Feminist gas station

Project for the Principles of Simulation Course

Course Instructor: Professor Mohammad Ranjbar
Student: Hadi Hassanzadeh

1- Introduction:

One of the issues that differs between men and women in Iran is the manner in which they refuel their vehicles. In most gas stations in Iran, if the driver is a woman and wishes to refuel, the station attendant performs the refueling process for her. However, if the driver is a man, he must disembark from his vehicle and carry out the refueling process himself. In a way, it can be said that in Iranian culture, refueling vehicles is perceived as a masculine task, and it is rare for women to disembark from their vehicles at gas stations.

In this research, an attempt has been made to answer the question using discrete event simulation techniques: Is it better for women to refuel themselves or to establish systematic refueling stations where an attendant performs the refueling process for each customer?

The required project information has been gathered from Gas Station 117. This gas station is located in the western part of Mashhad, at the address of Piroozi Boulevard, after Piroozi 28. Figure (1) illustrates the project's execution location. This facility privately engages in fuel supply services and operates 24 hours a day. The station has 5 fuel dispensing channels, offering regular unleaded gasoline to customers.

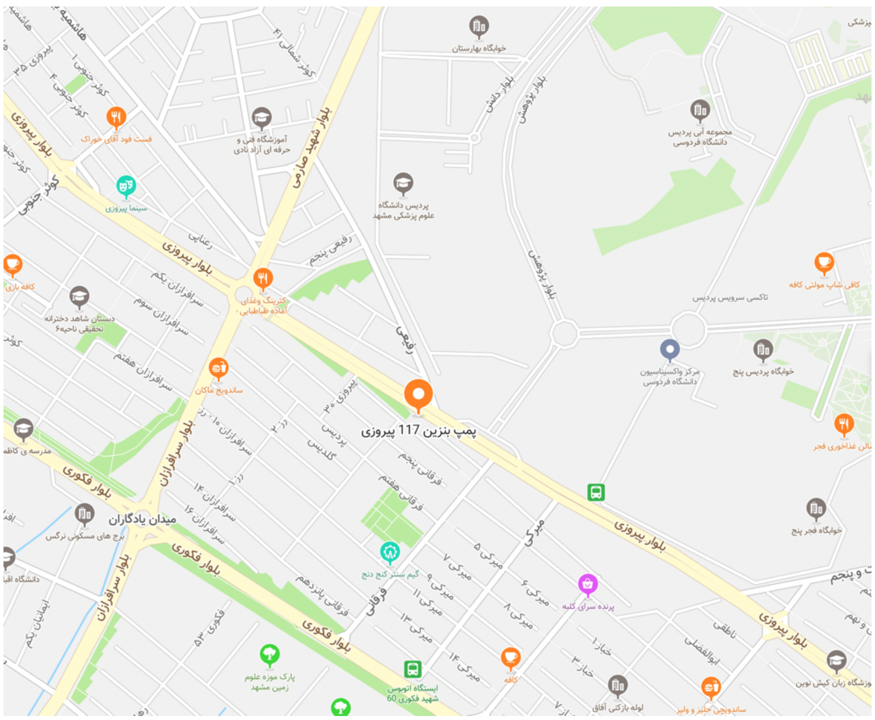


Figure (1)

In collaboration with the management of Gas Station 117, documentation available at this facility, including station statistics, has been utilized for this project. Information such as the time interval between consecutive customer arrivals, refueling duration, consumed gasoline volume, payment processing time, and the time spent exiting the gas station has been extracted. The data collection process occurred randomly over the course of two days. It is important to note that data collection was conducted during regular daytime hours, excluding quiet midnight hours or exceptionally busy periods.

In this report, our intention is to estimate the statistical distribution of various process times within the system using statistical concepts and extracted data. Additionally, we aim to design a conceptual model for the existing queuing system while analyzing the system's characteristics. Subsequently, we will simulate this model and compare it with the emerged simulation models. In the final phase of the project, we will evaluate the system's performance by defining specific criteria and, ultimately, delve into optimizing the configuration of the studied queuing system.

2- Identification of Queue System Components:

We perceive the mentioned gas station as a system, with customers being the integral components of this system, representing vehicles seeking refueling. For the sake of simplifying the system analysis, we assume that motorcycles are not present in this system.

In Figure (2), a general schematic of the 5-channel system of this gas station is illustrated. Subsequently, we will proceed to introduce each component of this system for further clarification.

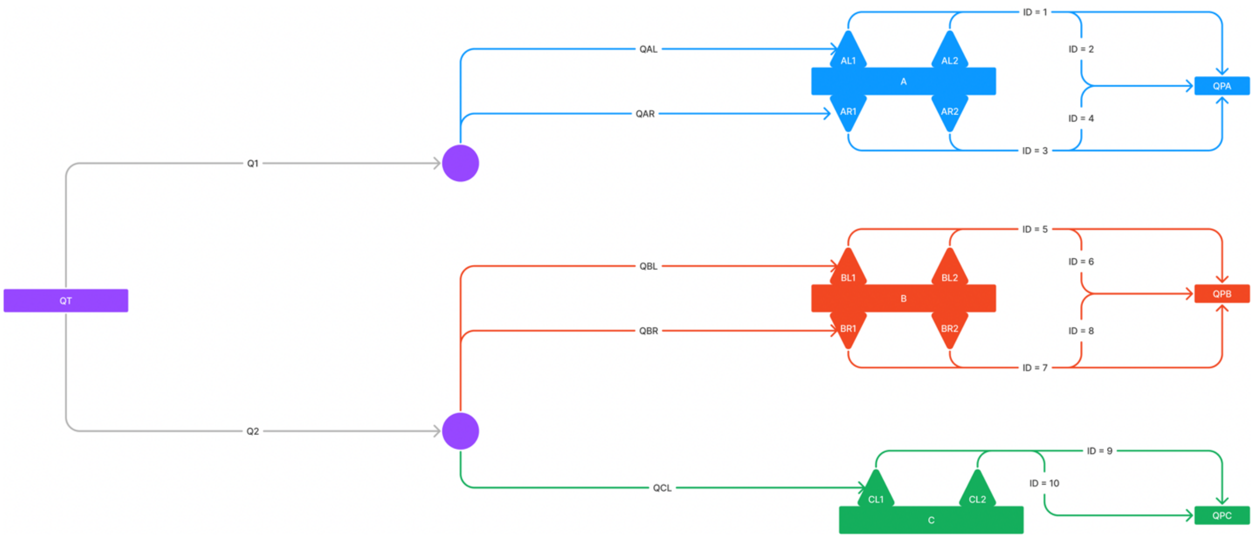


Figure (2)

2.1- Customer Arrival Pattern:

In this system, customer arrivals are assumed to be random and independent of each other, without any group arrivals. Additionally, it is assumed that customers do not refrain from joining the queue upon arrival and do not become impatient during the waiting time, leading them to leave the system. However, this assumption is not restrictive under normal circumstances. In specific hours or situations when gas stations are exceptionally crowded, the possibility of refusal or impatience exists. Nevertheless, in this report, we do not consider such conditions. In general, we assume that customer arrivals follow a specific pattern, and there are no peak hours in this analysis.

In the regular gasoline queue, customers, after entering the initial queue (denoted as QT in this report) and waiting, proceed to enter the fueling area. Now, each customer at the front of the queue must choose one of the two available queues, symbolized as Q1 and Q2.

