

John Carter  
carte668  
section 003

Supermarket Model  
Report

# Overview

The goal of this report is to give adequate statistics and analysis based on a computer generated model of a Supermarket. Although it is impossible to simulate a real-time supermarket containing many fluctuating and unpredictable factors, it is rather easy to show how concrete systems will react to changing factors that can be controlled. This report will give statistics and analysis based on the following changing factors:

- Changing amount of checkout lanes based on business
- Changing amount of checkout lanes based on employee or customer bagging
- The impact of express lanes have on changing business levels

This report gives no recommendations but only conclusions about the data and how they interact and compare.

## **Customer vs Employee Bagging**

- 30 second arrival interval***

- 1 to 2 hour testing period***

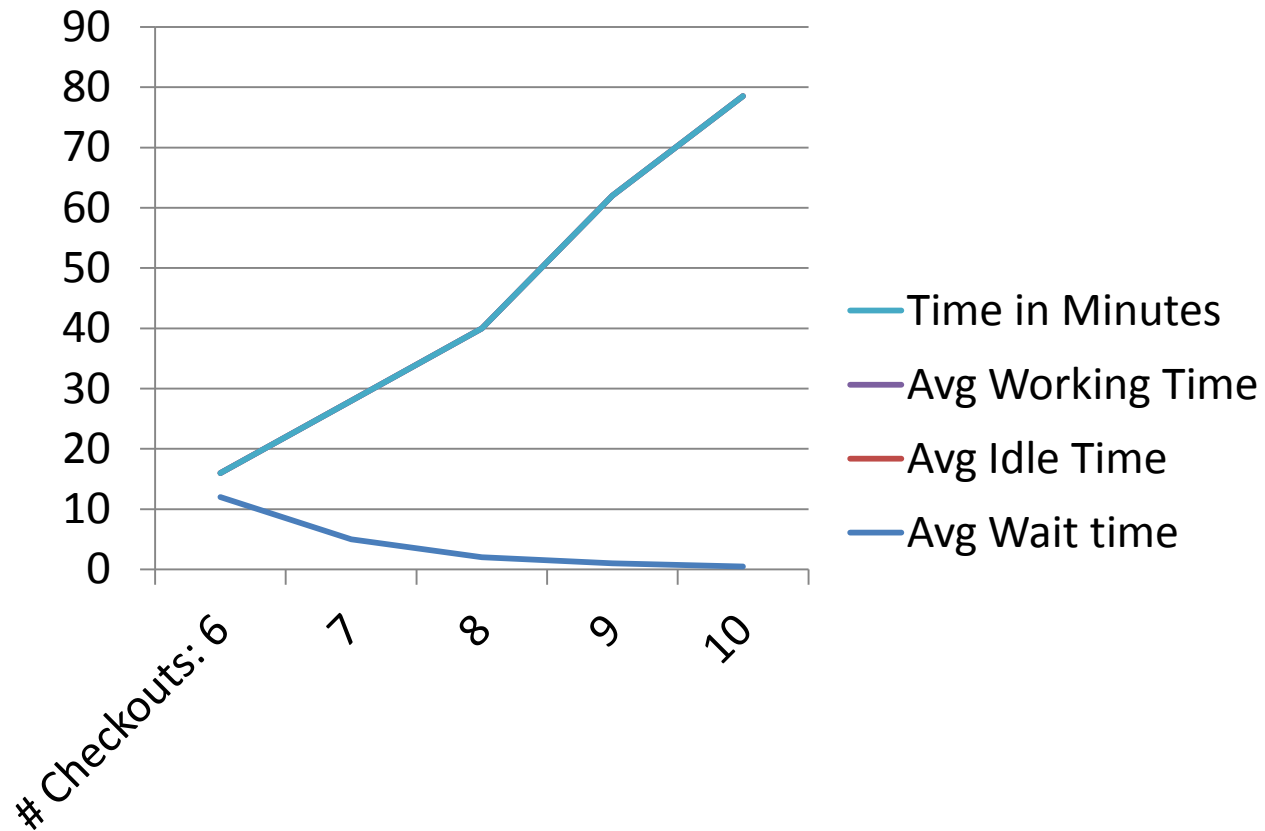
Based on the data collected for customer arrival rates of approximately every 30 seconds(raw data for this and subsequent findings can be shown in appendix), assuming that this is a high volume of business, shows that customer bagging can be expected to use the maximum of 12 checkout lanes with an average waiting time of approximately 9 minutes. At this volume of business using customer bagging can be expected to cause high periods of customer waiting with 30 to 60 minute maximum wait times. This volume of business can be handle by 6 checkout lanes that utilize employee bagging and attain essentially the same wait times.

## **Employee Bagging**

- Customer wait times vs Employee idle times***

The graph on the following page shows the comparison of customer wait times and employee idle time based on a 30 second customer arrival time. This data is meant to show what you can expect when deciding how many checkout lanes are needed for this volume of business, considering only employee bagging checkout lines since customer bagging checkout lines would appear to not properly handle this volume of business adequately.

