INFORMATION MODELS OF CUSTOMERS IN CRM AND E-CRM SYSTEMS

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Abstract: The following article deals with customer personality in the CRM systems. Its innovatory approach consists in the method of segmentation performed according to one of psychological factors - personality. The analysis is based on the assumption that the class of customers can be divided into separate types. This is possible due to the preservation of a large internal homogeneity within every type (homogeneous groups) and a considerable differentiation among types. The article argues that the classification of customers should be based on the criterion which has an essential influence on their behavior. Such a criterion is the customer personality. Accordingly, this division can make up a good basis for the CRM strategy: 1) the elaboration of several diverse scripts of the customers service suitably to distinguished groups; 2) the individualization of the service. It can be concluded that such a modeling will allow to supplement the CRM programmes with a module of an individual and institutional customers practical service.

Keywords: CRM, customer's personality, information model.

ACM Classification Keywords: K.6 Management of Computing and Information Systems - K.6.0 General Economics

Introduction The role of a customer at organization

Till the 1990s , the core interest of the organization in endeavour to the achievement of the profit, was a product [Tiwana, 2001a]. It has been recognized that the product is insufficient to compete on the market. Organizations began to perceive the customer's role. Recently, the customer has become the most valuable commodity, organizations strive for. It was noticed that the success of the organization depends on the individual approach to the customer, the building of a solid bond with them and the effective process of mutual communication [Lotko, 2003].

One of the main objectives facing the organization is building a bond with the customer. The relation with the customer makes up a process consisting of three phases [Mazur, 2001], [Tiwana, 2001b], [Kralewski, 2001] all of them aiming at the exchange of supplies between the organization and the customer.

The initial phase is winning over new customers and reaching new groups of customers applying suitable relation strategies. The next phase is improving and deepening relations with customers, working out the profit growth strategy and maintenance of the relation. In the final phase the signals foretelling breaking the relation are recorded and analyzed and preventive actions are taken to maintain the customers.

Long-term relation with customers depends on the rightness of management addressed at them as well as the proper selection of workers and tools. Such a management covers the analysis of the customers' real needs, collecting the information about them, disclosure and the circulation of the information about their needs and preferences. Management should result in proper functioning of the things, organization and people in accordance with the aim of the manager. It requires solving problems and decision taking regarding matters of various degree of complexity and diverse time horizons.

Managing customers relations means steering contacts that is planning, building, coordinating and controlling them. In other words, management is connected with meeting customers' expectations through getting to know and understanding their needs, using the knowledge, improvement of communication, offering the customer the product others do not have, building a bond between the company and the customer.

Gathering data from various sources aims at finding out clients' needs. Thanks to those data, a complex knowledge of the client is being created. The customer profile is formed on the basis of that knowledge. It is necessary to keep the profile's integrity through systematic collection and updating the data. Understanding customer needs is not easy and requires analysis. On a mass scale, it is usually done with the help of of Bussines Intelligence tools, segmentation and behaviour patterns. In the personalized view, the analysis of the profile is used and the observation of the most valuable customers. Contacts with the customer, questionnaires etc. contribute to the analysis of their preferences. All individual data about the customer are the foundation for starting personalization processes, and consequent actions aiming at tightening the customer's relation with the company. Improvement of the relation management follows together with the increasing number of essential data in the profile.

The individualization of the mass customer service, the minimization of costs connected with the customers service, the assurance of the customers loyalty are the main objectives in the customer relation management [Dejnaka, 2002].

Long-term maintenance of clients is, at present, the main objective. To reach it, works on creation of the suitable system began. As a result, certain customer relation management systems emerged.

The systems steered toward a customer

Customer relationship management (CRM) is a customer-focused business strategy that dynamically integrates sales, marketing and customer care service in order to create and add value for the company and its customers.

CRM consists of the processes a company uses to track and organize its contacts with its current and prospective customers. CRM software is used to support these processes; information about customers and customer interactions can be entered, stored and accessed by employees in different company departments. Typical CRM goals are to improve services provided for customers, and to use customer contact information for targeted marketing.

