

RESEARCH AND PRACTICE OF GROUP DECISION SYSTEMS

Ma Shao-qiu

ShiMao Group, 37F. ONE Lujiazui, 68 Yin Cheng Road Central, Shanghai, China

Zheng Yan

BaoSteel Group, 18F. BaoSteel Tower, 4 Pu Dian Road, Shanghai, China

Keywords: Business Intelligence (BI), Decision Support System (DSS), Data Warehouse (DW).

Abstract: In order to build an information system that support the Enterprise Group Decision Systems, we analyzed the Information Model of Enterprise Group Decision Support System, presented the architecture of enterprise group decision support systems which was based on data warehouse and business intelligence for the entire group, presented solutions of model-driven enterprise group decision support systems by defining the Decision Scheme Model and Decision-making Task Model, and applied in a real estate enterprise group. Application shows that the architecture is feasible and effective.

1 INTRODUCTION

In the process of implementation of information technology, Enterprise Group accumulating a large number of decentralized business data of projects, operations, finance, marketing, office, etc. How to turn the mass distribution of the business data into information for business decision-making has become the core problem of Enterprise Group Decision Support. Currently, research in Group decision support systems which was based on data warehouse have been numerous, but research for the methods and techniques of industry group decision support systems is still rare. By drawing on the methods and techniques of some literature, using the technology of data warehousing, data mining, model-driven, etc. , we presented the hierarchical structure of Enterprise Group Decision Support System. By defining the Decision Scheme Model and Decision-making Task Model, we presented solutions of model-driven enterprise group decision support systems. Finally, the proposed method and technology were applied in a real estate enterprise group, and achieved significant results.

2 INFORMATION MODEL OF GROUP DECISION SUPPORT SYSTEM

There are so many factors involved in decision-making process, in order to obtain effective decision-making information, reasonable information model must be established. Through analysis of related factors about Enterprise Group Decision, Information Model of Group Decision Support System are shown in Figure 1.

Figure 1 shows the related data which affect the Enterprise Group Decisions, including groups data (contain Project, Operations, Finance, Marketing, Office, etc.) also includes the necessary external information (such as market information). The format and meaning of different data are not entirely consistent. So only taking effective data management methods can achieve business group decision making. This paper completed the data environment construction of Enterprise Group Decision Support System by using data warehouse architecture, achieved the enterprise group decision support system functions by using the decision-oriented model-driven approach.

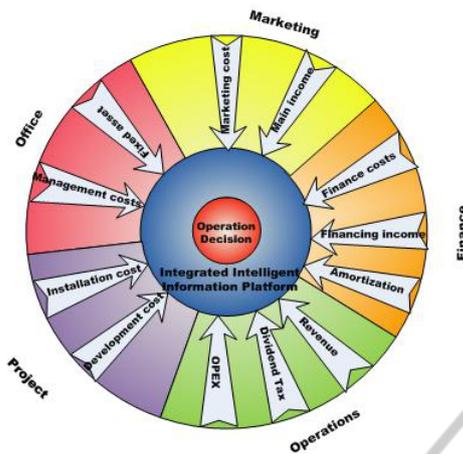


Figure 1: Information Model of Group Decision Support System.

warehouse should also pay special attention to the size and dividing problems.

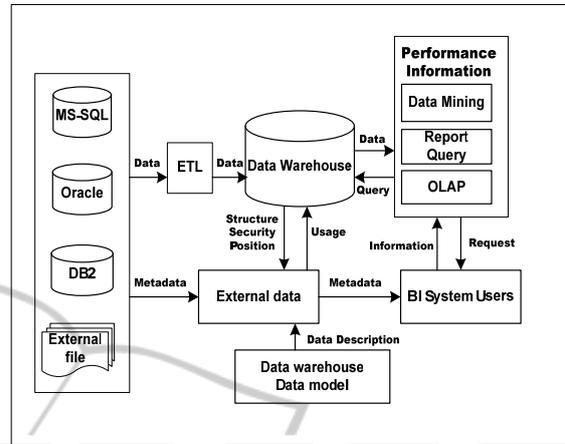


Figure 2: Distributed Data Warehouse of Enterprise Group.

