Project Plan 13.3.2013

Assessing the Impacts of Marketing Investments

Client: Nokia

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1. Background

Marketing can be defined as the activity and process of communicating the value of offerings to customers [1]. From the economic point of view, advertising is one of its most significant features, because it is such a big business which is able to reach almost everyone through some channels [2]. The economic theory of advertising also reasons the importance of marketing, i.e. why it has an effect on customers [2]. Briefly, this is because marketing is either persuasive, which means that it can change brand preferences, or it informs about the prices and new products. Additionally, marketing may also be complementary to the offering, which is the case when it, for example, enhances the brand status of the product or service and thus brightens up its image among some customers [2].

Consequently, companies invest money in marketing in order to shift their demand curve upwards [2] and to boost their sales. However, it is difficult to predict how specific marketing investments will affect sales and brand awareness, which might lead to fruitless investments. Moreover, it is challenging to determine which marketing strategy would lead to optimal sales. To overcome this problem, different kinds of techniques have been introduced to estimate the impacts of marketing.

2. Project Objectives

The aim of this project is to repeal the saying "Half of the marketing spend is wasted, we just don't know which half." This is done by analyzing the impacts of different kinds of marketing activities over several channels on the brand awareness and sales volumes of several mobile phone brands. Other factors like the price and quality will not be examined in the analysis. In addition, a literature review will be conducted on the subject.

The main goal is to find correlations between the performance data and explanatory indicators and thus explain how different types of marketing activities contribute to growth in consumer awareness. In addition, this analysis aims to estimate the return on investment (ROI) for the marketing activities in order to assess the effectiveness of the money spent. Eventually, also a strategic recommendation to optimize the marketing investments is given. Furthermore, sensitivity analyses will be conducted to estimate whether the effects on the recommendation would be significant if some variable values were changed. We also discuss what kind of data could improve the marketing results, if it were available for example in further analyses.

3. Procedure

For the analysis, a panel data set containing marketing investment for select media, results of brand awareness surveys, and sell-out data across multiple mobile phone brands and countries has been provided by Nokia. Also, it is roughly outlined for years 2008-2012. Because the quality and the usefulness of the data vary, the first task is to delimit the reviewed data by excluding data sets that are disjoint or useless due to other reasons. This means eliminating short time frames, if corresponding data is not available on other levels of data. Also validity of country and brand specific details must be checked, as well as if there are any missing figures for example in the sales time series. Preparing is expected to help to construct a more valid model and thus, also a better investment recommendation in the end. To begin with, the data will be explored and manipulated first hand by using Microsoft Excel. Also, other data mining software,

such as SPSS Modeler and the open source R environment will be used. The final model to estimate the correlations will be identified by analyzing the refined data described above. In order to find suitable model candidates, related literature is reviewed and descriptive statistics regarding data is processed. One potential alternative is to build a SARIMAX model (seasonal autoregressive integrated moving average with an external variable), where marketing investments are an exogenous variable, and by using the Box-Jenkins method as an identification tool. This method consists of model identification, model estimation and final diagnostic checks. If a satisfactory SARIMAX model is found, ROI can be predicted with the help of the parameters estimated. Other possible modes that could be are e.g. diffusion theory, decision tree models, as well as even a simple linear regression. The importance of predictors in the final model will be analyzed to determine the ROI for different marketing channels. Key issues include robustness of parameter estimates and sensitivity of the objective variable to each of the chosen predictors.

Finally, in order to make a marketing strategy recommendation, an optimization model will be built. This is done by formulating the optimization problem, i.e. the objective function and the criteria, to correspond to the main goals of the project. The strategy recommendation achieved will depend on the model built earlier and thus careful sensitivity analysis must be conducted. More detailed explanation of the procedures is explained in Chapter 4.

4. Project Management

The client of the project is Nokia and the project work is done for a course called "A Seminar on Case Studies in Operations Research" (Mat-2.4177). The project manager of the assignment is Olli Rentola. Most of the work will be done in pairs and individually. Some of the task will be done together. At the beginning of each stage, tasks will be divided among the group members and the overall workload will be reviewed and balanced during stages if needed. The project group informs the client about progress of the project. Meetings of the group and the client will be arranged when needed.

4.1. Project Schedule

The planned schedule for the project is presented in Figure 1: Schedule of the project. At the beginning of each stage, the project schedule is reviewed and checked if there is a need to do adjustments to the current schedule. We will use CRISP-DM framework [3] for the project. CRISP-DM stands for Cross Industry Standard Process for Data Mining. Sections 4.1.1 - 4.1.6 describe the different stages of the project.

