La versione elettronica ad accesso aperto di questo volume è disponibile al link:
http://www.openstarts.units.it/dspace/handle/10077/10652

Impaginazione

Gabriella Clabot

ISBN 978-88-8303-611-8
E-ISBN 978-88-8303-613-2

EUT – Edizioni Università di Trieste
Via Weiss, 21 – 34128 Trieste
http://eut.units.it
https://www.facebook.com/EUTEdizioniUniversitaTrieste

Iscritti, Laureati e Transizioni al lavoro: l'Università di Trieste

a cura di
Laura Chies
Grazia Graziosi

EUT EDIZIONI UNIVERSITÀ DI TRIESTE

Indice

Appendice (solo online)
Tabelle Capitoli 1-4

Premessa

La presente pubblicazione conclude una prima fase di analisi della popolazione studentesca e dei laureati dell'Ateneo di Trieste, condotta nell'ambito del progetto di ricerca dal titolo "*La transizione università-lavoro: metodi di analisi, basi dati innovative e impatto dei cambiamenti istituzionali sul successo occupazionale dei laureati*" finanziato principalmente dal Fondo di Ateneo per la Ricerca (FRA2011).

Il disporre di importanti basi di dati amministrative sia a livello di ateneo per quanto riguarda studenti iscritti, laureati e dottori di ricerca, che regionale, per quanto riguarda i dati sull'avviamento al lavoro, ha reso il progetto di ricerca non solo realizzabile, ma fonte di riflessioni originali sulla politica universitaria, del lavoro e della ricerca che ci hanno permesso di partecipare a numerosi convegni e seminari nazionali e internazionali, con i contributi raccolti nella seconda parte di questo volume.

Nella prima parte del saggio, invece, vengono presentati i dati dell'Università di Trieste negli anni dal 2000 al 2013. Tale quadro di riferimento è stato condotto principalmente sugli archivi amministrativi dell'università, che si sono rivelati molto ricchi di informazioni sulla comunità degli studenti, dei laureati, ma anche dei dottori di ricerca. Questi dati sono stati incrociati con quelli provenienti da altri archivi amministrativi, in particolare quelli regionali dei Centri per l'Impiego che conferiscono all'Osservatorio Regionale del Lavoro le comunicazioni obbligatorie delle imprese e che restituiscono il quadro dei flussi di studenti e laureati che nel corso degli anni sono transitati attraverso il sistema pubblico del collocamento, della regione Friuli Venezia Giulia. Purtroppo un lavoro un po' più ambizioso che voleva collegare i dati derivanti delle tre università del territorio: l'Università degli Studi di Trieste e l'Università degli Studi di Udine, nonché la SISSA (Scuola Superiore di Studi Avanzati), in un progetto che coinvolgesse anche il Ministero dell'istruzione, dell'Università e della Ricerca, non ha visto alla fine la luce a causa di cavilli di ordine burocratico. La scelta di condurre l'analisi delle correlazioni e degli effetti causali istruzione-lavoro principalmente su dati degli archivi amministrativi, invece che su dati d'indagine deriva dalla necessità di cogliere il primo ingresso regolare nel mercato del lavoro locale dopo la laurea. Appare infatti importante capire quanto il mercato locale possa godere della formazione di terzo livello e quanto questa sia apprezzata da parte delle imprese del

territorio. All'analisi dei dati amministrativi, che riguarda i capitoli dal primo al terzo ed il quinto relativo ai dottori di ricerca, è stato comunque affiancato un confronto con i dati dell'indagine Almalaurea nel capitolo quarto, per poter completare l'analisi con il paragone rispetto ad un dato medio nazionale.

Laura Chies

Ringraziamenti

Si ringraziano per la disponibilità e la preziosa collaborazione il personale tecnico-amministrativo dell'Università di Trieste, in particolare la Ripartizione Servizi agli Studenti e Progetti Speciali nelle persone di Sandra Marcon e Michele Tritta; Claudia Salata della Ripartizione Servizi agli Studenti e alla didattica; L'Ufficio Valutazione e controllo della Qualità nelle persone di Raffaella De Biase e Erika Mongiat; Massimo Del Gos della Ripartizione Processi Gestionali. Si ringraziano, inoltre, per la cortese fornitura dei dati amministrativi sul lavoro e la disponibilità per la risoluzione dei problemi tecnici Domenico Tranquilli già Direttore dell'Agenzia Regionale Del Lavoro del Friuli Venezia Giulia, nonchè Marco Cantalupi e Giorgio Plazzi dell'Osservatorio del Lavoro della Regione Friuli Venezia Giulia, Bruno Anastasia e Maurizio Rasera di Veneto Lavoro. Siamo grati a Gaetano Carmeci, Saveria Capellari, Francesco Pauli ed Elena Podrecca per i numerosi suggerimenti e discussioni che hanno accompagnato questo lavoro.