Customers consciously wait to select the queue with a shorter length. Upon entering either Q1 or Q2, they are directed to different fueling channels. After passing through the initial queues, customers are transferred to the beginnings of the queues for each of the fueling pump channels, as illustrated in Figure (2).

It is worth noting that once a customer selects a queue, they cannot change it afterward. Additionally, all queues in this system have a specified capacity, as reported in Table (1).

Queue Name:	QT	Q1	Q2	QAL	QAR	QBL	QBR	QCL
Queue Capacities:	unlimited	3 cars	5 cars	2 cars	2 cars	2 cars	2 cars	2 cars

Table (1)

The customer arrival pattern is assumed to be static, meaning that there is no change in customer arrivals over time. However, this assumption does not imply that customer arrivals are consistent throughout all hours of the day. In fact, during late-night hours, the system is typically free of customers.

2.2- Service Pattern:

The service process is divided into several components. Fueling pumps provide service at a constant rate, and the fuel injection process is carried out by either the vehicle owner or the station attendant. This process includes opening the car tank, inserting the fuel card into the device, waiting for the device to be ready, removing the fuel hose and placing it in the car tank, fueling, taking out the fuel hose and placing it back in the device, and finally, taking out the fuel card. The last step involves paying the fueling fee to the station attendant.

The service process in this system is random, influenced both by the type of service (required gasoline volume) and customer factors (customer's speed of action). Additionally, the service is provided individually, without any group service. As mentioned earlier, the replacement of service providers in the system channels is not allowed. Finally, it is worth noting that service providers in this system operate in parallel.

It has also been assumed in this system that all visitors have a fuel card, and the fuel payment process is carried out using a credit card.

Additionally, in this system, since a payment system is considered for both service channels, it is possible that for executing the payment operation of the consumed fuel, a queue is created for each device. These queues are abbreviated as QPA, QPB, and QPC.

2.3- Queue System Discipline:

In the considered system, the queue discipline follows the well-known First-Come-First-Serve (FCFS) principle, meaning that the first customer to arrive is the first to be serviced. Apart from this, there is no specific priority system in place within the system.

2.4- Queue System Capacity:

In the considered system, if the queue length increases, it continues onto a street adjacent to the station, and there is no restriction on the number of individuals in the queue. Therefore, it is reasonable to assume an unlimited capacity for the system. It's also worth noting that in this system, there is no time constraint for entering the system.

3- Converting the Existing Queue System into a Suitable Model:

In order to analyze the current queue system, it is essential to transform it into a recognized model as much as possible. For this purpose, appropriate statistical methods need to be employed to estimate the distributions of arrival and service times (as mentioned in previous sections, both arrival and service processes are considered random). Afterward, utilizing evaluation criteria such as average queue length and mean waiting times in the queue and system, we can analyze the adapted model. If possible, improvements can be implemented based on the evaluation results.

3.1- Determining the distributions of random processes of the system:

The random elements present in this system include the following: the consecutive time interval between two entries of customers to the gas pump, the refueling time for each vehicle, the duration of payment for refueling, the amount of fuel consumed by each customer, and the time taken to exit the gas pump.

The distribution of the duration of exiting the gas pump encompasses the moments during which individuals take time to retrieve their vehicles after paying for the fuel, turn on their vehicles, and drive towards the exit route of the gas pump. This includes the time required for the vehicle behind to approach the pump for refueling.

3.1.1- Determining the Time Between Two Arrivals:

To establish the distribution of the time between the arrivals of two consecutive vehicles at the gas pump, a total of 49 data points were collected. Initially, it was hypothesized that due to the presence of a traffic signal before the gas pump, the data might follow two different distributions. To investigate this, an Exponentially Weighted Moving Average (EWMA) control chart with a lambda coefficient of 0.1 was employed. As observed in Figure (3), all the data points exhibit a similar distribution, and no out-of-control data points were identified among them.

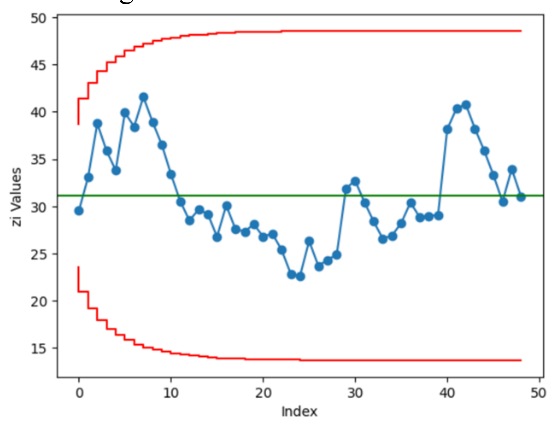


Figure (3)

Then, by plotting a histogram of the collected data (Figure (4)), it was speculated that the data follows an exponential distribution. After conducting a goodness-of-fit test with a significance level of 0.05, it was determined that the data indeed follows an exponential distribution with a mean of 31.122 seconds.

$$\begin{cases} H_0: x_i \sim Exp(\beta = 31.122) \\ H_1: x_i \nsim Exp(\beta = 31.122) \end{cases}$$

```
Chi-square statistic: 4.08182894287898
Degrees of freedom: 8
Critical value (alpha=0.05): 15.50731305586545
P-value: 0.8496660832476532
Fail to reject the null hypothesis. The data follows an exponential distribution with mean 31.12244897959184.
```

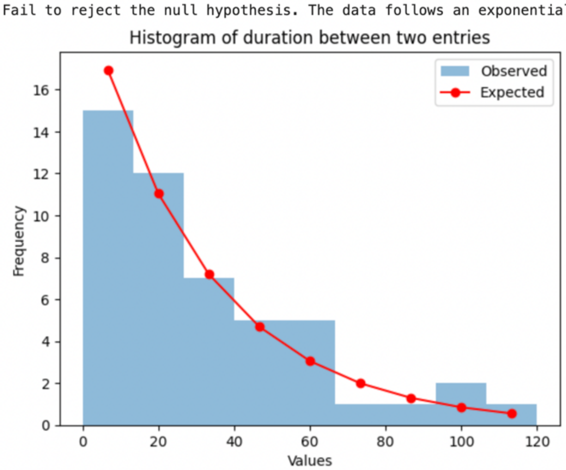


Figure (4)

3.1.2- Determining the Refueling Duration by Men:

To establish the distribution of the refueling duration by men, a total of 69 data points were collected. To assess whether the data is homogeneous and all follow the same distribution, an Exponentially Weighted Moving Average (EWMA) control chart with a lambda coefficient of 0.1 was plotted, as shown in Figure (5).

