ASSIGNMENT 1
Basic Analysis and AN(C)OVA [1]

The DELL Direct study (Malhotra, 2010, pp. 806-811) constitutes the basis for data analysis assignment 1. DELL is one of the major vendors of PC systems worldwide. More information on DELL can be found on the DELL website (http://www.dell.com). In this assignment we will use the data from the DELL Direct study to introduce the key concepts of data preparation and basic data analysis, and apply them using SPSS 25 and R. The data for the DELL Direct study were obtained using a mix of an online and a paper-and-pencil (offline) survey in February 2014 (n=927, overall response rate: 25.7%).

ASSIGNMENTS

Data Preparation

(1) The DELL Direct study was conducted by DELL in the USA (**DELL.DATA.sav**). Please, note that **Q3** and **Q7** have been omitted from the data, because of privacy reasons. Moreover, DELL also collects transaction data on its customers. After obtaining the written consent of the customers involved in the study DELL was able to add two variables from its CRM database: (1) **DB.Recent** (year of the most recent transaction) and (2) **DB.Value** (lifetime value in €). Please, first check the data for consistency, both the variables and the cases (i.e., the respondents). You may either use the command **Frequencies (Analyze→Descriptive Statistics→Frequencies)**, the data utility **Identify Duplicate Cases (Data→Identify Duplicate Cases**), or the data utility **Validate (Data→Validate).** A codebook contains all the necessary information about the variables (variable name, variable label, value names, value labels and missing values) in the data set. Using SPSS the codebook for the data file can be obtained using the display command. In the menu you can find it under **File→Display Data File Information→Working File.** The variable **SAMPLE** contains the source of the data, online or offline (paper-and-pencil).

(2) DELL management expects that given the nature of the survey the male subpopulation is overrepresented in the sample. Test whether gender **(Q14)** is representative for the US population assuming a 50% - 50% distribution. Formulate the hypotheses (H_0 and H_1), conduct the appropriate tests, assess the assumptions and interpret the SPSS output. What are the implications of these results for the study?

(3) DELL management expects that more affluent respondents are overrepresented in the online sample. Use income (**Q13**) and sample **(SAMPLE)** to test for this association in the data. Would it make a difference for your analysis approach whether you assume income is a nominal or an ordinal variable? Conduct the analyses assuming that income is both a nominal and ordinal variable. Formulate the hypotheses (H_0 and H_1), conduct the appropriate tests, assess the assumptions and interpret the SPSS output. What are the implications of these results for the study?

(4) DELL management assumes that respondents would be less willing to express their satisfaction **(Q4)** than they would be willing to recommend a DELL computer system **(Q5)**. Which test could you use to

[1] **Disclaimer:** This assignment was prepared for class discussion purposes only and does not represent the views of DELL or their affiliates. The scenario presented in the assignment, the questionnaire (and other materials) and the data are hypothetical, but resemble real marketing research problems, questionnaires (and materials) and data.

test for these differences assuming **Q4** and **Q5** to be either intervally or ordinally scaled? Formulate the hypotheses (H_0 and H_1), conduct the appropriate tests, assess the assumptions and interpret the SPSS output. What are the implications of these results for the study?

(5) Assess whether the respondents' education (**Q11; you may treat Q11 as a nominal variable**) is associated with the respondent's repurchase intention for DELL products (**Q6**). Dell assumes that more highly educated respondents would be more willing to repurchase DELL products. Formulate the hypotheses (H_0 and H_1), conduct the appropriate tests, assess the assumptions and interpret the SPSS output. What are the implications of these results for the study?

DELL Experiment

Introduction. Using an (between-subjects factorial) experimental design DELL would like to evaluate a few ideas for new products they would like to launch next year. The two most promising ideas are (a) a smart phone (a cell phone with extended computing capabilities) or (b) a new entertainment system (multimedia center with wireless LAN, internet TV and video streaming capabilities). Moreover, in terms of branding DELL is faced with two potential brand alliance options: (1) A brand alliance with Samsung or (2) a brand alliance with Sony. Both are interesting partners and would open attractive new markets with equal growth opportunities, but also threats. Therefore, the question remains, just in pure branding terms, which product would do best under what branding strategy?

