doi.org/10.26398/IJAS.0031-004

THE VALUE OF THE PERSONAL SKILLS OF NEW GRADUATES IN THE RECRUITMENT PROCESS: A CONJOINT ANALYSIS CASE STUDY IN LOMBARDY

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Abstract. *The ELECTUS multi-centre project seeks to strengthen the relationship between universities and companies. This could be achieved by gathering information about procedures for the entrepreneurs' choice in the recruitment process of the new graduates for different job vacancies. Using a CAWI survey, 471 Lombardy companies with at least 15 employees were asked to manifest their preferences in choosing between hypothetical profiles of new graduates with different competencies from one other. In this work, the attention focuses on the "human resource assistant". The statistical methodology here adopted is a stratified conjoint using some layering factors extracted from socioeconomic features of the company. Results of the analysis show difference in layering factors, this means that for different subsets, some competencies are more considered.*

Keywords: *Conjoint analysis, Recruitment process, Labour market, New-graduates*

1. INTRODUCTION

In recent years, the economic crisis has affected business performance and particularly employment in all European countries. The impact of this crisis struck weaker segments of the labour market, especially young persons and people with less work experience (Tanveer Choudhry et al., 2012). Most of the time, there was no possibility of turnover, so the younger people were unable to access the labour market. In Italy, from 2007 to 2013, the youth unemployment rate increased from 15.5% to 28% (Istat, 2014).

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This increase in the unemployment rate has had two immediate effects: firstly, it has discouraged young people from searching for a job and secondly, it has convinced them to take shelter in academic studies in order to find the right key to open the door of the labour market. The worst situation is represented by those who give up in the job search and in academic studies, and join the NEETs (Not engaged in Education, Employment or Training) group.

The need to reduce this imbalance between supply and demand in the labour market is fundamental to integrating young people into the labour force according to a European strategy for solving unemployment problems (Mariani, 2007). This is also one of the objectives of the Horizon 2020 program (European Commission, 2010).

A possible way to fix this problem is to devise tools connecting the job market and the academic paths, starting with the choice of an appropriate major, during the degree courses and at the end of the path in which ideally they could enter the job market. Universities can play a central role in this sense, being at the centre of a triangle consisting of education, research and innovation. This could reduce the time required for contact between the job searcher and the firm, which is considered to be an indicator of search channel efficiency (Lindeboom et al., 1994).

This study addresses the comprehension policies regarding relationships between enterprises and universities, with reference to the labour market for new graduates. The study is based on the multi-centre ELECTUS research project, an acronym standing for Education-for-Labour Elicitation from Companies' Attitudes towards University Studies, a research project involving several Italian universities (Fabbris and Scioni, 2015). This project was created with the objective of measuring the job offer by submitting a survey to the companies. This questionnaire contains two macro-sections. In the first section the entrepreneurs had to rank a set of profiles suitable for 5 different job vacancies; in the second section respondents were questioned about characteristics in order to create some possible layering factors. In this paper, the attention will be focused on the job of "Human Resource Assistant" (HRA).

The entrepreneurs' preferences for the HRA position will be stratified in relation to some socio-demographic factors of the companies such as its business sector and size. The aim of this stratification is achieved in order to verify the presence of evidences. The detection of segments of companies where levels of the attributes occur more frequently could be very useful to understand particular dynamics of the labour market.

The paper is structured as follows: Section 2 introduces the steps of the recruitment process, while the figure of the HRA is presented in Section 3. In

Section 4 the methodology of conjoint analysis (CA) in the presence of stratification factors is shown. Section 5 presents the results from the Electus research and Section 6 contains the summary and conclusions.

2. THE RECRUITMENT PROCESS

The recruitment process represents a large utility resource for a company and the choice of the right person for a vacancy has an essential relevance in terms of savings and satisfaction. Otherwise, a wrong choice during the process could provoke negative consequences, not only from a monetary point of view, but also in terms of loss of time. Russo *et al*. (1997) fully discuss firm attitudes toward recruitment, paying particular attention to the time devoted to searching and search channels.

