strong	5	8,3	8,5	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 3.31: Economics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,1	5,1
	Weak	15	25,0	25,4	30,5
	Moderate	28	46,7	47,5	78,0
	Strong	10	16,7	16,9	94,9
	Very Strong	3	5,0	5,1	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 3.32: Extract business value from social media**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	6,7	6,8	6,8
	Weak	14	23,3	23,7	30,5
	Moderate	29	48,3	49,2	79,7
	Strong	10	16,7	16,9	96,6
	Very Strong	2	3,3	3,4	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 3.33: Service orientation/product service offerings**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	8,3	8,6	8,6
	Weak	12	20,0	20,7	29,3
	Moderate	21	35,0	36,2	65,5
	Strong	14	23,3	24,1	89,7
	Very Strong	6	10,0	10,3	100,0
	Total	58	96,7	100,0	
	Missing System	2	3,3		
Total		60	100,0		

**Table 3.34: Business process management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,2	5,2
	Weak	15	25,0	25,9	31,0
	Moderate	20	33,3	34,5	65,5
	Strong	18	30,0	31,0	96,6
	Very Strong	2	3,3	3,4	100,0
	Total	58	96,7	100,0	
	Missing System	2	3,3		
Total		60	100,0		

**Table 3.35: Business change management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	18	30,0	31,0	32,8
	Moderate	16	26,7	27,6	60,3
	Strong	18	30,0	31,0	91,4
	Very Strong	5	8,3	8,6	100,0
	Total	58	96,7	100,0	
	Missing System	2	3,3		

Total	60	100,0		
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**Table 3.36: Understand and coordinate workflows**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,4	3,4
	Weak	7	11,7	12,1	15,5
	Moderate	16	26,7	27,6	43,1
	Strong	22	36,7	37,9	81,0
	Very Strong	11	18,3	19,0	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.37: Network security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,2	5,2
	Weak	8	13,3	13,8	19,0
	Moderate	22	36,7	37,9	56,9
	Strong	19	31,7	32,8	89,7
	Very Strong	6	10,0	10,3	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.38: IT architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	10	16,7	17,2	17,2
	Weak	19	31,7	32,8	50,0
	Moderate	21	35,0	36,2	86,2
	Strong	7	11,7	12,1	98,3

	Very Strong	1	1,7	1,7	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.39: Machine learning**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	10	16,7	17,2	17,2
	Weak	12	20,0	20,7	37,9
	Moderate	22	36,7	37,9	75,9
	Strong	12	20,0	20,7	96,6
	Very Strong	2	3,3	3,4	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.40: System development**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	16	26,7	27,6	27,6
	Weak	12	20,0	20,7	48,3
	Moderate	20	33,3	34,5	82,8
	Strong	7	11,7	12,1	94,8
	Very Strong	3	5,0	5,2	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.41: Integrating heterogeneous technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	17	28,3	29,3	29,3

	Weak	14	23,3	24,1	53,4
	Moderate	17	28,3	29,3	82,8
	Strong	9	15,0	15,5	98,3
	Very Strong	1	1,7	1,7	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.42: Mobile technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	12	20,0	21,1	21,1
	Weak	14	23,3	24,6	45,6
	Moderate	18	30,0	31,6	77,2
	Strong	10	16,7	17,5	94,7
	Very Strong	3	5,0	5,3	100,0
	Total	57	95,0	100,0	
Missing	System	3	5,0		
Total		60	100,0		

**Table 3.43: Sensors/embedded systems**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	24	40,0	41,4	41,4
	Weak	14	23,3	24,1	65,5
	Moderate	13	21,7	22,4	87,9
	Strong	5	8,3	8,6	96,6
	Very Strong	2	3,3	3,4	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.44: Network technology/M2M communication**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	17	28,3	29,3	29,3
	Weak	22	36,7	37,9	67,2
	Moderate	14	23,3	24,1	91,4
	Strong	5	8,3	8,6	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.45: Robotics/Artificial intelligence**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	23	38,3	39,7	39,7
	Weak	19	31,7	32,8	72,4
	Moderate	13	21,7	22,4	94,8
	Strong	2	3,3	3,4	98,3
	Very Strong	1	1,7	1,7	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.46: Predictive maintenance**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	23	38,3	40,4	40,4
	Weak	13	21,7	22,8	63,2
	Moderate	17	28,3	29,8	93,0
	Strong	3	5,0	5,3	98,2
	Very Strong	1	1,7	1,8	100,0
	Total	57	95,0	100,0	
Missing	System	3	5,0		
Total		60	100,0		

**Table 3.47: Modelling and programming**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	20	33,3	34,5	34,5
	Weak	24	40,0	41,4	75,9
	Moderate	10	16,7	17,2	93,1
	Strong	3	5,0	5,2	98,3
	Very Strong	1	1,7	1,7	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.48: Big data/Data analysis and interpretation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	14	23,3	24,1	24,1
	Weak	18	30,0	31,0	55,2
	Moderate	17	28,3	29,3	84,5
	Strong	6	10,0	10,3	94,8
	Very Strong	3	5,0	5,2	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.49: Cloud computing/architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	23	38,3	39,7	39,7
	Weak	16	26,7	27,6	67,2
	Moderate	11	18,3	19,0	86,2
	Strong	6	10,0	10,3	96,6
	Very Strong	2	3,3	3,4	100,0
	Total	58	96,7	100,0	

Missing System	2	3,3	
Total	60	100,0	

**Table 3.50: In-memory DBs**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	23	38,3	39,7	39,7
	Weak	19	31,7	32,8	72,4
	Moderate	12	20,0	20,7	93,1
	Strong	4	6,7	6,9	100,0
	Total	58	96,7	100,0	
Missing System	2	3,3			
Total	60	100,0			

**Table 3.51: Statistics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	10	16,7	16,9	16,9
	Weak	22	36,7	37,3	54,2
	Moderate	20	33,3	33,9	88,1
	Strong	3	5,0	5,1	93,2
	Very Strong	4	6,7	6,8	100,0
	Total	59	98,3	100,0	
Missing System	1	1,7			
Total	60	100,0			

**Table 3.52: Data security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	10	16,7	17,5	17,5
	Weak	20	33,3	35,1	52,6
	Moderate	18	30,0	31,6	84,2
	Strong	8	13,3	14,0	98,2

	Very Strong	1	1,7	1,8	100,0
	Total	57	95,0	100,0	
Missing	System	3	5,0		
Total		60	100,0		

### Analyzing

Analyzing sub-dimension is composed of 4 items. Participants rated Problem Solving %55.9 strong and very strong (Table 3.53), Optimization %40,7 (Table 3.54), Analytical Skills %42,4 (Table 3.55) and Cognitive Ability %59,3 (Table 3.56). Optimization and analytical skills are below average.

**Table 3.53: Problem Solving**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,1	5,1
	Weak	5	8,3	8,5	13,6
	Moderate	18	30,0	30,5	44,1
	Strong	23	38,3	39,0	83,1
	Very Strong	10	16,7	16,9	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 3.54: Optimization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	15	25,0	25,4	25,4
	Moderate	20	33,3	33,9	59,3
	Strong	19	31,7	32,2	91,5
	Very Strong	5	8,3	8,5	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 3.55: Analytical Skills**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	8,3	8,5	8,5
	Weak	11	18,3	18,6	27,1
	Moderate	18	30,0	30,5	57,6
	Strong	22	36,7	37,3	94,9
	Very Strong	3	5,0	5,1	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 3.56: Cognitive Ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,4	3,4
	Weak	6	10,0	10,2	13,6
	Moderate	16	26,7	27,1	40,7
	Strong	22	36,7	37,3	78,0
	Very Strong	13	21,7	22,0	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

## 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 (Table 3.57) and %44,8 strong and very strong in knowledge management (Table 3.58).

**Table 3.57: Life-long learning**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	5,0	5,1	5,1
Weak	9	15,0	15,3	20,3
Moderate	12	20,0	20,3	40,7
Strong	17	28,3	28,8	69,5
Very Strong	18	30,0	30,5	100,0
Total	59	98,3	100,0	
Missing System	1	1,7		
Total	60	100,0		

**Table 3.58: Knowledge management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,7	1,7	1,7
Weak	14	23,3	24,1	25,9
Moderate	17	28,3	29,3	55,2
Strong	15	25,0	25,9	81,0
Very Strong	11	18,3	19,0	100,0
Total	58	96,7	100,0	
Missing System	2	3,3		
Total	60	100,0		

### Creating and Innovation

Participants rated themselves %47,5 strong and very strong in Innovating (Table 3.59), %58,6 strong and very strong in creativity (Table 3.60), %57,6 strong and very strong in Critical Thinking (Table 3.61) and %55,9 strong and very strong in Change Management (Table 3.62).

**Table 3.59: Innovating**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,1	5,1
	Weak	6	10,0	10,2	15,3
	Moderate	22	36,7	37,3	52,5
	Strong	16	26,7	27,1	79,7
	Very Strong	12	20,0	20,3	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 3.60: Creativity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	7	11,7	12,1	12,1
	Moderate	17	28,3	29,3	41,4
	Strong	14	23,3	24,1	65,5
	Very Strong	20	33,3	34,5	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.61: Critical thinking**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	7	11,7	11,9	13,6
	Moderate	17	28,3	28,8	42,4
	Strong	18	30,0	30,5	72,9
	Very Strong	16	26,7	27,1	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		

Total	60	100,0		
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**Table 3.62: Change management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	6,7	6,8	6,8
	Weak	10	16,7	16,9	23,7
	Moderate	12	20,0	20,3	44,1
	Strong	26	43,3	44,1	88,1
	Very Strong	7	11,7	11,9	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

### Formulating Strategies

Business Strategy %32,8 strong and very strong (Table 3.63), Abstract Ability %31 strong and very strong (Table 3.64), and Managing Complexity %37,9 strong and very strong (Table 3.65). Hungarian participants rated low in formulating strategies.

**Table 3.63: Business strategy**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	6,7	6,9	6,9
	Weak	9	15,0	15,5	22,4
	Moderate	26	43,3	44,8	67,2
	Strong	14	23,3	24,1	91,4
	Very Strong	5	8,3	8,6	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.64: Abstraction ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	15	25,0	25,9	25,9
	Moderate	25	41,7	43,1	69,0
	Strong	13	21,7	22,4	91,4
	Very Strong	5	8,3	8,6	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.65: Managing complexity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,2	5,2
	Weak	10	16,7	17,2	22,4
	Moderate	23	38,3	39,7	62,1
	Strong	14	23,3	24,1	86,2
	Very Strong	8	13,3	13,8	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

## 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 (Table 3.66), Planning and organizing work %57,6 strong and very strong (Table 3.67) and % 44,2 strong and very strong Management Ability (Table 3.68).

**Table 3.66: Project management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,4	3,4
	Weak	11	18,3	18,6	22,0
	Moderate	21	35,0	35,6	57,6
	Strong	21	35,0	35,6	93,2
	Very Strong	4	6,7	6,8	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 3.67: Planning and organizing work**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	10	16,7	16,9	16,9
	Moderate	15	25,0	25,4	42,4
	Strong	24	40,0	40,7	83,1
	Very Strong	10	16,7	16,9	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 3.68: Management ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	8,3	8,5	8,5
	Weak	6	10,0	10,2	18,6
	Moderate	16	26,7	27,1	45,8
	Strong	20	33,3	33,9	79,7
	Very Strong	12	20,0	20,3	100,0
	Total	59	98,3	100,0	

Missing System	1	1,7	
Total	60	100,0	

### Delivering Results and Meeting Customer Expectation

Participants rated their Customer Orientation skills % 64,4 strong and very strong (Table 3.69), Customer Relationship Management skills %62,76 strong and very strong (Table 3.70)

**Table 3.69: Customer orientation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	6	10,0	10,2	11,9
	Moderate	14	23,3	23,7	35,6
	Strong	24	40,0	40,7	76,3
	Very Strong	14	23,3	23,7	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 3.70: Customer relationship management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	8	13,3	13,6	15,3
	Moderate	13	21,7	22,0	37,3
	Strong	22	36,7	37,3	74,6
	Very Strong	15	25,0	25,4	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

### Following Instructions and Procedures

Legislation awareness skills %16,9 strong and very strong (Table 3.71), Safety awareness skills %36,2 strong and very strong (Table 3.72) and Individual responsibility skills %64,4 strong and very strong (Table 3.73).

**Table 3.71: Legislation awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	13	21,7	22,0	22,0
	Weak	18	30,0	30,5	52,5
	Moderate	18	30,0	30,5	83,1
	Strong	9	15,0	15,3	98,3
	Very Strong	1	1,7	1,7	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 3.72: Safety awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	8,3	8,6	8,6
	Weak	15	25,0	25,9	34,5
	Moderate	17	28,3	29,3	63,8
	Strong	15	25,0	25,9	89,7
	Very Strong	6	10,0	10,3	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.73: Individual responsibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,1	5,1
	Weak	6	10,0	10,2	15,3
	Moderate	12	20,0	20,3	35,6

	Strong	22	36,7	37,3	72,9
	Very Strong	16	26,7	27,1	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

## 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 (Table 3.74), Intercultural competency skills %49,2 strong and very strong (Table 3.75), Flexibility skills %57,6 strong and very strong (Table 3.76) and Adaptability and ability to change mind-set skills %47,5 strong and very strong (Table 3.77).

**Table 3.74: Work in interdisciplinary environments**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,3	5,3
	Weak	11	18,3	19,3	24,6
	Moderate	16	26,7	28,1	52,6
	Strong	20	33,3	35,1	87,7
	Very Strong	7	11,7	12,3	100,0
	Total	57	95,0	100,0	
Missing	System	3	5,0		
Total		60	100,0		

**Table 3.75: Intercultural competency**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	8	13,3	13,6	13,6

	Weak	9	15,0	15,3	28,8
	Moderate	13	21,7	22,0	50,8
	Strong	19	31,7	32,2	83,1
	Very Strong	10	16,7	16,9	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 3.76: Flexibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,4	3,4
	Weak	10	16,7	16,9	20,3
	Moderate	13	21,7	22,0	42,4
	Strong	20	33,3	33,9	76,3
	Very Strong	14	23,3	23,7	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 3.77: Adaptability and ability to change mind-set**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,4	3,4
	Weak	9	15,0	15,3	18,6
	Moderate	20	33,3	33,9	52,5
	Strong	21	35,0	35,6	88,1
	Very Strong	7	11,7	11,9	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

### **Persuading and Influencing**

Participants rated their Work Life Balance skills %33,9 strong and very strong (Table 3.78).

**Table 3.78: Work-life Balance**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,4	3,4
	Weak	17	28,3	28,8	32,2
	Moderate	20	33,3	33,9	66,1
	Strong	12	20,0	20,3	86,4
	Very Strong	8	13,3	13,6	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

## 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 (Table 3.79).

**Table 3.79: Self-management and organization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,4	3,4
	Weak	10	16,7	16,9	20,3
	Moderate	15	25,0	25,4	45,8
	Strong	18	30,0	30,5	76,3

	Very Strong	14	23,3	23,7	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

### Entrepreneurial and Commercial Thinking

Participants rated their Business model understanding skills %37,9 strong and very strong (Table 3.80) and Entrepreneurship skills %44,6 strong and very strong (Table 3.81). Hungarian participant rate below average Entrepreneurial and Commercial Thinking skills.

**Table 3.80: Business model understanding**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	13	21,7	22,4	24,1
	Moderate	22	36,7	37,9	62,1
	Strong	16	26,7	27,6	89,7
	Very Strong	6	10,0	10,3	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 3.81: Entrepreneurship**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,8	1,8
	Weak	10	16,7	17,9	19,6
	Moderate	20	33,3	35,7	55,4
	Strong	13	21,7	23,2	78,6
	Very Strong	12	20,0	21,4	100,0
	Total	56	93,3	100,0	
Missing	System	4	6,7		

Total	60	100,0	
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## STUDENT QUESTIONNAIRE ANALYSIS-HUNGARY

### Demographics

Participants participated the research are % 42 male and %58 female (Table 4.1), age ranging from 17 to 34 and mean age is 22,76 (Table 4.2). %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 (Table 4.3). %61 of the respondents are planning to work in service (tourism, health, finance, IT) sector, %21in education and %18 in manufacturing (Table 4.4).

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

**Table 4.1: Gender**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	42	42,0	42,0	42,0
Female	58	58,0	58,0	100,0
Total	100	100,0	100,0	

**Table 4.2: Age**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 17,0	2	2,0	2,0	2,0
18,0	5	5,0	5,1	7,1
19,0	6	6,0	6,1	13,3
20,0	11	11,0	11,2	24,5
21,0	9	9,0	9,2	33,7
22,0	11	11,0	11,2	44,9

	23,0	13	13,0	13,3	58,2
	24,0	18	18,0	18,4	76,5
	25,0	10	10,0	10,2	86,7
	26,0	5	5,0	5,1	91,8
	27,0	3	3,0	3,1	94,9
	28,0	1	1,0	1,0	95,9
	29,0	2	2,0	2,0	98,0
	30,0	1	1,0	1,0	99,0
	34,0	1	1,0	1,0	100,0
	Total	98	98,0	100,0	
Missing	System	2	2,0		
Total		100	100,0		

**Table 4.3: Level of study**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Secondary school	41	41,0	41,0	41,0
vocational school	4	4,0	4,0	45,0
Collage	10	10,0	10,0	55,0
Graduate	33	33,0	33,0	88,0
Higher education (master/Phd)	12	12,0	12,0	100,0
Total	100	100,0	100,0	

### **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 4.5). %14 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 10).

%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 4.7). %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 4.8).

**Table 4.4: In which sector do you plan to work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Manufacturing	18	18,0	18,0	18,0
Education	21	21,0	21,0	39,0
Service (Tourism, health, finance IT)	61	61,0	61,0	100,0
Total	100	100,0	100,0	

**Table 4.5: 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	

**Table 4.6: 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	

**Table 4.7: 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	

**Table 4.8: 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 Personel Work Goals and Objectives, Entrepreneurial and Commercial Thinking all base on Big Eighth dimensions.

### Big Eight Dimensions and 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.

### **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 (Table 4.9), %68 strong and very strong level of taking responsibility (Table 4.10).

**Table 4.9: Decision making**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,0	1,0	1,0
Weak	7	7,0	7,0	8,0
Moderate	28	28,0	28,0	36,0
Strong	42	42,0	42,0	78,0
Very Strong	22	22,0	22,0	100,0
Total	100	100,0	100,0	

**Table 4.10: Taking responsibility**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	7	7,0	7,0	7,0
Moderate	25	25,0	25,0	32,0

Strong	42	42,0	42,0	74,0
Very Strong	26	26,0	26,0	100,0
Total	100	100,0	100,0	

### Leading and Supervising

Hungarian students score themselves %50 strong and very strong leadership skills (Table 4.11).

**Table 4.11: Leadership Skills**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,0	2,0	2,0
Weak	10	10,0	10,0	12,0
Moderate	38	38,0	38,0	50,0
Strong	33	33,0	33,0	83,0
Very Strong	17	17,0	17,0	100,0
Total	100	100,0	100,0	

### SUPPORTING AND COOPERATION

#### Working With People

%75 of the students rate themselves as strong and very strong in team work (Table 4.12), %81 rate themselves strong and very strong in collaborating with others (Table 4.13) and %76 rate strong and very strong in communicating with people (Table 4.14).

**Table 4.12: Team work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	4	4,0	4,0	4,0
Moderate	21	21,0	21,0	25,0
Strong	32	32,0	32,0	57,0
Very Strong	43	43,0	43,0	100,0

Total	100	100,0	100,0
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**Table 4.13: Collaborating with others**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,0	1,0	1,0
Weak	4	4,0	4,0	5,0
Moderate	14	14,0	14,0	19,0
Strong	38	38,0	38,0	57,0
Very Strong	43	43,0	43,0	100,0
Total	100	100,0	100,0	

**Table 4.14: Communicating with people**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	5	5,0	5,0	5,0
Moderate	19	19,0	19,0	24,0
Strong	36	36,0	36,0	60,0
Very Strong	40	40,0	40,0	100,0
Total	100	100,0	100,0	

### **Adhering to Principles and Values**

%73 of the students rate strong and very strong in Respecting ethics (Table 4.15), %65 strong and very strong in Environmental awareness (Table 4.16) and %40 strong and very strong in Awareness of ergonomics (Table 4.17). Hungarian students score low in awareness of ergonomics.

**Table 4.15: Respecting ethics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,0	2,0	2,0
Weak	4	4,0	4,0	6,0
Moderate	21	21,0	21,0	27,0
Strong	42	42,0	42,0	69,0

Very Strong	31	31,0	31,0	100,0
Total	100	100,0	100,0	

**Table 4.16: Environmental awareness**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	9	9,0	9,0	9,0
Moderate	26	26,0	26,0	35,0
Strong	40	40,0	40,0	75,0
Very Strong	25	25,0	25,0	100,0
Total	100	100,0	100,0	

**Table 4.17: Awareness of ergonomics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	4	4,0	4,0	4,0
Weak	18	18,0	18,0	22,0
Moderate	38	38,0	38,0	60,0
Strong	28	28,0	28,0	88,0
Very Strong	12	12,0	12,0	100,0
Total	100	100,0	100,0	

## INTERACTING AND PRESENTING

### Relating and Networking

%81 of the students rate strong and very strong in Compromising skills (Table 4.18), %76 rate strong and very strong in Creating business networks (Table 4.19), %78,7 rate strong and very strong in Maintaining customer relationships (Table 4.20).

**Table 4.18: Compromising**

	Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Very Weak	2	2,0	2,0	2,0
	Weak	7	7,0	7,0	9,0
	Moderate	20	20,0	20,0	29,0
	Strong	50	50,0	50,0	79,0
	Very Strong	21	21,0	21,0	100,0
	Total	100	100,0	100,0	

**Table 4.19: Creating business networks**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,0	1,0	1,0
	Weak	4	4,0	4,0	5,0
	Moderate	19	19,0	19,0	24,0
	Strong	41	41,0	41,0	65,0
	Very Strong	35	35,0	35,0	100,0
	Total	100	100,0	100,0	

**Table 4.20: Maintaining customer relationships**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,0	1,0	1,0
	Weak	12	12,0	12,1	13,1
	Moderate	18	18,0	18,2	31,3
	Strong	36	36,0	36,4	67,7
	Very Strong	32	32,0	32,3	100,0
	Total	99	99,0	100,0	
Missing	System	1	1,0		
	Total	100	100,0		

### **Persuading and Influencing**

%60 of the students rate strong and very strong in Negotiating (Table 4.21) and %75,8 strong and very strong in Emotional intelligence (Table 4.22).

**Table 4.21: Negotiating**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	13	13,0	13,0	13,0
Moderate	27	27,0	27,0	40,0
Strong	36	36,0	36,0	76,0
Very Strong	24	24,0	24,0	100,0
Total	100	100,0	100,0	

**Table 4.22: Emotional intelligence**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	1	1,0	1,0	1,0
Moderate	23	23,0	23,2	24,2
Strong	35	35,0	35,4	59,6
Very Strong	40	40,0	40,4	100,0
Total	99	99,0	100,0	
Missing System	1	1,0		
Total	100	100,0		

**Presenting and Communicating Information**

%70 of the students rate strong and very strong in Presenting and communication ability (Table 4.23).

**Table 4.23: Presenting and communication ability**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	5	5,0	5,0	5,0
Moderate	25	25,0	25,0	30,0
Strong	41	41,0	41,0	71,0
Very Strong	29	29,0	29,0	100,0
Total	100	100,0	100,0	

## ANALYZING AND INTERPRETING

### Writing and reporting

%73 of the Hungarian students rate strong and very strong in Targeted/Technical Communication (Table 4.24) and %76 rate strong and very strong in Literacy (Table 4.25).

**Table 4.24: Targeted/Technical Communication**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	7	7,0	7,0	7,0
Moderate	20	20,0	20,0	27,0
Strong	46	46,0	46,0	73,0
Very Strong	27	27,0	27,0	100,0
Total	100	100,0	100,0	

**Table 4.25: Literacy (Reporting, writing plans, writing letters)**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,0	2,0	2,0
Weak	4	4,0	4,0	6,0
Moderate	18	18,0	18,0	24,0
Strong	43	43,0	43,0	67,0
Very Strong	33	33,0	33,0	100,0
Total	100	100,0	100,0	

### Applying Expertise and Technology

%58 of the Hungarian students rate themselves with strong and very strong in IT and technology affinity (Table 4.26), %30 strong and very strong in Economics (Table 4.27), %14 strong and very strong in Extract business value from social media (Table 4.28), %39 strong and very strong in Service orientation/product service offerings (Table 4.29), %27 strong and very strong in Business process management (Table 4.30), %27 strong and very strong in Business change management (Table 4.31), %63 strong and very strong in Understand and coordinate workflows (Table 4.32), %33 strong and very strong in Network security (Table 4.33), %29 strong and very strong in IT architectures (Table 4.34), %31 strong and very strong in Machine learning (Table 4.35), %29,6 strong and very strong in System development (Table 4.36), %15 strong and very strong in Integrating heterogeneous

technologies (Table 4.37), %44 strong and very strong in Mobile technologies (Table 4.38), %16 strong and very strong in Sensors/embedded systems (Table 4.39), %16 strong and very strong in Network technology/M2M communication (Table 4.40), %15 strong and very strong in Robotics/Artificial intelligence (Table 4.41), %16,2 strong and very strong in Predictive maintenance (Table 4.42), %22 strong and very strong in Modelling and programming (Table 4.43), %33 strong and very strong in Big data/Data analysis and interpretation (Table 4.44), %20,2 strong and very strong in Cloud computing/architectures (Table 4.45), %12 strong and very strong in In memory DBs (Table 4.46), %25 strong and very strong in Statistics (Table 4.47), %26 strong and very strong in Data security (Table 4.48).

**Table 4.26: IT and technology affinity**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	4	4,0	4,0	4,0
Weak	11	11,0	11,0	15,0
Moderate	27	27,0	27,0	42,0
Strong	33	33,0	33,0	75,0
Very Strong	25	25,0	25,0	100,0
Total	100	100,0	100,0	

**Table 4.27: Economics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	7	7,0	7,1	7,1
Weak	20	20,0	20,2	27,3
Moderate	42	42,0	42,4	69,7
Strong	22	22,0	22,2	91,9
Very Strong	8	8,0	8,1	100,0
Total	99	99,0	100,0	
Missing System	1	1,0		
Total	100	100,0		

**Table 4.28: Extract business value from social media**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	13	13,0	13,0	13,0
Weak	24	24,0	24,0	37,0
Moderate	49	49,0	49,0	86,0
Strong	11	11,0	11,0	97,0
Very Strong	3	3,0	3,0	100,0
Total	100	100,0	100,0	

**Table 4.29: Service orientation/product service offerings**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	8	8,0	8,0	8,0
Weak	22	22,0	22,0	30,0
Moderate	31	31,0	31,0	61,0
Strong	24	24,0	24,0	85,0
Very Strong	15	15,0	15,0	100,0
Total	100	100,0	100,0	

**Table 4.30: Business process management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	7	7,0	7,0	7,0
Weak	27	27,0	27,0	34,0
Moderate	39	39,0	39,0	73,0
Strong	20	20,0	20,0	93,0
Very Strong	7	7,0	7,0	100,0
Total	100	100,0	100,0	

**Table 4.31: Business change management**

	Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Very Weak	7	7,0	7,0	7,0
	Weak	25	25,0	25,0	32,0
	Moderate	41	41,0	41,0	73,0
	Strong	19	19,0	19,0	92,0
	Very Strong	8	8,0	8,0	100,0
	Total	100	100,0	100,0	

**Table 4.32: Understand and coordinate workflows**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	3,0	3,0	3,0
	Weak	10	10,0	10,0	13,0
	Moderate	24	24,0	24,0	37,0
	Strong	44	44,0	44,0	81,0
	Very Strong	19	19,0	19,0	100,0
	Total	100	100,0	100,0	

**Table 4.33: Network security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	7	7,0	7,0	7,0
	Weak	16	16,0	16,0	23,0
	Moderate	34	34,0	34,0	57,0
	Strong	34	34,0	34,0	91,0
	Very Strong	9	9,0	9,0	100,0
	Total	100	100,0	100,0	

**Table 4.34: IT architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	16	16,0	16,0	16,0
	Weak	23	23,0	23,0	39,0

Moderate	32	32,0	32,0	71,0
Strong	17	17,0	17,0	88,0
Very Strong	12	12,0	12,0	100,0
Total	100	100,0	100,0	

**Table 4.35: Machine learning**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	27	27,0	27,0	27,0
Weak	21	21,0	21,0	48,0
Moderate	21	21,0	21,0	69,0
Strong	15	15,0	15,0	84,0
Very Strong	16	16,0	16,0	100,0
Total	100	100,0	100,0	

**Table 4.36: System development**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	19	19,0	19,4	19,4
Weak	26	26,0	26,5	45,9
Moderate	24	24,0	24,5	70,4
Strong	20	20,0	20,4	90,8
Very Strong	9	9,0	9,2	100,0
Total	98	98,0	100,0	
Missing System	2	2,0		
Total	100	100,0		

**Table 4.37: Integrating heterogeneous technologies**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	39	39,0	39,0	39,0
Weak	18	18,0	18,0	57,0
Moderate	28	28,0	28,0	85,0

Strong	8	8,0	8,0	93,0
Very Strong	7	7,0	7,0	100,0
Total	100	100,0	100,0	

**Table 4.38: Mobile technologies**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	16	16,0	16,0	16,0
Weak	13	13,0	13,0	29,0
Moderate	27	27,0	27,0	56,0
Strong	29	29,0	29,0	85,0
Very Strong	15	15,0	15,0	100,0
Total	100	100,0	100,0	

**Table 4.39: Sensors/embedded systems**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	44	44,0	44,0	44,0
Weak	19	19,0	19,0	63,0
Moderate	21	21,0	21,0	84,0
Strong	8	8,0	8,0	92,0
Very Strong	8	8,0	8,0	100,0
Total	100	100,0	100,0	

**Table 4.40: Network technology/M2M communication**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	48	48,0	48,0	48,0
Weak	20	20,0	20,0	68,0
Moderate	18	18,0	18,0	86,0
Strong	11	11,0	11,0	97,0

Very Strong	3	3,0	3,0	100,0
Total	100	100,0	100,0	

**Table 4.41: Robotics/Artificial intelligence**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	43	43,0	43,0	43,0
Weak	23	23,0	23,0	66,0
Moderate	19	19,0	19,0	85,0
Strong	8	8,0	8,0	93,0
Very Strong	7	7,0	7,0	100,0
Total	100	100,0	100,0	

**Table 4.42: Predictive maintenance**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	42	42,0	42,4	42,4
Weak	25	25,0	25,3	67,7
Moderate	16	16,0	16,2	83,8
Strong	12	12,0	12,1	96,0
Very Strong	4	4,0	4,0	100,0
Total	99	99,0	100,0	
Missing System	1	1,0		
Total	100	100,0		

**Table 4.43: Modelling and programming**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	34	34,0	34,0	34,0
Weak	21	21,0	21,0	55,0
Moderate	23	23,0	23,0	78,0
Strong	12	12,0	12,0	90,0

Very Strong	10	10,0	10,0	100,0
Total	100	100,0	100,0	

**Table 4.44: Big data/Data analysis and interpretation**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	14	14,0	14,0	14,0
Weak	17	17,0	17,0	31,0
Moderate	36	36,0	36,0	67,0
Strong	24	24,0	24,0	91,0
Very Strong	9	9,0	9,0	100,0
Total	100	100,0	100,0	

**Table 4.45: Cloud computing/architectures**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	37	37,0	37,4	37,4
Weak	24	24,0	24,2	61,6
Moderate	18	18,0	18,2	79,8
Strong	13	13,0	13,1	92,9
Very Strong	7	7,0	7,1	100,0
Total	99	99,0	100,0	
Missing System	1	1,0		
Total	100	100,0		

**Table 4.46: In-memory DBs**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	54	54,0	54,0	54,0
Weak	20	20,0	20,0	74,0
Moderate	14	14,0	14,0	88,0
Strong	10	10,0	10,0	98,0

Very Strong	2	2,0	2,0	100,0
Total	100	100,0	100,0	

**Table 4.47: Statistics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	9	9,0	9,0	9,0
Weak	27	27,0	27,0	36,0
Moderate	39	39,0	39,0	75,0
Strong	21	21,0	21,0	96,0
Very Strong	4	4,0	4,0	100,0
Total	100	100,0	100,0	

**Table 4.48: Data security**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	18	18,0	18,0	18,0
Weak	30	30,0	30,0	48,0
Moderate	26	26,0	26,0	74,0
Strong	16	16,0	16,0	90,0
Very Strong	10	10,0	10,0	100,0
Total	100	100,0	100,0	

### Analyzing

%77 of the Hungarian students rate strong and very strong in Problem Solving (Table 4.49), %54,5 strong and very strong in Optimization (Table 4.50), %42 strong and very strong in Analytical Skills (Table 4.51), %71 strong and very strong in Cognitive Ability (Tabel 2.52). Analytical skills needs improvement.

