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Analysing the Success of a MBA Programme

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Abstract

The success of an academic programme is normally assessed by means of sample surveys, but the analysis of such questionnaires is not straightforward. Surveys often contain qualitative as well as quantitative information. Optimal Scaling techniques are particularly well suited in this particular case, since they can deal with both types of data. Here we use Optimal Scaling together with Categorical Principal Components Analysis in order to assess the success of the MBA at Kent Business School, a relatively newcomer, but a successful one, to the Management Education community. The advantage of the techniques used is that, by visualising the results, the findings of the analysis become accessible to the non-specialist.

Keywords: Business Education, MBA, Multivariate Statistics, Optimal Scaling.

1 Introduction

Kent Business School (KBS), part of the University of Kent in the UK, is a relatively newcomer in the Business Education community. It offers both undergraduate and postgraduate degrees in various areas of Management from Accounting to Management Science. However, this paper is only concerned with the MBA programme.

The University of Kent invested generously in the MBA programme, which was accredited by the Association of MBAs (AMBA), the most important academic quality control body in this area, in May 2005. Continuous accreditation requires that the Business School produces relevant data on the

success of the programme. This data is also of relevance to the management of the Business School and to the alumni. This paper analyses the data collected in order to assess the success of the first cohort of accredited MBA graduates.

MBAs in the UK do not come cheap. A condition for enrolling in a MBA is that students have acquired at least three years of managerial experience. If the student decides to do the full-time version of the MBA he/she, besides paying heavy fees, has to forego one year earnings. It is, therefore, reasonable to expect that potential new students will be interested in knowing how obtaining an MBA is going to affect their future stream of earnings. Clearly, if the answer to this question is that the investment in the MBA pays off, this creates a good image for the management school, leads to an increase in the demand for places in future years, and justifies the resources invested by the university. This is why obtaining information about their careers after they have completed the programme, and analysing in a relevant way, is of great importance.

A crucial question in MBA curriculum design is up to what point students from different countries require different course structures. De Vita and Case (2003) discuss curricular design and teaching styles within an international framework. This matter is also addressed by Robinson (2006) on the basis of interviews with MBA students. The problem with the interview approach is that, by interviewing existing students, we are looking at aspirations rather than reality. In this paper we go one step further by looking at employment patterns of past students.

The first cohort of students with an AMBA accredited degree from Kent University completed their studies in the summer 2005. They were contacted by email and asked to complete a survey providing information on their past earnings, the job they were doing at the time of the survey, the industry in which they were working, the country in which they were residing, their salary prior to studying the programme, and their salary after they had completed the programme. As this was the first cohort of students with an accredited degree, their number was small, and as the time elapsed since they had completed their studies was only six months, it was not expected that their new skills had been fully rewarded.

Given that some of the information obtained from the survey was qualitative and some of the information was quantitative, Optimal Scaling is an appropriate analysis tool. Optimal Scaling was first introduced by Fisher (1938) —in *Statistical Methods for Research Workers*, 7th edition— although the

technique stayed somewhat "dormant" (Welsh and Robinson, 2005). This has been attributed to the obscure way in which Fisher explained his ideas (Savage, 1976). Optimal Scaling was surveyed by Young (1981) as part of his presidential address to the Psychometric Society of the US, but its application in the area of management remains scant. Examples of the application of this technique in management analysis are Serrano-Cinca *et al.* (2003), Serrano-Cinca *et al.* (2004), Portillo *et al.* (2006).

Optimal Scaling uses an algorithm known as Alternating Least Squares in order to allocate numerical scores to nominal data. Once such scores have been obtained, standard statistical techniques can be applied to analyse the data. In this case, the technique used was Categorical Principal Components Analysis. The calculations were performed using the CATPCA routine in the computer package SPSS, version 14.

It was found that, despite the short time elapsed between the end of the MBA and the completion of the questionnaire, alumni, in their majority, had achieved substantial income gains. The analysis also revealed country specific effects. It becomes clear that students from different parts of the world have different curricular needs. This observation can guide future curricular design.