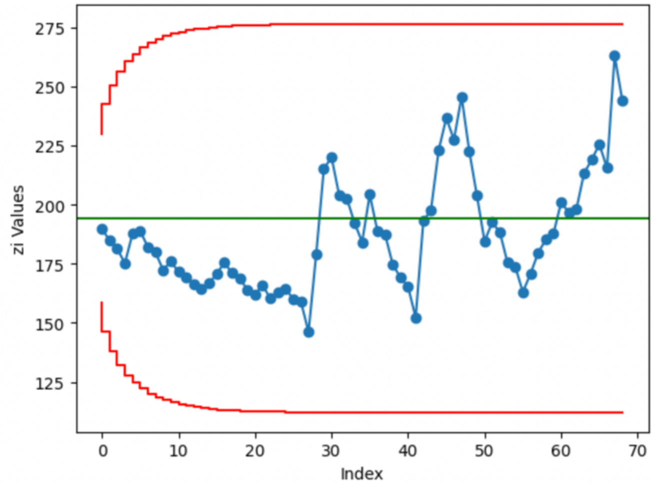


Figure (5)

Then, by plotting a histogram of the collected data, it was speculated that the data follows an exponential distribution. After conducting a goodness-of-fit test with a significance level of 0.05, it was determined that the data indeed follows an exponential distribution with a mean of 194.275 seconds.

$$\begin{cases} H_0: x_i \sim Exp(\beta = 194.275) \\ H_1: x_i \nsim Exp(\beta = 194.275) \end{cases}$$

```
Chi-square statistic: 15.447724958497526
Degrees of freedom: 8
Critical value (alpha=0.05): 16.170775613603467
P-value: 0.05100252911248271
Fail to reject the null hypothesis. The data follows a exponential distribution with mean 194.2753623188406.
```

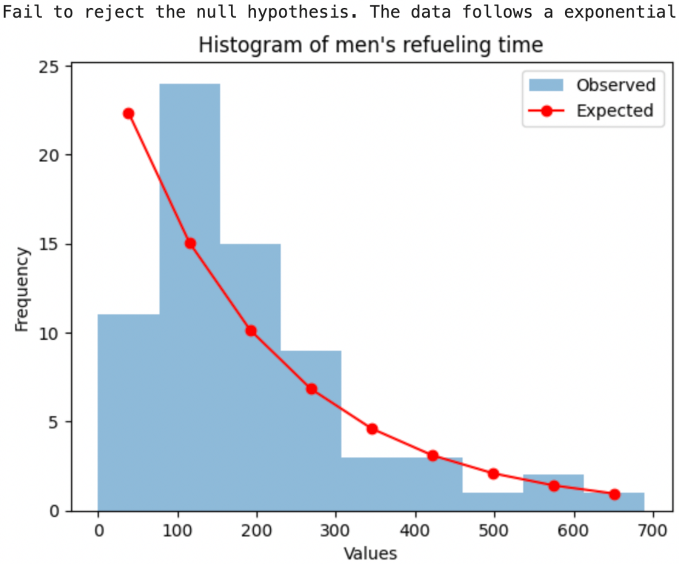


Figure (6)

3.1.3- Determining the Refueling Duration by Women:

To establish the distribution of the refueling duration by women, a total of 20 data points were collected. To assess whether the data is homogeneous and all follow the same distribution, an Exponentially Weighted Moving Average (EWMA) control chart with a lambda coefficient of 0.1 was plotted, as shown in Figure (7). Additionally, in this data collection, it was observed that approximately 30% of individuals visiting the gas pump are women.

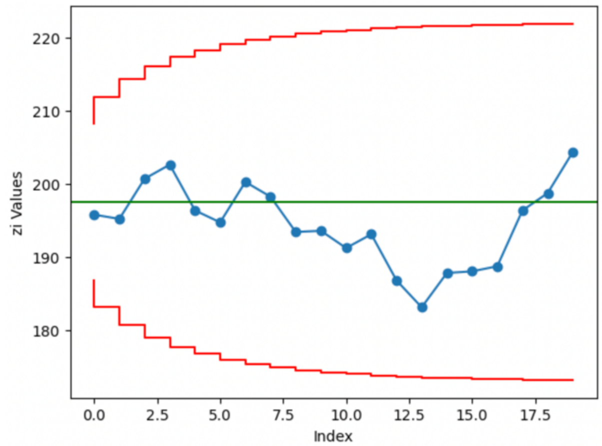


Figure (7)

Then, by plotting a histogram of the collected data, it was speculated that the data follows a uniform distribution. After conducting a goodness-of-fit test with a significance level of 0.05, it was determined that the data indeed follows a uniform distribution within the range of 130 to 265 seconds.

$$\begin{cases} H_0: x_i \sim Uniform[130\,,265] \\ H_1: x_i \nsim Uniform[130\,,265] \end{cases}$$

```
Chi-square statistic: 5.947368421052633
P-value: 0.31137394078826547
Fail to reject the null hypothesis. The data follows a uniform distribution  between 130 and 265.
```

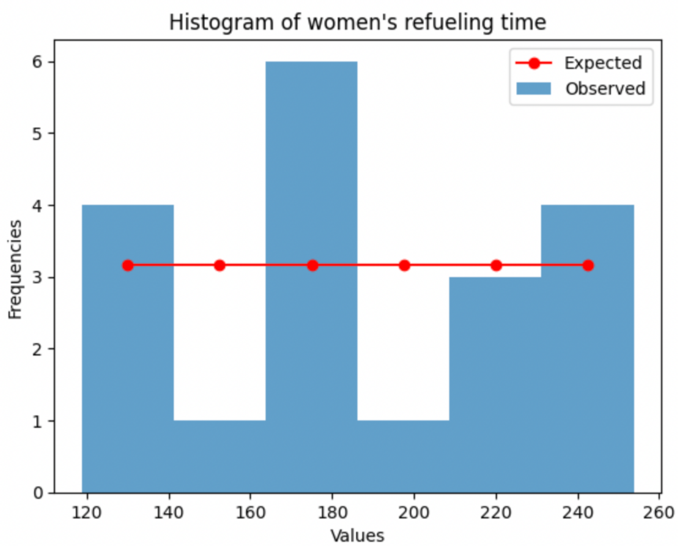


Figure (8)

In the first place, by comparing the averages of the two distributions of refueling durations by women and men, it can be noticed that the means are approximately equal. However, the shape of the distribution for women has become more uniform. This might be due to the fact that women generally do not perform the refueling process themselves; instead, it is carried out by an operator who is a skilled human resource, resulting in a more uniform execution of this operation.

3.1.4- Determining the distribution of fuel payment duration:
To determine the distribution of the time it takes to pay for fuel, a total of 25 data points have been collected. To assess whether the data are homogeneous and follow a common distribution, an EWMA control chart with a smoothing coefficient of 0.1 has been plotted, as shown in Figure (9).

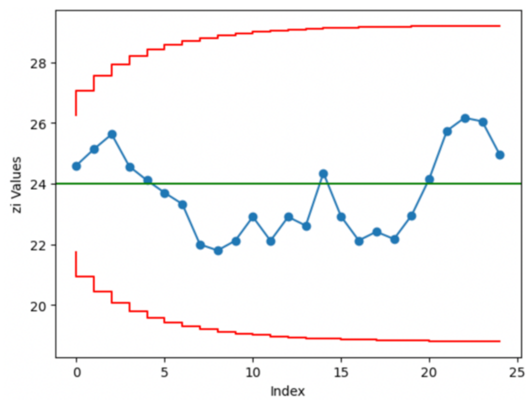


Figure (9)

Subsequently, by drawing a histogram of the data, it was hypothesized that the collected data have a normal distribution. Through a goodness-of-fit test with an alpha level of 0.05, it was confirmed that the data follow a normal distribution with a mean of 24 and a variance of 70.83 seconds.

$$\begin{cases} H_0: x_i \sim N[24\,,70.83] \\ H_1: x_i \nsim N[24\,,70.83] \end{cases}$$

