

**Field of study choice:
Using conjoint analysis and clustering**

Ze'ev Shtudiner, Moti Zwillling and Jeffrey Kantor

ABSTRACT

This paper aims to measure student's preferences regarding various attributes that affect their decision process while choosing a higher education area of study. The study exhibits two different models which shed light on the perceived value of each examined area of study: 1. Conjoint Analysis and 2. Clustering K-Means algorithm. The findings of the used methods exhibit not only which of the attributes have the greatest influence on students' decision-making processes, but also shed light on which types of study areas are most preferred by respondents. The paper addresses a new view on students' definition of higher education when adding the choice of selecting the "proper" area of study to one's profile.

1. Introduction

Choosing one's area of study from among a wide selection of higher education programs, particularly considering the substantial growth of academic institutions in recent years, has become a great challenge to students. Selecting one's area of education is often perceived as a "purchasing a first class ticket for life" (Russel, 2005), and the recruitment of qualified students among academic institutions has become very competitive. In contrast to the past, students are now more aware regarding the various programs and services offered by universities and colleges, which must continuously "reinvent" themselves, by refining their programs and turning their "USP" (Unique Selling Proposition) into a product that is valued by candidates. For this reason, decision makers strive to know in advance which attributes will have the most impact on students' selection regarding areas of study within different academic institutions. Moreover, most of the recent studies have not fully focused on which program or university's attributes have the biggest influence on students' selection process, but rather more on the variables that affect the decision process of striving for cognitive consistency (Mao & Oppewal, 2010). Other studies focus on the cost vs. benefit values the student might gain from choosing one area of study over another (Petruzzelis et al., 2006).

This study is the first to show how one can identify the impact of area of study attributes which most affect students' selection process in regard to a specific academic area. The study utilizes two different methods: 1. Conjoint Analysis and 2. K-Means Clustering. This optimized combination may assist in pre-designing the area of study and disregarding combinations which are not preferred by students during the selection process.

The rest of the paper is organized as follows: A literature review is presented in Section 2. In Section 3, we propose the study method. Section 4 presents the obtained results. Finally, Section 5 discusses the practical implications of this study.

2. Literature review and conceptual framework

Previous studies related to students' selection of universities or areas of studies have focused on the choice process as an iterative, complex and multidimensional concept involving cultural constraints such as socio-economic, cultural and ethnic conditions (Gambetta, 1996; Maringe, 2006). In addition, it was found that students most often tend to base their decisions about studies on their close environment or social circle, such as friends, family and relatives. In addition, this decision is frequently based on the advice of students or graduated students, who have already studied in the desired program or university. or have lately completed their academic requirements and are in the process of job seeking or continuing on to advanced academic studies (Hemsley-Brown, 1999).

The Higher education in Israel is divided into two main systems: Colleges and Universities. Along many private and public colleges in which the main focus is teaching reside 6 research universities. These institutions were affected from the changes in the bio and demographics' attributes related to the students, that took place in the last decade, such as: learning style, expectations and practices of Israeli university vs. college ones (Davidovitch et al., 2012). Israel has absorbed over one million immigrants from the former Soviet Union between the years of 1989 and 2009. Where it was shown by Davidovitch et al.,(2012), that it formed a substantial differences between israeli university students and college ones. While among others, college students attribute greater importance to relationships between students and guarantee of

employment upon graduation, university students attribute a greater importance to lectures and teaching assistants and active student life. In addition at the early years of 1990 many young israeli students who came from the former Soviet Union countries, were not been able to consume higher education preparation in the "perceived" higher education institutions. Most of them did not make a compulsory military service and they found the hebrew language as not been easy to them to adopt. This is the reason why many significant differences on almost all dimensions on which the cultures were compared were significant. However, in the last decade the differences are minor. For example: If at the early 1990, israli native students were seen their future in the field of studies in the university, where non-native students perceived the academic world as a professional springboard, nowadays, most of the students differ in their conception to higher education especially if they are studying in higher education institution that is classified as university or college. Meaning that, university students, tend to select the institution according to the admission requirements while college students tend to select it according to the interest. In addition, University students tend to evaluate the institution based on the lecturers and teaching assistants, while College students tend to evaluate the institution according to the relationships between the students and the class atmosphere. The differences between academic institutions as a whole, and classification of academic institution as a college or universities specifically is measured by the level of competition and the marketing efforts which are conducted by the recruiting or communication division. When competition becomes stronger and university or academic program selection is just one item in students' complex decision-making formula, the impact of involved variables assimilated in students' selection process becomes crucial to carrying out a successful decision. Petruzzellis and Romanazzi (2010) state that: "Students are becoming more concerned with their studies and being successful in their chosen institution, rather than with any perceived image that the institution might have". Information taken from

