

# DECISION SUPPORT SYSTEM MODEL BASED ON RULES AND OLAP FOR COSTS MANAGEMENT

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**Abstract:** The complexity and dynamics of today's decision process has required new technologies and frameworks for Decision Support Systems (DSS) development. In this respect the structure of decision support environment for cost accounting become very complex due to new generation of Business Intelligence applications and technologies like Data Warehouse, OLAP (On Line Analytical Processing) and Data Mining. In this paper we present a model of rules-based DSS for Costs Management using OLAP technology in order to support cost and budgetary control and simulation.

**Key words:** Decision Support Systems, Business Intelligence, OLAP, Cost Accounting.

## 1. INTRODUCTION

The right on time decision making process, based on real and reliable information is a major problem, in a context where the information system doesn't provide data related to revenue and cost structure and volume, in a centralized and integrated manner (Turban et al., 2010).

Costs Management is a very complex activity, which requires data and information from all points of the organization's information system. The main objectives of this activity are planning and control. The decisions taken by the managers involved in the budget and cost management could have major impact on the whole organization and its market position (Marakas, 2003). The information flow supporting the manager's decision for cost management is provided by the financial accounting information system.

In order to fulfill the managerial needs, we have created, using the DSS-UNIDEF framework (Brandas, 2007), a DSS model for the Costs and budget management named *K-Admin* DSS. This system has as main functions:

- Costs collection, centralization and allocation module.
- Multidimensional reporting module based on OLAP cubes.
- Simulation of costs scenarios.

We consider that this system is a hybrid decision support system, which combines the elements and functions of EIS (Executive Information Systems) with the OLAP technology.

## 2. LITERATURE REVIEW

Costs control in an organization is a critical issue, especially for today's management. Most often managers need real time information on all activities costs. This information is vital for managing budgets.

According to Horngren (2008) costs control problem represents the main concern of organization's management. This control can be achieved only with real-time information about costs from all organization.

Currently it is considered that the management by budget and costs method is efficient and effective unless it uses the information technologies. The task of planning and controlling costs and budgets needs the support of informational flow

generated by the organization's information system. Thus implementing and using a DSS (Decision Support Systems) for this task will ensure a successful management by budgets and costs (Filip, 2007).

Previous research in the field of DSS Development identified many approaches and strategies. Studies of DSS development methodologies (Turban et al., 2010) identified more than 30 different approaches to the design and construction of DSS technologies.

According to Marakas (2003) DSS development approaches can be classified in two strategies: (1) programming customized DSS, and (2) employing a DSS generator. Because each approach is unique, the choice often depends on the organizational setting or problem context.

Researchers assert the need for new business paradigms to drive a unified approach to development of new active decision support capabilities (Brandas, 2007). Jacobson, Booch and Rumbaugh introduced in 1999 the Unified Software Development Process (USDP) as a software engineering process standard (Booch et al., 2005). It is commonly referred to as the Unified Process or UP.

DSS developed based on UP and UML can be easily implemented using Prototyping. The research of use UP in DSS development process is very poor. Most of the research papers refer only on use UML to modeling DSS process.

The current literature shows that most of the DSS are based on Business Intelligence technologies. Thus the OLAP technology is a powerful data analysis and decision support.

## 3. DSS MODEL FOR COSTS MANAGEMENT

Research method used to develop the system model was practical experiment using DSS-UNIDEF framework (Brandas, 2007). By employing the DSS-UNIDEF framework, we can identify the decision-making requirements more accurate and we can elaborate rapidly (prototyping) the system model in a unified approach based on UML models.

The system architecture (figure 1) can be structured from a software and hardware view.

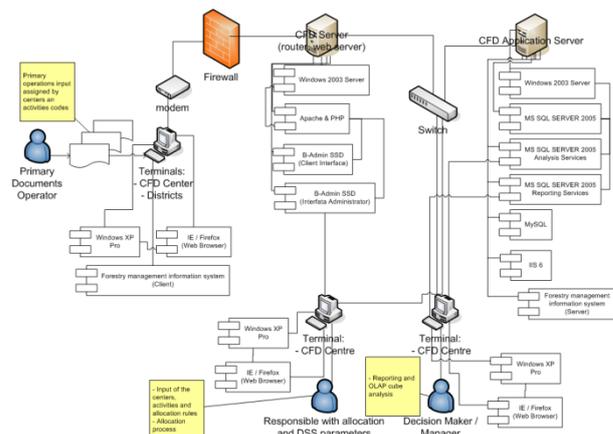


Fig. 1. K-Admin DSS architecture

The software side of the system has the following elements:

- Costs collection, centralization and allocation module
- Database management system: MS SQL SERVER 2005 – Database Engine.
- OLAP analysis module: MS SQL SERVER 2005 – Analysis Services.
- Reporting module: MS SQL SERVER 2005 – Reporting Services.
- IIS Web server.
- APACHE Web server.
- MySQL DBMS.
- Operating Systems: MS Windows 2003 Server and MS Windows XP Professional.