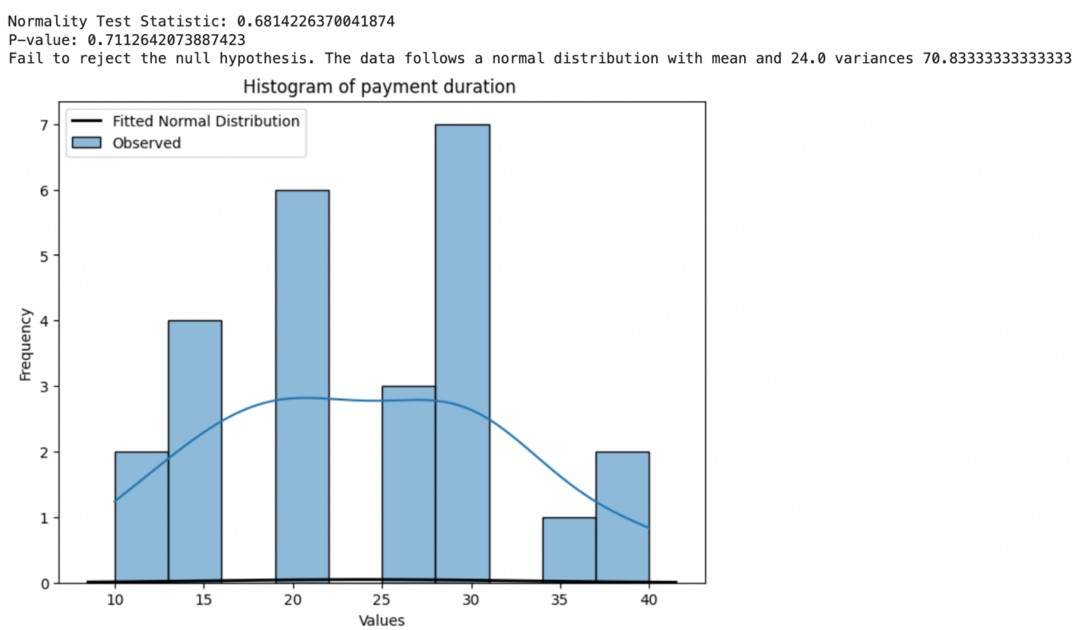


Figure (10)

3.1.5- Determining the distribution of the time to leave the gas station:
The distribution of the duration of exiting the gas pump has been determined by collecting a total of 20 data points. To assess whether the data is homogeneous and follows a particular distribution, an EWMA control chart with a smoothing coefficient (lambda) of 0.1 has been plotted, as shown in Figure (11).

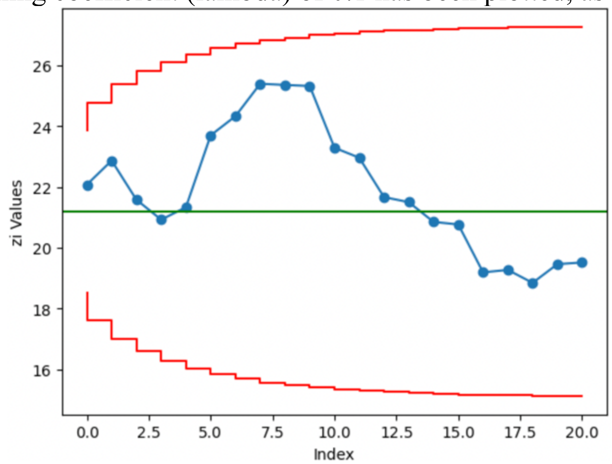


Figure (11)

Additionally, by creating a histogram of the collected data, it was hypothesized that the data follows a normal distribution. Upon conducting a goodness-of-fit test with an alpha level of 0.05, it was observed that the data is consistent with a normal distribution, with a mean of 21.19 seconds and a variance of 97.261 seconds.

$$\begin{cases} H_0: x_i \sim N[21.19\,, 97{,}261] \\ H_1: x_i \nsim N[21.19\,, 97.261] \end{cases}$$

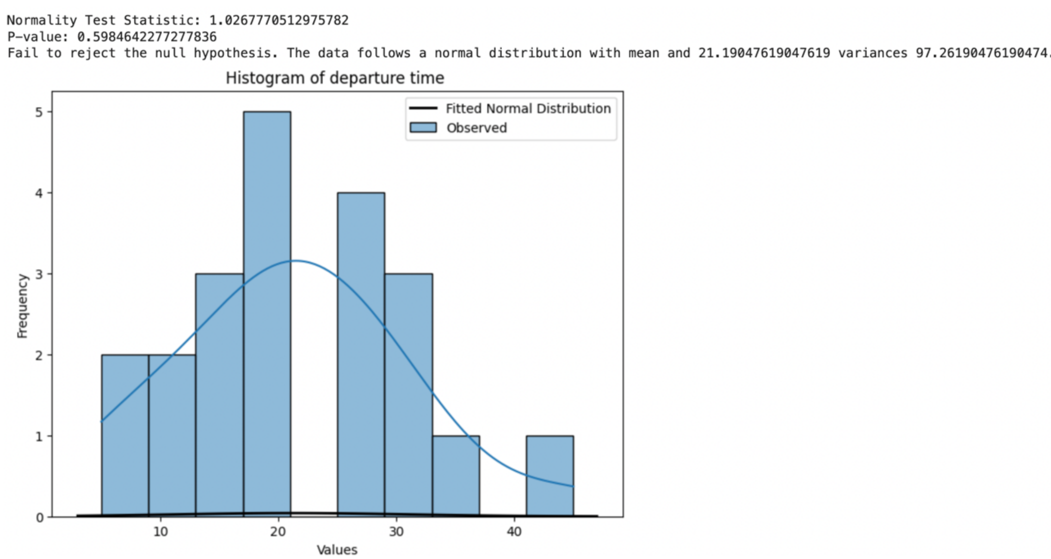


Figure (12)

3.1.6- Determining the distribution of fuel consumption:
The determination of the distribution of fuel consumption involves the aggregation of 50 data points. To assess whether the data points are homogeneous and follow a common distribution, an EWMA control chart with a smoothing parameter (lambda) of 0.1 has been plotted, as depicted in Figure (13).

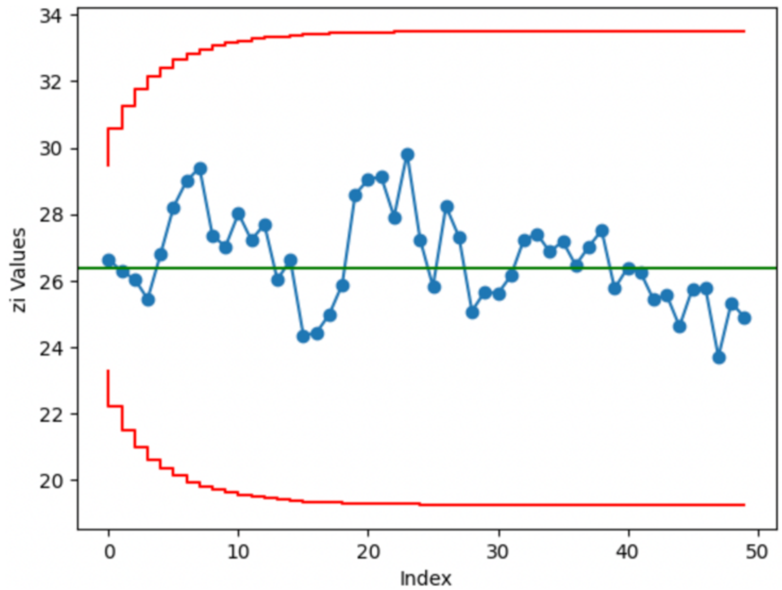


Figure (14)

