An Analysis on the Relationship Between Job Coding and Preferred Location and Shift

This study was conceived in an effort to determine if a Team Members Job Duties affect the way they perceive different shifts or venues. For example, cashiers might dislike Fruit due to the lack of busy work, while stockers might prefer it due to the expression of talent that it provides. Understanding these kinds of preferences can allow for leadership to take a more decisive approach in crafting policy designed to improve morale and increase efficiency. Understanding that employees all prefer opening can lead to a readjustment of closing procedures to make the shift less daunting and more preferable to employees, for example.

This study asked 24 Team members to record their job title, favorite shift, and favorite venue. The ultimate emphasis on the study was on cashiers and stockers as they interact with every venue, but was open to cooks, captains, and bussers as well. Unfortunately, due the small size of the busser population, none were involved in the sample. However, as bussers typically only work in one venue and hold one shift a day, their input was not essential to the completion of the study. A sample size of twenty-four was selected because the author of this study does not have funding and had to print off the sample cards on his home printer.

Findings

Job – Shift Relationship

The study was divided into two pieces. The first looked at the relationship between preferred shift and job coding. The data collected is visible in table 1

Job / Shift	Open	Mid	Close
Cashier	5	2	3
Cook	4	1	0
Stocker	4	1	0
Captain	3	0	1

Table 1

Table 1.1 yields a Pearson's χ^2 Score of 4.425 on 6 degrees of freedom, giving a p-value of .6194. Given this we fail to reject the null hypothesis of independence and conclude that Job Title and Shift Preference are independent of one another. There is still information to be gleamed from this data, however. Notice that opening is strongly preferred among all Job Titles. This can be seen clearer in Figure 1. Half of cashiers prefer to open and that's the smallest proportion of any sub-group. Closing is disproportionally under-preferred as well, only 16% of respondents preferred closing to another shift. This conclusion is statistically sound; performing a nonparametric χ^2 test for difference in proportions gives us a p-value of .01821, leading us to reject the null hypothesis of equal proportions and conclude that opening is the favorite shift of the venue.