**Table 4.49: Problem Solving**

	Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Very Weak	2	2,0	2,0	2,0
	Weak	5	5,0	5,0	7,0
	Moderate	16	16,0	16,0	23,0
	Strong	35	35,0	35,0	58,0
	Very Strong	42	42,0	42,0	100,0
	Total	100	100,0	100,0	

**Table 4.50: Optimization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	6,0	6,1	6,1
	Weak	14	14,0	14,1	20,2
	Moderate	25	25,0	25,3	45,5
	Strong	40	40,0	40,4	85,9
	Very Strong	14	14,0	14,1	100,0
	Total	99	99,0	100,0	
Missing	System	1	1,0		
	Total	100	100,0		

**Table 4.51: Analytical Skills**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	5,0	5,0	5,0
	Weak	15	15,0	15,0	20,0
	Moderate	38	38,0	38,0	58,0
	Strong	31	31,0	31,0	89,0
	Very Strong	11	11,0	11,0	100,0
	Total	100	100,0	100,0	

**Table 4.52: Cognitive Ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,0	1,0	1,0

Weak	6	6,0	6,0	7,0
Moderate	22	22,0	22,0	29,0
Strong	48	48,0	48,0	77,0
Very Strong	23	23,0	23,0	100,0
Total	100	100,0	100,0	

## CREATING AND CONCEPTUALIZATION

### Learning and Researching

%65 rate strong and very strong in Life-long learning skills (Table 4.53), %52 rate strong and very strong in Knowledge management skills (Table 4.54).

**Table 4.53: Life-long learning**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	3,0	3,0	3,0
Weak	12	12,0	12,0	15,0
Moderate	20	20,0	20,0	35,0
Strong	28	28,0	28,0	63,0
Very Strong	37	37,0	37,0	100,0
Total	100	100,0	100,0	

**Table 4.54: Knowledge management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	4	4,0	4,0	4,0
Weak	12	12,0	12,0	16,0
Moderate	32	32,0	32,0	48,0
Strong	36	36,0	36,0	84,0
Very Strong	16	16,0	16,0	100,0
Total	100	100,0	100,0	

### Creating and Innovation

%65 rate strong and very strong in Innovating (Table 4.55), %82 rate strong and very strong Creativity (Table 4.56), %62,2rate strong and very strong Critical thinking (Table 4.57), %70,7 rate strong and very strong Change management (Table 4.58).

**Table 4.55: Innovating**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	4	4,0	4,0	4,0
Weak	8	8,0	8,0	12,0
Moderate	23	23,0	23,0	35,0
Strong	38	38,0	38,0	73,0
Very Strong	27	27,0	27,0	100,0
Total	100	100,0	100,0	

**Table 4.56: Creativity**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,0	2,0	2,0
Weak	3	3,0	3,0	5,0
Moderate	13	13,0	13,0	18,0
Strong	32	32,0	32,0	50,0
Very Strong	50	50,0	50,0	100,0
Total	100	100,0	100,0	

**Table 4.57: Critical thinking**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	4	4,0	4,0	4,0
Moderate	25	25,0	25,3	29,3
Strong	43	43,0	43,4	72,7
Very Strong	27	27,0	27,3	100,0
Total	99	99,0	100,0	

Missing System	1	1,0	
Total	100	100,0	

**Table 4.58: Change management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	8	8,0	8,0	8,0
Moderate	26	26,0	26,0	34,0
Strong	44	44,0	44,0	78,0
Very Strong	22	22,0	22,0	100,0
Total	100	100,0	100,0	

### Formulating Strategies

%34 rate strong and very strong in Business strategy (Table 4.59), %39 strong and very strong in Abstraction ability (Table 4.60), %50 strong and very strong in Managing complexity (Table 4.61). Business strategy and Abstraction ability skills need improvement.

**Table 4.59: Business strategy**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	10	10,0	10,0	10,0
Weak	20	20,0	20,0	30,0
Moderate	36	36,0	36,0	66,0
Strong	26	26,0	26,0	92,0
Very Strong	8	8,0	8,0	100,0
Total	100	100,0	100,0	

**Table 4.60: Abstraction ability**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	3,0	3,0	3,0
Weak	19	19,0	19,0	22,0
Moderate	39	39,0	39,0	61,0

Strong	28	28,0	28,0	89,0
Very Strong	11	11,0	11,0	100,0
Total	100	100,0	100,0	

**Table 4.61: Managing complexity**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,0	1,0	1,0
Weak	11	11,0	11,0	12,0
Moderate	38	38,0	38,0	50,0
Strong	38	38,0	38,0	88,0
Very Strong	12	12,0	12,0	100,0
Total	100	100,0	100,0	

## ORGANIZING AND EXECUTING

### Planning and Organization

%50,5 rate strong and very strong in Project management (Table 4.62), %66 rate strong and very strong in Planning and organizing work (Table 4.63), %62 rate strong and very strong in Management ability (Table 4.64).

**Table 4.62: Project management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,0	2,0	2,0
Weak	15	15,0	15,2	17,2
Moderate	32	32,0	32,3	49,5
Strong	30	30,0	30,3	79,8
Very Strong	20	20,0	20,2	100,0
Total	99	99,0	100,0	
Missing System	1	1,0		
Total	100	100,0		

**Table 4.63: Planning and organizing work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,0	1,0	1,0
Weak	8	8,0	8,0	9,0
Moderate	25	25,0	25,0	34,0
Strong	41	41,0	41,0	75,0
Very Strong	25	25,0	25,0	100,0
Total	100	100,0	100,0	

**Table 4.64: Management ability**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	3,0	3,0	3,0
Weak	12	12,0	12,0	15,0
Moderate	23	23,0	23,0	38,0
Strong	33	33,0	33,0	71,0
Very Strong	29	29,0	29,0	100,0
Total	100	100,0	100,0	

**Delivering Results and Meeting Customer Expectation**

%60 of the Hungarian students rate their Customer orientation skills as strong and very strong (Table 4.65) and %60 in Customer relationship management (Table 4.66).

**Table 4.65: Customer orientation**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	3,0	3,0	3,0
Weak	17	17,0	17,0	20,0
Moderate	20	20,0	20,0	40,0
Strong	37	37,0	37,0	77,0
Very Strong	23	23,0	23,0	100,0

Total	100	100,0	100,0
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**Table 4.66: Customer relationship management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,0	2,0	2,0
Weak	18	18,0	18,0	20,0
Moderate	20	20,0	20,0	40,0
Strong	38	38,0	38,0	78,0
Very Strong	22	22,0	22,0	100,0
Total	100	100,0	100,0	

### Following Instructions and Procedures

%27 rate strong and very strong Legislation awareness skill (Table 4.67), %49 strong and very strong in Safety awareness (Table 4.68), %62 strong very strong in Individual responsibility (Table 4.69). Hungarian Students lack legislation awareness.

**Table 4.67: Legislation awareness**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	22	22,0	22,0	22,0
Weak	16	16,0	16,0	38,0
Moderate	35	35,0	35,0	73,0
Strong	20	20,0	20,0	93,0
Very Strong	7	7,0	7,0	100,0
Total	100	100,0	100,0	

**Table 4.68: Safety awareness**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	6	6,0	6,0	6,0

Weak	13	13,0	13,0	19,0
Moderate	32	32,0	32,0	51,0
Strong	35	35,0	35,0	86,0
Very Strong	14	14,0	14,0	100,0
Total	100	100,0	100,0	

**Table 4.69: Individual responsibility**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,0	2,0	2,0
Weak	9	9,0	9,0	11,0
Moderate	27	27,0	27,0	38,0
Strong	44	44,0	44,0	82,0
Very Strong	18	18,0	18,0	100,0
Total	100	100,0	100,0	

## **ADAPTING AND COPING**

### **Adopting and Responding to Change**

%44 rate strong and very strong in Work in interdisciplinary environments (Table 4.70), %46 rate strong and very strong in Intercultural competency (Table 4.71), %71 rate strong and very strong in Flexibility (Table 4.72), %61 rate strong and very strong in Adaptability and ability to change mind-set (Table 4.73).

**Table 4.70: Work in interdisciplinary environments**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	8	8,0	8,0	8,0
Weak	8	8,0	8,0	16,0
Moderate	40	40,0	40,0	56,0
Strong	28	28,0	28,0	84,0
Very Strong	16	16,0	16,0	100,0
Total	100	100,0	100,0	

**Table 4.71: Intercultural competency**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	5,0	5,0	5,0
	Weak	11	11,0	11,0	16,0
	Moderate	38	38,0	38,0	54,0
	Strong	27	27,0	27,0	81,0
	Very Strong	19	19,0	19,0	100,0
	Total	100	100,0	100,0	

**Table 4.72: Flexibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,0	2,0	2,0
	Weak	7	7,0	7,0	9,0
	Moderate	20	20,0	20,0	29,0
	Strong	43	43,0	43,0	72,0
	Very Strong	28	28,0	28,0	100,0
	Total	100	100,0	100,0	

**Table 4.73: Adaptability and ability to change mind-set**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	9	9,0	9,0	9,0
	Moderate	30	30,0	30,0	39,0
	Strong	38	38,0	38,0	77,0
	Very Strong	23	23,0	23,0	100,0
	Total	100	100,0	100,0	

**Persuading and Influencing**

%57 of the Hungarian students rate strong and very strong in Work Life Balance skill (Table 4.74).

**Table 4.74: Work-life Balance**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	16	16,0	16,0	16,0
Moderate	27	27,0	27,0	43,0
Strong	43	43,0	43,0	86,0
Very Strong	14	14,0	14,0	100,0
Total	100	100,0	100,0	

**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 (Table 4.75).

**Table 4.75: Self-management and organization**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	8	8,0	8,1	8,1
Moderate	31	31,0	31,3	39,4
Strong	37	37,0	37,4	76,8
Very Strong	23	23,0	23,2	100,0
Total	99	99,0	100,0	
Missing System	1	1,0		
Total	100	100,0		

**Entrepreneurial and Commercial Thinking**

%38,4 of the Hungarian students rate strong and very strong in Business model understanding (Table 4.76) and %73,6 rate strong and very strong in Entrepreneurship (Table 4.77). Hungarian students lack business model understanding skills.

**Table 4.76: Business model understanding**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	6,0	6,1	6,1
	Weak	14	14,0	14,1	20,2
	Moderate	41	41,0	41,4	61,6
	Strong	24	24,0	24,2	85,9
	Very Strong	14	14,0	14,1	100,0
	Total	99	99,0	100,0	
Missing	System	1	1,0		
Total		100	100,0		

**Table 4.77: Entrepreneurship**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	3,0	3,0	3,0
	Weak	10	10,0	10,1	13,1
	Moderate	23	23,0	23,2	36,4
	Strong	37	37,0	37,4	73,7
	Very Strong	26	26,0	26,3	100,0
	Total	99	99,0	100,0	
Missing	System	1	1,0		
Total		100	100,0		

## NEED ANALYSIS REPORT – POLAND

### 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 <sup>9</sup>	
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.

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<sup>9</sup> 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.<sup>10</sup> 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

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<sup>10</sup> <https://www.mpips.gov.pl/aktualnosci-wszystkie/zatrudnienie-i-przeciwdzialanie-bezrobociu/art,9859,w-marcu-lepiej-na-ryнку-pracy.html>

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.

**The unemployment rate among recent graduates**<sup>11</sup> (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.<sup>12</sup>

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

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<sup>11</sup> <http://www.ibe.edu.pl/pl/o-instytucie/aktualnosci/573-bezrobocie-polskich-absolwentow>

<sup>12</sup> System Ekonomicznych Losów Absolwentów (ELA),

secondary vocational education have a better chance of permanent employment than graduates. (PAP).

## 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.<sup>13</sup>

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

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<sup>13</sup> 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.<sup>14</sup>

**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,
- EURES services and information on living and working conditions in these countries to support mobility on the European labour market<sup>15</sup>,
- 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

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<sup>14</sup> WUP and PUP addresses are available on the website [www.psz.praca.gov.pl](http://www.psz.praca.gov.pl)

<sup>15</sup> <http://www.eures.praca.gov.pl>

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,
- 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](http://www.ohp.pl)*).<sup>16</sup>

### **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 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.<sup>17</sup>

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<sup>16</sup> 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](http://www.ohp.pl)

<sup>17</sup> The list of employment agencies can be found on the website

<http://www.kraz.praca.gov.pl/StronaGlowna.aspx>

**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,
- 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).

18

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 institutions**<sup>19</sup>

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.

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.<sup>20</sup>

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<sup>18</sup> 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).

<sup>19</sup> 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).

<sup>20</sup> The register of training institutions is available at [www.psz.praca.gov.pl](http://www.psz.praca.gov.pl)

**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:
  - 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>

## EMPLOYEE QUESTIONNAIRE ANALYSIS-POLAND

### 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)**

## EMPLOYEE QUESTIONNAIRE ANALYSIS-SPAIN

### Demographics

Participants participated the research are %16 male and %86 female (Table 7.1), age ranging from 26 to 63 and mean age is 45,14 (Table 7.2). %90,4 of the respondents are higher education, %5,3 are collage, %2,1 are vocational high school, %2,1 are secondary school (Table 7.3). %12,8 of the respondents are employed in service (tourism, health, finance, IT) sector, %84 in education and %3,2 in manufacturing (Table 7.4). %11,7 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 (Table 7.5). Participants are working years as a professional range from 0-42 years and average working year as professional is 17,87 years (Table 7.6), participants are working for the same company ranging from 1-36 years and average working years for the same company is 11,63 years (Table 7.7) 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 (Table 7.8).

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

**Table 7.1: Gender**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	15	16,0	16,0	16,0
Female	79	84,0	84,0	100,0
Total	94	100,0	100,0	

**Table 7.2: Age**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 26	2	2,1	2,1	2,1
27	2	2,1	2,1	4,3
28	1	1,1	1,1	5,3
29	2	2,1	2,1	7,4
30	1	1,1	1,1	8,5
31	1	1,1	1,1	9,6
32	3	3,2	3,2	12,8
33	1	1,1	1,1	13,8
34	5	5,3	5,3	19,1
36	1	1,1	1,1	20,2
37	2	2,1	2,1	22,3
38	5	5,3	5,3	27,7
39	5	5,3	5,3	33,0
40	3	3,2	3,2	36,2
42	2	2,1	2,1	38,3
43	4	4,3	4,3	42,6
45	5	5,3	5,3	47,9
46	3	3,2	3,2	51,1
47	3	3,2	3,2	54,3
48	7	7,4	7,4	61,7
49	3	3,2	3,2	64,9
50	6	6,4	6,4	71,3
51	1	1,1	1,1	72,3
52	2	2,1	2,1	74,5
53	3	3,2	3,2	77,7
54	4	4,3	4,3	81,9
55	4	4,3	4,3	86,2
57	1	1,1	1,1	87,2
58	2	2,1	2,1	89,4
59	2	2,1	2,1	91,5
60	2	2,1	2,1	93,6
61	2	2,1	2,1	95,7
62	2	2,1	2,1	97,9

63	2	2,1	2,1	100,0
Total	94	100,0	100,0	

**Table 7.3: Educational background**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Secondary school	2	2,1	2,1	2,1
Vocational high school	2	2,1	2,1	4,3
Graduate	5	5,3	5,3	9,6
Higher education (master/Phd)	85	90,4	90,4	100,0
Total	94	100,0	100,0	

**Table 7.4: Sector**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Manufacturing	3	3,2	3,2	3,2
Education	79	84,0	84,0	87,2
Service (Tourism, health, finance IT)	12	12,8	12,8	100,0
Total	94	100,0	100,0	

**Table 7.5: What is the size of the organization?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1-10	11	11,7	11,7	11,7
11-50	29	30,9	30,9	42,6
51-100	26	27,7	27,7	70,2
101-250	11	11,7	11,7	81,9
251-500	5	5,3	5,3	87,2
500+	12	12,8	12,8	100,0
Total	94	100,0	100,0	

**Table 7.6: How long have you being working as a professional?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0	3	3,2	3,2	3,2
1	1	1,1	1,1	4,3
2	3	3,2	3,2	7,4
3	1	1,1	1,1	8,5
4	2	2,1	2,1	10,6
5	2	2,1	2,1	12,8
6	5	5,3	5,3	18,1
7	3	3,2	3,2	21,3
8	3	3,2	3,2	24,5
9	3	3,2	3,2	27,7
10	6	6,4	6,4	34,0
11	3	3,2	3,2	37,2
12	1	1,1	1,1	38,3
13	1	1,1	1,1	39,4
14	5	5,3	5,3	44,7
15	1	1,1	1,1	45,7
16	1	1,1	1,1	46,8
17	2	2,1	2,1	48,9
18	6	6,4	6,4	55,3
19	1	1,1	1,1	56,4
20	4	4,3	4,3	60,6
21	2	2,1	2,1	62,8
22	1	1,1	1,1	63,8
23	1	1,1	1,1	64,9
24	3	3,2	3,2	68,1
25	2	2,1	2,1	70,2
26	3	3,2	3,2	73,4
27	4	4,3	4,3	77,7
28	6	6,4	6,4	84,0
30	2	2,1	2,1	86,2
31	1	1,1	1,1	87,2
33	3	3,2	3,2	90,4
35	2	2,1	2,1	92,6
36	2	2,1	2,1	94,7
37	1	1,1	1,1	95,7

38	2	2,1	2,1	97,9
40	1	1,1	1,1	98,9
42	1	1,1	1,1	100,0
Total	94	100,0	100,0	

**Table 7.7: How long have you worked for the company?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1	8	8,5	8,5	8,5
2	10	10,6	10,6	19,1
3	6	6,4	6,4	25,5
4	4	4,3	4,3	29,8
5	10	10,6	10,6	40,4
6	1	1,1	1,1	41,5
7	2	2,1	2,1	43,6
8	2	2,1	2,1	45,7
9	2	2,1	2,1	47,9
10	7	7,4	7,4	55,3
11	2	2,1	2,1	57,4
12	3	3,2	3,2	60,6
13	1	1,1	1,1	61,7
14	2	2,1	2,1	63,8
15	4	4,3	4,3	68,1
16	1	1,1	1,1	69,1
17	2	2,1	2,1	71,3
18	5	5,3	5,3	76,6
19	1	1,1	1,1	77,7
20	2	2,1	2,1	79,8
21	2	2,1	2,1	81,9
22	3	3,2	3,2	85,1
23	2	2,1	2,1	87,2
24	2	2,1	2,1	89,4
25	1	1,1	1,1	90,4
26	1	1,1	1,1	91,5
28	3	3,2	3,2	94,7
30	1	1,1	1,1	95,7
31	1	1,1	1,1	96,8

32	1	1,1	1,1	97,9
33	1	1,1	1,1	98,9
36	1	1,1	1,1	100,0
Total	94	100,0	100,0	

**Table 7.8: How long have you worked in present position?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1	11	11,7	11,7	11,7
2	12	12,8	12,8	24,5
3	6	6,4	6,4	30,9
4	7	7,4	7,4	38,3
5	11	11,7	11,7	50,0
6	3	3,2	3,2	53,2
7	1	1,1	1,1	54,3
8	1	1,1	1,1	55,3
9	1	1,1	1,1	56,4
10	6	6,4	6,4	62,8
12	2	2,1	2,1	64,9
13	2	2,1	2,1	67,0
14	5	5,3	5,3	72,3
15	1	1,1	1,1	73,4
16	1	1,1	1,1	74,5
17	2	2,1	2,1	76,6
18	6	6,4	6,4	83,0
21	1	1,1	1,1	84,0
22	1	1,1	1,1	85,1
23	1	1,1	1,1	86,2
24	1	1,1	1,1	87,2
25	1	1,1	1,1	88,3
27	1	1,1	1,1	89,4
28	3	3,2	3,2	92,6
30	1	1,1	1,1	93,6
31	1	1,1	1,1	94,7
33	1	1,1	1,1	95,7
36	1	1,1	1,1	96,8
37	1	1,1	1,1	97,9

38	1	1,1	1,1	98,9
40	1	1,1	1,1	100,0
Total	94	100,0	100,0	

### 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 7.9). %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 7.10). %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 7.11). %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 7.12).

**Table 7.9: 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	

**Table 7.10: 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	

**Table 7.11: 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	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	

**Table 7.12: If you loose 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 Eighth dimensions.

**GREAT EIGHT DIMENSIONS AND THEIR DEFINITIONS**

<p><b>Leading and Deciding</b></p> <p>Takes control and exercises leadership. Initiates action, gives direction, and takes responsibility.</p>
<p><b>Supporting and Cooperating</b></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><b>Interacting and Presenting</b></p> <p>Communicates and networks effectively. Successfully persuades and influences others. Relates to others in a confident, relaxed manner.</p>
<p><b>Analyzing and Interpreting</b></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><b>Creating and Conceptualizing</b></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>

**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**

%75,5 of the Polish participants evaluate themselves as strong and very strong level of decision making (Table 7.13) and %81,2 strong to very strong level of taking responsibility (Table 7.14).

**Table 7.13: Decision making**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,1	1,1	1,1
Weak	2	2,1	2,1	3,2
Moderate	20	21,3	21,3	24,5
Strong	48	51,1	51,1	75,5
Very Strong	23	24,5	24,5	100,0

Total	94	100,0	100,0
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**Table 7.14: Taking responsibility**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	3	3,2	3,2	3,2
Moderate	9	9,6	9,6	12,8
Strong	52	55,3	55,3	68,1
Very Strong	30	31,9	31,9	100,0
Total	94	100,0	100,0	

### 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 (Table 7.15).

**Table 7.15: Leadership Skills**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	4	4,3	4,3	4,3
Moderate	33	35,1	35,1	39,4
Strong	42	44,7	44,7	84,0
Very Strong	15	16,0	16,0	100,0
Total	94	100,0	100,0	

### 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 (Table 7.16) %84 in Collaborating with Others (Table 7.17) and %89,6 in Communicating with People (Table 7.18) respectively. Polish participants evaluate themselves high in working with people dimension.

**Table 7.16: Team work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,1	1,1	1,1
Weak	2	2,1	2,1	3,2
Moderate	14	14,9	14,9	18,1
Strong	49	52,1	52,1	70,2
Very Strong	28	29,8	29,8	100,0
Total	94	100,0	100,0	

**Table 7.17: Collaborating with others**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	1	1,1	1,1	1,1
Moderate	14	14,9	14,9	16,0
Strong	51	54,3	54,3	70,2
Very Strong	28	29,8	29,8	100,0
Total	94	100,0	100,0	

**Table 7.18: Communicating with people**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	1	1,1	1,1	1,1
Moderate	9	9,6	9,6	10,6
Strong	51	54,3	54,3	64,9
Very Strong	33	35,1	35,1	100,0
Total	94	100,0	100,0	

### 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 (Table 7.19) and %76,4 in Environmental Awareness (Table 7.20) skills, awareness of ergonomics rated %53,2 strong and very strong.

**Table 7.19: Respecting ethics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Moderate	5	5,3	5,3	5,3
Strong	37	39,4	39,4	44,7
Very Strong	52	55,3	55,3	100,0
Total	94	100,0	100,0	

**Table 7.20: Environmental awareness**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	4	4,3	4,3	4,3
Moderate	18	19,1	19,1	23,4
Strong	49	52,1	52,1	75,5
Very Strong	23	24,5	24,5	100,0
Total	94	100,0	100,0	

**Table 7.21: Awareness of ergonomics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,1	2,1	2,1
Weak	6	6,4	6,4	8,5
Moderate	36	38,3	38,3	46,8
Strong	39	41,5	41,5	88,3
Very Strong	11	11,7	11,7	100,0
Total	94	100,0	100,0	

## 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 (Table 7.22), %19,1 in creating business networks (Table 7.23), and %64,9 in maintaining customer relationships (Table 7.24). Polish participants rate low in Creating Business networks skills.

**Table 7.22: Compromising**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	3	3,2	3,2	3,2
Moderate	23	24,5	24,5	27,7
Strong	46	48,9	48,9	76,6
Very Strong	22	23,4	23,4	100,0
Total	94	100,0	100,0	

**Table 7.23: Creating business networks**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	6	6,4	6,4	6,4
Weak	27	28,7	28,7	35,1
Moderate	43	45,7	45,7	80,9
Strong	14	14,9	14,9	95,7
Very Strong	4	4,3	4,3	100,0
Total	94	100,0	100,0	

**Table 7.24: Maintaining customer relationships**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	8	8,5	8,5	8,5
Moderate	25	26,6	26,6	35,1
Strong	37	39,4	39,4	74,5
Very Strong	24	25,5	25,5	100,0
Total	94	100,0	100,0	

**Persuading and Influencing**

%46,8 of the Polish participants rated themselves strong and very strong in persuading influencing skills (Table 7.25) whereas %75,7 in emotional intelligence skills (Table 7.26).

**Table 7.25: Negotiating**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,1	1,1	1,1
Weak	8	8,5	8,5	9,6
Moderate	41	43,6	43,6	53,2
Strong	37	39,4	39,4	92,6
Very Strong	7	7,4	7,4	100,0
Total	94	100,0	100,0	

**Table 7.26: Emotional intelligence**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	2	2,1	2,1	2,1
Moderate	21	22,3	22,3	24,5
Strong	45	47,9	47,9	72,3
Very Strong	26	27,7	27,7	100,0
Total	94	100,0	100,0	

### Presenting and Communicating Information

Polish participant rate themselves with strong and very strong with %79,8 in presenting and communication ability (Table 7.27).

**Table 7.27: Presenting and communication ability**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	2	2,1	2,1	2,1
Moderate	17	18,1	18,1	20,2
Strong	48	51,1	51,1	71,3
Very Strong	27	28,7	28,7	100,0
Total	94	100,0	100,0	

### 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 (Table 7.28) and %97,9 strong and very strong in literacy skills (Table 7.29).

**Table 7.28: Targeted/Technical Communication**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,1	1,1	1,1
Weak	5	5,3	5,3	6,4
Moderate	37	39,4	39,4	45,7
Strong	39	41,5	41,5	87,2

Very Strong	12	12,8	12,8	100,0
Total	94	100,0	100,0	

**Table 7.29: Literacy (Reporting, writing plans, writing letters)**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Moderate	2	2,1	2,1	2,1
Strong	29	30,9	30,9	33,0
Very Strong	63	67,0	67,0	100,0
Total	94	100,0	100,0	

### **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 (Table 7.30), Economics %80,9 strong and very strong (Table 7.31), Extract business value from social media %68,1 strong and very strong (Table 7.32), Service orientation/product service offerings %33 strong and very strong (Table 7.33), Business process management %13,4 strong and very strong (Table 7.34), Business change management %33 strong and very strong (Table 7.35), Understand and coordinate workflows %36,2 strong and very strong (Table 7.36), Network security %58,5 strong and very strong (Table 7.37), IT architectures %17 strong and very strong (Table 7.38), Machine learning %10,6 strong and very strong (Table 7.39), System development %16 strong and very strong (Table 7.40), Integrating heterogeneous technologies %19,1 strong and very strong (Table 7.41), Mobile technologies %25,5 strong and very strong (Table 7.42), Sensors/embedded systems %9,6 strong and very strong (Table 7.43), Network technology/M2M communication %8,5 strong and very strong (Table 7.44), Robotics/Artificial intelligence %5,3 strong and very strong (Table 7.45), Predictive maintenance %8,5 strong only (Table 7.46), Modelling and programming %6,4 strong and very strong (Table 7.47), Big data/Data analysis and interpretation %13,8 (Table 7.48), Cloud computing/architectures %8,5 strong and very strong (Table 7.49), In-memory DBs %6,4 strong and very strong (Table 7.50), Statistics %12,8 strong and very strong (Table 7.51) and Data Security %28,7 strong and very strong (Table 7.52).

