Managing Customer Knowledge in the e-Business Environment: A Framework and System

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ABSTRACT

In the current Internet-based business environment, the areas of contact points between companies and customers are expanding rapidly into cyberspace on the Web. Customer knowledge has been recognized as a critical asset for gaining a competitive advantage. Customer knowledge concerns not only customers' needs and transactions but also decision processes and task results of a company. A system needs to be developed to support the process of managing customer knowledge. Therefore, this paper proposes a framework of customer knowledge and its management process. Furthermore, the architecture of a system that can support this process is proposed. A prototype system is built to demonstrate the applicability of the architecture.

KEYWORDS

Customer Knowledge, Customer Knowledge Management Process, Customer Knowledge Management System, Web-based Environment, e-Business

1. Introduction

Recently, commercial organizations have been attempting to expand their business on the basis of the Web-based environment. This environment extends contact points to the cyber customers, and its impact has become increasingly significant to commercial organizations for their business successes. This requires changes of management strategies and task procedures for the management of the contact points, which is conceived as a critical issue in establishing the business strategies of an commercial organization [1].

In this context, CRM (Customer Relationship Management) has put an emphasis on customer-oriented management in the Web-based environment [2]. The CRM needs to gather data according to the customers' purchase decisions and thus develop effective marketing strategies [3]. CRM applications are often developed in combination with data warehousing, e-commerce applications, and call centers based on the Web [4]. These applications focus on providing the information on customer types, transaction, statistics of population, complains, and seceders. Nevertheless, a framework or a systematic alternative lacks in elevating the values of the information.

Customer-centric knowledge or customer knowledge is useful for CRM. Customer knowledge can be conceived as an intellectual asset to achieve the strategic goals of the organizations. Even if all the organizations have same information about customers' trend of preferences or complaints, their responses may be diverse and the customers' evaluations on the responses may also be different from each other. The results of the responses and the evaluations can be useful for similar situations occurred in future. Therefore, the customer knowledge should reflect those valuable results. This knowledge is expected to play an important role in satisfying the customers and retaining them.

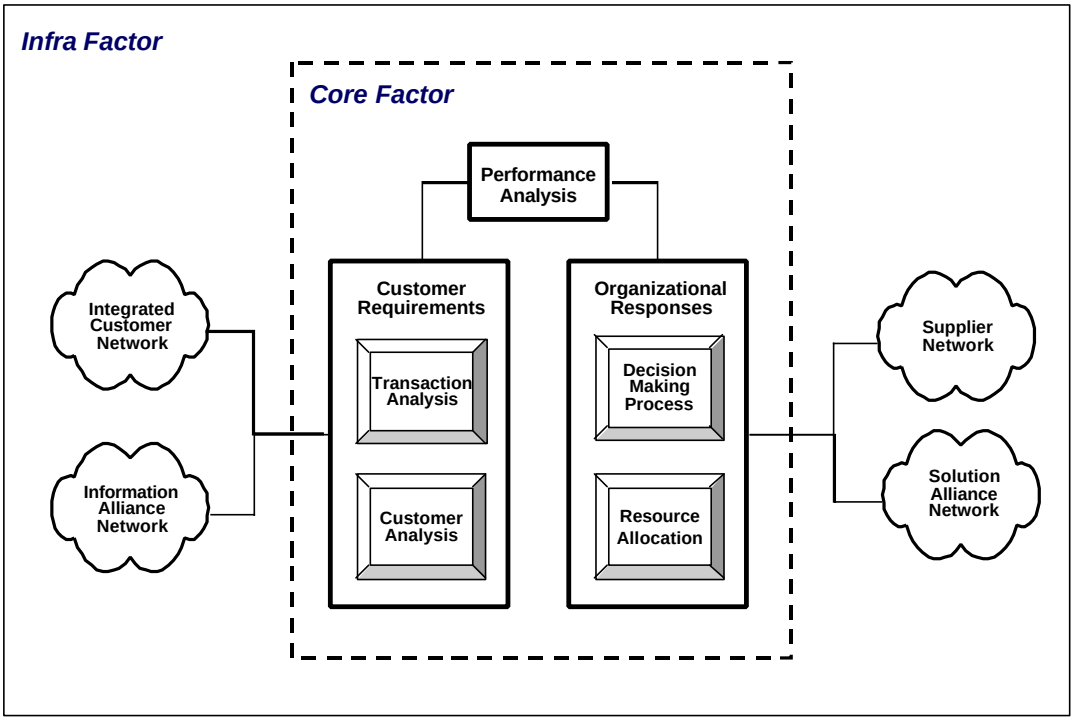
This paper proposes a framework of customer knowledge (Sec. 2), and its management process (Sec. 3.). Then, the architecture of a system for managing customer knowledge is suggested (Sec. 4). Finally, a prototype system

based on the architecture is illustrated to demonstrate the usefulness of the customer knowledge and the architecture proposed in this paper (Sec 5).

