A Study on Consumer Decision Making Styles: Evaluation of Notebook Choice by Conjoint Analysis

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***Abstract*— It has been quite hard to answer the consumer's needs due to the innovations and the variation of choices in markets today. The purpose of this research was to determine the preferred attitudes of a notebook to identify the consumer's needs in Bosnia. The data is obtained from the survey of Bosnian consumers from 17 to 48 ages working, nonworking or student groups by the method of simple random sampling. A card list is prepared for 20 notebooks. The conjoint analysis was conducted to Bosnian consumers who ranked their preferences from cardlist prepared as an orthogonal design. The results showed that on the desired notebook, the effect of demographics influences the choice as well as the effect of notebook attributes.**

***Index Terms*— Decision Making, Conjoint Analysis, Consumer Behaviour**
JEL Classification Codes: C44, C4, D12

I. INTRODUCTION

Decision making styles are shaped by the cultural, social, personal and psychological variables. There exists various factors influencing consumer behavior for different types of products. For this study we've observed that there have been many researches on consumer choice but not on notebook choicein Bosnia. In the study we employed conjoint analysis using IBM SPSS Statistics 20. The data is obtained from the survey of Bosnian consumers from 17 to 48 ages working, nonworking or student groups. We have prepared a cardlist for 20 notebooks explaining the attributes of them. The determined parameters are brand, processor, harddisk, RAM, speed, screensize, warranty, batterylife and price.

Sproles and Kendall were the first to establish the core concept of consumer decision making styles by defining it as "a mental orientation characterizing a consumer's approach to making choices"(Jain & Sharma, 2013)

Zhou, Arnold, Pereira, & Yu (2010) employ a cultural materialism perspective in understanding decision-making styles of inland and coastal shoppers. Findings reveal that consumers in the two regional markets do not differ in utilitarian shopping styles.

Yang & Min (2010) studied on online consumer purchase decision-making model designed to enrich the content of this field of theoretical and practical development of e-commerce market.

Bakewell & Mitchell (2006) have a study on male versus female consumer decision making (CDM) styles and identify that nine decision-making traits were common to both genders. Also Granot, Greene, & Brashear (2010) investigate how female shoppers make meaning in a branded-retail store shopping experience.

Baltas & Saridakis (2013) develop a disaggregate, compensatory choice model to examine the impact of under-examined factors on consumer car type choice behavior. Wu, Liao, & Chatwuthikrai (2014) find the important attributes of subcompact cars that effect customer choice, using conjoint analysis as an analytical tool. They conclude that using the results presented in this work, manufacturers can better tailor their subcompact cars to meet the needs of customers, and thus increase sale.

The employed models for consumer choice of products in the earlier studies are canonical random utility maximization (Chorus et al.,2014), pseudo-coefficients of determination (Sung et al.,2016), Markov chain model (Berbeglia, 2016). In the work of Halme & Kallio (2011) they compare the performance of four published optimization-based procedures and introduce a new one called CP for choice-based conjoint analysis.

Borthick ve Scheiner (1998) performed one of the first studies on the notebook choice using AHP approach, Pekkaya (2014) employed DEA, TOPSIS and VIKOR models, Erpolat & Cinemre (2011) used Data Envelopment Analysis (DEA) based on linear programming, and Koçer et al. (2014) performed an analysis by game theory approach to examine how the student preferences affect on the advertising strategies of the laptop computer firms.

By the literature rewiew conjoint analysis is recognized as the most appropriate model for choice of a product. The review of studies on consumer preferences and conjoint analysis is given in the table 1 below.

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TABLE 1. Recent Studies Using Conjoint Approaches

Reference	Year	Paper	Method
Wu et al.	2014	Applying conjoint analysis to evaluate consumer preferences toward subcompact cars.	Conjoint analysis to identify the key attributes of subcompact cars.
Halme & Kallio	2014	Estimation methods for choice-based conjoint analysis of consumer preferences.	Choice-based conjoint analysis Hierarchical Bayes (HB) method
Claret et al.	2012	Consumer preferences for sea fish using conjoint analysis: Exploratory study of the importance of country of origin, obtaining method, storage conditions and purchasing price.	conjoint analysis (CA) was applied to determine the utility values for the different levels of the selected attribute
Gamze Özel	2008	A research about investigating the factors which are effective on milk choice of consumers.	It was tried to show by CA how much the customers give importance to the determined properties for milk choice
Roh & Hun Kim	2007	Conjoint Analysis of High performance Fabrics for Mountaineering Jacket	A conjoint analysis was conducted to determine the most important attribute in choosing a hypothetical jacket
García-Torres et al.	2016	Intensive vs. free-range organic beef. A preference study through consumer liking and conjoint analysis	Evaluates consumer liking and preferences towards organic beef from two production systems.
Asioli et al.	2016	Comparison of rating-based and choice-based conjoint analysis models. A case study based on preferences for iced coffee in Norway	Two conjoint analysis approaches are compared eliciting consumer preferences among different product profiles of iced coffees in Norway

