

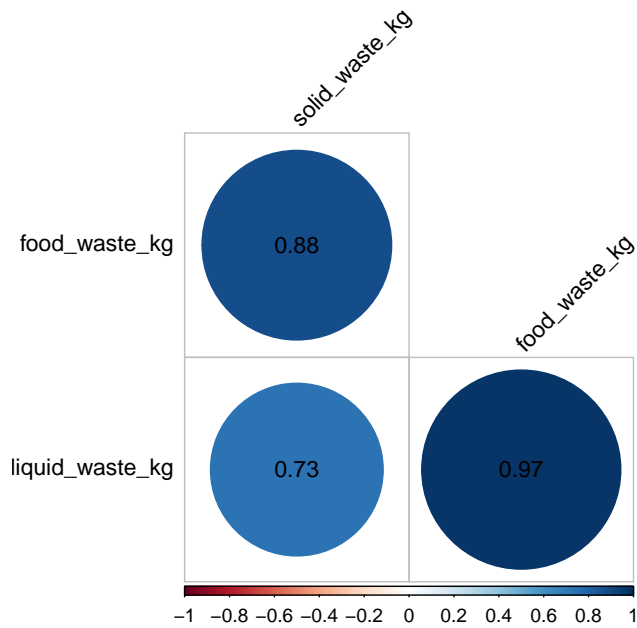
Bivariate - MA Data Analysis

Akihiko Mori

Correlation b/w dependent vars.(food loss and food waste)

```
## # A tibble: 3 x 4
##   rowname      food_waste_kg liquid_waste_kg solid_waste_kg
## * <chr>          <dbl>          <dbl>          <dbl>
## 1 food_waste_kg      1            0.97            0.88
## 2 liquid_waste_kg    0.97            1            0.73
## 3 solid_waste_kg     0.88            0.73            1
```

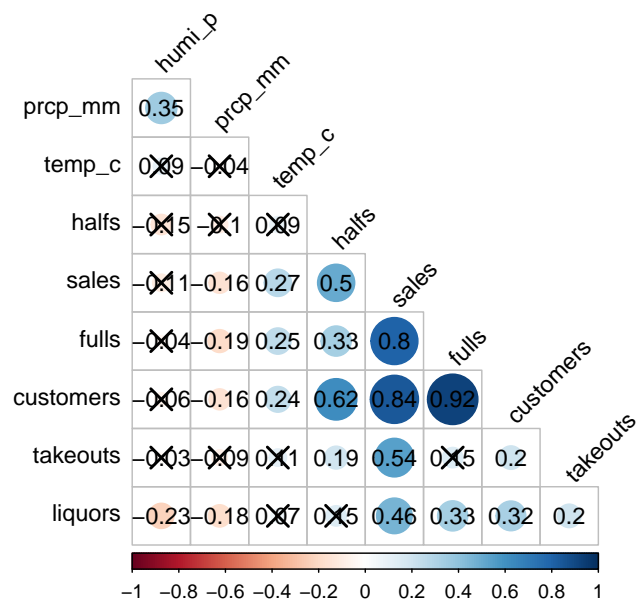
```
## # A tibble: 3 x 4
##   rowname      food_waste_kg liquid_waste_kg solid_waste_kg
##   <chr>          <dbl>          <dbl>          <dbl>
## 1 food_waste_kg      0            9.85e-100      5.27e-52
## 2 liquid_waste_kg    9.85e-100      0            2.94e-28
## 3 solid_waste_kg     5.27e- 52      2.94e- 28      0
```



Correlation b/w independent vars.

```
## # A tibble: 9 x 10
##   rowname temp_c humi_p prcp_mm fulls halves takeouts customers liquors sales
## * <chr>      <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 temp_c      1      0.094 -0.035 0.25 0.094 0.11 0.24 0.066 0.27
## 2 humi_p      0.094 1      0.35 -0.043 -0.15 -0.03 -0.065 -0.23 -0.11
## 3 prcp_mm     -0.035 0.35 1      -0.19 -0.097 -0.087 -0.16 -0.18 -0.16
## 4 fulls       0.25 -0.043 -0.19 1      0.33 0.15 0.92 0.33 0.8
## 5 halves      0.094 -0.15 -0.097 0.33 1      0.19 0.62 0.15 0.5
## 6 takeouts    0.11 -0.03 -0.087 0.15 0.19 1      0.2 0.2 0.54
## 7 customers   0.24 -0.065 -0.16 0.92 0.62 0.2 1      0.32 0.84
## 8 liquors     0.066 -0.23 -0.18 0.33 0.15 0.2 0.32 1      0.46
## 9 sales       0.27 -0.11 -0.16 0.8 0.5 0.54 0.84 0.46 1
```

```
## # A tibble: 9 x 10
##   rowname temp_c humi_p prcp_mm fulls halves takeouts customers liquors
##   <chr>      <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 temp_c      0      2.34e-1 6.57e-1 1.47e- 3 2.36e- 1 1.62e- 1 2.44e- 3 4.02e- 1
## 2 humi_p      2.34e-1 0      5.74e-6 5.85e- 1 5.28e- 2 7.07e- 1 4.1 e- 1 2.8 e- 3
## 3 prcp_mm      6.57e-1 5.74e-6 0      1.65e- 2 2.21e- 1 2.74e- 1 3.86e- 2 2.47e- 2
## 4 fulls        1.47e-3 5.85e-1 1.65e-2 0      1.58e- 5 6.14e- 2 4.63e-65 2.27e- 5
## 5 halves        2.36e-1 5.28e-2 2.21e-1 1.58e- 5 0      1.35e- 2 1.07e-18 5.79e- 2
## 6 takeouts     1.62e-1 7.07e-1 2.74e-1 6.14e- 2 1.35e- 2 0      1.18e- 2 1.32e- 2
## 7 customer~    2.44e-3 4.1 e-1 3.86e-2 4.63e-65 1.07e-18 1.18e- 2 0      3.12e- 5
## 8 liquors      4.02e-1 2.8 e-3 2.47e-2 2.27e- 5 5.79e- 2 1.32e- 2 3.12e- 5 0
## 9 sales        6.34e-4 1.74e-1 4.45e-2 6.76e-37 2.14e-11 9.41e-14 1.32e-44 5.46e-10
## # i 1 more variable: sales <dbl>
```

