

OLAP Technique – An It&C Support for Marketing Managers Decision-Making Process (Case Study: Sales Multidimensional Analysis Applied in Hotel Services Industry)

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Abstract. In order to generate the enthusiasm and implicitly, the customers loyalty, every organization must efficiently manage a marketing database. The information stocked in the databases (gathered by means of the direct contacts with the sales representatives, as a result of some marketing researches, registrations on the companies' websites, etc) allow an efficient management of the customers' portfolio, the determination of a customer profile and an efficient position of the offers on the market by means of the on-line analytical processing (OLAP) technique. In this paper, we emphasize the main capabilities of a CRM software that we developed and applied on the customers' portfolio of a Romanian hotel. The multidimensional analysis of the sales applied to the information about customers stored in the software's database using OLAP technique provides a real support for the marketing managers' decision making process. By testing the functions of this software, we reveal the possibilities to create a personalized CRM strategy, to determine customers' profitability using a RFM model and to determine the best offer positioning, taking into account the distribution of sales according to the most important segmentation criteria, using online analytical processing.

Keywords: CRM software, online analytical processing, sales multidimensional analysis, hotel services management

1. The main features of the CRM software which can be customized for the hotel services industry

The hotel services industry is highly competitive and the right knowledge about customer demands and expectations is essential to differentiate from competitors and gain sustainable competitive advantage. Implementing traditional marketing strategies is often no longer enough to achieve this goal. CRM has increasingly become more important, as this concept suggests more focus on retaining the customer and creating a win-win situation with a long-term perspective. In traditional marketing there is more focus on the customers' acquisition. We considered that a good balance between customers' acquisition and retention directed to the right segments is essential for future success of the hotels CRM strategies.

Nowadays, academics are paying great attention to identify logics and drivers allowing

enterprises to be effectively managed through the measurement of their performances. Another fundamental objective consists in identifying the way data and information can be transformed in value-making activities. [11] In this context, we consider that CRM datawarehouses provide great opportunities for marketing managers to realize multidimensional analysis, by taking into account OLAP functions (On-Line Analytical Processing), which is a capability of a datawarehouse to manipulate a great amount of data from multiple perspectives; it focuses on providing a set of data attributes from a data-warehouse organized around certain dimensions, such as time, locations and products. For example, a marketing manager access a data-warehouse which contains information referring to company's sales, displayed by geographical regions, types of products and distribution channels. Using an OLAP session, he can extract the sales from each region and for each type of product. Requesting a new OLAP session, he can obtain the sales volume from each distribution channel, in

correlation with the other two dimensions: region and product type; in this way, he can choose the most efficient strategy to sell the company's products. [5]

The CRM software that we projected and developed on a SQL Server platform is designed to marketing managers decisions in hotel services industry and has as a purpose the customers' tourist services packages management on a certain period of time. These data represent the basis for generating some cubes that will allow the carrying out of some multidimensional analyses on the sales using the OLAP technology (On Line Analytical Processing). The information resulted from these analyses represents a real support for the marketing managers of the hotels, responsible for the strategies oriented towards the complete satisfaction of customers.

The design of the CRM information systems must be based on the following characteristics:

- *The top-management involvement* – supposes a business philosophy centred on customers and a general manager that should have a strategic vision on the information systems and their role in the increase of the business processes efficiency, especially those which serve directly the customers;

- *The focus only on the real needs of customers* – involves the knowledge of the selection and analysis procedures of the information referring to the customers within the data deposits;

- *The availability of the data sources* – before the implementation of an information system, the CRM project manager must make sure of the existence of some multidimensional data bases, in which there are stocked large amounts of information derived from the potential or actual customers;

- *High flexibility* – while the information needs of the CRM project managers evolve and change in time;

- *Possibilities of continuous up- to- date* – an information system designed for CRM can't be exploited without having some permanent accomplishments to satisfy the changes in the business environment in which the company is involved.