2. A Framework of Customer Knowledge

Definitions and types of knowledge have been proposed in a variety of aspects. The value of knowledge can be found in its role in solving problems [5]. From this perspective, customer knowledge can be used effectively for solving the problems concerning on the customers. Customer knowledge can be produced through the validation of its effect on problem-solving.

A framework of customer knowledge is divided into two kinds - core and infra - considering its sources (Figure 1). The sources can be captured in terms of major organizational functions and network infrastructure, related to the customers. The core factor is based on the organizational functions, whereas the infra factor is based on network infrastructure for supporting the processes. Recently, an emphasis has been increasingly placed on the organizational knowledge over the Internet-based infrastructures in terms of e-commerce, intranets, or extranets [6, 7, 8]. The core factor is configured as a structure to utilize the best practices as customer knowledge in terms of customer requirements and organizational responses.



<Figure 1> A framework of customer knowledge

Customer requirements can be captured through transaction analysis and customer analysis. The transaction analysis focuses on the results of transactions and feedback by customers. This analysis considers transaction-related items such as market trend, sales, channel, and benefit. The customer analysis classifies customers, finds customers' potential requirements, and investigates the preferences of target customers. These tasks are important in traditional marketing areas or CRM.

The factor of organizational responses can be considered in terms of decision making process and resource allocation. The decision making process focuses on Who, How, and What in deciding customers' requirements. Even if the same information is given, their interpretation, decisions, or procedures vary depending on the decision-makers, and these differences influence the results of organizational responses. For example, an organization can approach a customer’s complaint in different ways such as an after service or a product change. The resource allocation concerns the use of organizational resources depending on the responsible decisions. Human, budget, and time are the major examples.

Performance analysis refers to the effectiveness of organizational activities for satisfying the customers' requirements. This effectiveness should be measured on the basis of financial and non-financial aspects. Through

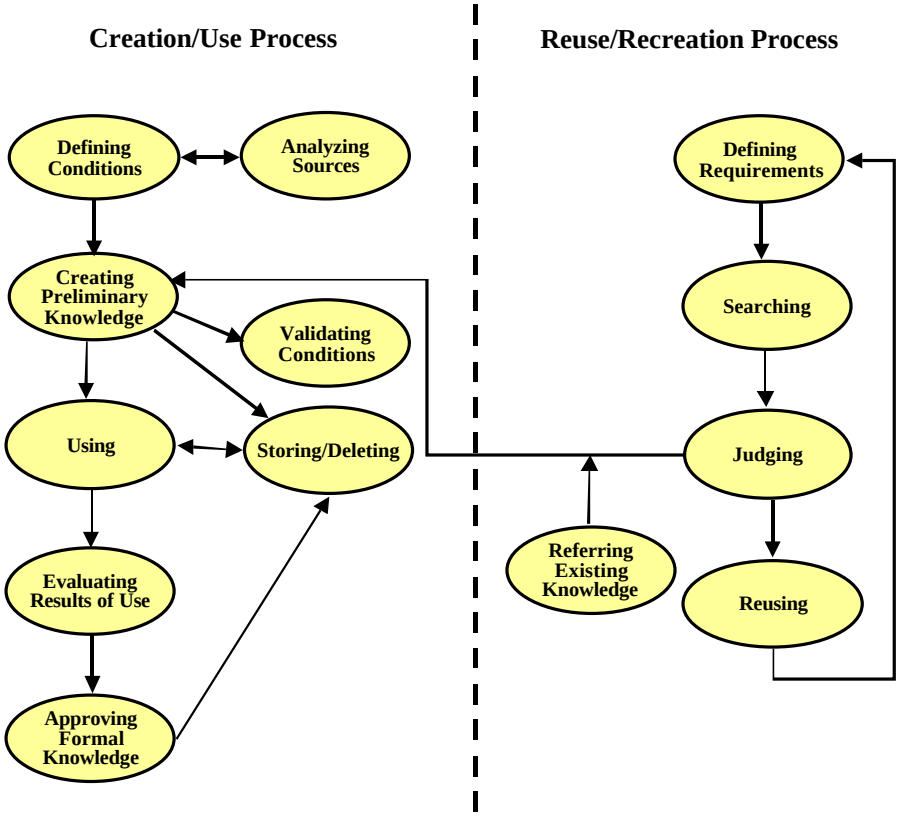
this analysis, preliminary customer knowledge is evaluated and the customer knowledge is finally confirmed and thus created.