Subsequently, by plotting the histogram of the collected data, it was hypothesized that the gathered data adheres to a normal distribution. After conducting a goodness-of-fit test with an alpha level of 0.05, it was established that the data conforms to a normal distribution with a mean of 26.38 and a variance of 132.281 seconds.

$$\begin{cases} H_0: x_i \sim N[26.38\,, 132.281] \\ H_1: x_i \nsim N[26.38\,, 132.281] \end{cases}$$

```
Normality Test Statistic: 0.0929635004835885
P-value: 0.9545819813013541
Fail to reject the null hypothesis. The data follows a normal distribution with mean and 26.38 variances 132.2812244897959.
```

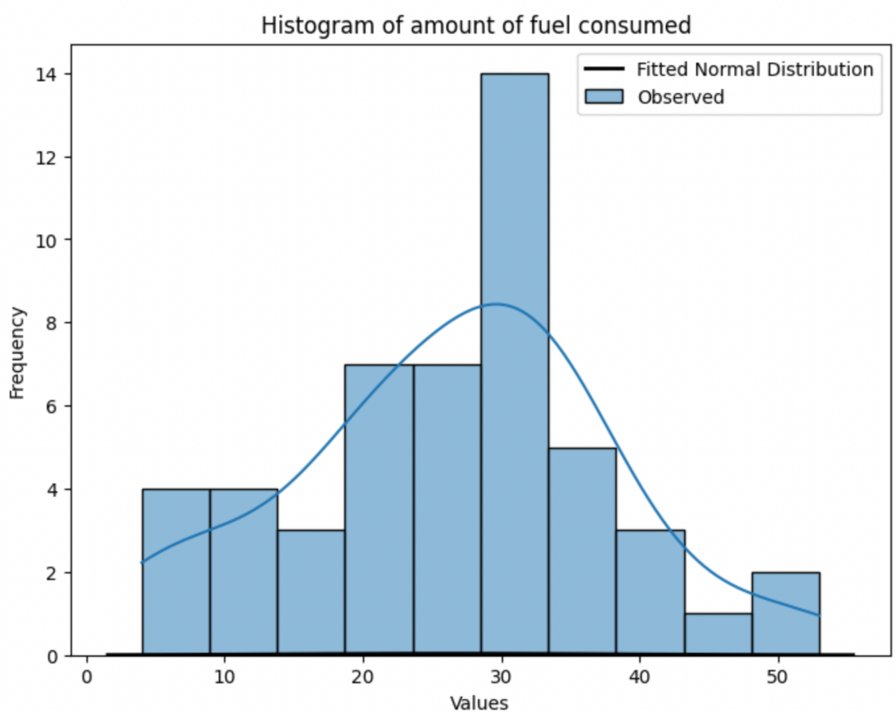


Figure (15)

3.2- Identification of Components and Model Events

To simulate this system, we require 25 different events, each providing a general overview of the names and functions of the components. (For a more detailed view of each, refer to the attached file.)

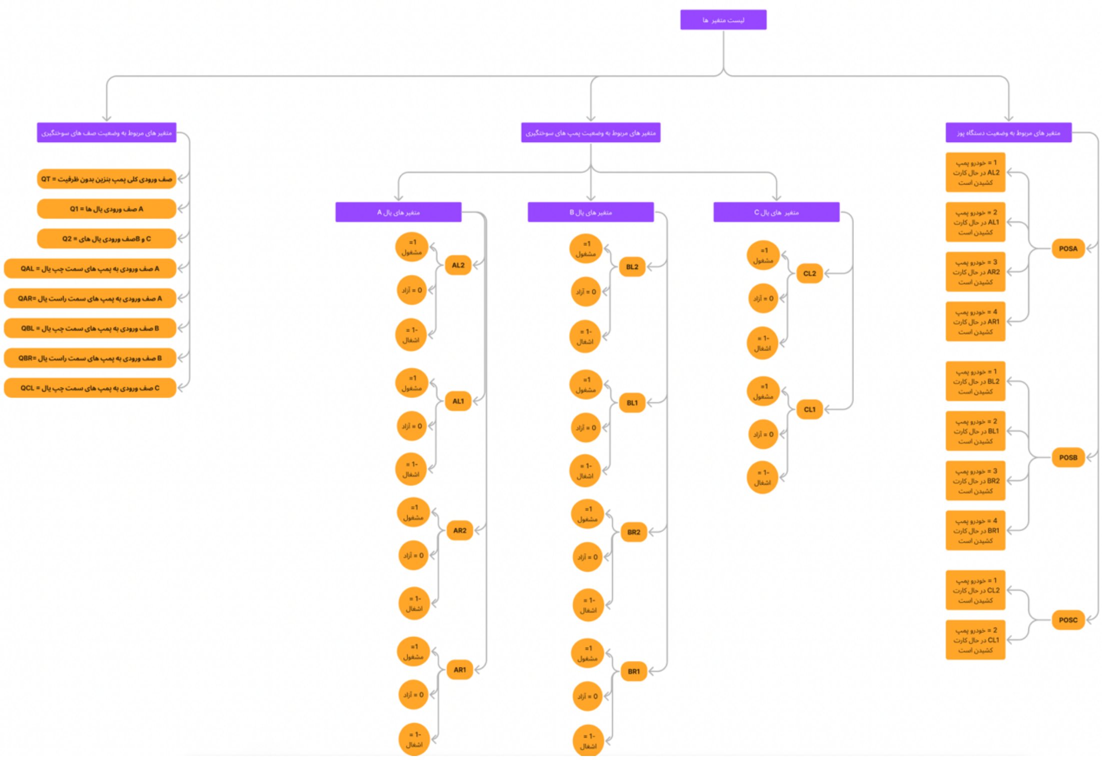


Figure (16)

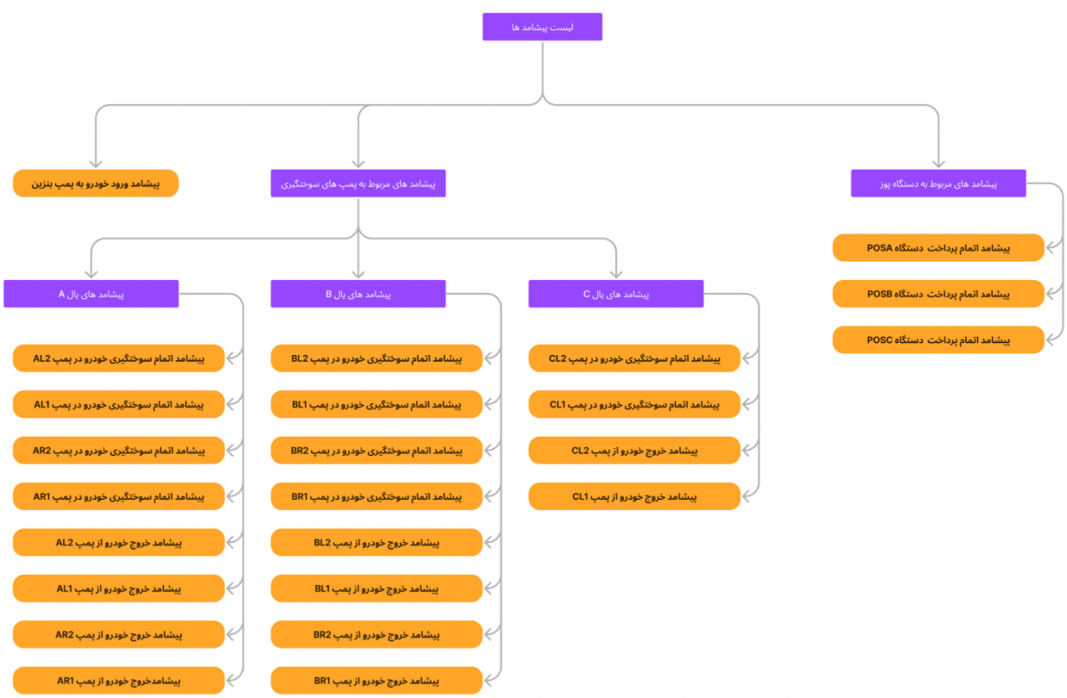


Figure (17)

