DECISION SUPPORT SYSTEMS AND SALES PERFORMANCE ANALYSIS FOR HOME DECORATION AND FURNITURE BUSINESS

Chutinan Trongtorkid[1], Kanokwan Santa[2],
Kitisak Osathanunkul[3], Part Pramokchon[4] and Panuwat Mekha[5,*]

[1,2,3,4,5]Department of Computer Science, Faculty of Science, Maejo University, Chiangmai, Thailand
Emails: chutinan.cs320@gmail.com[1], kanokwan.santa@gmail.com[2]
kit_o@mju.ac.th[3], part@mju.ac.th[4], panuwat_m@mju.ac.th[5]

ABSTRACT

The aim of decision support systems and sales performance analysis for home decoration and furniture business is to help executive and business managers make more informed business decisions for their organization. By using technology of BI software based on data warehouse theory in process of collecting data from several source, analyzing, running queries and creating the report, dashboard and data visualizations. In this project, IBM Cognos software is used. It provides a tool set for managing, analyzing, and presenting of the data. The software consists of several components to support the different data requirements for an organization. Moreover, it is represented in a form of dashboard and report which is displayed in tables, graphs and others. This systems help manager to see information that occurs in an organization's sales volume over time. Managers may analyze the trends in the report to plan ahead on what they should react to the current situation in the next step to achieve their objectives.

Index Terms— *Decision support systems; Data warehouse; Business intelligence; IBM Cognos Software; Dashboard; Report*

1. INTRODUCTION

Today, home decoration and furniture business is a challenging business. Executive and managers are faced with decisions on how to managing and planning their business in order to gain or maintain competitive advantages on business rivals. Strategic marketing planning is an important factor to run their organizations. The process of marketing planning needs much information from many parts of the organization. Although some decisions are simple, a lot more are still complex and required the managers to consider many factors. It is also difficult to collect and the executive or managers may waste their time to collect the data. So many organization needs to search for technology that can help them to analyses their business. Business Intelligence (BI) software is one of the most needed lists of major company. The benefits of BI software are improved the ability to make a quickly and correctly decisions from several data source by visualizing the information available before making a decision, the optimized information exchange in the organization, and reducing of money and time in the process of assessing information and creating a report. This is the reason why many organizations use BI in their organization.

For this reason, we have studied about business intelligence for developing decision support systems and sales performance analysis for home decoration and furniture business. The main objective of using BI in helping an organization in process of collecting, and managing data is to analytics our organization, and sales performance. To be able to analyses the sales performance of organization, to evaluate data from the report with high capability, and to help managers with making the best decision.

2. RELATED WORK

2.1 Theory

2.1.1. Business Intelligence (BI)
BI is a technology and application that enhances business decision making. BI refers to a process of collecting, integrating, analyzing and presenting of business information. The purpose of BI is to support an organization to make a better business decision by creating a business report, then present in a form that easy to understand such as a dashboard, table, graph or map according to user requirements. BI can be used for business analysis and marketing planning. There are a set of abilities, tools, techniques and business solutions on BI that help executives and managers to understand about their business situation. BI tools can present in a view of previous, now and future of business situation.

2.1.2. Data warehouse (DWH)
DWH is a large and important of data storage for business intelligence systems. It is a database that collects a data from several source and time of organization, such as customer information, product information or sales information. DWH is used for analyzing a legacy and current data.

DWH is a technology that is very important for today's business because of the complexity of information and a less time for business decisions. DWH can help in the process of data analysis, such as a comparison of data, presenting data in a specific perspective, analysis and legacy data and predict a future data based on "What-If" model.

2.1.3. Star Schema Architecture

A star schema is the simplest form of dimensional model for data warehouse and business intelligence. There are 2 type of table in star schema. Fact table consist of measurement data or fact of business process. Dimension table consist of an attribute or a details of data.

