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A New Relative Importance Index of Evaluation for Conjoint Analysis: Some Findings for CRM Assistant

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Abstract

ELECTUS is an Italian multi-centre research project with the aim of reinforcing the relationship between the academic world and business. Through this project, it is possible to acquire information about entrepreneurs' new graduate recruitment strategies. Using a CAWI survey, Lombardy companies with at least 15 employees were asked to indicate their preferences in choosing among hypothetical profiles of new graduates with different competencies. In this study, a conjoint analysis is performed to identify the features of a graduate's profile that employers prefer for a potential candidate for the position of a customer relationship management assistant. From a methodological point of view, starting from the part-worth utilities of conjoint analysis, a new indicator of relative importance of attributes is introduced to measure the monetary value for the skills possessed by the candidates.

Keywords Conjoint analysis · Relative importance of attributes · Economic valuation index · Labour market · ELECTUS

1 Introduction

One of the main reasons for gaining an understanding of the dynamics of the labour market is to improve the match between the competencies requested by entrepreneurs and the skill sets of job seekers.

Such an analysis is highly useful in a context of high unemployment, when employers are reluctant to invest in human capital. A raised unemployment rate causes a direct

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competition between individuals and this pushes them to spend resources on education without the possibility of using the acquired knowledges in a professional context. Specially, starting from the beginning of the world economic crisis, reducing the mismatch between supply and demand in the labour market is crucial to limiting youth unemployment and optimizing the efficiency of educational resources.

An economic shock is an event that occurs outside of an economy and the effects of shocks on the labour market are well-known in the economic literature. A slowdown of the business cycle causes changes to expectations in the short period and a reduction in new hirings. Moreover, unlike other economic crises, the one started in 2008 is impacting both workers with few qualifications and graduates. Youth unemployment usually depends not only on the economic cycle but also on structural reasons that are mainly related to a mismatch between supply and demand in the labour market. This results in a stream of highly qualified people to foreign countries (Unioncamere 2017; Isfol 2017).

In 2014, despite a slight fall in unemployment, more than 94,000 young people left Italy, many of whom were highly educated (Istat 2014). According to the 2016 AlmaLaurea Report, the employment prospects for graduates confirms the difficulties in the labour market during recent years, although prospects improved slightly in 2014 and 2015. In particular, unemployment fell amongst new graduates; additionally their salary and the efficacy and stability of their situation improved (Almalaurea 2016).

When looking at the labour market, it is important to analyse companies and their expectations regarding the possibility of taking on new people. It appears useful to understand the dynamics of recruitment, in particular the relative importance of the competencies requested from new graduates by entrepreneurs. For this reason, the aim of this paper is to perform a conjoint analysis (henceforth, CA) of the profiles that employers' prefer when selecting graduate candidates to a vacancy (Lancaster 1966). Specifically, the analysis intends to detect how some characteristics of the new graduates can affect possible future recruitment and remuneration. Moreover, the paper would like to define some across the board skills that are universally recognized as "best practices" for a graduate. Finally, the analysis allows us to differentiate and evaluate wages and competencies for new graduates. From a methodological point of view, in the context of conjoint analysis, a new index of relative importance of the attributes has been introduced. This index is very useful when the number of attribute levels is spread and different. The study is based on the multi-centre research, Education-for-Labour Elicitation from Companies' Attitudes towards University Studies (Fabbris and Scioni 2015), a research project involving several Italian universities.

The paper is organised as follows. Section 2 introduces the methodology of conjoint analysis and the proposal of an index for the relative importance of attributes. Section 3 presents the ELECTUS study in Lombardy. The results of the analysis are reported in Sect. 4. Section 5 is reserved for discussion and final remarks.

2 Methodology

Conjoint analysis is among the most used methods to analyse choice and to derive utility from the properties of each single characteristic of goods, services or, as in this application, jobs.