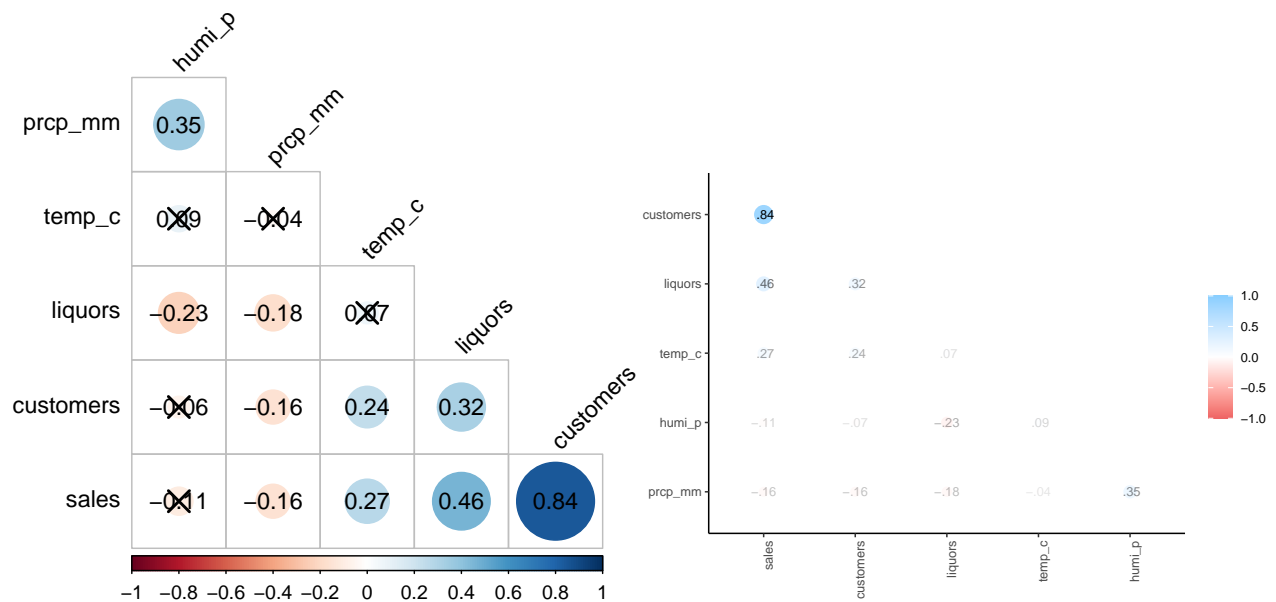


Correlation b/w independent vars.

```
## # A tibble: 6 x 7
##   rowname temp_c humi_p prcp_mm customers liquors sales
## * <chr>      <dbl> <dbl> <dbl>      <dbl> <dbl> <dbl>
## 1 temp_c      1      0.094 -0.035      0.24  0.066 0.27
## 2 humi_p      0.094 1      0.35      -0.065 -0.23 -0.11
## 3 prcp_mm     -0.035 0.35 1      -0.16  -0.18 -0.16
## 4 customers   0.24 -0.065 -0.16      1      0.32 0.84
## 5 liquors     0.066 -0.23 -0.18      0.32  1      0.46
## 6 sales       0.27 -0.11 -0.16      0.84  0.46 1
```

```
## # A tibble: 6 x 7
##   rowname temp_c humi_p prcp_mm customers liquors sales
## <chr>      <dbl> <dbl> <dbl>      <dbl> <dbl> <dbl>
## 1 temp_c      0      0.234 0.657      2.44e- 3 4.02e- 1 6.34e- 4
## 2 humi_p      0.234 0      0.00000574 4.1 e- 1 2.8 e- 3 1.74e- 1
## 3 prcp_mm      0.657 0.00000574 0      3.86e- 2 2.47e- 2 4.45e- 2
## 4 customers   0.00244 0.41 0.0386      0      3.12e- 5 1.32e-44
## 5 liquors     0.402 0.0028 0.0247      3.12e- 5 0      5.46e-10
## 6 sales       0.000634 0.174 0.0445      1.32e-44 5.46e-10 0
```