From University to Labour Market: the Case of the University of Trieste

Gabriella Schoier and Adriana Monte

Abstract The aim of this study is to analyze some problems regarding the transition from University to labour market, in particular by exploring the ties between degree and economic sector of the first post degree job (first job activation, first job placement). In order to perform the analysis we use two large administrative databases: the former concerning the graduates of the University of Trieste, the latter the activations in Friuli Venezia Giulia region. Our aim here is to explore such phenomena, in terms of the presence of clusters and ties between employers and graduates. The attention is focused on methods to highlight clusters of graduates. After the integration of the two databases and the examination of data quality, we try to explore the existing ties between type of degree and economic sector by using a two step cluster analysis. We analyze the evolution of some characteristics of the transition from University to labour market in the period 2005 - 2012.

Key words: labour market, administrative database, two step cluster analysis, data mining ...

1 Introduction

As it is well known there are many reasons for going to University, among them higher education is seen as a basic step to obtain a good job. Many higher education programs are explicitly vocational, including medicine, actuarial sciences, engineering, accountancy and law. Other courses are less directly vocational; nevertheless,

Gabriella Schoier
Dipartimento di Scienze Economiche Aziendali Matematiche e Statistiche, Universitá di Trieste, Piazzale Europa 1, 34127 Trieste, Italia e-mail: gabriella.schoier@deams.units.it

Adriana Monte
Dipartimento di Scienze Economiche Aziendali Matematiche e Statistiche, Universitá di Trieste, Piazzale Europa 1, 34127 Trieste, Italia e-mail: adriana.monte@deams.units.it

they help students to develop analytical and presentational skills which are highly valued in our modern economy. In fact in an increasingly knowledge-driven and global economy, universities need to ensure that they produce graduates who are employable, innovative, and in possession of skills which are relevant to national and international needs ([9]). The aim of this study is to analyze some problems regarding the transition from university to labour market, in particular exploring the ties between degree and economic sector of the first post degree job ([13], [12],([11])). In order to perform the analysis we use two large administrative databases. After the integration of these databases and the examination of data quality, we explore the existing ties between type of degree and economic sector. The individuation of the subjects and the specification of the ties allow to define a network. Different classical social network theories can be used; among these the small-world literature has shown that there is a high degree of local clustering in the networks, this suggests that an approach for studying the structure of large networks would involve at first the identification of local clusters and then the analysis of the relations within and between clusters ([15]).

Our aim here is to explore such phenomena in terms of the presence of clusters of units and of the ties between employers and graduates, trying to understand the origins and motivations of such elements. The application concerns the local labour market of the Friuli Venezia Giulia Region (F.V.G.), a region situated in the north-east of Italy, and the graduates of the University of Trieste in different years *i.e.*from 2005 to 2012.

2 The Methodology

Several studies have focused their interest on issues such as the ease and speed of transitions into jobs, the process of job search, the relationship between the degree course and the skills needed in the jobs held, the determinants of graduate pay and the problem of the time to obtain the first job ([2]). In this paper we consider a methodology that takes into account the problem of the huge amount of data at our disposal and that of the use of mixed variables (cathegorical and continuous).

2.1 Data Mining and Official Statistics

The huge increase in the amount of spatially referenced data available on Internet has outstripped our capacity to meaningfully analyzes such networks and run into significant computational barriers in large networks. This has induced the need for better analysis techniques to understand the various phenomena ([12]).

Data Mining has been and is a sort of revolution in the process of extracting knowledge from data bases. His success is due to the idea that great amount of data can gathered and knowledge can be obtained through a process that regards different

phases. Data collection, transformation, organization in a Data Warehouse and in different Data Marts, application of different statistical techniques and assessment of the results so to present them to the decision maker are the several passages of a Data Mining process. Applications of Data Mining regards different fields: Credit Scoring, Market Basket Analysis referred to the real world and to the web, Data Base Marketing, Web Mining with Web Usage Mining, Web Content Mining and Web Structure Mining, Text Mining and Spatial Data Mining and Official Statistics. In particular as regards Official Statistics and the statistical community they have to better understand the issues and develop new methods, tools and ideas to make effective the use of Big Data sources.