Preferences are implemented without a direct evaluation of the procedures related to the attributes of the product; instead, the existing trade-off among them is shown. The basis of this technique is the economic theory introduced by Lancaster (1966) and Green and

Srinivasan (1978), according to which consumers' preferences, expressed in terms of an ideal profile for a product, could be broken down into partial utilities consisting of the levels of an attribute of the product. In CA, it is necessary to find the utilities that, using an additive or multiplicative rule, reproduce the opinions expressed by consumers. Using CA, it is possible to identify the features of a graduate that mainly influence the entrepreneurs' choice and which levels of the attributes are perceived in a positive or negative way. Finally, it is necessary to build an ideal profile of the graduate. The conjoint rating response format is used to exploit the additional information regarding a respondent's preferences. The preference model is a part-worth utility linear function, and part-worth utilities are an assumption for each level of the various attributes estimated using OLS multiple regression. The attention is focused on a rating scale and opts for a very general preference model used in traditional CA. In fact, the information contained in the rating conjoint format is exploited by regressing individual responses on a piece-wise linear function of all the attribute levels that describe the possible candidate. Because conjoint data are collected on a non-metric scale, a non-metric estimation procedure such as MONANOVA would be more appropriate than OLS. However, as demonstrated in Carmone et al. (1978) and Cattin and Wittink (1982), OLS regression provides similar parameter estimates for both ranking and rating scales; therefore, it seems a reliable estimation procedure.

Let J indicate the number of attributes, where each attribute has l_j ($j = 1, 2, \ldots J$) levels. The general main-effect decompositional multi-attribute preference model (Mezbahur and Lorica 1999) can be formulated as:

$$u_k = \sum_{j=1}^{J} \sum_{h=1}^{l_j} \beta_{jh} x_{jh}. \tag{1}$$

where u_k is the overall utility assigned by respondents to the k-th alternative of the total K alternatives of the experiment. Moreover, β_{jh} is the part-worth utility associated to the h-th level of the j-th attribute, and x_{jh} denotes the presence ($x_{jh} = 1$) or absence ($x_{jh} = 0$) of the h-th level of the j-th attribute[1]. As a result, the overall utility u_k is obtained by summing the terms $\beta_{jh} x_{jh}$ over all attribute levels. In this paper, it refers to this piece-wise linear function as a part-worth function model that gives a specific utility value for each level of the considered attributes, the part-worth utility β_{jh}. Consequently, the number of parameters estimated by assuming the part-worth specification is greater than that required by alternative preference model specifications such as the vector model form and the ideal model (Green and Srinivasan 1978).

Let $\beta_j = [\beta_{j1}, \beta_{j2}, \ldots, \beta_{jl_j}]$ indicate the vector with the part-worth utilities of the j-th 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:

$$I_j = \frac{\max\left(\beta_j\right) - \min\left(\beta_j\right)}{\sum_{j=1}^{J} \left[\max\left(\beta_j\right) - \min\left(\beta_j\right)\right]}, \quad (j = 1, \ldots, J) \tag{2}$$

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[1] The K alternatives are given by the combination of presence or absence of the x_{jh}.

Usually, importance values are represented as percentages and have the property of adding up to one hundred.

2.1 A New Indicator of Relative Importance for Attributes

When the number of levels varies widely among attributes, it seems to be useful to directly consider this variability in computing the relative importance of the attribute. The recourse to this tweaking is particularly effective when there is a direct relationship between the levels of an attribute and a possible choice. To the best of our knowledge, few authors [see, for example Mezbahur and Lorica (1999) and Danaher (1997)] have proposed a solution to this problem. This paper proposes the innovative idea to divide the numerator of formula (2) by the number of the levels of the *j*-th attribute:

$$Imp_j^* = \frac{\max\left(\beta_j\right) - \min\left(\beta_j\right)}{l_j}, \quad (j = 1, \ldots, J) \tag{3}$$

and consequently:

$$I_j^* = \frac{Imp_j^*}{\sum_{j=1}^{J} Imp_j^*}, \quad (j = 1, \ldots, J) \tag{4}$$

In Eq. (3), the effect of the number of levels for the attribute is mitigated by dividing the importance of the attribute by the number of levels.

