Analysing the Success of MBA Programmes

Cecilio Mar Molinero [1]
Kent Business School

Fabiola Portillo [2]
University of La Rioja

[1] Cecilio Mar Molinero
Kent Business School
University of Kent
Canterbury
Kent CT2 7PE
United Kingdom
Tl +44 (0)1227 824554, Fax +44 (0)1227 761187
e-mail: C.Mar-molinero@kent.ac.uk

[2] Fabiola Portillo
Department of Economics and Business
University of La Rioja
C/ Ciguena 60
26005 Logroño, La Rioja
Spain
Tel +34 941 299377, Fax +34 941 299393
e-mail: fabiola.portillo@unirioja.es

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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, UK. The advantage of the techniques used is that, by visualising the results, the findings of the analysis become accessible to the non-specialist. The analysis allows us to identify the different needs of students from various national origins and contains lessons for future curriculum development.

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

1. Introduction

The history and development of MBAs is reviewed by Antunes and Thomas (2007). 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's 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. 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 outcomes. In this paper we look at outcomes by concentrating on the employment patterns of past students.

In this paper we use data from the MBA at the University of Kent, UK. This

MBA is accredited by the Association of MBAs (AMBA) which is the main authority on business education in the United Kingdom. The first cohort of students with an AMBA accredited degree from Kent University completed their studies in the summer of 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.

Some of the information obtained from the survey was qualitative and some of the information was quantitative, making Optimal Scaling 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 Didow *et al.* (1985), Serrano *et al.* (2003), Batista-Foguet *et al.* (2004), Serrano *et al.* (2004), Shen and Choy (2005) and Portillo *et al.* (2006).

Optimal Scaling uses the algorithm 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.

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 became 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). Section 2 contains a description of the data. Findings are next presented and discussed. A brief description of the technical apparatus and of the detailed results follows in an appendix.

2. Data

The data were collected with a standard questionnaire devised for this purpose. 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.

Questionnaire design followed the structure that has been adopted by other AMBA accredited MBAs 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.

Table 1: Descriptive statistics for qualitative variables

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 [a]	Accountancy-Finance	6	0.22
	Information Technology	8	0.30
	Consultancy	2	0.07
	Industrial	11	0.41
Employment Category [a]	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
	Eastern Europe	2	0.06
	Japan	2	0.06
	United States	1	0.03
	Other	3	0.09

(a) Data excludes students who remained unemployed or stayed in full-time education.

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 in most cases as a representative of the earnings both before and after the course. In the case of salaries smaller than 20000 or higher than 70000, estimates of reasonable values were made. 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.

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

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

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

Descriptive statistics for salaries can be seen in Table 2. It is clear that salaries have increased between the two time periods considered, this subject will be considered again.

3. Analysis

This section is divided into three subsections. We first do a formal test of comparison of means. The second subsection deals with Optimal Scaling analysis.

We end with the application of Categorical Principal Components and Property-Fitting analysis to the fully quantified data set.

3.1. Comparison of means

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

If we compare, as done in Table 2, 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.

3.2. Optimal Scaling Analysis

The statistical technique applied in this research originates from an idea by RA Fisher (1938). Fisher observed that one could allocate numerical 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, so that a quantitative model can be estimated and a measure of goodness of fit calculated. Then, the process starts again: the scores are revised, 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 measure of goodness of fit. The algorithm, in order to proceed smoothly, needs to impose constraints on the scores, but this does not present any difficulty. An algorithm devised by De Leeuw (1976) that implements this procedure, known as Alternating Least Squares, has been incorporated in the SPSS package.

The results returned by the package are summarized in Table 3.

Table 3: Optimal scores for categorical variables

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

The data have been analysed by means of Categorical Principal Components because, like the standard Principal Components Analysis (PCA), it 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.

Table 4: Component loadings for the first two components

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
Salary Change (%)	−.602	−.136
Pre-MBA Salary	.780	.937

Component loadings are given in Table 4.

3.3. Categorical Principal Components and Property-Fitting

The complete data set was input into the CATPCA routine of SPSS. There is no need to remove discordant observations in salary - as 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 Table 3. 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 as nominal (and not as ordinal) 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 ranking 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 list evolves from plant-based jobs to freelance.

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 Categorical Principal Components (CATPCA) 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, as can be deduced from Table 4. 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 fulltime 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 1. 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 person. Figure 1 also includes the employment status of the respondents.

