

Benefits of Cross-Training in a Skill-Based Routing Contact Center with Priority Queues and Impatient Customers

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Abstract

In this paper, we study customer contact centers providing different types of services to customers who either place phone calls or send e-mail messages. The customers calling are impatient; hence phone requests have higher priority over the e-mail messages. The e-mails that are not responded within a specified time limit can be prioritized. Our goal is to assess the performance improvement via cross-training the agents. We also compare the performance of the contact centers when operated under different strategies. Our extensive simulation study shows that limited cross-training, with 2 skills per agent, results in considerable performance improvements. More than the variability levels in customer arrival processes, service-time requirements or impatience behavior, it is the unbalanced traffic intensities due to different mean-service times for each class that necessitate more cross-training at 3 skills per agent to have considerable improvement in grade-of-service levels. We also show that if agents need more time to serve a customer when they use their lower level skills, going beyond 2 skills per agent, can deteriorate the system performance. We further employ an optimization algorithm to demonstrate how remarkably fewer agents will be sufficient under a good strategy to achieve same levels of performance of a poor strategy requiring more agents.

Keywords and Phrases: Call centers, Skill-based routing, Cross-training, Customer impatience, Priority queues