The following sections explain consumer decision making process including input, process and output stages and summarizes the empirical method. Also the statistical analysis results are presented and concluded in the last section.

2. CONSUMER DECISION MAKING

CDM styles are thinking styles that are preferred ways of using the abilities that an individual develops over several years, such as perfectionist and brand consciousness, relate to seeking high quality and equate to paying high prices with high quality (Wesley, LeHew, & Woodside, 2006).

Rezaei (2015) and Nayeem & Casidy (2015) and Tanksale, Neelam, & Venkatachalam (2014) mentioned the classification of consumer decision making styles as perfectionist, brand conscious, price conscious, fashion conscious, recreational, confused by over-choice, habitual/brand loyal and impulsive which are retained from the Sproles and Kendall's Consumer Styles Inventory (CSI).

Consumer decision-making styles is outlined below (Sproles and Kendall, 1986):

(1) *Perfectionist, high quality conscious decision-making style:* Consumer search for the very best quality in products.

(2) *Brand-conscious decision-making style:* There exists a tendency to buy expensive, well-known brands.

(3) *Recreation-conscious decision-making style*: Shopping is regarded as a form of enjoyment for consumer.

(4) *Price-conscious, value-for-money decision-making style*: Consumer exhibits price- and value-for-money consciousness.

(5) *Impulsive, careless decision-making style: C*onsumer is not concerned with how much s/he spends or with value for money.

(6) *Confused by over-choice decision-making style:* Consumer is confused by too much product information or too many product choices.

(7) *Habitual/brand loyal decision-making style:* Consumer's tendency to follow a similar purchase pattern each time with little re-assessment.

(8) *Novelty/fashion conscious decision-making style:* Consumer's tendency to seek out new products for the sake of excitement.

As a result of this study we will be able to specify the style of Bosnian consumers who have responded the survey. But how does the consumer choice come out? The process of consumer decision making is identified by Schiffman & Kanuk (1983) in three stages as input stage, process stage and output stage. The CDM process is given in figure 1.

2.1 Input

The input stage draws on external influences, product related values, sociocultural environment that affect the consumers' purchase decisions.

2. 2 Process

The process stage of the model is concerned with how consumers make decisions related to psychological concepts that we can call internal influences. As pictured in the Figure 1 it consists three stages.

2. 3 Output

The output stage is the evaluation of post purchase behavior such as observing if the purchase is repeating.

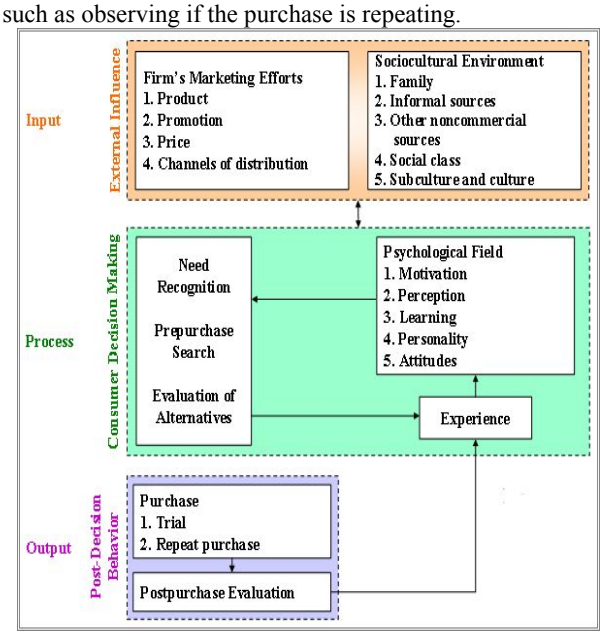

FIGURE 1. Consumer Decision Making Model

Source: Schiffman & Kanuk (1983). Consumer Behaviour, 1st Edition, Pearson Education

