The Framework of Web-Based Voice of the Customers Management for Business Process Management in Service Industry

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Abstract. To manage the quality of services, internal business processes should be managed as like the intermediate products are controlled for quality of final products in the manufacturing industry. The business process management (BPM) with the aim of improving processes requires both analysis and evaluation of practices. Till now, while the transactional data such as total sales are sufficiently analyzed, Customers' responses on the business processes are not considered. In this paper, we introduce the voice of the customers (VOC) as a data source for BPM in the service industry. We suggest a VOC management framework that acquires data about business processes performance and quality of services. A consequent data model and business process model are followed.

1 Introduction

While companies try to find and improve key business processes to maximize the company's own value, business processes are mostly managed based on experts' or leaders' experiences in business practice. Non-value added processes are sometimes over-controlled. In this environment, a simple and structured framework for a systematic business process management (BPM) is required.

But, there is a surprising lack of the overall frameworks to support continuous improvement based on the data about the performance of each business process.

In the service industry such as financial, hotel, etc., the significance of BPM is greater than any other industries such as the manufacturing industry. The process of acquiring and receiving the services is a product itself in service industry. There are some difficulties to apply BPM in service industry [1]. First, it is difficult to define processes and their flows. The flowcharts and process maps are hardly used in the service industry. Secondly, it is hard to measure process performance. Third, some noisy or uncontrollable factors such as customer behaviors influence service processes.

Although the processes management with the aim of improving processes necessarily requires both analysis and critical evaluation of practices, most of existing packages for BPM focus mainly on process design, configuration or a process aware

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information system, and process enactment. Although they report the simple statistical summaries about the workflow status, they do not support sufficiently diagnoses [2]. Because non-measurable factors such as customer responses are not considered, the analysis results are not enough to find effective process improvement methods. The limited competency of analysis is basically caused by the poor data model.

To overcome these shortcomings, we propose Voice of the Customer (VOC) as the new data source for BPM in service industry. The VOC is all kinds of messages from customers including asking, claiming, complaining and commending or praising. The VOC tells what customers think about companies' current offerings. Companies' offerings are highly related to business processes. It is possible to detect problematic internal business processes through the VOC analysis. However, VOC itself is not suitable for analysis purpose from the viewpoint of knowledge discovery in databases (KDD). As VOC represents what customers think, it is expressed by customers' words. VOC should be conversioned from the customer-side view to the company-side view.

In this paper, we propose a new framework for BPM using VOC in service industry. The VOC will be converted to enhance the data quality, and the practical methodology for analysis will be presented with managerial implications. We propose the family of measurements (FOM) as the performance of businesses processes. To demonstrate application results, we will apply the framework to financial industry. We gather the VOC from call centers of a credit card company and build a web-based system embedding the proposed methodology.

2 Literature Review

2.1 Business Process Management

While many people consider business process management to be the 'next step' after the workflow wave of 1990s, BPM is above workflow management. Figure 1 shows the relationship between workflow management and business process management using the BPM life cycle [2]. First, processes are designed. Second, designs are implemented by configuring a process aware information system (e.g., a workflow management system). Third, operational business processes are executed using the configured system in the enactment phase. Finally, the operational processes are analyzed to identify problems and find possible improvements in the diagnosis phase. As these four phases iterate, processes are redesigned.

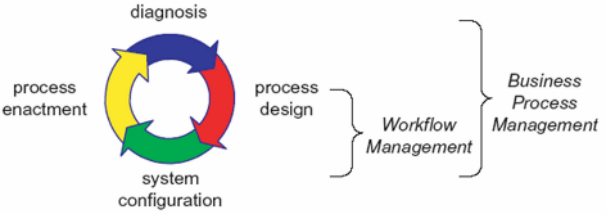

Fig. 1. BPM life cycle to compare WFM and BPM

The traditional workflow management system focuses the lower half of the BPM life cycle. As results, there is a little support for the diagnosis phase. Few systems support the collection and interpretation of real-time data. The Gartner group expects the BPM market to grow and also identifies Business Process Analysis (BPA) as an important aspect [3].