In the Web-based environment, customer knowledge can be created from the various sources which include those outside of an organization. The knowledge sources can be divided into two categories: an integrated customer network and an information alliance network. The integrated customer network contains contact points to the customers. In order to obtain effective customer knowledge, various contact points such as transaction channels and call centers are integrated into a network. Furthermore, this network should be integrated with customer databases. The information alliance network provides sources related to the customers' credits, economic trends, or surveys on customers. This network is developed by the alliance with special information providers.

Organizational decisions and resource allocations can be supported through the networks linked to suppliers and alliance organizations. Changes or development of products or services are usually made in cooperation with suppliers' items. Accordingly, in order for organizational decisions to be made timely, communications and information sharing should be achieved through a network linked to the suppliers. This network can provide useful information required for generating customer knowledge. Solution alliance network is required to create and use the customer knowledge that cannot be supported by suppliers. For example, a network channel between a telecommunication corporation and a bank provides sources for creating customer knowledge. Especially, in the area of e-business, strategic alliances are typically implemented by exchanging customer information and services over the Web. The companies can obtain customer knowledge required for their business from the network.

3. Customer Knowledge Management Process

Management process of customer knowledge comprises tasks of creation/use and reuse/recreation (Figure 2). This process can manage organizational knowledge (not limited to customer knowledge), because customer knowledge is a part of organizational knowledge.



<Figure 2> Management process of customer knowledge

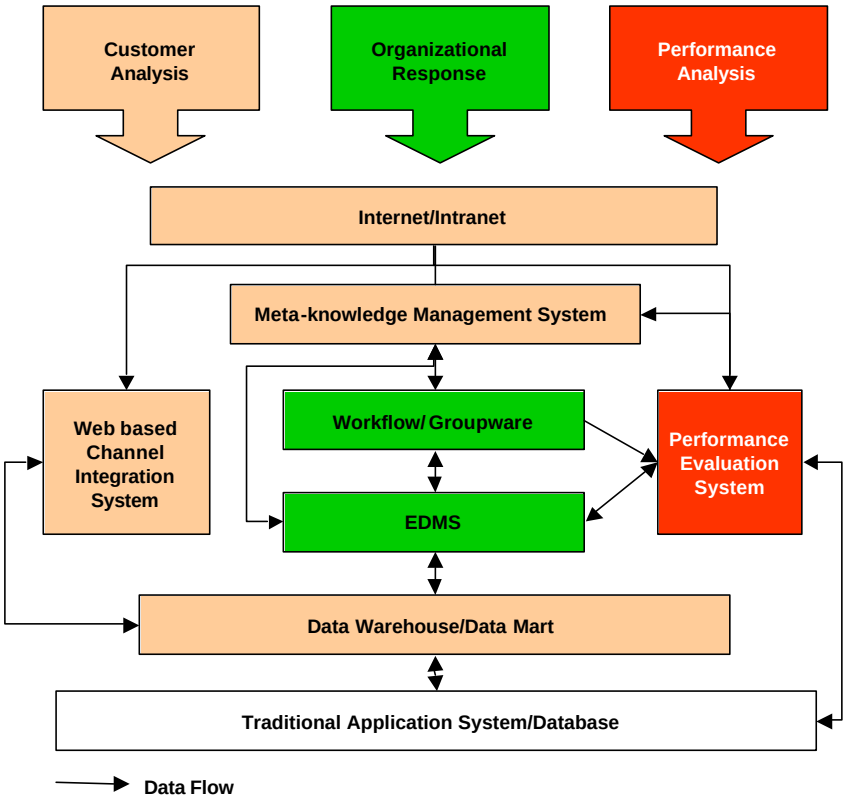
The creation/use process begins with defining conditions such as content, format, and sources required for customer knowledge. Such conditions should be satisfied to become formal organizational knowledge, which can be used effectively on the basis of a supported system. This task is performed interactively by analyzing and mapping relationships with sources. Then, on the basis of the mapping results, the preliminary customer knowledge is created. The preliminary knowledge does not validate its use yet. In creating the preliminary knowledge, implicit sources such as experiences and judgements as well as explicit sources are used. This knowledge is checked if it satisfies the conditions. Then, it is stored in a supported system and used for organizational tasks. Next, the results of using the preliminary knowledge is evaluated by using various measurements such as financial success, accomplishment of organizational objectives, and increase of customers' satisfaction. If the preliminary knowledge is approved as a formal knowledge according to the evaluation, then the confirmed knowledge should be managed separately from the preliminary knowledge.

