Assignment 2: Basic Data Analysis

Doug Davis, head of the DuPont Polymer Unit, walked out of the managers’ meeting feeling unsettled. The team that congregated had just finished a three-hour meeting pouring over the results of a pilot customer satisfaction study that the company had conducted on behalf of Doug’s division. Assuming that useful conclusions could be derived from the results of the study, DuPont planned to roll out similar studies across all business units. Unfortunately, the meeting had wrought little if any benefits and Doug left feeling as though he had less of a handle on his customer base than when he entered. It seemed everyone at the meeting had their own take on the data. Pete in Sales felt that overall customer satisfaction was primarily a function of sales & marketing support. Ralph in Tech Support insisted that it was DuPont’s speedy response to technical inquiries that was the primary driver, and so forth. Each and every manager saw the study through their own rose-colored glasses. What we need, thought Doug, is a more analytical approach to this analysis – a quantitative approach, rather than a qualitative one, in which everyone’s own personal biases are reflected in the discussion. The data collected is quite straight-forward … I’m not sure why the subsequent analysis is currently so muddy. The next day Doug approached Paul, a marketing intern. “Paul, I need your help with something.” “Sure thing, Doug, what can I do for you?” “Know anything about marketing research?” queried Doug. “Sure do. What’ve you got?” Doug talked Paul through the data. “You see, the research questionnaire we issued was really quite simple. A total of nineteen questions were divided into five primary groupings – product quality, technical support, sales & marketing support, supply and delivery, and innovation. Finally, we asked respondents to rate their overall satisfaction with the company.” “Sounds simple enough,” replied Paul. “And what kind of demographic information did you collect alongside those questions?’ “These here,” said Doug, pointing to a few columns of data from his spreadsheet. “Size (as in number of employees), revenues, years in operation and finally, number of products in the respondents’ company product line.” “Great!” said Paul, “and what are these WTE fields?” “Oh, that stands for ‘Willingness to Export’. A higher number indicates a greater willingness of that company to export their product offerings to their customers overseas.” “I see … and why are there three columns of WTE data?” “Well, one of the other managers thought that it might be more useful to look at that data in ways other than as a continuous variable. The field Expint3 divides the same WTE data into three buckets, rather than five. The field Expint2 looks at that same information as a binary …” “In other words, either they will export or they won’t?” “Exactly.” “Ok, I think I have what I need. Let me get back to you by the end of the week.” “That would be great Paul, thanks.” Exhibit 1 contains a listing of the variable names and descriptions of the data that you should use to answer the following questions:

1. Compute the mean (and the standard deviation) of Overall. Create an indicator variable for Overall: If Overall is greater than or equal to 8, D8Overall = 1, otherwise D8Overall = 0. What are the average values of Overall and D8Overall? Discuss your findings.

2. Test whether Overall is independent of WTE. Also test whether Overall is independent of Size, Revenue, Years, and Numprod. Discuss your findings.

3. Test whether D8Overall is independent of WTE. Also test whether D8Overall is independent of Size, Revenue, Years, and Numprod. Discuss your findings.

4. Compute the mean of 19 variables starting from Q1 to IN3 in the survey. Discuss your findings.

5. Among 19 variables starting from Q1 to IN3 in the survey, which variable has the lowest mean? Test whether Overall is independent of the variable with the lowest mean. Also create an indicator variable for the variable with the lowest mean: If the value of that variable is greater than or equal to 8, D8Lowest = 1, otherwise D8Lowest = 0. Test whether Overall (and D8Overall) is independent of D8Lowest. Discuss your findings.

6. Among 19 variables starting from Q1 to IN3 in the survey, which variable has the highest mean? Test whether Overall is independent of the variable with the highest mean. Also create an indicator variable for the variable with the highest mean: If the value of that variable is greater than or equal to 8, D8Highest = 1, otherwise D8Highest = 0. Test whether Overall (D8Overall) is independent of D8Highest. Discuss your findings.

Exhibit 1 Summary information about the DuPont customer satisfaction survey and customer demographics is in the SPSS dataset called DuPont.SAV.

Below is a listing of the variable names and description of the data:

