

THE UNEMPLOYMENT RECOVERY BY MEANS OF PROFESSIONAL TECHNICAL EDUCATION PROVIDED BY TECHNICAL UNIVERSITIES WITHIN EUROPEAN PROJECTS

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Rezumat. Până spre anul 2000, învățământul tehnic furniza industriei naționale resursă umană de înaltă calitate. După Revoluția din 1989, industria din România a suportat constant un proces de distrugere din motive diverse, precum învechirea tehnologiilor sau lipsa unui management performant, situație în care șomajul în rândul persoanelor cu pregătire tehnică a crescut continuu. Articolul prezintă colaborarea dintre un consorțiu academic și piața muncii din industrie în cadrul unui proiect cu finanțare europeană. Se subliniază contribuția experienței academice a personalului didactic în pregătirea profesională a șomerilor în vederea reangajării lor în companii industriale. Colaborarea s-a soldat cu un procent important de recuperare, circa 28% dintre persoanele șomere recrutate din rândul celor aflate în căutarea unui loc de muncă fiind angajate.

Abstract. Until the 2000's, the Romanian technical educational system has provided to the Romanian industry very specialized human resources. After the 89's revolution, Romanian industry has been constantly destroyed for reasons such as: lack of performances, outdated technologies or non-existent specific management, and unemployment blew up. This paper presents the collaboration between an academic consortium and the industrial business environment within a European project. It emphasizes the contribution of academic stringency in unemployed training for new jobs in industry. The entire collaboration ended in more than 28% of unemployed recovering on the industrial labour market. Therefore we can call it a successful story.

Keywords: technical education, unemployment, qualification industry, labour market.

1. Introduction

Globalization phenomena together with multinational companies' development gradually diminished people's opportunities for implementing their own intellectual capital in their own national organization. This enhanced the

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instability of some societies not only by influencing their income per capita in a rather negative way, but also by destroying the family, as more and more individuals fell a prey to the mirage of industrialized areas.

As many other countries, after December 1989, Romania became a player of modern capitalism. The outcome displays not only positive aspects, but also a quasi-inexistent indigenous industry and a disoriented people. However, there were quite many multinational companies progressively taking over this sector.

Thus, given the socio-political and structural changes that Romania underwent over the last decades, one can state that the shock she experienced was all the more profound and intense [1].

As a consequence, the unemployment blew up, in a frame of total absence of its coherent management. As a first resort, Law no.1/1991 tried to transfer some Western regulations, as well as to socially protect and professionally reintegrate the unemployed persons. It all ended by increasing the confusion, especially because of the major contradiction between the amounts of the severance pays, rather huge sometimes, and the moral prejudice of being laid off and companies sold and/or bankrupted.

Later on, in March 2002, the above mentioned law was replaced by Law no.76/2002 regarding the unemployment insurance system and stimulation of employment. In 2004, this was complemented by Law no.107/2004 together with Law no.580/2004. Nowadays, the regulations regarding the management of employment are aligned and harmonized up to a higher extent to the European ones. The National Agency for Employment, ANOFM, founded in 1999, became thus a better manager of unemployed people [2].

By the time the legislation gives signs of recovery, some difficulties to debug the results were displayed. Thus, the evolution over the last 25 years of the 8.2 millions of employees that Romanian economy counted in 1990 (according to the National Institute of Statistics, INS), points out the following situation (see Figure 1):

- Less than 15% of the specialized Romanian labour force was absorbed by international extremely automated high-tech companies;
 - Around 10% of the specialized Romanian labour force emigrated to the USA and Canada, especially in the engineering, energy and oil industries;
 - Around 15% remained as young employees of those Romanian companies that succeeded to surmount the domestic market difficulties;
 - 30% was doomed to concealed layoffs in exchange of some severance pays;
 - The rest of 30% officially became unemployed people with the best chance to find a job in a non-technical field.
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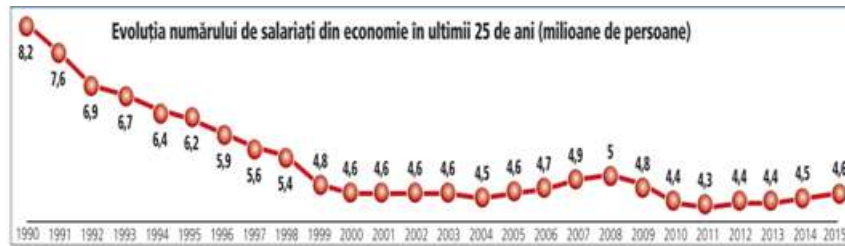


Fig. 1. Evolution of employees' number over the last 25 years (mil.).