sites such as "Facebook", "Twitter" and specific academic forums are considered key influencers who play an important role in the entire process. Worthington and Higgs (2004) found that the reputation of a course and the location of an institution are the most important factors in students' decision making. This process of decision making includes among others: program selection and institution selection. However, Jamieson (2007), examined the process of decision making within students, and found that the changing in the labor market demands and globalization process is one of the factors that influence the decision making process among them. Other variables, that are considered as important in the process of decision making are: The need to work and study as a part-time student along with motivation for personal development and the need to meet other people. Other reasons taken as part of the considerations systems of the student while selecting a higher education product, is the fact that for some of them, the process of decision making involves the need to make up for lost opportunities and increase their self-esteem as a social recognized and valued people. On the other hand, Chen et al., (2006), ascribes the process of decision making among students as related to consumer behavior arena, in their studies, the authors mention the research conducted by Hawkins et al.,(1994), as follows: "consumer behavior analyze the behavior behind purchases to find the potential market opportunities and to determine the appropriate marketing mix in order to develop practical and effective marketing strategies... by analyzing consumer behavior surrounding, the selection of higher education destinations can lead to an understanding of how the purchase-related variables interact and influence each other". Hence, the process of higher education decision making relies on numerous variables that can influence the consumer behavior of the individuals such as: environmental, cultural and resources available to the consumer (Assael, 1987)". Moreover, attitude is considered as the most important variable applied in the study of human behavior and changing attitudes during the process of reaching into a final decision, have been seen as one of

the main factors to influence the final decision by the consumer. This is the reason, why it is not sufficient to understand the process of decision making as a "stand alone component", but rather to evaluate and present which attributes are connected to it, by affecting and changing one's attitude in a way that it leads to a final choice in the process of higher education selection.

Moreover, Petruzzellis and Romanazzi (2010) state that "The university 'product' can be seen as a bundle of university related attributes, which are essentially defined as the components of the core product function sought by students, and student-related ones, which are external to the function or process of the offer".

As widely presented in the marketing literature, understanding students' choices and decision making processes assist in product improvement which, in turn, strengthens the organization's position and the competitive strategy targeted to students and candidates. Yet, several studies show that higher education has additional overlapping areas such as evaluating the quality of teaching and learning (Souter and McNeil, 1996), and evaluating the quality of the total student experience (Hill, 1995, Stodnick and Rogers, 2008). Other studies, such as that of Rawald and Gronroos (1996), show that customers appreciate not only the core product, but also the organization's value or, in other words, the value of service which is measured by reputation and satisfaction experience. This value produces loyalty which is mentioned extensively in the service studies literature. In the marketing research arena, the most obvious product attributes are often tested by Conjoint Analysis. This method is frequently related to an area in the field of product design.

Product design is an approach that begins with the assumption that each product has a number of attributes and levels; the larger the number of attributes and levels assigned to the product, the

higher the level of difficulty in designing it (Alexouda, 2003; Balakrishnan and Jacob, 1995, 1996). Taking this field into marketing practice, marketing practitioners try to find the best combination of product attributes and levels that lead to success in a competitive environment (Zwilling & Fruchter, 2013). This success is commonly measured by consumers' purchase intentions response rate. In this study, the pre-knowledge of higher education studies may strengthen candidate's probability of choosing their areas of study. In recent years, several heuristic methods in the field of product design have been suggested. Among them, Conjoint Analysis is considered one of the most popular marketing methods (Green & Shrivinasan, 1978). In addition, deterministic and stochastic methods, such as genetic algorithm and neural networks, have also been presented in the literature. In some cases, they have been shown to be superior to traditional conjoint analysis, especially when the set of combinations is very high (Balakrishnan & Jacob, 1995, 1996).

As stated above, the process of choosing the "right" or "wrong" area of studies is based on the consumer's product value, which is transformed into consumer utility. This value is composed of tangible and non-tangible attributes, such as the faculty's knowledge and ability to produce value for students; as well as intangible values such as reputation and past experience or perceived image of the program. The current study shows not only which attribute levels are most important to the area of studies selection process, but also that statistical tools may assist in indicating which of the tested attributes are perceived by students as being the most important. The results of this study may help academic decision-makers to adapt/revise areas of studies to better fit students' profiles and preferences, thus gaining a more competitive position in the market.