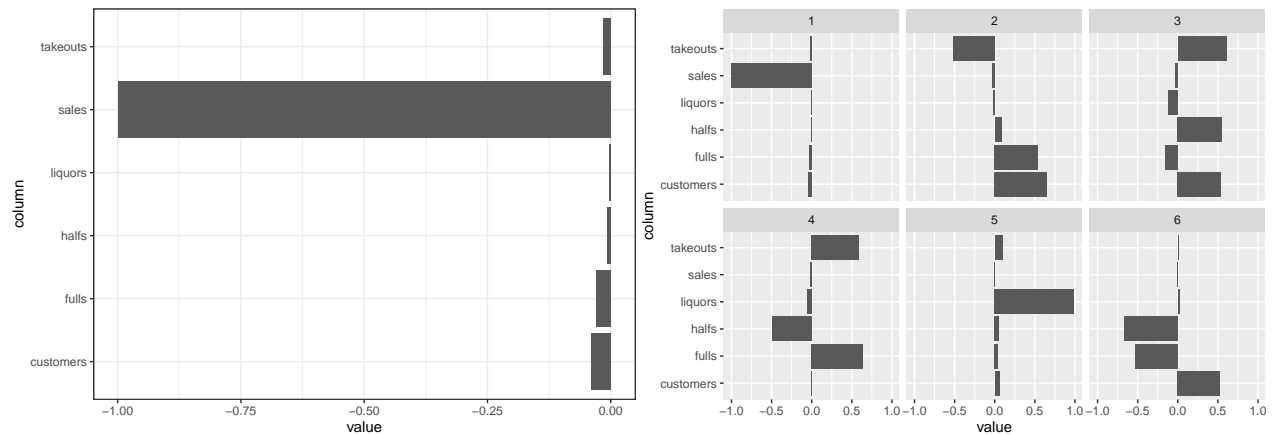
```
## Correlation computed with
## * Method: 'pearson'
## * Missing treated using: 'pairwise.complete.obs'
```

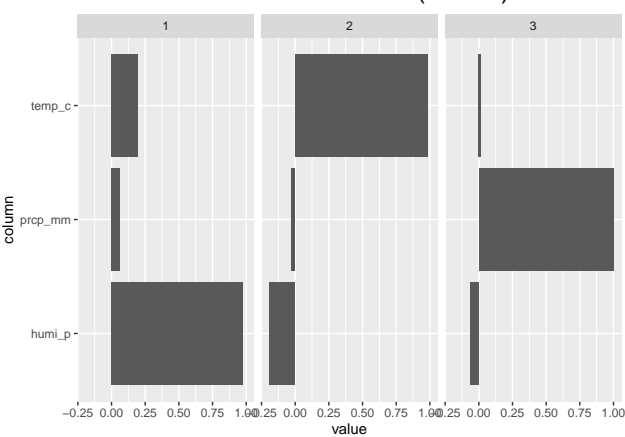
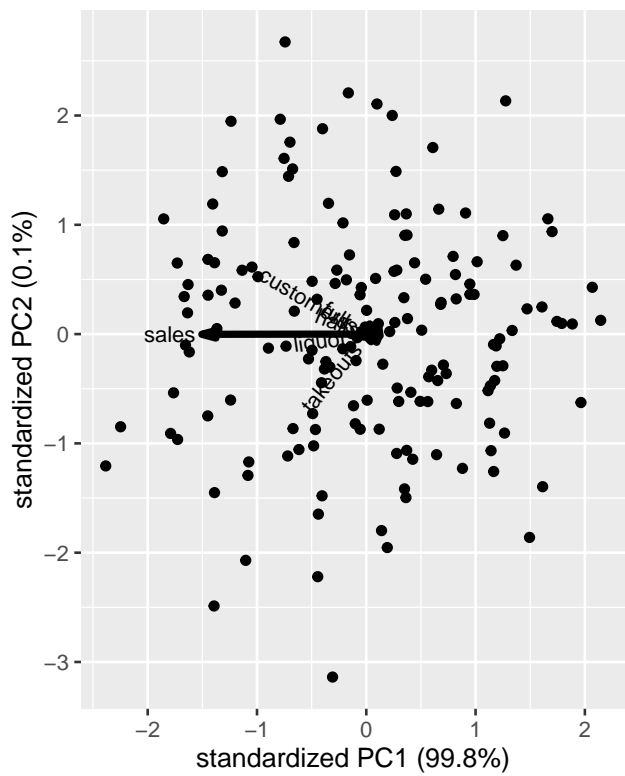
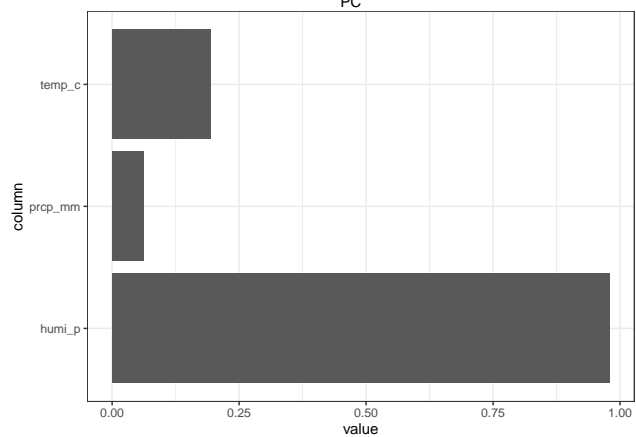
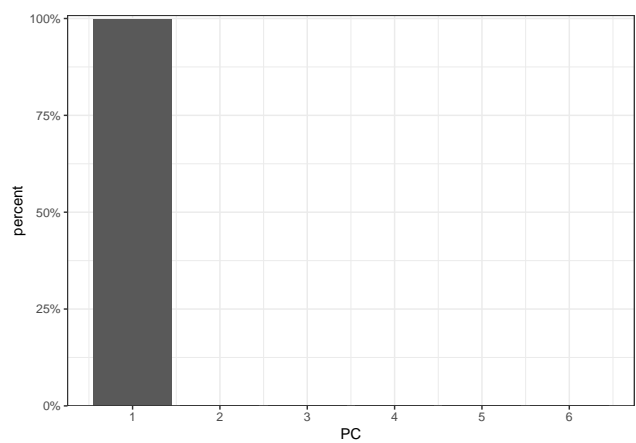


