THE DESIGN AND IMPLEMENTATION OF OLAP SYSTEM. CASE STUDY – UNIVERSITY RESEARCH

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Abstract: The aim of this study is to show that multidimensional modelling of existing data in organizations, depending on the topics of interest of managers and multidimensional view of data. It may also provide an effective informational support of managers in decision making, regardless of field of activity. To prove it, this study will design a data model and an OLAP multidimensional analysis of scientific research in education university.

JEL classification: C61, C67, C81

Key words: OLAP, hyper - cube, n-dimensional cube, conceptual model

1. INTRODUCTION

Entity-association modelling techniques and structuring data in normalized tables are the standard for database professionals who frequently use relational databases to store large volumes of transactional data existing in organizations. However, using tables to provide input in the decision-making organizations is not always an ideal solution for managers.

Access to information stored in relational databases requires the execution of transactional operations, often very complex, from multiple tables. Therefore, managers must use specialists to run applications for retrieval. Also, large relational databases, meant to support transactional applications, make it difficult for viewing information as subjects of interest of managers.

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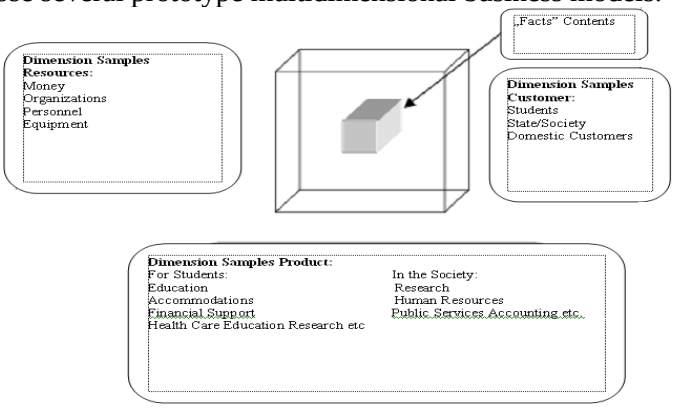
perspectives and assess online in order to assess as objectively and accurately the performance of organizations and make a decision based on the analysis process.

2. OBJECTIVES

To make a quality decision support for the organizations, the concepts of business models, providing a consolidated view of business can be defined at a conceptual level, in the form of n - dimensional data cubes (hyper - cube). These models describe the main topics on which organization should collect information (what information is needed to make better decisions). Business requirements are a combination of user requirements, data sources related realities and economic realities.

3. METHODOLOGY

Defining business models in the form of n-dimensional cubes or multi - cubes allows analysts and managers to better understand the data organization, data could be integrated, aggregated, view and analyze data from multiple perspectives (business size), reveal new aspects of the business, which could give companies new opportunities and improve the effectiveness of decision making (Figure no 1). In the following, we propose several prototype multidimensional business models.



Source: Bonifati, A. et al., "Designing Data Marts for Data Warehouses." ACM Transactions on Software Engineering and Methodology, 2001

Figure no. 1 Process (problem analysis) as a "cube" of information

For example, assessment and management of marketing activities involve (Kotler, 1998, p.23):

1. checking achieving planned performance through five types of analysis: sales analysis, market participation analysis, ratio analysis of the costs of marketing and sales, financial analysis and tracking customer satisfaction levels.
2. examination of where the company earns money, by establishing profitability by product, territory, customer, market segment, distribution channel, order size launched.
3. evaluating and improving efficiency by funds for marketing activities: sales force effectiveness analysis, efficiency analysis of commercial advertising, sales promotion effectiveness analysis and analysis of efficiency of distribution.
4. examining how the company responds to its best opportunities related to markets, products and distribution channels: evaluation of the effectiveness of marketing,

marketing analysis, marketing analysis and performance analysis of ethical and social responsibilities of business.

4. ANALYSES

Scientific research is defined "as a systematic and creative activity designed to increase the volume of knowledge, including knowledge of man, culture, and use this knowledge for new applications. Scientific research is classified into three categories (Răboacă, Ciucur, 2001, p. 56):

Basic scientific research is mainly theoretical work (in areas such as economic growth and modelling, process analysis of economic, financial, fiscal and monetary issues etc.) whose primary goal is "the accumulation of new knowledge on fundamental aspects of phenomena and observable facts, without having regard to a particular or specific application";

Applied Scientific Research is an investigating activity "oriented towards a specific practical aim or objective" to transform basic scientific research and development techniques and practical technologies into concrete steps of organization, economic management etc. Fundamental and applied scientific research occupies an important place in scientific research in higher education;

Research and Experimental Development is systematic work devoted to the use of basic scientific research results and applied "for principled solutions for design, implementation and testing of experimental prototypes and products etc.".

Since research is the main component of the processes of learning and innovation in universities and as a result of the fact that universities operate in a competitive environment, management must include effective research. There are at least two different reasons that determine the need for assessment of research performance in universities, namely funding and quality assurance. OLAP proposed system (the prototype was designed and built for scientific research) aims to provide managers:

1. ability to access the data directly (without intermediaries) and to manipulate it easily;
2. opportunity to identify errors and missing data and correct them;
3. easier business planning, as all participants will have access to information;
4. ability to objectively assign the funds and to ensure research quality.