3. Method

3.1 *Questionnaire*

The aim of the study is to measure and discover which of the following attributes most influence students' decision processes: 1) Diploma prestige; 2) Future salary and demand; 3) Time Invested in current studies; 4) Personal interest. Each attribute can be categorized by two values: "high" or "low"; therefore, there are 16 combinations, as displayed in Table 1. A total of 303 participants were asked to complete a questionnaire regarding 16 combinations of products comprised of the four described attributes. Each participant was asked to rank each combination in descending order, ranging from 1(1 = the most preferred combination - optimal) to 16 (16 = the least preferred combination). Finally, participants were requested to indicate their gender; age; and socio-economic status using a 9-point scale (1=low; 9=excellent), their religious attitude, and area of residence in Israel.

[Table 1]

3.2. *Conjoint Analysis*

The data was analyzed by the conjoint analysis method, using the "R" programming package (<http://www.r-project.org>).¹ Conjoint (trade-off) analysis is one of the most widely-used quantitative methods in marketing research. It is used to measure preferences about product features, to learn how price changes influence the demand for products or services, and to

¹ This code interpreter is an environment for statistical computing and graphics using code. The R package provides a wide variety of statistical (linear and nonlinear modelling, classical statistical tests, time-series analysis, classification, clustering) and graphical techniques.

forecast the likely acceptance of a product if brought to market. Rather than directly ask survey respondents what they prefer in a product or what attributes they find most important, conjoint analysis employs the more realistic context of respondents evaluating potential product profiles. Each profile includes multiple conjoined product features. Respondents usually complete between 12 and 30 conjoint questions. The questions are designed carefully, using experimental design principles. By independently varying the features that are shown to the respondents and observing the responses to the product profiles, the analyst can statistically deduce what product features are most desired and which attributes have the most impact on choice.

In contrast to simpler survey research methods that directly ask respondents what they prefer or the importance of each attribute, these preferences are derived from these relatively realistic tradeoff situations. The result is usually a full set of preference scores (often called *part-worth utilities*) for each attribute level included in the study. Conjoint market simulators allow the researcher to define specific competitive contexts (specific products in competition with another) and project the share of choices (preference shares), given respondents' estimated part-worth scores. These simulators enable researchers and managers to test a variety of what-if scenarios related to the examined subject.

3.3. *Clustering*

K-means is a widely used method in cluster analysis. This method is very popular in the marketing research arena. The method is implemented as follows: 1) The data is divided into a number of K clusters according to their accompanied attributes. 2) Given a data set and a pre-specified number of clusters, k , the algorithm minimizes the SSE, the within-cluster square error. The algorithm is essential, especially when dealing with optimization problems. The following

assumptions are made by the algorithm: 1. K-means assumes the variance of the distribution of each attribute (variable) is spherical. 2. All variables have the same variance. 3. The prior probability for all k clusters are the same, i.e., each cluster has a roughly equal number of observations; if any one of these 3 assumptions is violated, K-means will fail.

4. Results

4.1. *Conjoint Analysis*

The tested data clearly shows that among the 4 examined attributes the following attributes are perceived by candidates as most important in the following order of importance: Prestige, Salary, Interest in studies, and Time Investment (Figure 1). All of the examined factors (attributes) were found to have a 1% significance level, as displayed in Table 2. The values related to each bar represent the percent of each attribute's value from a total of 100%.

[Figure 1]

[Table 2]

Next, we analyze the decisions of women and men separately. The importance of attributes for women and men is displayed in Figures 2a and 2b, respectively; part worth utilities are displayed in Tables 2a and 2b, respectively. Figures 1, 2a and 2b exhibit a similar importance of attributes. However, there are differences related to the part worth utilities. First, it is found that regarding the entire level of attributes the part worth utilities related to men are lower compared to those related to women (for example: Prestige: 0.9375 [F] vs. 0.855 [M], Salary: 0.73268 [F] vs. 0.63314 [M]). All of the examined attributes were found to have a 1% significance level for

women and men, as displayed in Tables 2a and h 2b. However, a t-test analysis shows that the difference between level of attributes related to men and women was not found to be significant regarding all 16 profiles, except for Profile 3, where sig (Levni's test) < 0.05 . Yet, examining the P value related to the t-test for equality of means reveals that the received value is greater than 0.05. Therefore, it can be concluded that there is a difference related to the part worth utilities between women and men, but this difference is not considered significant (see Table 3).