Following Green and Helsen (1989), Green and Krieger (1991) and Mariani and Mussini (2013), for the *t*-th respondent, the importance of the *j*-th attribute with l_j levels is defined in terms of the average range of the part-worths across the levels of that attribute:

$$Imp_{tj}^* = \frac{\max\left(\beta_{tj}\right) - \min\left(\beta_{tj}\right)}{l_j}, \quad (t = 1, \ldots, n; j = 1, \ldots, J) \tag{5}$$

where β_{tj} is the vector of the part-worth utilities referred to the various levels of the *j*-th attribute for the *t*-th respondent, $\max\left(\beta_{tj}\right)$ and $\min\left(\beta_{tj}\right)$ are, respectively, the highest and the lowest value of the vector β_{tj}. Then, for the *t*-th respondent, the relative importance of the *j*-th attribute is given by:

$$I_{tj}^* = \frac{Imp_{tj}^*}{\sum_{j=1}^{J} Imp_{tj}^*}, \quad (t = 1, \ldots, n; j = 1, \ldots, J) \tag{6}$$

The separate computation of the importance values for each respondent allows for the attribute importance values to be summarised by considering how the attribute importance values vary over the various respondent (Mariani and Mussini 2013). Starting from the individual values of importance, it is possible to get a sample distribution of the relative importance of the *j*-th attribute. The sample distribution allows to derive quantiles of order

p, $I^*_{(p),j}$. The use of the order statistics can increase the robustness of the estimator (David and Nagaraja [1970]).

2.2 Coefficient of Economic Valuation

A coefficient based on part-worth utilities can determine the monetary variation associated with any change in the combination of the attributes of a job with respect to the actual revenue generated by that job.

Having chosen the preference model with the rating scale, a coefficient of economic valuation is developed for a hypothetical change that occurs in the combination of the attribute levels, as introduced by Mariani and Mussini ([2013]).

Total utility variation is computed by replacing one attribute level of *status quo b*, where b is the current profile of the job, with attribute level h (with $h = 1, \dots, l_j$). Let $M_j = [M_{j1}, M_{j2}, \dots, M_{jh}, \dots, M_{jl_j}]$ indicate a vector related to the j-th attribute, where the h-th element is defined as

$$M_{jh} = \frac{u_h^j - u_b}{u_b} \tag{7}$$

where u_b (assumed to be different from 0) denotes the sum of the utility scores of the *status quo b* of the job, while u_h^j denotes the sum of the part-worth utilities associated with the specific combination of the attributes (as in u_b) with the modification for the h-th level of the j-th attribute. Equation ([7]) indicates whether the *status quo b* modification gives a loss or a gain. If $M_{jh} = 0$, there is no loss or gain in terms of total utility. However, the utility change arising from an attribute-level modification can be considered more important or less important by respondents. Accordingly, this change can have a more important economic impact than a utility modification, which has a similar intensity while involving a less relevant attribute. As a solution, it is used to weigh the relative importance of the modified attribute (Garavaglia and Mariani [2017]). Otherwise, it is possible to express these importance values by entering the sample quantile of p to obtain the importance of the modified attribute:

$$MI_{(p),j} = M_j * I^*_{(p),j}. \tag{8}$$

Assuming a change in the *status quo* profile, formula [1] is used to estimate the variation of the mean individual revenue. Given the gross annual salary (*GAS*) associated with the *status quo b* profile, the coefficient of economic valuation is expressed as follows:

$$V_{(p),j} = MI_{(p),j} * GAS \tag{9}$$

where $V_{(p),j}$ is a vector which denotes the amount of salary variation for the j-th attribute for the l_j levels. The variation $V_{(p),j}$ is obtained by supposing that the monetary attribute of the job varies in proportion to the change in total utility. This assumption may seem restrictive. However, it is possible to argue that the monetary amount asked of an employer for a job reflects how a user values the combination of attributes of the job in terms of utility. Using this hypothesis, it is credible to assess the economic value of a change in the combination of attributes as a function of the utility and importance of the modified attributes. In addition, CA serves the purpose of approximating the real structure of preferences given that there is only partial knowledge of preferences. Therefore it is possible to use $V_{(p),j}$ as

a monetary indicator that approximates the impact of a given utility change in monetary terms.