A star schema is a diagram that surrounding each fact table with a dimension tables. The result of the diagram resembles as a star. The benefit of star schema is optimized for querying a large data.

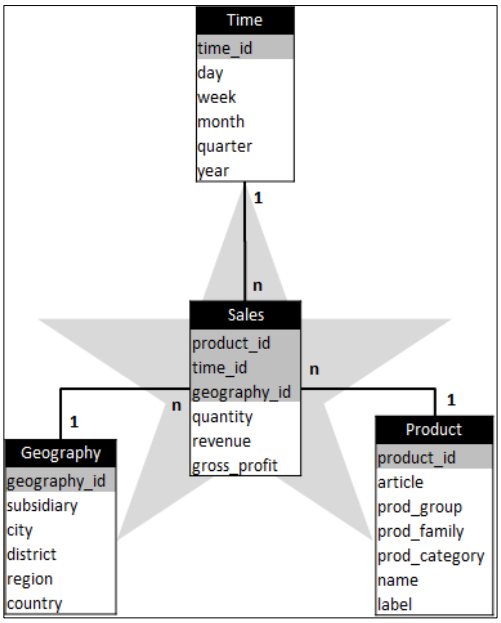

Figure1. Star Schema Architecture
(Source: http://en.dwhwiki.info/design/star_schema)

2.1.4. Report and dashboard

Report and dashboard is a presentation of business information. It is contain of data analysis, data forecasting and other business data. There are many kind of presentation that displayed on report and dashboard such as a table, chart, map, and other form of data analysis.

Report and dashboard are data visualization tools that have been created for helping an executive and manager to understand their business situations.

2.2 Technology

Main technology which is used in the system development are as followed.

2.2.1. Decision support system (DSS)

DSS is software or program that helping in process of making a decision about business management, collecting information, analyzing data and creating a complex model in the same software. For solve a complicated problem. In DSS consists of a set of tools model and another resource that user or an analyst use for analyzing evaluate and solve their organization problem. DSS is a software that collaboration between personal and software to solve an unstructured problems.

DSS is a system that helps an executive and manager making a decision, especially when the data is informed. Its flexibility to work and can respond quickly.

2.2.2. IBM Cognos Business intelligence

IBM Cognos Business intelligence is software that helps user to create a report combined with data analysis tools. Moreover, optimized an ability of creating a model, analyzing a real-time data and forcasting.

The main objective of IBM Cognos Business intelligence is to collect an information, analyzing and monitoring the result in a form that easy to understand. This software was designed to let a user to managing their data flexible and uncomplicated. This software is suitable for an executive, manager and employees.

2.2.3. IBM Cognos Framework Manager

The IBM Cognos Framework Manager is used to create a business model of metadata derived from one or more data sources. It is a Windows based tool which is used to publish the business models to Cognos BI in the form of packages which can be used for analytical reporting and analysis.

2.2.4. IBM Cognos Report Studio

Report Studio is a web-based tool that is used by report developers to create multi pages, complex reports on top of multiple data sources. You can create sales reports, inventory reports, account statements, balance sheets, etc.

2.2.5. OLAP (Online Analytics Processing)

OLAP is a technology that contain of a tools set for help in a process of monitoring a multidimensional information. OLAP allows users to extract a view of information from a several level. OLAP is suitable for an executive or organization that have to analysis data for making a decision with their business.

OLAP is one of BI tool that help to making a decision by analyzing a several information. OLAP is a tools for aggregate data by pre-aggregation data and use special index for create a multidimensional data structure. It is support an analyzing of trends analysis, data drilling, summaries data and ability of data comparison.

3. MATERIALS AND METHOD

3.1. Scope of the study

3.1.1. Content Scope
The scope of this project is to contain information of products, store, order method, payment method and sale measurement over 4 year (between 2013- 2016).