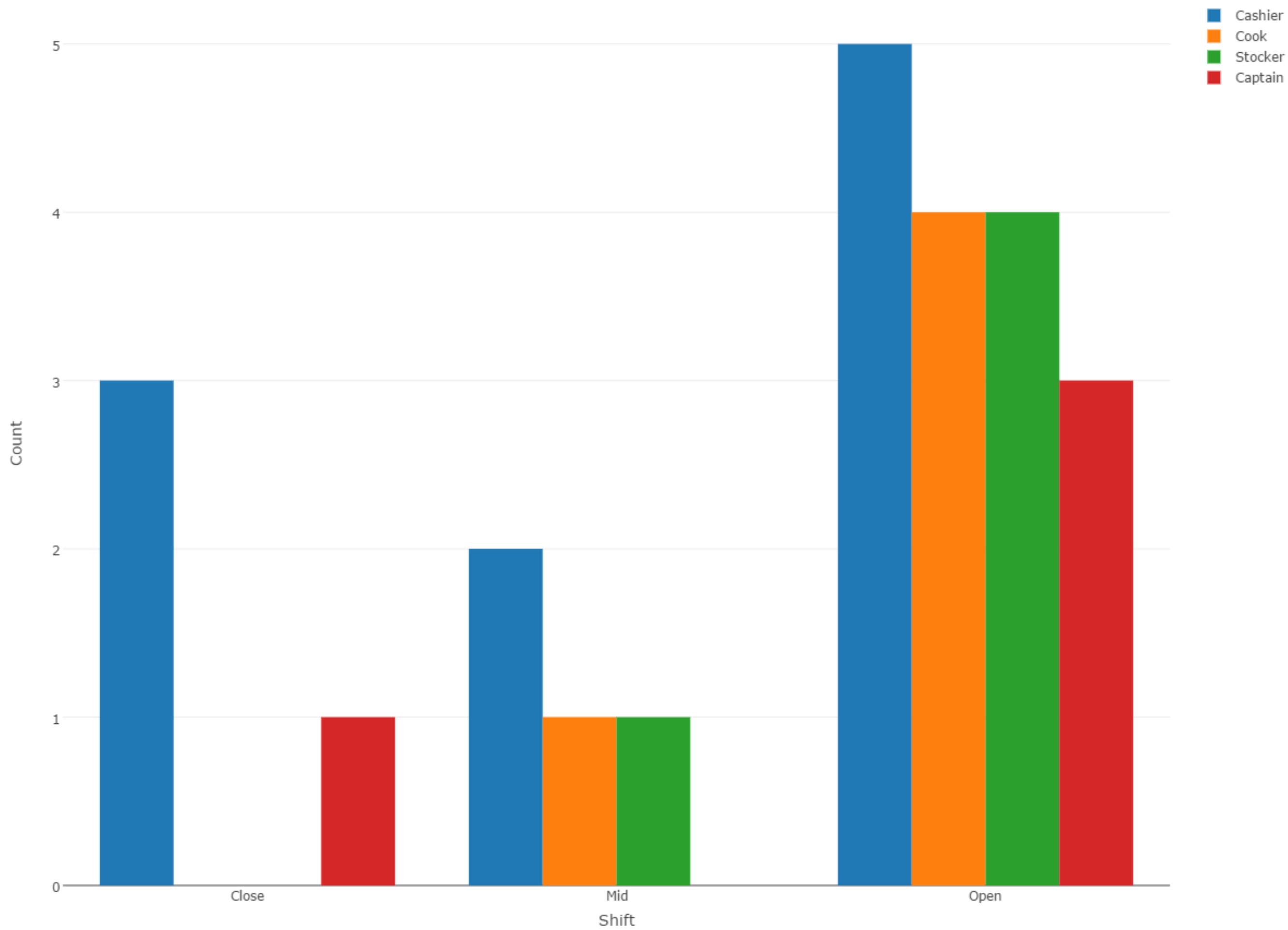

Figure 1

Job – Venue Relationship

Job / Venue	Pred	Grill	Fruit	Kong	Turkey	Beer
Cashier	1	1	0	3	2	3
Cook	2	2	0	0	1	0
Stocker	0	1	1	1	0	1
Captain	1	0	0	0	2	1

Table 2

The relationship between Job Coding and Favorite Venue is also minimal. Pearson's test of independence yields a χ^2 of 16.387 on 15 degrees of freedom, giving a p-value of .3568. We once again fail to reject the null hypothesis and conclude that Job Title and Favorite Venue are independent. The important thing to note from this data set is the response of cashiers. They seem prefer carts to restaurants as illustrated in Figure 2, however, after partitioning the table and performing the χ^2 test, the result stands, the partitioned table has a p-value of .16, too high to reject a hypothesis of independence.

