TOWARDS A SYSTEM FOR MANAGING COLLABORATIVE CUSTOMER KNOWLEDGE

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Keywords: Customer Knowledge Management, System, Socio-Technical Approach.

Abstract: The effective and efficient management of explicit customer knowledge is a key factor for gaining competitive advantages in current business environments. For this we consider the importance of customer knowledge in this paper and possibilities to integrate it into company internal processes. Therefore we develop a customer knowledge management system which we consider from an organizational viewpoint and from the technology side. This socio-technical approach will be presented in the next step. We conclude by suggesting specific areas of research which should be considered important for the implementation of this customer knowledge management system in practice and raise some future research questions.

1 INTRODUCTION

If knowledge is power, customer knowledge is high-octane power, says Davenport in one of his first articles in the field of customer knowledge management. It is widely known that the integration of customer knowledge enables improved innovations that bring a higher customer value and thereby strengthens customer loyalty.

For the achievement of competitive advantages a company internal orientation of activities is not sufficient. In order to reach competitive advantages from the viewpoint of a markt-based organization (Pfeffer and Salancik, 1978) and based on the concept of ba (Nishida, 1970), (Shimizu, 1995), (Nonaka and Konno, 1998) companies seek to create unique competencies through knowledge creation. For the purposes of the paper, following (Li and Calantone, 1998), this includes taking into account the customer knowledge and customer knowledge competency. Therefore instead of Knowledge Management the Customer knowledge management approach is needed which should be organized and is in need of being organized as systematic management work in order to strengthen the innovative capacity of enterprises. In comparison with knowledge management this will also require entirely new methods and approaches.

Following this a central issue facing every organization is how the knowledge of the market and the customer knowledge can be captured and integrated into the companies knowledge base in order to create value through a better understanding of real needs of the customer and finally to gain competitive advantage. Especially customer knowledge as an intangible asset enables a company to influence competition directly and determines a company's success.

The goal of this paper is to present a customer driven process of designing and modeling a customer knowledge management system. At the end this paper summarizes some learnings of the newly introduced customer knowledge management system and will summarize with the next important directions for future work.

2 LITERATURE ANALYSIS

2.1 Customer Knowledge

In literature, there are different meanings related to the term customer knowledge and mostly it is used

without being previously clearly defined. The most relevant and thorough definition of customer knowledge is the classification of (Stauss, 2002) who defines customer knowledge as the systematic knowledge from the customer, about the customer and for the customer (Stauss, 2002).

While most studies and research focus on analyzing and integrating only one or two of the three categories and mostly deal with the two most common categories of customer knowledge, namely the customer relationship management driven knowledge about the customer (Gibbert, Leibold and Probst, 2002), (Lyu, Yang and Chen, 2009) and the knowledge for the customer, this paper follows Stauss (Stauss, 2002) who integrates all three customer knowledge categories in a customer knowledge management cycle with a focus on the management of the knowledge from the customer.

However Stauss (Stauss, 2002) research on this type of customer knowledge focuses rather on organizational human aspects than on how IT can be used as an enabler and under which circumstances the supporting use of information technology is successful. This situation is surprising since it is known that the support of the management of customer knowledge through information technology allows higher efficiency. In face of increasing importance of information technology especially in the context of knowledge management (Riempp and Smolnik, 2007), (Gronau and Fröming, 2007) an improved information technology-supported approach of customer knowledge management is needed which integrates all three kinds of customer knowledge and leads to a new view and understanding of customer knowledge management.

2.2 Customer Knowledge Competency

Customer knowledge competency refers to the relevant processes that capture and integrate the above mentioned three types of customer knowledge into the companies knowledge base. These processes provide customer benefit, are embedded in the organization, are unique to the way they are applied and therefore not imitable for competitors (Prahalad and Hamel, 1990).

Secondly, regarding the ability to create a customer knowledge competency, not much research work has been done that characterizes the challenges that arise in this field. Campbell (Campbell, 2003) proposes a theoretic framework of how to adapt or change internal processes to develop the desired competency. Campbell (Campbell, 2003) follows (Li and Calantone, 1998) and conceptualizes four

components for integrating customer knowledge in company: (1) a customer information process, (2) marketing interface, (3) senior involvement and (4) employee evaluation and reward system.