3 The ELECTUS Project

From a perspective of synergy between education and the labour market, a possible solution is represented by multi-centre research such as ELECTUS (Fabbris and Scioni 2015). This project was created with the objective of measuring job offers by polling the companies, and it concerns the policies for understanding the relationships between the enterprises and universities, with reference to the labour market for new graduates. The questionnaire contains two macro-sections. In the first part the entrepreneurs are asked to choose and rank four possible profiles of new graduates for five different job vacancies. In the second part, the entrepreneurs are asked about their socio-demographic features. The survey was conducted in 2015 using the CAWI technique. Data were collected using a software program called Sawtooth (2017). To measure entrepreneurs' preferences, a conjoint experiment was conducted in these following terms (Fabbris and Scioni 2015):

- First, each entrepreneur was asked to select the best of four hypothetical profiles of candidates for a junior job position. The four profiles were presented with one vignette describing, in random order, the four profiles. The respondent was asked to indicate the preferred one, which was the one that most closely matched the profile of the ideal candidate for a given position. The question was 'Imagine that you are interested in recruiting a person for the position of (). Which of the four profiles that appear in the screen would you invite for a job interview, because it is the closest to your ideal candidate?'. Obviously, the choice is related to the pre-selection of candidates (before the job interview) and it is based on CVs.
- Subsequently, questions on the features qualifying the choice were also posed. One such question was to mark each profile on a scale of 1–10.

Five job positions were considered vacant as follows: administrative employee, marketing assistant, HR assistant, customer relationships management (CRM) assistant and ICT professional (system analyst).

The candidates' profile are characterized by the following six attributes:

- *Field of study* with 10 levels (Philosophy and Literature, Educational Sciences, Political Sciences/ Sociology, Economics, Law, Statistics, Industrial Engineering, Mathematics/ Computer Sciences, Psychology and Foreign Languages);
- *Degree mark* with 3 levels (Low, Medium and High);
- *Degree level* with 2 levels (Bachelor's and Master's);
- *Knowledge of English* with 2 levels (Suitable for communication with foreigners and 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 and 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 and Willing to travel on business even for long periods).

The attributes used to describe the possible candidates were selected after a literature review and thanks to the elicitation of experts' opinions through a focus group at the University of Padua. The profiles submitted to the entrepreneurs' attention are simply a 'sample' of the large set taught in a general university. Effectively, this survey could aim to consider the usefulness of disciplines taught at the universities with respect to the five job positions and the entrepreneurs' preferences. The combinations for all alternatives provided in full factorial design were numerous, making it necessary to reduce the possibilities using a tailored fractional factorial design. The universe of all possible alternatives was arranged and a random sample of four was administered to each respondent. This way, sufficient information over the entire spectrum of attribute levels was obtained from respondents. An individual questionnaire was generated according to the following criteria:

- Minimum overlap criterion: each attribute level should have appeared as few times as possible in a single questionnaire;
- Level balance criterion: each attribute level should have appeared approximately an equal number of times both within a single questionnaire and in the whole sample
- Orthogonality criterion: attribute levels should have been defined independently of other attribute levels so that the effect of each attribute level could be measured independent of the others.

At the end, the experimental design was both orthogonal and balanced. The experimental design was created by the Sawtooth program itself.

As far as the Milano-Bicocca research unit is concerned, interviewees were representatives of companies registered on the Portal of AlmaLaurea for recruitment and linkage, which was limited to the university site. The population of companies targeted consisted of 4183 potential recruiters. Companies received an e-mail inviting them to take part in the survey. If they did not answer after the first attempt, they were again invited another three times, once a week, to complete the questionnaire. After these attempts, the final number of respondents was 471. Company profiles show that they mainly had 15–49 employers (52%), followed by companies with 50–249 employees (25.6%) and the smallest group of companies (22.4%) had at least 250 employees. The most represented 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 within the domestic market. Moreover, they were mainly under the management of an entrepreneur (64.2%). Regarding attitudes towards new recruitment, 55.2% of the firms had kept the same number of employees during the last 3 years, while 33.3% had increased their workforce and more than 70% of the companies predicted that they would hire a new resource.