Unfortunately, besides the Romanian administration's difficult muster and the emergent opportunities provided by multinational companies, the economical crisis aroused at the end of the past decade heavily contributed too to the impairment of Romanian industry.

Thus, despite the stilted announcements about industry reestablishment made all along by Romanian governments, the poor management together with huge loans engaged in between 2009-2012 dropped the Romanian industry into an abysmal situation: even more employees were laid off and more industrial entities closed. Some warning signals were fired by economic analysts, among which institutions like Econtext highlighted the loss of 421,232 employees from industry and constructions, fact that led to a reduction of the employees' number from 2,105,327 (in 2008) to 1,684,095 (in September 2012) [3].

1.1. Opposite trends in Romanian education

The major transformations that the Romanian education system went through after 1990 revealed the allure of informatics to the detriment of technical specializations.

However, regardless of the newly settled trend in youth development, according to the Romanian Ministry of Education, out of a total number of 122,596 pupils enrolled in 2014 for the high school graduation exam, only 5,809 pupils chose Informatics as the third tested subject, meaning no more than 8.34%.

This only shows how inadequate the high school selection process is. It guides towards informatics pupils without vocation by simply considering their previous performance. This together with the so-proclaimed "physics' obsolescence" does no less than narrow the access to a technical faculty or specialization.

Figure 2 shows the youth diversion from the industrial high schools to those providing a theoretical background only. Vocational education registered itself a three times reduction of the enrolled pupils (from 115,697 to 5,643). By taking also into account the decrease of interest for education in general proved by the loss of almost 100,000 pupils (from 304,429 in 1990 to 205,647 in 2012), the full picture of the Romanian industry falling apart is obtained. Consequently, not only

are fewer pupils annually enrolled in education, and even fewer go for the vocational education, but out of these the best performers are taken by default by mathematics-informatics high schools, letting out only pupils with grades smaller than 7.5.

Paradoxically, the number of applicants in the post-secondary education increased 13 times in the 1990-2012 span, from 2,259 to 26,891. No matter how encouraging it sounds, this increase is still not retrieved within any industrial branch. This could simply signify a focus of the above mentioned courses on the tertiary sector of the economy, the services).

Following the same pattern, the number of higher education graduates broke out: from 25,927 graduates in 1990 to 111,028 in 2012, see Figure 2.

	Number of graduates by level of education	
	Year 1990	Year 2012
High school and vocational education	304,429	205,647
Total high school education, including:	188,732	200,004
Theoretical high schools	11,609	76,107
Technical high schools	138,367	68,763
Others	38,756	55,134
Total vocational education, including:	115,697	5,643
Vocational schools	113,967	4,166
Others	1,730	1,477
Post-secondary education	2,259	26,891
Total higher education	25,927	111,028

Fig. 2. Evolution of graduates by level of education in the 1990-2012 span [4].

2. Industrial Unemployment in the Post-crisis European Context

Even if it can generally be stated that Europe overcame the crisis at a global level, the recovery is still asynchronous at each nation level. As everyone wishes a consolidation of what is already regained and got stronger, strategies in place aim at the economic growth sustained by innovation and leadership exerted in the private sector. In line with this approach, the McKinsey Institute recommends seven priorities [6] as follows: a. strengthening of the European fiscal position; b. enriching the qualified labour supply by harmonizing all ages and levels of experience; c. structural reforms utilization meant to enhance innovation in the services field; d. stimulating the raise of productivity in the public sector; e. valuing the entire potential of resources; f. taking advantage of goods and services commercialization; g. sustaining innovation in general.

2.1. European industry challenged by Industry 4.0

Industry 4.0 is a new German concept promoting the integrated utilization of the mechatronic system (conceived by Industry 3.0) with the industrial cyber space, resulting into the occurrence of a real “smart Factory” [7]. Europe works on adopting and implementing it as it hopes in additional revenue of 550 billion euro achieved by increasing the industrial competitiveness. The European model focuses on “Industrial Internet” implementation, in other words, on digitization and automation of industrial processes.