[Figure 2a]

[Table 2a]

[Figure 2b]

[Table 2b]

[Table 3]

Finally, we analyzed the data separately for two categories of socio-economic status – "low" (1-4 ratings) and "high" (6-9 ratings). The results are displayed in Tables 4-5 and Figures 3-4. In both categories, the most important attribute is Prestige followed by Salary. However, Time Investment is found to be more important than Personal Interest in the "low" category compared to the "high" category. In the "high" category, Personal Interest was found to be more important than Time Investment. In both cases, all of the examined attributes were found to have a 1% significance level.

[Figure 3]

[Table 4]

[Figure 4]

[Table 5]

4.2. *K-Means Clustering*

K-Means is a simple learning algorithm used for clustering analysis. The goal of the K-Means algorithm is to find the best division of n entities in k groups, so that the total distance between a group's members and its corresponding centroid, representative of the group, is minimized. Formally, the goal is to partition the n entities into k sets S_i , $i=1, 2, \dots, k$ in order to minimize the within-cluster sum of squares (WCSS), defined as:

$$\sum_{j=1}^k \sum_{i=1}^n \| x_i^j - c_j \|^2$$

where term $\| x_i^j - c_j \|^2$ provides the distance between an entity point and the cluster's centroid.

In this study, K-Means analysis exhibits two main clusters, 0 and 1, where cluster 1 holds most of the examined instances (61%) over cluster 0 (39%). Each value related to a specific profile exhibits the mean centroid value taken from whole instances related to the profile, wherein the higher the value is, the more the probability of being important to consumers increases as well (Table 6). The values related to each cluster exhibit the following: Profiles [3,5,8,10,13,15,16] are grouped together in Cluster 0, while Profiles [1,2,4,6,7,9,11,12,14] are grouped together in Cluster 1.

The values of each of the attribute levels related to the 16 different profiles are exhibited in Table 7. The values show that Profiles: 3,5,8,10,13,15,16 could be assigned to Group 0, rather than those that refer to Group 1. Moreover, it is shown, for example, that Profile 1 and Profile 4

should reside in the same cluster, probably in response to the respondent's values (regardless of gender differences).

5. Discussion

The purpose of this study was to explore the relationships between four different attributes related to students' study area selection processes. The competition among higher education institutions has become progressively more aggressive over recent years, and marketing activities under a limited budget are needed in order to revise and sharpen marketing strategies. Thus, it has become increasingly important to discover the optimal combination influencing students' choice about areas of study, and to understand which attributes are perceived by candidates as having the highest importance when it comes to this selection process. Conjoint analysis and clustering statistical methods are two types of methods that can be used to analyze data and indicate the influencing attributes. However, in order to revise/adapt the area of study to better fit consumer profiles, i.e., the profiles of interested students and candidates, a future study must be conducted to gather more data on consumers, after which an elaboration of the presented results could then be implemented. The current study will shed light on the importance level of each attribute regarding students' study area selection on the one hand, and on the optimal combination among the different attributes (which increases together with the amount of levels of attributes), on the other hand. Nevertheless, the results show that Prestige and Salary are considered more important by candidates or students, especially in areas of study related to business administration and economics. The results of this research present the attributes that are important to specific populations, and therefore can help marketers to plan and design the proper marketing method. The managerial implications of this study are very important to people who work with student recruitment in collaboration with marketers or communication division people in many aspects.

such as: Many studies, such as the one of Boyer (1987) showed, that quantity and quality of campus facilities play a marked role in a student's decision to attend a particular institution. Other studies, such as the one of Chain and Renyolds (2006) focus on the physical factors (such as the library, academic technology, classroom building, and residence halls) leading students to select a particular institution. However, they also mention that nowadays, millennial students include other aspects to their choice decision, such as collaborating learning and transition of information between them and the faculty members. This is clearly the place where the current evaluated attributes in this study take place. To adapt a new generation of students, it is not sufficient to establish a new and modern library. The marketers of the recruitment division need to take into account the importance of the examined attributes such as "Diploma prestige" and "Future salary" among the other evaluated attributes, which are part of the process of information transaction among students. This attributes may assist in effective advertising campaign construction. As stated, a collaborative learning environment between students must consider the change in the climate of studying and the change in the approach of students to their studies, for example: many students want to work in groups and have access to multimedia materials. Oblinger (2006), describes the following change in the attitude of students to higher education consumption: "The "information commons" concept integrates variety of resources and services, ranging from traditional library services to multimedia technology to small group rooms and other accompanied influences". The fact that todody, students are not satisfied only from gaining a diploma, in a community where they study, work and socialize in groups, it is important to consider as a pre and post recruiting activities to preserve their satisfaction, and to take into account more accompanying variables such as: the prestige of the diploma, the implications of studies on the future salary, the cost vs. benefit on time investment in student's studies and the

personal interest of students in the study program and its relevance to the work environment. This attributes are all evaluated and discussed in this paper.