The recreation/reuse process is performed with the confirmed knowledge. This process begins with defining knowledge requirements for a specific purpose. This task is performed by searching the knowledge which is stored in knowledge base. The search is performed depending on the conditions in defining knowledge. If searched knowledge is appropriate, it can be reused. However, if it is inappropriate, preliminary knowledge is recreated by sharpening the existing knowledge.

4. Customer Knowledge Management System

A Knowledge management system includes groupware, data warehouse, workflow, and knowledge repository as major components. Some researches regard Internet-based technology as a linked component with other KM systems [9, 10, 11].

A system architecture for customer knowledge management is suggested as shown in Figure 4. This architecture includes workflow, groupware, EDMS, and data warehouse/data mart on the basis of standard interface technology with Internet and Intranet. In addition, this architecture contains meta-knowledge management system, web-based channel integration system, and performance evaluation system as core components.



<Figure 3> System architecture for customer knowledge management

For the customer analysis, meta-knowledge management system provides indexes for categorization of customer knowledge, expression guidelines, definitions of knowledge sources, and searching methods. This system defines customer knowledge requirements. It classifies knowledge a definition layer and an operation layer, and link both layers in an efficient manner. As well as defining knowledge, meta-knowledge management system can control groupware, EDMS, performance management system. Other components for customer analysis include Internet/Intranet, Web-based channel integration system, and data warehouse/data mart. Internet technology is used as an interface with customers and the Web-based channel integration system stores customer and transaction data into relevant database in a consistent fashion.

Workflow, groupware, and EDMS are system components for organizational response. Workflow system manages formal business processes. Groupware manages informal communication. In the real business environment, internal and external communications are frequent and difficult to control. Groupware, workflow and EDMS can manage valuable knowledge sources originated in communication process. EDMS stores, integrates, and searches various documents generated in the business process.

In performance analysis, a performance evaluation system is used to evaluate financial and non-financial data. Basically, this system is linked to the financial management system and accounting system for capturing financial data. It also receives quantitative and qualitative data in the workflow system and EDMS. The type and scope of performance evaluation system depend on evaluation requirements and system infrastructure of the company. By the use of performance evaluation system, users can identify, acknowledge, and mange the value of the customer knowledge.

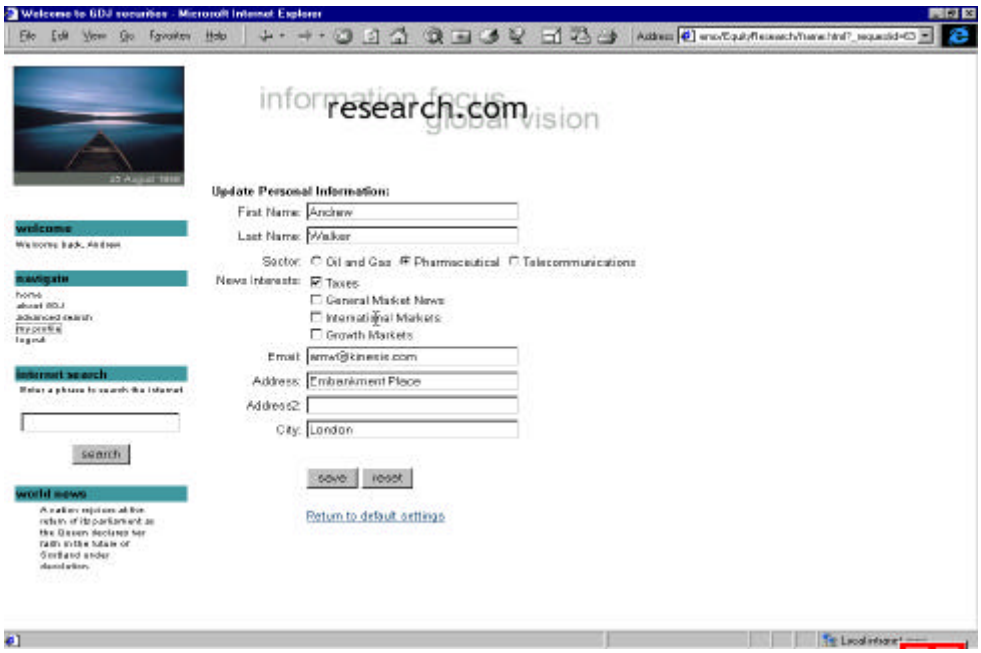
5. A Prototype System for Customer Knowledge Management