The basic assumption for obtaining good results in making the recruitment process is to measure attributes and competencies of the candidates for a job vacancy. Only through an objective and impartial evaluation of the candidates does the selection process yield satisfactory results (Taylor and Bergmann, 1987).

The recruitment process consists of the following steps:

- highlighting the role covered by a new recruit;
- recruiting a shortlist of candidates using job advertisements and then analysing CVs;
- evaluating/assessing competencies, attributes and attitudes of the candidates through psychological tests;
- selecting the best profile after some job interviews.

The first step is to identify exactly what the company really needs, the duties of the new recruit starting from the description of the job vacancy in the job advertisement. An error during this step could have very serious consequences such as the hiring of someone with non-proper attributes or the exclusion of the right person from the shortlist of candidates.

The second step consists of a primary screening of all the applicants to reduce the number of possible interviewees. This screening could involve eliminating applicants who do not possess the attributes required for the vacancy. The Electus project focuses on the screening activity at this step by simulating the company's screening process.

The measure of the competencies is the most complicated part of the recruitment process. The candidate's assessment could involve psychological tests and interviews. The tests aim to measure aspects of the personality, predispositions and inclinations of the applicants; the interviews can be conducted in groups

(assessment centre) or individually. During the interviews, candidates can be assigned problem-solving tasks or be asked about generic skills and/or experiences mentioned in the CV. Sometimes, the Human Resources manager is assisted by some specialist of the business area to evaluate the specific competencies through technical questions regarding the job vacancy.

The last phase is choosing the best profile and integrating the nominee into the job vacancy. After evaluating all candidates, through the reading the CVs and the interviews, the applicant will be chosen on the basis of some particular objective and subjective criteria that match the expectations of the company at that time. A period of integration and orientation is needed to the new recruit through training.

3. THE FIGURE OF HUMAN RESOURCE ASSISTANT

In this work the attention is focused on the job position of HRA. For this reason in this section, the job description of an HRA will be briefly illustrated. Usually, when thinking of Human Resources (HR), people just think of the recruitment process. Actually, it consists of all the organizational tasks involving the management of all employees. This means that the HRA has to possess skills, capabilities and competencies related to multiple fields.

The task of the HRA is to support the activity of the HR manager, so here for the sake of the simplicity, we refer to their work without any distinctions. First of all, competencies of the HRA are linked to the psychological world since they have to evaluate and choose from a list of candidates in the recruitment process. Secondly, they have to deal with basic legal matters. They in fact handle the bureaucratic part of the recruitment process, that is to say the negotiation and drafting of the job contract or allotting leave. Thirdly, it is necessary they have knowledge of economics, like the laws of supply and demand on the labour market and the decisions about wages. Finally, they need to have communicative skills, since they represent the image of the company in relationships with the external environment (Isfol, 2017).

Usually, the HRA's tasks are various. They liaise between HR managers and employees to ensure smooth communication and prompt resolution of all queries. They substantiate applicants' skills by administering and scoring tests; they schedule examinations by coordinating appointments and provide payroll information by collecting time and attendance records. Moreover, they could submit employee data reports by assembling, preparing, and analysing data and they could be involved in administrative duties (Esco, 2017).

In Italy, the HRA is classifed as "senior grade general business and secretarial

employee". In the period 2014-2018, it is predicted that in Italy the number of HRAs employed will increment by 1.3%. The number of HRAs should increase by 15,571 units. So the predicted number of employed is 483,984 units. In particular, in Italy a stable trend is predicted for HRAs (between -2% and +2%) (Isfol, 2017).

Moreover, in 2016, it was predicted that 940 new HRAs should be taken on, 47% on permanent contract, 65% of whom will be recruited by medium-sized and large companies. According to these predictions, 52% of these recruits will have a high-school leaving diploma and 48% will have attended university. In 76% of cases there will be no distinction between males and females (Unioncamere, 2017).

4. CONJOINT ANALYSIS

Conjoint analysis (CA) is among the mostly used methods of analysing consumer choices and extrapolating from it consumer utility for each single characteristic of the goods or service to which it applies. In our case, utility refers to job characteristics.