The main **functions of the CRM software** are represented by:

- *the processing of the transactions carried out by hotels' customers*, the customers' invoices being registered in the software's database and analyzed in the OLAP cube returned by SQL Server; this function is found in the majority of the personalized software designed for CRM;
- *the on-line communication with customers*, the CRM managers having the opportunity to send newsletters or any other kind of marketing messages to the customers; the most important advantages of CRM based on e-mail lists are:
 - the best targeting methods in "one-to-one" marketing approach;
 - the most reduced communication costs comparative with other type of promotion media;
 - the creation of a permanent presence in customers minds of the hotels' brands.

All the marketing efforts must be focused on the hotels' brand building strategies on Internet, in the conditions in which the multi-channel marketing adopted by a hotel which promotes its services involves a unique brand image that must be communicated on all the channels.

- *the promotion and loyalty programs management*, according to the number of fidelity points determined for each customer on the basis of the algorithm implemented in this CRM software, after RFM method; we offer to the users of this software the option that allows to allocate special offers for predefined points levels, in order to develop CRM campaigns which will generate the enthusiasm of hotels' customers;
- *the multidimensional analysis of the hotel services packages acquisitions*, based on different segmentation criteria (product type, occupation, sex, revenue level, etc.), using the on-line analytical processing (OLAP) technique, which we consider the main strength of our CRM software.

2. Connecting Marketing Intelligence, Sales Automation and Customer Care Support in the CRM

software applied in hotel services industry

The main components of our CRM software are: Marketing Intelligence support, Sales Automation support and Customer Care support.

From the Marketing Intelligence perspective, the CRM software provides powerful tools for marketing activities planning, personalized e-mail lists management, customers' acquisition and loyalty campaigns management and marketing analysis. (figure no. 1)

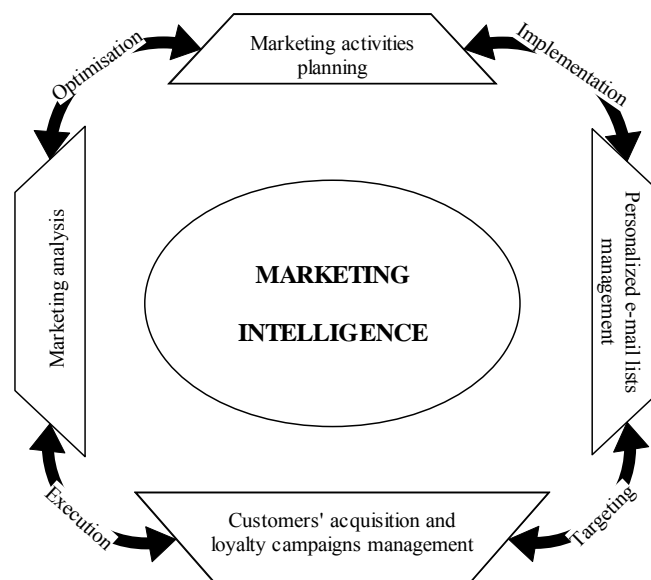


Figure no. 1 – The features of Marketing Intelligence support in the CRM software

Marketing is not viewed only as persuading passive customers by giving promises but it goes further to include meeting those promises leading to build relationships that evolve over time for the benefit of both customer and business. Customer satisfaction is a core strategy in this perspective that ensures customer base retention and long-term profitability. [6]

The users of the CRM software dispose of possibilities to transform data about customers into valuable knowledge, which allow an organization to react quickly to the changes in customers' preferences and to adapt to the new market opportunities. The personalized e-mail lists management assures the implementation of targeting techniques in view to attract new

customers, to increase the loyalty rate of the existent customers and to generate reports that emphasize the most successfully customers' acquisition and loyalty campaigns. The analysis referring to the customers' preferences and their interactions with companies' representatives and the acquisition history of each of them allow the anticipation of customers' needs and the design of specific offers for cross and up-selling.