This section introduces a prototype system which is developed by P consulting company. The system supports the customer knowledge process for investment banks. Investment banks provide investment information to investors through research process. As on-line transaction increases, relationships with promising customers in the Internet environment have become important. Leveraging capability of investment information to lead customers is a typical purpose of customer knowledge management. This system will be illustrated by focusing on three major requirements (customer analysis, organizational responses, and performance analysis).

5.1 Customer Analysis

As mentioned above, customer knowledge management starts by defining customer knowledge requirements. Various analytical methods can be adopted.

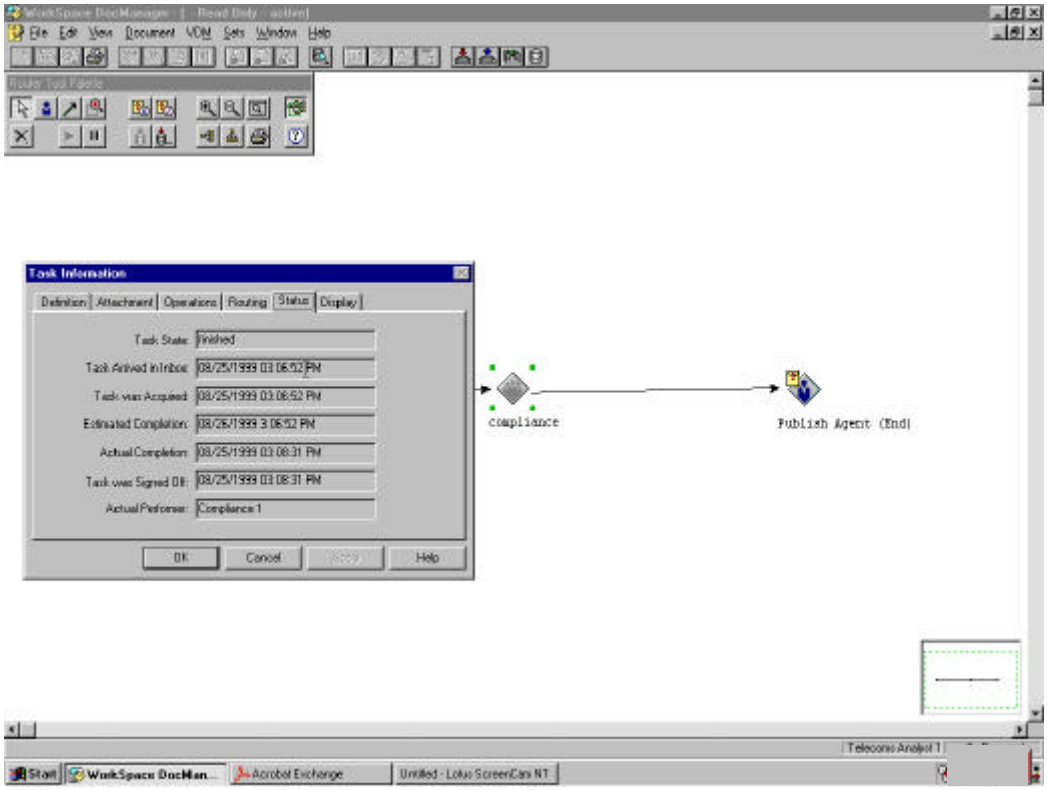
Figure 4 shows a typical example. A company provides a specific items for customers to check their preferences. For example, preferred industry, specific news category, or other concerns may be checked. If the company provides relevant investment information for the customers more accurately, timely and conveniently, it is highly likely that the customers check their preferences. If a customer checks telecommunication industry and new technology information as his major concerns, personalized investment information emerges when the customer enters the site again. As a different way for customer analysis, the company can analyze the activities and required information lists of customers by using interaction log file.