Fig. 3. The key pillars of Industry 4.0.

Industry 4.0 actually promotes a higher level of manufacturing development, so that nine technologies become interconnected thus resulting in a higher value of the previous three industrial revolutions’ final product (see Figure 3) [8].

In Romania, the nine technologies are seldom conceptually jointed even within the academic field. A much more ongoing, coordinated and consistent effort is needed to integrate these newly conceived concepts into the Romanian theoretical thinking thus enabling the future graduates to develop “Smart Factories” and “Smart Industries”.

2.2. Labour force properly qualified or enriching unemployment

Considering the current industrial frame and its potential future development, one can easily perceive its consequences over the education need. From this perspective, the average worker must forget about the toolbox and focus more on understanding the functioning of industrial robots and acquire the necessary online communication skills which become mandatory for practicing his / her profession. However, according to Ingo Ruhmann, special IT counsellor of Germany’s Federal Ministry of Education and Research, *complete automation is not realistic. Technology will mainly increase productivity through physical and digital assistance systems, not the replacement of human labour* [8]. Therefore,

the human resource must drift apart of routine and repeatability, and use its energy for finding creative tools enabling optimal management of modern production systems.

Ultimately, given the Fourth Industrial Revolution frame, up to a certain extent, the employees in general could be classified as unemployed. Hence it is not only about keeping the pace with professional requirements, but also about the psychological consequences of this new trend. Precisely for this reason a special attention starts to be paid to future educational strategies [9]. The follow-up of the last World Economic Forum provides a possible evolution of the industrial employee upon Clark model (see Figure 4) [10]. Here the demographic, socio-economic and technological drivers of change are defined for 2015-2020.

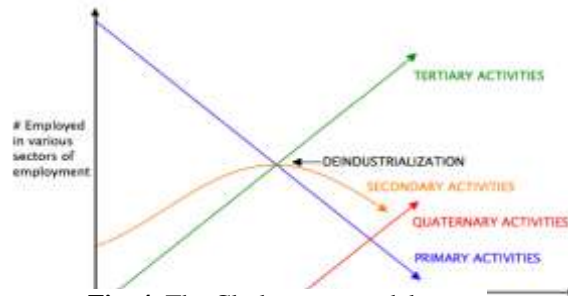


Fig. 4. The Clark sector model.

Among these, the following are considered:

- changing work environments and flexible working arrangements, with a rated as top trend, RTT, of 44%;
- climate changes, natural resource constraints and the transition to a greener economy, with 23% RTT;
- Mobile Internet and Cloud technology with 34% RTT;
- processing power and Big Data with 26% RTT.

As they are presented in the report, the effects that drivers of changes have on employment outlook over 2015-2020 seem to put in a favourable position people with *computer and mathematical* specialization (2.4% to 6.11% chances to be hired). At the opposite pole, the *office and administrative* specialization is found (from -2.77% to -9.72% chances) and *manufacturing and production* specialization (-0.83% chances for being hired), then *robotics, autonomous transport, DoC*, (-3.60%), *advanced manufacturing, 3D printing*, and so on [9].

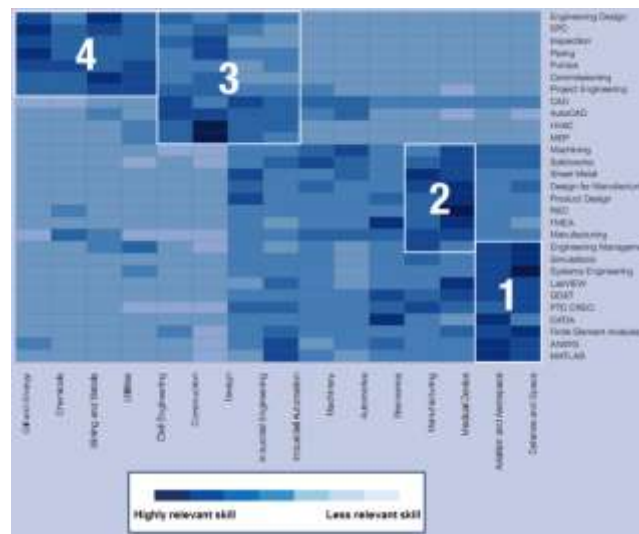


Fig.5. Mapping skills by industries for the next 5 years.