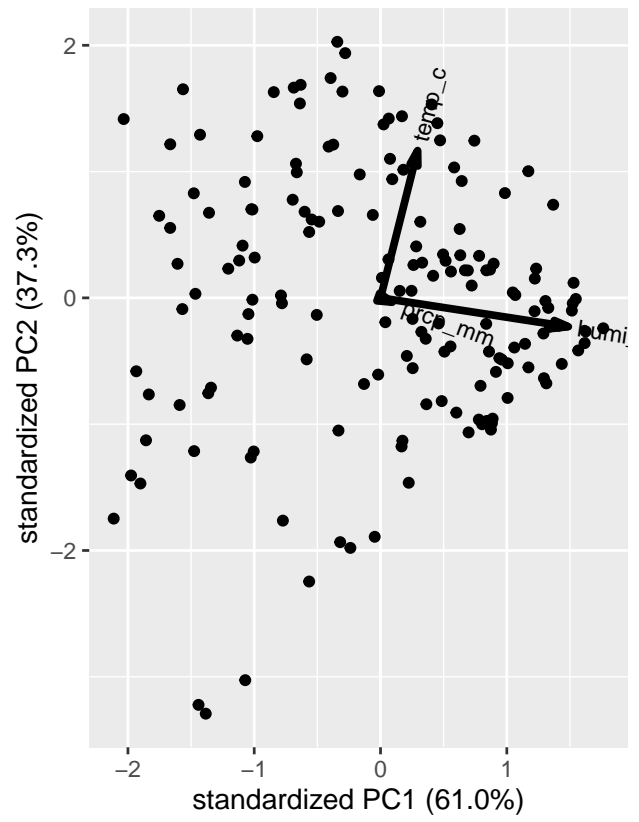
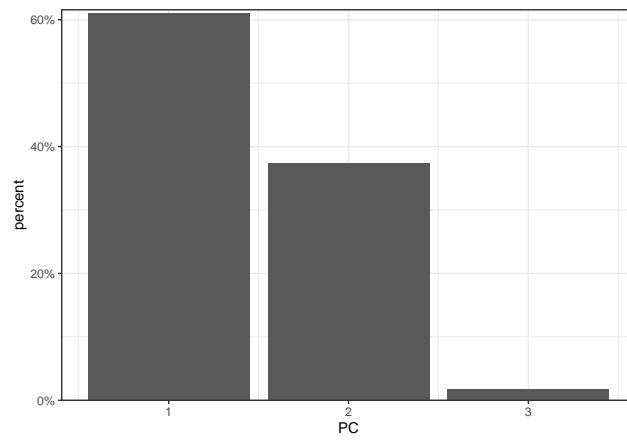
Principal Component Analysis

```
## Standard deviations (1, ..., p=6):
## [1] 214.732100  7.765591  3.696578  3.444734  1.566496  1.184341
##
## Rotation (n x k) = (6 x 6):
##           PC1      PC2      PC3      PC4      PC5
## customers -0.040159987  0.65415860  0.53926876  0.003558498  0.060251895
## fulls     -0.029860294  0.54164943 -0.15786373  0.636260658  0.041233236
## halves    -0.007547398  0.08289829  0.54937299 -0.489499360  0.050317942
## takeouts  -0.015212980 -0.51993282  0.60713716  0.592751376  0.096986947
## liquors   -0.003971133 -0.01596434 -0.11378519 -0.060061003  0.991282881
## sales     -0.998594698 -0.03514675 -0.02991606 -0.024260491 -0.009455986
##
##           PC6
## customers  0.5253664932
## fulls     -0.5237131815
## halves    -0.6701632001
## takeouts   0.0078888164
## liquors    0.0230916594
## sales     -0.0006150708

## Standard deviations (1, ..., p=3):
## [1] 11.97351  9.37176  1.99279
##
## Rotation (n x k) = (3 x 3):
##           PC1      PC2      PC3
## temp_c    0.19339715  0.9809830  0.01643034
## humi_p    0.97919789 -0.1919432 -0.06579745
## prcp_mm   0.06139248 -0.0288136  0.99769772
```