References

Alexouda, G. (2003). "An evolutionary algorithm approach to the share of choices problem in the product line design", *Computers and Operations Research*, Vol. 31, pp. 2215–2229.

Assael, H., (1987). "Consumer Behaviour and Marketing Action", 6th ed, *South-Western College Pub, Cincinnati, OH*.

Balakrishnan, P.V. and Jacob V.S. (1995). "Triangulation in decision support systems: Algorithms for product design", *Decision Support Systems*, Vol. 14, pp. 313–327.

Balakrishnan, P.V., & Jacob V.S. (1996). "Genetic algorithm for product design", *Management Science*, Vol. 42, No. 8, pp. 1105–1117.

Boyer, E.L., (1987). "College: The Undergraduate Experience in America", *New York: Harper & Row*.

Chain, D., and G.L. Reynolds., (2006). "The impact of Facilities on Recruitment and Retention of Students, Part I:", *Research Findings, Facilitateis Manager*, March-April, pp.54-60.

Chen, C-H., Zimmitat,C.,(2006),"Understanding Taiwanese students' decision-making factors regarding Australian international higher education", *The International Journal of Educational Management*, 20,2,pp.91-100.

Davidovitch,N.,Lobova,E.,Pryamikova,E.,Semenova,T.,Pechenkina,T.,Maria,Y., (2012),"Expectations, Practices, And Preferences of College Students: A Cross-Cultural Perspective of CIS-Born And Israeli-Born Students in Israel", *Journal of International Education Research*", Third Quarter,8(3), pp. 309-318.

Gambetta, D. (1996). *Were they pushed or did they jump? Individual decision mechanisms in Education*". Westview Press, Boulder, CO.

Green, P.E., and Shrinivasan P.V. (1978). "Conjoint analysis in consumer research: Issues and outlook", *Journal of Consumer Research*, Vol. 5, pp. 103-123.

Hamsley-Brown, J. (1999). "College Choice: Perceptions and priorities", *Educational Management & Administration*, Vol. 27, No. 1, pp. 85-98.

Hill, F.M. (1995). "Managing Service quality in higher education: The role of the student as primary consumer", *Quality Assurance in Education*, Vol. 3, No. 3, pp. 10-21.

Jamieson, A., (2007), "Higher education study in later life: what is the point ?", *Ageing & Society*, 27, pp.363-384.

Maringe, F. (2006), "University and course choice. Implications for positioning, recruitment and marketing", *International Journal of Educational Management*, Vol. 20, No. 6, pp. 466-79.

Oblinger, D.G., (2006), "Learning Spaces", *Boulder, CO: Educause*. Retrived October 18, 2008, from the World Wide Web: net.educause.edu/ir/library/pdf/PUB7102.pdf

Petruzzelis, L., D'Uggento, A.M., and Romanazzi, S. (2006). "Student satisfaction and quality of service in Italian universities", *Managing Service Quality*, Vol. 16, No. 4, pp. 349-364.

Rewald, A. and Gronroos, C., (1996). "The value concept and relationship marketing", *European Journal of Marketing*, Vol. 30, pp. 19-30.

Souter, G. and McNeil, M. (1996). "Measuring service quality in tertiary institution", *Journal of Educational Administration*, Vol. 34, pp. 72-82.

Stodnick, M. and Rogers, P. (2008). "Using SERVQUAL to measure the quality of the classroom experience", *Decision Science Journal of Innovative Education*, Vol. 6, No. 1, pp. 115-133.

Worthington, A. and Higgs, H. (2004). "Factors explaining the choice of an economic major. The role of student characteristics, personality and perceptions of the profession", *International Journal of Social Economics*, Vol. 31, pp. 593-613.