Figure 5 presents the forecast of the most important and relevant competences for the next five years function of industrial area [9]. By analysing the table above, it becomes clear that a higher level of computer utilization together with CAE apps highly supported by mathematics represents the most hunted ability of the future labour force.

In spite of all this the unemployment is still growing. This happens mainly because of some difficulties to manage triggering factors that act ceaselessly: the global growth of population, limited job opportunities, lack of harmonization of educational systems with the new trends of Industry 4.0 and so on.

At the European level, unemployment is considered a rather important issue that States have to deal with. A proof of their constant concern is actually the unemployment rate: 10.2% at European level and 11.6% for the euro-zone in 2014, not to mention the unemployment rate for youth under 25 years of age which is of 22.2%, and respectively 23.6% [11].

Given this frame, there is no surprise that a global European strategy was already initiated in 1997 (European Employment Strategy, EES), and rapidly became part of the Europe 2020 Growth Strategy. This also consists of a number of measures meant to encourage people's stability, such as: promoting the labour approach from the perspective of a single life cycle, encouraging continuous training and qualification, and nevertheless participation in contextual social dialogue.

The funding programmes such as European Social Fund make available important amount of money for recovering the unemployment during the 2015-2020 period.

3. Methodology

According to the statistical data of 2014, a Romanian trend in unemployment evolution similar to the European one is recorded: if the global national unemployment rate was 6.8% (quite close to the performance of Nordic countries), the youth under 25 exhibited a rather higher indicator exceeding the European one, and reaching 24% [11].

The analysis presented in this article is based on the work carried on between April 2014 and November 2015, in the context of the project FORMING - HRD/125/5.1/S/ 134003 (*Active insertion on the labour market through innovative professional training in engineering*). This project is among the few national projects oriented in schooling in technical areas the unemployed and people in search for a job.

Supporting the above statement, an excerpt from the official release of the ANOFM at the end of 2015 is presented. It shows the average range of courses generally offered to the unemployed during the year - see Figure 6 [5]. Notice the absence of engineering and technical areas training. By correlating information from both Figures 1 and 2, the lack of skilled labour force in the industry, especially the fields with high GDP, is overwhelming. The ANOFM report says that *the labour market requested this range of courses*. The strange thing is that all of them are enriching the services area, where illegal employment is generally very high anyway.

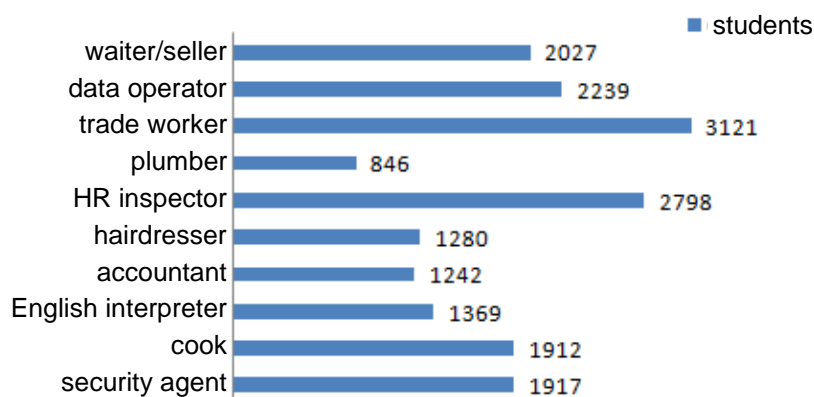


Fig. 6. Courses provided by the ANOFM in 2015.