## Comparing Average Employee Idle time vs Average Customer Waiting Time



## **Customer Wait Time vs Employee Idle Time**

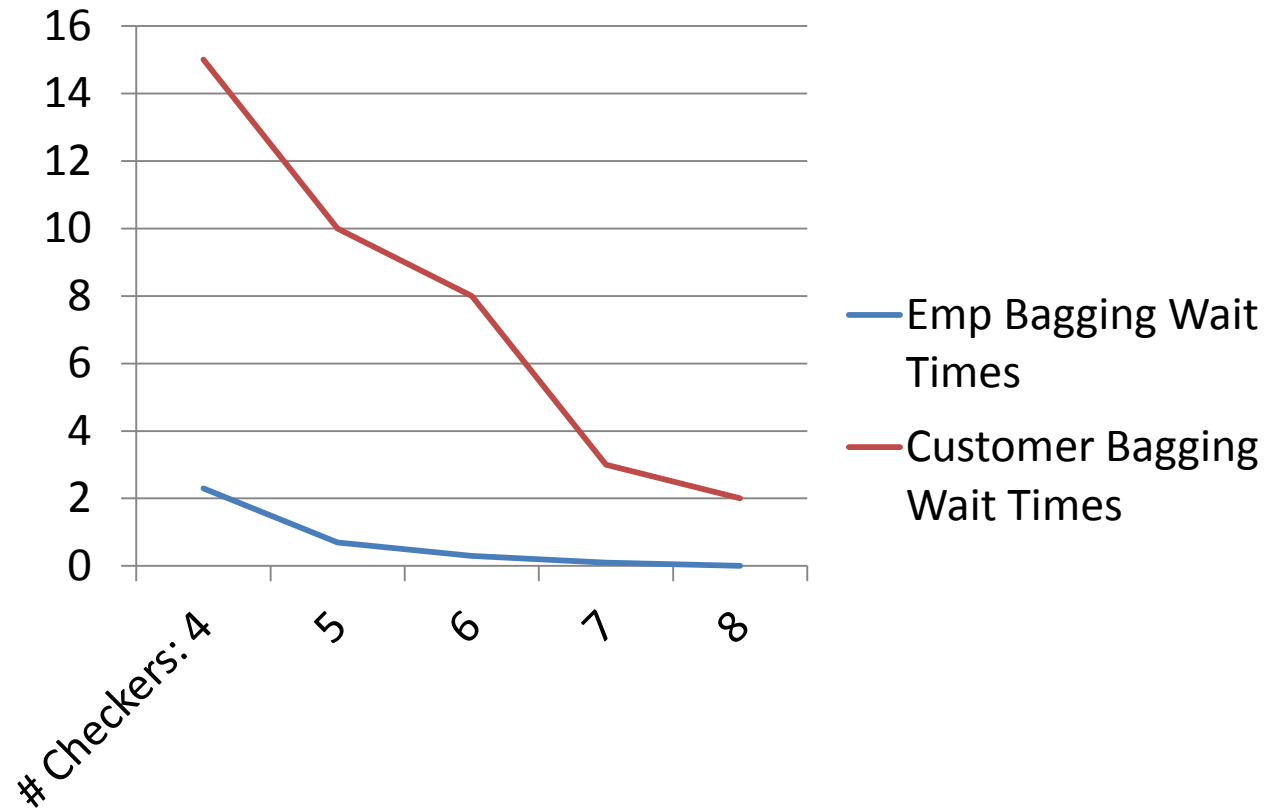
As shown in the graph, as customer wait time goes down by utilizing extra checkout lanes employee idle time goes up significantly. By utilizing 8 checkouts compared to 10, customer wait times go from on average 2 minutes down to .5 minutes but employee idle time goes from an average of 38 minutes per employee up to an average of 78 minutes per employee. Maximum wait time goes from approximately 16 minutes down to 6 minutes by utilizing 10 checkouts instead of 8. Using 7 checkout lanes increases customer waiting time to an average of 5 minutes with the maximum customer wait time of 23 minutes. This data can be used when making decisions based on labor costs vs customer satisfaction.

## **Employee Bagging vs Customer Bagging**

- ***60 second arrival interval***
- ***1 to 2 hour testing period***

The following graph shows how utilizing employee bagging of groceries vs customer bagging effects the number of checkout lanes needed. The data will show how the number of lanes needed for each method to arrive at similar customer waiting periods.

## Customer Bagging Wait Times vs Employee Bagging Wait Times



## Customer Bagging vs Employee Bagging

As shown in the previous graph, testing shows that on average you will need up to twice as many checkout lanes when utilizing customer bagging opposed to employee bagging. The customer wait time averaged approximately 2.3 minutes using 4 checkout lanes with employee bagging. Using customer bagging you would need 8 checkout lanes to achieve the same or better wait time. 8 checkout lanes with customer bagging achieved on average 2 minute wait times opposed to 2.3 minute wait times for employee bagging. In general, you would need slightly less than twice the checkout lanes if you were to utilize customer bagging vs employee bagging. This holds true for tests when 90 second arrival intervals were used. 4 checkout lanes using employee bagging achieved approximately the same wait times as 7 checkout lanes using customer bagging so the effects of using customer bagging would be an increase in checkout lanes slightly less than twice the number needed for employee checkout lanes.

One difference between employee vs customer bagging to consider is employee idle time. Although the wait times may be similar for 4 and 7 checkout lanes respectively, employee idle times were increased when using customer bagging by a significant enough margin to be of note which could be a factor when considering labor cost vs customer satisfaction.

## **The Effects of Express Checkout Lanes**

Utilizing express checkout lanes appears to have no significant change on customer wait times. Using 2 express lanes seem to slightly increase customer wait times over using 1 express lane. The difference between using no express lanes and 1 express lane on average results in approximately the same customer wait times.

There does seem to be a slight decrease in the maximum and average length of the customer wait lines when using express lanes, although minor. This decrease in customer wait lines seems to result in a minor decrease in maximum customer wait times. But this minor decrease in wait lines and maximum wait times does not seem to effect the average wait times. It is a possible consideration when making decisions about labor costs vs customer satisfaction.



## Conclusion

The data collected shows how changing different variables results in a different customer experience and a different amount of employee utilization. The data needed to understand how changing the amount of checkout lanes used can effect labor costs and customer satisfaction is provided in this report.

The decision to use employee bagging vs customer bagging can be aided by the understanding of how the number of checkout lanes needed for each results in differing customer wait times and employee idle time. On average using customer bagging increased the number of checkout lanes needed by slightly less than double, which is a factor to consider when deciding which bagging method to use.

Using 2 express lanes seems to increase the customer wait times slightly while using 1 express lane seems to have no significant impact on customer wait times or employee idle time as opposed to using no express lanes. One area to consider is the slight decrease in maximum wait times and wait lines. Although slight, this may or may not be of significance.

The following appendix includes the data collected that was used in this report.

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 6  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 240.06 minutes  
Total working time: 1459.13 minutes  
Total employee idle time: 32.21 minutes  
Total employee working time: 1426.92 minutes  
Average checkout time 3.36 minutes  
Total customer waiting time: 5360.78 minutes  
Maximum customer wait time: 40.50 minutes  
Average customer wait time: 12.61 minutes  
Maximum checkout waitline; 14  
Average checkout waitline: 0.79

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 6  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 120.19 minutes  
Total working time: 742.57 minutes  
Total employee idle time: 17.07 minutes  
Total employee working time: 725.50 minutes  
Average checkout time 3.42 minutes  
Total customer waiting time: 1786.87 minutes  
Maximum customer wait time: 29.24 minutes  
Average customer wait time: 8.43 minutes  
Maximum checkout waitline; 11  
Average checkout waitline: 0.60

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 6  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 239.95 minutes  
Total working time: 1451.14 minutes  
Total employee idle time: 16.89 minutes  
Total employee working time: 1434.25 minutes  
Average checkout time 3.41 minutes  
Total customer waiting time: 7027.27 minutes  
Maximum customer wait time: 56.08 minutes  
Average customer wait time: 16.73 minutes  
Maximum checkout waitline; 20  
Average checkout waitline: 1.01

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 6  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 120.47 minutes  
Total working time: 736.93 minutes  
Total employee idle time: 31.43 minutes  
Total employee working time: 705.50 minutes  
Average checkout time 3.51 minutes  
Total customer waiting time: 1616.01 minutes  
Maximum customer wait time: 27.40 minutes  
Average customer wait time: 8.04 minutes  
Maximum checkout waitline; 10  
Average checkout waitline: 0.55

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 6  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 240.33 minutes  
Total working time: 1455.03 minutes  
Total employee idle time: 24.78 minutes  
Total employee working time: 1430.25 minutes  
Average checkout time 3.44 minutes  
Total customer waiting time: 6143.68 minutes  
Maximum customer wait time: 51.69 minutes  
Average customer wait time: 14.77 minutes  
Maximum checkout waitline; 17  
Average checkout waitline: 0.90