Compared with Stauss (Stauss, 2002) Campbell's (Campbell, 2003) approach which is applied in five large Canadian firms is enabled with a customer relationship management system (CRM) so that in contrast to Stauss Campbell does involve technical aspects but nevertheless this approach is faced with the following limitations:

- In practice CRM systems have been widely used and implemented by firms for targeted advertising and customer-centric acitivities such as customer service (Hsieh, 2009), (Bull, 2010) to primarily manage knowledge about the customer and that knowledge for the customer is provided. This is, indeed, customer data and information, not customer knowledge.
- In addition CRM sytems are faced with a relatively high level of rigor in terms of information and are not hindered by recording of too much superfluous or redundant information (Bull, 2010).
- Based on an empirical study Rigby (Rigby, Reicheld and Schefter, 2002) demonstrated that nearly 55 % of the CRM projects fail because the biggest challenges and critical success factor is not considered or implemented sufficient that is the ability to access all relevant customer knowledge categories (Ernst, 2001).
- Customer knowledge is defined as the comprehensive customer knowing (Davenport and Prusak, 1998), (Gibbert, Leibold and Probst 2002), (Stauss, 2002), (Silberer, 2007) which primerally requires the integration of the customer's person. The existing research focuses indeed on organizational and technological aspects, but rarely on the customer itself. If the customer as person is not involved into the process the ability of creating customer knowledge competency with the help of the customer and the learning processes which could be enabled through technology will be hindered.
- An essential component of a customer company relationship are good interaction possibilities. It has been found out that the main reason for customers to leave a company is beside a bad service a bad interaction with the company (Hsieh, 2009).

Summarized, the need for a well-defined, systematic and strategic oriented customer knowledge management system which integrates all relevant knowledge categories and supports the powerful customer knowledge competency process is obviously. This allows us to deal efficiently with growing requirements in a complex and dynamic market. When this process is not managed effectively and efficiently referring to an empirical study this can cause important negative effects on innovation activities, strategic orientation and quality aspects as also customer service and time and cost increases.

2.3 Management Implications

With respect to customer knowledge management as a management approach different streams of research exist which differ regarding the organizational orientation, namely internal and/or external orientation of knowledge management, and in addition in focusing on the degree of either human or technical involvement.

In recent years research work in the first group is still dominated from the viewpoint that the focus of knowledge management is put on internal issues (Haasis and Möllenstädt, 2007), (Shu-Mei, 2009) in order to reach productivity and efficiency goals (Probst, Raub and Romhardt, 1997), (Stauss, 2002). The new understanding of customer knowledge management focuses on strengthening the innovative capacity of enterprises. The power of innovation as the target is fairly new, there have been until now primarily objectives such as the above mentioned efficiency goals like cost and quality as it is shown in figure 1:

Using this new definition of customer knowledge management these findings indicate that an internal orientation of companies is not sufficient. In this sense customer knowledge management requires the integrative treatment of internal and external knowledge resources and can not be discussed only from an inter-organizational viewpoint.

Customer knowledge value will be decided and is produced only by the customer! Only the customer itself produces value through externalizing his/her experiences, expertise and familiarity. Since customer knowledge which resides in the customer is strongly connected to the successful development of the companies innovative ability for new products and a higher customer satisfaction, we focus on integrating the external customer view into company and combine it with internal knowledge.

Research work in the second group focus on the

Figure 1: Customer Knowledge Management Goals.

degree of information and communication technology use to make sure the right information is delivered to the appropriate competent person at the right time to enable right decisions. This gains importance while customers do not always know what they want or they can not express correctly their demand so that employees has to propose customer solutions which can be derived from former customer solutions and lessons learned stored in an information technology-based customer knowledge management system. Information technology acts like an enabler and following this in this paper we specifically address customer knowledge trans-fer and creation through information and communication.

It must be said that efficient and effective customer knowledge management requires the integration of both research directions and has to be conceptualized as an integrated approach. Hence the customer knowledge management approach of this paper is a link between the research work of the first group with the second group.

In the following we will describe the prototype of the integrated Customer Knowledge Management (iCKM) system. This iCKM is based and developed on the recommendations of the TOMI-Model (Semmelrock-Picej, 2010).

We start with the presentation of the used technology for system design and implementation.

3 DESIGN MODEL ASPECTS

3.1 Introduction

A major challenge in the field of customer knowledge oriented software system development is to effectively link tools from both directions, human and technology, in order to match customer knowledge with internal organizational needs (Shankar, Acharia and Baveja, 2009). For that an effective and

efficient customer knowledge management system fulfills at least the following func-tionalities:

- Transparency about relevant customer knowledge ("direct knowledge orientation")
- Transparency about customer knowledge experts ("indirect knowledge orientation") and
- Transparency about relevant context ("context or process orientation").