<Figure 4> Screen for checking customer preferences

5.2 Organizational Response

In order to generate and deliver relevant investment information, research process of the investment bank should be revised and monitored. Figure 5 shows a monitoring process by using a commercial workflow system.

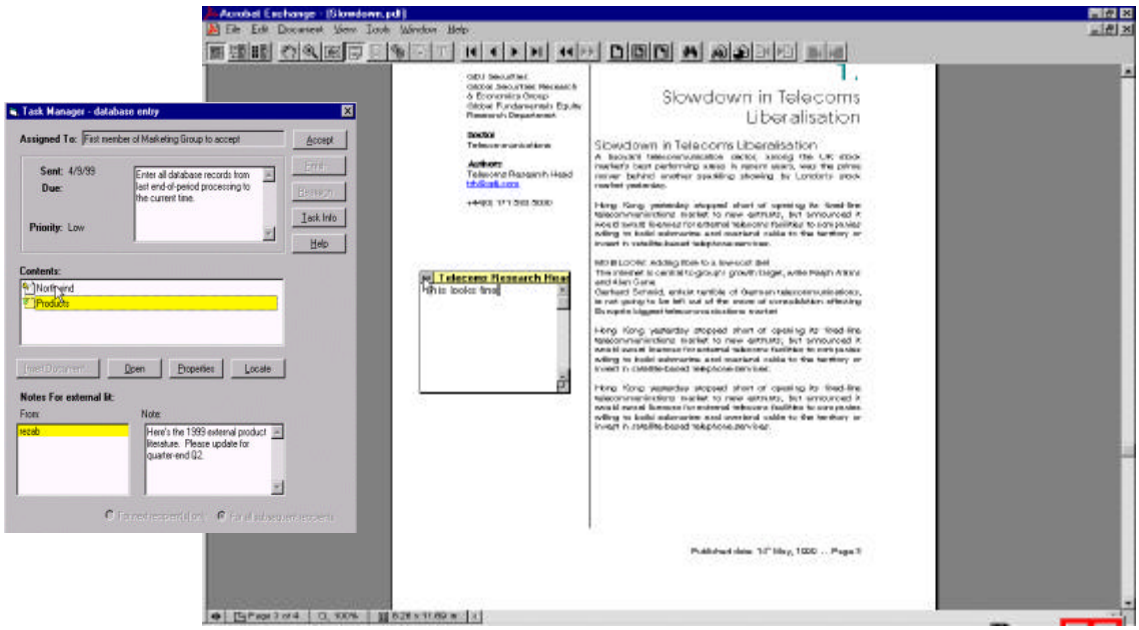


<Figure 5> Monitoring process by using workflow system

As shown in Figure 5, an investment bank can manage its customer knowledge process by using workflow system. In the system, users can monitor who is responsible and where and when the activities are implemented. This system function helps users find out how they respond to specific customer knowledge requirements.

5.3 Performance Analysis

In the prototype system, the performance evaluation system is linked to workflow system. By this evaluation system, research process and reports can be measured and used for evaluation systematically. Figure 6 shows an example of internal evaluation for final report, which would be loaded into the Web site as investment information.



<Figure 6> Example of internal evaluation for investment information

Depending on pre-defined evaluation criteria, research managers review the report and then a user approves to send or return it to revise. In this example, the criteria include timeliness, completeness, and compliance to customer knowledge requisites. In addition, even approved reports can be evaluated by customers. For example, how many times the report is downloaded is a typical measurement for this evaluation. Research managers can also find out the value of the report if this system provides the profitability for users who have seen the report in a specific period of time.

6. Conclusion

Recently, most business organizations have extended their work places to the Internet-based environment. The opportunities of virtual contacts between the companies and customers increases and new business strategies for customers are required. Accordingly, the management of customer knowledge emerges as a critical issue for the e-business success. From this viewpoint, this study proposes a customer knowledge framework, its management process, and an architecture of a system for managing it. Furthermore, a prototype system is illustrated.

Some contributions of this study can be summarized as follows: This study provides an enhanced framework for customer knowledge. In previous works, customer knowledge contains customer-related information only, however, this study considers even the evaluation results of organizational responses. This customer knowledge can help improve customers' satisfaction. The customer knowledge framework can provide on view of new knowledge sources for building Internet-based customer strategies.

Future works remains as follows. First, the completion of suggested prototype and the enhancement of meta-knowledge management system are major tasks. Second, the proposed system architecture will be applied to a variety of real-life cases for its validation and enhancement.

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