3 ARCHITECTURE OF GROUP DECISION SUPPORT SYSTEM

3.1 Architecture of Data Warehouse

To support the collectivize enterprise groups decision making, the use of the data warehouse can provide enterprise groups the decision support data environment, through hierarchical strategy to reduce the complexity of data extraction and conversion. The architecture of Enterprise Group data warehouse is shown in Figure 2. The data warehouse can provide these following services for decision support analysis and processing:

(1) To extracted the data for analysis from the OLTP database under the theme. During the extraction process, it is demand to do classify, sum or do statistical treatment with the raw data. The processing of extraction is actually the re-organization of the data.

(2) In the extraction process, it is demand to do the data cleaning, that is to remove the unqualified raw data, if necessary, the defect data must be supplemented.

(3) When the theme of the analysis and decision-making are changed, it can query and visit data by topic.

(4) To use off-line mass storage, online disk storage, memory, multilevel storage model to address the huge amount of data and organizational problems about dividing by topic and size.

Data extraction and purification, storage organization etc., are the key technology of building data warehousing. In addition, the design of data

3.2 Hierarchy of Decision Support System

Decision support systems using business intelligence (BI) technology, the hierarchical structure is shown in Figure 3:

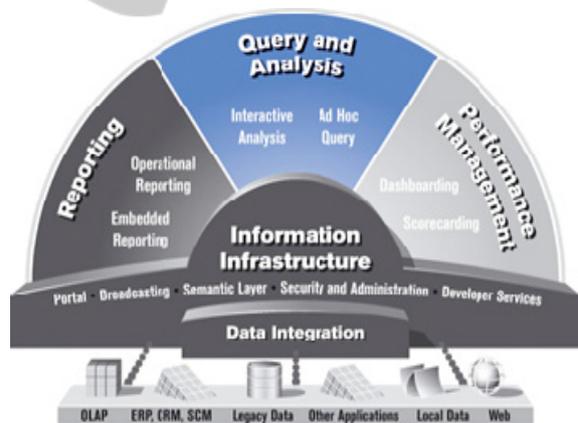


Figure 3: Hierarchy of Decision Support System.

From this framework, we can see clearly about the pattern of business intelligence architecture, including Data Layer, Business Logic Layer and Application Layer. Data Layer is basically the process of ETL. Business Logic Layer is mainly the process of OLAP and Data Mining. The Application Layer mainly includes the process of data display, analysis and performance analysis.

3.3 Basic Structure of Decision Support System

The basic structure of Decision Support System mainly consists of four parts, namely, the part of data, the part of model, the part of reasoning and the part of HCI:

The part of data is a database system;

The part of model includes Model Library (MB) and its management system (MBMS);

The part of reasoning is consisted by the Knowledge Base (KB), Knowledge Base Management System (KBMS) and the Inference Engine;

The part of HCI is the HCI interface of decision support system, for receiving and inspection user requests, call the internal system function software for decision making to make the model running ,data calling and knowledge reasoning to achieve the organic unity of solving the decision problems effectively.

4 APPLICATION OF DECISION SUPPORT SYSTEM

In the process of implementing the real estate business group decision support system development and application based on the distributed data warehouse, involving developers, expert users, decision-making users, data warehouse designers. Developers are responsible for designing and implementing the entire decision-making system, and other work such as adding new decision algorithm etc. Expert users are responsible for structuring Decision-making Task Model. Decision-making users are responsible for completing the enterprise decision analysis based on the distributed data warehouse. Data warehouse designers are responsible for defining the fact table of subject-oriented data warehouse, completing data extraction, transformation, loading and maintenance in the data warehouse.

In the Enterprise Group Decision Support System, the system functions are divided into 3 levels, decision information, decision analysis and decision support. In decision-making layer, through a common reporting system and graphical display components, users can define the query criteria, define the output columns and graphics display, dynamically generated query statements or graphics.

In the decision analysis layer, the system uses online analysis process mode, it is support of

digging other functions. In the decision support layer, the system uses data mining technology, through the decision-making model and decision algorithm, it can find some market discipline, customer variation trend and business models which are hard to find in the report query.

Enterprise Group Decision Support System coordinate the management needs, around the business objective and risk indicators which the group is concerned, through an integrated information platform, so that the relevant management and business process can be visible, steerable, optimized to play a greater support on the Group operations and decision in application of information technology.