One of the problems which can obtain good results from an accurate use and analysis of big data sets is that of high unemployment rates for young people. In fact in recent years it has been featuring top of public policy discussion and of government policy making in EEC and in Italy too. The difficulties of getting a job for young people are so relevant that youth unemployment can be considered as a distinct and stable feature of European and Italian unemployment. The outstanding youth unemployment incidence constitutes a common element of different European labour markets. This suggests that the transition from school to work has become more difficult and prolonged for individuals with high levels of education as for people with less level of education, these results are confirmed by different paper (see e.g. [6]).

This is one of the reasons for the increasing attention in the analysis of the transition from University to labour market by the labour microeconometric and statistic literature ([12]).

2.2 Two Step Cluster Analysis

Cluster analysis is a useful method for identifying homogenous groups of units called clusters. Units (or cases or observations) in a specific cluster share many characteristics, but are very dissimilar to units belonging to different clusters.

Various clustering algorithms have been developed to group data into clusters however they work effectively either on numerical or categorical data but most of them perform poorly on mixed categorical and numerical data. Two step cluster analysis allows to avoid this problem ([1], [10], [8]). In particular SPSS two step clustering developed by ([5]) for the analysis of large data sets consists of two steps:

Step 1 Pre-clustering of cases.

A sequential approach is used to pre-cluster the cases.

The aim is to compute a new data matrix with fewer cases for the next step; in order to reach this aim, the computed pre-clusters and their characteristics (cluster features) are used as new cases. The pre-clusters are defined as dense regions in

the analyzed attribute space. The results may depend on the input order of cases therefore it is recommended to use random order.

Step 2 Clustering of cases.

A model based on hierarchical technique is applied.

Similar to agglomerative hierarchical techniques, the pre-clusters are merged stepwise until all clusters are in one cluster.

In contrast to agglomerative hierarchical techniques, an underlying statistical model is used. The model assumes that the continuous variables are within clusters independent normal distributed and the categorical variables are within clusters independent multinomial distributed.

Two distance measures are available: euclidean distance and a log-likelihood distance in case of mixed types of attributes.

Remark 1: Number of clusters.

The number of clusters can be automatically determined by using the Akaike Information Criterion (*AIC*)

$$AIC_k = -2l_k + 2r_k, \tag{1}$$

or the Bayesian Information Criteria (*BIC*)

$$BIC_k = -2l_k + 2r_k \log(n), \tag{2}$$

where

k is the number of clusters,

l_k is not the exact log-likelihood function ([1]) but can be interpreted as a measure of dispersion within clusters; if only categorical variables are used, l_k is the entropy within clusters,

r_k is the number of independent parameters ([1]),

n is the number of observations.

Remark 2: Cluster membership assignment.

Each object is assigned deterministically to the closest cluster according to the distance measure used to find the clusters ([1]).

Remark 3: The procedure allows to define an outlier treatment. The user must specify a value for the fraction of noise, e.g. 5 (=5 %). A pre-cluster is considered as a potential outlier cluster if the number of cases is less than the defined fraction of the maximum cluster size. Outliers are ignored in the second step ([1]).

3 The Dataset

We analyzed the transition of graduates from University to labour market using information derived by two different administrative databases.

The former refers to graduates at the University of Trieste from January 2000 to June 2013. Each record identifies a degree and contains some general information related to the graduate (fiscal code, sex, birth date, residence, high school degree, etc.) and several information related to the degree (date of degree, final grades , etc.); there is also a variable identifying the profile of the degree (standard, *honoris causa*, transfer degree and other). This file is formed by 58870 records and contains twenty-six variables. In this study we have considered only the standard profile; in so doing the records come down to 56056.

In order to obtain information related to the first post degree job ([4]) we used a database with the data of the activations and terminations given by the Labour Market Regional Observatory of F.V.G. that refers to all the employments (but not to self-employments). This database refers to all the activations and terminations of employment relationships ([3]) from 2000 to 2012, concerning firms located in the F. V. G. region. Each record identifies an activation and contains a lot of information related to the employee (fiscal code, sex, age at activation, etc.), the firm (fiscal code, economic activity sector, localization, etc.) and the job relationship (the date of activation, the date of termination, the type of contract, the schedule, etc.). The database is formed by 1565424 records.

At first the graduate database has been reorganized, so for each fiscal code (person) there is only one record. This database has been merged with the employment database using the fiscal code.

