

# Visualisation of CRM Reports and Indicators in the Electric Power Supply Enterprise

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## Summary

The paper deals with the efficiency of CRM concept implementation and its integration with other systems in the organization that are mutually functionally associated. Activity of a power supply enterprise with complex requirements in the process of consumer relationship management (CRM) is chosen for analysis. Attention is focused on the advantages of the visualization of CRM reports and indicators for this kind of specific activity. The role of software tools is specially studied as very important, because it provides support in realizing analytical and visual techniques used in CRM data processing.

## Key words

Consumer relationship management, information and communication technologies, CRM strategies

## Introduction

Business strategy implementation uniting the focus on the consumer, redesign of functional activities and business processes re-engineering, supported by CRM technology (Lee) is a paraphrase of the definition often cited for consumer relationship management (CRM). In accordance with the cited attitude, it is obvious that an organization's development strategies represent the prerequisite for successful application of CRM concept. Significant domination of information and communication technologies in the sphere of business is shown especially in integral solution development, which also includes CRM. Information technologies are used for systems design through the organizational functionalities. Such a system integrates and automates the organization's business processes through sale, marketing and consumer services which are in interaction with the organization's consumers. It can be said that technology itself does not enable competitive advantage, but it certainly represents the condition for any network business. However, automated activities, obligatorily supported by technology, if properly selected and associated into a functional system, can provide competitive advantage.

Tools such as information technologies and software solutions make the superstructure and integrative component for successful implementation of CRM strategies. Specific activities and complexity of business processes, which characterize some organizations, reflect on business strategy as well, and therefore on the

choice of CRM systems. Electric power distribution enterprises probably belong to this group. The dynamics of business processes of these organizations require a serious approach to CRM implementation and its connection with both internal and external business environment. Some of the key indicators of CRM and report visualization will be considered below in one specific sector, such as power supply enterprises.

## 1. Specificities in Power Supply Activity

"In addition to the problems related to power distribution, all power distributors share the common and permanent problem of monitoring, accounting, collection, and consumption management of the energy that is distributed. Nevertheless, the greatest problems occupy power supply enterprises because they have the largest number of consumers, the longest and the most ramified network, and it is a well-known fact that electric power requirements change most dynamically (annual consumption increase amounts to 10 to 15%). At the same time, electric power is specific because it cannot be accumulated and stored. Electric power which is spent must be produced permanently and supplied to the network immediately after consumption by means of generators. The aggregate power of all generators in a national network is limited, regardless of its capacity. There are time intervals when electric power requirements are so extreme that generators are no longer able to service all consumers, which usually leads to restrictions in electric power

supply. However, it would be desirable for electric power supply enterprises to be able to manage independently the flows of electric power delivery on the territory they cover, especially in critical cases of shortage, as well as in cases when there is electric power surplus. For that purpose, it is necessary to know well all the dimensions of consumers' behavior and needs, anticipate their future activities in order to meet their requirements, and also increase the enterprises' profit.

Income increase of electric power enterprises is closely connected with the payment of consumed electric power, and it directly depends on customers, i.e. electric power consumers. Familiarizing with and monitoring the consumers require a new paradigm in the functioning of an enterprise, which must permeate its entire functioning: from the behavior of the window staff and workers employed in electric power network maintenance and extension, through acquisition, tracking, data processing and storage, to acquiring new knowledge about requirements and trends of consumers' demands based on collection of historical data on all forms of business activities. Such a change in philosophy of the enterprise can only result from introducing new forms of strategy into consumer relation management" (Petković, 2007b)

## 2. Major Fields for Successful CRM Functions in Power Supply Enterprises

CRM is usually described as a process (Peppers & Rogers) consisting of four substantial steps:

- consumer identification;
- differentiating consumers according to their needs and importance for realizing the organization's objectives;
- interaction with consumers in the way which improves cost efficiency and interaction efficacy;
- forming products and services offered to some groups of consumers based on what was 'learned' by interaction.

The idea of CRM is to help business in creating values and increasing consumer satisfaction, using technology and human resources, which can be reached by:

- providing better services to users;
- developing efficient call centers;
- helping the sale staff;
- increasing income from consumers.

CRM for electric power supply activities should include the following basic elements:

- business objective;
- business strategy;
- offered value; and
- the most important data; in regard to the defined business objectives.

Definition of the CRM business system objective must have three basic characteristics:

- measurability;
- temporal limitation;
- orientation to consumers.