The paper starts with a discussion of the non-technical aspects of the analysis, relegating the technical aspects to an appendix, as recommended by Ehrenberg (1982) who argues that writing in this way improves the readability of applied statistics papers. Section 2 contains a description of the data. The findings are next presented and discussed. A brief description of the technical apparatus and of the findings follows in an appendix.

2 Data

The data were collected with a standard questionnaire devised for this purpose. The authors will supply copies of the questionaire on request. The questionnaire was e-mailed to all the students who had completed the AMBA accredited MBA in the summer 2005 six months after the end of the course. Not all the electronic addresses were known. A total of 33 questionnaires were completed. This represented 61% of the number of students in the course. Given that non-response was only associated with lack of relevant

e-mailing information, no non-response bias was suspected, although this is an issue that will be explored in future years as more data becomes available.

Variable	Category	Distribution	
		Frequency	Proportion
Employment Status	**Full-time Employment**	22	0.67
	Part-time Employment	1	0.03
	Self-employed	4	0.12
	Unemployed	4	0.12
	Full-time Education	2	0.06
Company Area	**Accountancy-Finance**	6	0.22
	Information Technology	8	0.30
	Consultancy	2	0.07
	Industrial	11	0.41
Employment Category	**Advisor**	5	0.19
	Manager	19	0.70
	Marketing	3	0.11
Country of Residence	**European Union**	13	0.40
	Taiwan	10	0.30
	China	2	0.06
	Japan	2	0.06
	Eastern Europe	2	0.06
	United States	1	0.03
	Other	3	0.09

Table 1: Descriptive statistics for qualitative variables.

Questionnaire design followed the structure that has been adopted by other AMBA accredited courses in order to collect information that is required for continuing accreditation. Individuals were asked about their employment status six months after the completion of the course. Possible employment statuses were: in full-time employment, in part-time employment, self-employed, acquiring further education or training, and unemployed. When in employment, they were asked for the name of their company,

the area of activity of the company, the name of the job they were doing, and the country where they were employed. They were also asked to give details of their current pre-tax salary and of their pre-tax salary just before the MBA course.

Table 1 gives summary information for qualitative variables obtained from the questionnaires. It can be seen that the majority of the respondents were in full-time employment (67%). The most likely area of activity of the company that employed them was Information Technology related (30%), although 22% were in the Accounting/Finance sector. Not surprisingly for MBA graduates, the most common activity was Management (70%). 40% of the graduates were employed in the European Union, and 30% in Taiwan. Under "country of residence" the category "other" included individuals employed in India and South Africa.

Salaries, before and after the MBA were recorded in ranges; for example, one of the categories was from 20000 to 25000. Salaries, when in other currencies, were translated into pound sterling. The middle of the range was used as a representative of the earnings both before and after the course. Percentage salary increases were calculated from this data. Excluding those who were still unemployed or in full-time education, it was found that the average salary increase had been 44.3%. Amongst those in employment, only one person, who was self-employed, had suffered a reduction in income.

Variable	**Mean** (SEM)	**Median**	**Paired-tests**[b]	
Pre-MBA Salary[a]	20969.70 (5520.019)	12000.00	**WSRT**[c] **(p-value)**	–3.066 (<0.01)
Post-MBA Salary[a]	22242.42 (5199.073)	14000.00	**FST**[d] **(p-value)**	(<0.01)

(a) Pound sterling
(b) In these tests we have removed both an extreme observation on the higher side, and the students who remained unemployed or stayed in full time education
(c) Wilcoxon signed rank test
(d) Fisher sign test
SEM: Standard error of mean

Table 2: Descriptive statistics for salaries and results of non-parametric tests.

Descriptive statistics for salaries can be seen in *table 2*. It is clear that salaries have increased between the two time periods considered. This will be formally analysed below.

