Reengineering Call Center Operations Using Simulation

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Abstract

In today's customer-centric business environments, the company's ability to improve execution to meet customer needs and requirements often dictates its competitiveness and long-term profitability. iven the increasing importance of customer satisfaction to the company's survival, this paper focuses on the typical call center environment where customers' service inquiries should be answered in a courteous, fast, and orderly fashion, while utilizing the given number of telephone service representatives. This paper also develops a simulation model that validates the re-engineering efforts of the real-world company to improve its call center operations.

1. Introduction

Perhaps, a single most important indicator of the company's success is the company's ability to retain customers. Customer retention, however, cannot be maximized without identifying the changing needs and requirements of customers. Since clues for the customer needs and requirements can be traced back to the communication channel between customers and telephone service representatives (TSR) at call centers, it is important for the company to re-assess call center operations to improve the overall customer service level. The main functions of call centers include answering the customer calls promptly, identifying the customer, routing the calls in accordance with the skills of TSR, utilizing interactive voice response (IVR) to answer simple customer inquiries, and determining the appropriate staffing levels based on the projected number of customer calls. The fulfillment of these functions has become more onerous than ever before due to the increased sophistication of today's tech-driven call center operations involving automatic call center distributors (ACDs), automatic number identification (ANI), and computer-telephony integration (CTI).

Thus, there is a growing need for continuous re-engineering of current call center operations to fulfill the need of a high level of customer service. In an effort to re-engineer call center operations, this paper proposes a simulation model that can capture many features of call center operations such as call volumes, call handling time, customer queuing time, call abandonment patterns, skill-based routing, messaging, and agent staffing/scheduling. In the literature, simulation has considered to be a standard tool for designing and planning call center operations, due to its effectiveness in replicating a variety of call center operation scenarios and measuring call center performances [1,2,3,5]. In particular, this paper examines the impact of the proposed simulation model on the call center operational efficiency, discusses the lessons learned from simulation, and suggests how the proposed simulation model can be extended to tackle many challenging practical issues facing call centers.

2. Problem Statement

Since its inception in 1988, the insurance subrogation firm located in the Mid-western city has been serving more than 50 million insurers and health-care payors throughout the entire United States (U.S.). This firm (called "*Venus*" hereafter) offers sophisticated subrogation and recovery services to property and casualty insurance as well. *Venus*' client base includes *HMO*s, leading insurance companies (e.g., *Blue Cross and Blue Shield*), and self-insured employers across the U.S. Although *Venus* maintains branch offices in four different locations: Atlanta, Georgia; Encino, California; Milwaukee, Wisconsin; Pittsburgh, Pennsylvania, it has experienced some difficulty in handling a flood of phone calls made by a large number of clients throughout the U.S. These calls are often client inquiries related to missing claims data, provider bill audit, overpayment, and legal guidance on claim settlement. Since TSRs working at the call center do not always know how long it would take for them to respond to various client inquiries, they have to put some clients on hold for an extended period of time. Over the last several years, the chronic shortage of experienced TSRs coupled with a gradual increase in the frequency of phone inquiries have aggravated the problem and consequently called for a systematic solution.

One of the viable solutions put forward is to re-engineer the call center forecasting and staffing process. Such a re-engineering process will assure

Venus that the call center staff is held to highest possible service standards. The service standards that *Venus* uses include response time, TSR utilization rate, and the number of missed calls.

3. Simulation Model Design

In the past few years, simulation tools have begun to emerge in the call center industry, because call center operations are extremely complex, and much too important to run by intuition. In general, simulation is a way to describe and analyze the behavior of real-world systems over time by imitating the operations of real-world processes. A discrete-event simulation model for a call center aims to describe how dynamically the processes of a call center interact with each other. Its input data include the number of calls per period of time, time between calls, call arrival patterns, delays in processing calls, call transfers, and the availability of TSR in a particular time slot. The outputs are the typical call center metrics such as average speed of answer (waiting time) per customer, the percentage of phone calls that went to voice mail, average talk-time (serving time) per call, TSR utilization, and the average number of incoming calls that are being accepted by TSRs within a given time frame (e.g., 20 seconds). Examples of benchmark performance standards include: average speed of answer of 23 seconds per customer; average talk time of 4.7 minutes per call; average TSR availability of 6.5 hours per shift [4]. Simulation can also be used to address "what-if" questions regarding changes in demand patterns and staff level; thus, it can develop scenarios as to how the call center shall operate in the future.

