

# A Design model of a Business Intelligent System for Small and Medium Enterprises (SMEs)

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**Abstract**— A local south-east Asian restaurant chain made use of a business intelligent system (BIS) in order to support the adequate and instant decisions required in a competitive environment where needs are greatly being changed on regular basis. Since BIS are greatly used in huge corporations, it was a big challenge to implement it with optimal effectiveness in a SME. The paper presents a research supported by an application software. Leading the BIS to meet the specifications of the SME to a very large extent. The research provided a strong software solution for access to knowledge bases. Furthermore, being an aide to extract expert opinion to facilitate managerial decision making.

**Index Terms**— Application Software, Business Intelligence, Cloud Databases, Competitive Intelligence, Design Methodology, Economic Forecasting, Business ERPs.

## 1 INTRODUCTION

THIS document targets on providing a food chain based SME to incorporate the business intelligence to its setup in order to take maximum advantage of the technology in the process of effective decision making. As the modern world today, is facing a day-to-day challenge to keep up with the latest technology trends, small and medium businesses could not be left behind to find their road to success.

The BIS allows computers to extract meaningful information from unstructured data and directly process the contents. This leads to innovative solutions to different business problems. There is a lot of work being done in this area recently, which shows a great deal of potential in the areas of web mining, text mining of knowledge bases. Also it provides a set of methods to analyze unstructured data and then mold it in a form that facilitates in the decision making process by the managers.

The paper describes the business intelligence model in Section 2, proposed architecture in Section 3, problem area in Section 4, the suggested solution in section 5 and conclusion in section 6.

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## 2 BUSINESS INTELLIGENCE

### 2.1 Introduction

Business Intelligence (BI) is a technology-driven method for analyzing knowledge and presenting unstructured information to assist company executives, business managers and alternate end users to come to consensus with a number of business selections [1].

### 2.2 The Use of BI in the Software Application

The targeted food chain has multiple outlets where they experience several food products, recipes, customer details, sales etc on daily basis. All this data being recorded manually on excel sheets or even in hand-written journals. This introduces the problem of data analyses in terms of business growth, inventory management, strategies to be used and innovations. Here BI plays a vital role in terms of growth, cost, time and productivity.

The BI provides the users with graphical depictions of the results so as to track easily the inventory left and required, menu items, popular recipes, employee management, sales, products and branch operations.

### 2.3 Business Intelligence Algorithms

Out of a large number of algorithms designed for different BI applications the following algorithms tend to provide us the optimal results for our application.

1. **Regression Analysis (RA):**  
In RA, the application makes use of linear regression and non-linear regression to mechanically outline the evaluation functions and thereby confirm numeric target values. In order to derive a valuation function, the previously attained knowledge is used to train the data for analysis methods. This trained method is further trained to apply on different data sets created, which in turn is fed to the prediction algorithm for business forecasting [2].
2. **Decision Tree (DT):**  
The decision tree is used to build classifiers or regres-

sion models in the form of trees. The data set is broken down into smaller associated subsets. At a particular interval the associated call tree is developed incrementally. The tree structure represents the nodes as the search engines used, the edges as outlets of the chain and leaf nodes as classifier or call. The top call node of a tree that corresponds to the most effective predictor is labelled as the root. The trees handle each numerical information categorically [3].

### 3 PROPOSED ARCHITECTURE

#### 3.1 Cloud Database

A cloud may be used to manipulate the database in the computing environment. The cloud may store the database in two ways: One the users will administer the cloud by engaging a virtual machine. Second the access to an information service should be maintained through service purchase. The accessible database may be a square mean of SQL or NoSQL knowledge model [4], [5].

#### 3.2 Software Application

After the deployment of the cloud database, the connectivity of various business activities is assured either through web application, mobile devices or desktop computers. This runtime configuration enables the access to data for for analysis or decision making at any instance of time. Microsoft Soft Azure provides a good platform for the formation of such a cloud. Fig 1. shows an architectural view of the proposed system.

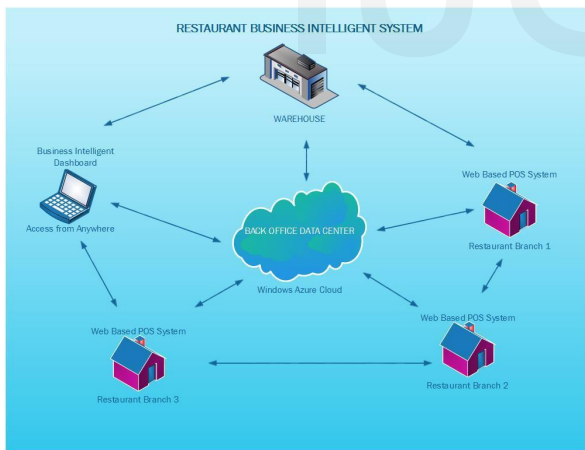


Fig. 1. Architecture of the Business Intelligent System for the food chain.