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 6  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.94 minutes  
Total working time: 732.03 minutes  
Total employee idle time: 39.28 minutes  
Total employee working time: 692.75 minutes  
Average checkout time 3.55 minutes  
Total customer waiting time: 1701.28 minutes  
Maximum customer wait time: 21.41 minutes  
Average customer wait time: 8.72 minutes  
Maximum checkout waitline; 7  
Average checkout waitline: 0.51

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 239.89 minutes  
Total working time: 1689.68 minutes  
Total employee idle time: 160.43 minutes  
Total employee working time: 1529.25 minutes  
Average checkout time 3.30 minutes  
Total customer waiting time: 2326.89 minutes  
Maximum customer wait time: 21.83 minutes  
Average customer wait time: 5.03 minutes  
Maximum checkout waitline; 7  
Average checkout waitline: 0.30

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.69 minutes  
Total working time: 853.66 minutes  
Total employee idle time: 80.41 minutes  
Total employee working time: 773.25 minutes  
Average checkout time 3.60 minutes  
Total customer waiting time: 1264.21 minutes  
Maximum customer wait time: 28.25 minutes  
Average customer wait time: 5.88 minutes  
Maximum checkout waitline; 8  
Average checkout waitline: 0.31

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 239.98 minutes  
Total working time: 1695.29 minutes  
Total employee idle time: 149.46 minutes  
Total employee working time: 1545.83 minutes  
Average checkout time 3.35 minutes  
Total customer waiting time: 2557.23 minutes  
Maximum customer wait time: 28.71 minutes  
Average customer wait time: 5.55 minutes  
Maximum checkout waitline; 9  
Average checkout waitline: 0.31

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.94 minutes  
Total working time: 856.98 minutes  
Total employee idle time: 104.73 minutes  
Total employee working time: 752.25 minutes  
Average checkout time 3.28 minutes  
Total customer waiting time: 808.26 minutes  
Maximum customer wait time: 19.26 minutes  
Average customer wait time: 3.53 minutes  
Maximum checkout waitline; 6  
Average checkout waitline: 0.24

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 239.13 minutes  
Total working time: 1698.58 minutes  
Total employee idle time: 171.24 minutes  
Total employee working time: 1527.33 minutes  
Average checkout time 3.41 minutes  
Total customer waiting time: 2063.76 minutes  
Maximum customer wait time: 22.44 minutes  
Average customer wait time: 4.61 minutes  
Maximum checkout waitline; 7  
Average checkout waitline: 0.26

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 120.01 minutes  
Total working time: 863.81 minutes  
Total employee idle time: 126.06 minutes  
Total employee working time: 737.75 minutes  
Average checkout time 3.24 minutes  
Total customer waiting time: 938.08 minutes  
Maximum customer wait time: 21.37 minutes  
Average customer wait time: 4.11 minutes  
Maximum checkout waitline; 7  
Average checkout waitline: 0.27

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 8  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 238.83 minutes  
Total working time: 1936.68 minutes  
Total employee idle time: 302.60 minutes  
Total employee working time: 1634.08 minutes  
Average checkout time 3.38 minutes  
Total customer waiting time: 1056.23 minutes  
Maximum customer wait time: 13.78 minutes  
Average customer wait time: 2.19 minutes  
Maximum checkout waitline; 4  
Average checkout waitline: 0.16

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 8  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.95 minutes  
Total working time: 982.77 minutes  
Total employee idle time: 152.10 minutes  
Total employee working time: 830.67 minutes  
Average checkout time 3.48 minutes  
Total customer waiting time: 500.38 minutes  
Maximum customer wait time: 10.53 minutes  
Average customer wait time: 2.09 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.15

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 8  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 239.95 minutes  
Total working time: 1933.68 minutes  
Total employee idle time: 400.01 minutes  
Total employee working time: 1533.67 minutes  
Average checkout time 3.31 minutes  
Total customer waiting time: 670.89 minutes  
Maximum customer wait time: 16.51 minutes  
Average customer wait time: 1.45 minutes  
Maximum checkout waitline; 4  
Average checkout waitline: 0.14

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 8  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 120.28 minutes  
Total working time: 984.50 minutes  
Total employee idle time: 141.42 minutes  
Total employee working time: 843.08 minutes  
Average checkout time 3.68 minutes  
Total customer waiting time: 692.66 minutes  
Maximum customer wait time: 17.51 minutes  
Average customer wait time: 3.02 minutes  
Maximum checkout waitline; 5  
Average checkout waitline: 0.19

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 8  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 240.03 minutes  
Total working time: 1947.63 minutes  
Total employee idle time: 286.21 minutes  
Total employee working time: 1661.42 minutes  
Average checkout time 3.54 minutes  
Total customer waiting time: 1241.99 minutes  
Maximum customer wait time: 17.93 minutes  
Average customer wait time: 2.65 minutes  
Maximum checkout waitline; 4  
Average checkout waitline: 0.17

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 8  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.46 minutes  
Total working time: 970.97 minutes  
Total employee idle time: 212.47 minutes  
Total employee working time: 758.50 minutes  
Average checkout time 3.26 minutes  
Total customer waiting time: 221.98 minutes  
Maximum customer wait time: 6.20 minutes  
Average customer wait time: 0.95 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.13

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 9  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 240.03 minutes  
Total working time: 2177.99 minutes  
Total employee idle time: 538.49 minutes  
Total employee working time: 1639.50 minutes  
Average checkout time 3.39 minutes  
Total customer waiting time: 477.58 minutes  
Maximum customer wait time: 9.68 minutes  
Average customer wait time: 0.99 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.12

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 9  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.86 minutes  
Total working time: 1100.42 minutes  
Total employee idle time: 301.42 minutes  
Total employee working time: 799.00 minutes  
Average checkout time 3.29 minutes  
Total customer waiting time: 181.18 minutes  
Maximum customer wait time: 6.18 minutes  
Average customer wait time: 0.75 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.11

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 9  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 240.13 minutes  
Total working time: 2181.12 minutes  
Total employee idle time: 552.95 minutes  
Total employee working time: 1628.17 minutes  
Average checkout time 3.39 minutes  
Total customer waiting time: 553.05 minutes  
Maximum customer wait time: 11.44 minutes  
Average customer wait time: 1.15 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.12

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 9  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.38 minutes  
Total working time: 1098.98 minutes  
Total employee idle time: 337.73 minutes  
Total employee working time: 761.25 minutes  
Average checkout time 3.28 minutes  
Total customer waiting time: 134.31 minutes  
Maximum customer wait time: 7.18 minutes  
Average customer wait time: 0.58 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.11

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 9  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 240.00 minutes  
Total working time: 2169.49 minutes  
Total employee idle time: 639.24 minutes  
Total employee working time: 1530.25 minutes  
Average checkout time 3.21 minutes  
Total customer waiting time: 382.73 minutes  
Maximum customer wait time: 8.57 minutes  
Average customer wait time: 0.80 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.11