Meanwhile, the Enterprise Group Decision System introduce a variety of models to assist aid decision making. The land value increment tax calculation and trial calculation model is provided. The model can automatically get the actual value and predicted value of costs, expenses, income, etc. of the corresponding business accounting. So that for ordinary residence and non-ordinary residence, the use of two nationally recognized methods can automatically calculating the corresponding tax rates and the tax. On this basis, it can also provide a variety of basis for decision-making by adjusting the dynamic trial calculation of cost-plus factor and/or income factor.

On the basis of land value increment tax calculation and trial calculation model, the system provides a profit, profit margin sensitivity analysis model, which is shown in Figure 6. Through a variety of data automatic acquisition and integrated application, it can intelligence estimate the ineffective and inefficient pricing range interval. By adjusting the price and tax optimization at the same time, it can significantly increase profits and profit margins. The model has been the important tool and means of a real estate to adjust the newly sale one's pricing adjustments.

5 CONCLUSIONS

The paper provided the whole framework of the Enterprise Group Decision Support System on the basis of data warehouse. Enterprise Group Data warehouse provide a good data environment for enterprise group decision support, by introducing hierarchical strategy such as the decision scheme layer, decision task model layer etc. It can reduce the complexity of decision support systems, integrated the data and decision-making algorithm, has a strong

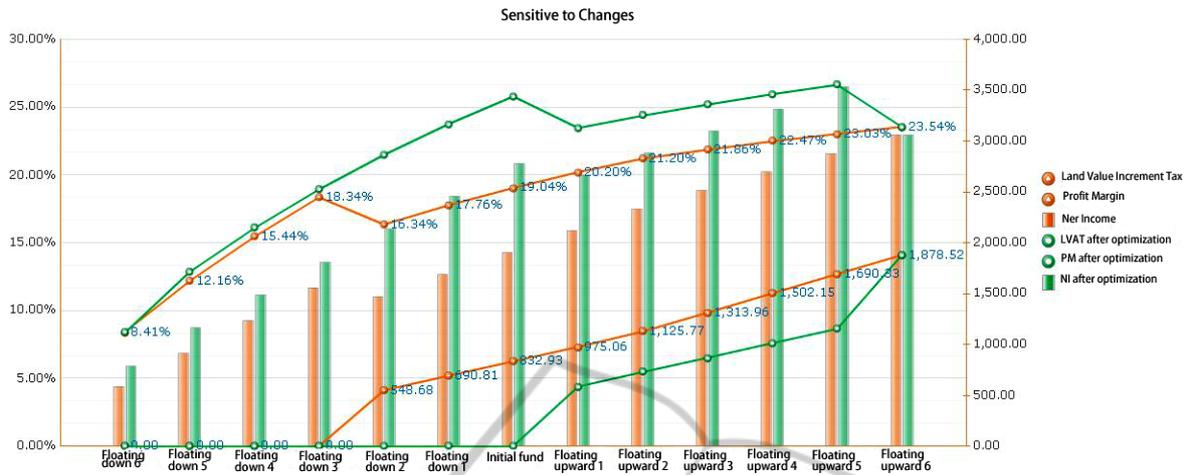


Figure 6. Profit, Profit margin sensitivity analysis.

versatility and scalability. Application shows that the proposed method is feasible and effective. Next, we will explore the INTERNET and the research and application of the decision support system based on the knowledge management, grid technology; meanwhile, we will hammer at enhancing the input and output means, such as the technology of introduction of text to speech, speech recognition, voiceprint recognition; we will also discuss the customer-oriented decision support system.

REFERENCES

Li Qi-yan, 2007. *Enterprise Business Intelligence Tutorial*, Tongji University Press. Shanghai.

Zhao Wei-dong, 2009. *Business Intelligence*. Tsinghua University Press. Beijing.

Li Dong and Cai Jian, 2005. *Decision Support System and Knowledge Management System*, Renmin University Press. Beijing.

Turban E., Aronson J. E. and Liang Ding-peng, 2009. *Decision Support Systems and Intelligent Systems*, Engineering Industry Press. Beijing. 7nd edition.