On the basis of the considerations outlined above, a conceptual model is developed to test the effect of notebook attributes on consumer choice. The following sections discuss the rationale of this model depicted in

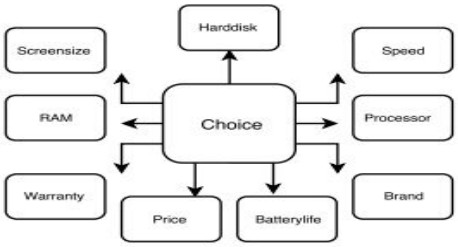

FIGURE 2. Concept Model for the Research

3. METHODOLOGY

Conjoint analysis is a research tool for developing effective product design. The researcher can answer questions such as: What product attributes are important or unimportant to the consumer? What levels of product attributes are the most or least desirable in the consumer's mind? *(SPSS Conjoint 14.0,* 2005) In application process the data is collected by a survey and used in the SPSS analysis.

3.1 Data Collecting

Data is acquired through a survey among Bosnian consumers from 17 to 48 ages working nonworking or student groups groups by the method of simple random sampling. We have prepared cardlist for 20 notebooks explaining the attributes of them shown in Table 2.

TABLE 2 Notebook Attibutes and their Levels

Attributes	Level
Processor	i3, i5, i7
Speed	1.7-1.9 GHz 1.9-2.2 GHz 2.2- more
Price	500€-750€ 750€-1250€ 1250€- more
Brand	Sony Vaio, Toshiba, Acer, Hp
Battery life	1-4 hours, 4 or more hours
Warranty	1 year, 2 or more years
RAM	2GB, 4GB, 6GB, 8GB
Screen Size	*11"-14", 14"-17"*
Hard disk	250-360 GB 360-500 GB 500-750 GB

All the possible combinations of the attribute levels would result in (3x3x3x4x2x2x4x2x3) 10368 profiles. However, this was considered too burdensome for the respondents to react to. An orthogonal array of IBM SPSS Statistics 20 software package was used in our analysis.

3.2 Generating an Orthogonal Design

We've chosen 20 profiles and wanted respondents to rank each of the products on a scale from 20 to 1, where 20 represent the highest degree of preference. The preference data collected from the subjects is stored in a SPSS file. Also the data consist of attributes of notebooks in are collected in another file. Respondents are asked to rank the chosen 20 product profiles from the most to the least preferred. The variables PREF1 through PREF20 contain the NOs of the associated product profiles, that is, the card NO's.

TABLE 3. Card list

No	Brand	Processor	RAM	Harddisk	Speed	Screen Size	Warranty	Battery life	Price
1	Sony Vaio	i3	2	250-360 GB	1.7-1.9 GHz	14"-17"	1 year	4 or more	500€-750€
2	Sony Vaio	i5	4	360-500 GB	1.9-2.2 GHz	14"-17"	2 or more	1-4 hours	750€-1250€
3	Sony Vaio	i7	6	360-500 GB	2.2- more	11"-14"	longer	4 or more	750€-1250€
4	Sony Vaio	i5	8	360-500 GB	2.2- more	11"-14"	1 year	4 or more	1250€- more
5	Sony Vaio	i7	6	500-750 GB	2.2- more	11"-14"	1 year	1-4 hours	1250€- more
6	Toshiba	i5	6	500-750 GB	1.7-1.9 GHz	14"-17"	longer	1-4 hours	750€-1250€
7	Toshiba	i5	4	360-500 GB	1.9-2.2 GHz	14"-17"	1 year	4 or more	1250€- more
8	Toshiba	i7	6	500-750 GB	2.2- more	11"-14"	longer	4 or more	1250€- more
9	Toshiba	i5	6	500-750 GB	2.2- more	11"-14"	longer	4 or more	500€-750€
10	Toshiba	i3	2	250-360 GB	1.9-2.2 GHz	14"-17"	1 year	1-4 hours	500€-750€
11	Acer	i5	4	250-360 GB	1.7-1.9 GHz	14"-17"	1 year	4 or more	750€-1250€
12	Acer	i5	4	360-500 GB	1.9-2.2 GHz	14"-17"	1 year	4 or more	500€-750€
13	Acer	i5	6	500-750 GB	2.2- more	11"-14"	longer	1-4 hours	750€-1250€
14	Acer	i7	6	500-750 GB	2.2- more	11"-14"	longer	1-4 hours	1250€- more
15	Acer	i7	8	500-750 GB	2.2- more	11"-14"	longer	4 or more	500€-750€
16	Hp	i3	2	250-360 GB	1.7-1.9 GHz	14"-17"	1 year	4 or more	500€-750€
17	Hp	i5	4	250-360 GB	1.9-2.2 GHz	14"-17"	1 year	1-4 hours	500€-750€
18	Hp	i7	4	360-500 GB	2.2- more	11"-14"	longer	1-4 hours	500€-750€
19	Hp	i5	6	360-500 GB	2.2- more	11"-14"	longer	4 or more	500€-750€
20	Hp	i5	6	500-750 GB	2.2- more	11"-14"	longer	4 or more	1250€- more