The resulting database contains information related to the jobs and the degrees of the graduate. We have selected only jobs referred to graduates, so the dimension of the database decreases considerably. These are activations in firms located in F. V. G. region before or post degree. The merging allows us to draw out some useful information as the distance (measured in days) between the degree attainment date and each activation date and consequently the existence of activations before the degree or not. Moreover this distance allows us to link the type of degree to the firm sector of activity and to other characteristics of the job relationship. We have considered an activation for each graduate, in particular the first post degree activation (first job placement). The highest degree (keeping out the doctorate) categorized into *short degree* (three years courses bachelor) and *long degree* (four, five or six years courses and master degree) is considered.

We focused our attention on the economic activity sector of the firms to study the link between type of degree (scientific or humanistic) and sector of the firm.

This piece of information is summarized in a categorical dichotomous variable (the graduate has worked before degree or not). The existence of the date of activation and the date of termination of the relationship allows to compute the duration of the job relationship; when the termination date is not present we have assumed that the job relationship carries on. This assumption is also based on the information related to the type of contract (fixed term contract, permanent contract etc.).

4 The Application

The object of the analysis regards variable selection and the application of a cluster analysis to describe graduates and their ties with firm of the region Friuli Venezia Giulia.

4.1 Variable Selection

Variables choice has been determined by the object of the research *i.e.* the relation between the degree and the sector of firm in the first post graduate job. The variables concerning the graduates are sex, age, type of degree (scientific or humanistic), final grades and job before degree (categorical (dichotomic) variable). The variables concerning firms are firm location and economic activity sector. The variables describing the relationship are waiting time (time between the degree achievement and the first activation), duration of the job relationship, schedule, position assigned to the graduate in the firm.

We recoded the economic activity sectors exploiting the Eurostat ([7]) aggregations of the manufacturing industry according to technological intensity (high-technology, medium high-technology, medium low-technology and low-technology) and of the services according to knowledge intensity (high knowledge-intensive, knowledge-intensive and less knowledge-intensive). We judged this classification more suitable than Ateco (Italian version of Nace) ([14]) to study the transition to work of graduates.

The records with missing in the used variables have been deleted (4,5%). The final database contains 11766 records, each of them refers to a person.

Tab. 1 contains the list of the variables used in the study, their description and their source.

In each year of activation the graduates are more females than males, but the difference is decreasing in recent years: in 2005 63% of graduates was female but 59% in 2012. The age at the date of the first activation is increasing from 27.8 years in 2005 up to 28.6 in 2012, and the 75% of the graduates placed by a job agency is up to 30 years old. The type of degree is a dichotomous variable that classifies a degree as *humanistic* if it belongs to Department of Humanities or Department of Legal, Languages, Interpreting and Translation Studies or Department of Political and Social Sciences. Otherwise a degree is classified as *scientific*. Since 2007 the first activations of *humanistic* graduates have been decreased (from 51.1% to 43.5%) consequently are increased the first activations of *scientific* graduates. Half of graduates have final grades greater than 105. A lot of graduates worked before degree and this quota is grown up to 44.5% in 2011. The graduates are placed in particular in Less Knowledge-Intensive and Knowledge-Intensive Services sectors (78% in 2011), whereas the percentage of graduates placed in High-technology and Medium-high-technology manufacturing industries are 6,.% (in 2011) . Most of firms are located in Trieste province (47% in 2011) and in Udine province (21%

Table 1 Variables description

Variable name	Description	Variable type	Information derived from
genere	sex	categorical	both databases
qualifica	position assigned to the graduate	categorical	activation database
avviamenti_pre	the graduate worked or not before degree	categorical	both the databases
fac_dic	type of degree (scientific or humanistic)	categorical	degrees database
class_tech_ric	firm's economic activity sector	categorical	activation database
durata	duration of the job relationship	categorical	activation database
CPI_az	firm location	categorical	activation database
Tipo_orario	schedule	categorical	activation database
eta	age	continuous	both databases
voto_finale	final grades	continuous	degrees database
giornidiff	waiting time	continuous	both databases

in 2011). The position of graduates in the job is frequently a medium one, but the percentage of them with medium-high positions is growing up (8.5% in 2005 and 25.7% in 2012), whereas the low positions are decreased (10.5% in 2005 and 4.9% in 2011). The schedule is also a dichotomous variable; we recode the original variable of the activation database in a new variable whose modalities are *full-time* and *partial-time*. In the years the quota of *full-time* employees is ever decreased from 76% in 2005 to 59% in 2012 (64% in 2011). The duration of the job relationship is longer than 1 year for more than half of graduates and is of more than three years for the 35.7 % of graduates.