Funded scientific research is carried out through programs, sub-research and development issues and activities covered, as appropriate, by: i) national scientific research programs and management, funded by the National Agency for Science, Technology and Innovation; ii) scientific research programs funded by the Ministry of Education, the National Council of Scientific Research in Higher Education; iii) scientific research topics and contracts with consulting, governmental companies; and iv) non-institutional programs coordinated by the Office of Senate and financed from own funds; v) institutional programs coordinated by the Department of Economic Research; vi) coordinated departmental chairs and individual faculties and research including those funded.

It has also recognized the results of scientific research that are reflected in: i) research reports submitted to libraries; ii) systems, models, software products, solutions for modernization and economic efficiency etc. accompanied by appropriate documentation submitted to the library; iii) books and monographs including novel

scientific content published and submitted to libraries; iv) scientific national and international works; v) articles published in volumes of scientific events or professional journals in the country and abroad.

Scientific research of students takes place in various forms: i) scientific research carried out independently, guided by teachers and completing projects, diploma work, case studies; ii) partial transformation of educational seminars in scientific seminars; iii) training and participation of students achieving programs / projects coordinated by the departments and research centres; iv) organization by the department of student scientific sessions. Results of scientific activity can be considered in the grading system of students, may be published in professional journals, may be submitted to the scientific sessions of students and professional competitions organized. Prototype requirements have been set up based on the identification of indicators used to measure the level of performance in scientific research and the goals and strategies of scientific research in universities.

Based on the current study of decision making and information requirements of the activity of scientific research in universities, Figure no.2 suggests a business model (as a cube of information) to evaluate research. Using this method of presentation can analyze the decision support such as comparative analysis between loading rate teachers and publications, analysis of publications (number of publications / teacher), teacher load, analysis of top 3 (the three departments / research centres according to performance indicators), graphics development for staff involved in research etc.

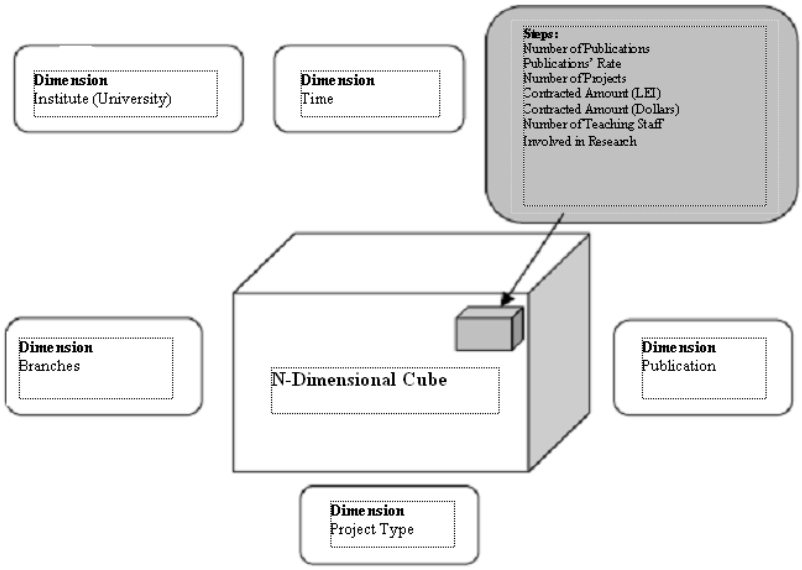


Figure no. 2 N-dimensional cube of data for research in higher education

4.1 Logic design

The multidimensional conceptual model designed in the previous stage can be implemented as a relational database (ROLAP solution) and a multidimensional database (MOLAP solution). If it takes a ROLAP solution, it means the design of a star

scheme database (Figure no.3, Figure no.4, Figure no.5, Figure no.6). We have identified the following tables of facts: facts tables **FS_1, FS_2, FP_1, FP_2**.

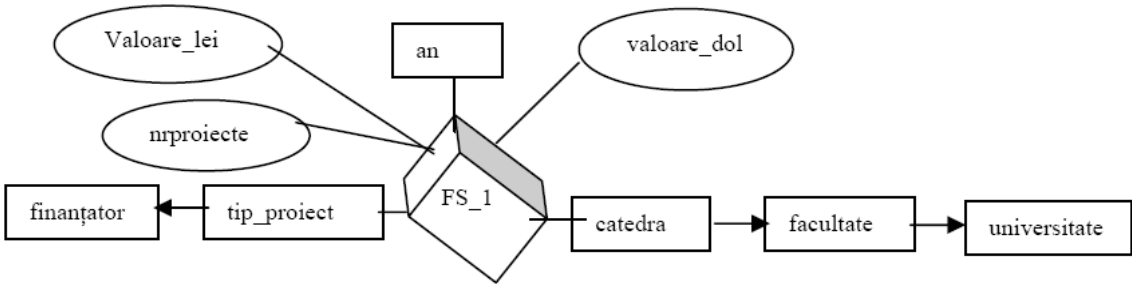


Figure no. 3 Multidimensional conceptual model for research in higher education -facts tables FS_1

