Stochastic Models of Customer Portfolio Management in Call Centers

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Abstract. We investigate the interest of migrating from a call center where all agents are pooled and customers are treated indifferently by any agent, towards a call center where customers are grouped into clusters with dedicated teams of agents. Each cluster will be called a portfolio. Customers of a same portfolio are always served by an agent of the corresponding team. There is no specialization involved in this organization in the sense that all customer portfolios as well as all agents teams have (statistically) identical behaviors. The purpose of this paper is to investigate how the benefits of moving to this new organization in terms of the management of the workforce can outweigh its drawback that comes from the increasing of variability.

1 Introduction

A call center is a complicated service system, in which managers must take into account the behavior of both customers and agents [1]. The purpose of this paper is to provide insights to help managers in the design and management of call centers. It is the result of a collaboration with *Bouygues Telecom*, a french mobile phone company. We investigate the adequacy of migrating from a call center where all agents are pooled and customers are treated indifferently, towards a call center where customers are grouped into clusters with dedicated agents. The aim of *Bouygues Telecom* through migrating into customer portfolio management is to better manage their employees and as a consequence to satisfy customers more accurately. This management approach makes agents more responsible towards their own customers. Moreover, partitioning agents into groups creates competition, which motivates agents to give better answers to customers. In this paper, we argue how these advantages may outweigh the variability that results from the loss in economy of scale originally associated with the pooled system. Also, in the proposed organization, all portfolios and corresponding set of dedicated agents are totally identical (statistically). Therefore, issues such as training and forecasting can be done in a homogenous manner.

Our study is linked to pooling phenomenon. Pooling in queueing systems has been described first by Kleinrock [2]. Results on pooling queues are obtained in [3], [4], and [5]. Whitt has also studied the issues of partitioning customers into service groups [6]. All above results do not take into account the human element. This takes us to a second area of literature, that is, human element. It is the main characteristic of call centers and contact centers. Both customers and agents are people [7]. Indeed, call center management requires a mix of disciplines that are not typically found in organizations [8]. The review of Boudreau [9] follows through this new area. He propose a framework which is a fertile source of research opportunities.

The remainder of this paper is structured as follows. In Section 2, we develop a simple queueing model that is then used to address the issue of benefits versus costs of migrating from the pooled organization to the dedicated organization. In Section 3, we extend this analysis to the situation where there is an out-portfolio flow. Finally, we conclude and propose some directions for future research.

2 Analysis of the Efficiency of the Team-Based Organization

In this section we present simple models of call centers. Complex aspects, such as abandonment, retrials, time-varying operations, etc, are not considered. Analyzing simple models are relevant by their intuitive interpretations, and insights to support managers' decisions.

2.1 The Models

The first model is a call center viewed as an $M/M/C$ (Erlang C) queue with s identical servers; arrival process of customers (or calls) is assumed to be Poisson, service times are assumed to be exponentially distributed and independent of each other, and the service discipline is assumed to be first-come, first-served (FCFS). The mean interarrival time is given by $1/\lambda$, and $1/\mu$ is the mean service time. Blocking, abandonment, and retrials are ignored. We refer to this model as the Pooled System (see Fig. 1).

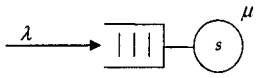

Fig. 1. Pooled System

The second model is the unpooling of the first model to n identical call centers, so that s is a multiple of n. Each call center is viewed as an $M/M/C$ queue with s_n identical servers. The arrival rate to each call center is λ_n, and