**Table 7.30: IT and technology affinity**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	6	6,4	6,4	6,4
Moderate	38	40,4	40,4	46,8
Strong	34	36,2	36,2	83,0
Very Strong	16	17,0	17,0	100,0
Total	94	100,0	100,0	

**Table 7.31: Economics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,1	1,1	1,1
Weak	17	18,1	18,1	19,1
Moderate	43	45,7	45,7	64,9
Strong	25	26,6	26,6	91,5
Very Strong	8	8,5	8,5	100,0
Total	94	100,0	100,0	

**Table 7.32: Extract business value from social media**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	7	7,4	7,4	7,4
Weak	23	24,5	24,5	31,9
Moderate	31	33,0	33,0	64,9
Strong	27	28,7	28,7	93,6
Very Strong	6	6,4	6,4	100,0
Total	94	100,0	100,0	

**Table 7.33: Service orientation/product service offerings**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	3,2	3,2	3,2
Weak	20	21,3	21,3	24,5
Moderate	40	42,6	42,6	67,0
Strong	28	29,8	29,8	96,8
Very Strong	3	3,2	3,2	100,0
Total	94	100,0	100,0	

**Table 7.34: Business process management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	13	13,8	13,8	13,8
Weak	27	28,7	28,7	42,6
Moderate	32	34,0	34,0	76,6
Strong	19	20,2	20,2	96,8
Very Strong	3	3,2	3,2	100,0
Total	94	100,0	100,0	

**Table 7.35: Business change management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	6	6,4	6,4	6,4
Weak	23	24,5	24,5	30,9
Moderate	34	36,2	36,2	67,0
Strong	26	27,7	27,7	94,7
Very Strong	5	5,3	5,3	100,0
Total	94	100,0	100,0	

**Table 7.36: Understand and coordinate workflows**

	Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Very Weak	4	4,3	4,3	4,3
	Weak	20	21,3	21,3	25,5
	Moderate	36	38,3	38,3	63,8
	Strong	29	30,9	30,9	94,7
	Very Strong	5	5,3	5,3	100,0
	Total	94	100,0	100,0	

**Table 7.37: Network security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	5	5,3	5,3	6,4
	Moderate	33	35,1	35,1	41,5
	Strong	44	46,8	46,8	88,3
	Very Strong	11	11,7	11,7	100,0
	Total	94	100,0	100,0	

**Table 7.38: IT architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	11	11,7	11,7	11,7
	Weak	29	30,9	30,9	42,6
	Moderate	38	40,4	40,4	83,0
	Strong	12	12,8	12,8	95,7
	Very Strong	4	4,3	4,3	100,0
	Total	94	100,0	100,0	

**Table 7.39: Machine learning**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	18	19,1	19,1	19,1
	Weak	21	22,3	22,3	41,5

Moderate	45	47,9	47,9	89,4
Strong	7	7,4	7,4	96,8
Very Strong	3	3,2	3,2	100,0
Total	94	100,0	100,0	

**Table 7.40: System development**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	17	18,1	18,1	18,1
Weak	29	30,9	30,9	48,9
Moderate	33	35,1	35,1	84,0
Strong	12	12,8	12,8	96,8
Very Strong	3	3,2	3,2	100,0
Total	94	100,0	100,0	

**Table 7.41: Integrating heterogeneous technologies**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	14	14,9	14,9	14,9
Weak	27	28,7	28,7	43,6
Moderate	35	37,2	37,2	80,9
Strong	14	14,9	14,9	95,7
Very Strong	4	4,3	4,3	100,0
Total	94	100,0	100,0	

**Table 7.42: Mobile technologies**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	7	7,4	7,4	7,4
Weak	16	17,0	17,0	24,5
Moderate	47	50,0	50,0	74,5
Strong	18	19,1	19,1	93,6

Very Strong	6	6,4	6,4	100,0
Total	94	100,0	100,0	

**Table 7.43: Sensors/embedded systems**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	31	33,0	33,0	33,0
Weak	28	29,8	29,8	62,8
Moderate	26	27,7	27,7	90,4
Strong	7	7,4	7,4	97,9
Very Strong	2	2,1	2,1	100,0
Total	94	100,0	100,0	

**Table 7.44: Network technology/M2M communication**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	43	45,7	45,7	45,7
Weak	23	24,5	24,5	70,2
Moderate	20	21,3	21,3	91,5
Strong	5	5,3	5,3	96,8
Very Strong	3	3,2	3,2	100,0
Total	94	100,0	100,0	

**Table 7.45: Robotics/Artificial intelligence**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	48	51,1	51,1	51,1
Weak	30	31,9	31,9	83,0
Moderate	11	11,7	11,7	94,7
Strong	2	2,1	2,1	96,8
Very Strong	3	3,2	3,2	100,0

Total	94	100,0	100,0
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**Table 7.46: Predictive maintenance**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	51	54,3	54,3	54,3
Weak	23	24,5	24,5	78,7
Moderate	12	12,8	12,8	91,5
Strong	6	6,4	6,4	97,9
Very Strong	2	2,1	2,1	100,0
Total	94	100,0	100,0	

**Table 7.47: Modelling and programming**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	54	57,4	57,4	57,4
Weak	22	23,4	23,4	80,9
Moderate	12	12,8	12,8	93,6
Strong	5	5,3	5,3	98,9
Very Strong	1	1,1	1,1	100,0
Total	94	100,0	100,0	

**Table 7.48: Big data/Data analysis and interpretation**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	25	26,6	26,6	26,6
Weak	27	28,7	28,7	55,3
Moderate	29	30,9	30,9	86,2
Strong	11	11,7	11,7	97,9
Very Strong	2	2,1	2,1	100,0
Total	94	100,0	100,0	

**Table 7.49: Cloud computing/architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	37	39,4	39,4	39,4
	Weak	28	29,8	29,8	69,1
	Moderate	21	22,3	22,3	91,5
	Strong	7	7,4	7,4	98,9
	Very Strong	1	1,1	1,1	100,0
	Total	94	100,0	100,0	

**Table 7.50: In-memory DBs**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	56	59,6	59,6	59,6
	Weak	23	24,5	24,5	84,0
	Moderate	9	9,6	9,6	93,6
	Strong	5	5,3	5,3	98,9
	Very Strong	1	1,1	1,1	100,0
	Total	94	100,0	100,0	

**Table 7.51: Statistics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	22	23,4	23,4	23,4
	Weak	28	29,8	29,8	53,2
	Moderate	32	34,0	34,0	87,2
	Strong	10	10,6	10,6	97,9
	Very Strong	2	2,1	2,1	100,0
	Total	94	100,0	100,0	

**Table 7.52: Data security**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	10	10,6	10,6	10,6
Weak	19	20,2	20,2	30,9
Moderate	38	40,4	40,4	71,3
Strong	22	23,4	23,4	94,7
Very Strong	5	5,3	5,3	100,0
Total	94	100,0	100,0	

### Analyzing

Analyzing sub-dimension is composed of 4 items. Participants rated Problem Solving %59,6 strong and very strong (Table 7.53), Optimization %33 (Table 7.54), Analytical Skills %47,9 (Table 7.55) and Cognitive Ability %76,6 (Table 7.56). Optimization and analytical skills are below average.

**Table 7.53: Problem Solving**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	3,2	3,2	3,2
Weak	2	2,1	2,1	5,3
Moderate	33	35,1	35,1	40,4
Strong	41	43,6	43,6	84,0
Very Strong	15	16,0	16,0	100,0
Total	94	100,0	100,0	

**Table 7.54: Optimization**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	7	7,4	7,4	7,4
Weak	17	18,1	18,1	25,5
Moderate	39	41,5	41,5	67,0
Strong	25	26,6	26,6	93,6
Very Strong	6	6,4	6,4	100,0

Total	94	100,0	100,0
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**Table 7.55: Analytical Skills**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	5	5,3	5,3	5,3
Weak	5	5,3	5,3	10,6
Moderate	39	41,5	41,5	52,1
Strong	32	34,0	34,0	86,2
Very Strong	13	13,8	13,8	100,0
Total	94	100,0	100,0	

**Table 7.56: Cognitive Ability**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,1	2,1	2,1
Weak	1	1,1	1,1	3,2
Moderate	19	20,2	20,2	23,4
Strong	52	55,3	55,3	78,7
Very Strong	20	21,3	21,3	100,0
Total	94	100,0	100,0	

## 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 (Table 7.57) and %76,6 strong and very strong in knowledge management (Table 7.58).

**Table 7.57: Life-long learning**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Moderate	5	5,3	5,3	5,3
Strong	37	39,4	39,4	44,7
Very Strong	52	55,3	55,3	100,0
Total	94	100,0	100,0	

**Table 7.58: Knowledge management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Moderate	22	23,4	23,4	23,4
Strong	41	43,6	43,6	67,0
Very Strong	31	33,0	33,0	100,0
Total	94	100,0	100,0	

### **Creating and Innovation**

Participants rated themselves %57,4 strong and very strong in Innovating (%39,4 moderate and %3,2 weak) (Table 7.59), %70,2 strong and very strong in creativity (Table 7.60), %75,5 strong and very strong in Critical Thinking (Table 7.61) and %38,3 strong and very strong in Change Management (Table 7.62). Polish participants rate low in Change management skill.

**Table 7.59: Innovating**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	3	3,2	3,2	3,2
Moderate	37	39,4	39,4	42,6
Strong	38	40,4	40,4	83,0
Very Strong	16	17,0	17,0	100,0

Total	94	100,0	100,0
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**Table 7.60: Creativity**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	1	1,1	1,1	1,1
Moderate	27	28,7	28,7	29,8
Strong	33	35,1	35,1	64,9
Very Strong	33	35,1	35,1	100,0
Total	94	100,0	100,0	

**Table 7.61: Critical thinking**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	2	2,1	2,1	2,1
Moderate	21	22,3	22,3	24,5
Strong	49	52,1	52,1	76,6
Very Strong	22	23,4	23,4	100,0
Total	94	100,0	100,0	

**Table 7.62: Change management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	11	11,7	11,7	11,7
Moderate	47	50,0	50,0	61,7
Strong	26	27,7	27,7	89,4
Very Strong	10	10,6	10,6	100,0
Total	94	100,0	100,0	

### Formulating Strategies

Business Strategy %21,3 strong and very strong (Table 7.63), Abstract Ability %62,8 strong and very strong (Table 7.64), and Managing Complexity %28,7 strong and very strong (Table 7.65). Polish participants rated low in formulating strategies and Managing Complexity.

**Table 7.63: Business strategy**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	13	13,8	13,8	13,8
Weak	25	26,6	26,6	40,4
Moderate	36	38,3	38,3	78,7
Strong	13	13,8	13,8	92,6
Very Strong	7	7,4	7,4	100,0
Total	94	100,0	100,0	

**Table 7.64: Abstraction ability**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,1	2,1	2,1
Weak	1	1,1	1,1	3,2
Moderate	32	34,0	34,0	37,2
Strong	40	42,6	42,6	79,8
Very Strong	19	20,2	20,2	100,0
Total	94	100,0	100,0	

**Table 7.65: Managing complexity**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	5	5,3	5,3	5,3
Weak	18	19,1	19,1	24,5
Moderate	44	46,8	46,8	71,3
Strong	23	24,5	24,5	95,7
Very Strong	4	4,3	4,3	100,0

Total	94	100,0	100,0
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## 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 (Table 7.66), Planning and organizing work %79,2 strong and very strong (Table 7.67) and %56,4 strong and very strong Management Ability (Table 7.68).

**Table 7.66: Project management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,1	2,1	2,1
Weak	15	16,0	16,0	18,1
Moderate	34	36,2	36,2	54,3
Strong	33	35,1	35,1	89,4
Very Strong	10	10,6	10,6	100,0
Total	94	100,0	100,0	

**Table 7.67: Planning and organizing work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	1	1,1	1,1	1,1
Moderate	18	19,1	19,1	20,2
Strong	50	53,2	53,2	73,4
Very Strong	25	26,6	26,6	100,0

Total	94	100,0	100,0
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**Table 7.68: Management ability**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,1	1,1	1,1
Weak	5	5,3	5,3	6,4
Moderate	35	37,2	37,2	43,6
Strong	42	44,7	44,7	88,3
Very Strong	11	11,7	11,7	100,0
Total	94	100,0	100,0	

### **Delivering Results and Meeting Customer Expectation**

Participants rated their Customer Orientation skills % 74,5 strong and very strong (Table 7.69), Customer Relationship Management skills %66 strong and very strong (Table 7.70)

**Table 7.69: Customer orientation**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	1	1,1	1,1	1,1
Moderate	23	24,5	24,5	25,5
Strong	53	56,4	56,4	81,9
Very Strong	17	18,1	18,1	100,0
Total	94	100,0	100,0	

**Table 7.70: Customer relationship management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	4	4,3	4,3	4,3
Moderate	28	29,8	29,8	34,0
Strong	45	47,9	47,9	81,9
Very Strong	17	18,1	18,1	100,0

Total	94	100,0	100,0
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### Following Instructions and Procedures

Legislation awareness skills %47,9 strong and very strong (Table 7.71), Safety awareness skills %55,3 strong and very strong (Table 7.72) and Individual responsibility skills %85,1 strong and very strong (Table 7.73).

**Table 7.71: Legislation awareness**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,1	2,1	2,1
Weak	9	9,6	9,6	11,7
Moderate	38	40,4	40,4	52,1
Strong	35	37,2	37,2	89,4
Very Strong	10	10,6	10,6	100,0
Total	94	100,0	100,0	

**Table 7.72: Safety awareness**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,1	2,1	2,1
Weak	3	3,2	3,2	5,3
Moderate	37	39,4	39,4	44,7
Strong	40	42,6	42,6	87,2
Very Strong	12	12,8	12,8	100,0
Total	94	100,0	100,0	

**Table 7.73: Individual responsibility**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,1	1,1	1,1
Moderate	13	13,8	13,8	14,9
Strong	56	59,6	59,6	74,5

Very Strong	24	25,5	25,5	100,0
Total	94	100,0	100,0	

## 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 (Table 7.74), Intercultural competency skills %48,9 strong and very strong (Table 7.75), Flexibility skills %78,7 strong and very strong (%21.3 Moderate, no weak or very weak) (Table 7.76) and Adaptability and ability to change mind-set skills %68,1 strong and very strong (Table 7.77).

**Table 7.74: Work in interdisciplinary environments**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,1	2,1	2,1
Weak	7	7,4	7,4	9,6
Moderate	33	35,1	35,1	44,7
Strong	38	40,4	40,4	85,1
Very Strong	14	14,9	14,9	100,0
Total	94	100,0	100,0	

**Table 7.75: Intercultural competency**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,1	1,1	1,1
Weak	10	10,6	10,6	11,7
Moderate	37	39,4	39,4	51,1
Strong	33	35,1	35,1	86,2

Very Strong	13	13,8	13,8	100,0
Total	94	100,0	100,0	

**Table 7.76: Flexibility**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Moderate	20	21,3	21,3	21,3
Strong	52	55,3	55,3	76,6
Very Strong	22	23,4	23,4	100,0
Total	94	100,0	100,0	

**Table 7.77: Adaptability and ability to change mind-set**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	1	1,1	1,1	1,1
Moderate	29	30,9	30,9	31,9
Strong	50	53,2	53,2	85,1
Very Strong	14	14,9	14,9	100,0
Total	94	100,0	100,0	

### **Persuading and Influencing**

Participants rated their Work Life Balance skills %53,2 strong and very strong (Table 7.78).

**Table 7.78: Work-life Balance**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	3,2	3,2	3,2
Weak	8	8,5	8,5	11,7
Moderate	33	35,1	35,1	46,8
Strong	40	42,6	42,6	89,4

Very Strong	10	10,6	10,6	100,0
Total	94	100,0	100,0	

## 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 (Table 7.79).

**Table 7.79: Self-management and organization**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,1	1,1	1,1
Weak	4	4,3	4,3	5,3
Moderate	19	20,2	20,2	25,5
Strong	50	53,2	53,2	78,7
Very Strong	20	21,3	21,3	100,0
Total	94	100,0	100,0	

### Entrepreneurial and Commercial Thinking

Participants rated their Business model understanding skills %30,9 strong and very strong (Table 7.80) and Entrepreneurship skills %40,4 strong and very strong (Table 7.81). Polish participant rate below average Entrepreneurial and Commercial Thinking skills.

**Table 7.80: Business model understanding**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	6	6,4	6,4	6,4
Weak	25	26,6	26,6	33,0
Moderate	34	36,2	36,2	69,1
Strong	26	27,7	27,7	96,8
Very Strong	3	3,2	3,2	100,0
Total	94	100,0	100,0	

**Table 7.81: Entrepreneurship**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,1	2,1	2,1
Weak	15	16,0	16,0	18,1
Moderate	39	41,5	41,5	59,6
Strong	25	26,6	26,6	86,2
Very Strong	13	13,8	13,8	100,0
Total	94	100,0	100,0	

### STUDENT QUESTIONNAIRE ANALYSIS-POLAND

Participants participated the research are % 20,3 male and %79,7 female (Table 8.1), age ranging from 17 to 66 and mean age is 31,56 (Table 8.2). %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 (Table 8.4). %88,4 of the respondents are planning to work in service (tourism, health, finance, IT) sector, %10,1 in manufacturing (Table 8.5).

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

**Table 8.1: Gender**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	28	20,3	20,3	20,3
Female	110	79,7	79,7	100,0

Total	138	100,0	100,0
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**Table 8.2: Age**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 17,0	1	,7	,7	,7
19,0	1	,7	,7	1,4
20,0	3	2,2	2,2	3,6
21,0	12	8,7	8,7	12,3
22,0	8	5,8	5,8	18,1
23,0	12	8,7	8,7	26,8
24,0	7	5,1	5,1	31,9
25,0	5	3,6	3,6	35,5
26,0	4	2,9	2,9	38,4
27,0	4	2,9	2,9	41,3
28,0	7	5,1	5,1	46,4
29,0	4	2,9	2,9	49,3
30,0	6	4,3	4,3	53,6
32,0	5	3,6	3,6	57,2
33,0	8	5,8	5,8	63,0
34,0	1	,7	,7	63,8
35,0	3	2,2	2,2	65,9
36,0	2	1,4	1,4	67,4
37,0	3	2,2	2,2	69,6
38,0	8	5,8	5,8	75,4
39,0	7	5,1	5,1	80,4
40,0	1	,7	,7	81,2
41,0	7	5,1	5,1	86,2
42,0	4	2,9	2,9	89,1
43,0	2	1,4	1,4	90,6
44,0	1	,7	,7	91,3
45,0	1	,7	,7	92,0
47,0	2	1,4	1,4	93,5
48,0	1	,7	,7	94,2
49,0	2	1,4	1,4	95,7
50,0	3	2,2	2,2	97,8
52,0	1	,7	,7	98,6

58,0	1	,7	,7	99,3
66,0	1	,7	,7	100,0
Total	138	100,0	100,0	

**Table 8.3: Level of study**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Collage	71	51,4	51,4	51,4
Graduate	67	48,6	48,6	100,0
Total	138	100,0	100,0	

**Table 8.4: Educational background**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Secondary school	56	40,6	40,6	40,6
vocational school	1	,7	,7	41,3
Vocational high school	18	13,0	13,0	54,3
Graduate	59	42,8	42,8	97,1
Higher education (master/Phd)	4	2,9	2,9	100,0
Total	138	100,0	100,0	

**Table 8.5: In which sector do you plan to work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Manufacturing	14	10,1	10,1	10,1
Service (Tourism, health, finance IT)	122	88,4	88,4	98,6
99	2	1,4	1,4	100,0
Total	138	100,0	100,0	

### 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 (Table 8.6). %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 8.7).

%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 8.8). %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 8.9).

**Table 8.6: 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	

**Table 8.7: 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	

**Table 8.8: Can you find a job in the sector you want to work?**

	Frequency	Percent	Valid Percent	Cumulative Percent
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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	

**Table 8.9: 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**

**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.

### **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 (Table 8.10), %82,6 strong and very strong level of taking responsibility (Table 8.11).

**Table 8.10: Decision making**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	2	1,4	1,4	1,4
Moderate	56	40,6	40,6	42,0
Strong	64	46,4	46,4	88,4
Very Strong	16	11,6	11,6	100,0
Total	138	100,0	100,0	

**Table 8.11: Taking responsibility**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	1	,7	,7	,7
Moderate	23	16,7	16,7	17,4
Strong	70	50,7	50,7	68,1

Very Strong	44	31,9	31,9	100,0
Total	138	100,0	100,0	

### Leading and Supervising

Polish students score themselves %55,8 strong and very strong leadership skills (Table 8.12).

**Table 8.12: Leadership Skills**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	2,2	2,2	2,2
Weak	7	5,1	5,1	7,2
Moderate	51	37,0	37,0	44,2
Strong	60	43,5	43,5	87,7
Very Strong	17	12,3	12,3	100,0
Total	138	100,0	100,0	

### SUPPORTING AND COOPERATION

#### Working With People

%80,4 of the students rate themselves as strong and very strong in team work (Table 8.13), %82,6 rate themselves strong and very strong in collaborating with others (Table 8.14) and %78,3 rate strong and very strong in communicating with people (Table 8.15).

**Table 8.13: Team work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	,7	,7	,7
Moderate	26	18,8	18,8	19,6
Strong	81	58,7	58,7	78,3
Very Strong	30	21,7	21,7	100,0
Total	138	100,0	100,0	

**Table 8.14: Collaborating with others**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	1,4	1,4	1,4
Moderate	22	15,9	15,9	17,4
Strong	83	60,1	60,1	77,5
Very Strong	31	22,5	22,5	100,0
Total	138	100,0	100,0	

**Table 8.15: Communicating with people**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	,7	,7	,7
Weak	4	2,9	2,9	3,6
Moderate	25	18,1	18,1	21,7
Strong	87	63,0	63,0	84,8
Very Strong	21	15,2	15,2	100,0
Total	138	100,0	100,0	

### **Adhering to Principles and Values**

%89,1 of the students rate strong and very strong in Respecting ethics (Table 8.16), %66,7 strong and very strong in Environmental awareness (Table 8.17) and %52,2 strong and very strong in Awareness of ergonomics (Table 8.18).

**Table 8.16: Respecting ethics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	1,4	1,4	1,4
Moderate	13	9,4	9,4	10,9
Strong	70	50,7	50,7	61,6
Very Strong	53	38,4	38,4	100,0
Total	138	100,0	100,0	

**Table 8.17: Environmental awareness**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	,7	,7	,7
Weak	3	2,2	2,2	2,9
Moderate	42	30,4	30,4	33,3
Strong	61	44,2	44,2	77,5
Very Strong	31	22,5	22,5	100,0
Total	138	100,0	100,0	

**Table 8.18: Awareness of ergonomics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	11	8,0	8,0	8,0
Moderate	55	39,9	39,9	47,8
Strong	60	43,5	43,5	91,3
Very Strong	12	8,7	8,7	100,0
Total	138	100,0	100,0	

**INTERACTING AND PRESENTING****Relating and Networking**

%69,6 of the students rate strong and very strong in Compromising skills (Table 8.19), %19,6 rate strong and very strong in Creating business networks (Table 8.20), %62,3 rate strong and very strong in Maintaining customer relationships (Table 8.21).

**Table 8.19: Compromising**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	4	2,9	2,9	2,9
Moderate	38	27,5	27,5	30,4
Strong	74	53,6	53,6	84,1
Very Strong	22	15,9	15,9	100,0
Total	138	100,0	100,0	

**Table 8.20: Creating business networks**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	13	9,4	9,4	9,4
Weak	32	23,2	23,2	32,6
Moderate	66	47,8	47,8	80,4
Strong	22	15,9	15,9	96,4
Very Strong	5	3,6	3,6	100,0
Total	138	100,0	100,0	

**Table 8.21: Maintaining customer relationships**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	1,4	1,4	1,4
Weak	11	8,0	8,0	9,4
Moderate	39	28,3	28,3	37,7
Strong	62	44,9	44,9	82,6
Very Strong	24	17,4	17,4	100,0
Total	138	100,0	100,0	

**Persuading and Influencing**

%47,8 of the students rate strong and very strong in Negotiating (Table 8.22) and %78,3 strong and very strong in Emotional intelligence (Table 8.23).

**Table 8.22: Negotiating**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	19	13,8	13,8	13,8
Moderate	53	38,4	38,4	52,2
Strong	55	39,9	39,9	92,0
Very Strong	11	8,0	8,0	100,0
Total	138	100,0	100,0	

**Table 8.23: Emotional intelligence**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	1	,7	,7	,7
Moderate	29	21,0	21,0	21,7
Strong	80	58,0	58,0	79,7
Very Strong	28	20,3	20,3	100,0
Total	138	100,0	100,0	

### **Presenting and Communicating Information**

%55,1 of the students rate strong and very strong in Presenting and communication ability (Table 8.24).

**Table 8.24: Presenting and communication ability**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	1,4	1,4	1,4
Weak	8	5,8	5,8	7,2
Moderate	52	37,7	37,7	44,9
Strong	61	44,2	44,2	89,1
Very Strong	15	10,9	10,9	100,0
Total	138	100,0	100,0	

### **ANALYZING AND INTERPRETING**

#### **Writing and reporting**

%40,6 of the Polish students rate strong and very strong in Targeted/Technical Communication (Table 8.25) and %92 rate strong and very strong in Literacy (Table 8.26).

**Table 8.25: Targeted/Technical Communication**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	,7	,7	,7
Weak	10	7,2	7,2	8,0
Moderate	71	51,4	51,4	59,4
Strong	48	34,8	34,8	94,2
Very Strong	8	5,8	5,8	100,0
Total	138	100,0	100,0	

**Table 8.26: Literacy (Reporting, writing plans, writing letters)**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	,7	,7	,7
Weak	1	,7	,7	1,4
Moderate	9	6,5	6,5	8,0
Strong	58	42,0	42,0	50,0
Very Strong	69	50,0	50,0	100,0
Total	138	100,0	100,0	

### **Applying Expertise and Technology**

%43,5 of the Polish students rate themselves with strong and very strong in IT and technology affinity (Table 8.27), %32,9 strong and very strong in Economics (Table 8.28), %38,4 strong and very strong in Extract business value from social media (Table 8.29), %37 strong and very strong in Service orientation/product service offerings (Table 8.30), %28,3 strong and very strong in Business process management (Table 8.31), %31,9 strong and very strong in Business change management (Table 8.32), %42,8 strong and very strong in Understand and coordinate workflows (Table 8.33), %58,7 strong and very strong in Network security (Table 8.34), %18,1 strong and very strong in IT architectures (Table 8.35), %17,4 strong and very strong in Machine learning (Table 8.36), %18,8 strong and very strong in System development (Table 8.37), %22,5 strong and very strong in Integrating heterogeneous technologies (Table 8.38), %43,5 strong and very strong in Mobile technologies (Table 8.39), %11,6 strong and very strong in Sensors/embedded systems (Table 8.40), %13 strong and very strong in Network technology/M2M communication (Table 8.41), %6,5 strong and very strong in Robotics/Artificial intelligence (Table 8.42), %14,5 strong and very strong in Predictive maintenance (Table 8.43), %9,4 strong and very strong in Modelling and programming (Table 8.44), %18,8 strong and very strong in Big data/Data analysis and interpretation (Table 8.45), %9,4 strong and very strong in Cloud computing/architectures (Table 8.46), %9,4 strong and very strong in In memory DBs (Table

8.47), %10,9 strong and very strong in Statistics (Table 8.48), , %29 strong and very strong in Data security (Table 8.49).

**Table 8.27: IT and technology affinity**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	1,4	1,4	1,4
Weak	14	10,1	10,1	11,6
Moderate	62	44,9	44,9	56,5
Strong	48	34,8	34,8	91,3
Very Strong	12	8,7	8,7	100,0
Total	138	100,0	100,0	

**Table 8.28: Economics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	,7	,7	,7
Weak	20	14,5	14,5	15,2
Moderate	73	52,9	52,9	68,1
Strong	38	27,5	27,5	95,7
Very Strong	6	4,3	4,3	100,0
Total	138	100,0	100,0	

**Table 8.29: Extract business value from social media**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	2,2	2,2	2,2
Weak	19	13,8	13,8	15,9
Moderate	63	45,7	45,7	61,6
Strong	49	35,5	35,5	97,1
Very Strong	4	2,9	2,9	100,0
Total	138	100,0	100,0	

**Table 8.30: Service orientation/product service offerings**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	1,4	1,4	1,4
	Weak	17	12,3	12,3	13,8
	Moderate	68	49,3	49,3	63,0
	Strong	46	33,3	33,3	96,4
	Very Strong	5	3,6	3,6	100,0
	Total	138	100,0	100,0	

**Table 8.31: Business process management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	2,9	2,9	2,9
	Weak	36	26,1	26,1	29,0
	Moderate	59	42,8	42,8	71,7
	Strong	32	23,2	23,2	94,9
	Very Strong	7	5,1	5,1	100,0
	Total	138	100,0	100,0	

**Table 8.32: Business change management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	3,6	3,6	3,6
	Weak	30	21,7	21,7	25,4
	Moderate	59	42,8	42,8	68,1
	Strong	40	29,0	29,0	97,1
	Very Strong	4	2,9	2,9	100,0
	Total	138	100,0	100,0	

**Table 8.33: Understand and coordinate workflows**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	2,2	2,2	2,2
	Weak	16	11,6	11,6	13,8
	Moderate	60	43,5	43,5	57,2
	Strong	52	37,7	37,7	94,9
	Very Strong	7	5,1	5,1	100,0
	Total	138	100,0	100,0	

**Table 8.34: Network security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	1,4	1,4	1,4
	Weak	3	2,2	2,2	3,6
	Moderate	52	37,7	37,7	41,3
	Strong	55	39,9	39,9	81,2
	Very Strong	26	18,8	18,8	100,0
	Total	138	100,0	100,0	

**Table 8.35: IT architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	9	6,5	6,5	6,5
	Weak	47	34,1	34,1	40,6
	Moderate	57	41,3	41,3	81,9
	Strong	18	13,0	13,0	94,9
	Very Strong	7	5,1	5,1	100,0
	Total	138	100,0	100,0	

**Table 8.36: Machine learning**

		Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Very Weak	16	11,6	11,6	11,6
	Weak	42	30,4	30,4	42,0
	Moderate	56	40,6	40,6	82,6
	Strong	20	14,5	14,5	97,1
	Very Strong	4	2,9	2,9	100,0
	Total	138	100,0	100,0	

**Table 8.37: System development**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	9	6,5	6,5	6,5
	Weak	36	26,1	26,1	32,6
	Moderate	67	48,6	48,6	81,2
	Strong	24	17,4	17,4	98,6
	Very Strong	2	1,4	1,4	100,0
	Total	138	100,0	100,0	

**Table 8.38: Integrating heterogeneous technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	7	5,1	5,1	5,1
	Weak	36	26,1	26,1	31,2
	Moderate	64	46,4	46,4	77,5
	Strong	25	18,1	18,1	95,7
	Very Strong	6	4,3	4,3	100,0
	Total	138	100,0	100,0	

**Table 8.39: Mobile technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	2,2	2,2	2,2
	Weak	18	13,0	13,0	15,2

Moderate	57	41,3	41,3	56,5
Strong	55	39,9	39,9	96,4
Very Strong	5	3,6	3,6	100,0
Total	138	100,0	100,0	

**Table 8.40: Sensors/embedded systems**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	25	18,1	18,1	18,1
Weak	44	31,9	31,9	50,0
Moderate	53	38,4	38,4	88,4
Strong	14	10,1	10,1	98,6
Very Strong	2	1,4	1,4	100,0
Total	138	100,0	100,0	

**Table 8.41: Network technology/M2M communication**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	30	21,7	21,7	21,7
Weak	48	34,8	34,8	56,5
Moderate	42	30,4	30,4	87,0
Strong	17	12,3	12,3	99,3
Very Strong	1	,7	,7	100,0
Total	138	100,0	100,0	

**Table 8.42: Robotics/Artificial intelligence**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	45	32,6	32,6	32,6
Weak	49	35,5	35,5	68,1
Moderate	35	25,4	25,4	93,5

Strong	9	6,5	6,5	100,0
Total	138	100,0	100,0	

**Table 8.43: Predictive maintenance**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	35	25,4	25,4	25,4
Weak	39	28,3	28,3	53,6
Moderate	44	31,9	31,9	85,5
Strong	17	12,3	12,3	97,8
Very Strong	3	2,2	2,2	100,0
Total	138	100,0	100,0	

**Table 8.44: Modelling and programming**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	41	29,7	29,7	29,7
Weak	53	38,4	38,4	68,1
Moderate	31	22,5	22,5	90,6
Strong	11	8,0	8,0	98,6
Very Strong	2	1,4	1,4	100,0
Total	138	100,0	100,0	

**Table 8.45: Big data/Data analysis and interpretation**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	30	21,7	21,7	21,7
Weak	32	23,2	23,2	44,9
Moderate	50	36,2	36,2	81,2
Strong	23	16,7	16,7	97,8
Very Strong	3	2,2	2,2	100,0
Total	138	100,0	100,0	

**Table 8.46: Cloud computing/architectures**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	41	29,7	29,7	29,7
Weak	52	37,7	37,7	67,4
Moderate	32	23,2	23,2	90,6
Strong	11	8,0	8,0	98,6
Very Strong	2	1,4	1,4	100,0
Total	138	100,0	100,0	

**Table 8.47: In-memory DBs**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	55	39,9	39,9	39,9
Weak	44	31,9	31,9	71,7
Moderate	26	18,8	18,8	90,6
Strong	12	8,7	8,7	99,3
Very Strong	1	,7	,7	100,0
Total	138	100,0	100,0	

**Table 8.48: Statistics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	18	13,0	13,0	13,0
Weak	43	31,2	31,2	44,2
Moderate	62	44,9	44,9	89,1
Strong	13	9,4	9,4	98,6
Very Strong	2	1,4	1,4	100,0
Total	138	100,0	100,0	

**Table 8.49: Data security**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	14	10,1	10,1	10,1
Weak	29	21,0	21,0	31,2
Moderate	55	39,9	39,9	71,0
Strong	32	23,2	23,2	94,2
Very Strong	8	5,8	5,8	100,0
Total	138	100,0	100,0	

**Analyzing**

%56,5 of the Polish students rate strong and very strong in Problem Solving (Table 8.50), %35,5 strong and very strong in Optimization (Table 8.51), %33,3 strong and very strong in Analytical Skills (Table 8.52), %56,5 strong and very strong in Cognitive Ability (Table 2.53). Optimization and Analytical skills needs improvement.