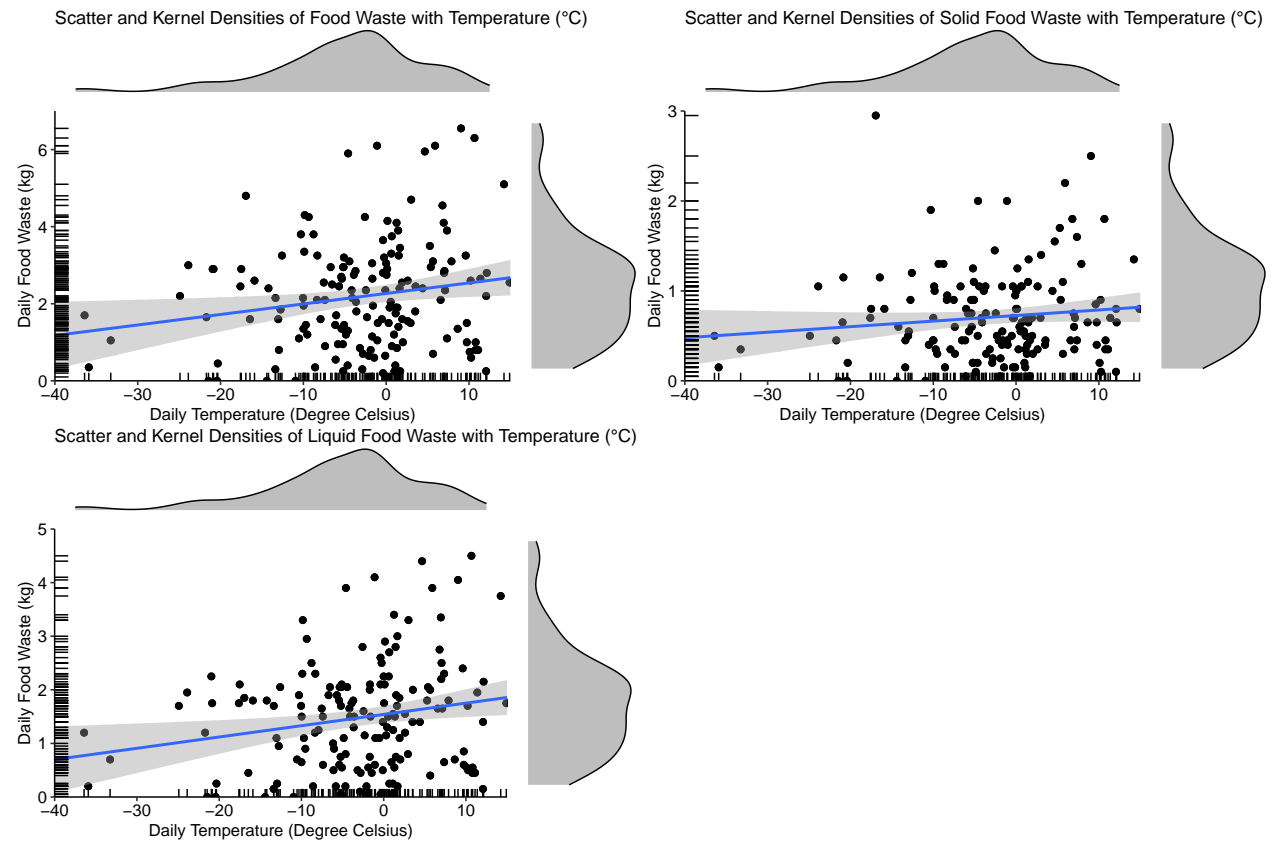




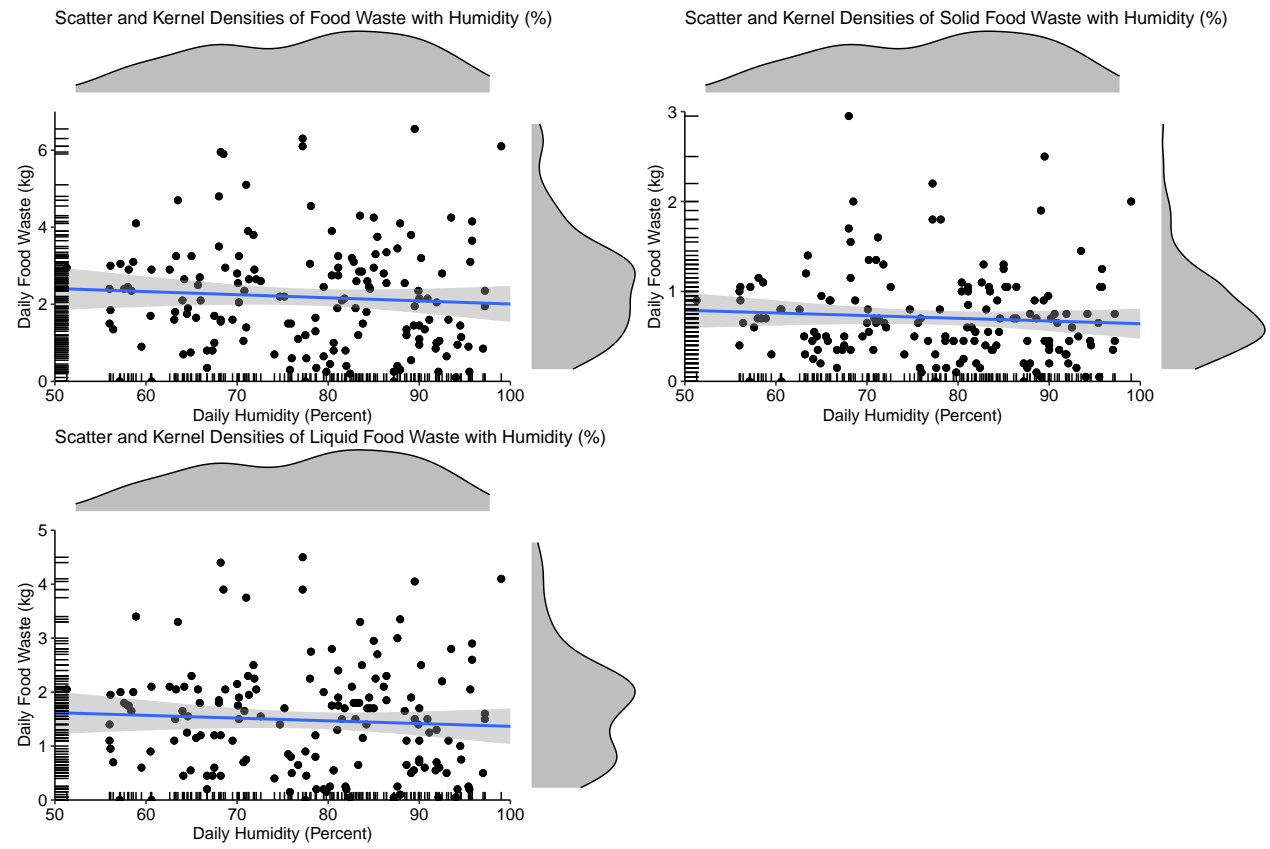


Scatter Plot

