Chapter 110
A Study on the System for Customer Feedback Integration Inference in B2C Service Industries

Min-Sik Kang and Eun-Jee Song

Abstract Recently, due to the rapid distribution of the smart phone, real-time SNS such as Twitter and Facebook has been growing exponentially, and the service provider sales are being affected by the customer feedback (comments from blogs, cafes, SNS etc.) as the customer stance has changed from passive to active as the era of social media arrived. However, the current B2C (Business to Customer) service industry lacks both qualitative and quantitative assessments for services provided to customers, causing the same problems to occur repeatedly and periodically. There are relatively low portion of standard process and key performance index because of too many companies and differences of their sizes in these industries. One of the proof of this fact is the need for SSME (Service Science, Management and Engineering) studies in this business area. This paper suggests a method of efficient customer feedback integration for the B2C service industry. The aim of this study is the standardization of process and the development key performance of index, and to develop algorithm about these assessment factors. This method involves collecting and analyzing the customer feedback in various ways (process mining, text mining, direct survey, and face recognition) as well as inferring systematically based on the real-time feedback for satisfaction and personal requirements for providing personalized and customized services. The result of this study is the development of general purpose platform for B2C service process improvement.

M.-S. Kang
Department of Industrial and Management Engineering, Namseoul University, Cheonan 303-707, Korea
e-mail: mskang@nsu.ac.kr

E.-J. Song (✉)
Department of Computer Science, Namseoul University, Cheonan 303-707, Korea
e-mail: sej@nsu.ac.kr

110.1 Introduction

To increase the competitiveness of B2C (Business to Customer) service industry, there needs to be a change in customer feedback analysis; the process of improving and the assessing the service system that requires an effective supporting system. Recently, due to the rapid distribution of smart phone, real-time SNS such as Twitter and Facebook are explosively growing, and service providers' sales are being affected by customers' feedback (comments from blog, cafe, SNS etc.) as customers' stance has changed from passive to active as the era of social media arrived [1].

However, current B2C service industry in Korea is less competent than in developed countries, lacking both qualitative and quantitative assessments of services provided to customers leading to the same problems occurring repeatedly and periodically. The result not only lowers customer satisfaction; it ultimately weakens the competitiveness of the service industry. Thus, IT technology that applies in the service industry needs to be developed and distributed.

In particular, the current growing trend of using services of online assessment analysis service and SNS issue analysis evaluation expresses real-time qualitative evaluation and requirements for customer services with social media. Before negative comments spread to the public, active response is urgently needed among companies.

If diagnostic evaluation technology for real-time operation, notification and proper alternatives are provided when the problems occur while monitoring customers' opinions with real-time, efficient service system management will be possible strengthening competency [2].

This paper provides technological infrastructure to collect and analyze the real-time customer feedback for the effective performance management for B2C service industry, and based on the customer satisfaction and the requirements from real-time feedback analysis, personalized and customized services can be provided. The results will be evaluated continuously to improve the service quality and performance.

To do so,

- The service components and the processes of the B2C service industry need to be standardized.
- Ontology based flexible and extensive service modeling technology that can be customized from different industry environments needs to be developed.
- To analyze the real-time customer feedback and customer profile and to infer the service components for the appropriate customer's needs, in order to recommend the good qualified customized service components.
- To efficiently provide the customer service components, finding the improving service process and fast delivery to related company and detailed comments from our inference engine for the improving points (service or product or service components).

- Providing optimized services to the customers and evaluating the provided services to develop an integrated platform to continuously improve service quality and performance.

110.2 Related Technologies

The purpose of the study is to collect, analyze and infer the real-time customer feedback through various channels (web, mobile, video, survey etc.), and to provide an integrated solution that collects, analyzes and infers the real-time business process log information. In addition, intelligent integrated B2C service control platforms such as process optimization, service reconfiguration and service recommendations can integrate, analyze and infer qualitative customer feedback and process the information provided. The objective platform concept is shown in Fig. 110.1.

The objective platform composes the real-time customer feedback analysis system, the process mining system, collecting and analyzing the process information from legacy systems and integrated inference systems from respective systems. Each system and integrated inference system are comprised of ontology based individual inference models and create the integrated inference model.