The overall objective of the above mentioned project was to improve the capacity of being employed for about 1,000 unemployed and people in search for a job. This should have been done by providing integrated services and innovative counselling, mediation and professional personalized training in engineering, in

order to improve skills, professional competencies and to provide a better correlation with labour market needs in the following Romanian regions: a. the North-Eastern one ascribed to the Technical University Gheorghe Asachi of Iasi, b. the Western one ascribed to the Politehnica University of Timisoara, c. the Central one ascribed to Lucian Blaga University of Sibiu, and d. the South-Muntenia and Bucharest-Ilfov ascribed to Politehnica University of Bucharest. Among the operational objectives concordant with those of priority axis no. 5, “*Promoting active employment measures*”, main field of intervention 5.1, “*Developing and implementing active employment measures*” we can state:

- Attracting and keeping people actively engaged on the labour market by providing individual counselling and mediation services, as to enlarge the occupancy rate;
- Reducing long-term unemployment through preventive and corrective actions, by providing flexible packages of hybrid courses, in a personalized form, by means of innovative approaches;
- Improving employability of unemployed and people searching for a job, with a special attention paid to the long-term and younger unemployed, by raising the level of their qualification, skills (including the entrepreneurial ones), and by providing them with personalized counselling services.

3.1. Participants

According to the statistics recorded at the end of 2012 (Romanian Public Employment Service, 2012), one year prior to project submission, at national level the number of unemployed registered an increase of 20.2% compared to the previous year.

Their structure, in terms of level of education, consisted of: 37,197 people graduating higher education, 110,147 graduating secondary and post-secondary education, and 346,431 people graduating primary, lower secondary and vocational education. Despite the rather large number of unemployed, the only category manifesting that year a slightly decreasing trend was the higher education (by 3.94% as to the previous year). As a conclusion, INS statistics show that the national economic situation has drastically affected the jobs dynamics as well.

As already stated, the project targeted group of over 1,000 people with technical engineering studies (upper - engineers, medium - graduates of vocational and technical high schools), who were then unemployed and looking for a job. Therefore, they finally included:

- 1, 288 long-term unemployed participating to integrated programs, of which:
 - 136 women (i.e. 47%),
 - 74 young people (i.e. 25.4%),
-

- 78 people over 45 and grown-up unemployed (i.e. 27%).

2. at least 100 people looking for a job;

3. some other maximum 612 average unemployed.

3.2.Materials

The specialists involved in the project had firstly to get in touch with the unemployed and people looking for a job. The aim was not only to identify the addressed market, but also to promote the opportunity, its undertaken conditions, curricula and desired outcomes. At the other end, the constant consultation of the employers' needs was also provided by the same specialists. This persisted throughout the entire deployment of the project, related to the proper curricula selection, courses delivered, and learners' evaluation.

The novelty was given by the modern inter-institutional TIC platform (www.forming.ro). With its help, both learners and teachers, together with employers, had the chance to continuously communicate online, thus enlightening the project's goals and best approach.

As we have already stated our interest in the real needs of the employers, a survey meant to map the required future employees' competencies was elaborated. It was applied on each geographical area, and broken down to industrial fields. The main sections composing the questionnaire were: (1) specific information related to companies, (2) leading fields of interest, (3) basic training need, (4) specific competencies required, (5) need of information and communication.

3.3.Design

The undertaken activities were coherent and backing up one another so that together converged to the final objectives achievement. For mentioning the main classes we note:

- Informing, communicating and promoting the addressed audience related to the project's objectives, tools and methods;
 - Providing specialized counselling both at individual and group level;
 - Providing mediation services at individual and group level, as well, and nevertheless organizing jobs fairs;
 - Providing courses by means of both traditional and modern methods of teaching, including here the TIC platform as well;
 - Designing, implementing and delivering online and onsite courses materials;
 - Correlating provided courses with the required skills of the related market;
 - Maintaining the constant communication among the parties involved by the project, occasionally appealing to online mediation supported by TIC platform.
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3.4.Procedure

The courses conducted took the form of e-learning training (40h during the first stage) – preserving in this way the homogeneity of the information transmitted towards learners, and nevertheless the form of face-to-face training along 80h. The latter were divided into 40h of theoretical preparation, followed by a break of one week and another 40 hours of practical training.

Higher education graduates were provided a *project management* (13 courses), and *CAD specialist* (6 courses), while secondary education graduates attended *PAC operator* (10 series), *mould-toolmaker* (one series), *plastics operator* (2 series), *CNC operator* (10 series), *electrician* (3 series), *database administrator* (8 series).

Keeping the track of the provided courses alignment to the addressed market needs, some additional authorizations proved to be necessary for several occupations.