The hardware side of the system comprised the following base elements: central server which has a router and web server function, application server; terminals; modems; switch.

According to the system architecture, the users can be grouped in three main categories:

- **Decision maker / Manager:** represents the decision factors (General Manager, Accounting Manager, Finance Manager, and Production Manager) which used the reports and OLAP cubes in order to gather data and information costs level, structure and dynamic.
- **The responsible for DSS parameters and expenses allocation:** this is the person who is in charge with the system parameterization (this person has to add into the system the centers, activities, costs allocation rules, users) and with the monthly generation of the costs allocation and aggregation using the system.
- **Primary documents operator:** these are the persons responsible for input into the system the primary documents received from the subdivisions and headquarters of the organization. Each entry will receive a code composed from the center's code and the activity's code for that entry. This code allocation, allows a direct revenue and cost collection on each center and on each activity.

A *K-Admin DSS* model structure consists in many modules and sub-modules depending on the flow of collecting and processing information regarding costs. The module for expense collecting, centralizing and allocating plays a very important role in developing a system database.

To centralize expenses and costs allocation of organization's centers and activities the system is based on a set of rules. Figure 2 presents a model for those rules.

In order to complete a multidimensional analysis of the processed and centralized data, received from the collecting, centralizing and expense allocation module, we implemented an OLAP cube using the special features offered by the Business Intelligence component of MS SQL SERVER 2005 (Matt, 2007).

The OLAP cube allows the managers of an organization to visualize a series of reports having a dynamic and multidimensional structure.

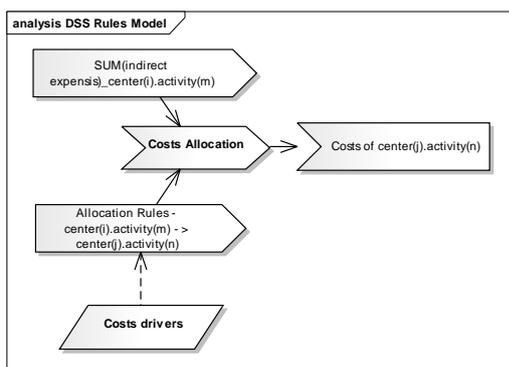


Fig. 2. K-Admin DSS rules model

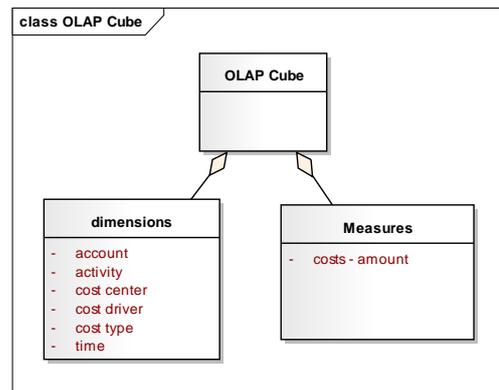


Fig. 3. K-Admin DSS OLAP cube structure

Therefore the costs can be presented in a multidimensional structure, being assigned to budgets, cost centers, activities, year, month or quarter.

The figure 3 depicts the dimensions structure of a data analysis OLAP cube.

The graphical display of data and the generated reports export can be done using the "Reporting Services" tool from MS SQL SERVER 2005.

#### 4. CONCLUSION

Implementing a Business Intelligence (especially OLAP) based DSS for the costs and budgets management will allow managers to plan and control the organization's activities more efficiently and effectively. Projecting and analyzing some strategic indicators these systems will lead to an increase in the organization's success.

Concerning the delivery of an effective decision support for the costs and budgets management, we propose the employment and improvement of a DSS model based on rules and OLAP, which was discussed in this paper. The model named above, has a quite general structure which allows it to be implemented in almost all organizations who have implemented the management by budgets.

As a further research we want to improve and develop this model, fitting in some new functions which will allow us to determine and manage the costs through the ABC (Activity-Based Costing) method.

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