This method is applied without a direct evaluation of the procedures related to the attributes of the product, but through the analysis of the multiple trade-offs among them. This technique is based on the economic theory introduced by Lancaster (1966). Consumer preferences, expressed in terms of an ideal profile for a product, could be broken down into partial utilities of the levels of the product attributes. In CA, utilities are estimated using an addition or multiplication rule, reproducing the opinions expressed by consumers. Finally, it is possible to identify an ideal profile of the product.

In this paper, the use of the conjoint rating format helps to evaluate respondents' preferences. The preference model assumes a linear part-worth utility function, and part-worth utilities are estimated by using OLS multiple regression.

The rating scale is a preference measurement model that is traditional in CA. In fact, the information contained in the rating conjoint format is processed by regressing individual responses on a piece-wise linear function of all the attribute levels that describe a graduate. Because conjoint data are collected on a non-metric scale, a non-metric estimation procedure such as MONANOVA could be more appropriate than OLS. However, as demonstrated by Carmone et al. (1978) and Cattin and Wittink (1982), OLS regression provides similar parameter estimates when preferences are elicited through ranking and rating scales; therefore, we will adopt it as a reliable estimation procedure.

Let m be the number of the attributes. Each attribute has l_j (j =1, 2,…,m), levels. The general main-effect decompositional multiattribute preference model (Mezbahur and Lorica, 1999) is defined as

$$U(X) = \sum_{j=1}^{m} \sum_{k=1}^{lj} \alpha_{jk} x_{jk} \tag{1}$$

where $U(X)$ is the overall utility function, a_{jk} is the parth-worth contribution associated with the k th level of the j th attribute, x_{jk} is the presence (=1) or absence (=0) of the attribute level.

Let $\alpha_j = [\alpha_{j1}, \ldots, \alpha_{jlj}]$ indicate the vector with the part-worth utilities of the jth attribute. The range, from highest to lowest, of the utility values for each attribute provides an indicator of how important the attribute is compared with the others. Attributes play a more important role when larger utility ranges are present. For any attribute j, the relative importance I_j can be computed by dividing its utility range by the sum of all utility ranges as follows:

$$I_j = \frac{\max(\alpha_j) - \min(\alpha_j)}{\sum_{j=1}^{m} \left[\max(\alpha_j) - \min(\alpha_j) \right]} \tag{2}$$

where $\sum_{j=1}^{m} I_j = 1$.

5. APPLICATION AND RESULTS

The survey was conducted in 2015 using a CAWI technique. Data were collected using a software program called Sawtooth (Sawtooth, 2017). Data manipulation and CA were obtained using *R* software and *Conjoint* package (Bak and Bartlomowicz, 2012).

The questionnaire contained two sections: the first is about the conjoint experiment for the five job positions and the second contains general information about the company (demographic questions). In Electus, the five job positions for the new graduates, Administration clerk, HRA, Marketing assistant, ICT professional and CRM assistant. In this study, we examine only results about HRA. The candidates' profile are characterized by six attributes:

- *Field of Study* with 10 levels (Philosophy and Literature, Educational Sciences, Political Sciences/Sociology, Economics, Law, Statistics, Industrial Engineering, Mathematics/Computer Science, Psychology, Foreign Languages);
- *Degree Mark* with 3 levels (Low, Medium, High);
- *Degree Level* with 2 levels (Bachelor, Master);
- *English Knowledge* with 2 levels (Suitable for communication with foreigners, Inadequate for communication with foreigners);

- *Relevant Work Experience* with 4 levels (No experience at all, Internship during or after completion of university studies, Discontinuous or occasional work during university studies, One year or more of regular work);
- *Willingness to Travel on Business* with 3 levels (Unwilling to travel on business, Willing to travel on business only for short periods, Willing to travel on business even for long periods).