4- Key Indices:

The key indices calculated in this simulation include:

- **The average waiting Time for Exit:** The average duration is the time customers have fueled their vehicles, paid the cost, and sat in their cars. However, the vehicle in front of them has not left the pump, keeping the waiting car from being able to exit the gas pump area.
- **The average waiting Time for Refueling:** The average duration it takes for customers to enter the gas pump and start refueling.
- **The average waiting Time for Payment:** The average duration that customers wait to start the process of paying for the fuel they have consumed.
- **The average total Spent Time:** The average duration it takes from the moment customers enter the gas pump area until their exit.
- **The average length of QAR**
- **The average length of QAL**
- **The average length of QBL**
- **The average length of QBR**
- **The average length of QCL**
- **The average length of QPA**
- **The average length of QPB**
- **The average length of QPC**
- **The average length of Q1**
- **The average length of Q2**
- **The average length of QT**
- **Total number of people who received service**
- **Total amount of fuel consumed**
- **The percentage of idle time, occupancy, engaged time, and instances when customers were in the process of payment for each of the 10 pumps.**

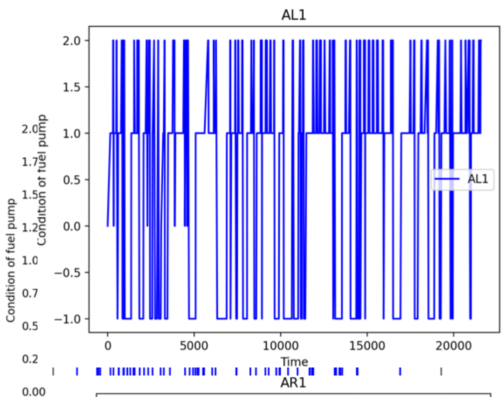
4.1- Simulation Output:

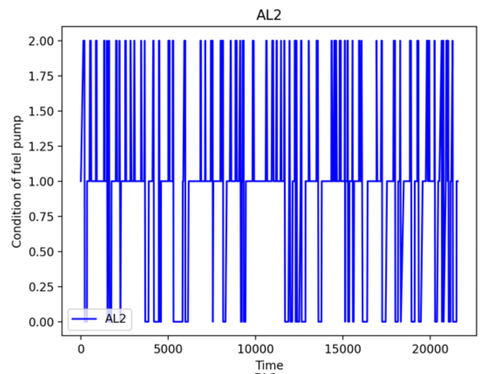
As the working shifts at a gas station are 6 hours, and refueling operations at the gas pump come to a complete halt every 6 hours for the relocation of workers, in the conducted simulations, the termination condition has been simulated for a 6-hour system. The outputs for one simulation are as follows:

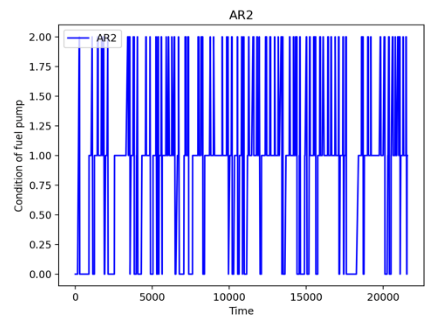
Indicator	Value
The average waiting Time for Exit:	38.290685233727615
The average waiting Time for Refueling:	602.5750638870961
The average waiting Time for Payment:	2.5850734263863244
The average total Spent Time:	874.0449068743653
The average length of QAR	1.7155472078020473
The average length of QAL	1.7102723257784884
The average length of QBL	1.589374780666767
The average length of QBR	1.6245762626857678
The average length of QCL	1.576493910168813
The average length of QPA	0.034276062965824965
The average length of QPB	0.0426265079170124
The average length of QPC	0.002378042110136886
The average length of Q1	1.853215436133066
The average length of Q2	2.845415653024048
The average length of QT	5.724545250417662
Total number of people who received service	661
Total amount of fuel consumed	17649.7194213029

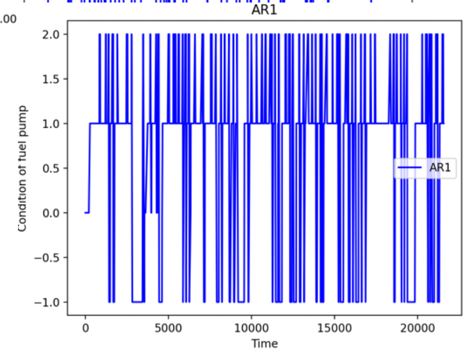
Refueling pump ID	Occupancy time	Engaged time	Payment time	Idle time
AL1	0.287982	0.537862	0.070145	0.104011
AL2	0	0.610841	0.070796	0.318363
AR1	0.207308	0.604219	0.078458	0.110016
AR2	0	0.561523	0.079082	0.359396
BL1	0.189611	0.593591	0.070494	0.146305
BL2	0	0.546676	0.072074	0.38125
BR1	0.213919	0.587374	0.068229	0.130478
BR2	0	0.512712	0.068932	0.418356
CL1	0.272947	0.51693	0.058016	0.152108
CL2	0	0.619074	0.062539	0.318386

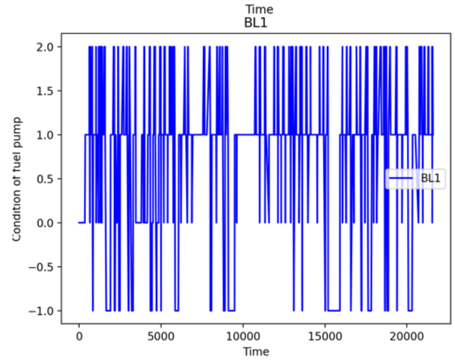
Additionally, below are several charts depicting the system's status throughout the simulation.

