

## The Development of Financial Information System and Business Intelligence Using Data Mining Concepts

PVD PRASAD

### Abstract

One of the most emerging technologies is finance, becoming more amenable to data-driven modeling as large sets of financial data become available everywhere. So we are applying the data mining techniques in financial information system with Business Intelligence. A Business Intelligence System (BIS) can be described as an interactive, computer-based system designed to help decision-makers to solve unstructured problems. Using a combination of models, analytical techniques, and information retrieval, such systems help develop and evaluate appropriate alternatives.

**Keywords:** Financial data, Business Intelligence System, Business Intelligence, Financial Information System.

### I. INTRODUCTION

#### Financial Information System with Business Intelligence

An FIS is used in conjunction with a decision support system, and it helps a firm attain its financial objectives because they use a minimal amount of resources relative to a predetermined margin of safety. A Business Intelligence System (BIS) can be described as an interactive, computer-based system using a combination of models, analytical techniques, and information retrieval, such systems help develop and evaluate appropriate alternatives. BIS should focus on strategic decisions. More specifically, they should contribute to reduce the risk faced by managers when they need to make decisions

regarding future options. It is in this light that we have chosen to develop BIS to assist real estate administrators in financial risk management decisions [2].

This FIS will helpful in following Areas

- Ad-hoc-Analysis of large amounts of data (Drill-down, Slice, Dice)
- Enterprise Reporting
- Management Reporting: For complex report creation processes
- OLAP (Online Analytical Processing)
- Business Charts
- Data marts
- "What-if" - Analysis

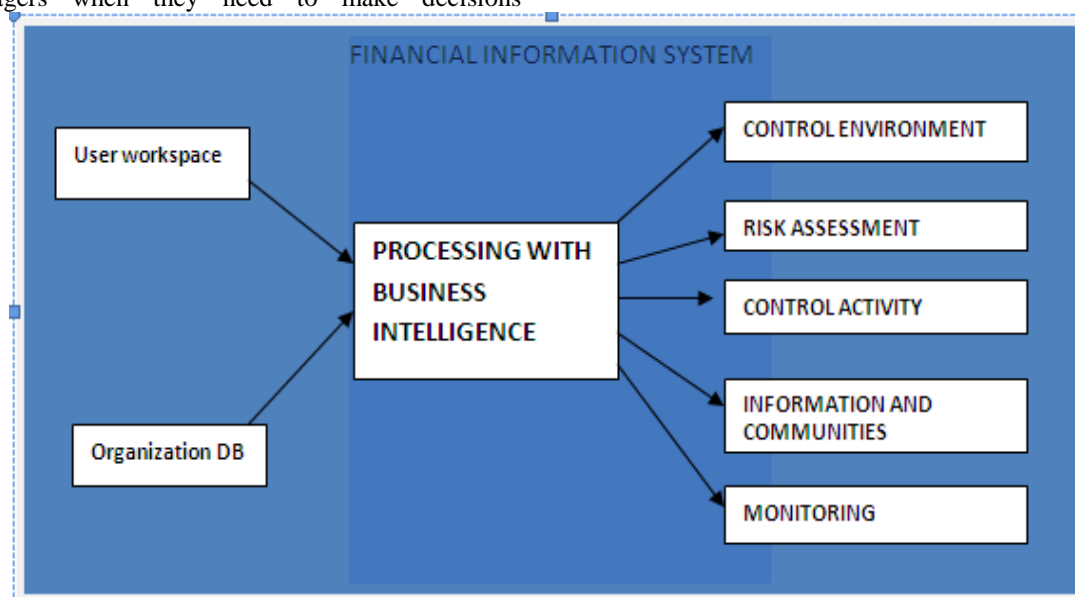


Fig 1.1. Financial Information System

The above figure illustrates the Multiple inputs From the User Workspace (dashboards, websites), Organization DB and Stores this data in the Data

ware house. By applying the Business intelligence Concepts such as slicing, dicing, Classification ....etc Process the information to the Output. Output

includes the Functionalities Control Environment, Risk Assessment, Control Activity, Information and Communities, Monitoring

The Formula of the FIS is given by

$$o = \sum_{j=1}^n w_{O(j-1)} \text{ if } o_j = I_i$$

Where O=output, W= selected functionality in BI,  $I_i$  inputs From the User Workspace, Organization DB.