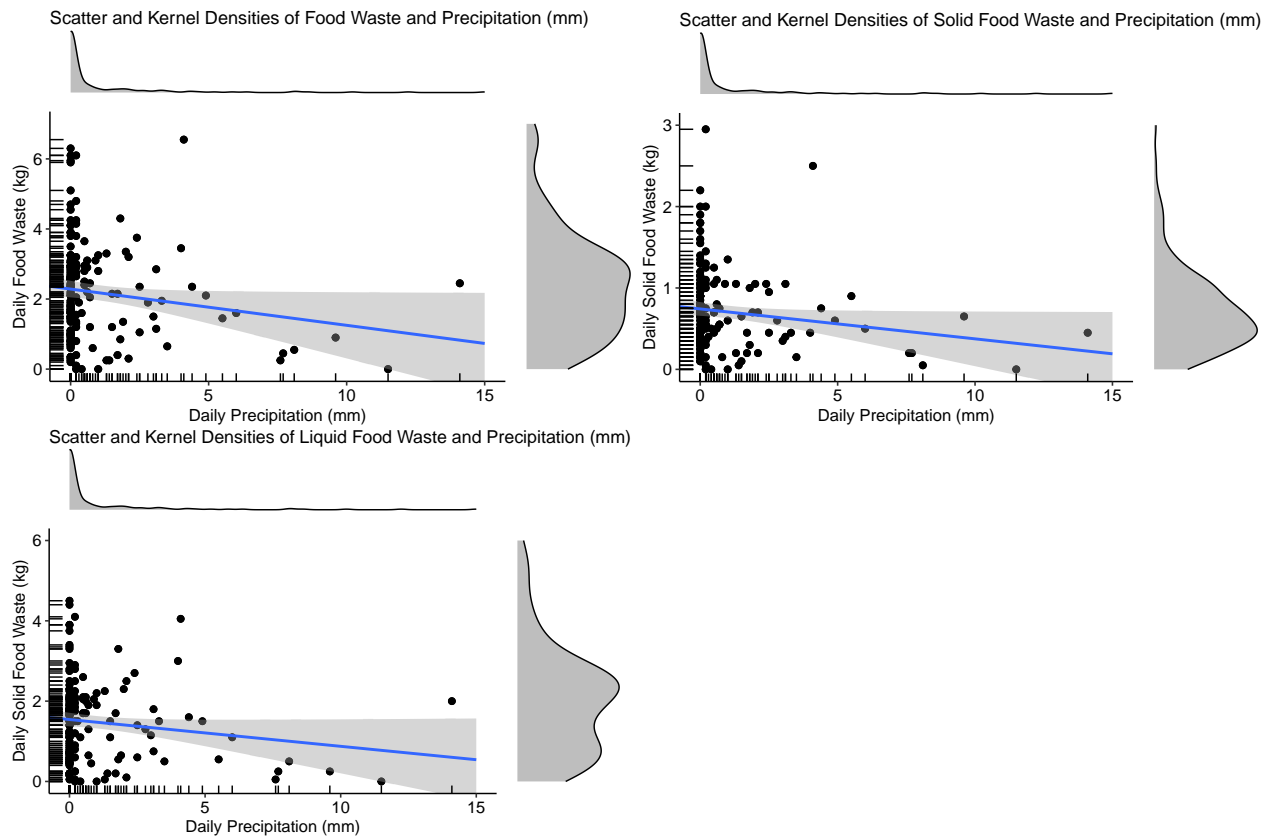
FW with temp



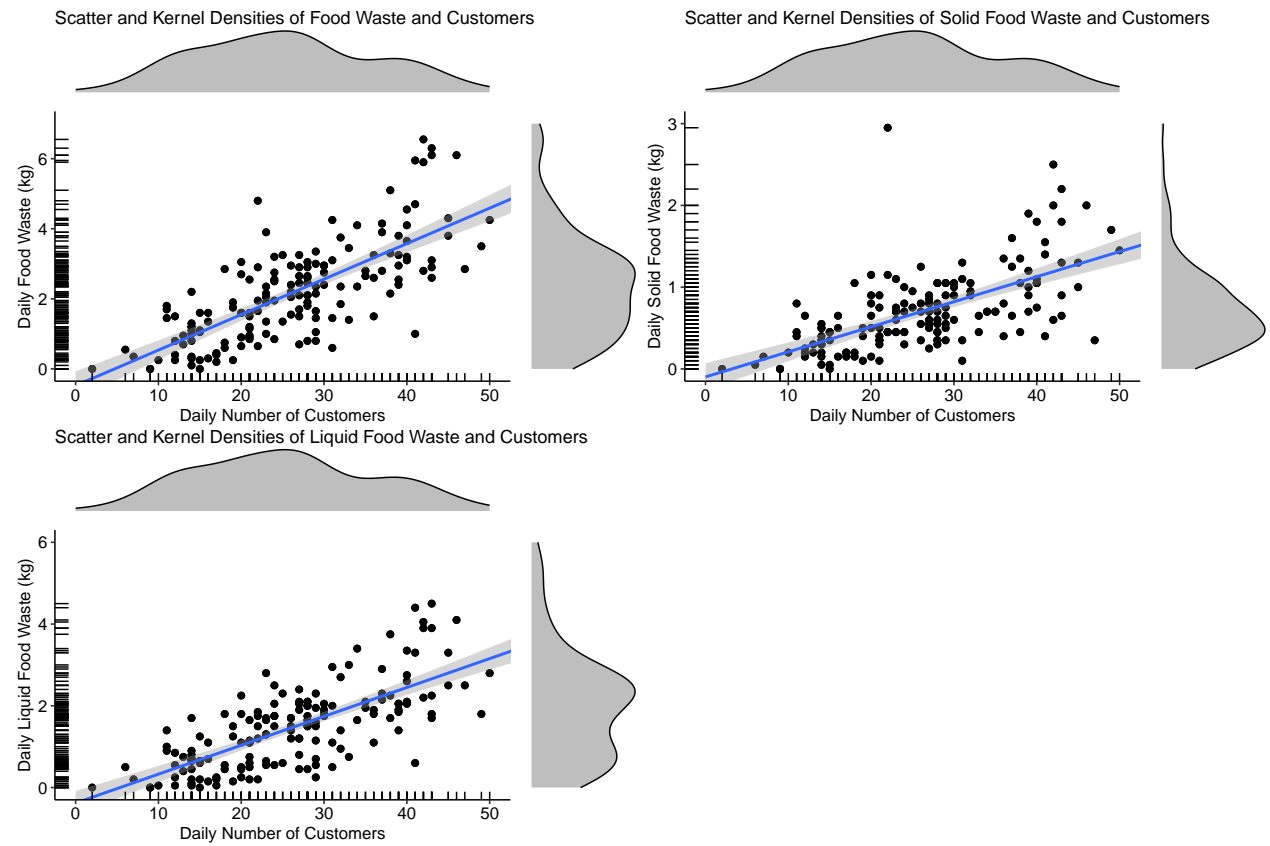