Knowledge about customers is consistent with this CRM. One of the most important features of CRM is satisfying the customer delivering him proper contents, products and services. Such an approach shows that the customer is an individual recepient who should feel as someone exceptional.

Accordingly, building knowledge about customers and propagating it at the company is the long-lasting and arduous process. However, it can bring quick effects with small costs. It requires the continuous process of learning. It is an important feature of correctly designed and realized approach to CRM in a company. Thanks to continuous winning knowledge about customers, the organization can continually outdistance the competition. It also allows to almost individual treatment of every one. It lets fit offers and ways of service to needs and the customers preference, and also conceal offers and ways of the working from the competition.

The existing systems of the CRM have the customer „flat model". The necessity of the development of the personalization of contacts (offers) is connected with the extension of the multidimensional profile of customers types. In particular, these models characterized customers according to real decission behaviours with omission of causes of such decisions. So well-founded and leaning on scientific bases of assembling criteria were lacked. Because of that there is the necessity of the investigations of possibility of wide-ranging characterizing the customer model.

The informative model of a customer

Researching and analysing the customer behaviours, ecomists in the modules of the systems of CRM class describing a customer, took into consideration general information (Id), preferences (Pr) and a value of a customer for the company (W). After some time, it turned out that not only these factors influenced the customer decision relating to a purchase. The essential meaning of psychological factors was perceived. Personality, the style of life, motives of a purchase, a susceptibility to risks, a creativity. further called („psychological factors" was redefined and replaced with the term) „personality".

Accordingly, the accomplished analysis [Stasieńko, 2007] of the individual and institutional customer allows to accept the thesis, that the personality favours him. The acquaintance of the customer personality plays an important part in the case of winning of the customers, building a relationship with them. However, an influence whether a customer buys a new product, uses new service, or not, depends on different psychological features, such as a susceptibility to risks and a creativity.

The personality influences information which are received from outside. For the reason
 not only psychologists are interested in this but also marketing experts, programmers or designers of informative systems.

In the result of investigations [Stasieńko, 2007] the customer model was widen with a customer personality and it takes shape of:

$$IMOK := < Id, W, Pr, Os > \hspace{3cm} (1)$$

where   Id - general information,

W - the value of a customer for a company,

Pr - the preferences,

Os - the personality.

The model of the customer personality was constructed to reveal the profile of the customers personality, both individual and institutional and it has to serve in improvement of the service within a system of the relationship management with customers at the organization. They consider an individual customer (MOKI) and an institutional(MOKIS) separately.

The model of individual customer personality (MOKI) which is described with a relation, (2) is defined as an arrangement of four features: temperament, susceptibility to risk, creativity and personal culture.

$$MOKI := [T, R, In, Kos] \hspace{3cm} (2)$$

where   T - Temperament,

R - Susceptibility to risk,

In - creativity,

Kos - the Personal Culture.

The model of the institutional customer (MOKIS) *personality* also takes into account four variables: the dynamism of the organization, its susceptibility to risks, creativity and organizational culture:

$$MOKIS := [D, R, Ins, Ko] \hspace{3cm} (3)$$

where D - dynamism,

R - susceptibility to risk,

Ins - creativity,

Ko - the organizational culture.

Comparing models MOKI and MOKIS one can perceive certain analogue and the general model of the customer (OMOK) personality can be emerged which can be defined by the dependence (4):

$$OMOK := [Dn, R, In, K] \hspace{3cm} (4)$$

where

Dn - the Dynamics

Dn = (T, D),   T - Temperament,

D - Dynamism

R - Susceptibility to the risk

In – Creativity

In = (Ind, Ins),   Ind - the individual customer creativity

       Ins – the institutional customer creativity

K - culture

K = (kos, Ko),   Kos - personal culture,

       Ko - the organizational culture.

The model of Opposite (lub Opposing) Values (MoWaP)

The models mentioned above suggest the necessity of finding a method of the division of complex community of the customers on homogeneous subsets with identifying opposite values. In the model of the opposite values (MoWaP) [Stasieńko, 2007].

In case of the two-dimensional model the solution consists in indication of two features describing the considered problematic area. In considerations over the customer personality two features were distinguished together with their extreme values They are: the interest in the surroundings and the way of the receiving of information.