**Table 8.50: Problem Solving**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	1,4	1,4	1,4
Weak	7	5,1	5,1	6,5
Moderate	51	37,0	37,0	43,5
Strong	68	49,3	49,3	92,8
Very Strong	10	7,2	7,2	100,0
Total	138	100,0	100,0	

**Table 8.51: Optimization**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	6	4,3	4,3	4,3
Weak	22	15,9	15,9	20,3
Moderate	61	44,2	44,2	64,5
Strong	46	33,3	33,3	97,8

Very Strong	3	2,2	2,2	100,0
Total	138	100,0	100,0	

**Table 8.52: Analytical Skills**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	5	3,6	3,6	3,6
Weak	26	18,8	18,8	22,5
Moderate	61	44,2	44,2	66,7
Strong	36	26,1	26,1	92,8
Very Strong	10	7,2	7,2	100,0
Total	138	100,0	100,0	

**Table 8.53: Cognitive Ability**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	4	2,9	2,9	2,9
Weak	7	5,1	5,1	8,0
Moderate	49	35,5	35,5	43,5
Strong	63	45,7	45,7	89,1
Very Strong	15	10,9	10,9	100,0
Total	138	100,0	100,0	

## CREATING AND CONCEPTUALIZATION

### Learning and Researching

%80,4 rate strong and very strong in Life-long learning skills (Table 8.54), %59,6 rate strong and very strong in Knowledge management skills (Table 8.55).

**Table 8.54: Life-long learning**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	,7	,7	,7

Weak	2	1,4	1,4	2,2
Moderate	24	17,4	17,4	19,6
Strong	76	55,1	55,1	74,6
Very Strong	35	25,4	25,4	100,0
Total	138	100,0	100,0	

**Table 8.55: Knowledge management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	2,2	2,2	2,2
Weak	1	,7	,7	2,9
Moderate	52	37,7	37,7	40,6
Strong	69	50,0	50,0	90,6
Very Strong	13	9,4	9,4	100,0
Total	138	100,0	100,0	

### Creating and Innovation

%46,9 rate strong and very strong in Innovating (Table 8.56), %72,5 rate strong and very strong Creativity (Table 8.57), %65,9 strong and very strong Critical thinking (Table 8.58), %39,1 rate strong and very strong Change management (Table 8.59). Polish student rate below average in innovating and change management.

**Table 8.56: Innovating**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	1,4	1,4	1,4
Weak	7	5,1	5,1	6,5
Moderate	65	47,1	47,1	53,6
Strong	52	37,7	37,7	91,3
Very Strong	12	8,7	8,7	100,0
Total	138	100,0	100,0	

**Table 8.57: Creativity**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	2,2	2,2	2,2
Weak	3	2,2	2,2	4,3
Moderate	32	23,2	23,2	27,5
Strong	69	50,0	50,0	77,5
Very Strong	31	22,5	22,5	100,0
Total	138	100,0	100,0	

**Table 8.58: Critical thinking**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	5	3,6	3,6	3,6
Moderate	42	30,4	30,4	34,1
Strong	67	48,6	48,6	82,6
Very Strong	24	17,4	17,4	100,0
Total	138	100,0	100,0	

**Table 8.59: Change management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	1,4	1,4	1,4
Weak	13	9,4	9,4	10,9
Moderate	69	50,0	50,0	60,9
Strong	45	32,6	32,6	93,5
Very Strong	9	6,5	6,5	100,0
Total	138	100,0	100,0	

### **Formulating Strategies**

%27,5 rate strong and very strong in Business strategy (Table 8.60), %46,4 strong and very strong in Abstraction ability (Table 8.61), %21,7 strong and very strong in Managing complexity (Table 8.62). Business strategy and Abstraction ability skills need improvement. Polish students lack formulating strategies.

**Table 8.60: Business strategy**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	10	7,2	7,2	7,2
	Weak	34	24,6	24,6	31,9
	Moderate	56	40,6	40,6	72,5
	Strong	32	23,2	23,2	95,7
	Very Strong	6	4,3	4,3	100,0
	Total	138	100,0	100,0	

**Table 8.61: Abstraction ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	1,4	1,4	1,4
	Weak	14	10,1	10,1	11,6
	Moderate	58	42,0	42,0	53,6
	Strong	46	33,3	33,3	87,0
	Very Strong	18	13,0	13,0	100,0
	Total	138	100,0	100,0	

**Table 8.62: Managing complexity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	8	5,8	5,8	5,8
	Weak	33	23,9	23,9	29,7
	Moderate	67	48,6	48,6	78,3
	Strong	25	18,1	18,1	96,4
	Very Strong	5	3,6	3,6	100,0
	Total	138	100,0	100,0	

## ORGANIZING AND EXECUTING

### Planning and Organization

%37,7 rate strong and very strong in Project management (Table 8.63), %65,2 rate strong and very strong in Planning and organizing work (Table 8.64), %55,8 rate strong and very strong in Management ability (Table 8.65). Polish students lack Project management skills.

**Table 8.63: Project management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	2,2	2,2	2,2
Weak	16	11,6	11,6	13,8
Moderate	67	48,6	48,6	62,3
Strong	43	31,2	31,2	93,5
Very Strong	9	6,5	6,5	100,0
Total	138	100,0	100,0	

**Table 8.64: Planning and organizing work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	2,2	2,2	2,2
Weak	7	5,1	5,1	7,2
Moderate	38	27,5	27,5	34,8
Strong	60	43,5	43,5	78,3
Very Strong	30	21,7	21,7	100,0
Total	138	100,0	100,0	

**Table 8.65: Management ability**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	5	3,6	3,6	3,6
Weak	13	9,4	9,4	13,0
Moderate	43	31,2	31,2	44,2

Strong	53	38,4	38,4	82,6
Very Strong	24	17,4	17,4	100,0
Total	138	100,0	100,0	

### Delivering Results and Meeting Customer Expectation

%52,2 of the Polish students rate their Customer orientation skills as strong and very strong (Table 8.66) and %57,2 in Customer relationship management (Table 8.67).

**Table 8.66: Customer orientation**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	2,2	2,2	2,2
Weak	13	9,4	9,4	11,6
Moderate	50	36,2	36,2	47,8
Strong	53	38,4	38,4	86,2
Very Strong	19	13,8	13,8	100,0
Total	138	100,0	100,0	

**Table 8.67: Customer relationship management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	1,4	1,4	1,4
Weak	14	10,1	10,1	11,6
Moderate	43	31,2	31,2	42,8
Strong	60	43,5	43,5	86,2
Very Strong	19	13,8	13,8	100,0
Total	138	100,0	100,0	

### Following Instructions and Procedures

%30,4 rate strong and very strong Legislation awareness skill (Table 8.68), %59,4 strong and very strong in Safety awareness (Table 8.69), %73,2 strong very strong in Individual responsibility (Table 8.70). Polish Students lack legislation awareness.

**Table 8.68: Legislation awareness**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	5	3,6	3,6	3,6
Weak	23	16,7	16,7	20,3
Moderate	68	49,3	49,3	69,6
Strong	33	23,9	23,9	93,5
Very Strong	9	6,5	6,5	100,0
Total	138	100,0	100,0	

**Table 8.69: Safety awareness**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	,7	,7	,7
Weak	10	7,2	7,2	8,0
Moderate	45	32,6	32,6	40,6
Strong	67	48,6	48,6	89,1
Very Strong	15	10,9	10,9	100,0
Total	138	100,0	100,0	

**Table 8.70: Individual responsibility**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	2,2	2,2	2,2
Weak	3	2,2	2,2	4,3
Moderate	31	22,5	22,5	26,8
Strong	64	46,4	46,4	73,2
Very Strong	37	26,8	26,8	100,0

Total	138	100,0	100,0
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## ADAPTING AND COPING

### Adopting and Responding to Change

%37,7 rate strong and very strong in Work in interdisciplinary environments (Table 8.71), %49,3 rate strong and very strong in Intercultural competency (Table 8.72), %67,4 rate strong and very strong in Flexibility (Table 8.73), %61,6 rate strong and very strong in Adaptability and ability to change mind-set (Table 8.74). Polish students lack Work in interdisciplinary environments skills.

**Table 8.71: Work in interdisciplinary environments**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	1,4	1,4	1,4
Weak	16	11,6	11,6	13,0
Moderate	68	49,3	49,3	62,3
Strong	42	30,4	30,4	92,8
Very Strong	10	7,2	7,2	100,0
Total	138	100,0	100,0	

**Table 8.72: Intercultural competency**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	,7	,7	,7
Weak	16	11,6	11,6	12,3
Moderate	53	38,4	38,4	50,7
Strong	44	31,9	31,9	82,6
Very Strong	24	17,4	17,4	100,0
Total	138	100,0	100,0	

**Table 8.73: Flexibility**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	,7	,7	,7

Weak	5	3,6	3,6	4,3
Moderate	39	28,3	28,3	32,6
Strong	64	46,4	46,4	79,0
Very Strong	29	21,0	21,0	100,0
Total	138	100,0	100,0	

**Table 8.74: Adaptability and ability to change mind-set**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	,7	,7	,7
Weak	6	4,3	4,3	5,1
Moderate	46	33,3	33,3	38,4
Strong	69	50,0	50,0	88,4
Very Strong	16	11,6	11,6	100,0
Total	138	100,0	100,0	

### **Persuading and Influencing**

%61,6 of the Polish students rate strong and very strong in Work Life Balance skill (Table 8.75).

**Table 8.75: Work-life Balance**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	,7	,7	,7
Weak	5	3,6	3,6	4,3
Moderate	47	34,1	34,1	38,4
Strong	69	50,0	50,0	88,4
Very Strong	16	11,6	11,6	100,0
Total	138	100,0	100,0	

### **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 (Table 8.76).

**Table 8.76: Self-management and organization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	2,2	2,2	2,2
	Weak	2	1,4	1,4	3,6
	Moderate	36	26,1	26,1	29,7
	Strong	69	50,0	50,0	79,7
	Very Strong	28	20,3	20,3	100,0
	Total	138	100,0	100,0	

### Entrepreneurial and Commercial Thinking

%30,4 of the Polish students rate strong and very strong in Business model understanding (Table 8.77) and %44,9 rate strong and very strong in Entrepreneurship (Table 8.77). Polish students lack business model understanding and entrepreneurship skills.

**Table 8.77: Business model understanding**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	10	7,2	7,2	7,2
	Weak	22	15,9	15,9	23,2
	Moderate	64	46,4	46,4	69,6
	Strong	36	26,1	26,1	95,7
	Very Strong	6	4,3	4,3	100,0
	Total	138	100,0	100,0	

**Table 8.78: Entrepreneurship**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,7	,7	,7

Weak	12	8,7	8,7	9,4
Moderate	63	45,7	45,7	55,1
Strong	47	34,1	34,1	89,1
Very Strong	15	10,9	10,9	100,0
Total	138	100,0	100,0	

# NEED ANALYSIS REPORT – SPAIN

## Literature Review for Spain

***Give general information about the number of employees and enterprise: how many firms are there in your country? How many employees? How many of them work for state/government/public and how many for private? What is the unemployment rate in general? What is the unemployment rate for new graduates?***

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**

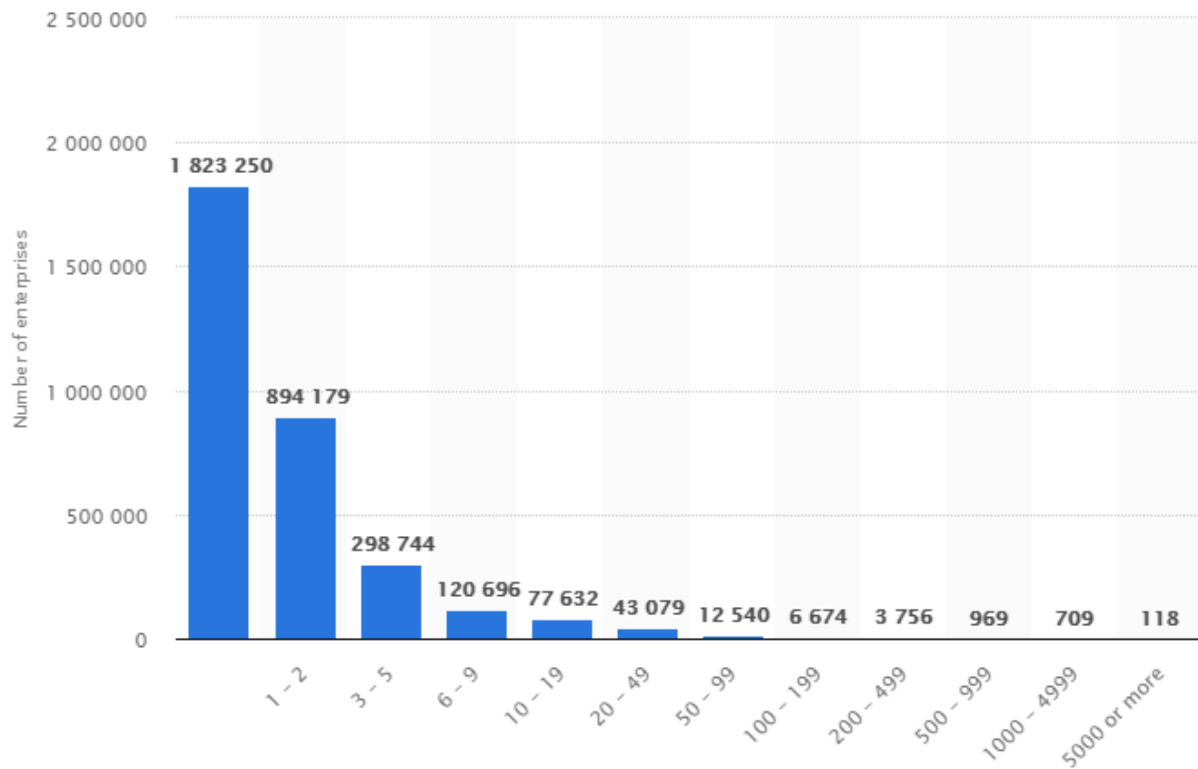


Fig. 1. Number of enterprises in Spain in 2017, by number of employees

#### Número de empresas activas

A 1 de enero de 2016

		Variación interanual %
<b>Total</b>	<b>3.236.582</b>	<b>1,6</b>
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 (%)
<b>Total</b>	<b>15,715.1</b>	<b>3.2</b>
Private sector	12,686.5	3.8
Public sector	3,028.6	0.9
<b>Men</b>	<b>8,202.1</b>	<b>3.2</b>
Private sector	6,854.5	3.8
Public sector	1,347.6	-0.1
<b>Women</b>	<b>7,512.9</b>	<b>3.2</b>
Private sector	5,832.0	3.7
Public sector	1,681.0	1.8

Employees. By hiring sector and sex - Spain. 2017

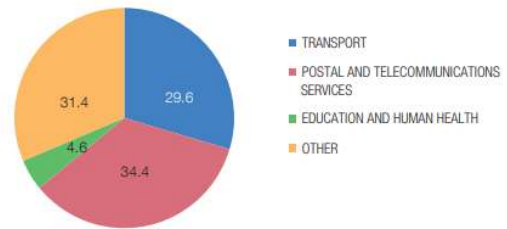
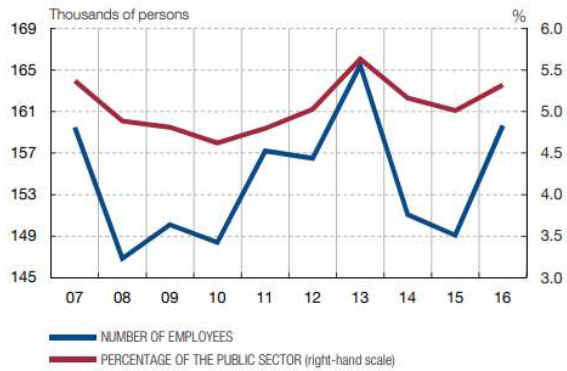
Source: INE. Active Population Survey.

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.

***What is the education system in your country? How many universities are there? How many of them are private and state? How many students are there in universities in your country? What are the opportunities for career management supported by the government/state and private education institutions?***

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

<b>Kindergarten</b>	<b>(0 – 3 yrs)</b>
<b>Pre-Scholar/Infantil</b>	<b>(3 – 6 yrs)</b>
<b>Primary</b>	<b>(6 – 12 yrs) Compulsory</b>
<b>E.S.O.</b>	<b>(12 – 16 yrs) Compulsory</b>
<b>Bachillerato/ Ciclos Formativos de Grado Medio</b>	<b>(16 – 18 yrs)</b>
<b>University (Diplomatura 3 yrs) Ciclos Formativos de Grado Superior</b>	<b>(18 – 21+ yrs)</b>
<b>University (Licenciatura 2 yrs) University Post Degree (2 yrs)</b>	<b>(18 – 22+ yrs)</b>

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		
<b>Public:</b> 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)	<b>Private:</b> 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)

CANARIAS

**Public:**  
 University of Oviedo (UNIOVI)

CASTILLA Y LEÓN

**Public:**  
 University of Balearic Islands (UIB)  
**Private:**  
 School of Design of Balearic Islands

**Public:**  
 University of Laguna (ULL)  
 University of Palmas of Gran Canaria (ULPGC)

CANTABRIA

**Public:**  
 University of Leon (UNILEON)  
 University of Valladolid (UVA)  
 University of Salamanca (USAL)  
 University of Burgos (UBU)

CASTILLA - LA MANCHA

**Private:**  
 Catholic University of Avila (UCAV)  
 IE University  
 European University Miguel de Cervantes (UEMC)  
 Inter. University of Castilla and Leon (UNICYL)  
 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)

## CATALUÑA

### 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)

## MADRID

### 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)

## GALICIA

## MURCIA

### 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 Mataró (EUPMT)  
International Trade School (ESCI)  
EADA High School Management and Administration  
Foundation IQS

### 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**  
**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)**  
PAÍS VASCO (EUSKADI)

Public: University of Coruña (UDC) University of Santiago de Compostela (USC) University of Vigo (UVIGO) International Univ. Menendez Pelayo (UIMP) NAVARRA	Public: <b>Polytechnical University of Cartagena (UPCT)</b> <b>University of Murcia (UM)</b> Private: <b>Catholic University of San Antonio (UCAM)</b>	Public: <b>University of Pais Vasco</b> Private: <b>Mondragon University</b> <b>University of Deusto</b>  RIOJA
Public: Public University of Navarre (UNAVARRA)  VALENCIA	Private: <b>University of Navarre (UNAV)</b> <b>School of Management and Marketing (ESIC)</b>	Public: <b>University of Rioja (UNIRIOJA)</b>
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: <b>Center for Financial Studies (CEF)</b> <b>School of Management and Marketing (ESIC)</b> <b>Valencia S.V. Martir (UCV)</b> <b>Training Centre</b> <b>Cardenal Herrera-CEU University</b>	<b>Catholic University of Florida</b>

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 studies<sup>1</sup>. 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.

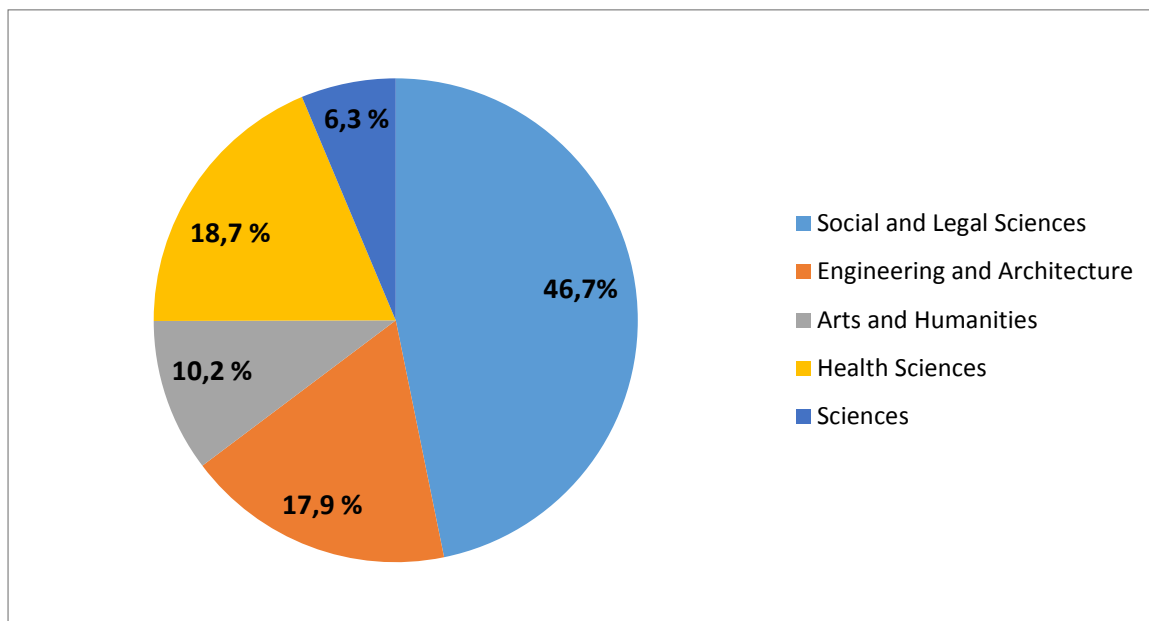
Evolution of enrolments in the universities in Degree, Cycle and Master



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

***What are the regional, local and national regulations, legislations on career management of your country? What are the regional, local and national projects related to career management in your country?***

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".

Table 1. Data collection regionally

	Hungary	Poland	Romania	Spain	Turkey	Total
Students	100	138	89	90	109	
Data Collection Method	Online?	Online?	Online?	Online	Face to Face	
Employees	58	94	73	61	60	
Data Collection Method	Online?	Online?	Online?	Online	Face to Face	
Managers	10	5	14	25	6	
Data Collection Method	Interview	Interview	Interview	Interview	Interview	

### **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
	Works well in situations requiring openness to new ideas and experiences. Seeks out learning opportunities. Handles situations and problems with

Creating and Conceptualizing	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)**

## **EMPLOYEE QUESTIONNAIRE ANALYSIS-SPAIN**

### **Demographics**

Participants participated the research are %45,2 male and %54,8 female (Table 1), age ranging from 18 to 62 and mean age is 40,24 (Table 2). %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 (Table 3). %51,6 of the respondents are employed in service (tourism, health, finance, IT) sector, %45,2 in education and %3,2 in manufacturing (Table 4). %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 (Table 5). Participants are working years as a professional range from 0-38 years and average working year as professional is 16,56 years (Table 6), participants are working for the same company ranging from 0-38 years and average working years for the same company is 12,8 years (Table 7) 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 (Table 8).

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.

**Table 1.1: Gender**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	28	45,2	45,2	45,2
Female	34	54,8	54,8	100,0
Total	62	100,0	100,0	

**Table 1.2: Age**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 18,00	1	1,6	1,6	1,6
19,00	1	1,6	1,6	3,2
20,00	1	1,6	1,6	4,8
21,00	1	1,6	1,6	6,5
22,00	4	6,5	6,5	12,9
23,00	2	3,2	3,2	16,1
24,00	1	1,6	1,6	17,7
25,00	1	1,6	1,6	19,4
26,00	2	3,2	3,2	22,6
28,00	2	3,2	3,2	25,8
30,00	1	1,6	1,6	27,4
32,00	1	1,6	1,6	29,0
33,00	3	4,8	4,8	33,9
34,00	1	1,6	1,6	35,5
36,00	1	1,6	1,6	37,1
38,00	3	4,8	4,8	41,9
39,00	4	6,5	6,5	48,4
40,00	2	3,2	3,2	51,6
41,00	2	3,2	3,2	54,8
43,00	2	3,2	3,2	58,1
44,00	3	4,8	4,8	62,9
45,00	2	3,2	3,2	66,1

48,00	3	4,8	4,8	71,0
51,00	1	1,6	1,6	72,6
52,00	2	3,2	3,2	75,8
54,00	5	8,1	8,1	83,9
55,00	2	3,2	3,2	87,1
56,00	1	1,6	1,6	88,7
57,00	1	1,6	1,6	90,3
58,00	1	1,6	1,6	91,9
59,00	1	1,6	1,6	93,5
60,00	1	1,6	1,6	95,2
62,00	3	4,8	4,8	100,0
Total	62	100,0	100,0	

**Table 1.3: Educational background**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Uneducated	1	1,6	1,6	1,6
Secondary school	2	3,2	3,2	4,8
vocational school	4	6,5	6,5	11,3
Vocational high school	15	24,2	24,2	35,5
Graduate	15	24,2	24,2	59,7
Higher education (master/Phd)	25	40,3	40,3	100,0
Total	62	100,0	100,0	

**Table 1.4: Sector**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Manufacturing	2	3,2	3,2	3,2
Education	28	45,2	45,2	48,4
Service (Tourism, health, finance IT)	32	51,6	51,6	100,0
Total	62	100,0	100,0	

**Table 1.5: What is the size of the organization?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-10	25	40,3	44,6	44,6
	11-50	17	27,4	30,4	75,0
	51-100	10	16,1	17,9	92,9
	500+	4	6,5	7,1	100,0
	Total	56	90,3	100,0	
Missing	99,00	6	9,7		
Total		62	100,0		

**Table 1.6: How long have you being working as a professional?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	,00	1	1,6	1,8	1,8
	1,00	6	9,7	10,9	12,7
	2,00	2	3,2	3,6	16,4
	3,00	4	6,5	7,3	23,6
	4,00	2	3,2	3,6	27,3
	7,00	2	3,2	3,6	30,9
	8,00	1	1,6	1,8	32,7
	10,00	3	4,8	5,5	38,2
	15,00	5	8,1	9,1	47,3
	16,00	3	4,8	5,5	52,7
	18,00	2	3,2	3,6	56,4
	19,00	1	1,6	1,8	58,2
	20,00	4	6,5	7,3	65,5
	22,00	1	1,6	1,8	67,3
	25,00	3	4,8	5,5	72,7
	26,00	2	3,2	3,6	76,4
	29,00	2	3,2	3,6	80,0
	30,00	4	6,5	7,3	87,3
	32,00	1	1,6	1,8	89,1
	34,00	2	3,2	3,6	92,7
	35,00	2	3,2	3,6	96,4
	36,00	1	1,6	1,8	98,2
	38,00	1	1,6	1,8	100,0
	Total	55	88,7	100,0	
Missing	99,00	7	11,3		

Total	62	100,0	
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**Table 1.7: How long have you worked for the company?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid ,00	1	1,6	1,8	1,8
1,00	11	17,7	20,0	21,8
2,00	3	4,8	5,5	27,3
3,00	5	8,1	9,1	36,4
5,00	4	6,5	7,3	43,6
6,00	1	1,6	1,8	45,5
9,00	2	3,2	3,6	49,1
10,00	2	3,2	3,6	52,7
11,00	1	1,6	1,8	54,5
12,00	1	1,6	1,8	56,4
14,00	1	1,6	1,8	58,2
15,00	3	4,8	5,5	63,6
17,00	1	1,6	1,8	65,5
18,00	2	3,2	3,6	69,1
19,00	1	1,6	1,8	70,9
20,00	1	1,6	1,8	72,7
22,00	1	1,6	1,8	74,5
25,00	3	4,8	5,5	80,0
26,00	1	1,6	1,8	81,8
27,00	1	1,6	1,8	83,6
28,00	1	1,6	1,8	85,5
29,00	3	4,8	5,5	90,9
30,00	1	1,6	1,8	92,7
32,00	1	1,6	1,8	94,5
34,00	1	1,6	1,8	96,4
35,00	1	1,6	1,8	98,2
38,00	1	1,6	1,8	100,0
Total	55	88,7	100,0	
Missing 99,00	7	11,3		
Total	62	100,0		

**Table 1.8: How long have you worked in present position?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid ,00	1	1,6	1,8	1,8
1,00	15	24,2	27,3	29,1
2,00	6	9,7	10,9	40,0
3,00	3	4,8	5,5	45,5
5,00	3	4,8	5,5	50,9
6,00	2	3,2	3,6	54,5
7,00	1	1,6	1,8	56,4
9,00	1	1,6	1,8	58,2
10,00	4	6,5	7,3	65,5
11,00	1	1,6	1,8	67,3
12,00	1	1,6	1,8	69,1
15,00	3	4,8	5,5	74,5
16,00	1	1,6	1,8	76,4
17,00	1	1,6	1,8	78,2
18,00	2	3,2	3,6	81,8
19,00	1	1,6	1,8	83,6
21,00	1	1,6	1,8	85,5
25,00	2	3,2	3,6	89,1
26,00	1	1,6	1,8	90,9
27,00	1	1,6	1,8	92,7
29,00	2	3,2	3,6	96,4
30,00	1	1,6	1,8	98,2
35,00	1	1,6	1,8	100,0
Total	55	88,7	100,0	
Missing 99,00	7	11,3		
Total	62	100,0		

**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 (Table 9). %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 (Table 10).

%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 (Table 11). %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 (Table 12).

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.