4. Results and discussion

As already said, the TIC platform (www.forming.ro) alongside the applied questionnaires for companies needs' identification were the two junctures between the industry labour market and project's specialists. Therefore, during the first three months of the project development, 109 questionnaires were filled, while after 20 months, 831 jobs were offered.

Although Figure 8 shows a pretty equal interest of companies in hiring higher education and secondary education graduates, the preference manifested in Bucharest's area was for the first category. The explanation resides in the higher concentration of both company headquarters and universities. On the other side, industrialized centres from Timișoara, Sibiu and Brașov preferred secondary education graduates, mostly due to their larger production facilities located there.

It should also be mentioned that, even if universities are not liable for the undergraduate level of secondary education, the present project proved a positive outcome once they were involved into.

Given the great variety of the job positions involved, some rules of conduct were established. At the same time, the whole number of positions was grouped according to convenient criteria considering specialization and geographical area, so that counselling, training and mediation become more accessible to all participants. The six groups thus resulted were: administration, audit and quality, IT/CAD, logistics, management, production/services - see Figure 7.

No matter how strange it may seem for some, Figure 8 shows in an indisputable way the real interest regarding the productive employment. This fact must come into notice of governmental bodies activating both in education and social protection, and consequently causing a better correlation of job offer and demand on the labour market.

In the end, what the project accomplished was:

- Enrolled and counselled people, 1,079 - see Figure 9 - out of which:
 - o 309 in Bucharest,
 - o 264 in Sibiu,
 - o 255 in Iași,
 - o 251 in Timișoara.
- 597 people benefited from mediation, 29 of them being performed by means of TIC platform;
- 1,032 people attended courses - see Figure 10 - out of which:
 - o 288 SLD (ID 123):
 - 136 women;
 - 74 youngster (15-24 years old);
 - 78 unemployed over 45 years old.
 - o 510 unemployed (ID 122)
 - o 143 people looking for a job (ID 76)
 - o 91 inactive people (ID 75)
- 257 graduates of these courses were hired during the first six months after graduation;
- 140 people hired in accordance with the new specialization awarded.

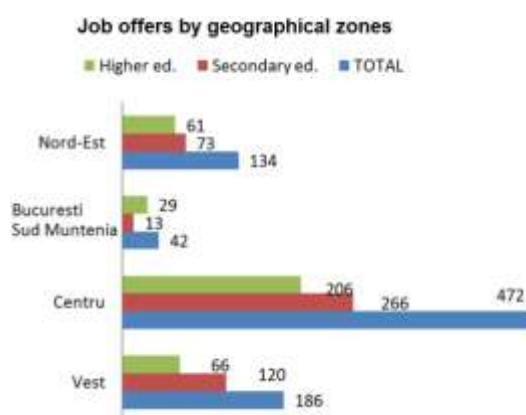


Fig. 7. Job offers by geographical zones

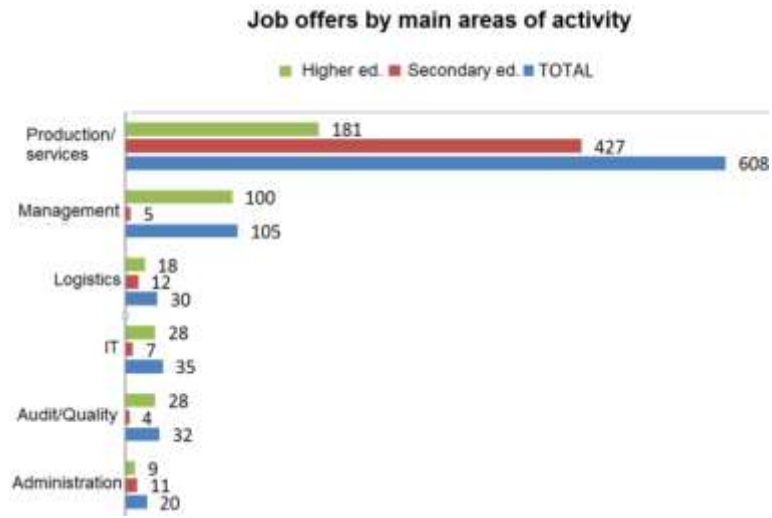


Fig. 8. Job offers by main areas of activity.

