

# KROGER

## reducing equipment maintenance costs

### The Kroger Co.

Kroger is the largest American supermarket chain by revenue. Kroger has over 2700 stores in the country in 35 states.

### Opportunity

Each Kroger store has about 30 types of electronic equipment that the customers and employees use. When problems occur on these devices and cannot be solved readily, a third party vendor is called. Reducing the number of tickets issued to the vendor could reduce the contract cost with the vendor.

### Findings

- Many calls could be resolved by available documentation or training to store employees
- High call volumes occur during certain periods, leading to a larger number of unnecessary tickets

### Recommendations

- Develop training and documentation for identified high-issue equipment and deploy at certain locations based on modeling estimates
- Increase call duration for certain equipment before escalating issue to vendor
- Gather additional information from technicians and leverage visualization dashboard to allow for further cost reduction

The Kroger Co. operates supermarkets around the country. These supermarkets house a variety of electronic equipment such as printers, barcode scanners and pin pads are used by both the employees and the customers. When an issue occurs with the equipment, a Kroger Support Center is called and if the issue is not resolved within three minutes a ticket is created and the issue is escalated to a contracted third party vendor. If Kroger can reduce the call volume to the third party vendor, the contract cost could be reduced in the future.



### Vendor ticket data

The Center for Business Analytics team was provided with several sets of data from a two-year span including equipment details, problem type, resolution description, time period and store details. The team used SQL to manipulate and geocode the data for analysis. Using R, the team explored the data and was able to pinpoint specific equipment, problem types, regions and stores that accounted for high levels of call volume. The team found that many calls could be avoided by visual aids or minimal training to employees. Additionally, one piece of equipment, a phone, caused higher-than-average tickets and should be investigated further for replacement or hardware issues.

### Logistic modeling and dashboards for visualization

After exploration of the data, a logistic regression model was developed to correlate non-equipment factors to ticket volume. This model delivered an estimate of likelihood that specific factors, like store location, were associated with high ticket volume. This type of information could be used by Kroger to focus training and documentation for specific equipment. Additionally, the team found that if Kroger increased the call limit over 3 minutes for certain pieces of equipment, fewer tickets would be issued. Finally, the team developed several visualization dashboards for Kroger to use long-term to understand and penetrate the vendor ticket data.

# CINCINNATI REDS

## predicting ticket sales

### Cincinnati Reds

The Cincinnati Reds, a Major League Baseball team, were established in 1881 and are a member of the National League Central division.

### Opportunity

Single game ticket sales could be influenced by many factors aside price. The Reds organization would like to better predict what variables influence game attendance to boost attendance and ticket sales.

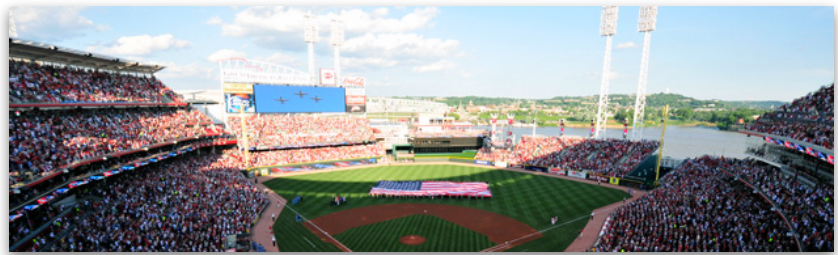
### Findings

The Center for Business Analytics team found a relationship amongst a number of factors that could be leveraged to predict single game ticket sales

### Recommendations

- Implement linear regression model to understand ticket sales
- Leverage output to improve ticket sales, staffing, merchandising and promotion

The Cincinnati Reds Ticket Office sells three types of tickets: season tickets, group tickets and single game tickets. Single game ticket sales account for 25-35% of ticket revenue are the most dynamic and are relatively difficult to predict because they are influenced by multiple variables. The better the Reds organization can predict ticket sales the more efficiently plan staffing, merchandising, ticket pricing and promotions.



### *Ticket transaction data*

The Reds organization had compiled 5 million ticket transactions from 2005 to 2015. The Center for Business Analytics' team cleaned and compiled the data to generate about 900 data points of games. Using metrics ranging from team performance and division rank to weather and time of day, the team explored the data to understand top predictors. The Reds organization and the Center for Business Analytics team worked closely to understand how a model could be implemented to choose optimal variables. For instance, the model should not need to be updated daily as staffing and promotion cannot be adjusted this frequently.

### *Generating a linear regression model*

The team used a variety of techniques, and technologies to analyze variables and produce the final predictive model. For instance, the team wanted to see if game attendance could be indicative of tickets purchased earlier in the month for the same game and leveraged ARIMA modeling in R. The team used the model on individual seasons to understand which variables produced the best prediction and which generated more error. The team presented the prediction

model to the Reds organization for immediate implementation. The model will help produce more efficient promotions and improved staffing for games for the 2016-2017 season.