Zwilling, M., and Fruchter, G., (2013). "Matching product attributes to celebrities who reinforce the brand: An innovative algorithmic selection model", *Journal of Advertising Research*, Vol. 53, No. 4, pp. 391-410

Table 1: The 16 profile (level of attributes) combinations

Profile	Prestige	Salary	Investment	Personal Interest
1	HIGH	HIGH	LOW	LOW
2	HIGH	HIGH	HIGH	HIGH
3	HIGH	LOW	LOW	HIGH
4	LOW	HIGH	LOW	HIGH
5	LOW	LOW	LOW	HIGH
6	LOW	HIGH	HIGH	HIGH
7	HIGH	HIGH	LOW	HIGH
8	LOW	HIGH	HIGH	LOW
9	HIGH	LOW	HIGH	HIGH
10	LOW	LOW	HIGH	LOW
11	HIGH	LOW	HIGH	LOW
12	HIGH	HIGH	HIGH	LOW
13	LOW	LOW	HIGH	HIGH
14	LOW	HIGH	LOW	LOW
15	LOW	LOW	LOW	LOW
16	HIGH	LOW	HIGH	LOW

Table 2: Part worth utilities

	Estimate	Std. Error	t value	Pr(> t)
Prestige	0,86300	0,02852	30,262	< 2e-16
Salary	0,67964	0,02852	23,832	< 2e-16
Investment	-0,16887	0,02852	-5,922	<3,4e-09
Interest	0,32285	0,02852	11,321	< 2e-16

Table 2a: Part worth utilities: Women

	Estimate	Std. Error	t value	Pr(> t)
Prestige	0,93750	0,05299	17,692	< 2e-16
Salary	0,73268	0,05299	13,827	< 2e-16
Investment	-0,14985	0,05299	-2,828	<0,00476
Interest	0,34111	0,05299	6,437	<1,7e-10

Table 2b: Part worth utilities: Men

	Estimate	Std. Error	t value	Pr(> t)
Prestige	0,85577	0,03847	22,246	< 2e-16
Salary	0,63314	0,03847	16,459	< 2e-16
Investment	-0,20266	0,03847	-5,268	<1,49e-07
Interest	0,32914	0,03847	8,556	< 2e-16

Table 3: Independent T-Test Analysis between men and women

		Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Prof1	Equal variances assumed	.030	.864	-.025	250	.980	-.006	.253	-.504	.491
	Equal variances not assumed			-.025	162.231	.980	-.006	.253	-.506	.494
Prof2	Equal variances assumed	.031	.859	.569	250	.570	.133	.234	-.328	.594
	Equal variances not assumed			.560	156.473	.576	.133	.238	-.336	.603
Prof3	Equal variances assumed	.328	.567	-.960	250	.338	-.244	.254	-.745	.257
	Equal variances not assumed			-.985	174.542	.326	-.244	.248	-.733	.245
Prof4	Equal variances assumed	3.767	.053	1.461	250	.145	.311	.213	-.108	.731
	Equal variances not assumed			1.522	181.506	.130	.311	.205	-.092	.715
Prof5	Equal variances assumed	4.353	.038	-1.611	250	.108	-.412	.256	-.916	.092
	Equal variances not assumed			-1.734	198.122	.084	-.412	.238	-.881	.057
Prof6	Equal variances assumed	.181	.671	1.247	250	.214	.296	.237	-.171	.763
	Equal variances not assumed			1.238	160.167	.217	.296	.239	-.176	.768
Prof7	Equal variances assumed	3.263	.072	.892	250	.373	.143	.160	-.172	.458
	Equal variances not assumed			.971	203.953	.333	.143	.147	-.147	.433
Prof8	Equal variances assumed	.206	.650	-.596	250	.552	-.130	.218	-.559	.299
	Equal variances not assumed			-.611	174.389	.542	-.130	.213	-.549	.290
Prof9	Equal variances assumed	.873	.351	1.352	250	.178	.322	.238	-.147	.790
	Equal variances not assumed			1.390	175.655	.166	.322	.231	-.135	.778
Prof10	Equal variances assumed	1.922	.167	-.593	250	.554	-.132	.223	-.571	.307
	Equal variances not assumed			-.639	198.854	.524	-.132	.207	-.539	.275
Prof11	Equal variances assumed	3.310	.070	.232	250	.816	.052	.224	-.388	.492
	Equal variances not assumed			.237	172.556	.813	.052	.219	-.380	.484
Prof12	Equal variances assumed	.241	.624	1.058	250	.291	.290	.274	-.250	.830
	Equal variances not assumed			1.069	167.883	.286	.290	.271	-.245	.825
Prof13	Equal variances assumed	.700	.403	-1.317	250	.189	-.321	.244	-.801	.159
	Equal variances not assumed			-1.290	154.628	.199	-.321	.249	-.813	.171
Prof14	Equal variances assumed	1.942	.165	-.439	250	.661	-.109	.248	-.597	.379
	Equal variances not assumed			-.461	185.945	.645	-.109	.236	-.574	.357
Prof15	Equal variances assumed	1.987	.160	-.100	250	.921	-.026	.256	-.530	.479
	Equal variances not assumed			-.097	150.692	.923	-.026	.264	-.547	.496
Prof16	Equal variances assumed	.400	.528	.406	250	.685	.096	.237	-.371	.564
	Equal variances not assumed			.418	175.744	.677	.096	.231	-.359	.552