In the studied space the model of the customer personality was divided into four quarters (Fig. 1). One of the axis - the axis X - the direction of perception and energy steered towards the world, the second - the axis Y - the way of receiving the information.

The axis X on the one pole assembles the values of extraversion features - emphasizing susceptibility to elasticity, risk and extraversion, dynamism (E); on the second - stability, caution, introversion (I). It means that there are customers who do not fear changes, adapt to them quickly and have large cognitive needs (E). From the other side there are careful customers in making a decision relating to new products and they are stable in their choices (I).

The axis Y includes values which describe customer communicativeness, their openness on advice, different prompts in making the decision, on supporting his arguments without a regard on circumstances and on low (U) or high cognitive needs (F).

MoWaP became a tool of customers segmentation. The extreme values of distinguished two features of the personality divided customers community into four definite types (fig. 1) and gathering of customer personality, which was not successful in qualifying. Every part received own name describing the most characteristic features of a customer. They were gathered from the literature relating to behaviours strategies [1]. Five types of customers were distinguished: UI – an OBSERVER, FI - CONSTANT, FE - EVOLUTIONARY, UE - DYNAMIC and a NONDEFINED type.

The left bottom quarter of the drawing (UI - an OBSERVER) distinguishes a careful customer, observing and copying developmental customers, slow in making a decision, a litlle bit active, acting without hurry, methodological, having small cognitive needs, although stable and loyal.

The left upper quarter (FI - CONSTANT) assembles careful customers, recognizing own rights, with large self-control, sedate and loyal.

The right upper quarter (FE - EVOLUTIONARY) describes the elastic customers who do not fear new challenges likes risk and novelty, with optimistic attitude towards the external world, making decisions quickly, with large cognitive needs, adjustment, independent, with the strong personality. However, they tend to be abrasive and they change their minds with obstinacy.

The right bottom quarter of the drawing (UE - DYNAMIC) presents open customers on new challenges, elastic in relation to susceptibility to risk, with optimistic attitude towards the external world , havings however small cognitive needs, they are educated, believing in their possibilities and skills, they are self confident. These customers, because of the large dose of energy, can appear less loyal.

The centre (NONDEFINED) accumulates the customers who were not successfully unambiguously classified

because of various reasons, for example because of the divergence of variables value (THE TEMPERAMENT - melancholic, interest in the external world - low (introvert), high susceptibility to risk and creativity). these are the subject of farther investigation of personality.
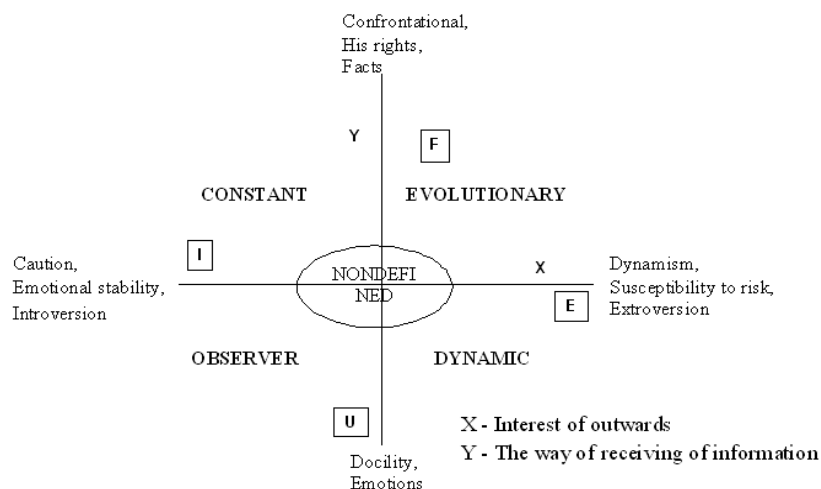
Figure 1. Model of customers division

MoWaP makes the division of customers community to distinguish homogeneous groups. It allows to build the common strategy of customers service within every profile and the differentiation of the strategy of the service in various groups.