Interviewees were representatives of companies registered on the Portal of Almalaurea for recruitment and linkage, limited to University of Milano-Bicocca. The population of companies consisted of 4,183 potential recruiters. Final respondents were 471. A majority (52%) of companies had 15-49 employees, the second largest group of companies (25.6%) had 50-249 employees and 22.4% of companies had at least 250 employees (22.4%). The most common business sectors were services to industry (62.1%), services to the person or the family (16.2%) and manufacturing (14.9%). The majority of companies (89.4%) operated fully or partially for the domestic market. Moreover, they were directly managed by the entrepreneur (64.2%). The first two characteristics of the companies, company size and business sector are layering factors for a stratified CA (see Table 1). Source of all tables in the text is our processing of data from the ELECTUS survey (University of Milano-Bicocca unit).

Tab. 1: Layering factors controlled in the experiment

Number of employees	Companies (%)	Business sectors	Companies (%)
≤19	37.5	Services for Industry	62.1
20-49	14.5	Personal Services	16.2
50-249	25.6	Manufacturing	14.9
≥250	22.4	Other	6.8

5.1 COMPANY SIZE

The first stratification variable is company size. The hypothesis is to verify possible changes in the construction of an ideal profile for HRAs while varying company size. The standard classification for the enterprise size divides companies into 4 categories according the number of persons employed and the turnover. According to this sub-division, enterprises are classified as micro, small, medium and large (European Commission, 2003). Actually, the design of the study involves only enterprises with more than 15 employees, so no micro companies are present in the analysed sample. The results in Table 2 show the competencies most appreciated by entrepreneurs in a new-graduate applying for a job as an HRA.

The ideal profile is a graduate in psychology with a high degree mark, who is able to communicate with foreign people, with regular relevant work experience and willing to travel on business also for long periods. No evidence about the degree level can be provided, since both utility levels are close to 0. The ideal profile consists of the combination of levels with the highest utilities of the characterizing attributes. Actually, even when results are shown for sub-samples relating to the firm size, no clear differences in terms of ideal profiles emerge.

Otherwise, the breakdown by the dimension of the company produces very interesting results when the hierarchy of attributes expressed through the importance index is considered. For all companies, whatever their size, the most important attribute is field of study. However, as can be seen in Table 3, the hierarchy of other attributes changes over the sub-samples. After reaching a peak for 20-49 employee companies, as firm size increases, the importance of the field of study decreases. This could suggest that for medium and large industries, the contribution of other factors is an important hiring factor. For example knowledge of English reaches its maximum of 20.8% in medium size firms and willingness to travel and degree score up to 14.9% and 13.5% for big size industries. Degree level is irrelevant and there is no change over the four size categories, and the importance of the level of final degree mark is low. Indeed, there is no apparent difference between the utility assigned to a bachelor degree and a master degree. This could be explained by the fact that a bachelor degree is a basic requirement for entering the labour market, while the upper degree level is useful to career and remuneration at further stages.

Tab. 2: Utililty estimates by graduate characteristics and company size (Signif. codes: 0 '*'; 0.001 '**'; 0.01 '*'; 0.05 '.'; 0.1 ' ' 1)**