The FIS taking in the Multiple inputs From the User Workspace (dashboards, websites),

Organization DB and Stores this data in the Data ware house. By applying the Business intelligence Concepts such as slicing, dicing, Classification ....etc Process the information to the Output. Output includes the Functionalities Control Environment, Risk Assessment, Control Activity, Information and Communities, Monitoring

The Business Intelligence Processing is shown in fig

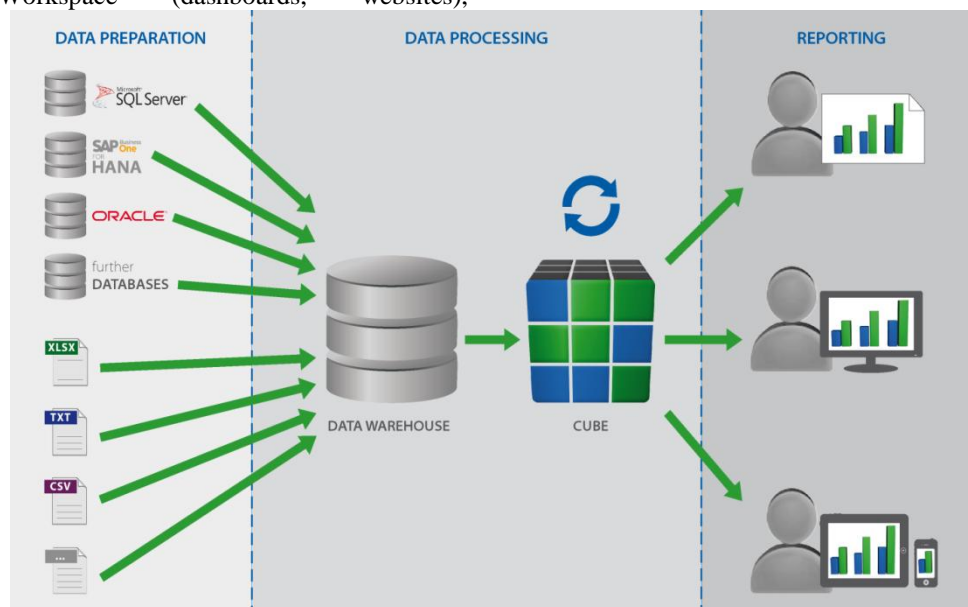


Fig 1.2. BI Processing data into Information

## II. IMPLEMENTATION OF FIS WITH BUSINESS INTELLIGENCE

### The Business Intelligence Algorithm

**Initialize** all BIFunctionalities (often small random values)

**Do for Each** training example  $x$

Prediction = Set Output (Control, Risk, Control Activity, Information, Monitoring)

**Compute**  $\sum_{j=1}^n W O$  for all functionalities

Perform the Data Mining operations (Slicing and Dicing, Classification)

**Until** all examples classified or another stopping criterion satisfied

### Return

The FIS taking in the Multiple inputs From the User Workspace (dashboards, websites), Organization DB and Stores this data in the Data ware house. Set Prediction (W) means this will give the Information related to the Selected model. Based on the given Inputs FIS will Computes the O i.e.  $\sum_{j=1}^n W O$  and then perform the Data Mining Operations.

### Slicing and Dicing

Slice is the act of picking a rectangular subset of a cube by choosing a single value for one of its dimensions, creating a new cube with one fewer dimension. Dice is The dice operation produces a sub cube by allowing the analyst to pick specific values of multiple dimensions<sup>[8][9]</sup>.

Consider multi dimensional cube with X, Y, Z directions

The function is given by  $f(X, Y, Z) \rightarrow W$  W is the Attribute

The Slicing and Dicing Function is given by  $g(X, Y) \rightarrow W$

### Classification

#### Bayes Classification

A Bayes classifier is a simple probabilistic classifier based on applying Bayes' theorem with strong independent assumptions and is particularly suited when the dimensionality of the inputs is high. A naive Bayes classifier assumes that the existence (or nonexistence) of a specific feature of a class is unrelated to the existence (or nonexistence) of any other feature. Classification is a form of data analysis

which can be used to extract models describing important data classes<sup>[1]</sup>

#### **Bayesian Algorithm:**

1. Order the nodes according to their topological order.
2. Initiate importance function  $Pr_0(X|E)$ , the desired number of samples  $m$ , the updating interval  $l$ , and the score arrays for every node.
3.  $k=0, T=\emptyset$
4. for  $i=1$  to  $m$  do
5. if  $(i \bmod l == 0)$  then
6.  $k=k+1$
7. update importance function  $Pr_k(X|E)$  based on  $T$  end if
8.  $s_i$  generate a sample according to  $Pr_k(X|E)$
9.  $T=T \cup \{s_i\}$
10. Calculate  $Score(s_i, Pr(X|E, e), Pr_k(X|E))$  and add it to the corresponding entry of every array according to the instantiated states.
11. Normalize the score arrays for every node. The major disadvantage of this model is that the predictive accuracy is highly correlated with this assumption. An advantage of this method is that it requires a small amount of training data to estimate the parameters (means and variances of the variables) necessary for classification<sup>[1]</sup>.

#### **Boosting**

The concept of boosting applies to the area of predictive data mining, to generate multiple models or classifiers (for prediction or classification), and to derive weights to combine the predictions from those models into a single prediction or predicted classification. A simple algorithm for boosting works like this: Start by applying some method to the learning data, where each observation is assigned an equal weight. Compute the predicted classifications, and apply weights to the observations in the learning sample that are inversely proportional to the accuracy of the classification. In other words, assign greater weight to those observations that were difficult to classify (where the misclassification rate was high), and lower weights to those that were easy to classify (where the misclassification rate was low)<sup>[1]</sup>.