Based on this a customer knowledge management system is a supply chain wide systematic attempt to generate, store and apply customer knowledge whereas this is needed and the system is not limited to inter-firm knowledge sharing, moreover it enables the direct integration of the customer. In addition all activities have to be summarized in this system where every employee is encouraged to add knowledge to further develop the organizational knowledge base.

3.2 Technological Implications

Integranova is a future-oriented software producer who succeeded in introducing the first software system generating complete applications from models with ONME® (Pastor et al, 2001), (Barberá, 2004). As this, the high-tech company is an entrepreneurial organization which seeks to develop differentiable competencies and organizational technology based techniques that provide differentiable value to the customer.

Integranova uses the OlivaNova Model Execution Set of tools (ONME®) to develop Business Applications. ONME® fully supports the MDA-based, conceptual model-centric software development approach. It forms an implementation of the initiative MDA developed by the OMG (Object Management Group). By means of MDA it is intended to develop software systems separating the specification of the system functionality from the implementation of that functionality (Barberá, 2004).

ONME® is the first system that generates a complete and error free application from the Model. In a first step the analyst creates a model of the business process on three different layers (static, functional and dynamic) and as a next step the content of the user interface within the presentation layer. Afterwards the programming machine generates the source code in various languages (C#, JSP/JSF, ASP.NET, Visual Basic) ready for compilation. Applying this method, i.e. developing by means of the model driven approach, has a series of advantages (Barberá, 2004).
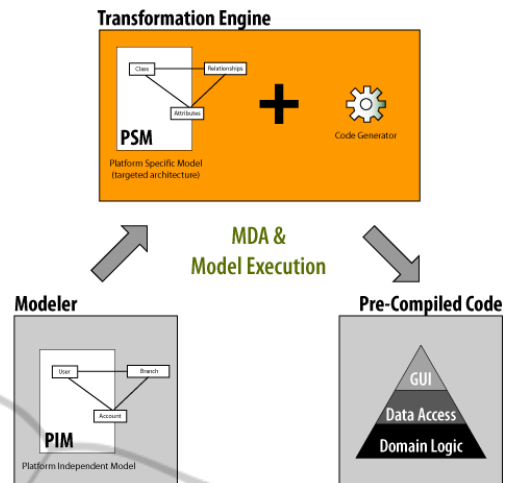

Figure 2: MDA & Model Execution within ONME.

The methodology of MDA (see figure 2) requires the definition of a platform independent model (PIM). First the customer decides on the technology to be employed, adding further information. Then the PIM completes the data into a platform specific model (PSM). These steps establish the transformation into the implementation model (IM) represented in this case as application code. OlivaNova (ON) Modeler allows these operations, furthermore it offers the possibility to construct, edit and validate conceptual models which can be seen as PIM.

The tool provides the following models (Kandutsch, Michael and Semmelrock-Picej, 2010) which allow defining all necessary information to the utmost detail in close collaboration with the customer:

- Object Model: The starting point to specify a conceptual model using the ON Modeler is the Object Model, which gathers the static properties of the information system.
- Dynamic Model: The Dynamic Model gathers the dynamic properties of objects, i.e. the behavior of objects and the communication and interaction between objects.
- Functional Model: The Functional Model illustrates how the execution of events modifies the state of the different objects of the system.
- User Interface or Presentation Model: ON Presentation Model provides the possibility of specifying how the user interacts with the system. This model that is not included in UML distinguishes ON Modeler from other modeling tools in that it allows the analyst to capture user interface requirements.

Mixing those patterns allows an analyst to define the interface of the application that will be generated in an intuitive and simple way.

3.3 Customer Knowledge Competency Building

The developed iCKM focuses primarily on supporting the software development process in order to build customer knowledge competency.

We will present some features of and lessons learned in the use with the implemented iCKM with respect to the framework of Campbell (Campbell, 2003) and the customer knowledge classification of Staus (Stauss, 2002).

Regarding the components "(1) a customer information process" and "(2) marketing interface" the screenshot (see figure 3) shows the part "Knowledge for the customer" of the iCKM system.
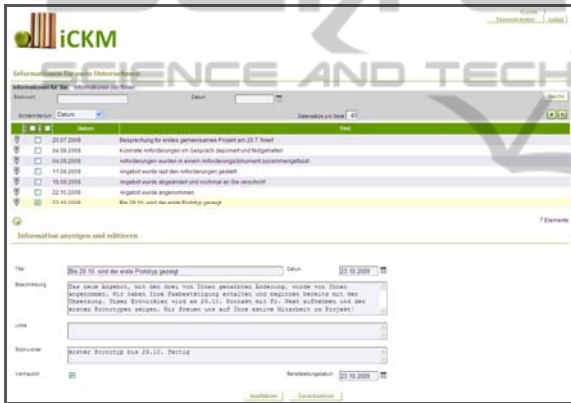

Figure 3: Managing "Knowledge for the customer".