4.2 Statistical Analysis

As written before the aim of this study is to analyze some problems regarding the transition from University to labour market, in particular by exploring the ties between degree and economic sector of the first post degree job. In this analysis different years *i. e*. 2005,2007,2009,2011 have been considered. The methodology is based on a two step clustering procedure where cases are gathered in random order ([5]).

According to AIC and BIC criterion five cluster have been analyzed, the results are reported in the next tables: Tab. 2,Tab. 3,Tab. 4,Tab. 5 where we summarized some peculiarities of each cluster year by year.

In order to carry out the description of each cluster we have considered separately graduates and firms while the existing relations are summarized by the variables: waiting time, duration, schedule, position.

For instance if we consider year 2009 there is a cluster (*cluster 1*) formed by males with scientific degree and that do not work before the degree) where firms

belonging to Manufacturing Industries sector (High and Medium-High) and to High Knowledge Intensive sector are to a greater extent than in the others clusters of the same year. These graduates are related to the firms by relationship with a medium-long duration and a full-time schedule. A similar cluster is present in 2007 (*Cluster 1*) and in 2011 (*Cluster 1*) too.

In 2009 there is another cluster (*Cluster 3*) similar to (*Cluster 3*) in 2007 and (*Cluster 5*) in 2011. In these clusters the graduates are younger, with smaller final grades, short degree and that worked before the degree. They are related with firms belonging to Less-Knowledge Services sector and the relations are: short (or medium short) duration, waiting time smaller and part time schedule. Other similar consideration can be obtained by considering Tab. 2,Tab. 3,Tab. 4,Tab. 5 in more details.

Year 2005 behaves in a different way as one can see from Tab. 2

5 Conclusions

The use of the two administrative databases presents two relevant aspects: we can analyze all the graduates and their first job, not only a sample, and can have precise measures of some variables (for example waiting time and duration of relationship are measured in days).

The merging of databases is the starting point to perform several analysis. In particular we focus our interest in economic activity sector and in ties between graduates and firms. Two step cluster analysis allows to deal with categorical and continuous variables simultaneously and consequently we can point out both quantitative and qualitative ties between network units. A result of the study is that these ties (waiting time, duration, schedule, position) are able to identify different categories of graduates and different categories of firms. Some types of clusters have the same peculiarities in the different years.

Table 2 Year 2005

Cluster	GRADUATES	TIES	FIRMS
Cluster n=174	*1* Mainly females (96.0% vs. 63.1%) Age (26.6 vs. 27.8) No work before degree (48.9% vs. 32.9%) Humanistic degree (52.3% vs. 47.9%) Short degree (17.8% vs. 15.1%)	Waiting time as average 0.9 years (vs.1.4) Short duration (less than 6 months 66.1% vs. 32.1%) Part time (49.4% vs.24.5%) medium-low position	Low-technology manufacturing industries (6.9% vs. 4.0%) Less-knowledge intensive services (86.2% vs. 31.8%) Located in Udine province (40.2% vs. 29.9%)
Cluster n=324	*2* Mainly females (87.7% vs. 63.1%) Age (28.2 vs. 27.8) Final grades (105.5 vs. 103.8) Work before degree (71.6% vs. 67.1%) Humanistic degree (76.2% vs. 47.9%)	Waiting time as average 1.7 years (vs.1.4) Medium-short (27.5% vs. 19%) and medium-long (18.8% vs. 15.2%) Part time (37.3% vs.24.5%) medium position	Knowledge-intensive services (76.5% vs. 44.9%) Less located in Trieste province (30.6% vs. 42.2%)
Cluster n=144	*3* Mainly males (79.9% vs. 36.9%) Age (28.0 vs. 27.8) Final grades (101.7 vs. 103.8) No work before degree (68.1% vs. 32.9%) Short degree (18.8% vs. 15.1%)	Waiting time as average 1.1 years (vs.1.4) Short duration (less than 6 months 55.6% vs. 32.1%) Full-time (95.1% vs. 75.5%) low position	Knowledge-intensive services (47.9% vs.44.9%) Less-knowledge intensive services (36.1% vs. 31.8%) Located in Gorizia province (18.8% vs. 11.4%)
Cluster n=132	*4* Mainly females (89.4% vs. 36.9%) Age (27.5 vs. 27.8) Work before degree (85.6% vs. 67.1%) Scientific degree (90.9% vs. 52.1%) Short degree (17.4% vs. 15.1%)	Waiting time as average 1.2 years (vs.1.4) Long and medium-long duration (greater than 1 year 75.0% vs. 48.9%) Full-time 100,0% vs. 75.5% medium-high and medium position	Medium-high-technology manufacturing industries (29.5% vs. 4.8%) Medium-low-technology manufacturing industries (31.1% vs. 7.6%) High- knowledge-intensive services (12.9% vs. 4.0%) Located in Pordenone province (28.0% vs. 16.5%)
Cluster n=142	*5* Age (28.1 vs. 27.8) Final grades (101.9 vs. 103.8) Work before degree (95.1% vs. 67.1%) Scientific degree (84.5% vs. 52.1%) Long degree (90.8% vs. 84.9%)	Waiting time as average 1.7 years (vs.1.4) Long duration (greater than 3 years 60.0% vs. 33.7%) Full-time (93.0% vs. 75.5%) medium-low position	Knowledge-intensive services (57.0% vs. 44.9%) Located in Trieste province (88.0% vs. 42.2