A business objective, whether simple or complex, is surely connected with a problem in the organization and it is impossible to define it always in a simple way. It is often said that problems or requirements associated with CRM systems (and business intelligence systems, too) are almost never well defined. The 'hard' systemic approach to information systems development cannot be successfully applied here. Scatter plot modeling (design resulting in the conceptual level of data models) enables the formulation of business goals or key performance indicators based on 'soft' business requirements in the information language.

An appropriate and well-defined business objective could be: 'Increase in collection rates for electric power consumption on the territory of the electric power supply enterprise by two percent annually over the next two years'.

Business strategy and offered values are closely connected elements of the development study. Here, business strategy means a range of organized, harmonized and synchronized procedures for attaining business objectives. These procedures should certainly be in accordance with the offered value of the organization.

From the standpoint of the offered value, organizations can be classified into three categories (Todman, 2001):

- closeness with consumers;
- leading products;
- operative perfection.

Organizations in the first category test and track the needs of their consumers and try to approach and satisfy their consumers personally and individually. The style of serving and skilled staff result in the fact that these products are fairly expensive. Their consumers are, however, ready for additional cost because they experience such service as new and enriched quality of life.

Enterprises with leading exclusive products provide their consumers with such positions. They are innovative organizations with recognized brands investing much in research and development of new products, and that is the reason why their products are also expensive. The people who like the worldwide-recognized brands and elegant, exclusive products will become consumers of these enterprises.

Operative perfection characterizes organizations which are fast and efficient in servicing their consumers. Their products and/or services are cheap, and they often give considerable discounts for their goods, but on the other hand, their products and/or services are unsuited to some consumers, and offer no after-sale support.

Organizations cannot be always classified exactly into one of the listed categories, but, in most cases, based on the characteristics of offered values they nevertheless belong to only one category. There are such enterprises that are strong in two categories, but it is not a frequent occurrence.

The electric power supply activity falls into the third category based on offered value, i.e. based on its main function: large-scale supply of electric power. According to this, two basic fields for successful realization of the CRM function can be differentiated:

1. technical (operative) perfection by which consumer satisfaction is attained; and
2. financial and business results.

### 3. Visualization in Some Fields

The review of CRM functions and reports obtained by the application of business intelligence techniques to data relating to consumer relation management is usually illustrated in the graphic representation as well. One view of the visual result presentation is worth more than the pile of number values (one look is worth more than a thousand of words). By visual presentation, results of the analysis and indicators are illustrated in a simplified, more understandable form, which provides faster interpretation, easier understanding and faster reaction to changed values.

For the visual presentation of financial and business results, in principle, we use the tools for graphic representation of groups of techniques of business intelligence, which are applied in the analysis: data mining, OLAP analysis and statistical analysis. All known statistical tools for CRM data processing usually include the three above listed

groups of business intelligence techniques. OLAP analyses point to historical ‘trends’, time series in developing values of selected indicators (Figure 1).

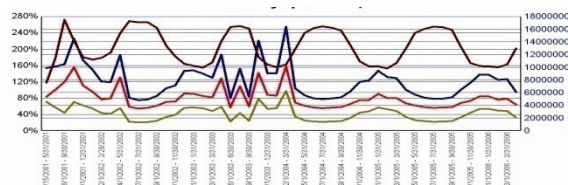


Figure 1 Time series analysis of electric power consumption

“Figure 1 illustrates four curves: electric power consumption according to the higher rate (red color), electric power consumption according to the lower rate (yellow-brown-khaki color), aggregate consumption (blue color) and the proportion of expensive and cheap electric power (brown) for marked accounting periods on the x-axis. Two marked ordinate axes exist on the graph: the right axis shows the quantity of consumed electric power and it applies to the first three curves; the left one includes proportional values for the fourth curve (Petković & Balaban, 2008).”

Data mining realizes data clustering (Figure 2), and it also shows the causes of trends articulated by means of OLAP analyses in order to help in making timely and right decisions.