From sales automation perspective, the CRM software provides a real support for sales activities planning, sales leads management, customer key accounts management and sales multidimensional sales analysis according to different segmentation criteria. (figure no. 2)

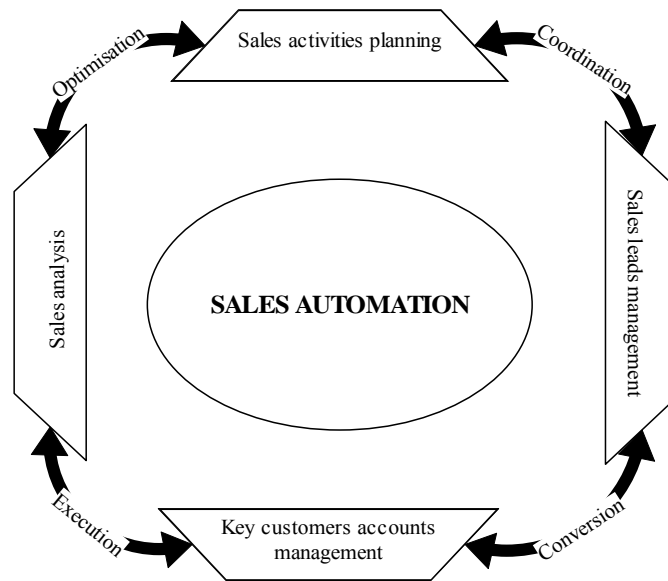


Figure no. 2 – The features of Sales Automation support in the CRM software

The sales automation function of the CRM software allows the creation, view and filtering of different types of reports in order to identify the sales leads and to evaluate the sales performances by monitoring and updating the invoices' processes; in the same time, it emphasizes a personalized image of the customers behavior and involves complex correlations between the information associated to customer key accounts by means of the multidimensional

analysis of sales using OLAP technique applied to the CRM database exported to Microsoft SQL Server.

From "Customer care" support perspective, the CRM software facilitates the customers' interactions management, customers' feedback and complaints management, personalized offers planning and the proactive assistance given to the customers' requests. (figure no. 3)

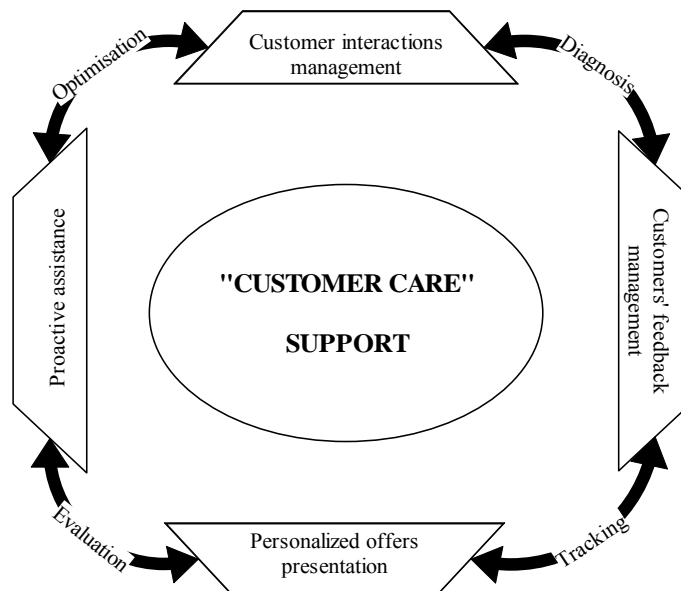


Figure no. 3 – The features of "Customer Care" support in the CRM software

We consider that this important function of the CRM software – "customer care" offers the opportunity to send personalized marketing messages to the customers, the registration and

tracking of their feedback which involves first of all the fast response to their complaints and requests. It also provides on-line assistance to customers using collaborative e-mail function of

the software, in view to assure the increase of the customers' satisfaction and implicitly, their loyalty and the decrease of their churn rate.