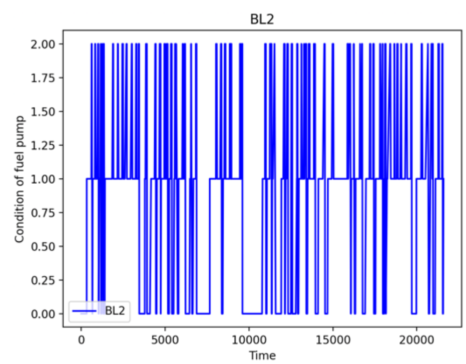


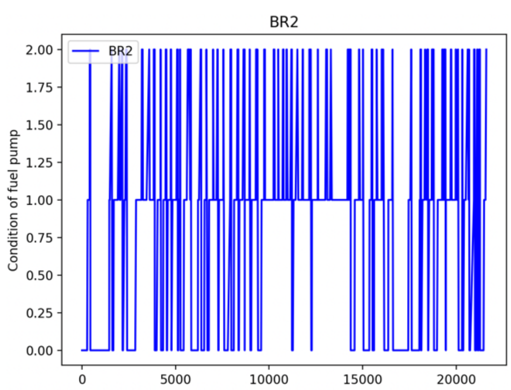


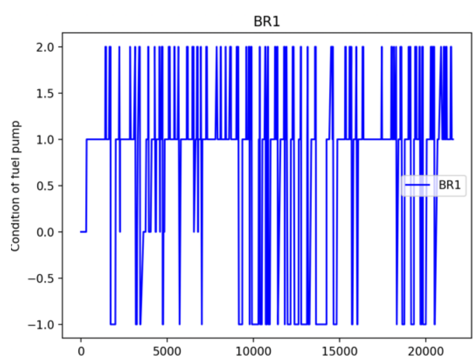


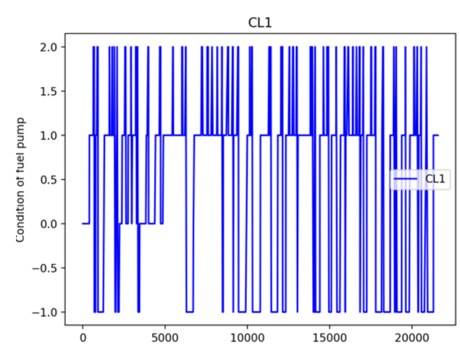


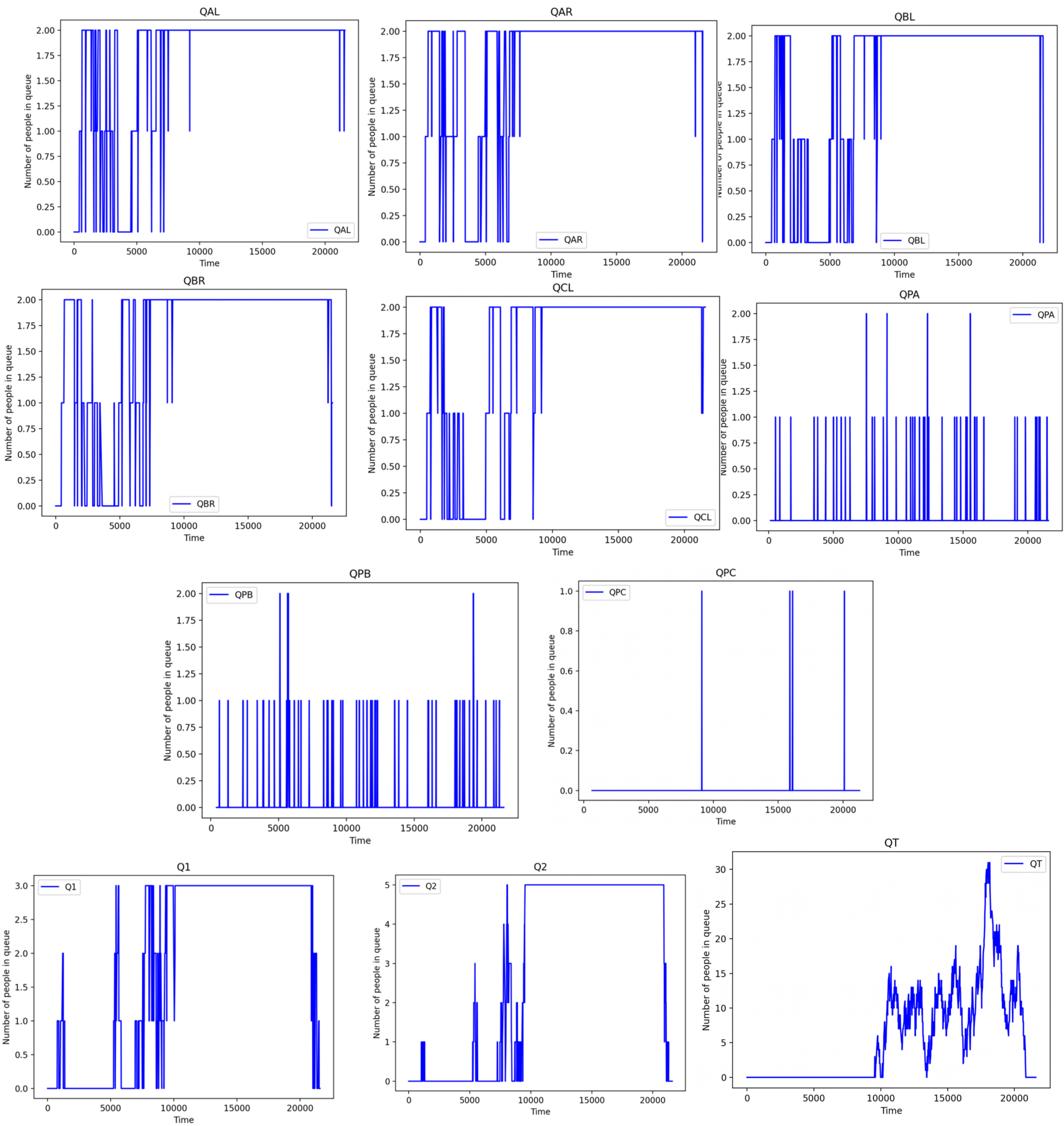


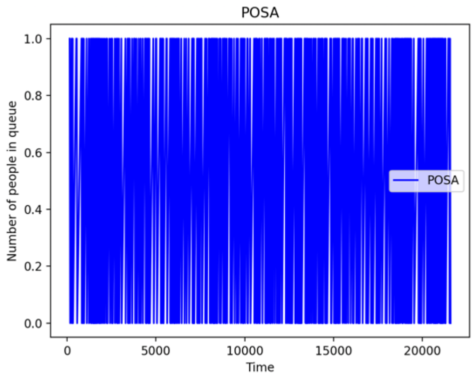


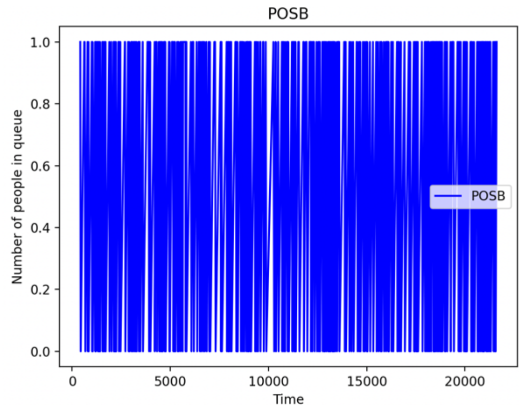


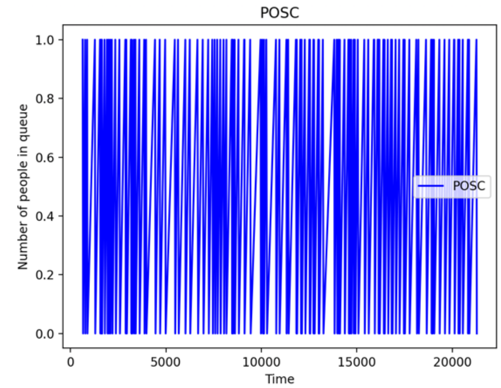





QAL
QAR
QBL
QBR
QCL
QPA
QPB
QPC
Q1
Q2
QT
Number of people in queue
Time







Also, you can review the Excel files in the attachment named “person_data.xlsx” to find detailed reports for each of the entities that have entered the system.

