Case Study 1: Cellphone Repair

Ling-Chieh Kung*

Note 1. For this case study, you will be given *real* data provided by a Taiwanese retailer. This data set is organized by the instructor specifically for this course. Therefore, they may be noisy and not "perfect" for a class practice. Nevertheless, they give us a chance to taste how data analysis may really help business decision makers in practice.

Note 2. Without the approval of the instructor, DO NOT share this data set to anyone not taking this course. DO NOT post it to the public.

1 Introduction

A leading 3C retailer in Taiwan sells cellphones and provides repair services. The management believes that the repair service can benefit the company in at least three ways:

1. Operations: The repair service itself can generate profit.

2. Marketing: The repair service certainly attracts consumers. Moreover, as it brings old consumers back to the retailer, the retailer then has a new chance to promote new products to them.

3. Supply chain: By providing this service, the retailer may also collect information about product functionality and reliability, which may then help it negotiate with manufacturers about future contracts.

While this service has its potential, it is of course challenging. For example, to quickly complete a repair request, there must be sufficient inventory of repair pairs. That introduces an inventory problem. As another example, if a product may fail in the future,

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*Department of Information Management, National Taiwan University; lckung@ntu.edu.tw.

selling extended warranty is a good idea. Setting the price and length of a production plan brings in a revenue management problem. Finally, indeed knowing how easily a product may fail may increase the retailer's bargaining power against manufacturers, but how to realize that power?[1]

As a consultant, you are asked by the retailer about how to utilize the repair data to make the retailer more profitable. The retailer gives you some data for you to do some preliminary analysis. They will give you more data only after they believe in your ability and agree with your proposed direction. Interestingly, they do not give you any specific question; they ask you to tell them what can be done with these data, and how.

2 Data

2.1 Data that we have

The retailer provides the repair data of 43 cellphones from 2013/6/1 to 2013/12/31 to us. These data are given in the MS Excel file "SDA-Fa16_case1_data.xlsx". The retailer owns hundreds of retail stores in Taiwan, and the data are the national totals, not for just one store.

Products and periods. The spreadsheet "Product" contains the product IDs, brand names, and model names of the 43 cellphones. Starting from 2013/6/3, every seven days are grouped into one week. These weeks are called periods, and the period IDs, starting dates, and ending dates of these periods are given in the spreadsheet "Period". Note that Period 1 also contains 2013/6/1 and 6/2.

Aggregated repair data. For each product in each period in 2013, the total number of repair requests is provided in the spreadsheet "Repair Agg", where "Agg" stands for "Aggregation". For example, two consumers asked the retailer to repair their ACER LIQUID E2 during the period between 2013/6/1 and 2013/6/9.

Detailed repair transactions. The detailed repair requests are contained in the spreadsheet "Repair Detail". Whenever one consumer asks the retailer to repair its

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[1]All these questions are difficult; if one may solve any of them, one may create a lot of values to the retailer. Unfortunately, this course is not going to teach you how to solve these problems. This course only aims to give you a tool, statistics and data analysis, that helps you solve these problems.

cellphone, one entry is added into this spreadsheet. For example, we may see that the two repair requests of ACER LIQUID E2 in Period 1 happened on 2013/6/5 and 6/8.

For each repair request, the date on which the product was sold is retrieved from the sales database and provided in the "Buy Date" column. The retailer also welcomes repair requests for products not purchased from it. In this case, the purchasing date is entered by the consumer. That date may thus be inaccurate. Finally, whether the product's warranty protection is still valid is recorded in the "Warranty" column, where 1 means valid and 0 means expired.

2.2 Data that we do not have

One may naturally want to do some analyses by combining the sales data and repair data. Unfortunately, the sales data is much more sensitive and are not provided by the retailer. Luckily, the purchasing dates (though with some inaccuracy) are provided. A consumer may bring its broken cellphone to one of the hundreds of retail stores. However, the store information is not provided.

Some consumers join the membership program of this retailer. Nevertheless, this membership information is not provided by the retailer. In fact, as this is a 3C retailer, most consumers do not frequently visit this retailer and have a limited incentive to become a member. Therefore, very few sales transactions are generated by members.

When a repair transaction occurs, if the product is still under warranty production, whether it is under the manufacturer's base warranty or the retailer's extended warranty is not recorded. Whether the product is purchased from the retailer is also not recorded.

The prices and launch dates of these products are not provided by the retailer. However, some of this information are publicly available.

3 Tasks

The CMO, COO, and CEO of the retailer are waiting for your report and presentation, which should address the following:

1. Do descriptive statistics to provide an overview for the repair business at that time.

You may do it from any perspective with any method. Due to the page limit (and the impatience of top managers), please put some emphases on interesting findings.

2. Write down one decision problem (in marketing, operations, supply chain, strategy, etc.) related to the repair business whose decision may be facilitated by data analysis. Then analyze the given data to address this problem. You may leverage any external data that you may obtain. Finally, if you believe any unprovided internal data (e.g., sales, membership, store, etc.) may be helpful, list them and describe how to use them.

   Note. If you have more than one good proposal, you may write down at most two.

4   Submission rules

Each team should have three students, unless a special approval is obtained from the instructor. Each team must submit a written report to address the above tasks. You do not need to include the details of your solution process, but you may want to summarize your procedure. Focus more on the presenting your results.

The report, including the cover page (if there is one), cannot be longer than **12 pages** (i.e., six double-sided pieces of paper). A report is considered good if it addresses the tasks correctly, precisely, and concisely. Including managerial implications found by analyzing the data is always a plus. Obviously, a well-formatted report is expected.

At the end of the report, a team may specify the amount of works done by each team member. Each team member will be graded by considering the work split. Please note that this is optional and if you think all the team members do the same amount of works and should receive the same grade, you do not need to specify this.

A hard copy of the written report must be submitted in class by **3:00 pm, October 26, 2016**. Electronic copies of the report (for all teams) and slides (for the presenting teams) should be uploaded to CEIBA by the same due time. For each team, only one member needs to upload the files. Submissions between 3:00 pm and 4:00 pm on the due date will get 20% off as a penalty. Submissions later than 4:00 pm are not accepted.

The report (for all teams) counts for 10% of the semester grades. The oral presentation (for presenting teams) counts for another 10%.