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# An analytical approach to use data mining in Medicine Marketing - Vitamin Products

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**ABSTRACT**

*In 21st century purchasing of any products increase as compare to earlier time but even though the selling of any products becomes more difficult job for the seller. Pharma industry is one largest industry in the market but even though due to competitive environment in business, pharmacists have to face more difficulties for selling medicine in market because medicines of same effects are available of various brands. By doing market research some feedback is collected from physicians about prescribing vitamin medicine and patient review. The collected data can be analyzed by applying different data mining techniques. This paper shows how to enhance marketing of vitamin products with the help of data mining techniques.*

**Keywords : Vitamin, Marketing, Data Mining**

### Introduction
Marketing is the process through which products and services move from production unit to the consumption unit. Usually marketing includes the harmony between 4 P's of marketing. 4 P's include product, price, place and promotional strategy [Kotler & Keller, 2006].

Vitamin plays important role to maintain overall health of human being. Deficiency of vitamins creates various deceases in human body. Now a day's people become more health conscious and take vitamins as supplementary food so that health becomes better. In market, vitamin's medicine are available of so many brands which give usually same result, but even thought in specific situation it gives different side effects and also different satisfaction level to the patient. This situation is illustrated in Figure 1[Kotler & Keller, 2006]. Figure 1 shows comparison of two brands in terms of awareness and satisfaction of the customer. Because of this scenario marketing of pharmaceutical products becomes a difficult job for the pharmacists.

Figure 1 about here:



**Figure 1 – Comparison of Two Brands**
Different feedbacks are collected from customers to know about choices and preferences. Such collected data from customer plays vital role in business industry to take meaningful decision. But such huge data generally directly cannot be used because it is not in form of information. To convert data into information, data should be analyzed and some information can be extracted [Seng & Chen, 2010]. Data mining is a process of extracting information form a large dataset. This process is known as Knowledge Discovery in Database (KDD) [William, Gregory & Christopher, 1992]. The Data Mining is the process of extracting information from large data sets with help of different techniques and algorithms and after analyzing data, the derived information can be used to achieve or fulfill some specific task. By implementing different data mining techniques and algorithms, we can analyze this data which is collected from the customer and can develop a group of relevant information.

### Role of Vitamin
To live long and pleasant life healthy diet is necessary and may it provide maximum nutrition but sometime, one may required to take some supplementary nutrition or vitamin [Rick & Puetter, 2000]. In the era of 21st century many people take multivitamin daily as supportive food as it may be missing from their diets. Sometimes also doctors or physician prescribe multivitamin as medicine. Vitamin actually enhance health of a person [ Shmerling, 2010]. Vitamin plays a vital role to prevent some major diseases [Norden]. Vitamin and nutrition also play a vital role in prevention and treatment of wounds and ulcers [Thompson & Furhrman, 2005].

Biological changes according to the age sometimes also require vitamin as supplementary to overcome deficiency of some vitamin. For example in menopausal stage of women, she required more calcium and vitamin D. Generally women may not get enough calcium and vitamin D from her daily regular diet. Because of this reason physician usually prescribe calcium and vitamin D as supplementary vitamin. Mega doses of vitamins should be avoided because it cause toxicity which can create complication is human body. Following table shows sources and functionality of some main vitamin [Bowen, 2003].

Table 1 about here:

| Vitamin Name | Source of vitamin | Effects |
|---|---|---|
| Vitamin A | - Animal tissues For example fish and liver<br>- Corticoids in green plants | - Resistance to infection agents<br>- To enhance bodily function |
| Vitamin D | - Absorbed into skin from Sunlight<br>- Some natural foods<br>- Artificially-fortified food products | - Maintaining of calcium homeostasis |
| Vitamin E | - Green vegetables with leafs<br>- All grains<br>- Vegetable oils | - Works as antioxidants |

| Vitamin K | - Photosynthetic parts of plants | - Form blood-clotting factors in the liver<br>- Deficiency leads to bleeding disorders |
| --- | --- | --- |
| Vitamin C | - Fruits and vegetables<br>- Citrus fruits<br>- Strawberries<br>- Leafy green vegetables | - Synthesis of hydroxyproline<br>- Wound healing |

**Table 1: Basic Information about vitamin**

Marketing of pharmaceutical products (Vitamin) and Data Mining

**Marketing scenario:**
As far as marketing of pharmaceutical products is concerned, there are many variables should considered like types of vitamins, dosages, types of population and situation of health conditions [Novella]. According to the research of Euro monitor, the global vitamin and supplement market is worth $68 billion [http://www.reportlinker.com/ci02037/Vitamin-and-Supplement.html]. In this era, due to economic crisis and competitive environment the marketing growth of pharma industry is slower. Even though in some specific segments of market, marketing growth is comparatively high. Such market segments require antioxidants, fish oils and probiotics.