#### **Support vector machine**

Support vector machine is a classifier technique. This method involves three elements. A score formula which is a linear combination of features selected for the classification problem, an objective function which considers both training and test samples to optimize the classification of new data, an optimizing algorithm for determining the optimal parameters of training sample Objective Function<sup>[1]</sup>.

### **III. EVALUATION KEY INDICATORS OF THE FI SYSTEM**

#### **What are Key Performance Indicators?**

Key Performance Indicators are also known as Key Success Indicators, they help an organization to better define and measure their progress toward professional goals. Once an organization has clearly identified its need, analyzed its mission, and defined its goals it will need a way to measure the progress toward those goals.

Key Performance indicators are those measurements. These indicators are measurements agreed upon beforehand that reflect the critical success factors of a business or organization. They differ depending on the business, the business may decide to appoint the percentage of its income that comes from returning customers as a Key Performance Indicator, or a college may use the rate of students that meet graduations requirements as a Key Performance Indicator. No matter what Key Performance Indicators are selected they must reflect the business or organization goals<sup>[5]</sup>.

#### **How does Key Performance Indicators work?**

To assess the present state of an organization Key Performance Indicators are laid down, they help to analyze business success and plan a proper course of action. This system gives organizations the necessary information presented in a clear way. To define a complete and effective set of performance indicators companies need to be sure that the measures are simple, workable, and firmly in place. This is so the current rate or position can be determined and then a plan to increase productivity or profit can be put into action. An organization needs to seriously review their professional needs before attempting to create a plan of action or setting Key Performance Indicators. They will also need to decide upon a way to monitor and review the data relevant to their asset goals<sup>[5]</sup>.

#### **Need of Key Performance Indicators**

##### **How helpful are Key Performance Indicators?**

When an organization uses Key Performance Indicators to measure the productivity of their employees it can stimulate motivation for those employees to do well and "measure up" to the company expectations. When building performance metrics one must keep in mind the desired end result. This means the organization will need to focus on the outcomes of the process. Every business needs a strategy for effective measurement of performance. This includes a system that can track and analyze asset information for better business decision making. Key Performance Indicators can also be used in organizations for reasons other than employee productivity.

They can be used to measure other areas such as increase in profit, measuring popularity, identifying trends, and even customer response. No matter what the need Key Performance Indicators serve to sole purpose of identifying and measuring a company's progress toward a goal or set of goals. Using Key Performance indicators on all areas of and organization that need or could benefit from improvement is how most companies become the leaders in their particular area of business.

When an organization stays on top of company needs whether they are financial or productive with the use of Business Intelligence and Key Performance Indicators they are found to be among the most successful. This is a way to monitor the success and the viability of a company and helps determine whether certain business ventures will or will not be lucrative<sup>[5]</sup>

### **How do Key Performance Indicators relate to Business Intelligence systems?**

Business Intelligence applications are one way of monitoring and assessing the level of Key Performance Indicators being met. Business Intelligence systems compile data relating to profit, productivity, customer return, and marketing trends. With this information readily available managers and executives can review the data and put in place indicators as needed, then using the software on a regular basis they are able to assess the success rate of the plans they initiate. People managing a business or organization are often faced with issues that impact them. These business issues are normally easy to group into one of the following two categories: external factors or internal performance. External factors deal with changes in the economy, political or environmental events, activities, and customer behaviors. As if external factors are not enough, professionals must also deal with internal performance, this is so that the business will remain competitive and profitable.

These factors directly affect business, financial, and operational functions. Such factors have the power to make or break a company. In situations involving either of these two types of factors a organization must have the ability to respond quickly, calling for all relevant information to be readily available in order to make quick decisions, that is where a Business Intelligence system comes into the picture<sup>[5]</sup>.

### **To identify successful Key Performance Indicators:**

The biggest part of creating a successful plan of action for an organization is identifying the area in which a business needs to improve upon, and then setting realistic yet advantageous Key Performance Indicators. By using a Business Intelligence system

the organization can review large amounts of data from a wide array of areas. Then using this information they can decide upon what goals need to be met in order to achieve the desired level of success.

After an organization has decided what areas of its business need improvement they must then move on to choosing which levels of improvement will be set as measurements. For example if a company who sold children's books found that they were making more profit from return customers then new customers, they may want to include incentives that influence customers to keep returning. Once a plan was set and fully decided upon, the company would then design indicators to measure the percentage of new customers that become return customers, offering incentives such as a membership and member discounts until the desired amount of customers are using their company for their literature needs.

Key Performance Indicators have been used for years and are being used more and more as economic need and technology grows. All types of businesses and organizations can profit and benefit from the correct use of Business Intelligence systems and Key Performance Indicators. The two go hand in hand to achieve a predetermined goal. If an organization makes informed decisions and designs Key Performance Indicators according to the information that a Business Intelligence system provides about their company, they can almost be guaranteed that they will achieve a much higher level of success<sup>[5]</sup>.

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