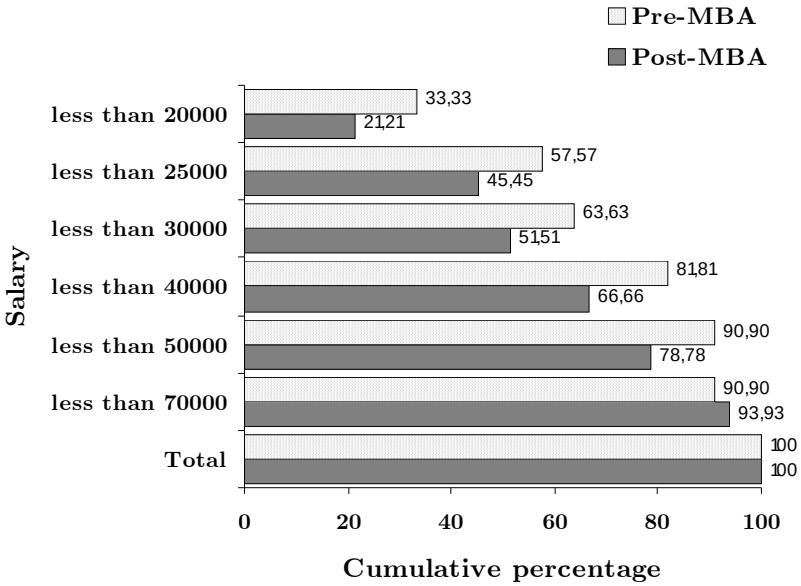

Figure 1: Cumulative distribution of salaries pre and post-MBA

Figure 1 shows cumulative distributions for salaries before and after the MBA. The increases that are revealed in *table 2* are also evident in *figure 1*.

3 Results

The data set fed into the SPSS consisted of seven variables. Four of them were nominal —work status, area of activity, type of job performed, and country of residence—, and three were numerical —salary prior to the course, salary after the course, and percentage change in salary—.

If we compare, as done in *table 2* and *figure 1*, salaries prior to the MBA with salaries after the MBA, we can see that salaries have, on the whole,

increased. The question we would like to ask is if such increases are statistically significant. In order to conduct the test we started by removing both an extreme observation on the higher side, and the students who remained unemployed or stayed in full time education. We next calculated, for every individual, the value of the absolute change in salary and tested for normality. Both the Kolmovorov-Smirnov and the Shapiro-Wilk tests rejected the hypothesis of normality in the differences at the 1% significance level. Following this result, several non-parametric tests of paired observations were performed. The tests were: the Wilcoxon signed ranks test (WSRT), and the Fisher Sign test (FST), a robust test based in the binomial distribution (Puri and Sen, 1993). The first test rejected the hypothesis of equality at the 0.2% significance level, while the second test rejected the same hypothesis at a level of significance that was lower than 0.1%. The tests were repeated with all the observations included but the results did not change, the normality hypothesis was still rejected, as was the hypothesis of equality in the salaries pre and post-MBA. We conclude that individuals have achieved a statistically significant salary increase from before the start of the MBA to the time when they filled in the questionnaire.

The complete data set was input into the CATPCA routine of SPSS. There is no need to remove discordant observations in salary, the way we have done in order to test for significance of salary changes, because CATPCA treats quantitative data as ordinal, and results are, therefore, robust to the presence of outliers. Every category of nominal variables was allocated a numerical score by the algorithm.

The optimal scores associated with each category are given in the appendix A. It is interesting to observe the ordering of scores associated with each of the categories. It has to be kept in mind, when looking at this ordering, that no value judgement was entered into the package: all the different categories were rated equally when fed into the package.

The ordering for employment status was: (i) self-employed; (ii) working full-time; (iii) working part-time; (iv) in further education; and (v) unemployed. This result would reflect the intuitive classification that most people would make.

In the case of company area of activity, the ordering is: (i) information technology; (ii) industrial; (iii) accounting, finance, and banking; (iv) consultancy; (v) more education; and (vi) unemployed. Ignoring the unemployed, whose activity is difficult to describe, the list appears to move from the more technical/industrial towards the more advisory/consultancy.

Turning now to the type of job undertaken, the ordering was: (i) management; (ii) marketing; (iii) advisor, auditor, and researcher; (iv) more education; and (v) unemployed. This moves from plant-based towards free-lance.