FW with humidity



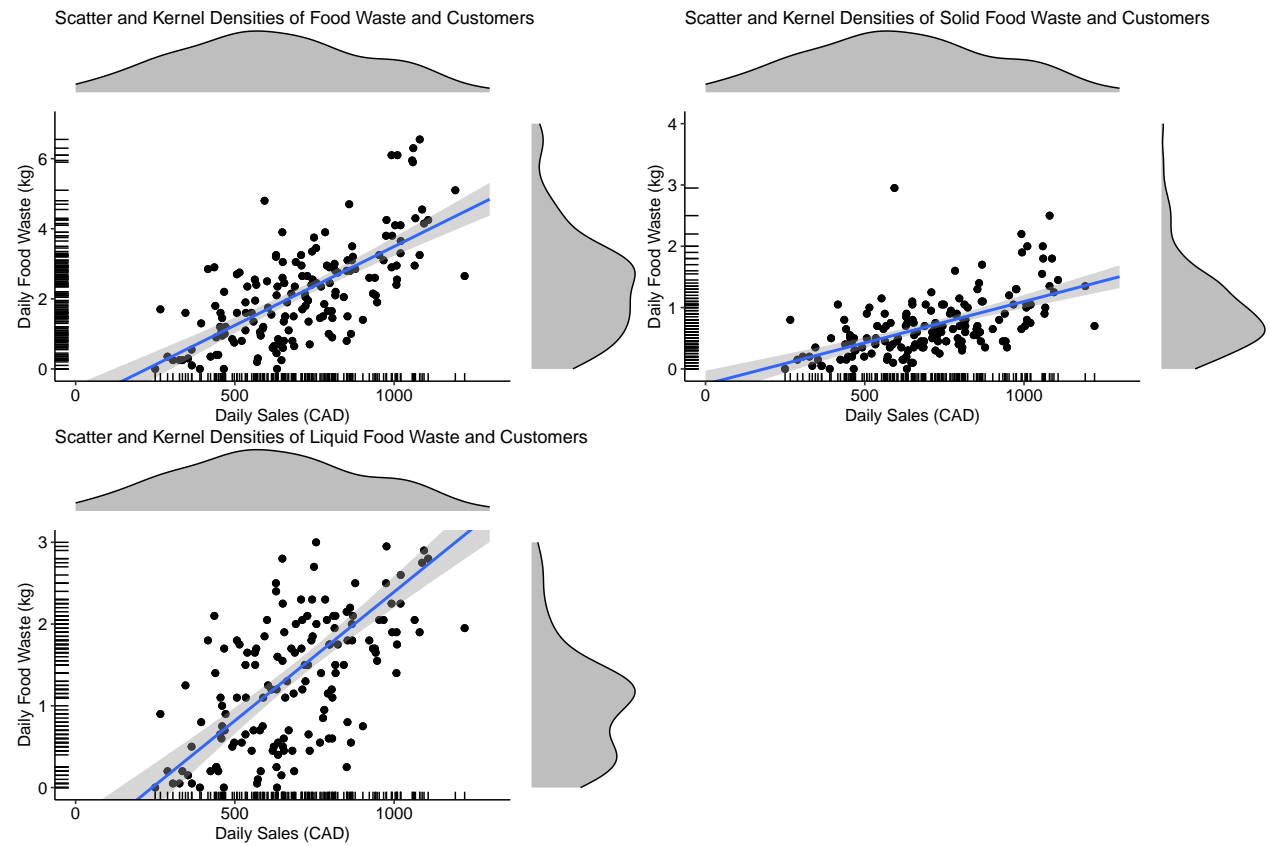
FW with precipitation



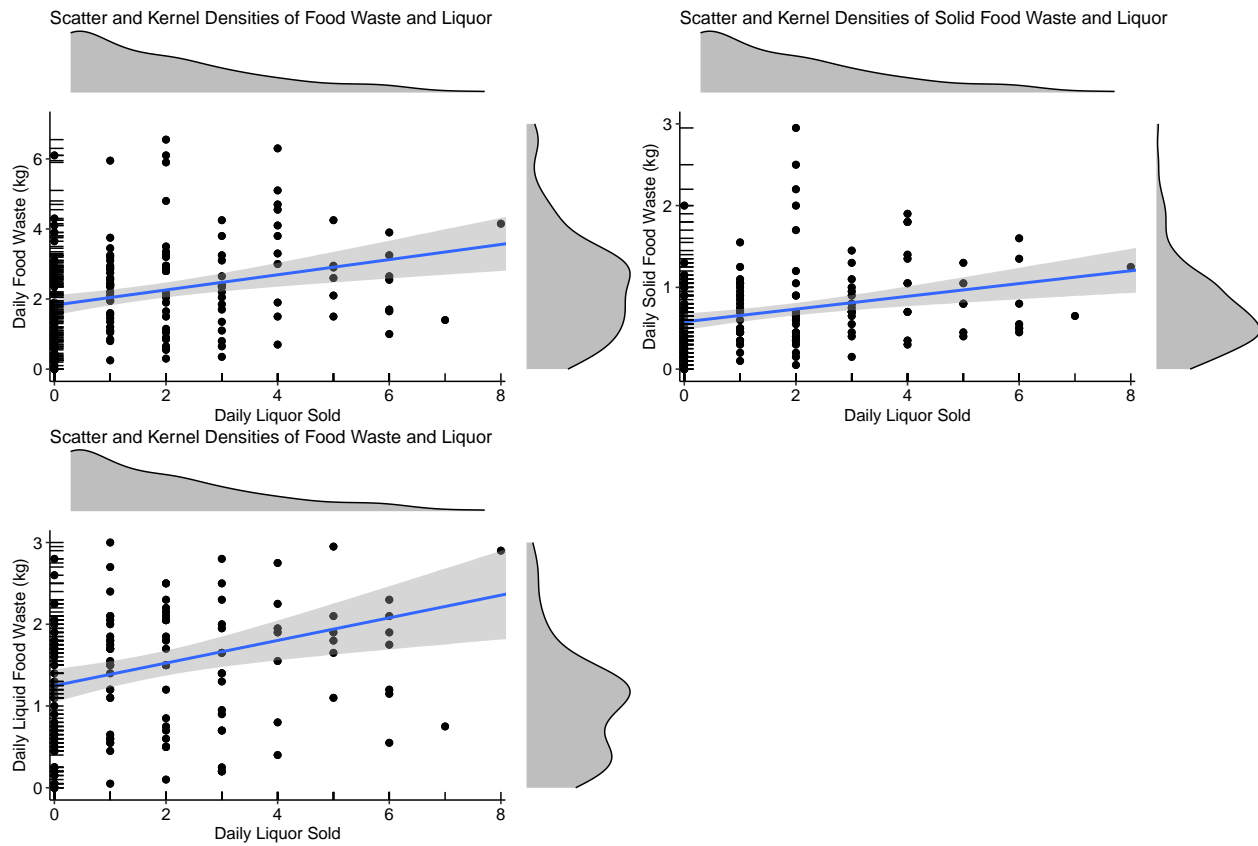
FW with customers



FW with sales



FW with liquor



Correlogram

Cross-Correlation