The experienced customers are less tolerant towards incompetent service and thus providers have to offer higher quality of services in order to build long term relationships. Specifically, more experienced customers look for updated information, lower prices, rewards and efficient customer service. [9]

3. The application of OLAP technique for the multidimensional analysis of the hotel services packages sales in the CRM software

In view to emphasize the multidimensional analysis of the hotel services packages sales, we conceived a relevant offer for a Romanian hotel for the summer holiday. This offer involves four packages of hotel services for low, middle and high-end target. (table no. 1)

Table no. 1
Description of the hotel services packages used in the CRM software simulation

| Hotel services package | Offer description | Price/person | Customer target |
|------------------------|--|--------------|-----------------|
| „SUN & SEA FOR ALL” | 5 nights accommodation + breakfast included | 149 EUR | Low |
| „ENJOY SUMMERTIME” | 5 nights accommodation + breakfast and dinner included | 199 EUR | Middle |
| „SUNSHINE GOLD” | 6 nights accommodation - All inclusive | 299 EUR | High-end |
| „SUNSHINE STAR” | 6 nights accommodation - All inclusive + cruise | 349 EUR | High-end |

The first operation specific to the use of the CRM software in the simulation of the project concerning the sales multidimensional analysis of hotel services packages consists of the definition of services categories (LOW-MEDIUM and PREMIUM) and the introduction of the hotel services packages (“Sun&Sea for All”, “Enjoy Summertime”, “Sunshine Gold” and “Sunshine Star”).

The information about customers (first name, last name, address, birth date, occupation, revenue level, education level, e-mail address) facilitates the realization both of the customers' portfolio targeting analysis inserted in the

software's operational database and the design and organization of CRM personalized strategies.

The invoices management system is realized in “Sales” tab of the CRM software, while the addition or change of the data concerning the products (in our case - hotel services packages) is revealed in a separate form. (figure no. 4)

A particularity of our CRM software is represented by the implementation of a loyalty points system based on RFM method application, which allow the CRM specialists to develop efficient loyalty strategies.

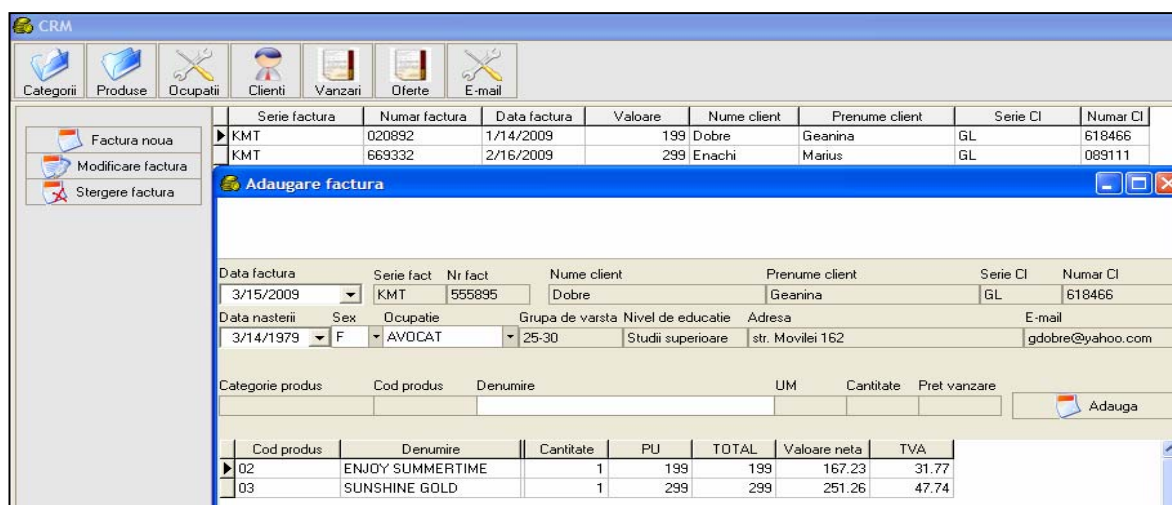


Figure no. 4 - The invoices management system implemented in the CRM software

RFM method (Recency, Frequency, Money) allows the evaluation of each customer included in the database in accordance with these reference variables – recency (the date of the latest purchase), frequency (the number of purchases from the analyzed period) and the monetary value (the volume, expressed in monetary units of the acquisitions).