Finally, the ordering for country of work was: (i) European Union and similar; (ii) other; (iii) United States; (iv) Japan; (v) Taiwan; (vi) East Europe; and (vi) China.

The results of the analysis revealed that two indicators (Categorical Principal Components) accounted for just under 83% of the variability in the data. We will now proceed to attach meaning to these Categorical Components.

Taking the second principal component first, this is constructed, almost exclusively, with information on salaries before and after the MBA course. Both variables have almost the same weight in the indicator. One could just say that this indicator is constructed by averaging the salary before and after the course is taken. The second principal component can, therefore, be interpreted as a measure of income in pound sterling.

The variables that define the first component are fundamentally qualitative. The variables with the highest weights in this component are: employment status, company area of activity, and type of job. Taking into account the ordering that was observed in the quantification of the different categories of these variables, if we were to order the jobs —leaving aside those in full time education and the unemployed— we would find at one end full-time management jobs in industrial concerns, and at the other end, research jobs in the consultancy area performed part-time. It is difficult to label this component, but one would venture to associate it with managerial jobs performed in a fixed location versus jobs that are not linked to a particular place of work.

After calculating for each individual the value of the first and of the second indicators, or components, individuals are plotted in *figure 2*. Two types of individuals stand apart from the crowd: the unemployed and those in full time education, at the right hand extreme of the figure; and one self-employed individual whose salary, both before and after the MBA was well beyond the salaries obtained by the other students. *Figure 2* also includes the employment status of the respondents.

All the full-time workers appear on the lower left-hand side of *figure 2*, indicating that full-time employment is associated, in our data set, with relatively low income levels in traditional industrial jobs. With one exception, the self-employed are located towards the top of *figure 2*, indicating that self-employment, in this data set, tends to be associated with higher income. The

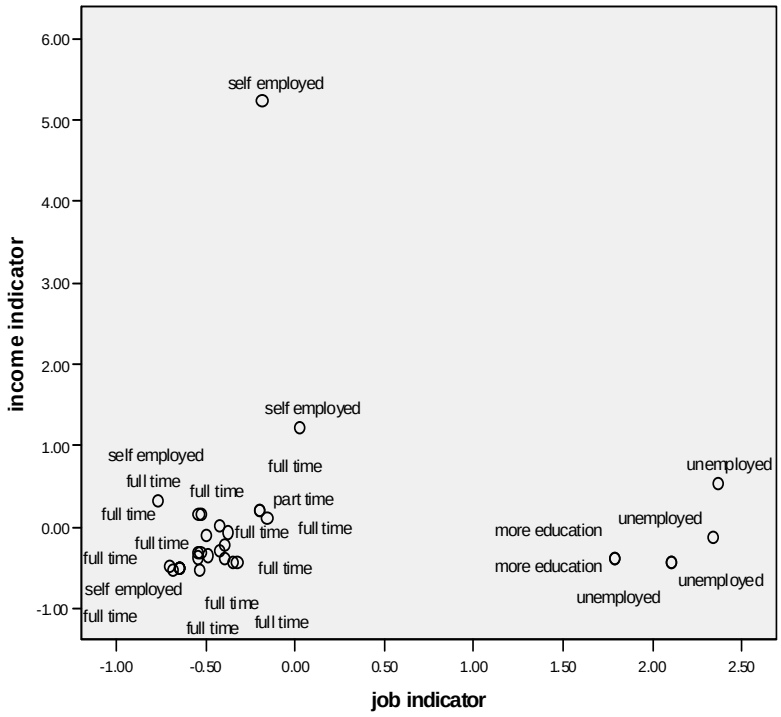

Figure 2: Plot of all the individuals in the space of the first two categorical components.

one person who was employed part-time is located between those who are in full-time employment and those who are self-employed.

Figure 3 reproduces the lower left-hand corner of *figure 2*, having excluded the self-employed person with a very high salary, and those in full-time education or unemployed. All the excluded individuals are from the European Union. *Figure 3* displays this time the country of origin.