**Table 1.9: What is the business trend in your organization**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Total revenue increasing	19	30,6	30,6	30,6
Total revenue decreasing	3	4,8	4,8	35,5
Without change	22	35,5	35,5	71,0
Not applicable	18	29,0	29,0	100,0
Total	62	100,0	100,0	

**Table 1.10: What is the employment trend in your organization**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Number of employees increasing	14	22,6	22,6	22,6
Number of employees decreasing	5	8,1	8,1	30,6
Without change	27	43,5	43,5	74,2
Not applicable	16	25,8	25,8	100,0
Total	62	100,0	100,0	

**Table 1.11: 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	8,1	8,1	8,1
Difficult	8	12,9	12,9	21,0
Moderate	27	43,5	43,5	64,5
Easy	16	25,8	25,8	90,3
Very Easy	6	9,7	9,7	100,0
Total	62	100,0	100,0	

**Table 1.12: If you loose your job, can you work in another sector?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Difficult	6	9,7	9,7	9,7
Difficult	13	21,0	21,0	30,6
Moderate	21	33,9	33,9	64,5
Easy	13	21,0	21,0	85,5
Very Easy	9	14,5	14,5	100,0
Total	62	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 Personel Work Goals and Objectives, Entrepreneurial and Commercial Thinking all base on Big Eighth 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

**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 suggest that %90,3 of the Spanish participants evaluate themselves as moderate to strong level of decision making (Table 1.13) and %79,1 strong to very strong level of taking responsibility (Table 1.14). 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.

**Table 1.13: Decision making**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	4,8	4,8	4,8
Moderate	22	35,5	35,5	40,3
Strong	34	54,8	54,8	95,2
Very Strong	3	4,8	4,8	100,0
Total	62	100,0	100,0	

**Table 1.14: Taking responsibility**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,6	1,6	1,6
Weak	2	3,2	3,2	4,8
Moderate	10	16,1	16,1	21,0
Strong	35	56,5	56,5	77,4

Very Strong	14	22,6	22,6	100,0
Total	62	100,0	100,0	

### 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 (Table 1.15).

**Table 1.15: Leadership Skills**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,6	1,6	1,6
Weak	6	9,7	9,7	11,3
Moderate	28	45,2	45,2	56,5
Strong	25	40,3	40,3	96,8
Very Strong	2	3,2	3,2	100,0
Total	62	100,0	100,0	

### 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 (Table 1.16). The similar pattern is also visible in Colobrating with Others and Communicating with People dimensions, only %3.2 of the participants reported themselves as weak (Table 1.17) and %4,8 as very weak and weak (Table 1.18) respectively. Spanish participants evaluate themselves high in working with people dimension.

**Table 1.16: Team work**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,6	1,6	1,6
	Weak	2	3,2	3,3	4,9
	Moderate	12	19,4	19,7	24,6
	Strong	29	46,8	47,5	72,1
	Very Strong	17	27,4	27,9	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.17: Collaborating with others**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	2	3,2	3,2	3,2
	Moderate	10	16,1	16,1	19,4
	Strong	26	41,9	41,9	61,3
	Very Strong	24	38,7	38,7	100,0
	Total	62	100,0	100,0	

**Table 1.18: Communicating with people**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,6	1,6	1,6
	Weak	1	1,6	1,6	3,2
	Moderate	10	16,1	16,1	19,4
	Strong	30	48,4	48,4	67,7
	Very Strong	20	32,3	32,3	100,0
	Total	62	100,0	100,0	

### **Adhering to Principles and Values**

Spanish participants evaluate themselves higher in Respecting Ethics (Table 1.19) and Environmental Awareness (1.20) 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.

**Table 1.19: Respecting ethics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,6	1,6	1,6
	Weak	1	1,6	1,6	3,2
	Moderate	2	3,2	3,2	6,5
	Strong	23	37,1	37,1	43,5
	Very Strong	35	56,5	56,5	100,0
	Total	62	100,0	100,0	

**Table 1.20: Environmental awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,6	1,6	1,6
	Weak	1	1,6	1,6	3,3
	Moderate	9	14,5	14,8	18,0
	Strong	28	45,2	45,9	63,9
	Very Strong	22	35,5	36,1	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
	Total	62	100,0		

**Table 1.21: Awareness of ergonomics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,2	3,3	3,3
	Weak	3	4,8	4,9	8,2
	Moderate	20	32,3	32,8	41,0

	Strong	27	43,5	44,3	85,2
	Very Strong	9	14,5	14,8	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

## 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 (Table 1.22), whereas only %27,9 in creating business networks (Table 1.23), and %55,7 in maintaining customer relationships (Table 1.24). The frequency analysis suggest that Spanish participants rate themselves low in creating business networks skill.

**Table 1.22: Compromising**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	1	1,6	1,7	1,7
	Moderate	3	4,8	5,0	6,7
	Strong	26	41,9	43,3	50,0
	Very Strong	30	48,4	50,0	100,0
	Total	60	96,8	100,0	
Missing	99,00	2	3,2		
Total		62	100,0		

**Table 1.23: Creating business networks**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	7	11,3	11,5	11,5
	Weak	14	22,6	23,0	34,4
	Moderate	23	37,1	37,7	72,1
	Strong	9	14,5	14,8	86,9
	Very Strong	8	12,9	13,1	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.24: Maintaining customer relationships**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	4,8	4,9	4,9
	Weak	5	8,1	8,2	13,1
	Moderate	19	30,6	31,1	44,3
	Strong	23	37,1	37,7	82,0
	Very Strong	11	17,7	18,0	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

### **Persuading and Influencing**

%54,1 of the Spanish participants rated themselves strong and very strong in persuading influencing skills (Table 1.25) whereas %67,2 in emotional intelligence skills (Table 1.26) Analysis suggest that %45,9 of the participants rate themselves as moderate and weak in negotiating skills.

**Table 1.25: Negotiating**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	6	9,7	9,8	9,8

	Moderate	22	35,5	36,1	45,9
	Strong	25	40,3	41,0	86,9
	Very Strong	8	12,9	13,1	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.26: Emotional intelligence**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,2	3,3	3,3
	Weak	2	3,2	3,3	6,6
	Moderate	16	25,8	26,2	32,8
	Strong	31	50,0	50,8	83,6
	Very Strong	10	16,1	16,4	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

### **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 (Table 1.27).

**Table 1.27: Presenting and communication ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,6	1,6	1,6
	Weak	5	8,1	8,2	9,8
	Moderate	23	37,1	37,7	47,5
	Strong	18	29,0	29,5	77,0
	Very Strong	14	22,6	23,0	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

## 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 (Table 1.28) and %73,7 moderate and strong in literacy skills and only %19,7 very strong (Table 1.29). Spanish participants rated themselves low in targeted and technical communication skills.

**Table 1.28: Targeted/Technical Communication**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Weak	4	6,5	6,5	6,5
Moderate	28	45,2	45,2	51,6
Strong	25	40,3	40,3	91,9
Very Strong	5	8,1	8,1	100,0
Total	62	100,0	100,0	

**Table 1.29: Literacy (Reporting, writing plans, writing letters)**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	3,2	3,3	3,3
Weak	2	3,2	3,3	6,6
Moderate	16	25,8	26,2	32,8
Strong	29	46,8	47,5	80,3
Very Strong	12	19,4	19,7	100,0
Total	61	98,4	100,0	
Missing	99,00	1	1,6	
Total	62	100,0		

### Applying Expertise and Technology

Applying expertise and technology dimension is composed of 23 items. Participants rated their skills in IT and technology affinity %55,7 strong and very strong (Table 1.30), Economics %48,3 strong and very strong (Table 1.31), Extract business value from social media %24,6 strong and very strong (Table 1.32), Service orientation/product service offerings %31,7 strong and very strong (Table 1.33), Business process management %33,9 strong and very strong (Table 1.34), Business change management %30 strong and very strong (Table 1.35), Understand and coordinate workflows %46,7 strong and very strong (Table 1.36), Network security %32,3 strong and very strong (Table 1.37), IT architectures %26,2 strong and very strong (Table 1.38), Machine learning %45,9 strong and very strong (Table 1.39), System development % 21,3 strong and very strong (Table 1.40), Integrating heterogeneous technologies %26,2 strong and very strong (Table 1.41), Mobile technologies %39,3 strong and very strong (Table 1.42), Sensors/embedded systems %28 strong and very strong (Table 1.43), Network technology/M2M communication %18,3 strong and very strong (Table 1.44), Robotics/Artificial intelligence %8,2 strong and very strong (Table 1.45), Predictive maintenance %15,3 strong only (Table 1.46), Modelling and programming % 21 strong and very strong (Table 1.47), Big data/Data analysis and interpretation %16,1 (Table 1.48), Cloud computing/architectures %18 strong and very strong (Table 1.49), In-memory DBs %18,6 strong and very strong (Table 1.50), Statistics %19,7 strong and very strong (Table 1.51) and Data Security % 26,2 strong and very strong (Table 1.52). 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.

**Table 1.30: IT and technology affinity**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	4,8	4,9	4,9
Weak	3	4,8	4,9	9,8
Moderate	21	33,9	34,4	44,3
Strong	24	38,7	39,3	83,6
Very Strong	10	16,1	16,4	100,0

Total	61	98,4	100,0
Missing 99,00	1	1,6	
Total	62	100,0	

**Table 1.31: Economics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	3,2	3,3	3,3
Weak	10	16,1	16,7	20,0
Moderate	25	40,3	41,7	61,7
Strong	16	25,8	26,7	88,3
Very Strong	7	11,3	11,7	100,0
Total	60	96,8	100,0	
Missing 99,00	2	3,2		
Total	62	100,0		

**Table 1.32: Extract business value from social media**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	10	16,1	16,4	16,4
Weak	10	16,1	16,4	32,8
Moderate	26	41,9	42,6	75,4
Strong	11	17,7	18,0	93,4
Very Strong	4	6,5	6,6	100,0
Total	61	98,4	100,0	
Missing 99,00	1	1,6		
Total	62	100,0		

**Table 1.33: Service orientation/product service offerings**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	4	6,5	6,7	6,7
Weak	11	17,7	18,3	25,0
Moderate	26	41,9	43,3	68,3

	Strong	14	22,6	23,3	91,7
	Very Strong	5	8,1	8,3	100,0
	Total	60	96,8	100,0	
Missing	99,00	2	3,2		
Total		62	100,0		

**Table 1.34: Business process management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	9,7	9,7	9,7
	Weak	13	21,0	21,0	30,6
	Moderate	22	35,5	35,5	66,1
	Strong	17	27,4	27,4	93,5
	Very Strong	4	6,5	6,5	100,0
	Total	62	100,0	100,0	

**Table 1.35: Business change management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	7	11,3	11,7	11,7
	Weak	13	21,0	21,7	33,3
	Moderate	22	35,5	36,7	70,0
	Strong	14	22,6	23,3	93,3
	Very Strong	4	6,5	6,7	100,0
	Total	60	96,8	100,0	
Missing	99,00	2	3,2		
Total		62	100,0		

**Table 1.36: Understand and coordinate workflows**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	4,8	5,0	5,0
	Weak	6	9,7	10,0	15,0

	Moderate	23	37,1	38,3	53,3
	Strong	23	37,1	38,3	91,7
	Very Strong	5	8,1	8,3	100,0
	Total	60	96,8	100,0	
Missing	99,00	2	3,2		
Total		62	100,0		

**Table 1.37: Network security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	6,5	6,5	6,5
	Weak	13	21,0	21,0	27,4
	Moderate	25	40,3	40,3	67,7
	Strong	15	24,2	24,2	91,9
	Very Strong	5	8,1	8,1	100,0
	Total	62	100,0	100,0	

**Table 1.38: IT architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	16	25,8	26,2	26,2
	Weak	10	16,1	16,4	42,6
	Moderate	19	30,6	31,1	73,8
	Strong	8	12,9	13,1	86,9
	Very Strong	8	12,9	13,1	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.39: Machine learning**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	9,7	9,8	9,8

	Weak	3	4,8	4,9	14,8
	Moderate	24	38,7	39,3	54,1
	Strong	21	33,9	34,4	88,5
	Very Strong	7	11,3	11,5	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.40: System development**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	20	32,3	32,8	32,8
	Weak	10	16,1	16,4	49,2
	Moderate	18	29,0	29,5	78,7
	Strong	12	19,4	19,7	98,4
	Very Strong	1	1,6	1,6	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.41: Integrating heterogeneous technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	13	21,0	21,3	21,3
	Weak	16	25,8	26,2	47,5
	Moderate	16	25,8	26,2	73,8
	Strong	11	17,7	18,0	91,8
	Very Strong	5	8,1	8,2	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.42: Mobile technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	8	12,9	13,1	13,1
	Weak	8	12,9	13,1	26,2
	Moderate	21	33,9	34,4	60,7
	Strong	18	29,0	29,5	90,2
	Very Strong	6	9,7	9,8	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.43: Sensors/embedded systems**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	16	25,8	26,2	26,2
	Weak	20	32,3	32,8	59,0
	Moderate	14	22,6	23,0	82,0
	Strong	8	12,9	13,1	95,1
	Very Strong	3	4,8	4,9	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.44: Network technology/M2M communication**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	18	29,0	30,0	30,0
	Weak	14	22,6	23,3	53,3
	Moderate	17	27,4	28,3	81,7
	Strong	9	14,5	15,0	96,7
	Very Strong	2	3,2	3,3	100,0
	Total	60	96,8	100,0	
Missing	99,00	2	3,2		
Total		62	100,0		

**Table 1.45: Robotics/Artificial intelligence**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	22	35,5	36,1	36,1
	Weak	20	32,3	32,8	68,9
	Moderate	14	22,6	23,0	91,8
	Strong	2	3,2	3,3	95,1
	Very Strong	3	4,8	4,9	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.46: Predictive maintenance**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	21	33,9	35,6	35,6
	Weak	15	24,2	25,4	61,0
	Moderate	14	22,6	23,7	84,7
	Strong	9	14,5	15,3	100,0
	Total	59	95,2	100,0	
Missing	99,00	3	4,8		
Total		62	100,0		

**Table 1.47: Modelling and programming**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	23	37,1	37,1	37,1
	Weak	14	22,6	22,6	59,7
	Moderate	12	19,4	19,4	79,0
	Strong	8	12,9	12,9	91,9
	Very Strong	5	8,1	8,1	100,0
	Total	62	100,0	100,0	

**Table 1.48: Big data/Data analysis and interpretation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	21	33,9	33,9	33,9
	Weak	13	21,0	21,0	54,8
	Moderate	18	29,0	29,0	83,9
	Strong	7	11,3	11,3	95,2
	Very Strong	3	4,8	4,8	100,0
	Total	62	100,0	100,0	

**Table 1.49: Cloud computing/architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	22	35,5	36,1	36,1
	Weak	15	24,2	24,6	60,7
	Moderate	13	21,0	21,3	82,0
	Strong	8	12,9	13,1	95,1
	Very Strong	3	4,8	4,9	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
	Total	62	100,0		

**Table 1.50: In-memory DBs**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	19	30,6	32,2	32,2
	Weak	15	24,2	25,4	57,6
	Moderate	14	22,6	23,7	81,4
	Strong	9	14,5	15,3	96,6
	Very Strong	2	3,2	3,4	100,0
	Total	59	95,2	100,0	
Missing	99,00	3	4,8		

Total	62	100,0		
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**Table 1.51: Statistics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	10	16,1	16,4	16,4
	Weak	19	30,6	31,1	47,5
	Moderate	20	32,3	32,8	80,3
	Strong	8	12,9	13,1	93,4
	Very Strong	4	6,5	6,6	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.52: Data security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	9	14,5	14,8	14,8
	Weak	18	29,0	29,5	44,3
	Moderate	18	29,0	29,5	73,8
	Strong	13	21,0	21,3	95,1
	Very Strong	3	4,8	4,9	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

### Analyzing

Analyzing sub-dimension is composed of 4 items. Participants rated Problem Solving %68,7 strong and very strong (Table 1.53), Optimization %53,3 (Table 1.54), Analytical Skills %51,8 (Table 1.55) and Cognitive Ability %50 (Table 1.56).

**Table 1.53: Problem Solving**

		Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Very Weak	1	1,6	1,6	1,6
	Weak	2	3,2	3,3	4,9
	Moderate	16	25,8	26,2	31,1
	Strong	30	48,4	49,2	80,3
	Very Strong	12	19,4	19,7	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.54: Optimization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	6,5	6,7	6,7
	Weak	9	14,5	15,0	21,7
	Moderate	15	24,2	25,0	46,7
	Strong	27	43,5	45,0	91,7
	Very Strong	5	8,1	8,3	100,0
	Total	60	96,8	100,0	
Missing	99,00	2	3,2		
Total		62	100,0		

**Table 1.55: Analytical Skills**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,6	1,6	1,6
	Weak	11	17,7	18,0	19,7
	Moderate	18	29,0	29,5	49,2
	Strong	25	40,3	41,0	90,2
	Very Strong	6	9,7	9,8	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.56: Cognitive Ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,6	1,7	1,7
	Weak	8	12,9	13,3	15,0
	Moderate	21	33,9	35,0	50,0
	Strong	24	38,7	40,0	90,0
	Very Strong	6	9,7	10,0	100,0
	Total	60	96,8	100,0	
Missing	99,00	2	3,2		
Total		62	100,0		

## 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 (Table 1.57) and %54,1strong and very strong in knowledge management (Table 1.58).

**Table 1.57: Life-long learning**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	3	4,8	4,9	4,9
	Moderate	20	32,3	32,8	37,7
	Strong	26	41,9	42,6	80,3
	Very Strong	12	19,4	19,7	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.58: Knowledge management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,6	1,6	1,6
	Weak	5	8,1	8,2	9,8
	Moderate	22	35,5	36,1	45,9
	Strong	28	45,2	45,9	91,8
	Very Strong	5	8,1	8,2	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Creating and Innovation**

Participants rated themselves %56,7 strong and very strong in Innovating (Table 1.59), %55 strong and very strong in creativity (Table 1.60), %70,5 strong and very strong in Critical Thinking (Table 1.61) and %47,4 strong and very strong in Change Management (Table 1.62).

**Table 1.59: Innovating**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	2	3,2	3,3	3,3
	Moderate	24	38,7	40,0	43,3
	Strong	26	41,9	43,3	86,7
	Very Strong	8	12,9	13,3	100,0
	Total	60	96,8	100,0	
Missing	99,00	2	3,2		
Total		62	100,0		

**Table 1.60: Creativity**

		Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Very Weak	1	1,6	1,7	1,7
	Weak	1	1,6	1,7	3,3
	Moderate	25	40,3	41,7	45,0
	Strong	25	40,3	41,7	86,7
	Very Strong	8	12,9	13,3	100,0
	Total	60	96,8	100,0	
Missing	99,00	2	3,2		
Total		62	100,0		

**Table 1.61: Critical thinking**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	4	6,5	6,6	6,6
	Moderate	14	22,6	23,0	29,5
	Strong	28	45,2	45,9	75,4
	Very Strong	15	24,2	24,6	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.62: Change management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,6	1,6	1,6
	Weak	8	12,9	13,1	14,8
	Moderate	17	27,4	27,9	42,6
	Strong	27	43,5	44,3	86,9
	Very Strong	8	12,9	13,1	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

## 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.

**Table 1.63: Business strategy**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	6,5	6,7	6,7
	Weak	17	27,4	28,3	35,0
	Moderate	19	30,6	31,7	66,7
	Strong	15	24,2	25,0	91,7
	Very Strong	5	8,1	8,3	100,0
	Total	60	96,8	100,0	
Missing	99,00	2	3,2		
Total		62	100,0		

**Table 1.64: Abstraction ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	9	14,5	14,8	14,8
	Moderate	17	27,4	27,9	42,6
	Strong	27	43,5	44,3	86,9
	Very Strong	8	12,9	13,1	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.65: Managing complexity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,6	1,7	1,7
	Weak	6	9,7	10,2	11,9
	Moderate	27	43,5	45,8	57,6
	Strong	19	30,6	32,2	89,8
	Very Strong	6	9,7	10,2	100,0

Total	59	95,2	100,0
Missing 99,00	3	4,8	
Total	62	100,0	

## 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 (Tabl1 1.66), Planning and organizing work %59,7 strong and very strong (Table 1.67) and % 54,1 strong and very strong Management Ability (Table 1.68).

**Table 1.66: Project management**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	4,8	5,0	5,0
Weak	5	8,1	8,3	13,3
Moderate	23	37,1	38,3	51,7
Strong	20	32,3	33,3	85,0
Very Strong	9	14,5	15,0	100,0
Total	60	96,8	100,0	
Missing 99,00	2	3,2		
Total	62	100,0		

**Table 1.67: Planning and organizing work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,6	1,6	1,6
Weak	2	3,2	3,3	4,9
Moderate	21	33,9	34,4	39,3
Strong	26	41,9	42,6	82,0

	Very Strong	11	17,7	18,0	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.68: Management ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,6	1,6	1,6
	Weak	4	6,5	6,6	8,2
	Moderate	23	37,1	37,7	45,9
	Strong	25	40,3	41,0	86,9
	Very Strong	8	12,9	13,1	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

### **Delivering Results and Meeting Customer Expectation**

Participants rated their Customer Orientation skills % 49,2 strong and very strong (Table 1.69), Customer Relationship Management skills %42,6 strong and very strong (Table 1.70)

**Table 1.69: Customer orientation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,2	3,3	3,3
	Weak	7	11,3	11,5	14,8
	Moderate	22	35,5	36,1	50,8
	Strong	23	37,1	37,7	88,5
	Very Strong	7	11,3	11,5	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.70: Customer relationship management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,2	3,3	3,3
	Weak	10	16,1	16,4	19,7
	Moderate	23	37,1	37,7	57,4
	Strong	19	30,6	31,1	88,5
	Very Strong	7	11,3	11,5	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Following Instructions and Procedures**

Legislation awareness skills %41 strong and very strong (Table 1.71), Safety awareness skills %41.7 strong and very strong (Table 1.72) and Individual responsibility skills %78,3 strong and very strong (Table 1.73). No participant rated individual responsibility as weak or very weak.

**Table 1.71: Legislation awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,2	3,3	3,3
	Weak	12	19,4	19,7	23,0
	Moderate	22	35,5	36,1	59,0
	Strong	20	32,3	32,8	91,8
	Very Strong	5	8,1	8,2	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.72: Safety awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,6	1,7	1,7
	Weak	9	14,5	15,0	16,7
	Moderate	25	40,3	41,7	58,3
	Strong	22	35,5	36,7	95,0
	Very Strong	3	4,8	5,0	100,0
	Total	60	96,8	100,0	
Missing	99,00	2	3,2		
Total		62	100,0		

**Table 1.73: Individual responsibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Moderate	13	21,0	21,7	21,7
	Strong	28	45,2	46,7	68,3
	Very Strong	19	30,6	31,7	100,0
	Total	60	96,8	100,0	
Missing	99,00	2	3,2		
Total		62	100,0		

## 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 (Table 1.74), Intercultural competency skills %46,7 strong and very strong (Table 1.75), Flexibility skills %70,5 strong and very strong (Table 1.76) and Adaptability and ability to change mind-set skills %73,3 strong and very strong (Table 1.77).

**Table 1.74: Work in interdisciplinary environments**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,2	3,3	3,3
	Weak	8	12,9	13,1	16,4
	Moderate	20	32,3	32,8	49,2
	Strong	24	38,7	39,3	88,5
	Very Strong	7	11,3	11,5	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.75: Intercultural competency**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	4,8	5,0	5,0
	Weak	4	6,5	6,7	11,7
	Moderate	25	40,3	41,7	53,3
	Strong	20	32,3	33,3	86,7
	Very Strong	8	12,9	13,3	100,0
	Total	60	96,8	100,0	
Missing	99,00	2	3,2		
Total		62	100,0		

**Table 1.76: Flexibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,6	1,6	1,6
	Weak	2	3,2	3,3	4,9
	Moderate	15	24,2	24,6	29,5
	Strong	32	51,6	52,5	82,0
	Very Strong	11	17,7	18,0	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.77: Adaptability and ability to change mind-set**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	2	3,2	3,3	3,3
	Moderate	14	22,6	23,3	26,7
	Strong	34	54,8	56,7	83,3
	Very Strong	10	16,1	16,7	100,0
	Total	60	96,8	100,0	
Missing	99,00	2	3,2		
Total		62	100,0		

### **Persuading and Influencing**

Participants rated their Work Life Balance skills %57,4 strong and very strong (Table 1.78).

**Table 1.78: Work-life Balance**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,6	1,6	1,6
	Weak	6	9,7	9,8	11,5
	Moderate	19	30,6	31,1	42,6
	Strong	25	40,3	41,0	83,6
	Very Strong	10	16,1	16,4	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

### **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 (Table 1.79)

**Table 1.79: Self-management and organization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	5	8,1	8,2	8,2
	Moderate	14	22,6	23,0	31,1
	Strong	30	48,4	49,2	80,3
	Very Strong	12	19,4	19,7	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

### **Entrepreneurial and Commercial Thinking**

Participants rated their Business model understanding skills %50,8 strong and very strong (Table 1.80) and Entrepreneurship skills %33,8 strong and very strong (Table 1.81)

**Table 1.80: Business model understanding**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	4,8	4,9	4,9
	Weak	5	8,1	8,2	13,1
	Moderate	22	35,5	36,1	49,2
	Strong	25	40,3	41,0	90,2

	Very Strong	6	9,7	9,8	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

**Table 1.81: Entrepreneurship**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	4,8	4,9	4,9
	Weak	14	22,6	23,0	27,9
	Moderate	24	38,7	39,3	67,2
	Strong	12	19,4	19,7	86,9
	Very Strong	8	12,9	13,1	100,0
	Total	61	98,4	100,0	
Missing	99,00	1	1,6		
Total		62	100,0		

## STUDENT QUESTIONNAIRE ANALYSIS-SPAIN

### Demographics

Participants participated the research are % 44,1 male and %55,9 female (Table 2.1), age ranging from 16 to 51 and mean age is 23,86 (Table 2.2). %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 (Table 2.3). %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 (Table 2.4). Demographic represent a participant profile with a balanced male female ratio, in their twenties, mostly planning to work in service sector.

**Table 2.1: Gender**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	41	44,1	44,1	44,1
Female	52	55,9	55,9	100,0
Total	93	100,0	100,0	

**Table 2.2: Age**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 16	2	2,2	2,2	2,2
17	3	3,2	3,2	5,4
18	8	8,6	8,6	14,0
19	10	10,8	10,8	24,7
20	7	7,5	7,5	32,3
21	8	8,6	8,6	40,9
22	11	11,8	11,8	52,7
23	12	12,9	12,9	65,6
24	4	4,3	4,3	69,9
25	6	6,5	6,5	76,3
26	2	2,2	2,2	78,5
27	2	2,2	2,2	80,6
28	3	3,2	3,2	83,9
30	1	1,1	1,1	84,9
31	5	5,4	5,4	90,3
32	1	1,1	1,1	91,4
34	1	1,1	1,1	92,5
36	1	1,1	1,1	93,5
37	1	1,1	1,1	94,6
39	1	1,1	1,1	95,7
40	1	1,1	1,1	96,8
43	2	2,2	2,2	98,9
51	1	1,1	1,1	100,0
Total	93	100,0	100,0	

**Table 2.3: Level of study**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Primary school	2	2,2	2,2	2,2
Secondary school	26	28,0	28,0	30,1
vocational school	8	8,6	8,6	38,7
Vocational high school	42	45,2	45,2	83,9
Graduate	10	10,8	10,8	94,6
Higher education (master/Phd)	5	5,4	5,4	100,0
Total	93	100,0	100,0	

**Table 2.4: In which sector do you plan to work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Manufacturing	16	17,2	17,2	17,2
Education	8	8,6	8,6	25,8
Service (Tourism, health, finance IT)	69	74,2	74,2	100,0
Total	93	100,0	100,0	

### **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 (Table 2.5). %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 (Table 10).

%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 (Table 2.7). %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 (Table 2.8).

**Table 2.5: What is the business trend in the sector you want to work?**

	Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Total revenue increasing	45	48,4	48,4	48,4
	Total revenue decreasing	6	6,5	6,5	54,8
	Without change	21	22,6	22,6	77,4
	Hard to say	21	22,6	22,6	100,0
	Total	93	100,0	100,0	

**Table 2.6: What employment possibilities are in the sector you want to work?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Number of employees increasing	38	40,9	40,9	40,9
	Number of employees decreasing	12	12,9	12,9	53,8
	Without change	24	25,8	25,8	79,6
	Hard to say	19	20,4	20,4	100,0
	Total	93	100,0	100,0	

**Table 2.7: Can you find a job in the sector you want to work?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Difficult	10	10,8	10,8	10,8
	Difficult	31	33,3	33,3	44,1
	Moderate	31	33,3	33,3	77,4
	Easy	13	14,0	14,0	91,4
	Very Easy	8	8,6	8,6	100,0
	Total	93	100,0	100,0	

**Table 2.8: 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	7	7,5	7,5	7,5

Difficult	19	20,4	20,4	28,0
Moderate	36	38,7	38,7	66,7
Easy	20	21,5	21,5	88,2
Very Easy	11	11,8	11,8	100,0
Total	93	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 Eighth dimensions.

### Big Eight Dimensions and 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.

**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 (Table 2.9), but very strong is only %5,4, and %66,7 strong and very strong level of taking responsibility (Table 2.10). Although, Spanish student score themselves with high decision making, they do not rate very strong.

### Deciding and Initial Action

**Table 2.9: Decision making**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,1	1,1	1,1
Weak	9	9,7	9,7	10,8
Moderate	36	38,7	38,7	49,5
Strong	42	45,2	45,2	94,6
Very Strong	5	5,4	5,4	100,0
Total	93	100,0	100,0	

**Table 2.10: Taking responsibility**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	1	1,1	1,1	1,1
Weak	4	4,3	4,3	5,4
Moderate	26	28,0	28,0	33,3
Strong	40	43,0	43,0	76,3
Very Strong	22	23,7	23,7	100,0
Total	93	100,0	100,0	

### Leading and Supervising,

Spanish students score themselves %47,3 strong and very strong leadership skills, but very strong is only %7,5 (Table 2.11). Students seem to exhibit low leadership skills, it may be because of lack of experience.

**Table 2.11: Leadership Skills**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	6	6,5	6,5	6,5
Weak	14	15,1	15,1	21,5
Moderate	29	31,2	31,2	52,7
Strong	37	39,8	39,8	92,5
Very Strong	7	7,5	7,5	100,0
Total	93	100,0	100,0	

**SUPPORTING AND COOPERATION****Working With People**

%71 of the students rate themselves as strong and very strong in team work (Table 2.12), %69,9 rate themselves strong and very strong in collaborating with others (Table 2.13) and %64,5 rate strong and very strong in communicating with people (Table 2.14).

**Table 2.12: Team work**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,2	2,2	2,2
Weak	4	4,3	4,3	6,5
Moderate	21	22,6	22,6	29,0
Strong	35	37,6	37,6	66,7
Very Strong	31	33,3	33,3	100,0
Total	93	100,0	100,0	

**Table 2.13: Collaborating with others**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	3,2	3,2	3,2
Weak	3	3,2	3,2	6,5
Moderate	22	23,7	23,7	30,1
Strong	33	35,5	35,5	65,6

Very Strong	32	34,4	34,4	100,0
Total	93	100,0	100,0	

**Table 2.14: Communicating with people**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	2	2,2	2,2	2,2
Weak	6	6,5	6,5	8,6
Moderate	25	26,9	26,9	35,5
Strong	32	34,4	34,4	69,9
Very Strong	28	30,1	30,1	100,0
Total	93	100,0	100,0	

### Adhering to Principles and Values

%80,6 of the students rate strong and very strong in Respecting ethics (Table 2.15), %66,3 strong and very strong in Environmental awareness (Table 2.16) and %46,2 strong and very strong in Awareness of ergonomics (Table 2.17). Spanish students score low in awareness of ergonomics.

