Serving Up OR/MS At Taco Bell
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In 1990, Taco Bell initiated a new marketing concept in the fast food industry. The value meal introduced the notion of providing better value through aggressive pricing. The success of this strategy led to an increase in business volume and revenues at Taco Bell. It also changed the fast food business forever as many other restaurants began to offer similar specially priced combinations of food.

With the increase in volume came the need for more servers and food preparers. Rather than simply hiring more people to meet the increased demand, Taco Bell management wanted to find a way to control labor costs without sacrificing service and product quality. Enter OR/MS!

Taco Bell's Operations Engineering group undertook an effort to develop an integrated labor management system to prepare more cost effective labor schedules. Dr. William Swart acted as a consultant and adviser to the project.

Early stages of the project focused on data collection. New cash registers were rolled out to company owned stores to capture detailed transaction data. Sales were collected throughout the day and downloaded to a central site on a daily basis for analysis. To obtain information on customer arrivals, in store observations were manually collected. All of this information was collected in 15 minute intervals throughout the day and across a wide variety of stores.

The Labor Management System

During 1991 and 1992, efforts were focused on development of the models. There are three major model components. The first is the demand forecasting model. Many statistical techniques were evaluated before selecting the current implementation. The model is calibrated for each restaurant and provides estimated store volumes by day of the week and time of day. The store manager has direct control over the model and can modify it to include special local events that may cause unusually high or low demand. These can be labeled by type and re-used in case they are repeatable.

The second component is a simulation model which determines the appropriate staffing level required to meet customer demand with a specified level of service. The simulation was designed with object oriented modules so that pieces can be pulled together to capture the dynamics of a particular store without having to simulate each of the 2,800 stores individually. Separate objects were developed to model aspects such as the mix of menu items, presence of a drive-thru, and the individual staff positions (cashier, food assembly, etc.) Stochastic variables include the customer arrival rate and service times. The simulation is run for different transaction volumes thereby covering demand fluctuation by day of the week or time of day.

The third component is the optimization model which performs the staff scheduling function. Decision variables are the number of workers and their start and end times. The model also recommends the most effective way to deploy staff among the various positions. Some creative work was required to keep the optimization computationally efficient. This was accomplished by converting it into a network flow model. The objective function seeks to minimize the total payroll cost and constraints are based on results from the simulation model as well as labor law limitations.

Business Impact

The Labor Management System was rolled out to company owned stores during 1993 and 1994. It is also now offered to franchise owners and about 70% have decided to use the system. Currently about 2,800 Taco Bell restaurants use the model on a weekly basis to help determine staffing levels.

Over the period from 1993 to 1996, the model generated over $40 million in reduced labor costs for Taco Bell. The model has also been used to evaluate proposals for new technology in the restaurants and changes in the customer service process. These results have convinced the people at Taco Bell that OR/MS is a great way to serve up success!

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