4 Application

In this paper, entrepreneurs' preferences for a CRM assistant in Lombardy will be considered. For this reason it appears useful to analyse this job position.

4.1 The CRM Assistant

There has been constantly increasing global interest in the business role of customer relationship management in recent years. This job position is heterogeneous, as the job

description varies with the activity sector and customers' needs. A general definition, given by Unioncamere (2017), defines the customer relationship management (henceforth, CRM) assistant as someone who:

- handles customers' phone calls to solve problems relating to products operation;
- liaises between the customer and company by handling orders and payments;
- fields requests for assistance from insured customers;
- provides help using back-office computerized procedures;
- takes care of all difficult situations to reinforce the link between the customer and the company.

It is clear that it is a job position requiring both generic and specific competencies and skills, most of which are related to the productive process. The interest in this position cuts across all business sectors. However, this job position is most often found in telecommunications and manufacturing companies (Isfol 2017).

Most of the companies have an information technology system to manage the relationships with customers and the use of CRM software makes their job easier than in the past. In other sectors, it is useful to have a business area devoted to the operational CRM. When companies work in detail this area is supervised by the customer service. The analysis of the use of CRM in the business processes shows that it is operational above all in sales and marketing processes. Furthermore, in recent years, the CRM area has been growing in the post-sale process and in E-commerce, which are areas in which processes have to be streamlined. Companies are moving towards new sectors such as digital transformation, marketing automation, Big Data; simultaneously CRM is moving towards customer experience and Social CRM (C-Direct Consulting 2016).

Since the CRM area is generally growing in the companies, it is reasonable to suppose that the CRM assistant will be a fundamental figure in the business organizational chart for the development of successful strategies.

In Lombardy, companies expressed a similar interest in this position, increasing their share in the companies from 0.44 to 0.46% in 2014–2016. Regarding the hirings in 2016, the majority were in medium-to-large companies (more than 50 employees), without differences between male and female numbers. The minimum educational level requested is a high school diploma, but knowledge of English and IT competencies are also necessary (Isfol 2017). There is a mismatch between companies' preferences and competencies possessed by candidates, and a deeper analysis could help improve the match between supply and demand for this job position. This should help graduates understand the skills that are most sought after and help firms find the right type of recruit.

4.2 Results

For the CRM assistant job position, there were 232 final respondents due to missing responses to the question about willingness to pay the right salary to the new recruit with the right profile. Some descriptive statistics about the final sample are described in Table 1. As for the total sample, companies mainly had 15–49 employers (46%). The most represented sectors were services to industry (61.2%), operating fully or partially within the domestic market (87.1%), under the management of an entrepreneur (64.2%).

Conjoint analysis was used to measure entrepreneurs' preferences. Data processing and CA were performed using *R* software and the 'conjoint' package (Bak and Bartlomowicz

Table 1 Descriptive statistics for respondents for CRM profile

No. of employees	Activity sectors	Activity market	Supervisor
0–19 (28.9%)	Service industries (61.2%)	Both (48.7%)	Entrepreneur (64.2%)
20–49 (17.2%)	Manufacturing (18.1%)	Domestic (38.4%)	Manager (25.4%)
50–249 (28.9%)	Personal services (15.1%)	International (12.9%)	Other (10.3%)
250+ (25.0%)	Other (5.6%)		

2012). In this experiment the possible profiles obtained from combining every level in a full factorial fashion were so many that, it was necessary to apply a tailored fractional factorial design. According to several criteria (Fabbris and Scioni 2015), an individual random sample of four profiles was administered to each respondent, who had to score them on a scale of 1–10. Table 2 shows the part-worth utilities for CRM assistant[2]. As seen in Table 2, the main degree component preferred by respondents is Economics, even if positive values are also present in descending order for Political Sciences, Engineering and Computer Sciences.

It is important to remember that, since the sum of utilities for all levels of an attribute equals to 0 by definition, less desirable attributes could have negative utilities.