3.1.2. Report Scope

- Dashboard
- Top and Bottom Sales Report
- Sales Performance Analysis by Product Report
- Sales Performance Analysis by Store Report
- Sales by Order Method

3.2. Over viewing of IBM Cognos Software Workflow

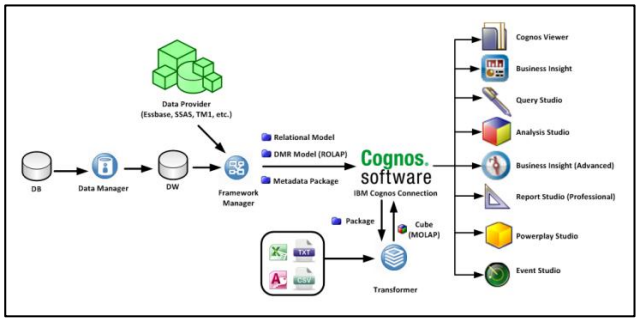

Figure2. IBM Cognos Workflow
(Source: IBM Cognos Intensive Modeling book)

3.3. Procedure

3.3.1. Research and prepare data source.
This is the process of gathering data that need in report, such as group of products, branches, and measure. Then define data source location, required schemas and tables.

3.3.2. Prepare database connectivity.
After data has been gathering, this process makes connectivity between data source and MySQL Server, then configuring data source in Cognos administration.

3.3.3. Design database relationship and make a model.
IBM Cognos Framework manager is then used to make a metadata model (relational model) from raw database to understandable presentation layer.

The design of a database will be in Star schema form, it contains a fact table that contains a foreign key to dimension table and measuring numeric facts. The dimension table consists of one or more hierarchy which categorizes data. The primary keys of each of the dimension tables are the part of the composite primary key of the fact table. After that OLAP compliance model is created. It is called DMR Model. It is a process to create and to examine dimensions of different levels of data. The advantage of DMR is that the data are organized in- hierarchical dimensions. Then public packages to IBM Cognos Connection to use a report tool sets.

3.2.4. Creating Report
Reports are created on IBM Cognos Connection by using the package.

4. REPORT INTERFACE

4.1. Dashboard

Figure3. Dashboard

Dashboard is present a current data which categorize into 2 views; YTD view refers to data analysis starting from the beginning of the current year and continuing up to the current date, MTD view refer to the data analysis from the beginning of the current month and ending at the current date in current month up to current date.

From the dashboard, user may see summaries of current data. At the top, user can find comparison data of revenue and profit between past and present. So, user may see an increasing or decreasing of data. If it is declining, user can fix the problem quickly. Moreover, user may see top 10 products and branches by revenue. The pie chart presents the percentage of each product group's revenue. User can assess the relative magnitude of each product group. The bar chart presents a comparison of region's revenue, and user can also see which region is good in revenue and which region have to raise revenue up.

4.2. Top and Bottom Sales

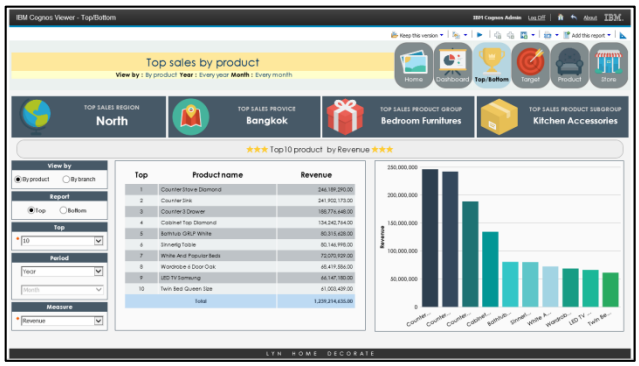

Figure4. Top and Bottom Sale Report

From figure 4, the report presents the top and bottom of sales performance by product and store, which can filter by any periods that users want to see. In this report, users may see the best and worst seller branch and product. The best seller refers to a success of sale. But if it is worst, users have to find the way to raise it up, such as improving a marketing plan, making a sale promotion, or closing down the worst product or branch.