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 9  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.92 minutes  
Total working time: 1096.43 minutes  
Total employee idle time: 284.77 minutes  
Total employee working time: 811.67 minutes  
Average checkout time 3.41 minutes  
Total customer waiting time: 232.61 minutes  
Maximum customer wait time: 5.09 minutes  
Average customer wait time: 0.98 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.11

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 10  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 239.73 minutes  
Total working time: 2415.07 minutes  
Total employee idle time: 781.98 minutes  
Total employee working time: 1633.08 minutes  
Average checkout time 3.42 minutes  
Total customer waiting time: 265.23 minutes  
Maximum customer wait time: 7.52 minutes  
Average customer wait time: 0.55 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.10

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 10  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.80 minutes  
Total working time: 1219.32 minutes  
Total employee idle time: 330.73 minutes  
Total employee working time: 888.58 minutes  
Average checkout time 3.44 minutes  
Total customer waiting time: 181.51 minutes  
Maximum customer wait time: 7.37 minutes  
Average customer wait time: 0.70 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.10

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 10  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 239.43 minutes  
Total working time: 2414.24 minutes  
Total employee idle time: 784.83 minutes  
Total employee working time: 1629.42 minutes  
Average checkout time 3.45 minutes  
Total customer waiting time: 243.61 minutes  
Maximum customer wait time: 6.83 minutes  
Average customer wait time: 0.52 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.10

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 10  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 120.27 minutes  
Total working time: 1213.12 minutes  
Total employee idle time: 441.78 minutes  
Total employee working time: 771.33 minutes  
Average checkout time 3.24 minutes  
Total customer waiting time: 81.48 minutes  
Maximum customer wait time: 4.06 minutes  
Average customer wait time: 0.34 minutes  
Maximum checkout waitline; 1  
Average checkout waitline: 0.10

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 10  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 239.97 minutes  
Total working time: 2409.37 minutes  
Total employee idle time: 799.37 minutes  
Total employee working time: 1610.00 minutes  
Average checkout time 3.28 minutes  
Total customer waiting time: 239.15 minutes  
Maximum customer wait time: 5.55 minutes  
Average customer wait time: 0.49 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.10

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 10  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 120.60 minutes  
Total working time: 1218.97 minutes  
Total employee idle time: 405.63 minutes  
Total employee working time: 813.33 minutes  
Average checkout time 3.35 minutes  
Total customer waiting time: 133.91 minutes  
Maximum customer wait time: 8.02 minutes  
Average customer wait time: 0.55 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.10

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 12  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 240.05 minutes  
Total working time: 2927.15 minutes  
Total employee idle time: 233.00 minutes  
Total employee working time: 2694.15 minutes  
Average checkout time 6.17 minutes  
Total customer waiting time: 4163.60 minutes  
Maximum customer wait time: 43.75 minutes  
Average customer wait time: 9.53 minutes  
Maximum checkout waitline; 8  
Average checkout waitline: 0.19

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 12  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 119.58 minutes  
Total working time: 1498.25 minutes  
Total employee idle time: 156.35 minutes  
Total employee working time: 1341.90 minutes  
Average checkout time 6.55 minutes  
Total customer waiting time: 1292.25 minutes  
Maximum customer wait time: 35.13 minutes  
Average customer wait time: 6.30 minutes  
Maximum checkout waitline; 6  
Average checkout waitline: 0.14

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 12  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 240.08 minutes  
Total working time: 2925.10 minutes  
Total employee idle time: 151.60 minutes  
Total employee working time: 2773.50 minutes  
Average checkout time 6.11 minutes  
Total customer waiting time: 5449.75 minutes  
Maximum customer wait time: 45.45 minutes  
Average customer wait time: 12.00 minutes  
Maximum checkout waitline; 8  
Average checkout waitline: 0.21

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 12  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 119.93 minutes  
Total working time: 1484.70 minutes  
Total employee idle time: 138.15 minutes  
Total employee working time: 1346.55 minutes  
Average checkout time 6.07 minutes  
Total customer waiting time: 1426.93 minutes  
Maximum customer wait time: 40.20 minutes  
Average customer wait time: 6.43 minutes  
Maximum checkout waitline; 8  
Average checkout waitline: 0.14

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 12  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 240.03 minutes  
Total working time: 2911.88 minutes  
Total employee idle time: 261.53 minutes  
Total employee working time: 2650.35 minutes  
Average checkout time 6.01 minutes  
Total customer waiting time: 4722.70 minutes  
Maximum customer wait time: 57.15 minutes  
Average customer wait time: 10.71 minutes  
Maximum checkout waitline; 10  
Average checkout waitline: 0.19

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 12  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 120.20 minutes  
Total working time: 1492.83 minutes  
Total employee idle time: 152.73 minutes  
Total employee working time: 1340.10 minutes  
Average checkout time 6.67 minutes  
Total customer waiting time: 1517.10 minutes  
Maximum customer wait time: 33.95 minutes  
Average customer wait time: 7.55 minutes  
Maximum checkout waitline; 7  
Average checkout waitline: 0.15

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 5  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 238.65 minutes  
Total working time: 1207.07 minutes  
Total employee idle time: 350.90 minutes  
Total employee working time: 856.17 minutes  
Average checkout time 3.49 minutes  
Total customer waiting time: 192.67 minutes  
Maximum customer wait time: 7.05 minutes  
Average customer wait time: 0.79 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.21

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 5  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 120.85 minutes  
Total working time: 604.35 minutes  
Total employee idle time: 212.18 minutes  
Total employee working time: 392.17 minutes  
Average checkout time 3.47 minutes  
Total customer waiting time: 45.83 minutes  
Maximum customer wait time: 3.62 minutes  
Average customer wait time: 0.41 minutes  
Maximum checkout waitline; 1  
Average checkout waitline: 0.20

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 5  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 240.60 minutes  
Total working time: 1210.42 minutes  
Total employee idle time: 376.33 minutes  
Total employee working time: 834.08 minutes  
Average checkout time 3.39 minutes  
Total customer waiting time: 157.75 minutes  
Maximum customer wait time: 8.38 minutes  
Average customer wait time: 0.64 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.20

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 5  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.25 minutes  
Total working time: 615.20 minutes  
Total employee idle time: 165.95 minutes  
Total employee working time: 449.25 minutes  
Average checkout time 3.59 minutes  
Total customer waiting time: 94.15 minutes  
Maximum customer wait time: 6.65 minutes  
Average customer wait time: 0.75 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.20

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 5  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 240.25 minutes  
Total working time: 1208.92 minutes  
Total employee idle time: 386.67 minutes  
Total employee working time: 822.25 minutes  
Average checkout time 3.45 minutes  
Total customer waiting time: 166.33 minutes  
Maximum customer wait time: 5.98 minutes  
Average customer wait time: 0.70 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.20

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 5  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 120.75 minutes  
Total working time: 610.00 minutes  
Total employee idle time: 230.42 minutes  
Total employee working time: 379.58 minutes  
Average checkout time 3.33 minutes  
Total customer waiting time: 65.30 minutes  
Maximum customer wait time: 6.72 minutes  
Average customer wait time: 0.57 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.20