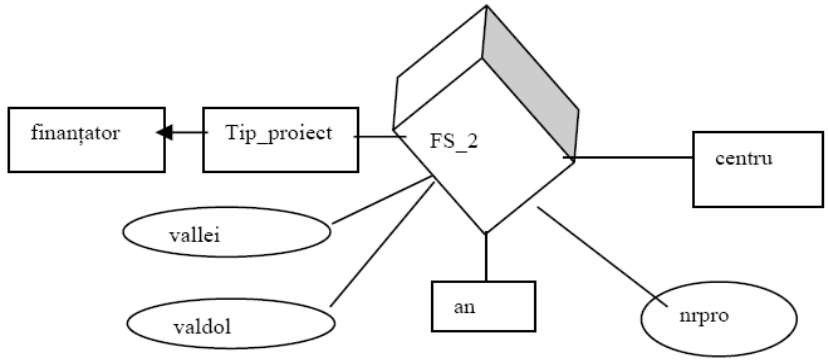


Figure no. 4 Multidimensional conceptual model for research in higher education -facts tables FS_2

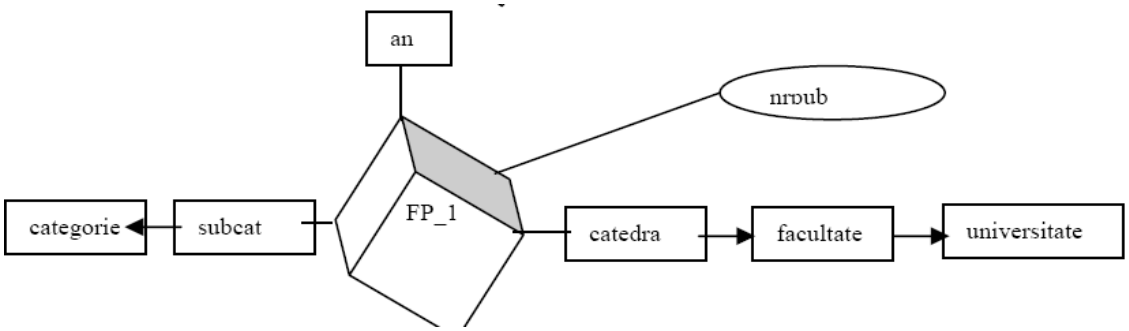
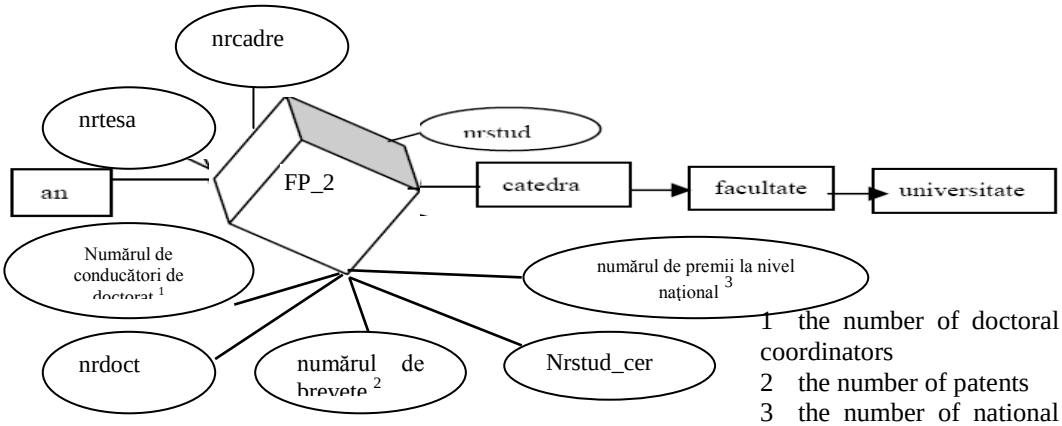


Figure no. 5 Multidimensional conceptual model for research in higher education -facts tables FP_1



1 the number of doctoral coordinators
2 the number of patents
3 the number of national prizes

Figure no. 6 Multidimensional conceptual model for research in higher education -facts tables FP_2

The two systems (transactional and decision support) complement each other, providing complete and current data. Also, the two systems are designed to support the methodology for allocating funds to universities based on funding being proposed by MEC. Based on data provided by transactional system, certain indicators can be set and analyzed used to measure the level of performance in scientific research. Conceptual scheme and logical source relational database allow the definition of these indicators. Also, multidimensional conceptual model should not be changed (not shown in new dimensions).

5. CONCLUSIONS

The present survey has suggested a business model for research evaluation in the form of a cube of information, the study of decision-making power and information requirements of the activity of scientific research in universities. The multidimensional conceptual model for designing demand-driven method has been used.

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