3.3 Characteristics of the respondents

The data of characteristics of respondents is used to observe the affect of gender, age, education and income on PREF1(first preferences). Table 4. shows the demographics.

TABLE 4. Demographic Information of Respondents

		Percent	Valid Percent	Cumulative Percent
gender	female	62.5	62.5	62.5
	male	37.5	37.5	100.0
Age	under 18	28.1	28.1	28.1
	18-24	21.9	21.9	50.0
	25-44	40.6	40.6	90.6
	45-54	9.4	9.4	100.0
Marital Status	single	68.8	68.8	68.8
	married	31.3	31.3	100.0
Education	high school	37.5	37.5	37.5
	undergraduate	37.5	37.5	75.0
	master	18.8	18.8	93.8
	other	6.3	6.3	100.0
Position	student	40.6	40.6	40.6
	working private	50.0	50.0	90.6
	working in government	6.3	6.3	96.9
	none	3.1	3.1	100.0
Income	1-199	37.5	37.5	37.5

200-299	6.3	6.3	43.8
300-499	6.3	6.3	50.0
500-749	15.6	15.6	65.6
750-999	18.8	18.8	84.4
1000-1499	6.3	6.3	90.6
1500-1999	3.1	3.1	93.8
2000 or more	6.3	6.3	100.0

4. Statistical Analysis Results

4.1 The Affect of Demographics

Consumers from 17 to 48 ages working nonworking or student groups were respondents in this analysis. The observations of SPSS data analysis on consumer demographics shows that the most preferred notebook profile 15 is preferred by female respondents more than the male. The profiles 5, 6 and 10 are not preferred by female consumers while 1, 16 and 18 are not preferred by male consumers. Figure 3 is the distribution of male and female consumers' first preferences with respect to age groups.

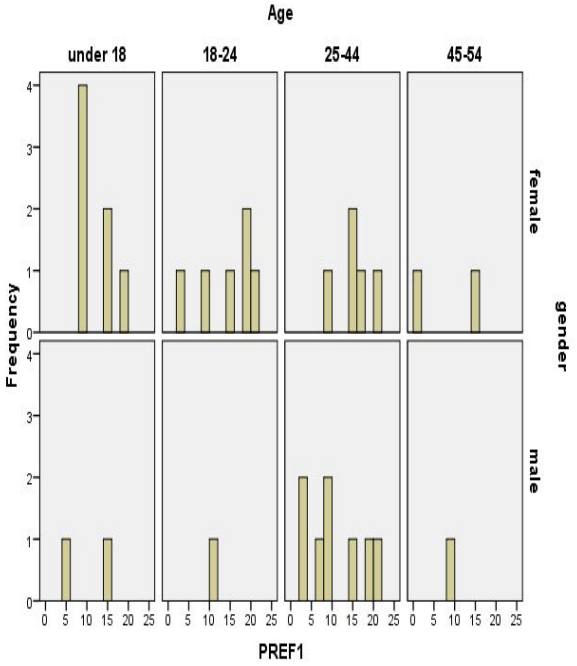

FIGURE 3 First Preferences Classified by Gender

Consumers under 17 are more likely than to follow the popular trends. The most popular profile 15 is desired mostly by respondents under 17 years. Consumers which have graduated high school or undergraduate level mostly prefer profile 8 and 15. Also the highest age respondents are looking for the same popular profiles. These profiles are Acer i7 with low price and Toshiba i7 with highest price. See table 5 for the most preferred profiles. We can clearly see that in the best choices, there exists an affect of processor type. Respondents of middle income groups preferred the profile 15 and 3 which are lower price. This shows the affect of economic situation on the purchasing decisions. The most rated models are given in the Table 5 below.