With the above discussion in mind, we designed a simulation model that can assess the impact of dynamic changes in system parameters such as call volumes/patterns, talk time, and staffing levels on the service performances of a call center. The simulation model consists of two modules: (1) a front-end Excel file; (2) the Extend simulation program. All the input and output are controlled/reported in various spreadsheets of the Excel file. Thus, it is not necessary for the user to have full knowledge of simulation and/or the Extend program. First of all, we developed a flow chart for the detailed processes of the call center operations as outlined in Figure 1. The manager and supervisors were interviewed to obtain the specific input data such as incoming call volumes/patterns and TSR schedules. The majority of calls arrived between 11:00 a.m. to 4:00 p.m. and the remaining calls came in the morning prior to 11:00 a.m. and the evening after 4:00 p.m. We also discovered that a larger number of phone calls were received on Monday and Tuesday than the rest of the weekdays as shown in Figure 2. Since the call center did not change its staff level according to fluctuations in call volume, a lot of phone calls went to voice mail on Monday and early Tuesday. Unfortunately, TSR will not be able to response to those calls that went to voice mail until late Tuesday. That is to say, those customers who tried to reach the call center on Monday or early Tuesday will not be served on time and consequently exacerbate the overall service level. *Venus* wishes that it could find a way to correct this situation. To make matters more challenging, *Venus* is undergoing major system changes with the hope of increasing sales revenue and improving operational efficiencies. *Venus* would like to know how its call center operation should react to such changes.

As depicted in Figure 3, the simulation model starts with phone call entering the system and then it directs incoming calls to available TSR. If the call was not answered by TSR within 20 seconds, it will be automatically transferred to a voice mail system where the unanswered call will take the path of either exit (missed calls) or into the queue of the voice mail system. To minimize missed calls and call transfers to voice mail, the call center often hired temporary staff who pick up the slacks left by regular TSRs. The simulation model was constructed to consider such a situation. After the base-line simulation model was built, dynamic links were created between the simulation model and a front-end spreadsheet as illustrated in Figure 4 to handle the “what-if” questions in a user-friendly manner.

4. Evaluating the Simulation Experiment

One of the key motivations for simulation is its capability for experimentation under various what-if scenarios [5]. The simulation model allows *Venus* to experiment many plausible scenarios without committing actual resources to planned managerial changes. Thus, it serves as a tool for *Venus* to evaluate potential changes in the current call center operation. Examples of such changes include:

Venus considers installing a system that requires the caller to enter a file number before talking to a TSR. In this system, the file will be retrieved by an available TSR who does not need to ask the caller to enter a file number after answering the phone call and subsequently saves talk time. The simulation model allows *Venus* to estimate the extent of savings in talk time and to conduct the cost and benefit analysis of installing the system.

In the wake of anticipated sales increases, *Venus* plans to implement a system that receives customer inquiries through the Internet. It also considers hiring additional TSRs and eliminating post mails. Before implementing such a plan, *Venus* would like to experiment the simulation model with the planned system.

Given unpredictable fluctuations in incoming calls and high turnover of TSRs, the optimal schedule of TSRs was a daunting task for *Venus*. The simulation model allows *Venus* to evaluate the alternative option of hiring part-time (temporary) TSRs to absorb unexpected surge in incoming calls and its impact on customer service level. In other words, the proposed simulation model allows for the better prediction of customer inquires and consequently creates a proactive means of meeting customers' needs before getting out of hand.

5. Conclusion

A customer care today is often shaped by the call center's ability to differentiate itself from the competition by developing mechanism that handles customer inquires swiftly and efficiently. In this case study, we proposed a simulation model as mechanism to optimize a call center's operating efficiencies with regard to responsiveness, capacity utilization, and abandonment rates. Since *Venus* (one of the leading U.S. firms for health-care claims recovery) began its journey towards systematic re-engineering through simulation, it has continually achieved improvements in call volume, handling time, waiting time, abandonment rate, and labor productivity. Future improvements for *Venus* may include linking the simulation model to demand forecasting and workforce scheduling models through a model-based decision support system. The current simulation model should be further refined to deal with realities such as agents with different skill levels (expert agents; proficient agents; new, inexperienced agents), calls of different types, consideration of the World Wide Web for routine customer inquiries, and premium customer calls ahead of other calls (i.e., deviation from first-come first served principles).

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Full figures will be furnished from the first author upon request.