Table 3 Year 2007

Cluster	GRADUATES	TIES	FIRMS
Cluster 1 n=222	Mainly males (95,5% vs. 35.4%) No work before degree (88.3% vs. 68.5%) Final grades (103.2 vs. 104.0) Scientific degree (77.0% vs.48.8%) Long degree (83,3% vs. 72.5%)	Waiting time as average 2.2 years (vs.2.0) Medium-long duration (greater than 1 year 84% vs. 43.6%) Full-time (100.0% vs.74.8%) medium position	Medium-high-technology manufacturing industries (14.9% vs. 3.2%) Medium-low-technology manufacturing industries (18.9% vs. 4.3%) High knowledge-intensive services (8.1% vs. 3.7%) Located in Udine province (37.4% vs. 28.3%)
Cluster 2 n=300	Mainly females (76.3% vs. 64.6%) Age (30.4 vs.28.8) No work before degree (83.7% vs. 68.5%) Final grades (105.5 vs. 104) Humanistic degree (60.0% vs. 51.2%) Long degree (88,7% vs. 72.5%)	Waiting time as average 3.0 years (vs. 2.0) Short-medium duration (greater than 3 months and less than 1 year 48.7% vs. 33.3%) Part time (28.0% vs.25.2%) medium-high and medium-low position	Knowledge-intensive services (93.0% vs. 57.2%) Located in Trieste province (65.0% vs. 47.3%)
Cluster 3 n=371	Mainly females (73.0% vs. 64.9%) Age (27.6 vs. 28.8) Work before degree (46.9% vs.31.5%) Final grades (102.9 vs. 104) Short degree (35,0% vs. 27.5%)	Waiting time as average 1.3 years (vs.2.0) Short duration (less than 6 months 55% vs. 35.2) Part time (38.3% vs.25.2%)medium-low and low position	Less-knowledge intensive services (81.1% vs. 26.7%)
Cluster 4 n=230	Age (28.0 vs. 28.8) Final grades (103.3 vs. 104) Scientific degree (99.6% vs. 48.8%) Short degree (50.9% vs. 27.5%)	Waiting time as average 1.6 years (vs.2.0) Long duration (greater than 3 years 39.1% vs. 31.3%) Full-time (80.0% vs.74.8%) medium position	Knowledge-intensive services (87.8% vs. 57.2%) Located in Trieste province (56.1% vs. 47.3%)
Cluster 5 n=285	Mainly females (84.9% vs. 64.9%) Age (29.3 vs. 28.8) Work before degree (42.1% vs.31.5%) Final grades (104.8 vs. 104) Humanistic degree (99.6% vs. 51.2%)	Waiting time as average 2.1 years (vs.2.0) Short-medium duration (less than 1 year 68.1% vs. 56.5%) Part time (29.1% vs.25.2%) medium position	Knowledge-intensive services (71.2% vs. 57.2%) Located in Udine province (42.5% vs. 28.3%)