Table 4: Part worth utilities - Low Socio-economic Status

	Estimate	Std. Error	t value	Pr(> t)
Prestige	0,78671	0,06468	12,163	< 2e-16
Salary	0,53671	0,06468	8,298	<3,40e-16
Investment	-0,30258	0,06468	-4,678	<3,29e-06
Interest	0,24702	0,06468	3,819	<0,000142

Table 5: Part worth utilities - Low Socio-economic Status

	Estimate	Std. Error	t value	Pr(> t)
Prestige	0,88480	0,03191	27,730	< 2e-16
Salary	0,71001	0,03191	22,252	< 2e-16
Investment	-0,13639	0,03191	-4,274	<1,96e-05
Interest	0,34031	0,03191	10,665	< 2e-16

Table 6: K-Means clustering with 6 iterations

	Full Data	Cluster #0	Cluster #1
Attribute/Total Instances	(199)	(59)	(140)
Prof1	4.9849	4.6271	<u>5.1357</u>
Prof2	5.7839	4.5763	<u>6.2929</u>
Prof3	3.6734	<u>4.322</u>	3.4
Prof4	4.7236	4.339	<u>4.8857</u>
Prof5	2.603	<u>4.4746</u>	1.8143
Prof6	3.8995	3.2373	<u>4.1786</u>
Prof7	7.6231	7.2881	<u>7.7643</u>
Prof8	2.7688	<u>3.1864</u>	2.5929
Prof9	5.8643	4.4407	<u>6.4643</u>
Prof10	1.7085	<u>2.322</u>	1.45
Prof11	4.8241	4.6949	<u>4.8786</u>
Prof12	6.201	4.661	<u>6.85</u>
Prof13	4.3568	<u>4.5932</u>	4.2571
Prof14	5.7085	4.9492	<u>6.0286</u>
Prof15	3.2362	<u>5.0508</u>	2.4714
Prof16	3.9296	<u>5.2373</u>	3.3786

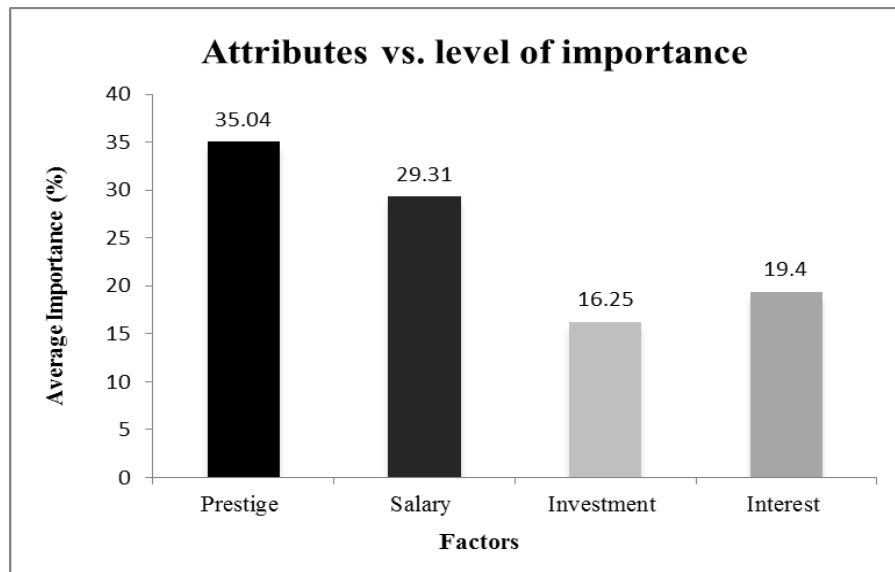
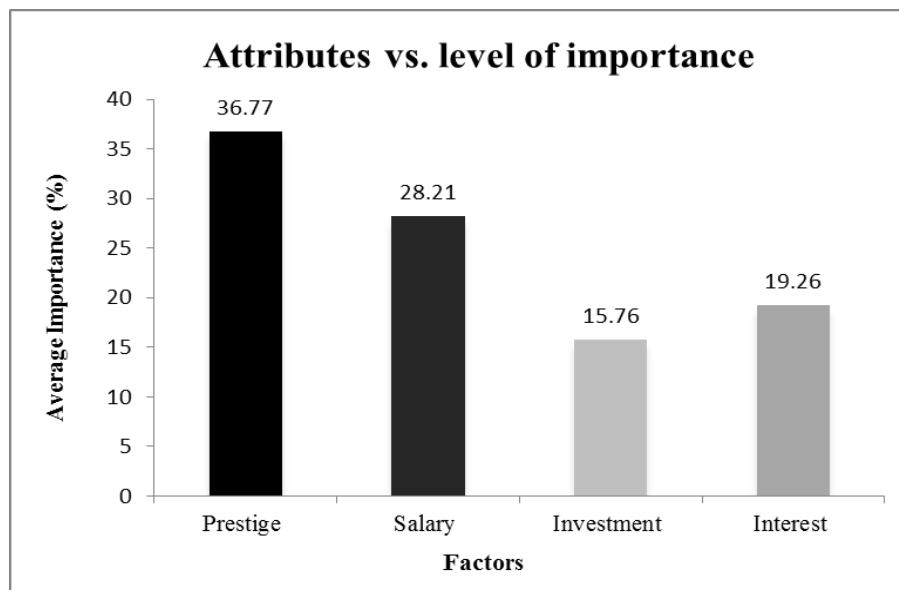
Figure 1: Conjoint Analysis preferences**Figure 2a: Conjoint Analysis: Women's preferences**