In addition, the real-time customer feedback system compartmentalizes all channels such as web, mobile, multimedia, on-line survey, and comprises the analysis and inference model based on the ontology which can be applied without the framework conversion despite channel expansion and the analysis and inference model conversions [3, 4].
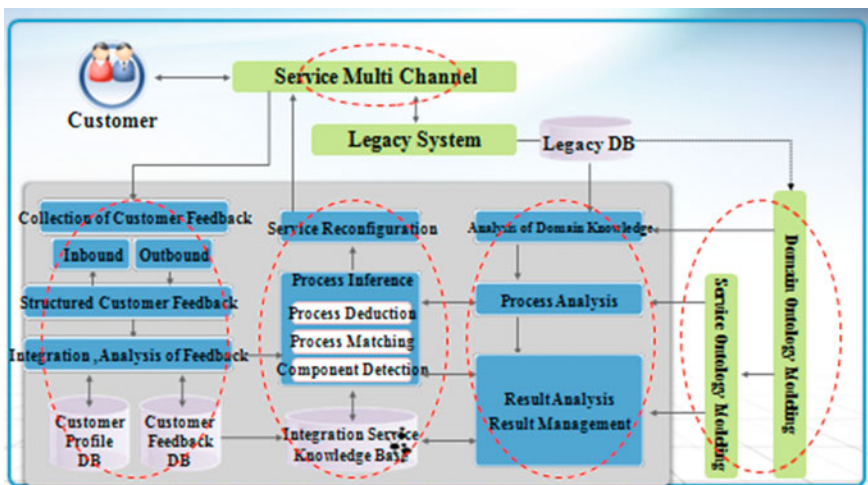

Fig. 110.1 System configuration

For this system configuration, the following related technologies are required.

(1) In order to model B2C service industry systematically, standardizing the service components and processes, and the ontology based service modeling technology development that can customize flexibly and extensively are required [5]. Specifically, the optimized ontology modeling technology and targeted and specialized ontology implementing and operating technology, the service ontology evaluation method and the standard system development are required.

(2) The development of the technology that can infer the service components that customers want providing the personalized services and recommendations, analyze the linkage between the technology and the heterogeneous platforms to share the information and selectively collect and analyze the customer feedback information are needed. Specifically, the multi-channel and the multi-platform, the cross-industry expertise and the information technology integration and analysis based on knowledge inference and the process reconfiguration technology are needed.

(3) Orthopedic or atypical of the real-time data acquisition via online content, mobile devices, multimedia and the qualitative analysis of the customer feedback in the B2C service industries that can take advantage of the real-time customer feedback components can be classified and standardized from the gathered feedback and mass feedback information analysis technology development is required. Specifically, the technology to collect, classify and standardize the real-time customer feedback as well as the techniques to process and analyze it are needed [6].

(4) The optimized service components in B2C service industries, the technology to standardize the business processes, customer feedback and appropriate service components matching processes in order to provide a service that meets the requirements of the customers based on customer feedback to provide personalized customer services needs to be developed when it comes to performance management technologies and services.

110.3 Customer Feedback Integrated Inference System

110.3.1 System Configuration and Algorithm

Components and roles of the comprehensive customer feedback inference system to continuously improve service quality through customer feedback analysis and process optimization in B2C services industry are shown in Table 110.1.
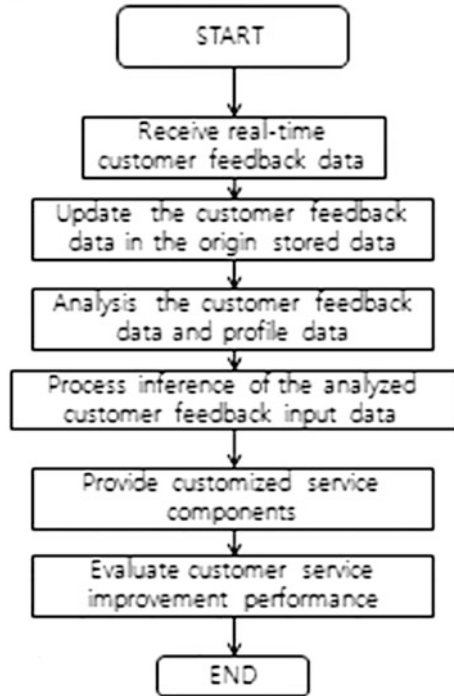
The customer feedback system for the integrated inference algorithm in B2C service industries is as follows.

Table 110.1 Integrated inference system components and roles

Component	Role
Multi-channel	Input the real-time customer service feedback data from the user
Feedback analysis	Analyze the customer feedback service data from the multi-channel input and the customer profile data
Legacy system	Extract the data from the existing transaction log of the legacy system
Process mining	Analyze the data from the transaction log in order to find the improvement processes necessary for customers
Integrated inference	Analyze and evaluate the integrated knowledge database from process mining, surveys and the opinion mining data in order to provide the personalized service components

(1) The receiving step of real-time customer feedback data input is performed through a multi-channel input from the customer. Here, web, mobile devices, video, multimedia and online content receives real-time feedback from the customer. More specifically, social networks and mobile web surveys through the SNS through web sites on the internet and mobile devices.

(2) The qualitative customer service feedback input is updated in the original stored data information. Here, the qualitative customer service feedback data is collected through the real-time investigation and analysis via online survey and sensibility analysis. Online surveys serve to collect customer satisfaction through web (email) or mobile system like tablet PC or smart phone. Sensibility analysis is used to analyze the language of the comments and satisfaction for B2C services to collect and store in the database.