Table 4 Year 2009

Cluster	GRADUATES	TIES	FIRMS
Cluster 1 n=245	Mainly males (68.6% vs. 36.1%) Age (28.7 vs.28.1) No work before degree (83.3% vs.58.1%) Scientific degree (98.8% vs. 53.8%) Long degree (74.7% vs. 60.8%)	Waiting time as average 2.4 years (vs.1.9) Medium-long duration (greater than 1 year 82.9% vs. 51.9%) Full-time (95.9% vs.66.6%) medium-high position	High-technology manufacturing industries (7.3% vs. 2.1%) Medium-high-technology manufacturing industries (10.2% vs. 3.1%) Medium-low-technology manufacturing industries (5.7% vs. 2.6%) High knowledge-intensive services (10.6% vs. 5.0%)
Cluster 2 n=182	Mainly females (68.1% vs. 63.9%) Age (27.0 vs.28.1) Work before degree (49,5% vs. 41.9%) Final grades (104.2 vs. 103.7) Scientific degree (68.7% vs. 53.8%) Short degree (51.6% vs. 39.2%)	Waiting time as average 1.3 years (vs.1.9) Long duration (greater than 3 years 63.2% vs. 42.8%) Full-time (76.9% vs.66.6%) medium position	Knowledge-intensive services (85.2% vs. 45.8%) Located in Trieste province (88.5% vs. 47.6%)
Cluster 3 n=299	Age (27.0 vs.28.1) Work before degree (59.9% vs. 41,9%) Final grades (102.9 vs. 103.7) Short degree (49.8% vs. 39.2%)	Waiting time as average 1.3 years (vs.1.9) Short duration (less than 6 months 55.2% vs. 30.5%) Part time (54.5% vs. 33.3%) medium-low and low position	Less-knowledge intensive services (84.6% vs.32.5%) Located in Gorizia province (17.4% vs. 9.5%)
Cluster 4 n=159	Mainly females (86.8% vs. 63.9%) Final grades (104.2 vs. 103.7) Humanistic degree (82.4% vs. 46.2%) Long degree (65.4% vs. 60.8%)	Waiting time as average 2.0 years (vs.1.9) Short-medium duration (less than 1 year 91.2% vs. 48.1%) Part time (54.1% vs. 33.3%) medium-high position	Knowledge-intensive services (93.1% vs. 45.8%) Located in Pordenone province (26.4% vs. 13.2%)
Cluster 5 n=149	Mainly females (84.6% vs. 63.9%) Age (30.4 vs.28.1) Humanistic degree (95.3% vs. 46.2%) Long degree (69.8% vs. 60.8%)	Waiting time as average 3.2 years (vs.1.9) Long duration (greater than 3 years 66.4% vs. 42.8%) Full-time (70.5% vs. 66.6%) medium position	Low-technology manufacturing industries (6.0% vs. 3.8%) Medium-low-technology manufacturing industries (5.4% vs. 2.6%) High knowledge-intensive services (7.4% vs. 5.0%) Located in Udine province (40.9% vs. 19.8%)

Table 5 Year 2011

Cluster	GRADUATES	TIES	FIRMS
Cluster n=278	*1* Mainly males (64.4% vs. 39.0%) No work before degree (61.9% vs. 55.5%) Final grades (104.1 vs.103.5) Scientific degree (98.9% vs.51.1%) Long degree (64.0% vs. 58.6%)	Waiting time as average 2.0 years (vs.2.2) Medium-long duration (greater than 1 year 81.7% vs. 51.0%) Full-time (98.6% vs.63.7%) medium-low position	High-technology manufacturing industries (3.6% vs. 1.1%) Medium-high-technology manufacturing industries (18.0% vs. 5.1%) Medium-low-technology manufacturing industries (7.6% vs. 2.8%) High knowledge-intensive services (9.0% vs. 4.3%)
Cluster n=223	*2* Mainly females (66.4% vs. 61.0%) Age (29.2 vs. 28.2) No work before degree (65.5% vs. 55.5%) Final grades (104.8 vs.103.5) Humanistic degree (89.2% vs. 48.9%) Long degree (63.2% vs. 58.6%)	Waiting time as average 3.3 years (vs.2.2) Medium-long duration (greater than 1 year 74.0% vs. 51.0%) Full-time (85.2% vs.63.7%) low position	Low-technology manufacturing industries (7.6% vs. 4.3%) Located in Udine province (25.6% vs. 20.7%)
Cluster n=184	*3* Mainly females (75.5% vs. 61.0%) Final grades (102.6 vs. 103.5) Humanistic degree (58.7% vs. 48.9%) Short degree (51.1% vs. 41.4%)	Waiting time as average 2.2 years (vs.2.2) Short duration (greater than 1 month and less than 6 months 52.2% vs. 25.0%) Part time (85.3% vs. 36.3%) medium-high position	Knowledge-intensive services (88.6% vs.45.5%) Located in Trieste province (64.7% vs. 46.6%)
Cluster n=120	*4* Mainly females (73.3% vs. 61.0%) Age (29.0 vs. 28.2) Work before degree (56.7% vs. 44.5%) Humanistic degree (62.5% vs. 48.9%) Long degree (71.7% vs. 58.6%)	Waiting time as average 1.9 years (vs.2.2) Very short duration (less than 3 months 63.3% vs.20.2%) and medium-short (greater than 6 months and less than one year 25.8% vs. 15.4%) Full-time (64.2% vs. 63.7%) medium position	Knowledge-intensive services (98.3% vs.45.5%) Located in Pordenone province (17.5% vs. 11.9%)
Cluster n=205	*5* Mainly females (69.3% vs. 61.0%) Age (26.7 vs. 28.2) Final grades (102.1 vs. 103.5) Work before degree (56.6% vs. 44.5%) Humanistic degree (53.2% vs. 48.9%) Short degree (52.7% vs. 41.4%)	Waiting time as average 1.3 years (vs.2.2) Medium-short duration (less than 1 year 71.2% vs. 49.0%) Part time (63.4% vs. 36.3%)medium-high and medium position	Less-knowledge intensive services (90.2% vs. 32.1%) Located in Gorizia province (12.7% vs. 9.9%)