**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 4  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 239.00 minutes  
Total working time: 966.73 minutes  
Total employee idle time: 134.65 minutes  
Total employee working time: 832.08 minutes  
Average checkout time 3.34 minutes  
Total customer waiting time: 774.77 minutes  
Maximum customer wait time: 18.20 minutes  
Average customer wait time: 3.11 minutes  
Maximum checkout waitline; 5  
Average checkout waitline: 0.37

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 4  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.75 minutes  
Total working time: 490.28 minutes  
Total employee idle time: 83.62 minutes  
Total employee working time: 406.67 minutes  
Average checkout time 3.48 minutes  
Total customer waiting time: 239.93 minutes  
Maximum customer wait time: 8.38 minutes  
Average customer wait time: 2.05 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.30

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 4  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 240.15 minutes  
Total working time: 966.82 minutes  
Total employee idle time: 208.82 minutes  
Total employee working time: 758.00 minutes  
Average checkout time 3.17 minutes  
Total customer waiting time: 479.55 minutes  
Maximum customer wait time: 12.83 minutes  
Average customer wait time: 2.01 minutes  
Maximum checkout waitline; 4  
Average checkout waitline: 0.31

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 4  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.57 minutes  
Total working time: 488.68 minutes  
Total employee idle time: 62.93 minutes  
Total employee working time: 425.75 minutes  
Average checkout time 3.55 minutes  
Total customer waiting time: 226.08 minutes  
Maximum customer wait time: 8.83 minutes  
Average customer wait time: 1.88 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.29

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 4  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 239.80 minutes  
Total working time: 966.90 minutes  
Total employee idle time: 180.90 minutes  
Total employee working time: 786.00 minutes  
Average checkout time 3.25 minutes  
Total customer waiting time: 541.73 minutes  
Maximum customer wait time: 13.57 minutes  
Average customer wait time: 2.24 minutes  
Maximum checkout waitline; 4  
Average checkout waitline: 0.30

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 4  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 118.65 minutes  
Total working time: 490.05 minutes  
Total employee idle time: 72.88 minutes  
Total employee working time: 417.17 minutes  
Average checkout time 3.54 minutes  
Total customer waiting time: 249.52 minutes  
Maximum customer wait time: 11.48 minutes  
Average customer wait time: 2.11 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.29

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 238.70 minutes  
Total working time: 1693.80 minutes  
Total employee idle time: 279.45 minutes  
Total employee working time: 1414.35 minutes  
Average checkout time 5.87 minutes  
Total customer waiting time: 757.40 minutes  
Maximum customer wait time: 16.85 minutes  
Average customer wait time: 3.14 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.16

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 118.90 minutes  
Total working time: 867.10 minutes  
Total employee idle time: 192.85 minutes  
Total employee working time: 674.25 minutes  
Average checkout time 6.30 minutes  
Total customer waiting time: 306.90 minutes  
Maximum customer wait time: 21.90 minutes  
Average customer wait time: 2.87 minutes  
Maximum checkout waitline; 4  
Average checkout waitline: 0.17

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 238.20 minutes  
Total working time: 1705.90 minutes  
Total employee idle time: 333.55 minutes  
Total employee working time: 1372.35 minutes  
Average checkout time 5.65 minutes  
Total customer waiting time: 571.40 minutes  
Maximum customer wait time: 18.30 minutes  
Average customer wait time: 2.35 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.15

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 119.90 minutes  
Total working time: 858.85 minutes  
Total employee idle time: 197.20 minutes  
Total employee working time: 661.65 minutes  
Average checkout time 5.91 minutes  
Total customer waiting time: 242.60 minutes  
Maximum customer wait time: 11.95 minutes  
Average customer wait time: 2.17 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.16

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 240.60 minutes  
Total working time: 1718.90 minutes  
Total employee idle time: 302.60 minutes  
Total employee working time: 1416.30 minutes  
Average checkout time 6.10 minutes  
Total customer waiting time: 716.00 minutes  
Maximum customer wait time: 18.00 minutes  
Average customer wait time: 3.09 minutes  
Maximum checkout waitline; 4  
Average checkout waitline: 0.17

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 120.15 minutes  
Total working time: 880.00 minutes  
Total employee idle time: 171.10 minutes  
Total employee working time: 708.90 minutes  
Average checkout time 6.22 minutes  
Total customer waiting time: 370.45 minutes  
Maximum customer wait time: 14.55 minutes  
Average customer wait time: 3.25 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.17

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 8  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 239.85 minutes  
Total working time: 1936.50 minutes  
Total employee idle time: 541.80 minutes  
Total employee working time: 1394.70 minutes  
Average checkout time 5.72 minutes  
Total customer waiting time: 406.50 minutes  
Maximum customer wait time: 15.80 minutes  
Average customer wait time: 1.67 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.13

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 8  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 120.45 minutes  
Total working time: 992.95 minutes  
Total employee idle time: 271.60 minutes  
Total employee working time: 721.35 minutes  
Average checkout time 6.33 minutes  
Total customer waiting time: 161.10 minutes  
Maximum customer wait time: 13.50 minutes  
Average customer wait time: 1.41 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.13

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 8  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 241.15 minutes  
Total working time: 1946.45 minutes  
Total employee idle time: 468.65 minutes  
Total employee working time: 1477.80 minutes  
Average checkout time 6.13 minutes  
Total customer waiting time: 545.20 minutes  
Maximum customer wait time: 16.55 minutes  
Average customer wait time: 2.26 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.13

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 8  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 118.80 minutes  
Total working time: 982.90 minutes  
Total employee idle time: 271.30 minutes  
Total employee working time: 711.60 minutes  
Average checkout time 5.83 minutes  
Total customer waiting time: 216.80 minutes  
Maximum customer wait time: 12.45 minutes  
Average customer wait time: 1.78 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.14

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 8  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 239.75 minutes  
Total working time: 1946.60 minutes  
Total employee idle time: 582.80 minutes  
Total employee working time: 1363.80 minutes  
Average checkout time 5.85 minutes  
Total customer waiting time: 470.90 minutes  
Maximum customer wait time: 14.70 minutes  
Average customer wait time: 2.02 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.14

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 8  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 119.70 minutes  
Total working time: 976.45 minutes  
Total employee idle time: 302.65 minutes  
Total employee working time: 673.80 minutes  
Average checkout time 5.76 minutes  
Total customer waiting time: 139.25 minutes  
Maximum customer wait time: 12.20 minutes  
Average customer wait time: 1.19 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.13

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 9  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 119.95 minutes  
Total working time: 1112.15 minutes  
Total employee idle time: 370.55 minutes  
Total employee working time: 741.60 minutes  
Average checkout time 6.08 minutes  
Total customer waiting time: 101.55 minutes  
Maximum customer wait time: 11.70 minutes  
Average customer wait time: 0.83 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.11