Utility scores for the variable *Degree level* are very close to 0 for each position. This means that there is no significant difference between bachelor's and master's degrees for the respondents. This because all analysed positions are very basic and do not require specialized skills. *Degree mark* is a skill where the best two levels are preferred such that, a medium-high degree is preferable among candidates. *Knowledge of English* shows the highest utility for candidates with the ability to communicate fluently with foreigners. Finally, *Willingness to travel on business* for short or long periods is a very appreciated quality in candidates.

Since this study clearly shows and empirically proves that there is an entrenched relationship between *Field of study* and the entrepreneurs' choice of a candidate for a job vacancy, the application of the modified version of the index presented in Eq. (4) seems plausible. Table 3 shows a comparison between two methods for the computation of the index of importance. In the first column the values of I_j are shown, while the second column reports the values of I_j^*. Regarding I_j, the influence of *Field of study* was prevalent (43%). For I_j^*, the predominant attribute is now *Knowledge of English* which has increased to 35%, while *Field of study* dropped to the third position with 16.5%. In relation to the other skills, there is not a big difference between the two methods, in that *Willingness to travel* is the second most prevalent with respectively 18% and 22.8%. *Degree mark* and Relevant work experience were in an intermediate position with values close to 10% and finally the *Degree level* remained the least relevant competence.

As reported in Table 3, the new formulation of the index dramatically changes the importance of the attributes. To evaluate which of the two rankings is more valid we

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[2] Following this approach all competencies are treated as single variables and all interactions are ignored, even if the approach seems reductive. In fact, a business-oriented mentality-such as that represented by practicing foreign languages and travelling-heavily depends on the field of study. Even the final mark of graduates interacts with the field of study and this interaction defines, or in any case correlates with the so called human capital.

Table 2 Part-worth utilities for CRM assistant

Levels of attributes	Utilities	SE	P-value
Field of study			
Philosophy and literature	− 0.563	− 2.608	0.009
Educational sciences	− 0.209	− 0.963	0.335
Political sciences	0.200	0.933	0.351
Economics	1.016	4.907	1.10e−06
Law	− 0.091	− 0.421	0.674
Statistics	− 0.169	− 0.809	0.419
Engineering	0.047	0.221	0.825
Computer sciences	0.025	0.116	0.907
Psychology	− 0.156	− 0.730	0.465
Foreign languages	− 0.101	–	–
Degree level			
Bachelor's	− 0.059	− 0.831	0.406
Master's	0.059	–	–
Degree mark			
Low	− 0.230	− 2.317	0.020
Medium	0.140	1.403	0.161
High	0.090	–	–
Knowledge of English			
Suitable	0.300	4.256	2.29e−05
Inadequate	− 0.300	–	–
Relevant work experience			
No experience	− 0.162	− 1.315	0.189
Internship	− 0.131	− 1.066	0.287
Occasional	− 0.101	0.838	0.402
Regular	0.192	–	–
Willingness to travel on business			
Unwilling to travel	− 0.420	− 4.188	3.09e−05
Short period	0.235	2.350	0.019
Long period	0.185	–	–

Table 3 Competency attributes and ideal levels for job vacancies; the ranking in descending order is shown in brackets

Competencies	I_j	I_j^*
Field of study	43%(1)	16.5%(3)
Degree level	3%(6)	6.2%(6)
Degree mark	10%(4)	12.9%(4)
Knowledge of English	16%(3)	31.4%(1)
Relevant work experience	10%(5)	9.2%(5)
Willingness to travel	18%(2)	22.8%(2)

introduce another information source. In the survey, the respondents were asked to rank the relevance of each of the six attributes (from first to sixth position) after profile rating. Table 4 shows the average rank of the attributes as directly valued by respondents.

