Chapter 10

Excess Inventories and Stock Out Events Through Advanced Demand Analysis and Emergency Deliveries:
Error Analysis and Simulation Case Study

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ABSTRACT

Companies have to deter many remarkable problems on a daily basis. The existence of excess inventories and stock out events as well the usage of emergency deliveries are three indicative prominent subjects for discussion. Firms try to comprehend the consumer's desires in order to enhance costumer experience. In the current chapter, sales data of one tangible product from a well-known Greek retailing company are used. These data are analyzed in order to forecast the behavior of the demand. The author adapts an alternative approach for managing inventory during cycles with different levels of demand in order to develop a system that minimizes both excessive inventories and stock out events. Additional experiments take place regarding the parameterization of emergency deliveries in order to configure whether their usage is beneficial. Both an error analysis model and a simulation model are developed so as to determine the results of the aforementioned action.

INTRODUCTION

The author had the opportunity to obtain some core data of one product from a well-known Greek retailing company (Diamantis Masoutis S.A.). The primary goal was to identify customers' behavior by analyzing the given data sets. Persistent efforts were made to comprehend the way and the reason for customers' actions. This was an intermediate goal which would lead to predict future behaviors of

customers' demand and potential errors. In the current chapter, variations in the promotional activities are also included. Both the promotional periods and the non-promotional periods are studied.

Thence, the author attempted to create the proper forecasting models regarding the characteristics of each data set (existence of seasonality, trend etc.). The forecasting models were examined in order to identify the most reliable one. Alongside, an error analysis was developed in order to obtain a proper performance evaluation system. The error analysis is related to the correlated errors indicators (MSE and MAD) and the different types of confidence interval (90% and 95%).

Companies are plagued by many persistent issues such as the existence of excess inventories and stock out events or even the potentiality of emergency deliveries. Hence, these issues are examined in order to propose an alternative process which sets up more prosperous solutions. Simulation is used because it appears to be a useful tool able to remove obstacles and add credibility. Meanwhile, the author was forced to adapt a distinction between the different levels of demand due to the unfamiliar behavior of the given product. The current distinction is necessary in order to examine if this attempt is beneficial and indeed a proper deed. Ultimately, under this effort one or more alternative processes are proposed in order to guide to more productive results.

To sum up, regarding the aforementioned analysis, some overall results are reported and some key points for further recommendations are mentioned at the end of the current chapter.

BACKGROUND

Companies are able to acquire new heritage, face potential threats, and obtain new abilities by using knowledge properly. Shu-hsien Liao (2003) points out that special frameworks, methods, and tools are able to embrace the knowledge management. Quantitative methodologies which explore the notions of classification, acquisition, and decision are indicative methods to obtain knowledge.

Companies ought to unfold new techniques and services in order to retain existing customers and obtain new ones. The knowledge of consumer's purchasing behavior is an indicative way. Although promotional periods are able to attract new customers, creating new techniques based on data manipulation are the main incentives that a company has to follow. Tapscott et al. (2011) concluded that knowledge support systems are proper tools for the effective reuse of knowledge. Alongside, Marcus (2001) concluded that information technology is the proper way to manage knowledge.

Bevington and Robinson (2003) stipulated in their book that the uncertainty must be confronted through experiments and measurements. In order to achieve this, it is a dire need to focus mainly on the uncertainties which appear due to fluctuations in measurements and the systematic errors that minimize the correctness of the outcome.

Cooper et al. (1997) points out that it is a matter of great importance for a company to belong to the proper supply chain. All the collaborators should cooperate efficiently in order to optimize the procedures within the supply chain. This gives the appropriate opportunity in a company in order to adapt a remarkable performance. Huan (1995) provides an appealing approach to the significance of a marked trade collaboration in enhancing customer satisfaction.

Regarding the uncertainties that have been already mentioned, Towill et al. (2000) suggests that there are four principal categories of uncertainties: supply side; process side; demand side; and control side. In every company there is a marked incentive to decrease uncertainty. In the current chapter (mainly with the forecasting methods) the author tried to minimize the demand side uncertainties. Demand side

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