CV characteristics	**Company size**				
	≤ 19	20-49	50-249	≥250	**Total**
Field of Study					
Philosophy and Literature	0.327	0.054	0.110	0.082	0.156
Educational Sciences	0.825***	0.348	1.173***	0.728	0.860***
Political Sciences	-0.337	0.235	0.382	-0.132	0.188
Economics	0.328	-0.226	0.728*	0.772*	0.321*
Law	0.333	0.515	0.381	0.642*	0.550**
Statistics	-0.774**	-0.407	-1.187**	-0.472	-0.696***
Engineering	-0.937**	-1.414**	-1.338***	-1.505***	-1.558***
Computer Science	-1.311	-0.681	-0.615*	-1.398***	-1.121***
Psychology	**1.649**	**1.884*** **	**1.192*** **	**1.323*** **	**1.537*** **
Foreign Languages	-0.103	-0.308	-0.825	-0.040	-0.237
Degree Level					
Bachelor	**0.010**	**0.047**	**0.012**	**0.042**	**0.025****
Master	-0.010	-0.047	-0.012	-0.042	-0.025
Degree Mark					
Low	-0.178	-0.235	-0.106	-0.407*	-0.250***
Medium	-0.031	0.086	-0.067	0.096	0.095
High	**0.208**	**0.149**	**0.173**	**0.311**	**0.155**
English Knowledge					
Suitable	**0.349****	**0.314***	**0.488*** **	**0.193***	**0.270****
Inadequate	-0.349	-0.314	-0.488	-0.193	-0.270
Relevant Work Experience					
No experience	-0.219	-0.025	0.140	-0.130	-0.167
Internship	0.047	0.018	-0.047	-0.063	-0.002
Occasional	-0.117	-0.104	-0.045	- 0.155	-0.138
Regular	**0.289**	**0.111**	**0.232**	**0.347**	**0.307**
Willingness to Travel on Business					
Unwilling to travel	-0.347**	-0.274	-0.283*	-0.360*	-0.353
Short period	0.045	**0.236**	0.067	-0.070	0.070
Long period	**0.302**	0.038	**0.216**	**0.430**	**0.283**

Tab. 3: Percent Importance estimates of graduate's attributes by company size

	Company size				
Attributes	≤ 19	20-49	50-249	≥250	**Total**
Field of study	56.7	64.3	54.1	53.3	57.2
Degree level	0.4	1.8	0.5	1.6	0.5
Degree mark	7.4	7.5	6.0	13.5	7.2
English knowledge	13.4	12.3	20.8	7.3	12.5
Relevant work experience	9.7	4.2	7.9	9.4	8.6
Willingness to travel	12.4	10.0	10.7	14.9	14.0

5.2 BUSINESS SECTORS

The second layering factor taken into account is the business sector of companies, as it can be seen in Table 1. The most represented economic sector is services for industries with a percentage of 62.1%. This sector contains a subset of the domestic economy, excluding the economic activities of general government, of private households, and of non-profit organizations serving individuals. The second sector considered, personal services, contains the part of the economy which is run by private individuals or groups, usually as profit-making enterprises, and is not controlled by the State.

The last sector is manufacturing and is represented by all companies working in the production of goods for use or sale using labour and machines, tools, chemical and biological processing. Enterprises belonging to other business sectors (6.8%) have not been considered in this work.

With regard to company size in Table 4, the estimate of the part-worth utilities was obtained through stratified CA. Also in this case, field of study is the most relevant requirement. But unlike the analysis about firm size, here there is no universality about the ideal major for a HRA position. Indeed, for services for industries and manufacturing firms the best profile is that of a graduate in psychology, while for the personal services sector, the major with the highest utility score is law. Negative utilities are present in all sectors for statistics, engineering, computer sciences and foreign languages. A master degree graduate is slightly preferred to a bachelor but, as in the previous analysis, utility scores are close to 0. It is more important not have a low degree mark which produces negative utility scores. A high degree mark is preferred for service for industries and manufacturing, while a medium one is enough for personal services. The ability to communicate with foreign people and the willingness to travel even for long periods are always desirable competencies. In terms of relevant work experience, regular experience

is preferred by companies providing services for industries and personal services, while for manufacturing companies, an internship experience suffices.

Tab. 4: Stratified part-worth utilities by business sector (Signif. codes: 0 '*'; 0.001 '**'; 0.01 '*'; 0.05 '.'; 0.1 ' ' 1)**