Table 4 Average rate of the attributes for the CRM position in the preference elicitation experiment

Competencies	Average rank
Field of study	2.78(2)
Degree level	3.63(4)
Degree mark	3.11(3)
Knowledge of English	2.72(1)
Relevant work experience	4.81(6)
Willingness to travel	3.95(5)

Ranking in descending order is shown in brackets

Comparing the ranks in Tables 3 and 4, it is apparent that, the sum of the absolute deviation of the ranks obtained by the CA from the ranks obtained by the direct ranking of attributes[3] favours the indicator I_j^*. Moreover using the sum of the squared deviation of the ranks obtained by the CA from the ranks obtained by the direct ranking of attributes[4], the indicator I_j^* performs better than the old one. Looking at the correlation between rankings[5] the rank given by the new indicator is more similar to the rank given by the direct ranking of attributes. In addition, given that the first position and the third position in the ranking given by the new indicator and the ranking in Table 4 coincide, we decided to use the new indicator for the analysis of WTP.

The distribution of the individual contribution has been used to build a non-parametric confidence interval by index of importance. After rating the selected profile and choosing the best one, the entrepreneurs had to propose a gross annual salary (*GAS*) for the chosen profile to measure the WTP (Breidert et al. 2006). Here, *GAS* = 28,000 € was considered for a CRM assistant with the best profile. For this reason all monetary variation will be negative. This amount is the result of a specific question in the survey in which the respondents were asked to assign a GAS to the new hired profile. This salary is an average value only corresponding to respondents who selected an ideal CRM candidate, obtained as a combination of the levels with the biggest utility for each attribute. The ideal profile is represented by a master graduate in Economics with a medium Degree Mark, who can communicate with foreign people, has a regular relevant work experience and is willing to travel only for short periods. Of note, for some attributes such as *Degree mark* and *Willingness to travel on business*, there is no significant difference between the top two levels (High Mark versus Medium Mark and Willingness to Travel on Business for short versus long periods).

Moreover, when only considering the minimum of the *GAS* for the CRM assistant position for the national collective bargaining agreement, this amount is approximately GAS_{min} = 25,000 €. Therefore, it is possible to hypothesize that a difference between a best candidate and a profile with GAS_{min} is approximately 3000 €. This difference is strictly related to the attributes of the ELECTUS survey. In fact the sum of the biggest differences present in Tables 4, 5, 6, 7, 8, 9 and 10 is a little more than 3000 €. In Tables 5, 6, 7, 8, 9 and 10, the values of $V_{(p),j}$ are presented for $p = 0.025, p = 0.5$ and $p = 0.975$.

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[3] The values are 20 for I_j and 16 for I_j^*.

[4] The values are 10 for I_j and 8 for I_j^*.

[5] The values of the correlations of the ranks obtained by the CA with the rank obtained by the direct ranking of attributes are 0.426 and 0.543 respectively for I_j and for I_j^*.

Table 5 Monetary variations $V_{(p),j}$ for *Field of study*

Field of study	$V_{(0.025),j}$	$V_{(0.5),j}$	$V_{(0.975),j}$
Philosophy and literature	− 120.00	− 422.40	− 1269.60
Educational sciences	− 93.60	− 328.80	− 986.40
Political sciences	− 62.40	− 218.40	− 657.60
Economics	0.00	0.00	0.00
Law	− 84.00	− 297.60	− 890.40
Statistics	− 91.20	− 316.80	− 952.80
Engineering	− 74.40	− 259.20	− 780.00
Computer sciences	− 76.80	− 266.40	− 796.80
Psychology	− 88.80	− 314.40	− 943.20
Foreign languages	− 86.40	− 300.00	− 900.00

Table 6 Monetary variations $V_{(p),j}$ for *Degree level*

Degree level	$V_{(0.025),j}$	$V_{(0.5),j}$	$V_{(0.975),j}$
Bachelor	− 26.40	− 31.20	− 36.00
Master	0.00	0.00	0.00

Table 7 Monetary variation for *Degree mark*

Degree mark	$V_{(0.025),j}$	$V_{(0.5),j}$	$V_{(0.975),j}$
Low	− 84.00	− 199.20	− 283.20
Medium	0.00	0.00	0.00
High	− 12.00	− 26.40	− 38.40

Table 8 Monetary variations $V_{(p),j}$ for *Knowledge of English*

Knowledge of English	$V_{(0.025),j}$	$V_{(0.5),j}$	$V_{(0.975),j}$
Suitable	0.00	0.00	0.00
Inadequate	− 664.80	− 804.00	− 964.80