3 Methodology

3.1 VOC Management for Business Process Management

Companies set up customer supporting centers, which manage VOC all together over the diverse VOC receipt channels such as ARS, call centers, the internet homepages, and so on. Some of VOC cannot be directly handled on contact points. CSRs (Customer Support Representative) can not handle the complicate VOC that requires approvals of the other departments or inquiries to the other institutes. In this case, the VOC is transferred to the responsible person (or department) on the back office.

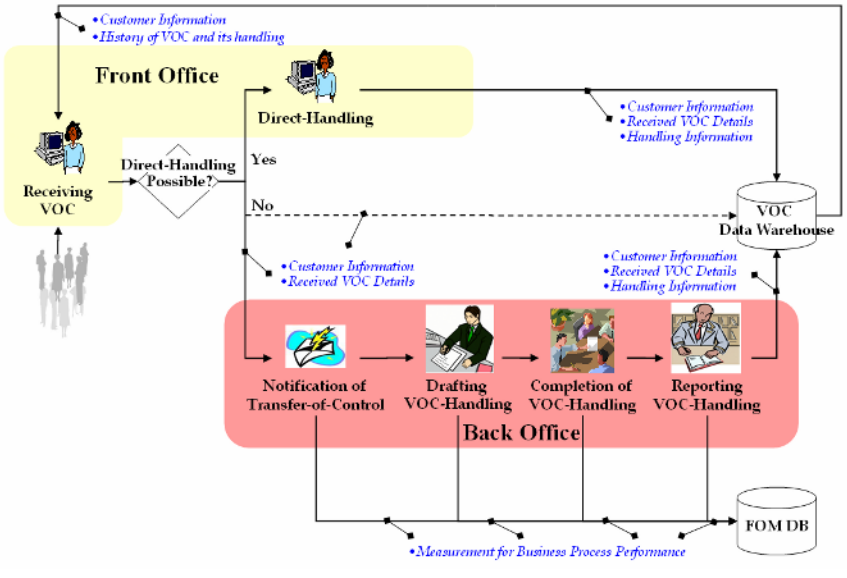

Fig. 2. The Framework of VOC Management for Business Process Management

There are problems on handling of transferred VOC; transfers to inappropriate persons, failures to notices, non-sharing of transferred VOC, and so on. Therefore, we suggest the framework of VOC management for BPM as depicted in Figure 2. It has following features.

- According to the type of VOC, required posterior processes and responsible persons should be mapped.
- Notices of transferred VOC should be systematically performed in enterprise-wide operating systems that should be integrated on both back office and front office.

- We construct a data warehouse, in which customer information, received VOC details, and handling information is recorded, to share the status of VOC handling or any feedbacks.
- From the initial transfer to the end of the VOC-handling, every intermediate processes, from drafting a plan to completion, should be monitored. We record business performance measurements on the FOM (Family of Measurements) database.
- Companies analyze the data on both VOC data warehouse and FOM database, and get knowledge about bottleneck processes and value-added processes.

VOC itself is not suitable for analysis of business process because it is expressed by customers' words who don't care about internal business processes. After, we present requisite VOC conversion viewpoints and an analysis framework for BPM.

3.2 Data Enrichment by VOC Conversion

Companies have their own code-structures to record received VOC details on the data base. This code structure represents the topic that the received VOC is related with. The existing VOC code-structures are poor for models because they are for transaction processing rather than for analysis. Companies focus on issues such as database storage efficiency, but do not include a plan for how the data will eventually be used and analyzed.

In order to produce reasonable and valuable analysis results for decision making, we suggest the code-structure that describes the substance of customer complaints. It reflects requisite analysis viewpoints about VOC by conversion. To comprehend descriptions, we present a case of credit card company of financial industry.

3.2.1 Business Processes Mapping

For business process management based on VOC, business processes should be mapped to VOC. The internal business processes may not be the same with customer-perceived external processes. Because customers do not care about internal business processes, the actual processes and their flows should be identified through conversion. In conversion, we use Process Classification Framework (PCF) as a basis. PCF has been developed by the APQC International Benchmarking Clearinghouse, with the assistance of several major international corporations. PCF is a high-level, generic enterprise model. Many organizations have used PCF in practical ways to understand their processes better. PCF serves as a common reference about business processes [4].

Through business process mapping, companies can get direct feedback of customers' evaluation on external processes. Also, they assess the adequacy and performance of current approaches for fulfilling customer needs, and identify their strengths and weakness. Eventually, companies could detect the critical processes that affect customer satisfaction.