All the full-time workers appear on the lower left-hand side of Figure 1, 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 1, indicating that self-employment, in this data set, tends to be associated with higher income. The one person who was employed part-time is located between those who are in full-time employment and those who are self-employed.

(*Figure 1* near here)

Figure 2 reproduces the lower left-hand corner of Figure 1, 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 2 also displays country of origin.

(*Figure 2* near here)

All the individuals whose residence is in Taiwan, China, Japan, or East Europe appear on the lower left hand side of Figure 2. This indicates that, after the MBA, individuals from these countries are employed in industrial jobs and have lower incomes (in pound sterling) compared to those individuals with jobs in the European Union, Japan or the US.

Figure 3 shows the function that individuals perform in their companies.

(*Figure 3* near here)

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 3.

Finally, Figure 4 gives an indication of percentage change in salary.

(*Figure 4* near here)

The message conveyed by Figure 4 is not as clear as the one to be found in Figures 1, 2, and 3 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% lower than before. This is rather an exceptional case. In general, incomes at the top of Figure 4 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 increased or remained the same. Some of the increases are as large as 50%, but they start from a low base. We know, from Figure 2, that at the bottom of Figure 4 we find alumni from Taiwan, China, or East Europe.

Some facts become apparent now. 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 achieve substantial salary increases six months 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 living, whilst on their MBA in the UK, is high.

Western Europeans, on the other hand, when they are in employment, can end up with very large salary increases, 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 higher return on their educational investment.

4. Conclusions

The first conclusion of this paper is methodological. Questionnaire analysis often involves 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 an MBA programme are, of course, limited by the small number of questionnaires available for analysis. We have seen that students who do an 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 an MBA programme at Kent, and more generally in the UK. 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.

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Analysing the Success of MBA Programmes

Executive Summary

Individuals who study a Master in Business Administration (MBA) invest considerable resources in it. They are charged high fees, they often have to live away from their home country, and they incur in loss of earnings since several years of relevant managerial experience are required as a condition of enrolment. The natural question they might ask is whether it was worth it. They are interested in the jobs open to them upon graduation, and in the salaries that MBA qualified individuals obtain just after completing the degree.

MBAs tend to be an important source of prestige and income to universities, and universities are naturally interested in assessing the success that their graduates achieve in the labour market. A further area of interest to universities is curriculum design: up to what point the curriculum reflects the needs of the employers, and if different types of students have different curricular needs.

In this paper we study the success of the MBA at Kent Business School. A questionnaire was completed by all students who completed their studies in the summer of 2005 and whose email was known. We went beyond the

standard practice of producing some simple summary statistics, and applied analytical tools that can deal with quantitative and qualitative information, and can visualise the results in the form of charts. These charts contain most of the information in the data set, and can be understood by the non-specialist.

Clear differences were found between students from the Far East (China, Taiwan, Japan) and students from the European Union (EU). Students from the Far East tend to find jobs (after graduation) in management or marketing in traditional manufacturing industries. They achieve large salary increases, of the order of 50%, although starting from a low basis. Western Europeans, on the other hand, end up with large salary increases in absolute values, in the more intellectual end of the job spectrum: consultancy, auditing, advisory.

Several conclusions follow from this study. The first one is methodological: modern statistical analysis permits the analysis of complex data sets made of qualitative and quantitative information, and the visual representation of the results in a form that can be accessible to all. The second conclusion relates to curriculum design: students from different parts of the world have different needs; students from the Far East require knowledge that can be applied to the management of industrial processes, while students from the EU are likely to need consultancy, analysis, and presentation skills.

Figure 1: Plot of all the individuals in the space of the first two categorical components with indication of employment status