ID	Task Name	Duration	Start	Finish	January	February	March	April	May
1	Project Planning	29 days	Fri 18.1.13	Fri 15.2.13					
2	Data Understanding	11 days	Sat 16.2.13	Tue 26.2.13					
3	Data Preparation	15 days	Wed 27.2.13	Wed 13.3.13					
4	Modeling	28 days	Thu 14.3.13	Wed 10.4.13					
5	Evaluation	11 days	Thu 11.4.13	Sun 21.4.13					
6	Deployment	19 days	Mon 22.4.13	Fri 10.5.13					

Figure 1: Schedule of the project

4.1.1. Project Planning

The lifecycle of the project is planned at this stage. The background of the project is presented and the problem is examined. The goals of the project are set as well as the criteria for success. The data is preprocessed. Initial literature review will be conducted.

4.1.2. Data Understanding

The data is examined in greater detail to confirm that the goals defined in the project plan can be achieved. The firms and brands are selected on which the analysis will be conducted.

4.1.3. Data Preparation

Literature review will be conducted in greater detail. Literature review will mostly focus on previous researches done about the effects of marketing, on time series modeling and on marketing and customer behavior. Also, the essential data sets are selected and the data validity is confirmed. The data is processed so that it can be analyzed.

4.1.4. Modeling

The tools for modeling are chosen. Tests are planned for verification of the model and the model will be built.

4.1.5. Evaluation

Assessing the results of data mining with respect to success criteria defined in Chapter 2. Review of the whole data analysis process is done and recommendations for future projects are made based on the findings.

4.1.6. Deployment

A marketing strategy is presented and recommendations for decision makers are given based on the findings. The results of the project will be presented and a final report is written.

4.2. Resources

The group consists of four members including the project manager. With the exception of the project manager, each member is going to contribute equal hours to the project. The additional responsibilities of the project manager are project management and communication with interest groups.

4.3. Risk Management

The group will hold regular reviews with each other so that each group member stays on track of what the others are doing. The meetings will be held at need basis, but preferably at least once in two weeks. This way problems can be discussed and resolved as they arise and work overlap minimized. An online collaboration tool will help on its part in ensuring that everyone is well informed about the progress and has the same set of numbers. Mostly Dropbox and Google Drive will be used. However, precaution must be taken not to exchange any sensitive data over the internet. This constant process of peer review will be a key component in risk management.

One key source of uncertainty is the quality of data. For example, significant inconsistencies and gaps in the panel data will render the estimated model unusable for forecasting. However, the data covers a very wide

range of brands and countries, and is expected to be of good quality for all major brands and markets. The model is therefore expected to yield satisfactory results for at least some of the major lead markets for all major brands. To mitigate risks related to data quality and to discover unforeseen problems as early as possible, data preparation and consolidation was begun immediately after receiving the data and has proceeded in parallel with planning.

One source of uncertainty is the choice of modeling method. Some methods will likely prove to be more suitable for the problem than others, and an inappropriate choice might lead to a lot of iteration in the modeling stage. Also, the application of the chosen methods could cause problems of their own.

There is a wide range of modeling tools available for data manipulation and analysis, and the choice of which one to use mostly depends on the practitioner. However, inexperience with using these tools might cause additional delays and must be taken into account by reserving a sufficient buffer in the project schedule for iteration. Also, excessive reliance on a single software tool is best to be avoided, and different tools can be used for specific tasks if they appear to be better suited for them.

In addition, there can be inherent unpredictability in the underlying phenomena that cannot be explained with the given set of predictors. In this case, unpredictability would also be considered a finding, as trying to find a better set of predictors or building a more sophisticated non-standard model is out of scope for this project.

The key risks and methods for mitigating those are summarized in Table 1.

Risk	Risk outcome	Mitigation	Significance
Data quality is poor.	Poor data quality will undermine the significance of results.	Reserve enough time for data preparation in respect to the whole schedule of the project.	High
Methods are too complex or do not fit the problem.	Methods poorly suited for solving the problem due to inexperience with data mining projects. The results of the project are inconclusive.	Reserve time for multiple iterations in the modeling stage. Consult more experienced persons during the project.	High
Learning to use necessary tools will take too long.	The project will be delayed due to inexperience with modeling tools.	Reserve time for learning the tools. Consult more experienced persons during the project.	Medium
Individual time management in the project will fail.	The project will be delayed.	Precise and disciplined planning of actions.	Low
The project will be managed inefficiently.	The inexperience of the project manager will increase the overall workload.	Precise planning and preparation for different stages.	Low

Table 1: Risk table

5. References

[1] http://www.marketingpower.com/AboutAMA/Pages/DefinitionofMarketing.aspx (7.2.2013)

[2] Bagwell. The Economic Analysis of Advertising. Handbook of Industrial Organization. Vol. 3. 2007. Pp. 1701-1844

[3] http://en.wikipedia.org/wiki/Cross_Industry_Standard_Process_for_Data_Mining (13.3.2013)