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 9  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 240.60 minutes  
Total working time: 2183.60 minutes  
Total employee idle time: 650.60 minutes  
Total employee working time: 1533.00 minutes  
Average checkout time 6.13 minutes  
Total customer waiting time: 374.55 minutes  
Maximum customer wait time: 15.15 minutes  
Average customer wait time: 1.50 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.12

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 9  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 240.45 minutes  
Total working time: 2188.35 minutes  
Total employee idle time: 751.80 minutes  
Total employee working time: 1436.55 minutes  
Average checkout time 6.25 minutes  
Total customer waiting time: 238.30 minutes  
Maximum customer wait time: 11.00 minutes  
Average customer wait time: 1.04 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.11

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 9  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 240.10 minutes  
Total working time: 2216.40 minutes  
Total employee idle time: 728.10 minutes  
Total employee working time: 1488.30 minutes  
Average checkout time 6.56 minutes  
Total customer waiting time: 191.65 minutes  
Maximum customer wait time: 11.20 minutes  
Average customer wait time: 0.84 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.11

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 9  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 240.05 minutes  
Total working time: 2163.45 minutes  
Total employee idle time: 778.80 minutes  
Total employee working time: 1384.65 minutes  
Average checkout time 5.89 minutes  
Total customer waiting time: 162.55 minutes  
Maximum customer wait time: 9.85 minutes  
Average customer wait time: 0.69 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.11

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 9  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 239.30 minutes  
Total working time: 2172.70 minutes  
Total employee idle time: 732.85 minutes  
Total employee working time: 1439.85 minutes  
Average checkout time 6.08 minutes  
Total customer waiting time: 232.15 minutes  
Maximum customer wait time: 13.15 minutes  
Average customer wait time: 0.98 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.11

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 3  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 240.98 minutes  
Total working time: 730.13 minutes  
Total employee idle time: 192.63 minutes  
Total employee working time: 537.50 minutes  
Average checkout time 3.40 minutes  
Total customer waiting time: 166.95 minutes  
Maximum customer wait time: 9.68 minutes  
Average customer wait time: 1.06 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.35

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 3  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 121.43 minutes  
Total working time: 377.44 minutes  
Total employee idle time: 75.36 minutes  
Total employee working time: 302.08 minutes  
Average checkout time 3.39 minutes  
Total customer waiting time: 126.33 minutes  
Maximum customer wait time: 8.02 minutes  
Average customer wait time: 1.42 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.37

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 3  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 238.58 minutes  
Total working time: 720.68 minutes  
Total employee idle time: 164.85 minutes  
Total employee working time: 555.83 minutes  
Average checkout time 3.63 minutes  
Total customer waiting time: 218.35 minutes  
Maximum customer wait time: 8.74 minutes  
Average customer wait time: 1.43 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.37

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 3  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.27 minutes  
Total working time: 368.60 minutes  
Total employee idle time: 101.60 minutes  
Total employee working time: 267.00 minutes  
Average checkout time 3.30 minutes  
Total customer waiting time: 114.03 minutes  
Maximum customer wait time: 8.73 minutes  
Average customer wait time: 1.41 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.38

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 3  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 240.90 minutes  
Total working time: 730.18 minutes  
Total employee idle time: 165.09 minutes  
Total employee working time: 565.08 minutes  
Average checkout time 3.49 minutes  
Total customer waiting time: 251.67 minutes  
Maximum customer wait time: 11.09 minutes  
Average customer wait time: 1.55 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.37

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 3  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.40 minutes  
Total working time: 365.18 minutes  
Total employee idle time: 78.51 minutes  
Total employee working time: 286.67 minutes  
Average checkout time 3.37 minutes  
Total customer waiting time: 137.22 minutes  
Maximum customer wait time: 9.99 minutes  
Average customer wait time: 1.61 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.38

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 4  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 237.30 minutes  
Total working time: 968.96 minutes  
Total employee idle time: 499.13 minutes  
Total employee working time: 469.83 minutes  
Average checkout time 3.15 minutes  
Total customer waiting time: 20.11 minutes  
Maximum customer wait time: 3.88 minutes  
Average customer wait time: 0.13 minutes  
Maximum checkout waitline; 1  
Average checkout waitline: 0.25

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 4  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 120.23 minutes  
Total working time: 480.25 minutes  
Total employee idle time: 209.67 minutes  
Total employee working time: 270.58 minutes  
Average checkout time 3.30 minutes  
Total customer waiting time: 13.20 minutes  
Maximum customer wait time: 2.87 minutes  
Average customer wait time: 0.16 minutes  
Maximum checkout waitline; 1  
Average checkout waitline: 0.25

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 4  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 239.40 minutes  
Total working time: 960.92 minutes  
Total employee idle time: 430.92 minutes  
Total employee working time: 530.00 minutes  
Average checkout time 3.12 minutes  
Total customer waiting time: 30.75 minutes  
Maximum customer wait time: 3.80 minutes  
Average customer wait time: 0.18 minutes  
Maximum checkout waitline; 1  
Average checkout waitline: 0.25

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 4  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 118.50 minutes  
Total working time: 477.86 minutes  
Total employee idle time: 242.28 minutes  
Total employee working time: 235.58 minutes  
Average checkout time 3.14 minutes  
Total customer waiting time: 16.71 minutes  
Maximum customer wait time: 2.95 minutes  
Average customer wait time: 0.22 minutes  
Maximum checkout waitline; 1  
Average checkout waitline: 0.25

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 4  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 240.30 minutes  
Total working time: 965.72 minutes  
Total employee idle time: 362.13 minutes  
Total employee working time: 603.58 minutes  
Average checkout time 3.64 minutes  
Total customer waiting time: 54.55 minutes  
Maximum customer wait time: 5.81 minutes  
Average customer wait time: 0.33 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.25

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 4  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.25 minutes  
Total working time: 478.53 minutes  
Total employee idle time: 224.44 minutes  
Total employee working time: 254.08 minutes  
Average checkout time 2.95 minutes  
Total customer waiting time: 36.01 minutes  
Maximum customer wait time: 4.47 minutes  
Average customer wait time: 0.42 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.25

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 6  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 239.18 minutes  
Total working time: 1437.98 minutes  
Total employee idle time: 446.48 minutes  
Total employee working time: 991.50 minutes  
Average checkout time 6.28 minutes  
Total customer waiting time: 124.58 minutes  
Maximum customer wait time: 7.35 minutes  
Average customer wait time: 0.79 minutes  
Maximum checkout waitline; 1  
Average checkout waitline: 0.17

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 6  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 120.38 minutes  
Total working time: 742.58 minutes  
Total employee idle time: 321.83 minutes  
Total employee working time: 420.75 minutes  
Average checkout time 5.69 minutes  
Total customer waiting time: 51.15 minutes  
Maximum customer wait time: 11.33 minutes  
Average customer wait time: 0.69 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.17

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 6  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 240.08 minutes  
Total working time: 1440.45 minutes  
Total employee idle time: 388.95 minutes  
Total employee working time: 1051.50 minutes  
Average checkout time 6.53 minutes  
Total customer waiting time: 240.15 minutes  
Maximum customer wait time: 11.63 minutes  
Average customer wait time: 1.49 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.17