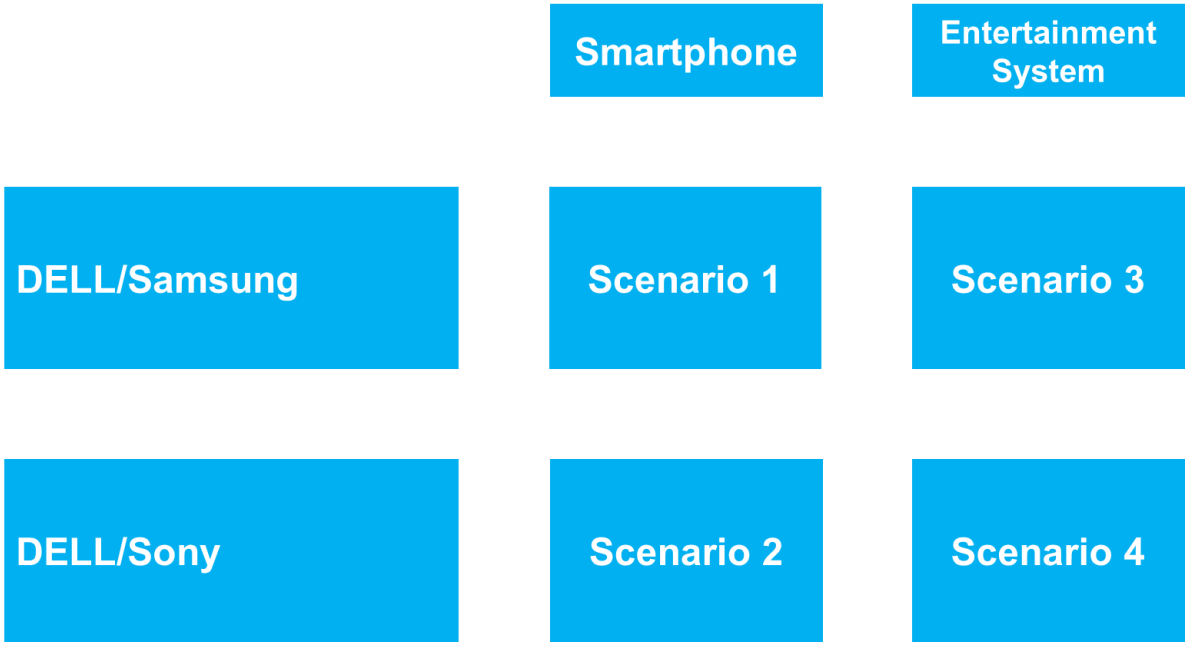
Measures. An experimental design was set up with two independent variables, or (between-subjects) factors: (1) brand alliance (**BRAND**) and product type (**PRODUCT**). Brand alliance is manipulated on two levels: (1) DELL/Samsung and (2) DELL/Sony. Product type is manipulated on two levels: a smart phone and (2) an entertainment system. These different combinations represent four different scenarios. A description of each of the four scenarios was prepared and submitted to the respondents. Additionally, the respondents answered the following items:

- Their attitude towards the product (**ATT**) measured as "I really like this product" on a 7-point Likert-type scale (1='Strongly disagree', 7='Strongly agree');
- Their purchase intention (**PI**) measured as "I would definitely buy this product" on a 7-point Likert-type scale (1='Very unlikely', 7='Very likely');
- Their opinion leadership (**OL**) measured as "Friends always ask my opinion when buying new ICT products" on a 7-point Likert-type scale (1='Strongly disagree', 7='Strongly agree');
- and their age (**AGE**) and gender (**GENDER**; 1=male, 2=female).

See Figure 1 for a graphical representation of the design.

Method and Sampling. The research was conducted using an online panel of Maastricht University. The experiment treatment allocation was completely randomized. First of all, the respondents answered the item regarding opinion leadership and subsequently were shown the scenario and answered the questions on attitude, purchase intention, age and gender. A total of 398 respondents successfully completed the experiment. The data has been cleaned and validated. The data for the experiment are included in the SPSS data file **DELL.EXP.sav**.

Figure 1: Experimental Design



(6) In order to determine the required sample size the DELL research team used the following assumptions based on previous studies. The effect size ([partial] η^2) for the main effect **BRAND** and the main effect of **PRODUCT** is 0.15 and for the interaction effect is 0.1 (for either attitude or purchase intention). You may use a significance level of 0.05 and a desired power of 0.80. Determine the sample size for the main effects and the interaction effect. **Hint:** You may use the R package easypower (https://cran.r-project.org/web/packages/easypower/index.html) in SPSS using the R Essentials plugin, or G*Power (http://www.gpower.hhu.de/). A recent article by Benjamin et al. (2017) suggests that a more stringent significance level of 0.005 should be used. What would be the impact of this suggestion on the sample size requirements?

(7) Use **BRAND** and **PRODUCT** as two independent variables or fixed factors and **attitude** (**ATT**) and **purchase intention** (**PI**) as dependent variables (You may conduct two separate analyses for each of the dependent variables). Formulate the hypotheses (H_0 and H_1), conduct the appropriate tests, assess the assumptions and interpret the SPSS output (**Hint:** You might want to consider a graphical representation of your results). What are the implications of these results for the study?

(8) Although the respondents have been randomly assigned to scenarios individual characteristics, such as opinion leadership, might affect their attitude and purchase intention. A possibility to correct for this is using **opinion leadership** (**OL**) as a covariate in the design. Formulate the hypotheses (H_0 and H_1), conduct the appropriate tests, assess the assumptions and interpret the SPSS output. (**Hint:** You might want to consider a graphical representation of your results). What are the implications of these results for the study?

References

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