In order to determine customers' loyalty points, we applied an algorithm which involves an adaptation of the RFM method. Thus, the total amount of a customer expenses (emphasized in its invoices) is divided by 10, while the acquisitions' frequency is determined by the multiplication of

number of invoices with 3; moreover, if a customer bought company's products (in this case, the hotel services packages) in the last month, he is rewarded with 5 loyalty points. The tab "Determine the loyalty points" implemented in the CRM software can be used after the upload of customers' invoices in the database; we mention the fact that the CRM system allows a permanent update of loyalty points, if other invoices are uploaded.

The CRM software returns under the form of personalized reports the information about the acquisitions of each customer, associating the loyalty points. (figure no. 5)

| Situatia vanzarilor la data de 3/15/2009 | | | | | | | | | | |
|--|---------------|--------------|---------|------------|------------------|----|-----------|-------------|---------------|--|
| CLIENT | Dobre Geanina | | | | | | | | | |
| Serie/Nr CI | GL / 618466 | | | | | | | | | |
| PUNCTAJ | 203.3 | | | | | | | | | |
| Suma totala | 1893 | | | | | | | | | |
| Serie factura | Numar factura | Data factura | Valoare | Cod produs | Denumire produs | UM | Cantitate | Pret unitar | Valoare bruta | |
| KMT | 020892 | 1/14/2009 | 199 | 02 | ENJOY SUMMERTIME | mp | 1 | 199 | 199 | |
| KMT | 787049 | 2/10/2009 | 1196 | 03 | SUNSHINE GOLD | mp | 4 | 299 | 1196 | |
| KMT | 555895 | 3/15/2009 | 498 | 02 | ENJOY SUMMERTIME | mp | 1 | 199 | 199 | |
| KMT | 555895 | 3/15/2009 | 498 | 03 | SUNSHINE GOLD | mp | 1 | 299 | 299 | |

Figure no. 5 – Model of a personalized customer account implemented in the CRM software

One of the multidimensional analyses that can be performed by means of the information transferred in SQL Server database consists of the sales allocation on personalized hotel services packages, according to different segmentation criteria. In this way, the marketing manager of a hotel can identify exactly the offer positioning

when he develops customer value management strategies.

The data transfer from the operational database integrated in the CRM software to SQL Server offers the possibility to view the tables diagram, accessing Enterprise Manager option (figure no. 6)

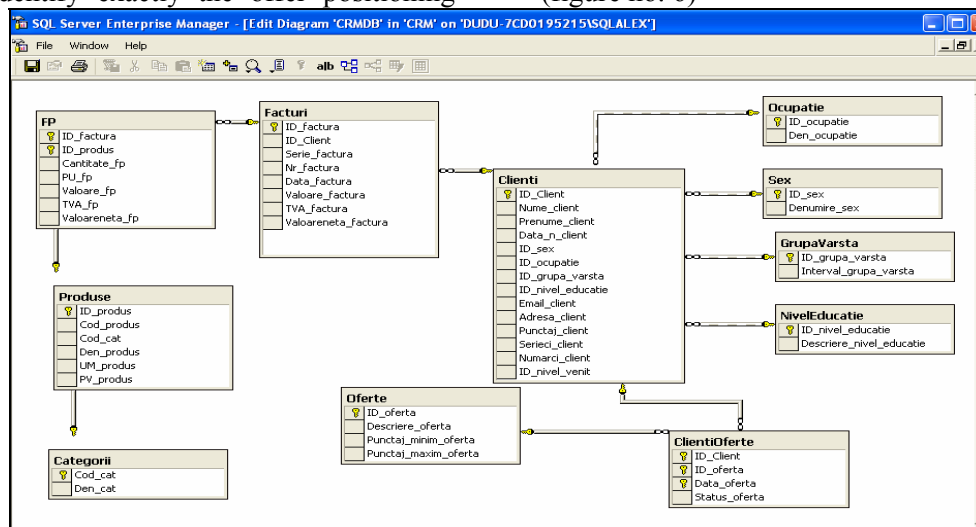


Figure no.6 – The visualization of network diagrams between CRM application tables