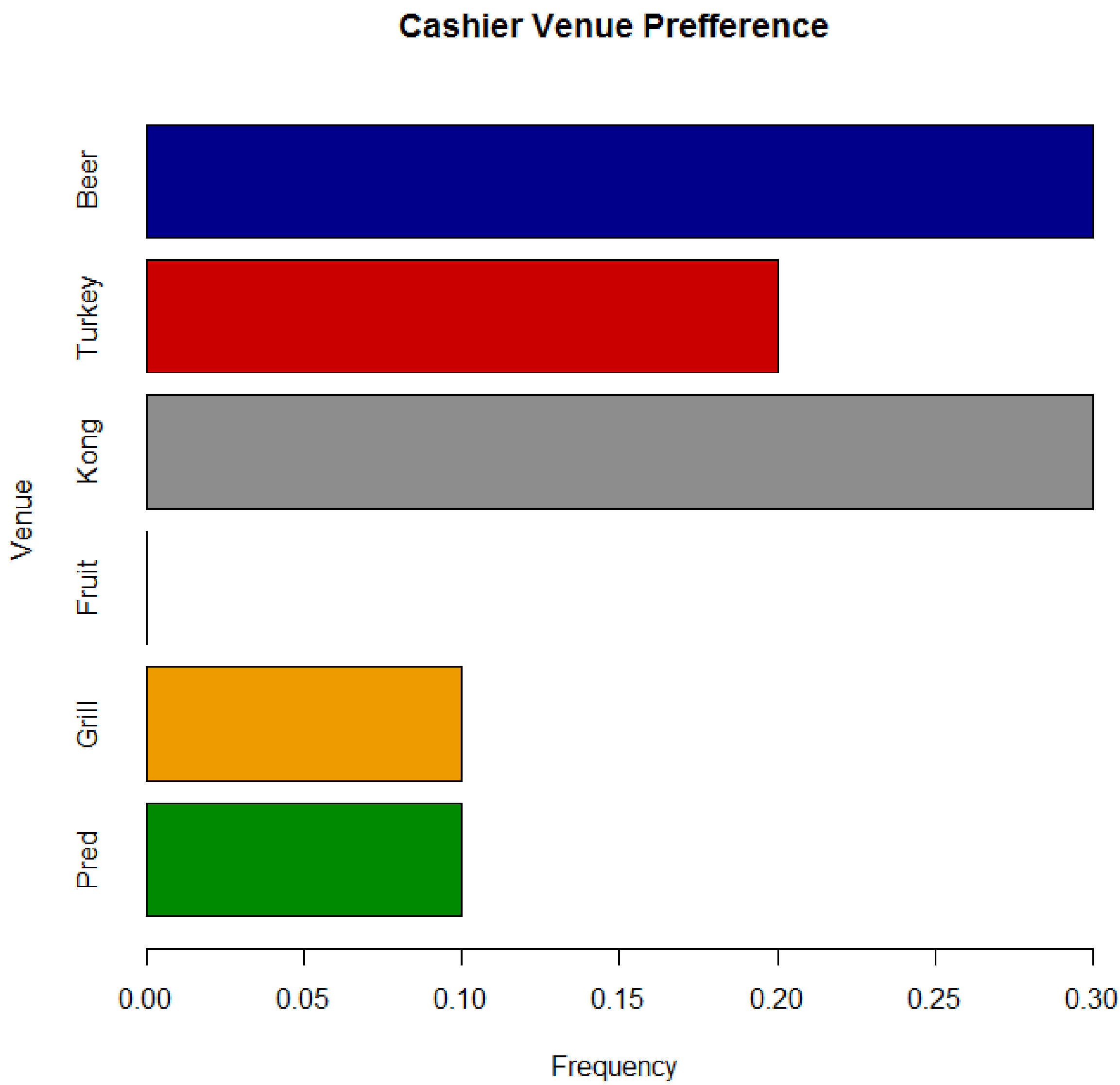

Figure 2

Limitations and Conclusion

The primary conclusions are that Cashiers somewhat prefer carts and everyone prefers opening. Better conclusions can likely be drawn with more data.