3.2.2 VOC Primary-Cause Identification

In order to find the remedies for problematic processes, companies should understand what causes customer complaints on the process. To discover the causes, we adapt the concept of the Cause and Effect Diagram from Total Quality Management (TQM).

The cause and effect diagram is also known as the fishbone diagram or Ishikawa Diagram. It helps to search for root causes, identify problems, and compare the relative importance of different causes [5].

Possible causes should be defined in advance for instant detection of causes and efficient derivation of improvement directions. Causes can be pre-defined based on 4M which classifies the process affecting factors from quality management perspective. While these categories can be anything, 4M such as manpower, methods, materials, and machinery is often used. We modify 4M into 5M that are customized to the credit card case as shown in Table 1. Once companies define and apply 5M according to their industrial characteristics, it is useful to prioritize resources for process improvement.

3.2.3 VOC Characteristics Identification

To differentiate the necessity of process improvement, we identify the characteristics of VOC by applying the Failure Modes and Effect Analysis (FMEA). FMEA is a

Table 1. Customized 5M of the Cause and Effect Diagram

5M	Description
Man-customer	The VOC originated from customers' peculiarity, so cannot be easily solved
Man-Employee	Employees' mistakes cause the VOC. The employee training or education is required.
Materials	The characteristics of goods or services cause the VOC. The examination for initial design or adjustment is required.
Methods	The processes themselves cause the VOC. So the process improvement or process innovation is required.
Machinery	Machinery means the affiliations or support agencies. Companies should clear up their authorities and responsibilities.

Table 2. The types of failure mode error in FMEA and the examples of the credit card case

Type of error	Description
Information Validation Omission	There are no checks to catch incorrect or incomplete information items. ex) inquiries, confirmations
Process Validation Omission	There is no mechanism for catching or correcting an incorrectly applied process. ex) erroneous notices, insufficient notices
Reception Omission	There is no mechanism for checking that an information item is received by a process after being sent by another process. ex) application errors, application omissions
Transmission Omission	There is no mechanism for checking that an information item required by a process has been sent by another process. ex) transaction delay
Process Exception	A process is not designed to handle a possible situation within its scope. ex) discontents

series of systematic activities intended to recognize and evaluate the potential failure modes of goods or services and their effects. Because the FMEA classifies the types of failure modes, which are reasons of VOC occurrence, companies could reduce the chance of potential failure modes occurring [5], [6]. The identification of characteristics of VOC enables to prioritize the VOC seriousness. For example, the seriousness of inquiries cannot be the same with the seriousness of complaints caused by transaction delay.

3.3 Data Mining: VOC Analysis

3.3.1 Business Process Performance Data: Family of Measurements (FOM)

In addition to the status of VOC receiving, it is also important to handle the received VOC. Companies should manage the operational processes by which VOC is handled and customers recovered on back office. Therefore, they should gather the outputs (or performance) of business processes to find key business processes and bottleneck processes. To follow up VOC handling, we apply the Family of Measurements (FOM) concept from USAA case as summarized in table 3 [7].

Table 3. Family of Measurements in service industry

FOM	Description
Quantity	- The number of the VOC occurrence - Both the absolute quantity and the relative quantity should be considered. The relative quantity is estimated by normalization. According to the managerial analysis purpose, companies can select the various bases, for example, the number of subscribers per product, the number of subscribers per district.
Quality	- The degree of contribution to customer satisfaction - It means how the VOC handling affects customer satisfaction. Companies can differentiate the VOC that is directly related with customer satisfaction according to its contribution. Because it cannot be estimated only by VOC handling, the surveys such as the customer satisfaction index survey or the focus group interview should be combined with the VOC handling.
Timeliness	- The speed of the VOC handling - Usually companies measure only the time elapsed from the VOC receiving to the VOC handling completion. However, the intermediary processes should be measured; receiving, notification of transfer-of-control (if the VOC is transferred), drafting VOC-Handling, and completion of VOC –handling should be measured.
Cost	- The amount of money to handle the VOC - Because some of VOC arouses the loss such as the compensation payment, companies should reduce the occurrence of VOC with heavy cost.