**Table 2.15: Respecting ethics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	3	3,2	3,2	3,2
Weak	4	4,3	4,3	7,5
Moderate	11	11,8	11,8	19,4
Strong	29	31,2	31,2	50,5
Very Strong	46	49,5	49,5	100,0
Total	93	100,0	100,0	

**Table 2.16: Environmental awareness**

	Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Very Weak	4	4,3	4,3	4,3
	Weak	9	9,7	9,8	14,1
	Moderate	18	19,4	19,6	33,7
	Strong	26	28,0	28,3	62,0
	Very Strong	35	37,6	38,0	100,0
	Total	92	98,9	100,0	
Missing	99	1	1,1		
Total		93	100,0		

**Table 2.17: Awareness of ergonomics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	4,3	4,3	4,3
	Weak	16	17,2	17,2	21,5
	Moderate	30	32,3	32,3	53,8
	Strong	20	21,5	21,5	75,3
	Very Strong	23	24,7	24,7	100,0
	Total	93	100,0	100,0	

## INTERACTING AND PRESENTING

### Relating and Networking

%81,5 of the students rate strong and very strong in Compromising skills (Table 2.18), %34,8 rate strong and very strong in Creating business networks (Table 2.19), %61,1 rate strong and very strong in Maintaining customer relationships (Table 2.20). Spanish students rate themselves low in creating business networks.

**Table 2.18: Compromising**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	2	2,2	2,2	3,3
	Moderate	14	15,1	15,2	18,5
	Strong	28	30,1	30,4	48,9

	Very Strong	47	50,5	51,1	100,0
	Total	92	98,9	100,0	
Missing	99	1	1,1		
Total		93	100,0		

**Table 2.19: Creating business networks**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	5,4	5,6	5,6
	Weak	22	23,7	24,7	30,3
	Moderate	31	33,3	34,8	65,2
	Strong	21	22,6	23,6	88,8
	Very Strong	10	10,8	11,2	100,0
	Total	89	95,7	100,0	
Missing	99	4	4,3		
Total		93	100,0		

**Table 2.20: Maintaining customer relationships**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,2	2,2	2,2
	Weak	10	10,8	11,1	13,3
	Moderate	23	24,7	25,6	38,9
	Strong	35	37,6	38,9	77,8
	Very Strong	20	21,5	22,2	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

### **Persuading and Influencing**

%49,5 of the students rate strong and very strong in Negotiating (Table 2.21) and %72,5 strong and very strong in Emotional intelligence (Table 2.22). Spanish students rate low in negotiating.

**Table 2.21: Negotiating**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	5,4	5,5	5,5
	Weak	9	9,7	9,9	15,4
	Moderate	32	34,4	35,2	50,5
	Strong	33	35,5	36,3	86,8
	Very Strong	12	12,9	13,2	100,0
	Total	91	97,8	100,0	
Missing	99	2	2,2		
Total		93	100,0		

**Table 2.22: Emotional intelligence**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	6	6,5	6,6	7,7
	Moderate	18	19,4	19,8	27,5
	Strong	36	38,7	39,6	67,0
	Very Strong	30	32,3	33,0	100,0
	Total	91	97,8	100,0	
Missing	99	2	2,2		
Total		93	100,0		

**Presenting and Communicating Information**

%53,8 of the students rate strong and very strong in Presenting and communication ability (Table 2.23).

**Table 2.23: Presenting and communication ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	18	19,4	19,8	20,9
	Moderate	23	24,7	25,3	46,2
	Strong	32	34,4	35,2	81,3

	Very Strong	17	18,3	18,7	100,0
	Total	91	97,8	100,0	
Missing	99	2	2,2		
Total		93	100,0		

## ANALYZING AND INTERPRETING

### Writing and reporting

%43,7 of the Spanish students rate strong and very strong in Targeted/Technical Communication (Table 2.24) and %45,6 rate strong and very strong in Literacy (Table 2.25). Spanish students report low Targeted/Technical Communication and Literacy (Reporting, writing plans, writing letters).

**Table 2.24: Targeted/Technical Communication**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,2	2,2	2,2
	Weak	18	19,4	20,0	22,2
	Moderate	31	33,3	34,4	56,7
	Strong	22	23,7	24,4	81,1
	Very Strong	17	18,3	18,9	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

**Table 2.25: Literacy (Reporting, writing plans, writing letters)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,2	2,2	2,2
	Weak	15	16,1	16,7	18,9
	Moderate	32	34,4	35,6	54,4
	Strong	24	25,8	26,7	81,1
	Very Strong	17	18,3	18,9	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		

Total	93	100,0	
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### Applying Expertise and Technology

%59,9 of the Spanish students rate themselves with strong and very strong in IT and technology affinity (Table 2.26), %33 strong and very strong in Economics (Table 2.27), %39,3 strong and very strong in Extract business value from social media (Table 2.29), %31,5 strong and very strong in Service orientation/product service offerings (Table 2.30), %28,4 strong and very strong in Business process management (Table 2.31), %21,8 strong and very strong in Business change management (Table 2.32), %39,8 strong and very strong in Understand and coordinate workflows (Table 2.33), %33,3 strong and very strong in Network security (Table 2.34), %19,3 strong and very strong in IT architectures (Table 2.35), %43,3 strong and very strong in Machine learning (Table 2.36), %15,9 strong and very strong in System development (Table 2.37), %21,3 strong and very strong in Integrating heterogeneous technologies (Table 2.38), %54,4 strong and very strong in Mobile technologies (Table 2.39), %25,8 strong and very strong in Sensors/embedded systems (Table 2.40), %17 strong and very strong in Network technology/M2M communication (Table 2.41), %16,5 strong and very strong in Robotics/Artificial intelligence (Table 2.42), %11,8 strong and very strong in Predictive maintenance (Table 2.43), %18,9 strong and very strong in Modelling and programming (Table 2.44), %18,2 strong and very strong in Big data/Data analysis and interpretation (Table 2.45), %17 strong and very strong in Cloud computing/architectures (Table 2.46), %12,5 strong and very strong in In memory DBs (Table 2.47), %22,5 strong and very strong in Statistics (Table 2.48), %25,8 strong and very strong in Data security (Table 2.49).

**Table 2.27: IT and technology affinity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	13	14,0	14,4	15,6
	Moderate	23	24,7	25,6	41,1
	Strong	32	34,4	35,6	76,7
	Very Strong	21	22,6	23,3	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

**Table 2.28: Economics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	6,5	6,6	6,6
	Weak	22	23,7	24,2	30,8
	Moderate	33	35,5	36,3	67,0
	Strong	21	22,6	23,1	90,1
	Very Strong	9	9,7	9,9	100,0
	Total	91	97,8	100,0	
Missing	99	2	2,2		
Total		93	100,0		

**Table 2.29: Extract business value from social media**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	3,2	3,4	3,4
	Weak	18	19,4	20,2	23,6
	Moderate	33	35,5	37,1	60,7
	Strong	27	29,0	30,3	91,0
	Very Strong	8	8,6	9,0	100,0
	Total	89	95,7	100,0	
Missing	99	4	4,3		
Total		93	100,0		

**Table 2.29: Service orientation/product service offerings**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,2	2,2	2,2
	Weak	21	22,6	23,6	25,8
	Moderate	38	40,9	42,7	68,5
	Strong	22	23,7	24,7	93,3
	Very Strong	6	6,5	6,7	100,0
	Total	89	95,7	100,0	
Missing	99	4	4,3		
Total		93	100,0		

**Table 2.30: Business process management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	5,4	5,7	5,7
	Weak	20	21,5	22,7	28,4
	Moderate	38	40,9	43,2	71,6
	Strong	18	19,4	20,5	92,0
	Very Strong	7	7,5	8,0	100,0
	Total	88	94,6	100,0	
Missing	99	5	5,4		
Total		93	100,0		

**Table 2.31: Business change management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	5,4	5,7	5,7
	Weak	28	30,1	32,2	37,9
	Moderate	35	37,6	40,2	78,2
	Strong	13	14,0	14,9	93,1
	Very Strong	6	6,5	6,9	100,0
	Total	87	93,5	100,0	
Missing	99	6	6,5		
Total		93	100,0		

**Table 2.32: Understand and coordinate workflows**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	20	21,5	22,7	23,9
	Moderate	32	34,4	36,4	60,2
	Strong	25	26,9	28,4	88,6
	Very Strong	10	10,8	11,4	100,0

Total	88	94,6	100,0
Missing 99	5	5,4	
Total	93	100,0	

**Table 2.33: Network security**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	8	8,6	8,9	8,9
Weak	22	23,7	24,4	33,3
Moderate	30	32,3	33,3	66,7
Strong	24	25,8	26,7	93,3
Very Strong	6	6,5	6,7	100,0
Total	90	96,8	100,0	
Missing 99	3	3,2		
Total	93	100,0		

**Table 2.34: IT architectures**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	13	14,0	14,8	14,8
Weak	32	34,4	36,4	51,1
Moderate	26	28,0	29,5	80,7
Strong	13	14,0	14,8	95,5
Very Strong	4	4,3	4,5	100,0
Total	88	94,6	100,0	
Missing 99	5	5,4		
Total	93	100,0		

**Table 2.35: Machine learning**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	5	5,4	5,6	5,6
Weak	15	16,1	16,7	22,2
Moderate	31	33,3	34,4	56,7

	Strong	26	28,0	28,9	85,6
	Very Strong	13	14,0	14,4	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

**Table 2.36: System development**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	9	9,7	10,2	10,2
	Weak	34	36,6	38,6	48,9
	Moderate	31	33,3	35,2	84,1
	Strong	10	10,8	11,4	95,5
	Very Strong	4	4,3	4,5	100,0
	Total	88	94,6	100,0	
Missing	99	5	5,4		
Total		93	100,0		

**Table 2.37: Integrating heterogeneous technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	10	10,8	11,2	11,2
	Weak	29	31,2	32,6	43,8
	Moderate	31	33,3	34,8	78,7
	Strong	13	14,0	14,6	93,3
	Very Strong	6	6,5	6,7	100,0
	Total	89	95,7	100,0	
Missing	99	4	4,3		
Total		93	100,0		

**Table 2.38: Mobile technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Very Weak	3	3,2	3,3	3,3
	Weak	13	14,0	14,4	17,8
	Moderate	25	26,9	27,8	45,6
	Strong	29	31,2	32,2	77,8
	Very Strong	20	21,5	22,2	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

**Table 2.39: Sensors/embedded systems**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	16	17,2	18,0	18,0
	Weak	25	26,9	28,1	46,1
	Moderate	25	26,9	28,1	74,2
	Strong	18	19,4	20,2	94,4
	Very Strong	5	5,4	5,6	100,0
	Total	89	95,7	100,0	
Missing	99	4	4,3		
Total		93	100,0		

**Table 2.40: Network technology/M2M communication**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	22	23,7	25,0	25,0
	Weak	24	25,8	27,3	52,3
	Moderate	27	29,0	30,7	83,0
	Strong	10	10,8	11,4	94,3
	Very Strong	5	5,4	5,7	100,0
	Total	88	94,6	100,0	
Missing	99	5	5,4		
Total		93	100,0		

**Table 2.41: Robotics/Artificial intelligence**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	31	33,3	34,1	34,1
	Weak	26	28,0	28,6	62,6
	Moderate	19	20,4	20,9	83,5
	Strong	12	12,9	13,2	96,7
	Very Strong	3	3,2	3,3	100,0
	Total	91	97,8	100,0	
Missing	99	2	2,2		
Total		93	100,0		

**Table 2.42: Predictive maintenance**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	22	23,7	25,9	25,9
	Weak	24	25,8	28,2	54,1
	Moderate	29	31,2	34,1	88,2
	Strong	7	7,5	8,2	96,5
	Very Strong	3	3,2	3,5	100,0
	Total	85	91,4	100,0	
Missing	99	8	8,6		
Total		93	100,0		

**Table 2.43: Modelling and programming**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	16	17,2	17,8	17,8
	Weak	30	32,3	33,3	51,1
	Moderate	27	29,0	30,0	81,1
	Strong	11	11,8	12,2	93,3
	Very Strong	6	6,5	6,7	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

**Table 2.44: Big data/Data analysis and interpretation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	26	28,0	29,5	29,5
	Weak	25	26,9	28,4	58,0
	Moderate	21	22,6	23,9	81,8
	Strong	10	10,8	11,4	93,2
	Very Strong	6	6,5	6,8	100,0
	Total	88	94,6	100,0	
Missing	99	5	5,4		
Total		93	100,0		

**Table 2.45: Cloud computing/architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	27	29,0	30,7	30,7
	Weak	29	31,2	33,0	63,6
	Moderate	17	18,3	19,3	83,0
	Strong	7	7,5	8,0	90,9
	Very Strong	8	8,6	9,1	100,0
	Total	88	94,6	100,0	
Missing	99	5	5,4		
Total		93	100,0		

**Table 2.46: In-memory DBs**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	29	31,2	33,0	33,0
	Weak	22	23,7	25,0	58,0
	Moderate	26	28,0	29,5	87,5
	Strong	9	9,7	10,2	97,7
	Very Strong	2	2,2	2,3	100,0

Total	88	94,6	100,0
Missing 99	5	5,4	
Total	93	100,0	

**Table 2.47: Statistics**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	15	16,1	16,9	16,9
Weak	29	31,2	32,6	49,4
Moderate	25	26,9	28,1	77,5
Strong	13	14,0	14,6	92,1
Very Strong	7	7,5	7,9	100,0
Total	89	95,7	100,0	
Missing 99	4	4,3		
Total	93	100,0		

**Table 2.48: Data security**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very Weak	15	16,1	16,9	16,9
Weak	24	25,8	27,0	43,8
Moderate	27	29,0	30,3	74,2
Strong	15	16,1	16,9	91,0
Very Strong	8	8,6	9,0	100,0
Total	89	95,7	100,0	
Missing 99	4	4,3		
Total	93	100,0		

## Analyzing

%48,9 of the Spanish students rate strong and very strong in Problem Solving (Table 2.49), %37,8 strong and very strong in Optimization (Table 2.50), %41,1 strong and very strong in Analytical Skills (Table 2.51), %42,2 strong and very strong in Cognitive Ability (Table 2.52). Analyzing skills are higher than Applying Expertise and Technology skills, but still needs improvement.

**Table 2.49: Problem Solving**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	13	14,0	14,4	15,6
	Moderate	32	34,4	35,6	51,1
	Strong	28	30,1	31,1	82,2
	Very Strong	16	17,2	17,8	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

**Table 2.50: Optimization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,2	2,2	2,2
	Weak	22	23,7	24,4	26,7
	Moderate	32	34,4	35,6	62,2
	Strong	23	24,7	25,6	87,8
	Very Strong	11	11,8	12,2	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

**Table 2.51: Analytical Skills**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	7	7,5	7,8	7,8
	Weak	17	18,3	18,9	26,7
	Moderate	29	31,2	32,2	58,9
	Strong	27	29,0	30,0	88,9
	Very Strong	10	10,8	11,1	100,0
	Total	90	96,8	100,0	

Missing	99	3	3,2	
Total		93	100,0	

**Table 2.52: Cognitive Ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	6,5	6,7	6,7
	Weak	17	18,3	18,9	25,6
	Moderate	29	31,2	32,2	57,8
	Strong	27	29,0	30,0	87,8
	Very Strong	11	11,8	12,2	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

## CREATING AND CONCEPTUALIZATION

### Learning and Researching

%57, 1 rate strong and very strong in Life-long learning skills (Table 2.53), %52,9 rate strong and very strong in Knowledge management skills (Table 2.54).

**Table 2.53: Life-long learning**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	13	14,0	14,3	14,3
	Moderate	26	28,0	28,6	42,9
	Strong	31	33,3	34,1	76,9
	Very Strong	21	22,6	23,1	100,0
	Total	91	97,8	100,0	
Missing	99	2	2,2		
Total		93	100,0		

**Table 2.54: Knowledge management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,2	2,3	2,3
	Weak	13	14,0	14,9	17,2
	Moderate	26	28,0	29,9	47,1
	Strong	40	43,0	46,0	93,1
	Very Strong	6	6,5	6,9	100,0
	Total	87	93,5	100,0	
Missing	99	6	6,5		
Total		93	100,0		

### Creating and Innovation

%48,1 rate strong and very strong in Innovating (Table 2.55), %56,7 rate strong and very strong Creativity (Table 2.56), %62,2rate strong and very strong Critical thinking (Table 2.57), %44,7 rate strong and very strong Change management (Table 2.58). Innovating and change management skills are slightly below average.

**Table 2.55: Innovating**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	4,3	4,5	4,5
	Weak	13	14,0	14,8	19,3
	Moderate	28	30,1	31,8	51,1
	Strong	27	29,0	30,7	81,8
	Very Strong	16	17,2	18,2	100,0
	Total	88	94,6	100,0	
Missing	99	5	5,4		
Total		93	100,0		

**Table 2.56: Creativity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	5,4	5,6	5,6
	Weak	9	9,7	10,0	15,6
	Moderate	25	26,9	27,8	43,3
	Strong	30	32,3	33,3	76,7

	Very Strong	21	22,6	23,3	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

**Table 2.57: Critical thinking**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,2	2,2	2,2
	Weak	10	10,8	11,1	13,3
	Moderate	22	23,7	24,4	37,8
	Strong	25	26,9	27,8	65,6
	Very Strong	31	33,3	34,4	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

**Table 2.58: Change management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,2	2,2	2,2
	Weak	17	18,3	18,9	21,1
	Moderate	29	31,2	32,2	53,3
	Strong	26	28,0	28,9	82,2
	Very Strong	16	17,2	17,8	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

### Formulating Strategies

%29,8 rate strong and very strong in Business strategy (Table 2.59), %46 strong and very strong in Abstraction ability (Table 2.60), %43,8 strong and very strong in Managing complexity (Table 2.61). Although all items are below average, Business strategy skill is rated lowest.

**Table 2.59: Business strategy**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,2	2,2	2,2
	Weak	25	26,9	28,1	30,3
	Moderate	36	38,7	40,4	70,8
	Strong	18	19,4	20,2	91,0
	Very Strong	8	8,6	9,0	100,0
	Total	89	95,7	100,0	
Missing	99	4	4,3		
Total		93	100,0		

**Table 2.60: Abstraction ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	3,2	3,4	3,4
	Weak	19	20,4	21,8	25,3
	Moderate	25	26,9	28,7	54,0
	Strong	26	28,0	29,9	83,9
	Very Strong	14	15,1	16,1	100,0
	Total	87	93,5	100,0	
Missing	99	6	6,5		
Total		93	100,0		

**Table 2.61: Managing complexity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,2	2,2	2,2
	Weak	18	19,4	20,2	22,5
	Moderate	30	32,3	33,7	56,2
	Strong	34	36,6	38,2	94,4
	Very Strong	5	5,4	5,6	100,0
	Total	89	95,7	100,0	

Missing	99	4	4,3	
Total		93	100,0	

## ORGANIZING AND EXECUTING

### Planning and Organization

%44,9 rate strong and very strong in Project management (Table 2.62), %58,4 rate strong and very strong in Planning and organizing work (Table 2.63), %45,5 rate strong and very strong in Management ability (Table 2.64).

**Table 2.62: Project management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	22	23,7	24,7	24,7
	Moderate	27	29,0	30,3	55,1
	Strong	31	33,3	34,8	89,9
	Very Strong	9	9,7	10,1	100,0
	Total	89	95,7	100,0	
Missing	99	4	4,3		
Total		93	100,0		

**Table 2.63: Planning and organizing work**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	12	12,9	13,5	14,6
	Moderate	24	25,8	27,0	41,6
	Strong	32	34,4	36,0	77,5
	Very Strong	20	21,5	22,5	100,0
	Total	89	95,7	100,0	
Missing	99	4	4,3		
Total		93	100,0		

**Table 2.64: Management ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	16	17,2	18,2	19,3
	Moderate	31	33,3	35,2	54,5
	Strong	27	29,0	30,7	85,2
	Very Strong	13	14,0	14,8	100,0
	Total	88	94,6	100,0	
Missing	99	5	5,4		
Total		93	100,0		

**Delivering Results and Meeting Customer Expectation**

%41,1 of the Spanish students rate their Customer orientation skills as strong and very strong (Table 2.65) and %47,2 in Customer relationship management (Table 2.66).

**Table 2.65: Customer orientation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	20	21,5	22,2	23,3
	Moderate	32	34,4	35,6	58,9
	Strong	20	21,5	22,2	81,1
	Very Strong	17	18,3	18,9	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

**Table 2.66: Customer relationship management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	18	19,4	20,2	20,2
	Moderate	29	31,2	32,6	52,8
	Strong	23	24,7	25,8	78,7

	Very Strong	19	20,4	21,3	100,0
	Total	89	95,7	100,0	
Missing	99	4	4,3		
Total		93	100,0		

### Following Instructions and Procedures

%33,3 rate strong and very strong Legislation awareness skill (Table 2.67), %40,4 strong and very strong in Safety awareness (Table 2.68), %65,6 strong very strong in Individual responsibility (Table 2.69). Spanish Students lack legislation awareness and safety awareness skills.

**Table 2.67: Legislation awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	7	7,5	8,0	8,0
	Weak	28	30,1	32,2	40,2
	Moderate	30	32,3	34,5	74,7
	Strong	14	15,1	16,1	90,8
	Very Strong	8	8,6	9,2	100,0
	Total	87	93,5	100,0	
Missing	99	6	6,5		
Total		93	100,0		

**Table 2.68: Safety awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	3,2	3,4	3,4
	Weak	17	18,3	19,1	22,5
	Moderate	33	35,5	37,1	59,6
	Strong	23	24,7	25,8	85,4
	Very Strong	13	14,0	14,6	100,0
	Total	89	95,7	100,0	
Missing	99	4	4,3		
Total		93	100,0		

**Table 2.69: Individual responsibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	6	6,5	6,7	7,8
	Moderate	24	25,8	26,7	34,4
	Strong	28	30,1	31,1	65,6
	Very Strong	31	33,3	34,4	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

**ADAPTING AND COPING****Adopting and Responding to Change**

%47,2 rate strong and very strong in Work in interdisciplinary environments (Table 2.70), %48,3 rate strong and very strong in Intercultural competency (Table 2.71), %70,5 rate strong and very strong in Flexibility (Table 2.72), %67,8 rate strong and very strong in Adaptability and ability to change mind-set (Table 2.73).

**Table 2.70: Work in interdisciplinary environments**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	18	19,4	20,2	20,2
	Moderate	29	31,2	32,6	52,8
	Strong	21	22,6	23,6	76,4
	Very Strong	21	22,6	23,6	100,0
	Total	89	95,7	100,0	
Missing	99	4	4,3		
Total		93	100,0		

**Table 2.71: Intercultural competency**

		Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	Very Weak	3	3,2	3,4	3,4
	Weak	16	17,2	18,0	21,3
	Moderate	27	29,0	30,3	51,7
	Strong	21	22,6	23,6	75,3
	Very Strong	22	23,7	24,7	100,0
	Total	89	95,7	100,0	
Missing	99	4	4,3		
Total		93	100,0		

**Table 2.72: Flexibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	11	11,8	12,5	13,6
	Moderate	14	15,1	15,9	29,5
	Strong	37	39,8	42,0	71,6
	Very Strong	25	26,9	28,4	100,0
	Total	88	94,6	100,0	
Missing	99	5	5,4		
Total		93	100,0		

**Table 2.73: Adaptability and ability to change mind-set**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	2,2	2,2	2,2
	Weak	9	9,7	10,0	12,2
	Moderate	18	19,4	20,0	32,2
	Strong	34	36,6	37,8	70,0
	Very Strong	27	29,0	30,0	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

**Persuading and Influencing**

%58,4 of the Spanish students rate strong and very strong in Work Life Balance skill (Table 2.74).

**Table 2.74: Work-life Balance**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	3,2	3,4	3,4
	Weak	10	10,8	11,2	14,6
	Moderate	24	25,8	27,0	41,6
	Strong	30	32,3	33,7	75,3
	Very Strong	22	23,7	24,7	100,0
	Total	89	95,7	100,0	
Missing	99	4	4,3		
Total		93	100,0		

## ENTERPRISING AND PERFORMING

### Achieving Personal Work Goals and Objectives

%56 of the Spanish students rate strong and very strong in Self-management and organization (Table 2.75).

**Table 2.75: Self-management and organization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,1	1,1	1,1
	Weak	11	11,8	12,1	13,2
	Moderate	28	30,1	30,8	44,0
	Strong	30	32,3	33,0	76,9
	Very Strong	21	22,6	23,1	100,0
	Total	91	97,8	100,0	
Missing	99	2	2,2		
Total		93	100,0		

## Entrepreneurial and Commercial Thinking

%47,8 of the Spanish students rate strong and very strong in Business model understanding (Table 2.76) and %50,6 rate strong and very strong in Entrepreneurship (Table 2.77)

**Table 2.76: Business model understanding**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	3,2	3,3	3,3
	Weak	12	12,9	13,3	16,7
	Moderate	32	34,4	35,6	52,2
	Strong	27	29,0	30,0	82,2
	Very Strong	16	17,2	17,8	100,0
	Total	90	96,8	100,0	
Missing	99	3	3,2		
Total		93	100,0		

**Table 2.77: Entrepreneurship**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	4,3	4,5	4,5
	Weak	7	7,5	7,9	12,4
	Moderate	33	35,5	37,1	49,4
	Strong	26	28,0	29,2	78,7
	Very Strong	19	20,4	21,3	100,0
	Total	89	95,7	100,0	
Missing	99	4	4,3		
Total		93	100,0		

## NEED ANALYSIS REPORT – TURKEY

### 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. Sectoral 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.

Table 1: Basic workforce indicators, 2016, 2017\*

	Total		Male		Female	
	2016	2017	2016	2017	2016	2017
<b>15 and over</b>						
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%
<b>15-64 age group</b>						
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%
<b>Young population (15-24 years)</b>						
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%
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Source: TUIK, Sayı: 27699, 23 Mart 2018, Saat: 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.

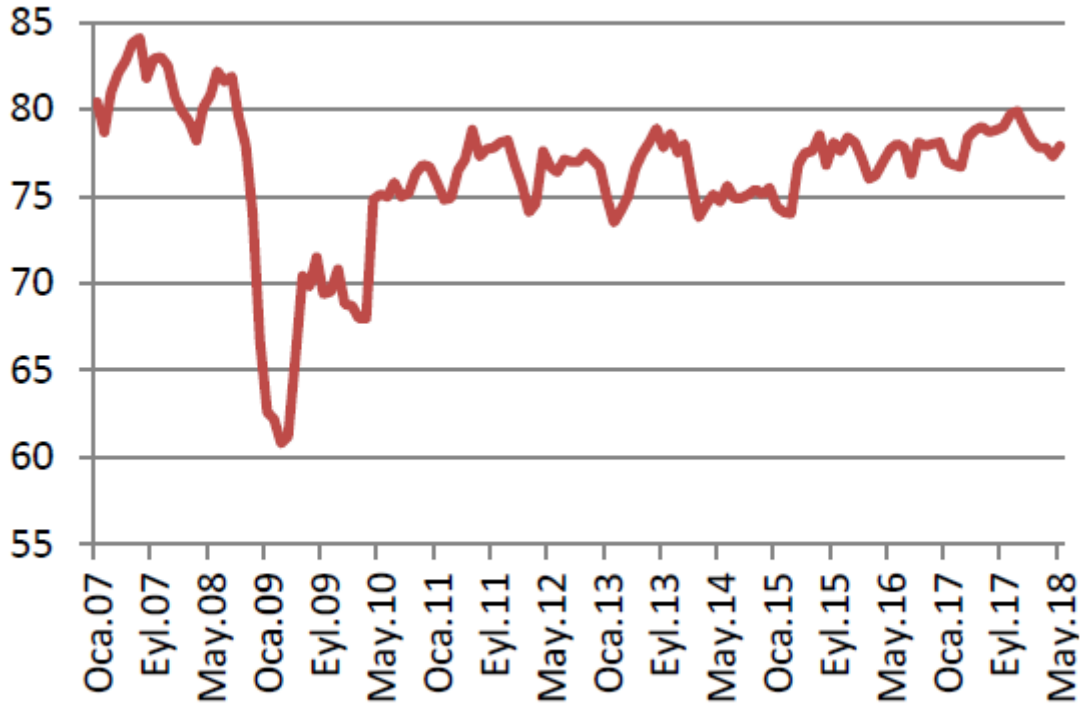
In the first quarter of 2018, the labor force participation rate (LFPR) increased by 0.2 points compared to the previous year as 52.4% (33.4% for women and 71.8% for men). Non-agricultural employment increased by 4.6% compared to the same period of the previous year and agricultural employment decreased 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. KALKINMA BAKANLIĞI, İŞGÜCÜ PİYASASINDAKİ GELİŞMELERİN MAKRO ANALİZİ, 2018)

## MACROECONOMIC OUTLOOK AND DEVELOPMENTS IN EMPLOYMENT

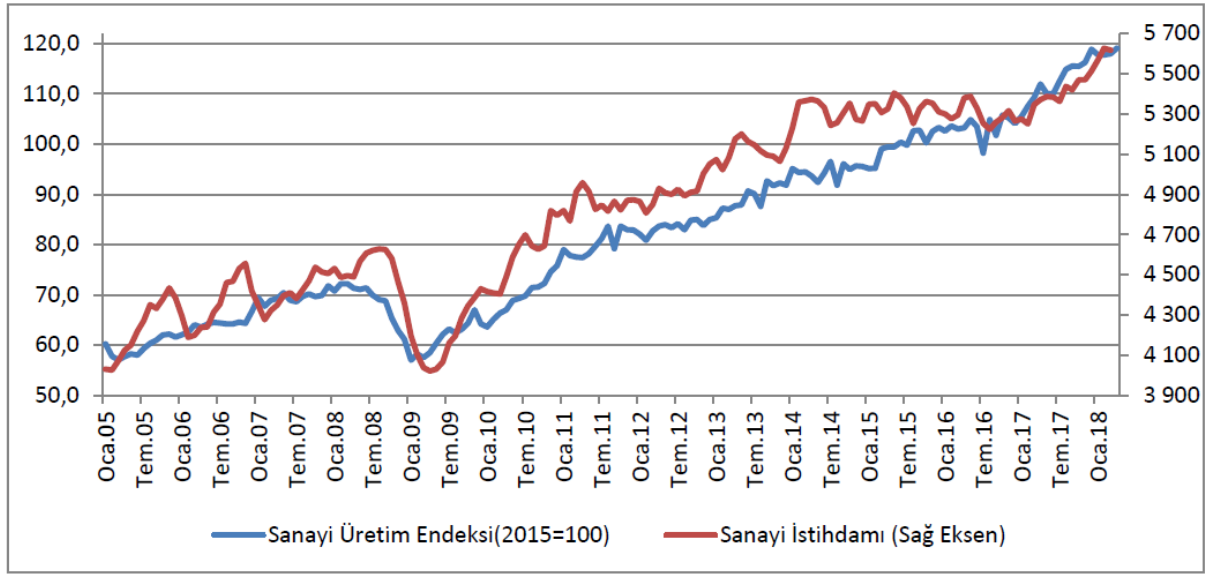
The capacity utilization has been recorded as 77.9 percent in May 2018, 0,9 points higher compared to the same period of the previous year (Figure 2). The industrial production index (MD), which displayed an upward trend since the last quarter of 2016, increased by 1.1 percentage points in April 2018 compared to the previous month. It is observed that the developments in the industrial production index reflected the industrial employment in March 2018 (Figure 3).