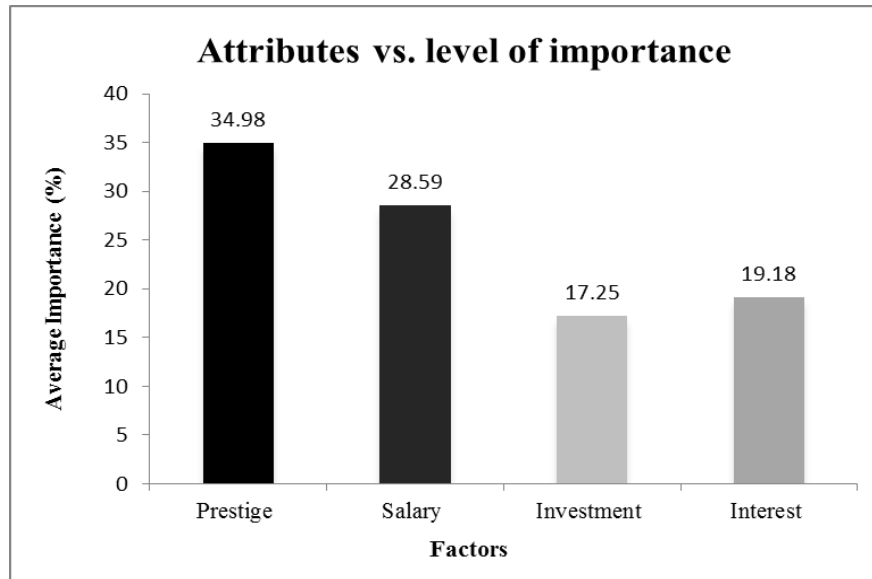
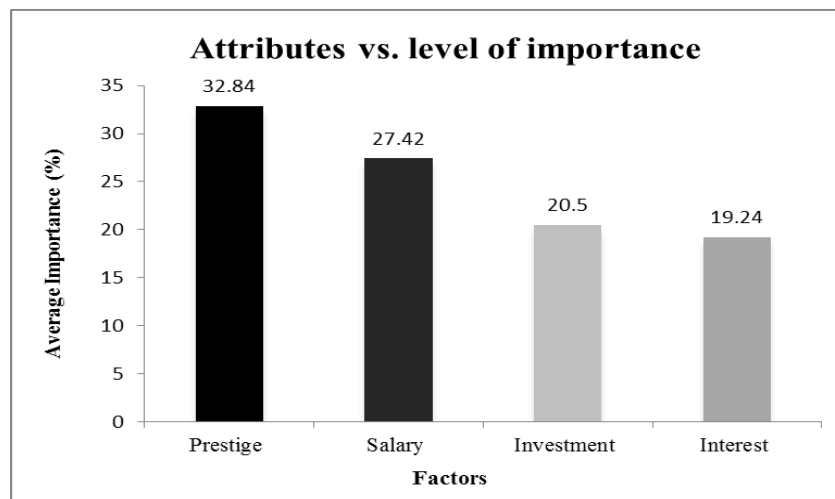
Figure 2b: Conjoint Analysis: Men's preferences**Figure 3: Conjoint Analysis preferences - Low Socio-economic Status**

Figure 4: Conjoint Analysis preferences - High Socio-economic Status