People generally use vitamin as a supplementary food in the form of pills, liquids or powders. Sometimes it may be taken in the form of injection. Products related to vitamin are considered as foods or natural health products. For example, In US vitamins are considered as food products and such products should not include any pharmaceuticals or steroids. Multivitamin is the highly sell product in US as it enhance the immune system mostly during cold and flu season. Pharmaceutical stores, health centers, supermarkets and online retailers are the center from where pharmaceutical products are available.

For marketing purpose, data is collected by analyzing some market segments and some feedbacks are taken from physicians as well as from direct consumers or patients. Figure 2 – illustrate marketing scenario for the products.
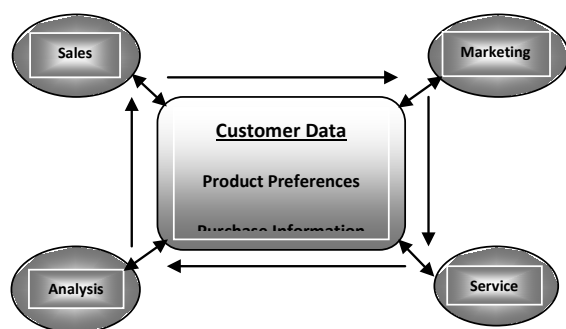
Figure 2 about here:



**Figure 2 - Marketing Scenario**

**Data Mining Techniques**
Data mining terms has been widely used in different fields like marketing, banking, engineering etc. Data mining is use to design different strategies of company. Important patterns might be hidden in the industrial data. Different data mining techniques like association modeling, classification, cluster-

ing, forecasting, regression, sequence discovery and visualization can be implemented to mine data [Han & Kamber, 2006].

Association modeling is used to identify different items which are available together depending on the market basket analysis and in cross selling of products. Apriori and statistics algorithm are used for association modeling. Classification includes different classes of the information depending on the prediction of future customer behavior depending on certain criteria. Generally neural networks and decision trees are used for classification.

The clustering technique of data mining model is used for segmenting heterogeneous population into a number of more homogeneous clusters [Ahmed & Berry, 2004]. Discrimination analysis and neural networks tools are used for clustering.

Forecasting is based on continuously valued outcomes. Survival analysis and neural networks are used for forecasting. One example of fore casting model is demand forecast. Regression technique is one kind of statistical estimation technique which is used to map each data object to real value. Modeling of causal relationship, prediction based on forecasting are the example of usage of regression. Logistic regression and linear regression are used for regression technique. Sequence discovery technique of data mining concentrate on the states of the process generating the sequence over some particular time period. Tools used for sequence discovery are set theory and statistics. The last technique of data mining model is visualization. Complex pattern can be viewed by customer by presentation of data through visualization. Most common examples of visualization are Hygraphs, 3D graphs and SeeNet.

According to the requirements of pharmaceutical company, combination of any two or more data mining techniques can be used for knowledge discovery in database. The aim of implementing data mining techniques is to identify potentially useful information from large data set [Koh & Tan, 2005]. Different data mining techniques are used to identify various correlated patterns. Pattern mining identifies some rules which describe specific patterns within data. Discovery of sequential patterns is another important tack of pattern mining. Thousand of patterns are uncovered with data mining techniques. Some patterns may be less interesting for specific users or prescribers because they represent common knowledge. But some patterns are more useful to analyze market and identifying patterns which indicate expectations and beliefs of prescribers and users. Deployment into the market is the main purpose of identifying such patterns. As a result of such implementation ultimately company can increase profit margin as well as can gain proper markets for selling the products.

**Conclusion**
In this era, as every business industry facing a critical situation in selling products. Competitive environment create more difficulties in marketing of pharmaceutical products. This review paper indicates that how marketing of pharmaceutical products can be enhanced. By analyzing some market segment, data is collected from the physicians as well as from the patients. Such data is processed with use of data mining techniques and information is extracted which are useful for identifying market segment having specific demand. Satisfaction level of physicians as well as of patients is recognized. Depending on this information, marketing strategies can be prepared which are profitable for the pharma industry.

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