4.3. Sales Performance by Product Report

Figure5. Sales Performance by Product Report

From figure 5, the report presents sales performance sorting by products. The pie chart in the figure presents a comparison percentage of product's gross profit. Scatter chart presents the revenue, quantity and percent of profit margin. In this scatter chart, size of bubbles depict of a success of profit margin. In this report, user can see the comparison between revenue and target. This is one of the most important KPIs for each manager to see the actual revenue generated within a certain period, compared to the company's target revenue. It also tells users about their success or fail of their revenue. If it is fail, user can plan for raise their revenue.

4.4. Sales Performance by Store Report

Figure6. Sales Performance by Store Report

From figure 6, the report presents the sales performance grouping up by store, shown in Cognos map which is easy to see about situation of region's sales. Pie chart presents about the percentage of each region's gross profit. Bar chart presents a comparison of each region's sale quantity. In this report, user may see a comparison between actual revenue and target revenue. The green bar refers to success of revenue and red bar refer to fail revenue. If it is fail, users should make a marketing plan to raise their revenue up.

4.5. Sales by Order Method

Figure7. Sales by Order Method

From figure 7, the report presents revenue from each order method. By seeing this report, users may know which order method is popular for order. So, user can make a suitable order method for their sales and can plan about their manufacturing goods, then market those goods to a suitable prospective customer.

5. CONCLUSION AND ASSESSMENT SUMMARY

5.1. Conclusion

After the project has been done, business intelligence has been learned. We found that BI is important for planning in organization, and making more capability of decision support for manager. It can also help the managers to understand about their business, their revenue, and also their loss of profit.

IBM Cognos Business Intelligence is one of BI software that is in the top list. We have been learned in every step of how IBM Cognos working. By using many tools of Cognos such as IBM Cognos Framework Manager, and IBM Cognos report studio. IBM Cognos contains many solutions that suit for calculating business measure, and have many features to provide report to a user.

In the study case, the report presents about sales performance. Managers can see what is going on with their revenue, profit, sale quantity, etc. When an organization loses a profit, the manager can find the cause of the problem easily by looking at the reports and manager can fix a timely problem.

5.2. Assessment summary

Assessment of the system ability are to consider that how much the system is effective the needs of the users. By

evaluating the trial system of 30 people; classified student from Computer Science, Maejo University (28 people) and Business Intelligence Consult's staff of Business Application Company (2 people). The evaluation criteria divided into 2 parts, which are part of the Report Interface and parts of Data Analysis.

The result of assessment considered by an average score of tester's satisfaction using the formula below:

$$\bar{x} = \frac{\sum x}{n} \quad (1)$$

when $\bar{x}$ Represent average.
$\sum x$ Represent summary of score.
n Represent population.

Table 1. Level of assessment score

Average rating	Satisfaction level
4.50-5.00	Excellent
3.50-4.49	Good
2.50-3.49	Average
1.50-2.49	Fair
1.00-1.49	Poor

Table 2. Average assessment score result

Topic	Average	Satisfaction level
1. User Interface		
1.1. Reports are easy to understand.	3.55	Good
1.2. Having suitability of font and color on user interface.	3.40	Average
1.3. Using the suitability of image, chart type and table style.	3.60	Good
2. Report Analysis		
2.1. The words are used in reports are suitable for business analysis.	3.90	Good
2.2. The report can show a correct data trend analysis.	3.20	Average
2.3. The data can analyze in multidimensional view.	3.10	Average
2.4. Presents information on the report can help an executive and managers to make a decision for their business.	2.95	Average
Summaries	**3.38**	**Average**

6. RECOMMENDATIONS

From a study of BI and DSS, there are things to consider before the report or dashboard should be created for sales analysis. One of the most important things is the research on the process of business and marketing planning is the main factor effecting to organization's financial.

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