All the individuals whose residence is in Taiwan, China, Japan, or East Europe appear on the lower left hand side of *figure 3*. This indicates that, after the MBA, individuals from these countries are employed in industrial jobs and have lower incomes compared to those individuals with jobs in the European Union, Japan or the US.

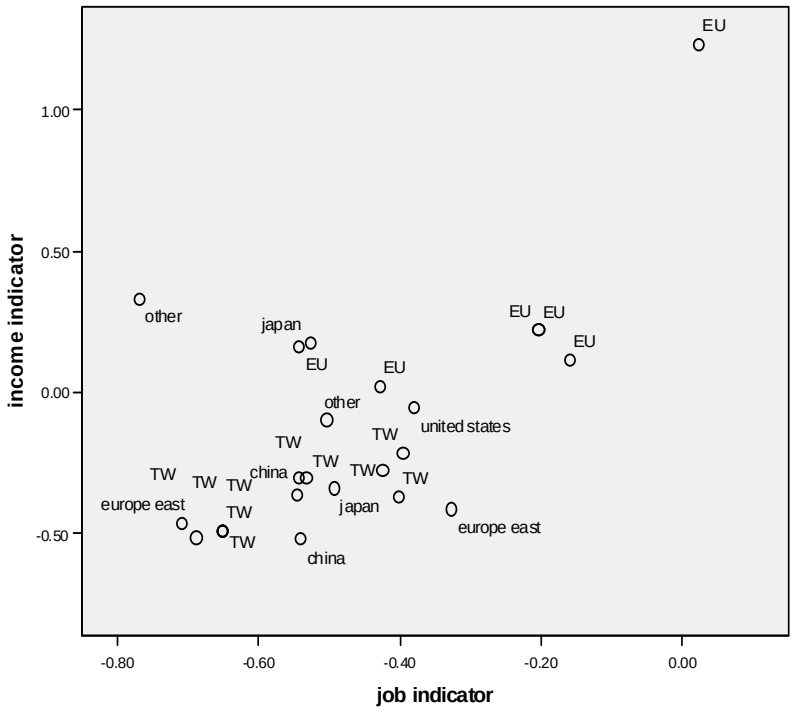

Figure 3: Selected plot with indication of job function.

To find out the function that individuals perform in their companies, *figure 4* has been produced.

The person situated at the top right hand side of the figure described his function as "management". This can be interpreted in many different ways. On close examination of the raw data, it turns out that he/she runs his/her own company. This is quite different from the managerial tasks performed by a recent graduate in what are often multinational companies. We can see, however, that most individuals located at the lower left hand side of the figure work in management. The activities of advisor, researcher, or auditor appear, with one exception, towards the top of the figure. The individuals who perform a marketing function are also located on the lower left hand side of the plot, although towards the middle of *figure 4*.

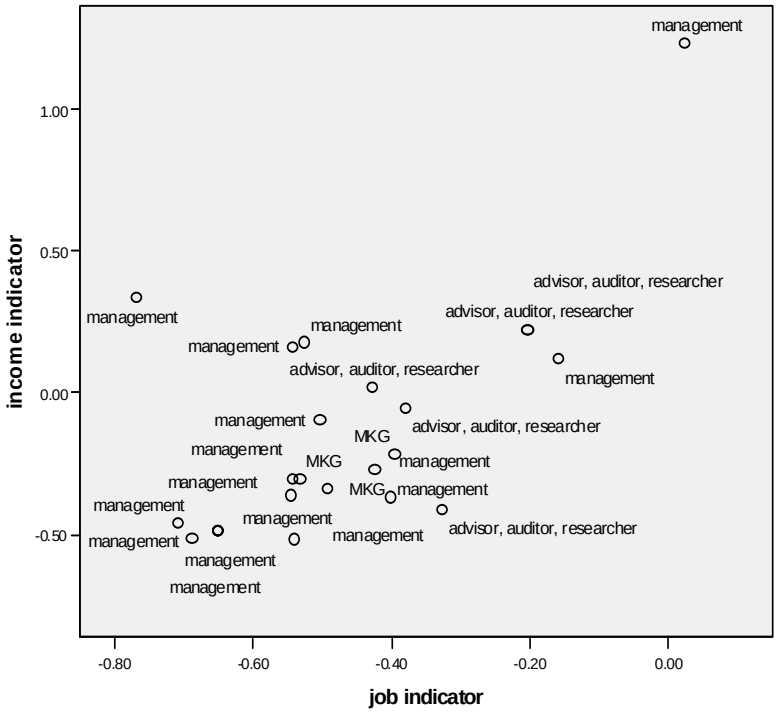

Figure 4: Selected plot with indication of job function.