TABLE 5 Most Rated Preferences of Consumers

	Percent	Valid Percent	Cumulative Percent
3	9.4	9.4	12.5
8	18.8	18.8	37.5
9	9.4	9.4	46.9
15	25	25	75
18	6.3	6.3	84.4
19	6.3	6.3	90.6
20	9.4	9.4	100
Total	100	100	

4.2. The Effect of Notebook Attributes on Conjoint Analysis

Consumers do not consider each attribute independently, instead they consider a range of product attributes in totality. The use of conjoint analysis is appropriate for predetermining the importance that a consumer attaches to the functional property attributes of a notebook (Levy, 1995).

Conjoint analysis is a method for measuring and modeling consumer preferences for multi attribute alternatives. Unlike traditional research techniques, conjoint analysis does not ask respondents directly which attributes are important. It forces them to make trade-offs between products, and it shows their actual behavior when purchasing products. Analysis of the data is a task that requires the use of command syntax specifically, the CONJOINT command. The necessary command syntax has been provided, than preferences data file and also notebook attributes data file are used in the analysis. We got the outputs as given in the tables 5, 6, 7.

Utility values shows which levels of product attributes are the most or least desirable by the consumer for evaluation of that attribute. Higher utility values indicate greater preference for that level of attribute. As expected, there is an inverse relationship between price and utility, with higher prices corresponding to lower utility (larger negative values mean lower utility) (*SPSS Conjoint 14.0.*, 2005). The presence of processor i7 with 1 year guarantee, 8GB RAM and long batterylife corresponds to a higher utility which means greater preference is shown in the Table 6.

The utility of price for the determined three levels is shown in details by figure 4. It is clearly seen that the middle level (750€-1250€) of price is not preffered by consumers, it has a negative value on Table 6 which means lower utility.

TABLE 6. Utilities

		Utility Estimate	Std. Error
Brand	Sony Vaio	0.826	15.739
	Toshiba	0.865	14.49
	Acer	-0.355	17.084
	Hp	-1.336	21.172
Processor	i3	-4.851	39.22
	i5	1.312	23.766
	i7	3.539	20.908
Harddisk	250-360 GB	1.255	40.045
	360-500 GB	-1.421	17.894
	500-750 GB	0.166	34.333
Speed	1.7-1.9 GHz	-0.393	20.945
	1.9-2.2 GHz	-0.314	31.802
	2.2-more	0.708	38.177
ScreenSize	11"-14"	-2.936	31.746
	14"-17"	2.936	31.746
Warranty	1 year	3.959	86.574
	longer	-3.959	86.574
Batterylife	1-4 hour	-7.863	75.907
	4 or more	7.863	75.907
Price	500€-750€	1.977	65.412
	750€-1250€	-2.635	38.483
	1250€-more	0.658	64.368
RAM	2	0.922	27.941
	4	1.843	55.882
	6	2.765	83.823
	8	3.686	111.765
(Constant)		6.807	79.368

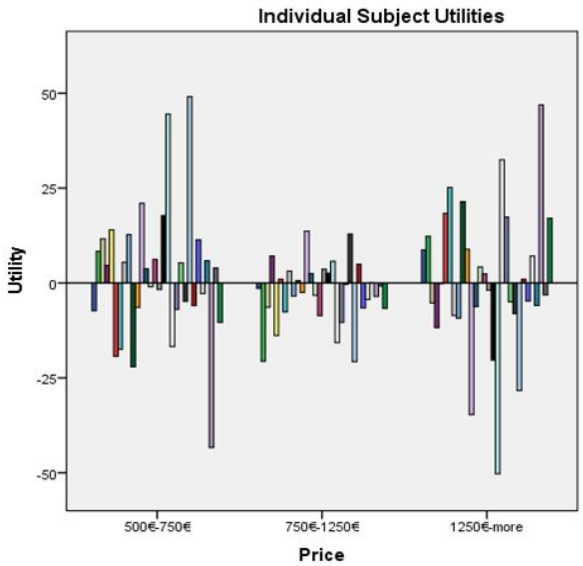

FIGURE 4 Utility of Price

The Table 7 provides a measure of the relative importance of each factor known as an importance score or value.