3.3.2 VOC Analysis Framework

The VOC analysis model consists of four phases: entity construction, summary, exception, and comparison as depicted in Figure 3. The entity means the analysis viewpoint that is the criteria to read VOC data from the VOC data warehouse and make a data subset. We use the viewpoints of VOC conversion as entity. Also, we use the combination of two entities (two-dimensional).

In the summary phase, we derive a summary of a VOC data subset for the FOM. After we find the problems with one dimensional entity vs. FOM, we take a drill-down analysis by two-dimensional entity vs. FOM. We identify the root causes and the characteristics per processes. We examine whether the distribution of FOM is biased by a specific entity. The ANOVA test exhibits the significant interaction between VOC and the entity. The summary phase is the basis for the following exception and comparison phase.

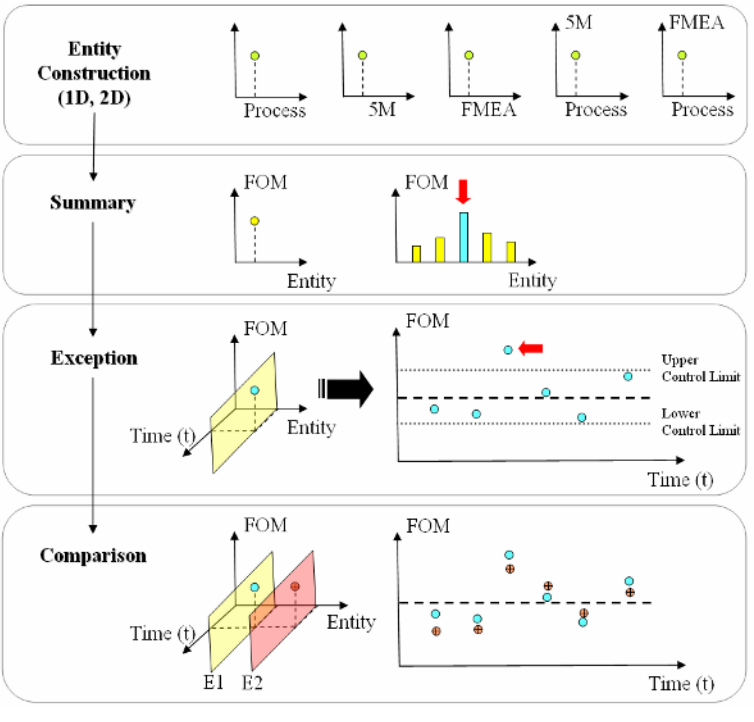

Fig. 3. The framework of VOC analysis

In exception phase, we examine whether the temporal factor affects business processes and finds the exceptional processes' performance using the control chart. Control limits are established based on domain knowledge and displayed in the control chart. Usually, companies set control limits to 3σ according to the Six Sigma philosophy. If an exceptional case occurs, we examine the occurrence reason and detect key events that provoke the process troubles. Key events can be new good or service launching, strategy changes, regulation changes, novice employments and so on.

In the comparison phase, we compare discovered patterns in terms of shapes of fluctuation and time by F-test. We induce temporal rules and use them for forecasting. Common patterns are detected from inter entities or intra entities. Within a group, cycle time can be derived from accumulated patterns. Between groups, time gap can be detected. For example, if the VOC of process A and B occur together in time lag of two weeks, and if the VOC of process A increases, we expect that the VOC of process B increase as well. The comparison helps to cluster similar processes, and the clustering suggests the hints for process improvement.

4 Application (Case of a Credit Card Company)

We applied our VOC management framework in a credit card company in South Korea. It is one of the largest credit card companies in South Korea, and receives principally through call centers. There are problems on VOC management. On the contact points, if the responsibility for the VOC is not clearly defined, some VOC are transferred to the inappropriate person. Although the number of VOC per month is around 4,000,000, the VOC is transferred by the telephone without documented notice system. Because CSRs cannot know the handling of transferred VOC, they cannot reply to the customers' requests for confirmations. There is no process improvements based on VOC, a repetition of the same VOC transfer impedes the entire business processes.

We developed the web-based VOC Management System (VMS) that enables the VOC registration, handling, and sharing enterprise-widely on web. All of information related with the VOC, such as customer data, the past business transaction data and the history of VOC per customer, is presented from the VOC data warehouse. When a responsible person logs in VMS, he or she is informed of the lists of VOC that are not handled. VMS automatically puts on records of cost and time for VOC handling, such as initial recognition time, the time of remedy establishment, and the duration of overall treatment. All of required information, such as customer data, attached files, and payment information, is offered. Figure 4 shows the registration screen of VMS.