References

1. Bacher J. K.,Wenzing M., Vogler M. : SPSS Two Cluster - A First Evaluation. Universitat Erlangen-Nurnberg.(2004) http://www.statisticalinnovations.com/products/twostep.pdf Cited Nov. 2015
2. Ballarino G., Bratti M. : Field of Study and University Graduates Early Employment Outcomes in Italy during 19952004. Labour **23**, 421–457 (2009)
3. Chelli F.,Gigliarano C. : An Analysis of the Italian Labour Market based on Compulsory Communications Data. Rivista di Statistica Ufficiale **2-3**, 5–17 (2012)
4. Chies L., Puggioni A., Stok R. : Il Limbo tra Laurea e il Primo Lavoro: Scienza e Tecnologia lo Accorciano? In: XXXIV Conferenza Italiana di Scienze Regionali (2014) http://www.grupposervizioambiente.it/aisre_sito/doc/papers/Chies.pdf Cited Nov. 2014
5. Chiu T., Fang D., Chen J., Wang Y., Jeris C. : A Robust and Scalable Clustering Algorithm for Mixed Type Attributes in Large Database Environment. In: Proceedings of the 7th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining , pp. 263-268. (2001)
6. Consorzio Interuniversitario AlmaLaurea: XI Profilo dei laureati italiani. Valutazione dei percorsi formativi nella Universita a dieci anni dalla Dichiarazione di Bologna, il Mulino, Bologna. (2010)
7. Eurostat: Eurostat indicators of High-tech Industry and Knowledge - Intensive Services, January 2014 Annex 2 - High-tech aggregation by NACE Rev.1.1 http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/Annexes/htec_esms_an3.pdf Cited Nov. 2014
8. Huang, Z. : Extensions to the k-means Algorithm for Clustering Large Data Sets with Categorical Variables. Data Mining and Knowledge Discovery,**2**, 283–304 (2011)
9. Lombardo R., De Luca G., Passarelli G. : Field of Study and Transition into a Stable Job: The Case of a University in Southern Italy. International Journal of Economics and Finance **4**, 69–84 (2011)
10. Ming-Yi S., Jar-Wen J., Lien-Fu L. : A Two-Step Method for Clustering Mixed Categorical and Numeric Data. Tamkang Journal of Science and Engineering **13**, 11–19 (2010)
11. Monte A., Schoier G. : A Statistical Analysis on the Transition from University to Labour Market. Rivista Italiana di Economia Demografia e Statistica (to appear)
12. Pozzoli D. : The Transition to Work for Italian University Graduates. Labour **23**, 131–169 (2009)
13. Salas-Velasco M. : The Transition from Higher Education to Employment in Europe: the Analysis of the Time to Obtain the First Job. Higher Education **54**, 333–360 (2007)
14. Vicari P., Ferrillo A., Valery A.(Eds.): Classificazione delle Attivita Economiche ATECO 2007, Metodi e Norme, **40**, ISTAT, Roma. (2009)
15. Wasserman S., Faust K. : Social Network Analysis: Methods and Applications, Cambridge University Press, New York. (1994)