	Business Sector			
CV characteristics	*Service for industries*	*Personal services*	*Manufacturing*	**Total**
Field of study				
Philosophy and Literature	0.167	-0.006	0.193	0.103
Educational Sciences	0.852***	0.989***	0.690***	0.880***
Political Sciences	0.190	-0.509	-0.094	0.086
Economics	0.308	0.726**	0.858**	0.465**
Law	0.232	**1.257*** **	-0.606	0.280**
Statistics	-0.905***	-0.437*	-0.656**	-0.742**
Engineering	-1.137***	-1.683***	-1.526***	-1.351***
Computer Sciences	-1.114***	-1.093***	-0.405	-1.014**
Psychology	**1.600*** **	1.173***	**1.938*** **	**1.558*** **
Foreign Languages	-0.193	-0.417	-0.392	-0.265
Degree Level				
Bachelor	-0.032	-0.007	-0.119	-0.013
Master	**0.032**	**0.007**	**0.119**	**0.013**
Degree Mark				
Low	-0.250	-0.109	-0.277**	-0.195**
Medium	**0.173**	0.279	-0.083	0.021
High	0.076	**0.389**	**0.360**	**0.174**
English Knowledge				
Suitable	**0.262*** **	**0.266*** **	**0.559*** **	**0.317*** **
Inadequate	-0.262	-0.266	-0.559	-0.317
Relevant Work Experience				
No experience	-0.107	-0.428	0.010	-0.137
Internship	-0.014	0.114	**0.187**	0.047
Occasional	-0.174	-0.266	-0.033	-0.172
Regular	**0.294**	**0.580**	-0.164	**0.263**
Willingness to Travel on Business				
Unwilling to travel	-0.435**	-0.201**	-0.450**	-0.390***
Short period	0.163	-0.068	-0.079	0.068
Long period	**0.272**	**0.269**	**0.529**	**0.322**

Table 5 shows the importance indices for all attributes representing the relative weighting of entrepreneurs' preferences. Also the breakdown by company size shows that the importance index by field of study is over 50%, making it the most relevant attribute. The second most relevant attribute changes over the sectors. For services for industry companies, the second most relevant competence is willingness to travel, which scores 14.3%, for personal services companies it is relevant work experience, which scores 17.9%, for manufacturing it is English knowledge, which scores 16.5%. The degree mark is quite close to 10% for all sectors, while the lowest percent importance is reserved to degree level.

Tab. 5: Percent importance indices by business sector

Attributes	**Business Sector**			**Total**
	Service for industries	*Personal services*	*Manufacturing*	
Field of Study	55.6	52.2	51.0	57.2
Degree level	1.3	0.3	3.5	0.5
Degree Mark	8.6	11.9	9.4	7.2
English Knowledge	10.7	9.4	16.5	12.5
Relevant work experience	9.5	17.9	5.2	8.6
Willingness to travel	14.3	8.3	14.4	14.0

Results showed that there is a substantial difference between the examined layering factors, company size and business sector. On one hand, the firm size does not seem to represent a reason of heterogeneity for the ideal profile for an HRA. On the other hand, the ideal profile changes over the sub-samples when a different activity sector is taken into account.

6. CONCLUSION

In this study the results of the Electus project are presented. This research project involved 471 entrepreneurs in Lombardy and measured the skills and competencies required in a newly fledged HRA.

The use of two stratification factors allowed potential differences to be evaluated when sub-samples about enterprise size and activity sectors are taken into account. Results of the analysis did not show clear evidence about difference in layering factors in the construction of the ideal profile but in the hierarchy of the competencies. The ideal profile for a human resource assistant is a graduate in psychology with a high mark, relevant work experience, able to communicate in English and willing to travel on business even for long periods.

The differences between stratification factors are relevant in terms of hierarchy of attributes. Field of study is the most relevant factor in hiring a new HRA. A command of English is the most appreciated factor for small and medium-size companies and for enterprises operating in manufacturing. Willingness to travel is highly desirable for large companies. Having regular relevant work experience is largely preferred for firms working in the personal services sector. Finally, little importance is assigned to the level of the degree (bachelor or master), probably because the concerned position is an entry level position on the labour market. The degree level could represent a distinctive factor when the possibility of professional growth within the company is considered.

The goal of this study was achieved and it would be beneficial to compare our results with analogous research analyses in order to improve the match between what universities offer the labour market and what companies are looking for.

These results can be exploited by students to address their choices in terms of field of study or in terms of extra-curricular skills. To know what the most required features for the access to the job market are could help to understand what job positions are more suitable for them. On the other side, universities could be encouraged to compare their educational offer and what the entrepreneurs are looking for in new recruits.

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