TABLE 7. Importance Percentages of Notebook Attributes

Importance Values	
Brand	6.611
Processor	10.384
Harddisk	11.031
Speed	7.687
ScreenSize	6.781
Warranty	14.428
Batterylife	15.268
Price	18.346
RAM	9.463

Averaged Importance Score

The results show that price has the most influence on overall preference. We find out that brand and screen size plays the least important role in determining overall preference. Figure 5 shows that Batterylife plays a significant role but not as much as price.

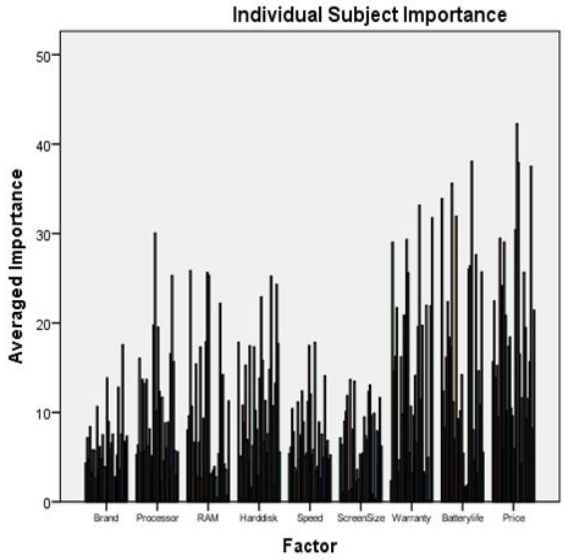

FIGURE 5 Importance value of factors.

We can determine the decision making style as "price-value consciousnes" in this study. The consumers appear conscious of lower prices in general, and are likely to be comparison shoppers. They are also concerned with getting the best value for their money. See the figure 6 as a summary of importance percentages.

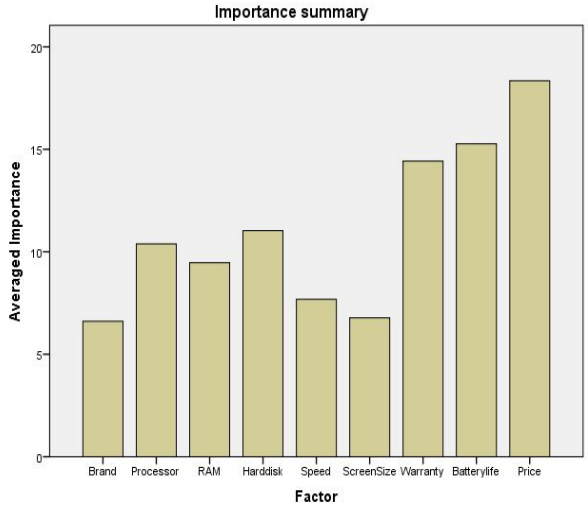

FIGURE 6. Importance Percentages

CONCLUSION

Every change of the social or economic situation can change the way the consumer purchase, the purchases of Bosnian consumers are more economical and responsible. In this research the application of conjoint analysis provides estimation of consumers desire to some attributes of notebooks. The results demonstrate that economic situation have a big impact on consumer decision making. We identify the decision making style as "price-value consciousnes". Also we can clearly see that in the best choices, there exists an affect of processor type.

The purpose is to determine the preferred attitudes of a notebook to identify the consumer's needs. We observe that brand and screen size plays the least important role in determining the consumer preference. Batterylife plays a significant role but not as significant as price.

As a conclusion we can remark that if the importance of each attribute and the trade-offs between levels of attributes are understood than markets can provide consumers more desirable notebooks. Further research can be done to identify how cultural or regional changes impact the consumer decision making styles of notebook choice.

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Appendices:

Appendix 1 The Syntax used in Conjoint Analysis

```
CONJOINT PLAN='C:\Users\math\Desktop\data3.sav'
/DATA='C:\Users\math\Desktop\PREFERENCES.sav'
/SEQUENCE=PREF1 TO PREF20
/SUBJECT=NO
/FACTORS=BRAND (DISCRETE)
RAM (LINEAR)
/PRINT=SUMMARYONLY
/PLOT=ALL
```