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LEVERAGING SIMULATION FOR CUSTOMER MANAGEMENT NEEDS: VIRGINIA DMV STAFFING ANALYSIS

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ABSTRACT

Stakeholder satisfaction at the Virginia Department of Motor Vehicles' (VA DMV) 74 Customer Service Centers (CSCs) is strongly correlated to customer wait times. By simulating customer volume and transaction type using SIMUL8, VA DMV produced a staffing model for reducing average customer wait times to no more than 20 minutes. Through repeated trials, the model calculated results of various scenarios defined from distributions in customer arrival and transaction serve time variance. The outcome included recommendations for staffing levels needed to achieve the wait time goal, reported at hourly intervals. In addition to addressing the key driver of customer satisfaction within VA DMV's primary customer touchpoints, this analysis also served to reveal some of the more subtle operational influences within the CSCs. Findings produced by the simulation analysis provide agency executives with the ability to make data-driven decisions in pursuit of the ideal balance between customer satisfaction and operational efficiency.

1 INTRODUCTION

The Virginia Department of Motor Vehicles (VA DMV) operates 74 brick and mortar Customer Service Centers (CSCs) across the Commonwealth. Each of the 74 CSCs conduct licensing-, vehicle-, and identification-related transactions, as well as extended services to support other government agencies. Last fiscal year 4.5 million customers were served at the VA DMV's service centers. Depending on area populations and operating hours, CSC annual volumes ranged from 11,000 to 155,000 customers.

VA DMV defines its business using a number of performance measures. The metric most frequently referenced by stakeholders is the customer's wait time prior to being served. In a customer survey conducted in 2015, one-third of respondents that had expressed dissatisfaction with the VA DMV mentioned wait times or staffing levels as the culprit. VA DMV has a goal of achieving an average wait time of no more than 20 minutes at each of our CSCs. Our CSCs utilize a queuing system that provides transaction-level data, which our team was tasked with analyzing to produce staffing level recommendations for each CSC to achieve this goal. The product of the analysis answered the question: what staffing levels are needed to achieve an average 20 minute wait time?

2 USING SIMULATION TO ESTIMATE STAFFING NEEDS

The average wait time at CSCs is impacted by a myriad of factors. These factors include hourly customer volume, available staff, transaction types and the serve time associated with each transaction type. The customer base of a CSC influences its proportion of each transaction type, as well as trends in customer volume. For example, CSCs in our northern Virginia locations see a significantly higher customer volume by virtue of the population density, but also experience higher proportions of complex transactions tied to original applications (new customers) and identify verification (international customers) with the travel

that occurs so close to the nation's capital. In comparison, our more rural locations see fewer customers and more routine transactions associated with an environment of slower migration. It was essential for the accuracy of our staffing recommendations that these factors were considered in our analysis.

Customer volume and service type proportions, in turn, influence an individual CSC's wait time. A CSC with low customer volumes and a service mix of primarily fast transactions would be expected to show low wait times, if appropriately staffed. Alternatively, a CSC with high customer volumes and a service mix of predominantly complex, time-consuming transactions would be expected to show a higher wait time if staffed in the same manner as the first CSC. The use of simulation to map customer flow in CSCs allows our analysis to consider all variables simultaneously, significantly improving the quality of our analysis capabilities. With this model, VA DMV now has at its disposal a tool with which to tailor staffing recommendations for the context of an individual CSC.

The simulation model was developed using SIMUL8 software. Resources were defined using aggregated serve time from our queuing system, and then adjusted for shrinkage to determine hourly staffing levels. Transactional data from the most recent fiscal year were used to calculate service type probability, average serve time by service type, and average hourly customer arrivals. These data were also used in conjunction with Stat-Fit for SIMUL8 to determine best fit distributions for use in the simulation's arrival and serve time values. An initial trial was run, and hourly customer arrivals were adjusted accordingly, using a flat percentage change, until the model's wait time for each CSC fell into an acceptable range.

Once normalized, the wait time benchmark was set and the full model run, utilizing an algorithm designed to identify the lowest number of staff required to accomplish an average wait time at each hour interval. For each trial, 100 runs were calculated to produce hourly average wait times. The scenario was evaluated chronologically, and at the earliest instance where the average wait time exceeded the benchmark, the staff resource was increased by one. Subsequent trials were automatically conducted, until staffing levels accomplished the wait time benchmark for a full day of operation. Upon completion, recommendations were evaluated against existing limitations such as maximum staff and service window availability. For example, if the model returned a staffing recommendation of 25 in the third hour, but only 12 service windows are available at the site, the staffing numbers were manually reduced to reflect that limitation. Another trial was completed after manual adjustments were made. If the average wait time met the 20 minute goal, staffing recommendations were compared to the actual levels, and the variance was reported as the staffing adjustment necessary for each hourly interval to achieve the benchmark.

3 DECISION-MAKING AND IMPLEMENTING POLICY

Through the use of this simulation model, management is provided a tool that suggests appropriate staff allocation to front counter tasks on an hourly basis. During periods with high customer arrivals and high risk of carryover volume to the next hour, the VA DMV analysis now suggests the best times of day to have the most employees at the front counter. Evaluation of wait time improvements due to staffing adjustments will be conducted, and over time our simulation model and the prescribed response for its recommendations will be refined to ensure the best outcome possible from the analysis effort put forth. Using simulation is an iterative process, where opportunities have arisen to better understand our service data, identify potential metrics to use in the future, and fully exercise the translation of simulation model outcomes to service practice.

Throughout the analysis, unintended benefits were also realized. For example, VA DMV has a greater understanding of its data. We have documented arrival patterns and the differences in weekday versus weekend operations, and the extent to which transaction times differ based on the service type. The impact of customer overflow from one hour to the next on customer wait times is much clearer than before. VA DMV has implemented analysis that clearly describes what our CSCs experience individually over the course of a business day, and can now articulate those patterns to management, supplemented with recommendations for policy decisions that will positively impact customer service moving forward.