The STRAT-SE module

The theoretical model of segmentation customers became the basis to build the STRAT-SE module supplementing CRM systems with the auxiliary tool in the range of recognizing individual and institutional customers, their psychological figure of customers and building on thie basis of the rational strategy of their service .

The structure of the module

To illustrate STRAT-SE - an expert system simulating the human reasoning process. was built on the basis of the OMOK and MoWaP models. The basic function of the module is to support of the CRM system in the range of the analysis of individual and institutional customers and to build the schedules of the service.

Basic tasks of SE are as follows:
 * cognition of the customers personality and attributing each of them to the definite class in relation to the personality,
 * the choice of the worked out strategy of the customer service.

STRAT- SE is built from two process units. First defines the customer changing personalities, the second - makes his segmentation, that is it classifies one of the customer five personality types.

The structure of STRAT-SE is placed in standard SE which contains [Stefanowicz, 2002]: the dialogue module (user interface) - the user services, the "knowledgebase", the knowledge engineering.

The function of the user interface is to present questions and information to the user and supply the user's responses to the inference engine. It allows for co-operation and communicating the customer with the system. After preliminary announcements, linking the contact with the customer, the module represents the pattern of the description in the shape of a questionnaire which contains the series of questions relating to customers personalities. The questions were drawn up in the form of closed statements. The answers are given by the customer are the facts consisting in the entrance vector, which for STRAT-SE, makes up the basis to the beginning the process of the analysis of the customer psychological figure. After answering all questions from the

pattern, the system gives the values of variables and the type of the customer personality.

The knowledge gathered about the customer is written down in the figure of rules. "knowledgebase" is divided into two subsets: the base of facts and the base of rules.

The base of facts contains the information in the shape of entry vectors on the subject of the customer personality, gathered on the basis of the pattern of the customer description. Every such vector consists of data which are values of all changing enterings which are included in the OMOK model, necessary to the qualification of the customer personality. It is concluded that, in case of lack of an answer from a customer, the entrance vector is replenished by the organization staff on the basis of the observation of the customer behaviors.

The base of rules contains rules letting to qualify the customer personality on the basis of facts accumulated in base of facts and to execute classifying every customer to one of five formed groups in MoWaP in the consequence. The whole base of rules is divided in two gatherings: the subsets of preliminary rules and the subset of stratification rules.

The experimental module was built on the platform of the skeletal expert system EXSYS CORVID of the firm EXSYS Inc.

The working of the system STRAT_SE leaned on the system called EXSYS CORVID consists in the creation of the automatic and interactive session which copies consultations with an expert – a psychologist in the opinion of the personality and helps the process of the classification .

STRAT-SE describes the process of solving the problem in the shape of rules. The inference engine uses these rules to the automatic qualification which information (facts) is necessary and what will be the result of individual events, and then represents the solution. The system manages the rules which make possible the qualification of customer (his variables) personality and his division according to the principles of the MoWaP model.

The system gives next questions from the frame. On the basis of answers given by the customer, the system generates an answer with the profile of the personality. On the screen changing personalities are shown (though they can be they skipped) and the type of the customer who was settled by the system on the basis of segmentation rules.

The verification of the STRAT-SE module

To review the trial of pilotage introducing of STRAT-SE was undertaken. The main aim was examining the legitimacy of the model.

1. 118 persons were the subject of studies who filled the questionnaire. The questions and the rules of inference in the base of knowledge were worked out according to psychologists hints.

The larger part of studied (98 people - 83%) filled the questionnaire directly in STRAT-SE. Remaining 17% (20 persons) – filled it in the paper version. The gathered data was introduced to the STRAT-SE system SE.

The system qualified the changing personalities of every one from studied, it qualified to what type of the personality the given person can be subordinated to. The results - the type of the personality – the gathered knowledge was passed to these studied people. All studied people could take an attitude to the result passed by the system: accept it or question its legitimacy. 80% persons agreed with the result settled by STRAT SE. Remaining 20% had total or partial (they agreed with some changing values passed by the system) restrictions.

It should be noticed however, that classifying some customers to the different type of the personality, than they judge about themselves, does not disqualify the STRAT-SE system. It can be resulted from the different knowledge on the subject of one's personality.