**Şekil 2. Kapasite Kullanım Oranları (%)**



Kaynak: TCMB

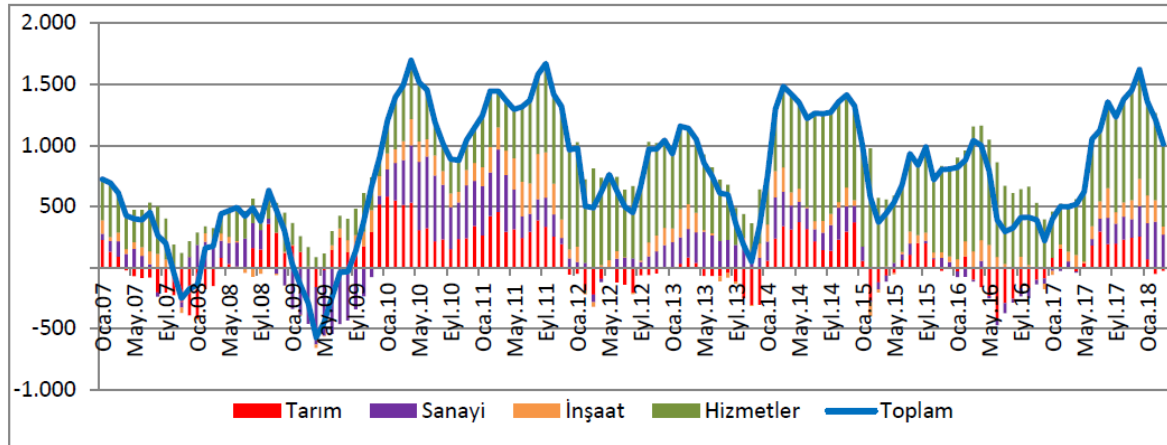
Şekil 3: Sanayi İstihdamı ve Sanayi Üretim Endeksi (MD)



Kaynak: TÜİK

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 (Figure 4).

Şekil 4: Sektörlerin Toplam Net İlave İstihdama Katkıları (Yıllık, Bin Kişi)



Kaynak: TÜİK

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).

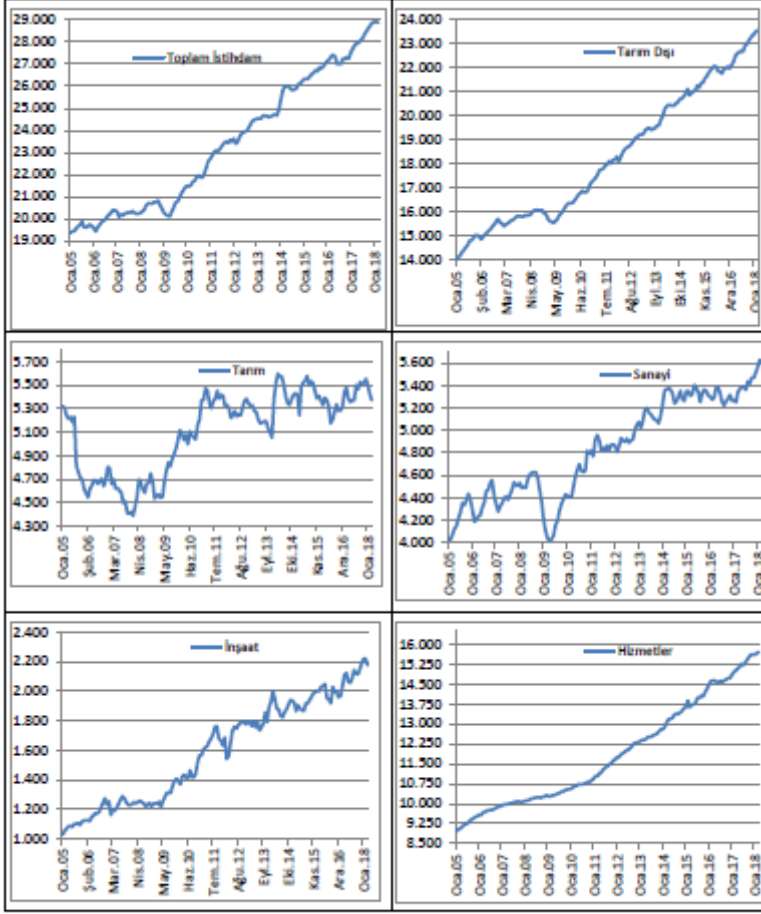
### **Employment**

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 and by industry and agriculture which fall far behind service sector (T.C. Kalkınma Bakanlığı, 2018).

Şekil 5: Sektörel İstihdamdaki Gelişmeler (MD, Bin Kişi)

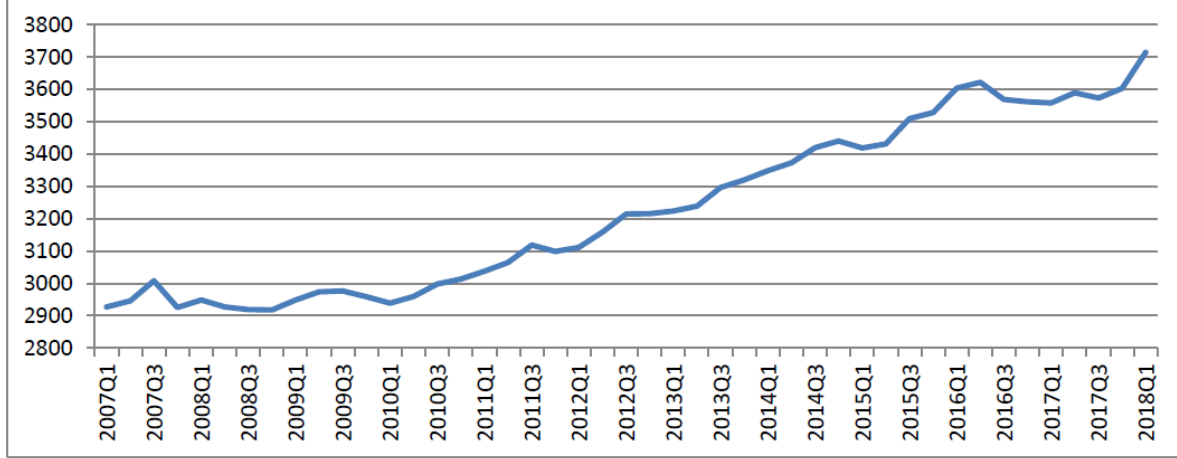


Kaynak: TÜİK

## 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 (Figure 7).

Şekil 7: Toplam Kamu İstihdamı



Kaynak: TÜİK

When the developments in sectoral 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 (Figure 8).

### 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 10).



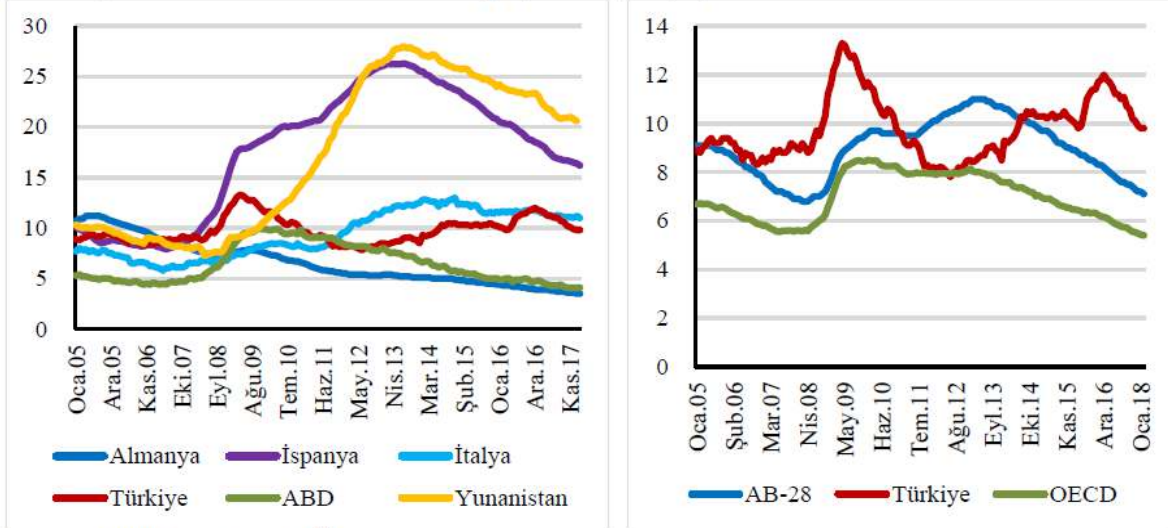
Kaynak: TÜİK

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.

Şekil 12: İşsizlik Oranlarının Uluslararası Karşılaştırması (MD, %)



Kaynak: EUROSTAT, OECD, TÜİK

### New Established and Stopped-Functioning Company Numbers

	Şirket Türleri					Genel Toplam
	Anonim	Kollektif	Komandit	Limited	Kooperatif	
<b>Kurulan</b>	7.836	7	3	45.209	653	53.708
<b>Kapanan</b>	1132	27	1	5.169	594	6.923

Kaynak:

TOBB,

2018,

<https://www.tobb.org.tr/BilgiErisimMudurlugu/Sayfalar/KurulanKapananSirketistatistikleri.php>, 19/09/2018, saat 12:00

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 suggest a dynamic business life in Turkey, some new entrepreneurs are being established as well as some are stopped. However, net total of companies is increasing.

**Education System in Turkey (BU BÖLÜM TÜRK EĞİTİM SİSTEMİNİN GENEL YAPISI, Yrd. Doç. Dr. Gülay ASLAN, 2013 (TÜRK EĞİTİM SİSTEMİ VE OKUL YÖNETİMİ, Editör: Aycan Çiçek Sağlam, 2013) DEN ALINMIŞTIR)**

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 (Lise)**

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 highschool

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

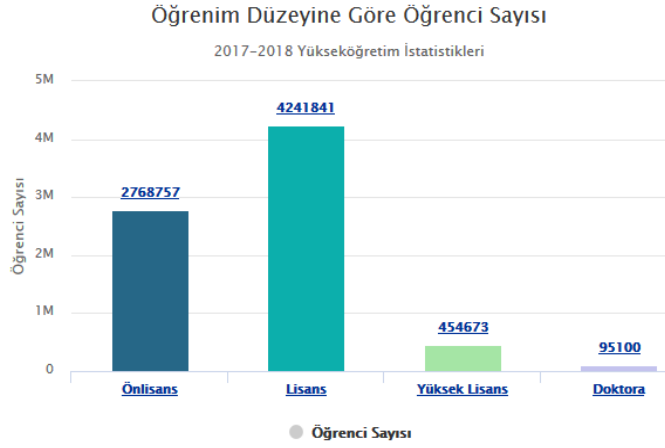
- Open Education High School (Occupation)

High Schools Attached to Other Ministries

- Conservatory
- Police College

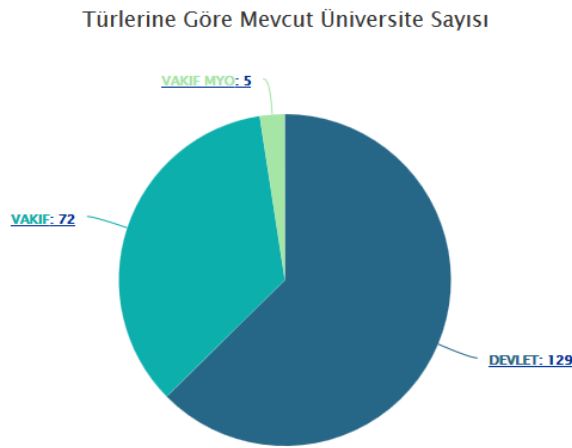
### **Higher Education System in Turkey**

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 (Figure X).



Yök, <https://istatistik.yok.gov.tr/>, 18.09.2018; saat 12:00.

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 (Figure x).



Yök, <https://istatistik.yok.gov.tr/>, 18.09.2018; saat 12:00.

## STUDENTS QUESTIONNAIRE-TURKEY Demographics

Participants participated the research are %46,8 male and %53,2 (Table 10.1), all the participants are graduates (Table 10.2). %27,5 of the participants work in Manufacturing, %35,8 in Education and %36,7 in Service sectors (Table 10.3).

**Table 10.1: Gender**

Frequency	Percent	Valid Percent	Cumulative Percent
-----------	---------	---------------	--------------------

Valid	Female	58	52,7	53,2	53,2
	Male	51	46,4	46,8	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.2: Educational background**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Graduate	109	99,1	100,0	100,0
Missing	System	1	,9		
Total		110	100,0		

**Table 10.3: Sector**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Manufacturing	30	27,3	27,5	27,5
	Education	39	35,5	35,8	63,3
	Service	40	36,4	36,7	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

### Business trends

%13 of the participants reported that Total revenue is decreasing, %50 Total revenue increasing

%7,4 No Change, %27,8 Dont know, %1,9 Not applicable (Table 10.4). %18,3 of the participants reported that Number of employees decreasing, %56,9 Number of employees increasing, %7,3No Change, %17,4 Not Applicable in the sector they want to work (Table 10.5).

%1,8 of the participants reported that it is Very Difficult to find a job in the sector they want to work, %22,9 Difficult, %55 Moderate, %17,4 Easy, %2,8 Very Easy (Table 10.6).

%1,8 of the participants reported that if they find a job in the sector they want to work, to find a another job in another sector is Very Difficult, %18,3 Difficult, %47,7 Moderate, %27,5 Easy, %4,6 Very Easy (Table 10.7).

**Table 10.4: 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		

**Table 10.5: 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		

**Table 10.6: 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		

**Table 10.7: 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 Eighth 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

**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 suggest that %55,1 of the Turkish participants evaluate themselves as moderate to strong level of decision making (Table 10.8) and %71,6 strong to very strong level of taking responsibility (Table 10.9).

**Table 10.8: Decision making**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	6	5,5	5,5	6,4
	Moderate	42	38,2	38,5	45,0
	Strong	45	40,9	41,3	86,2
	Very Strong	15	13,6	13,8	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.9: Taking responsibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	6	5,5	5,5	6,4
	Moderate	24	21,8	22,0	28,4
	Strong	52	47,3	47,7	76,1
	Very Strong	26	23,6	23,9	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

### 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 (Table 10.10)

**Table 10.10: Leadership Skills**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	8	7,3	7,4	7,4
	Moderate	33	30,0	30,6	38,0
	Strong	44	40,0	40,7	78,7
	Very Strong	23	20,9	21,3	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

## 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 %59,6 reported strong and very strong team work skills (Table 10.11), %66,9 strong and very strong in Colobrating with Others (Table 10.12) and %71,6 strong and very strong in Communicating with people skills (Table 10.13). Turkish participants evaluate themselves high in working with people dimension.

**Table 10.11: Team work**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	12	10,9	11,0	11,9
	Moderate	31	28,2	28,4	40,4

	Strong	48	43,6	44,0	84,4
	Very Strong	17	15,5	15,6	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.12: Collaborating with others**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	7	6,4	6,4	6,4
	Moderate	29	26,4	26,6	33,0
	Strong	54	49,1	49,5	82,6
	Very Strong	19	17,3	17,4	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.13: Communicating with people**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	2	1,8	1,8	2,8
	Moderate	28	25,5	25,7	28,4
	Strong	51	46,4	46,8	75,2
	Very Strong	27	24,5	24,8	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

### **Adhering to Principles and Values**

Turkish participants evaluate themselves high in Respecting Ethics with %76,9 (Table 10.14) and Environmental Awareness with %73,8 (Table 10.14) strong and very strong ratings. However, compared to other skills, awareness of ergonomics rated lower, only %49,5 reported strong and very strong.

**Table 10.14: Respecting ethics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	2	1,8	1,9	2,8
	Moderate	22	20,0	20,4	23,1
	Strong	56	50,9	51,9	75,0
	Very Strong	27	24,5	25,0	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.15: Environmental awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	4	3,6	3,7	3,7
	Moderate	24	21,8	22,4	26,2
	Strong	50	45,5	46,7	72,9
	Very Strong	29	26,4	27,1	100,0
	Total	107	97,3	100,0	
Missing	System	3	2,7		
Total		110	100,0		

**Table 10.16: Awareness of ergonomics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	1,0	1,0
	Weak	11	10,0	10,7	11,7
	Moderate	40	36,4	38,8	50,5
	Strong	40	36,4	38,8	89,3
	Very Strong	11	10,0	10,7	100,0
	Total	103	93,6	100,0	
Missing	System	7	6,4		
Total		110	100,0		

**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 (Table 10.17), %51,3 in creating business networks (Table 10.18), and %54,1 in maintaining customer relationships (Table 10.19).

**Table 10.17: Compromising**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	5	4,5	4,6	4,6
	Moderate	26	23,6	24,1	28,7
	Strong	59	53,6	54,6	83,3
	Very Strong	18	16,4	16,7	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.18: Creating business networks**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	10	9,1	9,2	10,1
	Moderate	42	38,2	38,5	48,6
	Strong	42	38,2	38,5	87,2
	Very Strong	14	12,7	12,8	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.19: Maintaining customer relationships**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	1,8	1,8	1,8
	Weak	7	6,4	6,4	8,3
	Moderate	41	37,3	37,6	45,9
	Strong	45	40,9	41,3	87,2
	Very Strong	14	12,7	12,8	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Persuading and Influencing**

%49,6 of the Turkish participants rated themselves strong and very strong in negotiating skills (Table 10.20) whereas %71,3 in emotional intelligence skills (Table 10.21).

**Table 10.20: Negotiating**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	7	6,4	6,4	6,4
	Weak	25	22,7	22,9	29,4
	Moderate	23	20,9	21,1	50,5
	Strong	33	30,0	30,3	80,7
	Very Strong	21	19,1	19,3	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.21: Emotional intelligence**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	8	7,3	7,4	8,3
	Moderate	22	20,0	20,4	28,7
	Strong	47	42,7	43,5	72,2
	Very Strong	30	27,3	27,8	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		

Total	110	100,0		
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### Presenting and Communicating Information

Turkish participant rate themselves with strong and very strong with %53,7 in presenting and communication ability (Table 10.22).

**Table 10.22: Presenting and communication ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	11	10,0	10,2	11,1
	Moderate	38	34,5	35,2	46,3
	Strong	41	37,3	38,0	84,3
	Very Strong	17	15,5	15,7	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

## 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 (Table 10.23) and %55 strong and very strong in literacy skills (Table 10.24).

**Table 10.23: Targeted/Technical Communication**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	10	9,1	9,2	10,1
	Moderate	47	42,7	43,1	53,2

	Strong	44	40,0	40,4	93,6
	Very Strong	7	6,4	6,4	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.24: Literacy (Reporting, writing plans, writing letters)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	2,7	2,8	2,8
	Weak	14	12,7	12,8	15,6
	Moderate	32	29,1	29,4	45,0
	Strong	41	37,3	37,6	82,6
	Very Strong	19	17,3	17,4	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

### 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 (Table 10.25), Economics %36,7 strong and very strong (Table 10.26), Extract business value from social media %42,6 strong and very strong (Table 10.27), Service orientation/product service offerings %47,7 strong and very strong (Table 10.28), Business process management %42,2, strong and very strong (Table 10.29), Business change management %24,8 strong and very strong (Table 10.30), Understand and coordinate workflows %56,4 strong and very strong (Table 10.31), Network security %28,7 strong and very strong (Table 10.32), IT architectures %19,2 strong only (Table 10.33), Machine learning %33,9 strong and very strong (Table 10.34), System development %32,1 strong and very strong (Table 10.35), Integrating heterogeneous technologies %33 strong and very strong (Table 10.36), Mobile technologies %47,2 strong and very strong (Table 10.37), Sensors/embedded systems %31,5 strong and very strong (Table 10.38), Network technology/M2M communication %26,8 strong and very strong (Table 10.39), Robotics/Artificial intelligence %19,5 strong and very strong (Table 10.40), Predictive maintenance %32,2 strong only (Table 10.41), Modelling and programming %26,6 strong and very strong (Table 10.42), Big data/Data analysis and interpretation %24,8 (Table 10.43), Cloud computing/architectures %20,2 strong and very strong (Table 10.44), In-memory DBs

%22,1 strong and very strong (Table 10.45), Statistics %29,4 strong and very strong (Table 10.46) and Data Security %28,4 strong and very strong (Table 10.47).

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

**Table 10.25: IT and technology affinity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	9	8,2	8,3	8,3
	Moderate	38	34,5	35,2	43,5
	Strong	46	41,8	42,6	86,1
	Very Strong	15	13,6	13,9	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.26: Economics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	3,6	3,7	3,7
	Weak	14	12,7	12,8	16,5
	Moderate	51	46,4	46,8	63,3
	Strong	31	28,2	28,4	91,7
	Very Strong	9	8,2	8,3	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.27: Extract business value from social media**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	1,8	1,9	1,9
	Weak	17	15,5	15,7	17,6
	Moderate	43	39,1	39,8	57,4
	Strong	31	28,2	28,7	86,1
	Very Strong	15	13,6	13,9	100,0

	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.28: Service orientation/product service offerings**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	3,6	3,7	3,7
	Weak	10	9,1	9,2	12,8
	Moderate	43	39,1	39,4	52,3
	Strong	43	39,1	39,4	91,7
	Very Strong	9	8,2	8,3	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.29: Business process management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	2,7	2,8	2,8
	Weak	10	9,1	9,2	11,9
	Moderate	50	45,5	45,9	57,8
	Strong	37	33,6	33,9	91,7
	Very Strong	9	8,2	8,3	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.30: Business change management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	5,5	5,5	5,5
	Weak	20	18,2	18,3	23,9
	Moderate	56	50,9	51,4	75,2
	Strong	21	19,1	19,3	94,5
	Very Strong	6	5,5	5,5	100,0
	Total	109	99,1	100,0	

Missing	System	1	,9		
Total		110	100,0		

**Table 10.31: Understand and coordinate workflows**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	12	10,9	11,1	12,0
	Moderate	34	30,9	31,5	43,5
	Strong	48	43,6	44,4	88,0
	Very Strong	13	11,8	12,0	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.32: Network security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	5,5	5,6	5,6
	Weak	27	24,5	25,0	30,6
	Moderate	44	40,0	40,7	71,3
	Strong	27	24,5	25,0	96,3
	Very Strong	4	3,6	3,7	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.33: IT architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	4,5	4,6	4,6
	Weak	31	28,2	28,4	33,0
	Moderate	52	47,3	47,7	80,7
	Strong	19	17,3	17,4	98,2
	Very Strong	2	1,8	1,8	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		

Total		110	100,0		
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**Table 10.34: Machine learning**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	3,6	3,7	3,7
	Weak	22	20,0	20,2	23,9
	Moderate	46	41,8	42,2	66,1
	Strong	30	27,3	27,5	93,6
	Very Strong	7	6,4	6,4	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.35: System development**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	3,6	3,7	3,7
	Weak	27	24,5	24,8	28,4
	Moderate	43	39,1	39,4	67,9
	Strong	31	28,2	28,4	96,3
	Very Strong	4	3,6	3,7	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.36: Integrating heterogeneous technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	5,5	5,5	5,5
	Weak	25	22,7	22,9	28,4
	Moderate	42	38,2	38,5	67,0
	Strong	30	27,3	27,5	94,5
	Very Strong	6	5,5	5,5	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.37: Mobile technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	2,7	2,8	2,8
	Weak	18	16,4	16,7	19,4
	Moderate	36	32,7	33,3	52,8
	Strong	40	36,4	37,0	89,8
	Very Strong	11	10,0	10,2	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.38: Sensors/embedded systems**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	10	9,1	9,3	9,3
	Weak	27	24,5	25,0	34,3
	Moderate	37	33,6	34,3	68,5
	Strong	28	25,5	25,9	94,4
	Very Strong	6	5,5	5,6	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.39: Network technology/M2M communication**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	13	11,8	12,0	12,0
	Weak	25	22,7	23,1	35,2
	Moderate	41	37,3	38,0	73,1
	Strong	24	21,8	22,2	95,4
	Very Strong	5	4,5	4,6	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.40: Robotics/Artificial intelligence**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	9	8,2	8,3	8,3
	Weak	33	30,0	30,6	38,9
	Moderate	45	40,9	41,7	80,6
	Strong	18	16,4	16,7	97,2
	Very Strong	3	2,7	2,8	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.41: Predictive maintenance**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	9	8,2	8,3	8,3
	Weak	22	20,0	20,2	28,4
	Moderate	43	39,1	39,4	67,9
	Strong	32	29,1	29,4	97,2
	Very Strong	3	2,7	2,8	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.42: Modelling and programming**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	9	8,2	8,3	8,3
	Weak	28	25,5	25,7	33,9
	Moderate	43	39,1	39,4	73,4
	Strong	25	22,7	22,9	96,3
	Very Strong	4	3,6	3,7	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.43: Big data/Data analysis and interpretation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	13	11,8	11,9	11,9
	Weak	30	27,3	27,5	39,4
	Moderate	39	35,5	35,8	75,2
	Strong	22	20,0	20,2	95,4
	Very Strong	5	4,5	4,6	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.44: Cloud computing/architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	17	15,5	15,6	15,6
	Weak	34	30,9	31,2	46,8
	Moderate	36	32,7	33,0	79,8
	Strong	19	17,3	17,4	97,2
	Very Strong	3	2,7	2,8	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.45: In-memory DBs**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	19	17,3	17,4	17,4
	Weak	29	26,4	26,6	44,0
	Moderate	37	33,6	33,9	78,0
	Strong	21	19,1	19,3	97,2
	Very Strong	3	2,7	2,8	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.46: Statistics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	5,5	5,5	5,5
	Weak	24	21,8	22,0	27,5
	Moderate	47	42,7	43,1	70,6
	Strong	22	20,0	20,2	90,8
	Very Strong	10	9,1	9,2	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.47: Data security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	9	8,2	8,3	8,3
	Weak	30	27,3	27,5	35,8
	Moderate	39	35,5	35,8	71,6
	Strong	24	21,8	22,0	93,6
	Very Strong	7	6,4	6,4	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

## Analyzing

Analyzing sub-dimension is composed of 4 items. Participants rated Problem Solving %58,9 strong and very strong (Table 10.48), Optimization %33,3 (Table 10.49), Analytical Skills %45,8 (Table 10.50) and Cognitive Ability %46,5 (Table 10.51). Optimization and analytical skills are below average.

**Table 10.48: Problem Solving**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	4	3,6	3,7	4,7
	Moderate	39	35,5	36,4	41,1
	Strong	48	43,6	44,9	86,0

	Very Strong	15	13,6	14,0	100,0
	Total	107	97,3	100,0	
Missing	System	3	2,7		
Total		110	100,0		

**Table 10.49: Optimization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	4	3,6	3,7	3,7
	Weak	9	8,2	8,3	12,0
	Moderate	59	53,6	54,6	66,7
	Strong	32	29,1	29,6	96,3
	Very Strong	4	3,6	3,7	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.50: Analytical Skills**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	2,7	2,8	2,8
	Weak	9	8,2	8,3	11,0
	Moderate	47	42,7	43,1	54,1
	Strong	43	39,1	39,4	93,6
	Very Strong	7	6,4	6,4	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.51: Cognitive Ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	8	7,3	7,4	8,3
	Moderate	38	34,5	35,2	43,5
	Strong	45	40,9	41,7	85,2
	Very Strong	16	14,5	14,8	100,0

Total		108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

## 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 (Table 10.52) and %60,2 strong and very strong in knowledge management (Table 10.53).

**Table 10.52: Life-long learning**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	6	5,5	5,6	6,5
	Moderate	26	23,6	24,1	30,6
	Strong	48	43,6	44,4	75,0
	Very Strong	27	24,5	25,0	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.53: Knowledge management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	11	10,0	10,2	11,1
	Moderate	31	28,2	28,7	39,8

	Strong	54	49,1	50,0	89,8
	Very Strong	11	10,0	10,2	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

### Creating and Innovation

Participants rated themselves %44,9 strong and very strong in Innovating (Table 10.54), %56 strong and very strong in creativity (Table 10.55), %63,9 strong and very strong in Critical Thinking (Table 10.56) and %45 strong and very strong in Change Management (Table 10.57).

**Table 10.54: Innovating**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	2,7	2,8	2,8
	Weak	11	10,0	10,1	12,8
	Moderate	46	41,8	42,2	55,0
	Strong	37	33,6	33,9	89,0
	Very Strong	12	10,9	11,0	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.55: Creativity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	4,5	4,6	4,6
	Weak	5	4,5	4,6	9,2
	Moderate	38	34,5	34,9	44,0
	Strong	39	35,5	35,8	79,8
	Very Strong	22	20,0	20,2	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.56: Critical thinking**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	5	4,5	4,6	4,6
	Moderate	34	30,9	31,5	36,1
	Strong	42	38,2	38,9	75,0
	Very Strong	27	24,5	25,0	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.57: Change management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	12	10,9	11,0	11,9
	Moderate	47	42,7	43,1	55,0
	Strong	38	34,5	34,9	89,9
	Very Strong	11	10,0	10,1	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Formulating Strategies**

Business Strategy %44,9 strong and very strong (Table 10.58), Abstract Ability %51,3 strong and very strong (Table 10.59), and Managing Complexity %48,6 strong and very strong (Table 10.60). Turkish participants rated low in formulating strategies.

**Table 10.58: Business strategy**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	2,7	2,8	2,8
	Weak	17	15,5	15,6	18,3
	Moderate	40	36,4	36,7	55,0

	Strong	37	33,6	33,9	89,0
	Very Strong	12	10,9	11,0	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.59: Abstraction ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	9	8,2	8,3	9,2
	Moderate	43	39,1	39,4	48,6
	Strong	31	28,2	28,4	77,1
	Very Strong	25	22,7	22,9	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.60: Managing complexity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	1,8	1,9	1,9
	Weak	9	8,2	8,4	10,3
	Moderate	44	40,0	41,1	51,4
	Strong	35	31,8	32,7	84,1
	Very Strong	17	15,5	15,9	100,0
	Total	107	97,3	100,0	
Missing	System	3	2,7		
Total		110	100,0		

## 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 (Table 10.61), Planning and organizing work %53,2 strong and very strong (Table 10.62) and % 55 strong and very strong Management Ability (Table 10.63).