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 6  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 119.18 minutes  
Total working time: 728.93 minutes  
Total employee idle time: 282.83 minutes  
Total employee working time: 446.10 minutes  
Average checkout time 5.65 minutes  
Total customer waiting time: 47.63 minutes  
Maximum customer wait time: 7.73 minutes  
Average customer wait time: 0.60 minutes  
Maximum checkout waitline; 1  
Average checkout waitline: 0.17

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 6  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 241.13 minutes  
Total working time: 1459.65 minutes  
Total employee idle time: 490.80 minutes  
Total employee working time: 968.85 minutes  
Average checkout time 5.98 minutes  
Total customer waiting time: 155.18 minutes  
Maximum customer wait time: 9.23 minutes  
Average customer wait time: 0.96 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.17

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 6  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 120.83 minutes  
Total working time: 723.00 minutes  
Total employee idle time: 319.05 minutes  
Total employee working time: 403.95 minutes  
Average checkout time 4.99 minutes  
Total customer waiting time: 42.68 minutes  
Maximum customer wait time: 5.33 minutes  
Average customer wait time: 0.53 minutes  
Maximum checkout waitline; 1  
Average checkout waitline: 0.17

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 239.55 minutes  
Total working time: 1693.35 minutes  
Total employee idle time: 800.40 minutes  
Total employee working time: 892.95 minutes  
Average checkout time 5.99 minutes  
Total customer waiting time: 14.03 minutes  
Maximum customer wait time: 2.55 minutes  
Average customer wait time: 0.09 minutes  
Maximum checkout waitline; 1  
Average checkout waitline: 0.14

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 240.75 minutes  
Total working time: 1686.75 minutes  
Total employee idle time: 786.30 minutes  
Total employee working time: 900.45 minutes  
Average checkout time 5.77 minutes  
Total customer waiting time: 60.15 minutes  
Maximum customer wait time: 9.83 minutes  
Average customer wait time: 0.39 minutes  
Maximum checkout waitline; 1  
Average checkout waitline: 0.14

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 240.08 minutes  
Total working time: 1683.75 minutes  
Total employee idle time: 739.95 minutes  
Total employee working time: 943.80 minutes  
Average checkout time 5.75 minutes  
Total customer waiting time: 63.00 minutes  
Maximum customer wait time: 5.18 minutes  
Average customer wait time: 0.38 minutes  
Maximum checkout waitline; 1  
Average checkout waitline: 0.14

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 120.45 minutes  
Total working time: 854.70 minutes  
Total employee idle time: 321.30 minutes  
Total employee working time: 533.40 minutes  
Average checkout time 6.35 minutes  
Total customer waiting time: 22.35 minutes  
Maximum customer wait time: 3.45 minutes  
Average customer wait time: 0.27 minutes  
Maximum checkout waitline; 1  
Average checkout waitline: 0.14

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 119.78 minutes  
Total working time: 844.05 minutes  
Total employee idle time: 364.50 minutes  
Total employee working time: 479.55 minutes  
Average checkout time 6.23 minutes  
Total customer waiting time: 52.88 minutes  
Maximum customer wait time: 14.18 minutes  
Average customer wait time: 0.69 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.14

**\*\*Simulation Results\*\***

Arrival interval: 90  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Customer Bagging

Period of simulation time: 121.50 minutes  
Total working time: 862.80 minutes  
Total employee idle time: 371.25 minutes  
Total employee working time: 491.55 minutes  
Average checkout time 5.78 minutes  
Total customer waiting time: 21.08 minutes  
Maximum customer wait time: 4.73 minutes  
Average customer wait time: 0.25 minutes  
Maximum checkout waitline; 1  
Average checkout waitline: 0.14



**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.76 minutes  
Total working time: 850.53 minutes  
Total employee idle time: 118.70 minutes  
Total employee working time: 731.83 minutes  
Average checkout time 3.36 minutes  
Total customer waiting time: 734.95 minutes  
Maximum customer wait time: 14.09 minutes  
Average customer wait time: 3.37 minutes  
Maximum checkout waitline; 4  
Average checkout waitline: 0.22

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 6  
Number of express checkers: 1  
Bagging method: Employee Bagging

Period of simulation time: 119.28 minutes  
Total working time: 862.83 minutes  
Total employee idle time: 120.08 minutes  
Total employee working time: 742.75 minutes  
Average checkout time 3.33 minutes  
Total customer waiting time: 668.66 minutes  
Maximum customer wait time: 18.05 minutes  
Average customer wait time: 3.00 minutes  
Maximum checkout waitline; 4  
Average checkout waitline: 0.20

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.56 minutes  
Total working time: 853.21 minutes  
Total employee idle time: 70.29 minutes  
Total employee working time: 782.92 minutes  
Average checkout time 3.50 minutes  
Total customer waiting time: 944.21 minutes  
Maximum customer wait time: 22.97 minutes  
Average customer wait time: 4.22 minutes  
Maximum checkout waitline; 7  
Average checkout waitline: 0.27

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 6  
Number of express checkers: 1  
Bagging method: Employee Bagging

Period of simulation time: 119.41 minutes  
Total working time: 865.54 minutes  
Total employee idle time: 79.21 minutes  
Total employee working time: 786.33 minutes  
Average checkout time 3.39 minutes  
Total customer waiting time: 842.63 minutes  
Maximum customer wait time: 14.10 minutes  
Average customer wait time: 3.63 minutes  
Maximum checkout waitline; 4  
Average checkout waitline: 0.23

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 7  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 120.50 minutes  
Total working time: 854.46 minutes  
Total employee idle time: 82.04 minutes  
Total employee working time: 772.42 minutes  
Average checkout time 3.27 minutes  
Total customer waiting time: 913.19 minutes  
Maximum customer wait time: 15.95 minutes  
Average customer wait time: 3.87 minutes  
Maximum checkout waitline; 5  
Average checkout waitline: 0.25

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 6  
Number of express checkers: 1  
Bagging method: Employee Bagging

Period of simulation time: 119.94 minutes  
Total working time: 857.90 minutes  
Total employee idle time: 93.07 minutes  
Total employee working time: 764.83 minutes  
Average checkout time 3.25 minutes  
Total customer waiting time: 904.23 minutes  
Maximum customer wait time: 13.48 minutes  
Average customer wait time: 3.85 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.25

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 9  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 120.00 minutes  
Total working time: 1094.11 minutes  
Total employee idle time: 309.19 minutes  
Total employee working time: 784.92 minutes  
Average checkout time 3.33 minutes  
Total customer waiting time: 188.66 minutes  
Maximum customer wait time: 6.13 minutes  
Average customer wait time: 0.80 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.11

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 8  
Number of express checkers: 1  
Bagging method: Employee Bagging

Period of simulation time: 119.78 minutes  
Total working time: 1095.67 minutes  
Total employee idle time: 338.50 minutes  
Total employee working time: 757.17 minutes  
Average checkout time 3.40 minutes  
Total customer waiting time: 201.42 minutes  
Maximum customer wait time: 6.85 minutes  
Average customer wait time: 0.90 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.11