Finally, *figure 5* reproduces *figure 3* but this time there is an indication of the percentage change in salary.

The message conveyed by *figure 5* is not as clear as the one to be found in *figures 2, 3*, and *4* but some facts emerge from it. In order to guide the discussion, a vertical and a horizontal line have been added. On the top right hand side of the figure there is a self-employed individual whose income, six months after the MBA course was 50% than before. This is rather an exceptional case. In general, incomes at the top of *figure 5* have all increased, some of them by large percentages. These incomes were already large to start with. This includes all the students from the European Union who are not in education or unemployed.

On the lower left hand side of the figure we find that salaries have in-

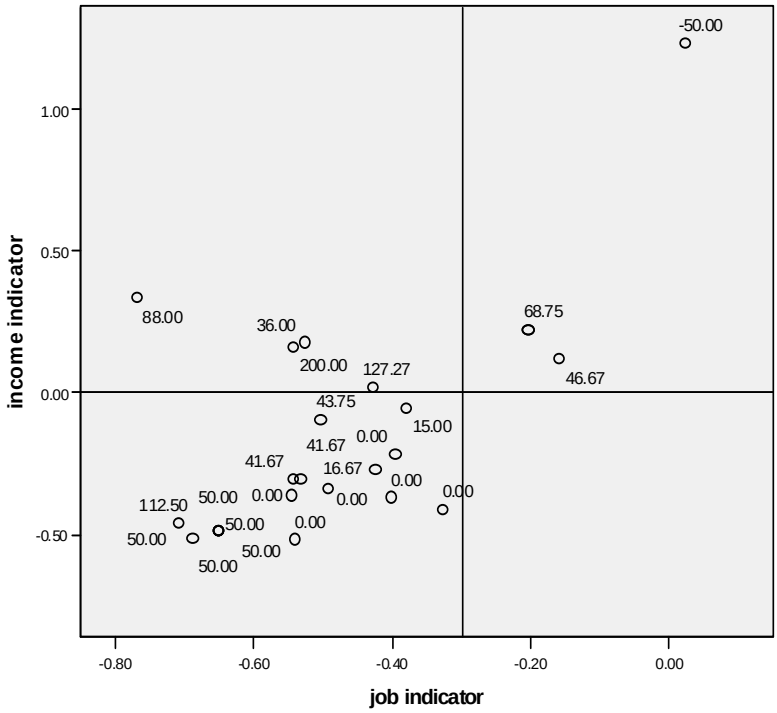

Figure 5: Selected plot with indication of percentage change in salary.

creased or remained the same. Some of the increases are as large as 50%, but they start from a low base. When salaries increase, the increases are never as large as the increases one finds towards the top of the figure. At the bottom of the figure we find alumni from Taiwan, China, or East Europe.

Some facts become now apparent. Students who find jobs in China, Taiwan, or Eastern Europe end up as full time employees in traditional industries (we include Information Technology amongst them) working in either management or marketing. Some of them end up with substantial salary increases six moths after the end of their MBA, but these increases start from a relatively low base, and are not as high as the salary increases obtained by their European Union counterparts. They pay higher fees, higher travel costs, and the difference in the cost of life, whilst on their MBA in the UK,

is highest.

Western Europeans, on the other hand, when they are in employment, can end up with very large salary increases, and in the more intellectual end of the job spectrum: consultancy, auditing, advisory. Given that they pay lower fees and tend to spend less on travel, they obtain a high return on their educational investment.