2. The result in the figure 41% customers described as UNDEFINED should be treated as a signal underlining the necessity of the supplement of the base in knowledge about additional classifying rules and to continuing researches towards the direction of greater depth of the analysis of customers personality by inclusion to the model of more features or enlargement of the number of questions defining THE TEMPERAMENT (in this case there were the most undefined values - the temperament UNDEFINED). This shows the fact that 13 questions

are insufficient to qualify the customer personality. The investigations of the temperament or personalities led by psychologists contain tens questions. The number of questions studying the temperament should be enlarged. THE TEMPERAMENT - UNDEFINED shows the most often on the customer about the UNDEFINED type. Because of that there is so high (41%) percentage.

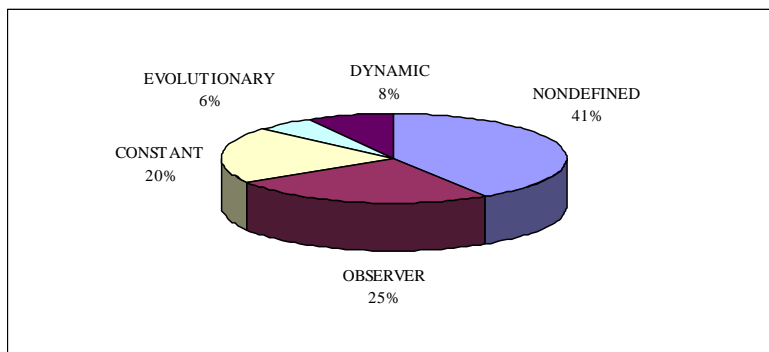Figure 2. illustrates customers studied according to their personality settled by STRAT-SE.

Figure 2. According to the types of the personality in the studied sample customers schedule.

The conclusions were formulated towards the development of the advanced system of the customer service. These conclusions (introduced below) focus particularly on the part of the STRAT-SE module.

1.Conducted experiments on the STRAT-SE module showed that applied in it models made up the good basis to customers segmentation according to the types of their personality.

2. Using of the STRA-SE module showed two main problems:

Difficulty with gathering information about customers: they are not always willing to devote several minutes on the fulfillment of the questionnaire. It is necessary to prepare workers having contact with the customer to their observation and building on this basis the profile of the customer personality.

Existence of numerous groups of customers which have UNDEFINED profile of the personality. It is probably connected with a small number of questions relating to one of changing personalities - THE TEMPERAMENT. Experts formulate tens questions in psychological tests. In the case of STRAT-SE system there are 8.

The application of CeReMOs

After the pilotage results of the tests of the STRAT-SE module, CeReMos application was built

CeReMOs is leaning on the OMOK model which except typical data processed in existing CRM systems appeals to the customer changing personalities.

It is underlining that workers and the owners of a company were satisfied with the improvement of customer service. It confirms one of the main thesis of the work / the investigation, that the theoretical OMOK model can be a helpful instrument, enriching the functions of the systems of customer relationships management.

Three main informative structures were distinguished within CeReMOs: general data, data connected with the personality, the schedules of the service.

The application CeReMOs came into being in the environment of Lotus Notebook. It can function in the conditions of the traditional and electronic economy in relationship with the generality of this software. The possibility of the existence on many equipment platforms and operating systems is the essential advantage of this software.

The conducted introducing works of the application CeReMOs leaning on the model IMOK show that CeReMOs can make up the part of the integrated CRM system of the customer service. It is connected with already existing system which has data about a customer, history of his transaction, orders, accounts, strategy of the behavior etc. CeReMOs can make up an independent module in less advanced systems, in which it takes over the whole management with customers .

Conclusion

To sum up, the aim of every organization playing the essential part on the competitive market, is preservation of financial fluency, winning loyal customers, the assurance of the dynamic development of the company, consolidation of the a good mark, enlargement of the profits and the assurance of the satisfaction among workers. The proposed application CeReMOs goes towards the realization of the majority of these aims. The method of the division of customers (The Model Opposite Value) seems to be obvious, what makes it much more convincing.

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