The multidimensional analysis can be realized using a Pivot Table from Microsoft EXCEL, in which we import an external data source - the operational database from CRM

software in which we uploaded information about the four hotel services packages and about customers that bought them. (figure no. 7)

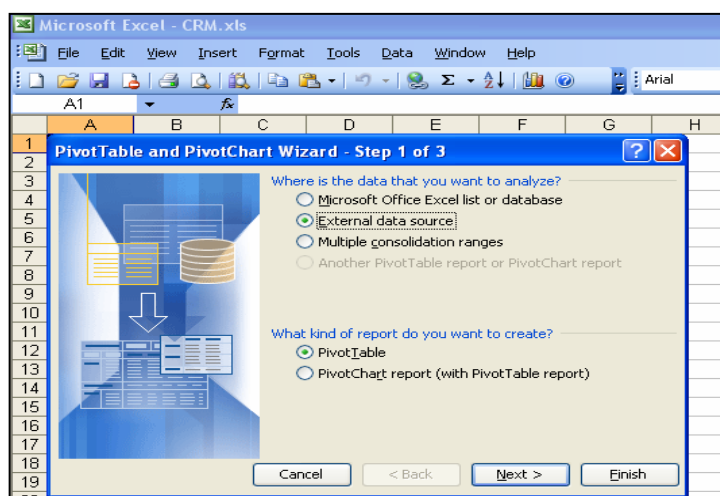


Figure no. 7 – Accessing the External data source using Pivot table from Microsoft Excel

The OLAP cube, created by a star structure of tables, represents the simplest data warehouse model, in which the number of aggregations is determined by the hierarchy possibilities of entry data. This OLAP cube allows the sales analysis according to hotel services packages categories and specified segmentation criteria, after the definition of the SQL queries. Using a cube means to extract data from it which will become information after adding some context to it and in the final stage of its evolution

will be transformed into actionable knowledge. The cube we defined can be implemented by using its browse option which will generate a common form which will be populated with data, drop downlists and drilling features.

In order to analyse the hotel services packages sales depending on the revenue level and customers' sex (male, female), the introduction of the SQL query in Microsoft Query Analyzer will generate an OLAP cube, the SQL script being emphasized in figure no. 8

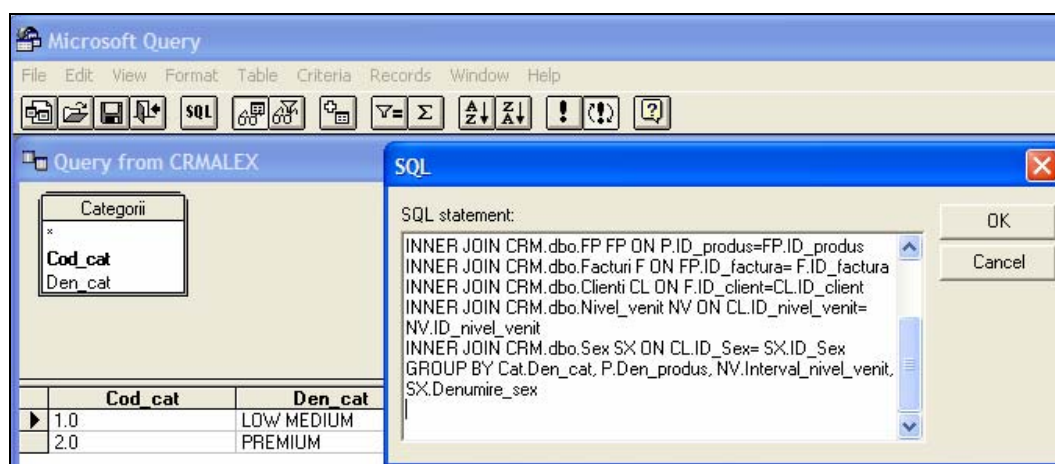


Figure no. 8 – SQL script configuration in view to generate the cube which facilitates hotel services packages sales in function of specified segmentation criteria