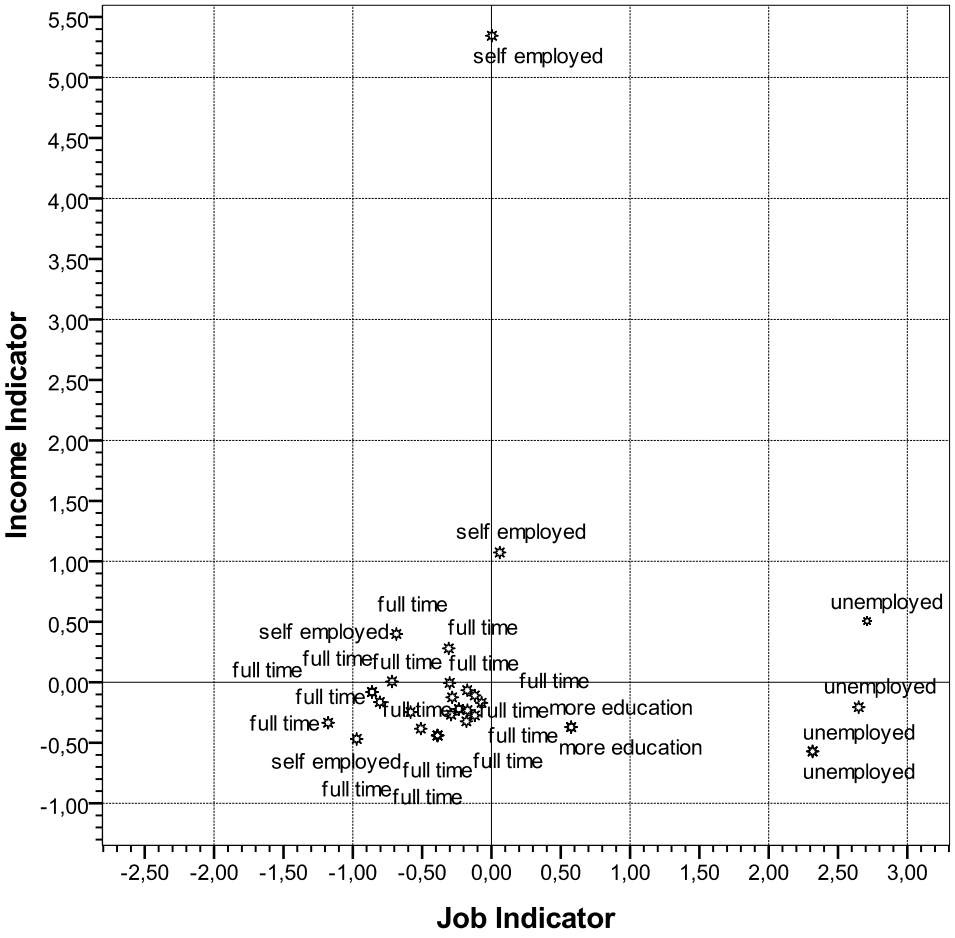

Figure 2: Selected plot with indication of country of origin

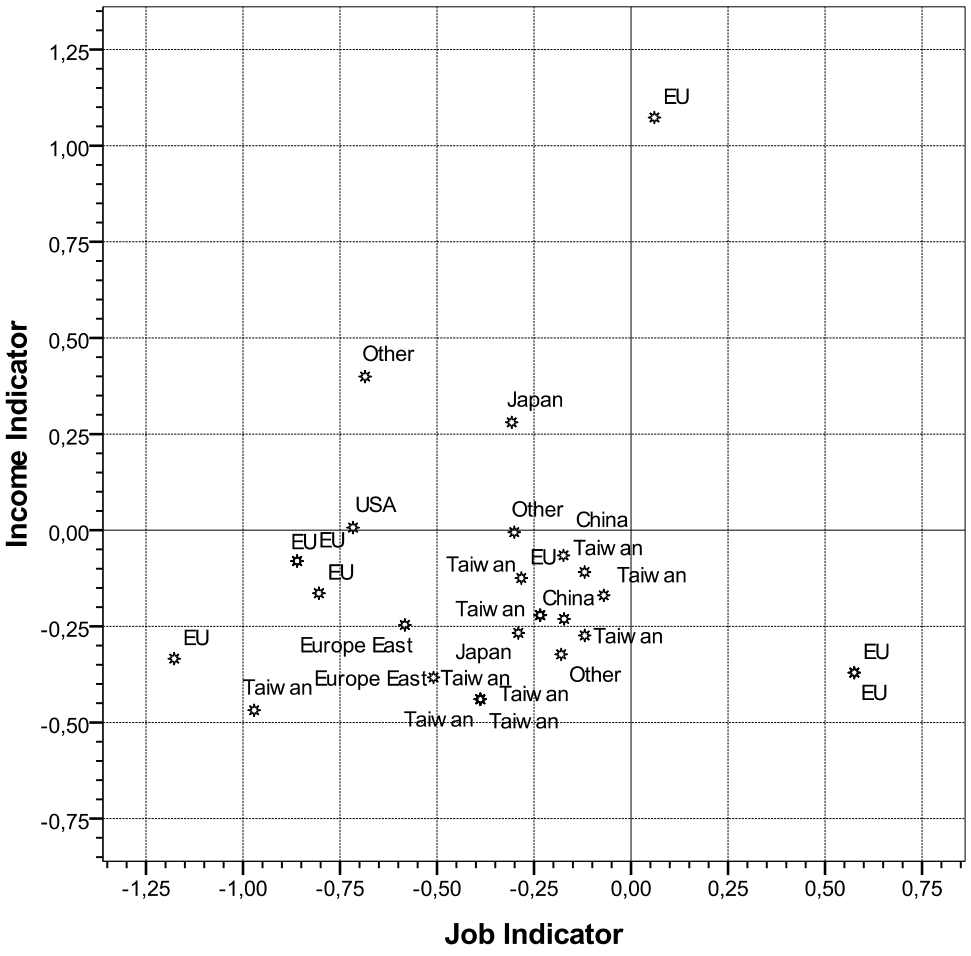