### 4 PROBLEM AREA

The BI system into consideration was developed based on a number of problems that were being faced by the food chain owners. Following is a list of a few critical issues being addressed by our proposed model:

1. Data being managed manually on Excel sheets.
2. Report generation was manual and time consuming.
3. System for a multi-branch not being centralized.

4. Very high probability of human error.
5. Data not being shared in real-time.
6. Inventory check and balance was manual.

### 5 SOLUTIONS

In context of problems mentioned with the existing system in section 4, a few concrete steps were taken to solve them.

#### 5.1 Back office Operations

Back office operations are based on administrative tasks. This included the formation of a dashboard with the following modules:

1. User Registration

This module deals with the registration and login operations for users. This operation enables the user to access his/her data from any part of the world, at any instance of time.

2. Option Panel

The option panel comprises of basic operations such as the create, read, update, delete commands for the user. The Option Panel may be populated with more options so as to make the application more sophisticated and as per user's needs.

3. Recipe Module

A centralized repository of all the ingredients which are used to prepare all the menu items at all the outlets of the restaurant. The user is even provided with the functionality to combine two or more recipes based on the ingredients list created for customized orders.

4. Cost Estimation Module

The basic cost estimation module concerned with the details of cost incurred in the preparation of menu items, outlet maintenance, employee salary. The designed module provides a daily, weekly, and/or monthly reports giving a detailed description of the overall and individual costs of the menu items. I

5. Inventory Management

This module is responsible for tracking the available stock at the outlet. It is also responsible for generating notifications when the stock hits critical levels and when new stock should be ordered.

Also providing the main page of the dashboard with graphical representations of their sale status, product estimations, menu innovations, so that they may make easy and visible choices for long term business choices.

Fig 2. Depicts the back office operations highlighted in this sections.



Fig. 2. Back Office Operations for Product Activity

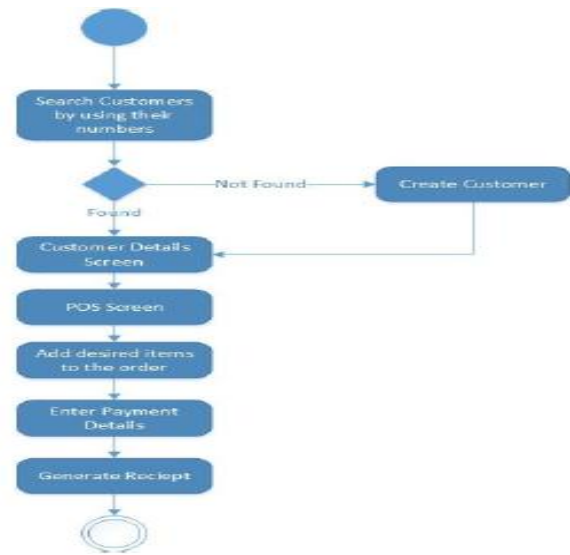


Fig. 3. Point-of-Sale of Front Office Operations

## 5.2 Front Office Operations

Front office is based on the operations of Order placement, Order Settlement, Sessions for each Branch Manager and waiters. It also involves the knowledge of the sort of sales occurred, which items are short in the stock. The following set of operations have been designed for this purpose:

### 1. User Registration

The module has been designed to register and provide log-in to branch managers for critical operations.

### 2. Order Settlement Module

This module is designed for placement of order by the customers. The orders may further be categorized in terms of Dine-In, Take away or Delivery.

### 3. Order Placement Module

This module is designed for order settlements, dues to be cleared and generation of receipts as per the customer needs. The module also incorporates the option of cancellation of order, after the approval of administrator i.e. branch manager in this case.

Fig 3. Depicts the front office operations highlighted in this sections

In short the front office is responsible for report generation of total sales, inventory utilization, employee management. All this data is then proceeded to the cloud and has the direct access by the administrator from any location. This facilitates our main objective of providing a centralized and automated solution for the food chain in consideration so as to reduce human errors and induce higher efficiency of the system.

## 6 CONCLUSION

Incorporating Business Intelligence (BI) into SMEs is one of the leading trends of business upgradation and automation. In this paper, we have described investigations conducted in order to find the practical challenges faced by the small and medium enterprise owners in order to follow the latest industry standards. The investigations helped to conclude where the gap exist and what are the real challenges needed to be mitigated. With the intention to fill this gap we have introduced a new and substantial solution aimed to help the managers in migrating manual applications from hand-written logs to cloud-based database design. The usability of the cloud is then described in the business context and how they can support the practitioners in following the latest standards. We are aiming to expand this collection to address more issues involved in the migration process. In future, we are also aiming to provide a pattern-oriented tool support for the migration between different software architectures.

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