The *analysis dimensions* are the hotel services packages categories, revenue level and customers' sex (male, female), while the *analysis measure* is the sum of all invoices' values inserted in the database, which corresponds to each values combination of the dimensions.

After launching in execution the query presented in the figure no. 8, the wizard of

Microsoft Query allows the option to **link the cube dimensions** by transferring them in the OLAP analysis module and requires **the configuration of the analysis measure** - the sum of all invoices' values. (figure no. 9 and figure no. 10)

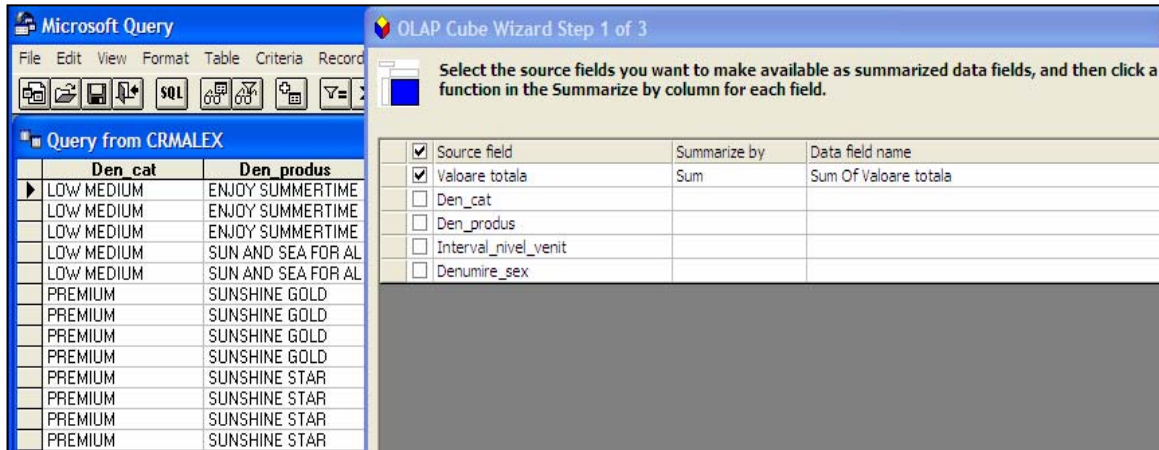


Figure no. 9 – The selection of the pivot table from data cube

The cube dimensions: hotel services packages categories, revenue level and customers' sex (male, female) become aggregated fields in OLAP analysis, while the total value of all invoices become pivot table in the cube.

Our marketing software provides a unique database that gathers information about products, customers, leads, personalized offers and invoices helping the processes of sales force automation and the quick search of information about sales analysis.