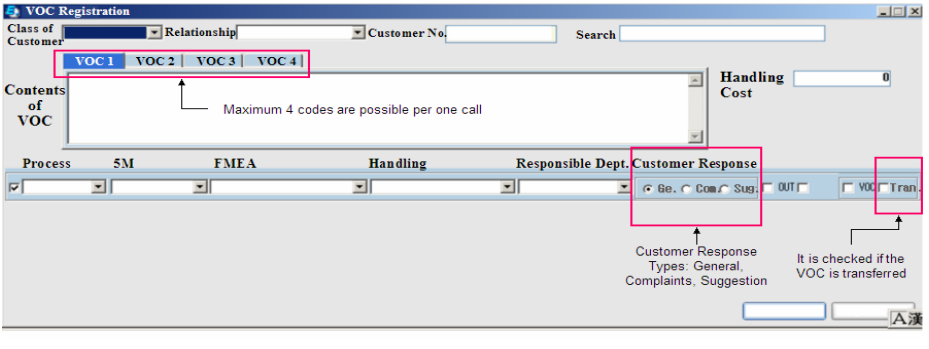

Fig. 4. The registration screen in VMS

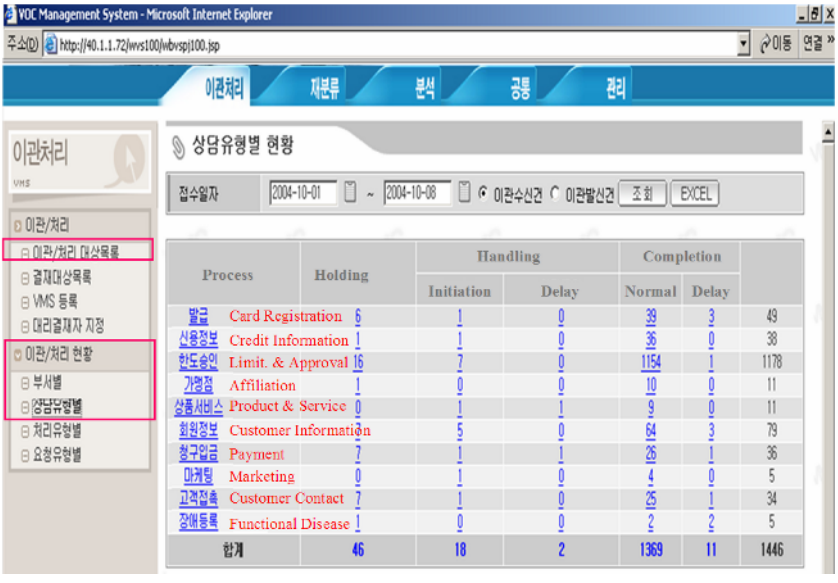

Fig. 5. The inquiry screen for status of transferred VOC handling in VMS. The click on the upper rectangle on left side displays the list of transferred VOC and handling-completed VOC. The click on the lower rectangle on left side displays the status of transfer/handling per departments, and per processes.

Figure 5 shows the screen to inquire the status of transferred VOC handling according to the processes. The VOC managers can drill down the specific process by clicking the process name, and then the 5M and FMEA are displayed in Pareto Charts. When CSRs want to know the status of the VOC, they use the 'The list of transferred VOC/Handling Completed VOC' menu on the left side.

5 Conclusion

In this paper, we apply the VOC and its handling data for BPM through the VOC conversion and the analysis with three viewpoints. The VOC is not a troublesome object to be handled any more. It is a valuable information source for BPM from the customer side that is one of four sides of BSC (Balanced Score Card)

However, we consider the only the negative side of VOC for BPM. There are two basic ways to gather the VOC [8]. Reactive methods, such as customer calls, web page hits, e-mails mean that VOC comes to companies through a customer's initiative. Proactive methods, such as surveys, questionnaires, focus groups, interviews mean that companies take the initiative to contact customers. In case of reactive methods, because customers are more likely to contact companies when they have problems, the majorities of reactive VOC are complaints (negative side). Therefore, the methodology to consider the positive side of VOC through proactive methods is required.

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