**Table 10.61: Project management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	1,8	1,8	1,8
	Weak	10	9,1	9,2	11,0
	Moderate	46	41,8	42,2	53,2
	Strong	38	34,5	34,9	88,1
	Very Strong	13	11,8	11,9	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.62: Planning and organizing work**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	2,7	2,8	2,8
	Weak	10	9,1	9,2	11,9
	Moderate	38	34,5	34,9	46,8
	Strong	45	40,9	41,3	88,1
	Very Strong	13	11,8	11,9	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.63: Management ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	2,7	2,8	2,8

	Weak	11	10,0	10,1	12,8
	Moderate	35	31,8	32,1	45,0
	Strong	43	39,1	39,4	84,4
	Very Strong	17	15,5	15,6	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

### Delivering Results and Meeting Customer Expectation

Participants rated their Customer Orientation skills %46,5 strong and very strong (Table 10.64), Customer Relationship Management skills %51,9 strong and very strong (Table 10.65)

**Table 10.64: Customer orientation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	5,5	5,6	5,6
	Weak	8	7,3	7,4	13,0
	Moderate	33	30,0	30,6	43,5
	Strong	45	40,9	41,7	85,2
	Very Strong	16	14,5	14,8	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.65: Customer relationship management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	4,5	4,7	4,7
	Weak	9	8,2	8,5	13,2
	Moderate	37	33,6	34,9	48,1
	Strong	42	38,2	39,6	87,7
	Very Strong	13	11,8	12,3	100,0
	Total	106	96,4	100,0	
Missing	System	4	3,6		
Total		110	100,0		

Following Instructions and Procedures

Legislation awareness skills %40,3 strong and very strong (Table 10.66), Safety awareness skills %55,1 strong and very strong (Table 10.67) and Individual responsibility skills %70,4 strong and very strong (Table 10.68).

**Table 10.66: Legislation awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	5,5	5,5	5,5
	Weak	14	12,7	12,8	18,3
	Moderate	45	40,9	41,3	59,6
	Strong	37	33,6	33,9	93,6
	Very Strong	7	6,4	6,4	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.67: Safety awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	2,7	2,8	2,8
	Weak	11	10,0	10,1	12,8
	Moderate	35	31,8	32,1	45,0
	Strong	49	44,5	45,0	89,9
	Very Strong	11	10,0	10,1	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.68: Individual responsibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	5	4,5	4,6	5,6
	Moderate	26	23,6	24,1	29,6
	Strong	56	50,9	51,9	81,5
	Very Strong	20	18,2	18,5	100,0
	Total	108	98,2	100,0	

Missing	System	2	1,8		
Total		110	100,0		

## 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 (Table 10.69), Intercultural competency skills %50 strong and very strong (Table 10.70), Flexibility skills %50,4 strong and very strong (Table 10.71) and Adaptability and ability to change mind-set skills %63,2 strong and very strong (Table 10.72).

**Table 10.69: Work in interdisciplinary environments**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	2	1,8	1,8	2,8
	Moderate	41	37,3	37,6	40,4
	Strong	54	49,1	49,5	89,9
	Very Strong	11	10,0	10,1	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.70: Intercultural competency**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	8	7,3	7,4	8,3
	Moderate	45	40,9	41,7	50,0
	Strong	38	34,5	35,2	85,2
	Very Strong	16	14,5	14,8	100,0

	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.71: Flexibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	7	6,4	6,4	7,3
	Moderate	46	41,8	42,2	49,5
	Strong	41	37,3	37,6	87,2
	Very Strong	14	12,7	12,8	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

**Table 10.72: Adaptability and ability to change mind-set**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	9	8,2	8,5	9,4
	Moderate	29	26,4	27,4	36,8
	Strong	50	45,5	47,2	84,0
	Very Strong	17	15,5	16,0	100,0
	Total	106	96,4	100,0	
Missing	System	4	3,6		
Total		110	100,0		

### Persuading and Influencing

Participants rated their Work Life Balance skills %50 strong and very strong (Table 10.73).

**Table 10.73: Work-life Balance**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	,9	,9	,9
	Weak	9	8,2	8,3	9,3

	Moderate	44	40,0	40,7	50,0
	Strong	43	39,1	39,8	89,8
	Very Strong	11	10,0	10,2	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

## 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 (Table 10.74).

**Table 10.74: Self-management and organization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	5	4,5	4,6	4,6
	Moderate	26	23,6	23,9	28,4
	Strong	48	43,6	44,0	72,5
	Very Strong	30	27,3	27,5	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

### Entrepreneurial and Commercial Thinking

Participants rated their Business model understanding skills %52,8 strong and very strong (Table 10.75) and Entrepreneurship skills %55 strong and very strong (Table 10.76).

**Table 10.75: Business model understanding**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	2,7	2,8	2,8
	Weak	11	10,0	10,2	13,0
	Moderate	37	33,6	34,3	47,2
	Strong	42	38,2	38,9	86,1
	Very Strong	15	13,6	13,9	100,0
	Total	108	98,2	100,0	
Missing	System	2	1,8		
Total		110	100,0		

**Table 10.76: Entrepreneurship**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	1,8	1,8	1,8
	Weak	10	9,1	9,2	11,0
	Moderate	37	33,6	33,9	45,0
	Strong	37	33,6	33,9	78,9
	Very Strong	23	20,9	21,1	100,0
	Total	109	99,1	100,0	
Missing	System	1	,9		
Total		110	100,0		

## EMPLOYEES QUESTIONNAIRE-TURKEY

### Demographics

Participants participated the research are %33,3 male and %66,7 female (Table 9.1), %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

(Table 9.2). %28,3 of the participants work in Manufacturing, %36,7 in Education and %35 in Service sectors (Table 9.3). %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 (Table 9.4). Participants are working years as a professional range from 01-39 years, average Professional working years is 9,88 years (Table 9.5), participants are working for the same company ranging from 1-20 years, average is 4,37 years (Table 9.6).

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

**Table 9.1: Gender**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	20	33,3	33,3	33,3
	Male	40	66,7	66,7	100,0
	Total	60	100,0	100,0	

**Table 9.2: Educational background**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary School	4	6,7	6,7	6,7
	Secondary School	4	6,7	6,7	13,3
	College	17	28,3	28,3	41,7
	Vocational School	3	5,0	5,0	46,7
	Vocational High School	2	3,3	3,3	50,0
	Graduate	17	28,3	28,3	78,3
	Higher Education	13	21,7	21,7	100,0
	Total	60	100,0	100,0	

**Table 9.3: Sector**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Manufacturing	17	28,3	28,3	28,3
	Education	22	36,7	36,7	65,0
	Service	21	35,0	35,0	100,0
	Total	60	100,0	100,0	

**Table 9.4: What is the size of the organization?**

		Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	1-10	2	3,3	3,5	3,5
	11-50	24	40,0	42,1	45,6
	51-100	2	3,3	3,5	49,1
	101-250	4	6,7	7,0	56,1
	251-500	14	23,3	24,6	80,7
	500+	11	18,3	19,3	100,0
	Total	57	95,0	100,0	
Missing	System	3	5,0		
Total		60	100,0		

**Table 9.5: How long have you being working as a professional?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	11,7	11,7	11,7
	2	2	3,3	3,3	15,0
	3	5	8,3	8,3	23,3
	4	1	1,7	1,7	25,0
	5	5	8,3	8,3	33,3
	6	3	5,0	5,0	38,3
	7	4	6,7	6,7	45,0
	8	4	6,7	6,7	51,7
	10	8	13,3	13,3	65,0
	11	3	5,0	5,0	70,0
	12	1	1,7	1,7	71,7
	13	4	6,7	6,7	78,3
	15	2	3,3	3,3	81,7
	17	1	1,7	1,7	83,3
	18	2	3,3	3,3	86,7
	19	1	1,7	1,7	88,3
	20	1	1,7	1,7	90,0
	22	2	3,3	3,3	93,3
	23	1	1,7	1,7	95,0
	27	1	1,7	1,7	96,7
28	1	1,7	1,7	98,3	
39	1	1,7	1,7	100,0	
Total		60	100,0	100,0	

**Table 9.6: How long have you worked for the company?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	18	30,0	30,0	30,0
	2	9	15,0	15,0	45,0
	3	7	11,7	11,7	56,7
	4	5	8,3	8,3	65,0
	5	4	6,7	6,7	71,7
	6	2	3,3	3,3	75,0
	7	2	3,3	3,3	78,3
	8	6	10,0	10,0	88,3
	10	3	5,0	5,0	93,3
	13	2	3,3	3,3	96,7
	15	1	1,7	1,7	98,3
	20	1	1,7	1,7	100,0
	Total	60	100,0	100,0	

### Business Trends

%28,3 of the participants reported that total revenue decreasing in their sector, %18,3 reported total revenue increasing, %13,3 reported No Change, and 33,3 %Dont know and %6,7 Not applicable. Turkish participants reported a neutral and negative trend in the sector.

**Table 9.7: 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

#### 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.

**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.

## **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 participants evaluate themselves as moderate to strong level of decision making (Table 9.8) and %76,7 strong to very strong level of taking responsibility (Table 9.9).

**Table 9.8: Decision making**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	3	5,0	5,0	6,7
	Moderate	18	30,0	30,0	36,7
	Strong	29	48,3	48,3	85,0
	Very Strong	9	15,0	15,0	100,0
	Total		60	100,0	100,0

**Table 9.9: Taking responsibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	4	6,7	6,7	6,7
	Moderate	10	16,7	16,7	23,3
	Strong	28	46,7	46,7	70,0
	Very Strong	18	30,0	30,0	100,0
	Total	60	100,0	100,0	

### 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 (Table 9.10)

**Table 9.10: Leadership Skills**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	5	8,3	8,3	10,0
	Moderate	22	36,7	36,7	46,7
	Strong	28	46,7	46,7	93,3
	Very Strong	4	6,7	6,7	100,0
	Total	60	100,0	100,0	

## 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 (Table 9.11), %78 strong and very strong in Collaborating with Others (Table 9.12) and %71,7 strong and very strong in Communicating with people skills (Table 9.13). Turkish participants evaluate themselves high in working with people dimension.

**Table 9.11: Team work**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	3	5,0	5,0	5,0
	Moderate	10	16,7	16,7	21,7
	Strong	33	55,0	55,0	76,7
	Very Strong	14	23,3	23,3	100,0
	Total	60	100,0	100,0	

**Table 9.12: Collaborating with others**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	2	3,3	3,4	3,4
	Moderate	11	18,3	18,6	22,0
	Strong	29	48,3	49,2	71,2
	Very Strong	17	28,3	28,8	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.13: Communicating with people**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	2	3,3	3,3	3,3
	Moderate	15	25,0	25,0	28,3
	Strong	27	45,0	45,0	73,3
	Very Strong	16	26,7	26,7	100,0
	Total	60	100,0	100,0	

**Adhering to Principles and Values**

Turkish participants evaluate themselves high in Respecting Ethics with %72,9 (Table 9.14) and Environmental Awareness with %72,9 (Table 9.14) strong and very strong ratings. However, compared to other skills, awareness of ergonomics rated lower, only %49,1 reported strong and very strong.

**Table 9.14: Respecting ethics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	2	3,3	3,4	5,1
	Moderate	13	21,7	22,0	27,1
	Strong	26	43,3	44,1	71,2
	Very Strong	17	28,3	28,8	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.15: Environmental awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	6	10,0	10,2	11,9
	Moderate	9	15,0	15,3	27,1
	Strong	28	46,7	47,5	74,6
	Very Strong	15	25,0	25,4	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.16: Awareness of ergonomics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,6	3,6
	Weak	4	6,7	7,3	10,9
	Moderate	22	36,7	40,0	50,9
	Strong	19	31,7	34,5	85,5
	Very Strong	8	13,3	14,5	100,0
	Total	55	91,7	100,0	
Missing	System	5	8,3		
Total		60	100,0		

## **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 (Table 9.17), %70,6 in creating business networks (Table 9.18), and %66,1 in maintaining customer relationships (Table 9.19).

**Table 9.17: Compromising**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	4	6,7	6,7	6,7
	Moderate	8	13,3	13,3	20,0
	Strong	35	58,3	58,3	78,3
	Very Strong	13	21,7	21,7	100,0
	Total	60	100,0	100,0	

**Table 9.18: Creating business networks**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	3	5,0	5,2	5,2
	Moderate	14	23,3	24,1	29,3
	Strong	35	58,3	60,3	89,7
	Very Strong	6	10,0	10,3	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 9.19: Maintaining customer relationships**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	3	5,0	5,1	5,1
	Moderate	17	28,3	28,8	33,9

	Strong	25	41,7	42,4	76,3
	Very Strong	14	23,3	23,7	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

### Persuading and Influencing

%46,5 of the Turkish participants rated themselves strong and very strong in persuading influencing skills (Table 9.20) whereas %61 in emotional intelligence skills (Table 9.21). Turkish participants rate low in negotiating.

**Table 9.20: Negotiating**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,2	5,2
	Weak	5	8,3	8,6	13,8
	Moderate	23	38,3	39,7	53,4
	Strong	17	28,3	29,3	82,8
	Very Strong	10	16,7	17,2	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 9.21: Emotional intelligence**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	10	16,7	16,9	16,9
	Moderate	13	21,7	22,0	39,0
	Strong	24	40,0	40,7	79,7
	Very Strong	12	20,0	20,3	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

### Presenting and Communicating Information

Turkish participant rate themselves with strong and very strong with %54,3 in presenting and communication ability (Table 9.22).

**Table 9.22: Presenting and communication ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	5	8,3	8,5	10,2
	Moderate	21	35,0	35,6	45,8
	Strong	23	38,3	39,0	84,7
	Very Strong	9	15,0	15,3	100,0
	Total		59	98,3	100,0
Missing	System	1	1,7		
Total		60	100,0		

## 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 (Table 9.23) and %55,2 strong and very strong in literacy skills (Table 9.24).

**Table 9.23: Targeted/Technical Communication**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,4	3,4
	Weak	3	5,0	5,1	8,5
	Moderate	24	40,0	40,7	49,2
	Strong	24	40,0	40,7	89,8
	Very Strong	6	10,0	10,2	100,0
	Total		59	98,3	100,0

Missing	System	1	1,7		
Total		60	100,0		

**Table 9.24: Literacy (Reporting, writing plans, writing letters)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,2	5,2
	Weak	4	6,7	6,9	12,1
	Moderate	19	31,7	32,8	44,8
	Strong	25	41,7	43,1	87,9
	Very Strong	7	11,7	12,1	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

### 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 (Table 9.25), Economics %37,9 strong and very strong (Table 9.26), Extract business value from social media %46,7 strong and very strong (Table 9.27), Service orientation/product service offerings %47,5 strong and very strong (Table 9.28), Business process management %55,2, strong and very strong (Table 9.29), Business change management %36,2 strong and very strong (Table 9.30), Understand and coordinate workflows %6,9 strong and very strong (Table 9.31), Network security %58,3 strong and very strong (Table 9.32), IT architectures % 20,3 strong only (Table 9.33), Machine learning %41,1 strong and very strong (Table 9.34), System development % 31 strong and very strong (Table 9.35), Integrating heterogeneous technologies %33,3 strong and very strong (Table 9.36),

Mobile technologies %39 strong and very strong (Table 9.37), Sensors/embedded systems %15,5 strong and very strong (Table 9.38), Network technology/M2M communication %32,2 strong and very strong (Table 9.39), Robotics/Artificial intelligence %17 strong and very strong (Table 9.40), Predictive maintenance %26,8 strong only (Table 9.41), Modelling and programming %18,7 strong and very strong (Table 9.42), Big data/Data analysis and interpretation %22,4 (Table 9.43),

Cloud computing/architectures %3,4 strong and very strong (Table 9.44), In-memory DBs %11,6 strong and very strong (Table 9.45), Statistics %21 strong and very strong (Table 9.46) and Data Security %21,6 strong and very strong (Table 9.47).

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

**Table 9.25: IT and technology affinity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	9	15,0	15,3	16,9
	Moderate	17	28,3	28,8	45,8
	Strong	18	30,0	30,5	76,3
	Very Strong	14	23,3	23,7	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.26: Economics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,2	5,2
	Weak	6	10,0	10,3	15,5
	Moderate	27	45,0	46,6	62,1
	Strong	18	30,0	31,0	93,1
	Very Strong	4	6,7	6,9	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 9.27: Extract business value from social media**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,3	3,3
	Weak	8	13,3	13,3	16,7
	Moderate	22	36,7	36,7	53,3

Strong	21	35,0	35,0	88,3
Very Strong	7	11,7	11,7	100,0
Total	60	100,0	100,0	

**Table 9.28: Service orientation/product service offerings**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	5	8,3	8,5	8,5
	Moderate	26	43,3	44,1	52,5
	Strong	25	41,7	42,4	94,9
	Very Strong	3	5,0	5,1	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.29: Business process management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	7	11,7	12,1	13,8
	Moderate	18	30,0	31,0	44,8
	Strong	27	45,0	46,6	91,4
	Very Strong	5	8,3	8,6	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 9.30: Business change management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	5	8,3	8,6	8,6
	Weak	8	13,3	13,8	22,4
	Moderate	24	40,0	41,4	63,8
	Strong	19	31,7	32,8	96,6
	Very Strong	2	3,3	3,4	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		

Total		60	100,0		
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**Table 9.31: Understand and coordinate workflows**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,2	5,2
	Moderate	15	25,0	25,9	31,0
	Strong	29	48,3	50,0	81,0
	Very Strong	11	18,3	19,0	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 9.32: Network security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	7	11,7	11,7	11,7
	Weak	14	23,3	23,3	35,0
	Moderate	24	40,0	40,0	75,0
	Strong	11	18,3	18,3	93,3
	Very Strong	4	6,7	6,7	100,0
	Total	60	100,0	100,0	

**Table 9.33: IT architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	11	18,3	18,6	18,6
	Weak	14	23,3	23,7	42,4
	Moderate	22	36,7	37,3	79,7
	Strong	12	20,0	20,3	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.34: Machine learning**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	6	10,0	10,7	10,7
	Weak	9	15,0	16,1	26,8
	Moderate	18	30,0	32,1	58,9
	Strong	16	26,7	28,6	87,5
	Very Strong	7	11,7	12,5	100,0
	Total	56	93,3	100,0	
Missing	System	4	6,7		
Total		60	100,0		

**Table 9.35: System development**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	8	13,3	13,8	13,8
	Weak	8	13,3	13,8	27,6
	Moderate	24	40,0	41,4	69,0
	Strong	13	21,7	22,4	91,4
	Very Strong	5	8,3	8,6	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 9.36: Integrating heterogeneous technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	9	15,0	15,0	15,0
	Weak	10	16,7	16,7	31,7
	Moderate	21	35,0	35,0	66,7
	Strong	17	28,3	28,3	95,0
	Very Strong	3	5,0	5,0	100,0
	Total	60	100,0	100,0	

**Table 9.37: Mobile technologies**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,1	5,1

	Weak	11	18,3	18,6	23,7
	Moderate	22	36,7	37,3	61,0
	Strong	17	28,3	28,8	89,8
	Very Strong	6	10,0	10,2	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.38: Sensors/embedded systems**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	11	18,3	19,0	19,0
	Weak	13	21,7	22,4	41,4
	Moderate	25	41,7	43,1	84,5
	Strong	7	11,7	12,1	96,6
	Very Strong	2	3,3	3,4	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 9.39: Network technology/M2M communication**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	11	18,3	18,6	18,6
	Weak	14	23,3	23,7	42,4
	Moderate	15	25,0	25,4	67,8
	Strong	16	26,7	27,1	94,9
	Very Strong	3	5,0	5,1	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.40: Robotics/Artificial intelligence**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	20	33,3	33,9	33,9
	Weak	15	25,0	25,4	59,3

	Moderate	14	23,3	23,7	83,1
	Strong	6	10,0	10,2	93,2
	Very Strong	4	6,7	6,8	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.41: Predictive maintenance**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	10	16,7	16,9	16,9
	Weak	12	20,0	20,3	37,3
	Moderate	21	35,0	35,6	72,9
	Strong	12	20,0	20,3	93,2
	Very Strong	4	6,7	6,8	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.42: Modelling and programming**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	14	23,3	23,7	23,7
	Weak	18	30,0	30,5	54,2
	Moderate	16	26,7	27,1	81,4
	Strong	6	10,0	10,2	91,5
	Very Strong	5	8,3	8,5	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.43: Big data/Data analysis and interpretation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	14	23,3	24,1	24,1
	Weak	16	26,7	27,6	51,7
	Moderate	15	25,0	25,9	77,6

	Strong	11	18,3	19,0	96,6
	Very Strong	2	3,3	3,4	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 9.44: Cloud computing/architectures**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	16	26,7	27,6	27,6
	Weak	21	35,0	36,2	63,8
	Moderate	19	31,7	32,8	96,6
	Strong	1	1,7	1,7	98,3
	Very Strong	1	1,7	1,7	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 9.45: In-memory DBs**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	18	30,0	30,0	30,0
	Weak	19	31,7	31,7	61,7
	Moderate	16	26,7	26,7	88,3
	Strong	5	8,3	8,3	96,7
	Very Strong	2	3,3	3,3	100,0
	Total	60	100,0	100,0	

**Table 9.46: Statistics**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	16	26,7	28,1	28,1
	Weak	10	16,7	17,5	45,6
	Moderate	19	31,7	33,3	78,9
	Strong	10	16,7	17,5	96,5
	Very Strong	2	3,3	3,5	100,0
	Total	57	95,0	100,0	

Missing	System	3	5,0		
Total		60	100,0		

**Table 9.47: Data security**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	12	20,0	20,0	20,0
	Weak	16	26,7	26,7	46,7
	Moderate	19	31,7	31,7	78,3
	Strong	8	13,3	13,3	91,7
	Very Strong	5	8,3	8,3	100,0
	Total	60	100,0	100,0	

### Analyzing

Analyzing sub-dimension is composed of 4 items. Participants rated Problem Solving %71.9 strong and very strong (Table 9.48), Optimization %40,3 (Table 9.49), Analytical Skills %39 (Table 9.50) and Cognitive Ability %49,2 (Table 9.51). Optimization and analytical skills are below average.

**Table 9.48: Problem Solving**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	1	1,7	1,8	1,8
	Moderate	15	25,0	26,3	28,1
	Strong	31	51,7	54,4	82,5
	Very Strong	10	16,7	17,5	100,0
	Total	57	95,0	100,0	
Missing	System	3	5,0		
Total		60	100,0		

**Table 9.49: Optimization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,8	1,8
	Weak	10	16,7	17,5	19,3
	Moderate	23	38,3	40,4	59,6
	Strong	21	35,0	36,8	96,5

	Very Strong	2	3,3	3,5	100,0
	Total	57	95,0	100,0	
Missing	System	3	5,0		
Total		60	100,0		

**Table 9.50: Analytical Skills**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,4	3,4
	Weak	9	15,0	15,3	18,6
	Moderate	25	41,7	42,4	61,0
	Strong	19	31,7	32,2	93,2
	Very Strong	4	6,7	6,8	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.51: Cognitive Ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,1	5,1
	Weak	3	5,0	5,1	10,2
	Moderate	24	40,0	40,7	50,8
	Strong	24	40,0	40,7	91,5
	Very Strong	5	8,3	8,5	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

## 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 (Table 9.52) and %52,3 strong and very strong in knowledge management (Table 9.53)

**Table 9.52: Life-long learning**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	6	10,0	10,0	10,0
	Moderate	18	30,0	30,0	40,0
	Strong	26	43,3	43,3	83,3
	Very Strong	10	16,7	16,7	100,0
	Total	60	100,0	100,0	

**Table 9.53: Knowledge management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	8	13,3	13,6	13,6
	Moderate	20	33,3	33,9	47,5
	Strong	26	43,3	44,1	91,5
	Very Strong	5	8,3	8,5	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

### Creating and Innovation

Participants rated themselves %30,3 strong and very strong in Innovating (Table 9.54), %42,4 strong and very strong in creativity (Table 9.55), %57,7 strong and very strong in Critical Thinking (Table 9.56) and %40 strong and very strong in Change Management (Table 9.57).

**Table 9.54: Innovating**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,4	5,4
	Weak	9	15,0	16,1	21,4

	Moderate	27	45,0	48,2	69,6
	Strong	13	21,7	23,2	92,9
	Very Strong	4	6,7	7,1	100,0
	Total	56	93,3	100,0	
Missing	System	4	6,7		
Total		60	100,0		

**Table 9.55: Creativity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,4	3,4
	Weak	7	11,7	11,9	15,3
	Moderate	25	41,7	42,4	57,6
	Strong	19	31,7	32,2	89,8
	Very Strong	6	10,0	10,2	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.56: Critical thinking**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,4	3,4
	Weak	5	8,3	8,5	11,9
	Moderate	18	30,0	30,5	42,4
	Strong	27	45,0	45,8	88,1
	Very Strong	7	11,7	11,9	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.57: Change management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	10	16,7	16,7	16,7
	Moderate	26	43,3	43,3	60,0
	Strong	18	30,0	30,0	90,0

Very Strong	6	10,0	10,0	100,0
Total	60	100,0	100,0	

### Formulating Strategies

Business Strategy %43,1 strong and very strong (Table 9.57), Abstract Ability %58,6 strong and very strong (Table 9.58), and Managing Complexity %61,1 strong and very strong (Table 9.59). Turkish participants rated low in formulating strategies.

**Table 9.57: Business strategy**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	7	11,7	12,1	13,8
	Moderate	25	41,7	43,1	56,9
	Strong	23	38,3	39,7	96,6
	Very Strong	2	3,3	3,4	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 9.58: Abstraction ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	8	13,3	13,8	15,5
	Moderate	15	25,0	25,9	41,4
	Strong	29	48,3	50,0	91,4
	Very Strong	5	8,3	8,6	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 9.59: Managing complexity**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,4	3,4

	Weak	4	6,7	6,8	10,2
	Moderate	17	28,3	28,8	39,0
	Strong	29	48,3	49,2	88,1
	Very Strong	7	11,7	11,9	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

## 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 (Table 9.60), Planning and organizing work %52,5 strong and very strong (Table 9.61) and % 52,6 strong and very strong Management Ability (Table 9.62).

**Table 9.60: Project management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	10	16,7	17,2	19,0
	Moderate	22	36,7	37,9	56,9
	Strong	21	35,0	36,2	93,1
	Very Strong	4	6,7	6,9	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 9.61: Planning and organizing work**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	6	10,0	10,2	10,2
	Moderate	22	36,7	37,3	47,5
	Strong	22	36,7	37,3	84,7
	Very Strong	9	15,0	15,3	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.62: Management ability**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,8	1,8
	Weak	3	5,0	5,3	7,0
	Moderate	23	38,3	40,4	47,4
	Strong	24	40,0	42,1	89,5
	Very Strong	6	10,0	10,5	100,0
	Total	57	95,0	100,0	
Missing	System	3	5,0		
Total		60	100,0		

### **Delivering Results and Meeting Customer Expectation**

Participants rated their Customer Orientation skills %52,6 strong and very strong (Table 9.63), Customer Relationship Management skills %52,6 strong and very strong (Table 9.64)

**Table 9.63: Customer orientation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	5	8,3	8,5	10,2
	Moderate	22	36,7	37,3	47,5
	Strong	22	36,7	37,3	84,7
	Very Strong	9	15,0	15,3	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.64: Customer relationship management**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,5	3,5
	Weak	4	6,7	7,0	10,5
	Moderate	21	35,0	36,8	47,4
	Strong	21	35,0	36,8	84,2
	Very Strong	9	15,0	15,8	100,0
	Total	57	95,0	100,0	
Missing	System	3	5,0		
Total		60	100,0		

**Following Instructions and Procedures**

Legislation awareness skills %39,7 strong and very strong (Table 9.65), Safety awareness skills %63,3 strong and very strong (Table 9.66) and Individual responsibility skills %73,2 strong and very strong (Table 9.67).

**Table 9.65: Legislation awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,4	3,4
	Weak	11	18,3	19,0	22,4
	Moderate	22	36,7	37,9	60,3
	Strong	15	25,0	25,9	86,2
	Very Strong	8	13,3	13,8	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 9.66: Safety awareness**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	6	10,0	10,0	11,7
	Moderate	15	25,0	25,0	36,7

Strong	29	48,3	48,3	85,0
Very Strong	9	15,0	15,0	100,0
Total	60	100,0	100,0	

**Table 9.67: Individual responsibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weak	4	6,7	7,1	7,1
	Moderate	11	18,3	19,6	26,8
	Strong	28	46,7	50,0	76,8
	Very Strong	13	21,7	23,2	100,0
	Total	56	93,3	100,0	
Missing	System	4	6,7		
Total		60	100,0		

## 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 (Table 9.68), Intercultural competency skills %48,3 strong and very strong (Table 9.69), Flexibility skills %53,5 strong and very strong (Table 9.70) and Adaptability and ability to change mind-set skills %63,3 strong and very strong (Table 9.71).

**Table 9.68: Work in interdisciplinary environments**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	3	5,0	5,0	6,7
	Moderate	14	23,3	23,3	30,0
	Strong	32	53,3	53,3	83,3
	Very Strong	10	16,7	16,7	100,0
	Total	60	100,0	100,0	

**Table 9.69: Intercultural competency**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	3	5,0	5,0	6,7
	Moderate	27	45,0	45,0	51,7
	Strong	26	43,3	43,3	95,0
	Very Strong	3	5,0	5,0	100,0
	Total	60	100,0	100,0	

**Table 9.70: Flexibility**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	5	8,3	8,6	10,3
	Moderate	21	35,0	36,2	46,6
	Strong	24	40,0	41,4	87,9
	Very Strong	7	11,7	12,1	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		
Total		60	100,0		

**Table 9.71: Adaptability and ability to change mind-set**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	3	5,0	5,0	5,0
	Weak	4	6,7	6,7	11,7
	Moderate	15	25,0	25,0	36,7
	Strong	29	48,3	48,3	85,0
	Very Strong	9	15,0	15,0	100,0
	Total	60	100,0	100,0	

**Persuading and Influencing**

Participants rated their Work Life Balance skills %56 strong and very strong (Table 9.72).

**Table 9.72: Work-life Balance**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	7	11,7	11,9	13,6
	Moderate	18	30,0	30,5	44,1
	Strong	24	40,0	40,7	84,7
	Very Strong	9	15,0	15,3	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

## 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 (Table 9.73).

**Table 9.73: Self-management and organization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	6	10,0	10,3	12,1
	Moderate	11	18,3	19,0	31,0
	Strong	34	56,7	58,6	89,7
	Very Strong	6	10,0	10,3	100,0
	Total	58	96,7	100,0	
Missing	System	2	3,3		

Total	60	100,0		
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### Entrepreneurial and Commercial Thinking

Participants rated their Business model understanding skills %47,5 strong and very strong (Table 9.74) and Entrepreneurship skills %53,3 strong and very strong (Table 9.75). Turkish participant rate below average Entrepreneurial and Commercial Thinking skills.

**Table 9.74: Business model understanding**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	1	1,7	1,7	1,7
	Weak	4	6,7	6,8	8,5
	Moderate	26	43,3	44,1	52,5
	Strong	26	43,3	44,1	96,6
	Very Strong	2	3,3	3,4	100,0
	Total	59	98,3	100,0	
Missing	System	1	1,7		
Total		60	100,0		

**Table 9.75: Entrepreneurship**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Weak	2	3,3	3,3	3,3
	Weak	7	11,7	11,7	15,0
	Moderate	19	31,7	31,7	46,7
	Strong	21	35,0	35,0	81,7
	Very Strong	11	18,3	18,3	100,0
	Total	60	100,0	100,0	

### 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, the managers in Turkey are in the opinion that Industry 4.0 will be a threat for the employees.