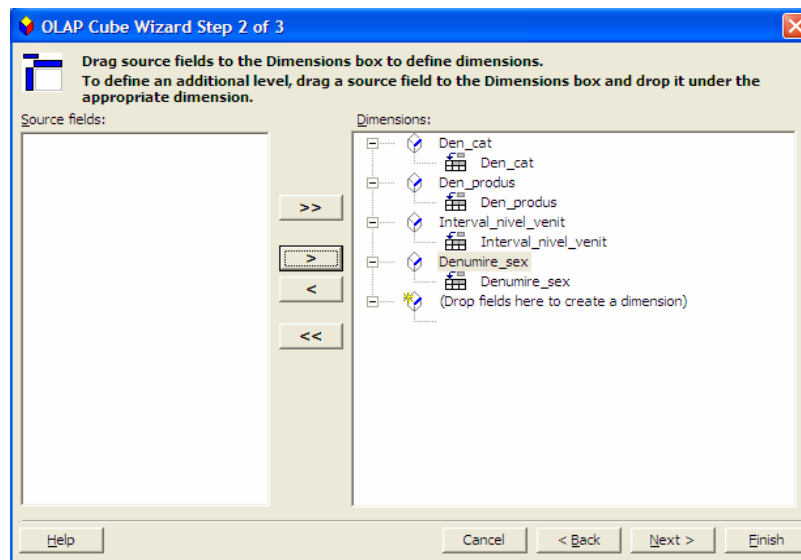


Figure no. 10 – The transfer of the aggregated fields in the cube dimensions

Returning to the Excel sheet, we can distribute the cube dimensions on rows and columns, taking into account the fact that the pivot field (the sum of all invoices' values) must be distributed into Data Area, determining the dissemination of the sales on four aggregated dimensions (the products' categories, the products' names, the intervals of customers' age and their education level). The pivot table opened in Excel sheet allows a lot of analysis for the entire values domain of the dimensions or selecting several values, according to the user's specifications. (figure no. 11)

The OLAP data can be shown only as a Pivot Table report and not as a external data zone, but these reports can be saved in patterns, generating the creation of Office Data Connection (.odc) files in view to connect to the relationship database by means of query files (.oxy). The aggregated fields of OLAP cube can improve the response time to the users' requests because the response to an OLAP query exits before the request is launched. A great number of aggregations determines an efficient response, but requires an important storage space.

| Den_cat | Den_produ | >1100 RON | 0-299 RON | 500-699 R | 700-899 F | 900-1099 RON | Feminin Total | Masculin | Masculin Tot | Grand Total |
|-------------|---------------------|-----------|-----------|-----------|-----------|--------------|---------------|----------|--------------|-------------|
| LOW MEDIUM | ENJOY SUMMERTIME | 995 | | 796 | | 498 | 2289 | | | 2289 |
| | SUN AND SEA FOR ALL | | 298 | | | | 298 | 447 | 447 | 745 |
| LOW MEDIUM | Total | 995 | 298 | 796 | | 498 | 2587 | 447 | 447 | 3034 |
| PREMIUM | SUNSHINE GOLD | 1196 | | | | 498 | 1694 | 598 | 1196 | 1794 |
| | SUNSHINE STAR | 698 | | | 698 | 698 | 2094 | | 1047 | 3141 |
| PREMIUM | Total | 1894 | | | 698 | 1196 | 3788 | 598 | 2243 | 6629 |
| Grand Total | | 2889 | 298 | 796 | 698 | 1694 | 6375 | 1045 | 2243 | 9663 |

Figure no. 11 – The multidimensional analysis of the hotel services packages sales using OLAP technique

Conclusions

We consider that the multidimensional analysis applied to the information gathered in the SQL Server database provides a real support for the marketing managers responsible for the business development focalized on profitable customers, in the constraints imposed by e-business. The OLAP technique emphasizes the interdependences between the different variables of a CRM information system, focusing on the promotion of the customer value. This data organization method helps a Pivot Table report to realize the dissemination of sales on the segmentation criteria specified by the software's user.

The marketing databases offer numerous opportunities to manage efficiently the information about customers from a hotel and to create links between its components, providing answers to some questions like: what is the average expense of each customer to acquire the hotel services packages?, what is the acquisition

frequency?, what type of hotel services packages the customers prefer?, which promotion techniques have a strong impact upon the customers targets? etc.

The originality of the CRM software design consists of the realization of the interconnections between concepts like Marketing Intelligence, Sales Automation and Online Communication Support, which allow ulterior improvements using data mining and data expanding techniques.

The OLAP systems allow to the analysts and marketing managers from a hotel to improve the sales performances, by means of a fast interactive access to a great number of data reports efficiently managed.

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