WTE Willingness to export

Expint3 1 if WTE =1 or 2; 2 if WTE = 3; 3 if WTE = 4 or 5

Expint2 1 if WTE = 3 or 4 or 5; 0 otherwise

Size Employee size

Revenue Firm revenue

Years Years of operation in domestic market

Numprod Number of products

Q1-Q4 Product quality

TS1-TS3 Technical support

SM1-SM2 Sales and marketing support

SD1-SD7 Supply and delivery

IN1-IN3 Innovation

Overall Overall effectiveness and value Card 1

POLYMERS CUSTOMER SATISFACTION STUDY – RESINS Q.1A ANSWER SHEET Rotate Rating \_\_\_\_\_\_\_ PRODUCT QUALITY \_\_\_\_\_\_\_ 01 THE RANGE OF CHOICES IN THE (product) PRODUCT LINE \_\_\_\_\_\_\_ (12 - 13) \_\_\_\_\_\_\_ 02 THE CONSISTENCY OF (product) QUALITY FROM LOT TO LOT \_\_\_\_\_\_\_ (14 – 15) \_\_\_\_\_\_\_ 03 THE WAY (product) PROCESSES IN YOUR MANUFACTURING OPERATIONS \_\_\_\_\_\_\_ (16 – 17) \_\_\_\_\_\_\_ 04 THE WAY (product) PERFORMS IN YOUR FINISHED PRODUCTS \_\_\_\_\_\_\_ (18 – 19) \_\_\_\_\_\_\_ TECHNICAL SUPPORT \_\_\_\_\_\_\_ 05 DU PONT’S SPEED IN RESPONDING TO YOUR CALLS FOR TROUBLE-SHOOTING TECHNICAL PROBLEMS \_\_\_\_\_\_\_ (20 - 21) \_\_\_\_\_\_\_ 06 DU PONT’S TECHNICAL REPRESENTATIVES’ KNOWLEDGE OF YOUR MANUFACTURING PROCESSES AND PRODUCTS \_\_\_\_\_\_\_ (22 – 23) \_\_\_\_\_\_\_ 07 DU PONT’S TECHNICAL EXPERTISE IN IDENTIFYING, ANALYZING AND SOLVING TECHNICAL PROBLEMS \_\_\_\_\_\_\_ (24 – 25) \_\_\_\_\_\_\_ SALES AND MARKETING SUPPORT \_\_\_\_\_\_\_ 08 DU PONT’S SALES REPRESENTATIVES’ COMPREHENSIVE KNOWLEDGE OF (product) \_\_\_\_\_\_\_ (28- 29) \_\_\_\_\_\_\_ 09 DU PONT’S SALES REPRESENTATIVE’S UNDERSTANDING OF YOUR NEEDS AND EFFECTIVENESS IN PURSUING THOSE NEEDS WITHIN DU PONT \_\_\_\_\_\_\_ (30 – 31) \_\_\_\_\_\_\_ SUPPLY AND DELIVERY \_\_\_\_\_\_\_ 10 DU PONT’S PERFORMANCE IN MEETING YOUR REQUESTED DELIVERY SERVICES ON (product) ORDERS \_\_\_\_\_\_\_ (46 – 47) \_\_\_\_\_\_\_ 11 DU PONT’S CONSISTENCY IN DELIVERING CORRECT PRODUCT AND QUANTITY \_\_\_\_\_\_\_ (48 – 49) \_\_\_\_\_\_\_ 12 THE EASE OF COMMUNICATING YOUR COMPLAINTS TO DU PONT \_\_\_\_\_\_\_ (50 – 51) \_\_\_\_\_\_\_ 13 DU PONT’S SPEED AND FAIRNESS IN HANDLING YOUR COMPLAINTS \_\_\_\_\_\_\_ (52 – 53) \_\_\_\_\_\_\_ 14 DU PONT’S PROMPTNESS IN RESOLVING DISPUTED INVOICES \_\_\_\_\_\_\_ (54 – 55) \_\_\_\_\_\_\_ 15 DU PONT’S PRODUCT PACKAGING AND ITS CONDITION ON ARRIVAL \_\_\_\_\_\_\_ (56 – 57) \_\_\_\_\_\_\_ 16 YOUR CONFIDENCE IN DU PONT AS A DEPENDABLE SOURCE OF SUPPLY FOR (product) \_\_\_\_\_\_\_ (58 – 59) Card 2 POLYMERS CUSTOMER SATISFACTION STUDY – RESINS Q.1A ANSWER SHEET Rotate Rating \_\_\_\_\_\_\_ INNOVATION \_\_\_\_\_\_\_ 17 DU PONT’S PERFORMANCE IN DEVELOPING NEW PRODUCTS FOR YOUR BUSINESS \_\_\_\_\_\_\_ (5 - 6) \_\_\_\_\_\_\_ 18 DU PONT’S RESPONSIVENESS IN DEVELOPING SOLUTIONS TO THE UNIQUE PROBLEMS YOU BRING TO DU PONT \_\_\_\_\_\_\_ (7 – 8) \_\_\_\_\_\_\_ 19 DU PONT’S PRODUCTS AND SERVICES ARE HELPING YOU ADDRESS YOUR ENVIRONMENTAL NEEDS \_\_\_\_\_\_\_ (9 – 10) Ask Last: OVERALL EFFECTIVENESS AND VALUE \_\_\_\_\_\_\_ 20 YOUR OVERALL SATISFACTION WITH THE VALUE YOU RECEIVE FROM DU PONT’S (product) PRODUCTS AND SERVICES \_\_\_\_\_\_\_ (15 - 16)