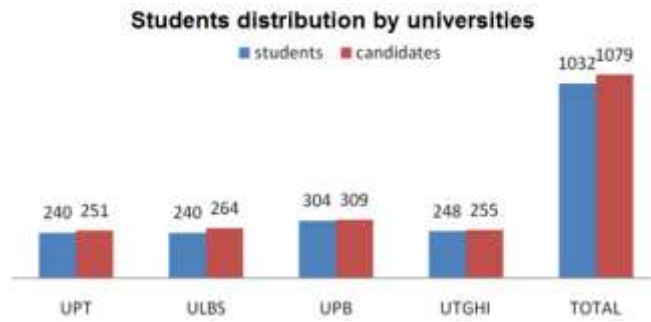


Fig. 9. Students distribution by universities.

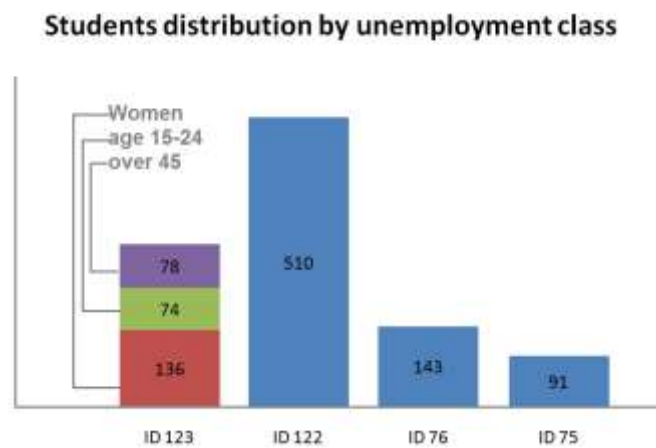


Fig. 10. Students distribution by unemployment class.

Given this real success, we consider that our project proves the helping hand that universities can give to the reinstatement of people in specific job positions, with the only conditions of being provided flexible and adequate tools, good intentions and rewarded hard work. It is a good example of what could be done. Not to mention the utopian situation displaying all the Government's entities collaborating and working together!

At the end of the day, **25.20%** of the graduates of these courses were hired leaving us the hope of still existent capable, well prepared and willing to work Romanian adults.

REFERENCES

- [1] Ciupagea, C., Mazilu, A., Bălan, C., *Evoluția structurală a economiei României în perioada 1989-1998* (Lucrările au fost propuse de SCIENTCONSULT, atribuite prin competiție și finanțate de Agenția Națională pentru Știință, Tehnologie și Inovare, respectiv Ministerul Educației și Cercetării, în cadrul Programului ORIZONT 2000, România, iunie 1999). http://marioduma.ro/CD/consult/D1F1.htm#_ftnref3.
 - [2] www.anofm.ro
 - [3] Murgu, I.A., *Criza a pus industria românească pe butuci: peste 400.000 de angajați au fost concediați*, econtext.ro, aprilie, 2013, www.old.econtext.ro.
 - [4] <http://www.zf.ro/>
 - [5] <http://www.anofm.ro/files/Comunicat%20de%20presa%20formare%202015.pdf>
 - [6] Roxburgh, C., Mischke, J., *European Growth and Renewal: The Path from Crisis to Recovery*, Report McKinsey Global Institute, July 2011, from <http://www.mckinsey.com/global-themes/europe/european-growth-and-renewal-path-to-recovery>
 - [7] Schwab, K., *The Fourth Industrial Revolution*, Kindle Edition, 2016, ISBN-13: 978-1-944835-01-9, ISBN-10: 1944835016.
 - [8] Rusmann, M., Lorenz, M., Gerbert, P., Waldner M., Justus, J., Engel, P., Hamisch, M., *Industry 4.0: The Future of Productivity and Growth in Manufacturing Industries*, April 2015, from <https://www.bcgperspectives.com>
 - [9] *The Future of Jobs. Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*, http://www3.weforum.org/docs/Media/WEF_Future_of_Jobs_embargoed.pdf
 - [10] <http://www.economicsonline.co.uk/>
 - [11] http://ec.europa.eu/eurostat/statistics-explained/index.php/Unemployment_statistics
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