Figure 3: Selected plot with indication of function performed

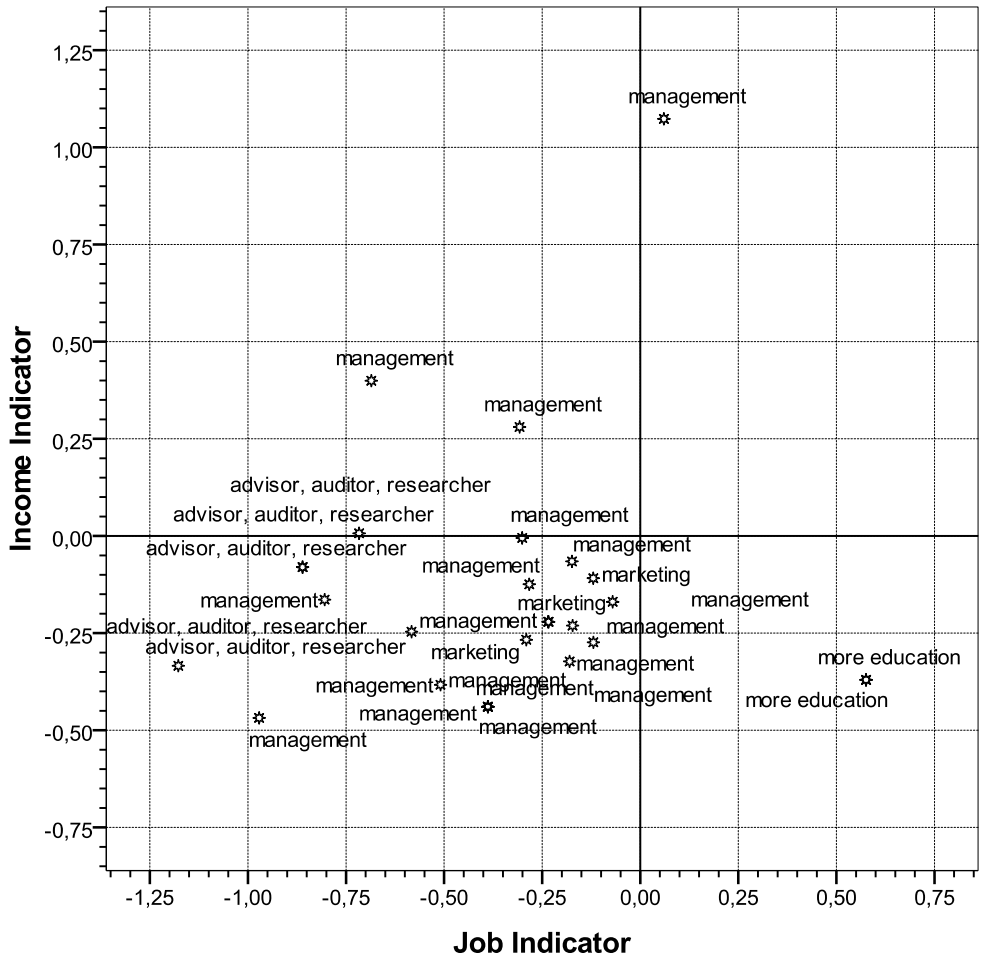

Figure 4: Selected plot with indication of percentage change in salary