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 9  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.55 minutes  
Total working time: 1082.48 minutes  
Total employee idle time: 290.90 minutes  
Total employee working time: 791.58 minutes  
Average checkout time 3.37 minutes  
Total customer waiting time: 233.38 minutes  
Maximum customer wait time: 8.44 minutes  
Average customer wait time: 0.99 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.12

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 8  
Number of express checkers: 1  
Bagging method: Employee Bagging

Period of simulation time: 120.18 minutes  
Total working time: 1098.39 minutes  
Total employee idle time: 236.48 minutes  
Total employee working time: 861.92 minutes  
Average checkout time 3.67 minutes  
Total customer waiting time: 302.52 minutes  
Maximum customer wait time: 7.95 minutes  
Average customer wait time: 1.29 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.11

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 9  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 120.03 minutes  
Total working time: 1099.83 minutes  
Total employee idle time: 289.42 minutes  
Total employee working time: 810.42 minutes  
Average checkout time 3.39 minutes  
Total customer waiting time: 251.56 minutes  
Maximum customer wait time: 8.66 minutes  
Average customer wait time: 1.05 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.12

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 8  
Number of express checkers: 1  
Bagging method: Employee Bagging

Period of simulation time: 119.56 minutes  
Total working time: 1091.03 minutes  
Total employee idle time: 236.69 minutes  
Total employee working time: 854.33 minutes  
Average checkout time 3.67 minutes  
Total customer waiting time: 329.15 minutes  
Maximum customer wait time: 7.93 minutes  
Average customer wait time: 1.41 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.12

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 7  
Number of express checkers: 2  
Bagging method: Employee Bagging

Period of simulation time: 119.58 minutes  
Total working time: 1096.10 minutes  
Total employee idle time: 308.85 minutes  
Total employee working time: 787.25 minutes  
Average checkout time 3.42 minutes  
Total customer waiting time: 245.22 minutes  
Maximum customer wait time: 7.22 minutes  
Average customer wait time: 1.07 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.11

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 8  
Number of express checkers: 1  
Bagging method: Employee Bagging

Period of simulation time: 119.78 minutes  
Total working time: 1095.67 minutes  
Total employee idle time: 338.50 minutes  
Total employee working time: 757.17 minutes  
Average checkout time 3.40 minutes  
Total customer waiting time: 201.42 minutes  
Maximum customer wait time: 6.85 minutes  
Average customer wait time: 0.90 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.11

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 7  
Number of express checkers: 2  
Bagging method: Employee Bagging

Period of simulation time: 120.28 minutes  
Total working time: 1094.93 minutes  
Total employee idle time: 273.10 minutes  
Total employee working time: 821.83 minutes  
Average checkout time 3.51 minutes  
Total customer waiting time: 324.91 minutes  
Maximum customer wait time: 7.30 minutes  
Average customer wait time: 1.39 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.12

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 8  
Number of express checkers: 1  
Bagging method: Employee Bagging

Period of simulation time: 120.18 minutes  
Total working time: 1098.39 minutes  
Total employee idle time: 236.48 minutes  
Total employee working time: 861.92 minutes  
Average checkout time 3.67 minutes  
Total customer waiting time: 302.52 minutes  
Maximum customer wait time: 7.95 minutes  
Average customer wait time: 1.29 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.11

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 7  
Number of express checkers: 2  
Bagging method: Employee Bagging

Period of simulation time: 119.88 minutes  
Total working time: 1099.37 minutes  
Total employee idle time: 265.45 minutes  
Total employee working time: 833.92 minutes  
Average checkout time 3.43 minutes  
Total customer waiting time: 410.80 minutes  
Maximum customer wait time: 10.49 minutes  
Average customer wait time: 1.69 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.12

**\*\*Simulation Results\*\***

Arrival interval: 30  
Number of regular checkers: 8  
Number of express checkers: 1  
Bagging method: Employee Bagging

Period of simulation time: 119.56 minutes  
Total working time: 1091.03 minutes  
Total employee idle time: 236.69 minutes  
Total employee working time: 854.33 minutes  
Average checkout time 3.67 minutes  
Total customer waiting time: 329.15 minutes  
Maximum customer wait time: 7.93 minutes  
Average customer wait time: 1.41 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.12

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 4  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 120.10 minutes  
Total working time: 490.20 minutes  
Total employee idle time: 99.70 minutes  
Total employee working time: 390.50 minutes  
Average checkout time 3.31 minutes  
Total customer waiting time: 137.30 minutes  
Maximum customer wait time: 8.12 minutes  
Average customer wait time: 1.16 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.27

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 3  
Number of express checkers: 1  
Bagging method: Employee Bagging

Period of simulation time: 120.75 minutes  
Total working time: 491.10 minutes  
Total employee idle time: 92.85 minutes  
Total employee working time: 398.25 minutes  
Average checkout time 3.29 minutes  
Total customer waiting time: 249.45 minutes  
Maximum customer wait time: 10.28 minutes  
Average customer wait time: 2.06 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.27

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 4  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.80 minutes  
Total working time: 494.72 minutes  
Total employee idle time: 59.55 minutes  
Total employee working time: 435.17 minutes  
Average checkout time 3.43 minutes  
Total customer waiting time: 306.10 minutes  
Maximum customer wait time: 13.48 minutes  
Average customer wait time: 2.41 minutes  
Maximum checkout waitline; 4  
Average checkout waitline: 0.31

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 3  
Number of express checkers: 1  
Bagging method: Employee Bagging

Period of simulation time: 119.75 minutes  
Total working time: 486.95 minutes  
Total employee idle time: 81.37 minutes  
Total employee working time: 405.58 minutes  
Average checkout time 3.32 minutes  
Total customer waiting time: 270.15 minutes  
Maximum customer wait time: 10.13 minutes  
Average customer wait time: 2.21 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.29

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 4  
Number of express checkers: 0  
Bagging method: Employee Bagging

Period of simulation time: 119.80 minutes  
Total working time: 484.77 minutes  
Total employee idle time: 71.10 minutes  
Total employee working time: 413.67 minutes  
Average checkout time 3.48 minutes  
Total customer waiting time: 333.37 minutes  
Maximum customer wait time: 11.55 minutes  
Average customer wait time: 2.80 minutes  
Maximum checkout waitline; 3  
Average checkout waitline: 0.34

**\*\*Simulation Results\*\***

Arrival interval: 60  
Number of regular checkers: 3  
Number of express checkers: 1  
Bagging method: Employee Bagging

Period of simulation time: 120.00 minutes  
Total working time: 484.93 minutes  
Total employee idle time: 91.77 minutes  
Total employee working time: 393.17 minutes  
Average checkout time 3.22 minutes  
Total customer waiting time: 239.88 minutes  
Maximum customer wait time: 7.82 minutes  
Average customer wait time: 1.97 minutes  
Maximum checkout waitline; 2  
Average checkout waitline: 0.29