(3) The real-time input of the customer service feedback and the customer profile data are analyzed. That is, through structuring the customer feedback and analyzing it, personalized customer feedback data can be provided.

(4) The real-time inference step from the analyzed customer service feedback input data is performed. At this point, for the service process inference algorithm, one can be selected and applied among alpha algorithm, heuristic mining and fuzzy mining after comparing pros and cons.

(5) Appropriateness of the inferred customer service process is measured and corresponding customized service components are inferred and provided. For instance, when the client is using the medical service, one should perform each step to receive the medical service and after each procedure, the client's status can be tracked and the client can receive optimized process.

(6) After providing customized service components, process and customer service improvement performance are evaluated. Here, the analyzed service assessments for each process and performance indicator can be integrated into system improvement.

The flow chart of algorithm is shown in Fig. 110.2.

Fig. 110.2 Flow chart

110.3.2 System Application Examples

Figure 110.3 shows an example where a B2C service customer feedback integrated inference system that this paper proposes is applied in the medical service industry.

The customer profile information is gathered through web, phone, fax, email, mail and the real-time customer service feedback is gathered through SNS, web, mobile and multimedia. Here, collected information is analyzed through survey and sensibility analysis.

In addition, from the automatic collection of the medical service system log, the customer's progress and performance allow integrated inference: the process of optimization, service reconfiguration and service recommendation.

In other words, when the client is using the hospital medical system, he/she should perform each procedure to receive medical service and by tracking the client's status, we can provide optimized processes to the client as well as receiving the process service improvement feedback information at the same time.

Therefore, through the B2C service customer feedback integrated inference system, the diagnostic assessment technique of real-time operation notifies the user when problems occur and provides the alternatives in real-time while monitoring the customer's opinion. This allows effective service system management [7].
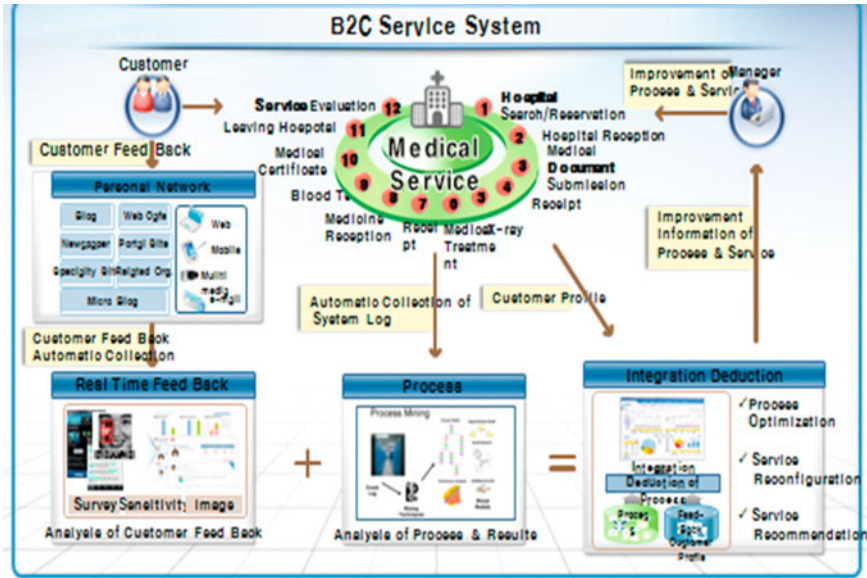
Fig. 110.3 Example of integrated inference system applied in medical service industry

110.4 Conclusions and Future Works

Recently, SNS has been growing explosively, and the era of social media is changing the status of the customer from passive to active. As a result, service provider sale is affected by customer feedback such as SNS.

Thus, for effective business management, changes in feedback analysis, the process improvement and evaluation service system is necessary.

This paper proposed B2C service customer feedback integrated inference system to improve the customer service quality by providing the customized customer service through developing the platform for continuous service quality improvement with customer feedback information analysis and the process optimization.

The proposed system is composed of service multi-channels that receive the real-time customer feedback data, the feedback analysis that analyzes the qualitative service feedback data and the customer profile data from the service multi channel.

Moreover, there is the legacy system that updates and manages the customer feedback data in originally stored data in multi-channel and the process mining that infers the customer service in real-time from the feedback analysis.

Finally, there is the integrated inference that evaluates the appropriateness of the customer service process from process mining and provides the customized service components corresponding to the customer service process.

In particular, the customer service process uses service ontology modeling and domain ontology modeling to analyze and infer. For the system development this

paper suggests, further research about the techniques to analyze the big data such as SNS and process mining techniques are necessary as well as inference technology using ontology technology [8, 9].

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