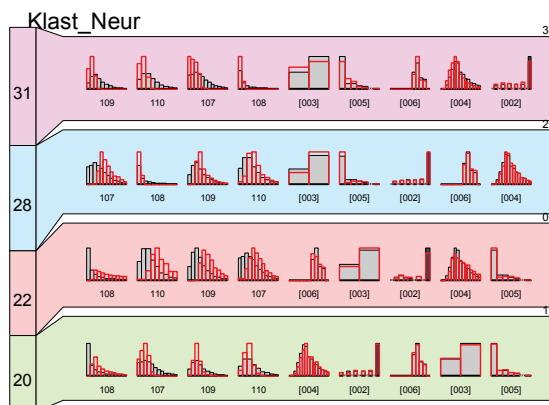


Figure 2 Results of neural network cluster analyses (Petković, 2007a)

Statistical analyses can point to the importance of value deviations from a taken or calculated mean value (Figure 3). These techniques of visualization illustrate trends, causes of appearance of these trends and the importance of value deviation from the desired or average value(s).

The previously described form of the visual presentation is not appropriate for presenting the current values of critical (key) parameters of technical functioning of the electric power system. In case of the raised temperature of the

transformer oil, for instance, one should react at once. Visual presentations of parameters of the technical system are usually based on the instantaneous data acquisition, i.e. current values, and dashboards are used for their presentation. They include several key indicators of the technical system for electric power distribution on the display, primarily for businesspersons who are not versed in information technologies. Colors are also applied for the graphic representation of parameter values; green – for the parameter value in the limits of normal (acceptable) values; yellow – for the values outside optimal, but still acceptable set of values, and red – for alarming values (Figure 4).

| Variance analysis |              |    |              |    |          |          |
|-------------------|--------------|----|--------------|----|----------|----------|
|                   | Between      | df | Inside       | df | F        | mean.    |
| Aver. temp.       | 1.834452E+03 | 1  | 1.707461E+03 | 45 | 48.34683 | 0.000000 |
| Aggr. cons. HR    | 2.517258E+13 | 1  | 1.056728E+14 | 45 | 10.71956 | 0.002043 |
| Aggr. cons. LR    | 2.310071E+13 | 1  | 3.694684E+13 | 45 | 28.13588 | 0.000003 |
| Aggr. oblig.      | 1.231282E+15 | 1  | 8.787631E+14 | 45 | 63.05190 | 0.000000 |
| Aggr. paym.       | 6.430206E+14 | 1  | 9.926522E+14 | 45 | 29.15012 | 0.000002 |

Figure 3 Statistical analysis – “K-Means” cluster analysis (Petković & Balaban, 2008)

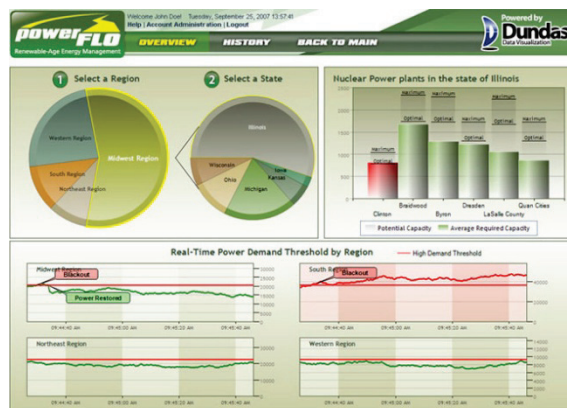


Figure 4 Monitoring electric power plants load in the USA

Dashboards and scoreboards have developed into software suites with the following components (Petković, 2009):

1. monitoring;
2. analysis;
3. graphical representation of:
  - tracked data by means of monitoring; or
  - reports of completed analysis.

Dashboards and scoreboard can be generally classified into two groups:

1. independent boards (including monitoring, analysis and reporting);
2. rebuilt dashboards (illustrating results of already known BI solutions).

#### 4. Conclusion

In the analysis of key fields important for successful CRM functions in electric power supply enterprises, all the elements of business strategy are included, as well as offered values and representative data in relation to business objectives that should be realized. From the standpoint of the main function of these enterprises, relating to large-scale character of electric power distribution, CRM successfulness can be viewed through (a) technical and operative activities providing consumer satisfaction, and (b) business financial results.

Efficiency of business activities is increased by the use of CRM graphic representations. Visual presentations are clear and understandable, and deviations and essential shortages in analysis are more obvious. However, there are situations when visual presentations are not the right solution because some deviations from set parameters need a prompt reaction. Software tools include a broader spectrum of business intelligence techniques and show good results in CRM data processing. Special emphasis should be placed on the importance of data clustering (data mining) and decision-making process by OLAP tools. Orientation of organizations to the implementation of CRM strategy, together with technological support and appropriate software solutions, which rely on business strategy, provide business competitiveness, consumer satisfaction, i.e. achievement of defined goals and a successful, customer oriented organization.

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