Table 9 Monetary variations $V_{(p),j}$ for *Work experience*

Work experience	$V_{(0.025),j}$	$V_{(0.5),j}$	$V_{(0.975),j}$
No experience	− 96.00	− 134.40	− 204.00
Internship	− 86.40	− 124.80	− 184.80
Occasional	− 24.00	− 33.60	− 52.80
Regular	0.00	0.00	0.00

Table 10 Monetary variations $V_{(p),j}$ for *Willingness to travel on business*

Willingness to travel	$V_{(0.025),j}$	$V_{(0.5),j}$	$V_{(0.975),j}$
Unwilling to travel	− 326.40	− 626.40	− 804.00
Short period	0.00	0.00	0.00
Long period	− 26.40	− 48.00	− 62.40

New monetary variations are still proportional to part-worth utilities: therefore attributes with low utility scores correspond to lower monetary variations (Tables 4, 5, 6, 7, 8, 9, 10).

Regarding the *Field of study*, new monetary variations are reduced compared with the first approach because of the dramatic decrease in the index of importance from 43 to 16.5 due to the new indicator considering the number of levels for an attribute. For this reason, *Field of study* appears to be the most penalized attribute and the biggest monetary decrease varies in the interval from 120 € (lower limit[6]) to 1269.60 € (upper limit[7]) for a graduate in Philosophy and Literature.

As said before, the *Degree level* is the least relevant quality for the respondents such that, monetary variations are very low in the interval from 26.40 € (lower limit) to 36 € (upper limit) for a bachelor's graduate.

There is no significant difference between a medium and a high *Degree mark* such that, its $V_{(p),j}$ is not significantly different from 0. The variation is relevant when the comparison is with a low mark graduate and its value lies in the interval from 84 € (lower limit) to 283.20 € (upper limit).

An interesting value is obtained with variations in the *Knowledge of English*. Since the new method was introduced, *Knowledge of English* has become a more requested skill and its interval varies from 664.80 € (lower limit) to 964.80 € (upper limit) for a graduate with no capacity to communicate with foreign people.

Regarding *Work experience*, the $V_{(p),j}$ coefficients vary in the interval from 96 € (lower limit) over to 204 € (upper limit) for a graduate with no regular work experience.

As already observed for the *Degree mark*, as well as for *Willingness to travel on business*, only one level is significantly different from the baseline level. The $V_{(p),j}$ coefficients are only significantly different from 0 for graduates who are unwilling to travel, varying from 326.40 € (lower limit) to 804 € (upper limit). This means that respondents required willingness to travel, but it did not matter whether the candidate was willing to travel for short or long periods.

5 Conclusion and Future Research

Analysis of the importance of the competencies requested of new graduates by entrepreneurs appears to be a crucial focus for trying to reduce the mismatch between higher education and the labour market. This work presents an analysis of the preferred profiles for new graduates applying for positions in *customer relationship management*. The study reports on differences between and valuations of wage and competencies for new graduates. The study is based on the multi-centre ELECTUS research project. From a methodological point of view, the paper introduced a new index of relative importance of the attributes in the context of CA. This index is based on the average range between the levels of attributes and proves very useful in all cases in which the range of values is very wide. The results on the CRM position lead to a definition of the best profile for the graduate. Economics degrees with a medium-high degree mark and *Knowledge of English* are most useful to candidates who are able to communicate fluently with foreigners. Only graduates with one or more years of regular work achieve positive scores in the section *Relevant Work experience*. Finally, *Willingness to travel on business* for short or long periods is a very appreciated quality in candidates. The study also shows the differences, in terms of

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[6] For lower limit, we mean $V_{(0.025),j}$.

[7] For upper limit, we mean $V_{(0.975),j}$.

salaries, between several profiles of new graduates considering the levels of attributes less eligible for the job position. Future research will focus on the results of stratified CA based on socio-demographic features of the companies responding to the ELECTUS project using the relative importance of the attributes for the five profiles proposed in the survey.

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