Code

```
setwd("D:/Files/Programing and Data/R Directory/Work Surveys")

library(plotly)

JS <- read.csv("JobShift.csv")
JV <- read.csv("JobVenue.csv")

JS$Job <- factor(x = JS$Job, levels = c("Cashier", "Cook", "Stocker",
"Captain"))
JS$Shift <- factor(x = JS$Shift, levels = c("Open", "Mid", "Close"))
JS.table <- xtabs(formula = Count ~ Job + Shift, data = JS)
table.sum <- sum(JS.table)
JS.r.hat <- JS.table / rowSums(JS.table)
JS.t.hat <- round(JS.table / table.sum, 2)
summary(JS.table)


open.sum <- sum(JS.table[,1])
mid.sum <- sum(JS.table[,2])
close.sum <- sum(JS.table[,3])
column.sums <- c(open.sum, mid.sum, close.sum)
JS.c.hat <- t(t(JS.table) / column.sums)

JS.col.props <- colSums(JS.table) / table.sum
open.prop <- as.vector(JS.col.props[1])
else.prop <- as.vector(sum(JS.col.props[2:3]))

SE <- sqrt(((open.prop*(1-open.prop))/open.sum)+((else.prop*(1-
else.prop))/(close.sum+mid.sum)))
z <- (open.prop - else.prop) / SE
pnorm(z)

prop.test(x = c(open.sum, (mid.sum+close.sum)), n = c(table.sum, table.sum),
correct = FALSE)

################################################
############### Tables generated ###############
################################################
                                               #
### The Full Table                             #
JS.table                                       #
### Counts as a proportion of Row Sums         #
JS.r.hat                                       #
```

```
### Counts as a proportion of Column Sums      #
JS.c.hat                                       #
### Counts as a proportion of Table Sums       #
JS.t.hat                                       #
                                               #
################################################

barplot(JS.r.hat[,1],
        main = "Open Prefference",
        xlab = "Frequency",
        ylab = "Job",
        horiz = "TRUE",
        col = c("green4", "grey55", "wheat", "blue4"),
        xaxp  = c(0.0, .85, 17)
)

Shift <- colnames(JS.table)
Cashier <- as.vector(JS.table[1,])
Cook <- as.vector(JS.table[2,])
Stocker <- as.vector(JS.table[3,])
Captain <- as.vector(JS.table[4,])
JS.data <- data.frame(shifts, cashier, cook, stocker, captain)
JS.plot <- plot_ly(JS.data,
                   x = ~Shift,
                   y = ~ Cashier,
                   type = 'bar',
                   name = 'Cashier') %>%
      add_trace(y = ~ Cook, name = 'Cook') %>%
      add_trace(y = ~ Stocker, name = 'Stocker') %>%
      add_trace(y = ~ Captain, name = 'Captain') %>%
      layout(yaxis = list(title = 'Count'), barmode = 'group')
JS.plot

#############################################################################
##############

JV$Job <- factor(x = JV$Job, levels = c("Cashier", "Cook", "Stocker",
"Captain"))
JV$Venue <- factor(x = JV$Venue, levels = c("Pred", "Grill", "Fruit", "Kong",
"Turkey", "Beer"))
JV.table <- xtabs(formula = Count ~ Job + Venue, data = JV)
JV.r.hat <- JV.table / rowSums(JV.table)
table.sum <- sum(JV.table)
JV.t.table <- round(JV.table / table.sum, 2)
```

```
################################################
############### Tables generated ###############
################################################
                                               #
### The Full Table                             #
JV.table                                       #
### Counts as a proportion of Row Sums         #
JV.r.hat                                       #
### Counts as a proportion of Table Sums       #
JV.t.hat                                       #
                                               #
################################################

x11()
barplot(JV.r.hat[1,],
        main = "Cashier Venue Prefference",
        xlab = "Frequency",
        ylab = "Venue",
        horiz = "TRUE",
        col = c("green4", "orange2", "white", "grey55", "red3", "blue4")
)

### Lets partition the chi-sq

R.Cashiers <- sum(JV.table[1,1:2])
C.Cashiers <- sum(JV.table[1,3:6])
R.Else <- sum(JV.table[2:4,1:2])
C.Else <- sum(JV.table[2:4,3:6])

p.table <- array(
      data = c(R.Cashiers, C.Cashiers, R.Else, C.Else),
      dim = c(2,2),
      dimnames = list(
            Job = c("Cashier", "Else"),
            Venue = c("Restaraunt", "Cart")))
summary(p.table)
prop.test(x = p.table, conf.level = .95, correct = FALSE)
```