4 Conclusions

The first conclusion of this paper is methodological. Questionnaire analysis often requires dealing with quantitative and qualitative information. Methodological tools for the statistical analysis of quantitative information have long been developed and are well understood. Methodological tools for the analysis of a mixture of quantitative and qualitative information exist, but are not sufficiently exploited. We have shown that Optimal Scaling can be used to complement standard statistical techniques and can reveal important aspects of the data that would otherwise be difficult to expose.

The practical conclusions for the director of the MBA programme are, of course, limited by the small number of questionnaires available for analysis. We have seen that students who do the MBA can expect substantial salary increases, and that these increases depend on the type of job and the country of residence.

There are also conclusions that are relevant for the structure of the MBA programme at Kent. We have seen that the types of jobs in which students from the Far East are employed after completion of their studies differ from the jobs done by students from the European Union. This has curricular consequences. An appropriate curriculum that is aimed at satisfying the demand from the Far East and East Europe should emphasise industrial management, operations management, and marketing. An appropriate curriculum to satisfy European Union demand should develop skills associated with analysis, communication, and consultancy. This, of course, requires a continuing effort to the development of the programme and the analysis of the need of future students. There is no doubt that, as more students complete the programme, and as more information on salaries and destinations becomes available, more analysis can guide the management of the Business School to adapt the content of the programme to the needs of the educational market so that it continues to be a successful management school.

A Appendix

The statistical technique applied in this research originates from an idea by RA Fisher (1938). Fisher observed that one could allocate scores to qualitative data and then apply standard statistical tools. The quality of the results depends on how well the scores have been allocated. The procedure then becomes a two-step one. First, scores are allocated to qualitative data, the quantitative model is estimated, and a measure of goodness of fit is calculated to assess the quality of the results. Then, the process starts again, new scores are allocated to qualitative data, the statistical model is re-estimated, and the measure of quality of fit is recalculated. The process continues until there is no improvement in the goodness of fit measure. The algorithm, in order to proceed smoothly needs to impose constraints on the scores, but this does not present any difficulty. An algorithm due to De Leeuw (1976) that implements this procedure, known as Alternating Least Squares, has been incorporated in the SPSS package.

The data have been analysed by means of Categorical Principal Components because, like the standard Principal Components Analysis (PCA), is a data reduction technique. From the original variables one derives a set of indicators that summarise most of the information available in the data; see, for example, Krzanowski (1988). As in PCA, the decision on how many components to include in the analysis is guided by the number of eigenvalues that take a value higher than unity. In our case, the first eigenvalue took the value 3.74 and explained 53.45% of the variability in the data. The second eigenvalue took the value 2.06 and explained a further 29.36%. Thus, the first two principal components account for almost 83% of the variation in the data, a very large percentage in most applications. The third eigenvalue was 0.92 and explained 13% of the variance. It would have been possible to produce the analysis in three dimensions, but it was found that the main message of the data was contained in the plot of the first two component scores.

The quantifications returned by the package are summarized in *table 3*.

Variable	Category	Optimal Scores
Employment Status	**Self-employed**	-0.584
	Full-time Employment	-0.463
	Part-time Employment	-0.136
	Full-time Education	1.842
	Unemployed	2.243
Company Area	**Information Technology**	-0.572
	Industrial	-0.493
	Accountancy-Finance	-0.342
	Consultancy	-0.292
	Full-time Education	1.834
	Unemployed	2.242
Employment Category	**Manager**	-0.516
	Marketing	-0.476
	Advisor	-0.281
	Full-time Education	1.841
	Unemployed	2.228
Country of Residence	**European Union**	-1.210
	Other	0.485
	United States	0.496
	Japan	0.674
	Taiwan	0.752
	Eastern Europe	0.908
	China	1.550

Table 3: Optimal sores for categorical variables.

Component loadings are given in *table 4*.

Component Loadings	Dimension	
	1	2
Employment Status	.984	-.109
Company Area	.988	-.050
Employment Category	.986	-.089
Post-MBA Salary	-.171	.960
Country of Residence	-.652	-.384
% of Salary Change	-.602	-.136
Pre-MBA Salary	0.78	.937

Table 4: Component loadings for the first two components.

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