As we can notice iCKM is a customer-company interaction and communication system and a central information point where information and knowledge which is gained or created is documented and stored along the relevant process. The whole interaction process is supported through an organizational culture of a strict documentation concerning every formal and informal feedback or knowledge from the customer and from inside the organization.

The next figure shows the screenshot (see figure 4) of the part "Knowledge from the customer" of the iCKM system.

The customer likes to see the position of the software product in the relevant process so that he can give feedback and recommendations anytime. From the use of iCKM in practice we know that customers like to have the opportunity to provide feedback which directly should flow into the customer solution. And customer's await for a quick
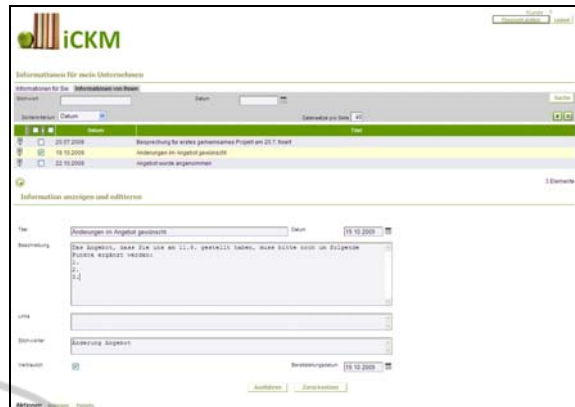

Figure 4: Managing "Knowledge from the customer".

answer. It is important that the other way around knowledge is provided for the customer for communication and targeted activities affecting individual customer's needs.

This allows the high-tech company to provide personalized service and on the other hand the customer feedback gives good recommendations for action. This is the starting point for a single loop learning process in the sense that based on a task after completing this task successfully the task definition is supplemented with the accordingly customer feedback (positive and negative) and supplemented with the gained experience through task execution. The entire knowledge is stored as lessons learned for next projects. These learning processes contribute to customer competency building. Regularly these learning processes are expanded to an organizational level where the tasks and learnings are analyzed and reflected collectively.

It is important to mention that we have recognized that customers need to believe that the system is trustworthy. Therefore on the lower left side the degree of confidentiality of information can be indicated.

Concerning the component "(3) senior involvement" we experienced that the kind of leadership and the role and behaviour of the senior during every software development project ranges from a strong guidance which should be provided by the com-pany's senior leader as part of the customer knowledge creation process to a delegative leadership or the simultaneously application of the opposite leadership stategies in a balanced way (Semmelrock-Picej, 2010) what depends on the concrete project.

Finally, concerning the component "(4) employee evaluation and reward system" we recognize a shift from a notable intra-organizational viewpoint of a traditional economy where incentives are used

for motivation to the behavioural rules conditioned to the knowledge based economy, as Richter stated on the social network XING on 4th of March 2010 (see figure 5):

Figure 5: Use of Incentives in Knowledge Economy.

Knowledge sharing is more than ever a question of personal motivation which is triggered by a high degree of transparency about the ownership of externalized knowledge.

4 CONCLUSIONS

This paper contributes to the research in the area of customer knowledge competency building.

Our approach addresses the above mentioned issues by proposing a customer knowledge management model which takes care of human aspects and organizational aspects and the customer knowledge management goals in a company. This system follows a process oriented approach which helps managing a companies process and the entire knowledge in this process, with special attention to the management of the customer's knowledge.

We conclude that for reaching these goals a customer relationship management approach is faced with a number of limitations.

Therefore, in high technology companies, as presented, the customers's preferences are the focus to be served especially with a technology based customer knowledge management system.

The information technology based system is designed and implemented using ONME® in order to generate cost and time sensitive applications from models. This system acts like an enabler, to support this, some useful learnings from the organizational viewpoint have to be mentioned too, like a structure that is characterized by a low degree of centralization, formalization and an open culture.

The future work will concentrate on information technology based externalization techniques (Semmelrock-Picej and Kandutsch, 2010) in order to support the customer to better express his/her knowledge, needs and wants.

The next research questions concern the value contribution of the gained knowledge to corporate success.

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