4.2- Identifying the most lucrative pump at the gas station:

Since the idle percentages of pumps al1 and ar1 are very close, we want to determine which of these two pumps has the highest activity volume. To achieve this, ten simulations have been conducted, and the idle percentage values for each pump in each simulation after the simulation reset are as follows. We will use a paired t-test to assess our null hypothesis.

NO	1	2	3	4	5	6	7	8	9	10
AL1	0.122932	0.112873	0.112163	0.125799	0.117815	0.083474	0.115303	0.123157	0.090773	0.106051
AR1	0.130124	0.107357	0.13831	0.149027	0.104574	0.088274	0.101075	0.119403	0.089244	0.113131
d_j	-0.007192	0.005516	-0.026147	-0.023228	0.013241	-0.0048	0.014228	0.003754	0.001529	-0.00708

$$d_j = AL1 - AR1$$

$$\begin{cases} H_0: \mu_{AL1} \geq \mu_{AR1} \\ H_1: \mu_{AL1} < \mu_{AR1} \end{cases} \Rightarrow \begin{cases} H_0: \mu_d \geq 0 \\ H_1: \mu_d < 0 \end{cases}$$

$\bar{d} = -0.0030179$

$S_d = 0.013669253$

$n = 10$

$\alpha = 0.05$

$$t_0 = \frac{\bar{d}}{S_d / \sqrt{n}} = \frac{-0.0030179}{0.013669253/3.16} = -0.69766533$$

$$A \equiv [-t_{\alpha,n-1}, \infty] \equiv [-t_{0.05,9}, \infty] \equiv [-1.83, \infty) \quad \overrightarrow{t_0 \epsilon A} \quad Acceptance\ of\ H_0$$

It c”n be concluded that pump al1 is emptier compared to pump ar1 based on the results of the paired t-test.

4.3- Estimation of the duration spent by each customer at the gas pump:

No	1	2	3	4	5	6	7	8	9	10
x	792.352 18	767.272 719	848.822 873	987.846 573	661.484 298	688.430 856	761.456 133	1091.9 511	746.308 948	557.949 565

$\mu = \bar{X} = 790.3875242$
$S = 155.5285122$
$n = 10$
$\alpha = 0.05$

$$\left[\bar{X} - t_{\frac{\alpha}{2},n-1}\frac{S}{\sqrt{n}}, \bar{X} + t_{\frac{\alpha}{2},n-1}\frac{S}{\sqrt{n}}\right]$$
$$\equiv \left[790.3875242 - 2.262 \times \frac{155.5285122}{\sqrt{10}}, 790.3875242 + 2.262 \times \frac{155.5285122}{\sqrt{10}}\right]$$
$$\equiv [679.1368586, 901.6381898]\ 95\%\ C.I$$

5- Decision-Making for Increasing the Number of Workers:

Initially, we want to determine if creating changes at the gas pump, such that all individuals entering the station, regardless of gender, are compelled to refuel by themselves, would result in higher profits compared to ensuring that no driver gets out of their vehicle.

Currently, the station is staffed with 7 workers. If the goal is to ensure that no driver gets out of their vehicle or, in a way, only female customers are attended at the gas pump, then there should be one worker per pump. Therefore, the number of workers needs to be increased to 10.

The addition of 3 workers increases the monthly salary by 33 million Tomans. Considering the MARR rate of 23%, the daily profit of the gas station should be equal to 7606500 Therefore, it can be assumed that in each 6-hour shift, the amount of 3803250 Tomans worth of fuel or equivalent to 1267.75 liters should be sold.

$$A = 33{,}000{,}000 \times \left({}^{A}/_{P}, 23\%, 30\right) = 33{,}000{,}000 \times 0.2305 = 7{,}606{,}500$$

Therefore, we will repeat the simulation 10 times and compare the statistics of the amount of fuel sold in the two scenarios mentioned above.

NO	1	2	3	4	5	6	7	8	9	10
X	16972.4577	17650.1744	17878.509	18245.9113	18201.242	16984.5534	18147.0423	17167.9726	20070.7965	17623.7226
Y	16068.1606	16270.8224	16714.0753	17403.6518	17078.9927	16829.9794	15539.0078	15679.9212	15338.0983	16448.3528

Scenario X: All refueling operations are performed by operators.
Scenario Y: All refueling operations are performed by drivers.

Initially, we need to conduct a test for the equality of variances.

$$\begin{cases} H_0: \sigma_x^2 = \sigma_y^2 \\ H_1: \sigma_x^2 \neq \sigma_y^2 \end{cases}$$
$S_x^2 = 817433.5567$
$S_y^2 = 469879.5472$
$$F_0 = \frac{S_x^2}{S_y^2} = \frac{817433.5567}{469879.5472} = 1.739666179$$
$$A \equiv \left[F_{1-\alpha/2,n_x-1,n_y-1}, F_{\alpha/2,n_x-1,n_y-1}\right] \equiv \left[F_{0.975,9,9}, F_{0.025,9,9}\right] \equiv [0.24, 4.03]\ \overrightarrow{F_0 \epsilon A}\ \ Acceptance\ of\ H_0$$

Now we know that we should use the t-test under the conditions of equality of variances.

$$\begin{cases} H_0: \mu_x - \mu_y \geq 1267.75 \\ H_1: \mu_x - \mu_y < 1267.75 \end{cases}$$

$$S_p^2 = \frac{(n_x - 1)S_x^2 + (n_y - 1)S_y^2}{n_x + n_y - 1} = \frac{9 \times 817433.5567 + 9 \times 469879.5472}{18} = 643656.552$$

$$t_0 = \frac{\bar{X} - \bar{Y} - \mu_0}{S_p^2 \sqrt{\frac{1}{n_x - 1} + \frac{1}{n_y - 1}}} = \frac{17894.23817 - 16337.10623 - 1267.75}{802.28209\sqrt{\frac{2}{9}}} = 0.765157055$$

$$A \equiv \left[-t_{\alpha, n_x + n_y - 1}, \infty\right] \equiv \left[-t_{0.05,18}, \infty\right] \equiv [-1.734, \infty) \ \overrightarrow{t_0 \epsilon A} \ \ Acceptance\ of\ H_0$$

5.1- Reducing the waiting time for customers to refuel:

Now, let's examine whether this increase in costs will also benefit the customers or not. For this purpose, we will test scenarios X and Y for the average duration each customer takes from the moment they enter the gas pump area until they exit.

NO	1	2	3	4	5	6	7	8	9	10
X	321.263746	354.186292	414.220336	310.177868	361.445083	324.242472	304.05846	323.177137	337.921208	339.180444
Y	1693.30515	515.593736	1604.84394	1430.31477	1234.09079	1800.25508	2081.11569	1935.11213	2002.1054	794.687826

Scenario X: All refueling operations are performed by operators.
Scenario Y: All refueling operations are performed by drivers.

Initially, we need to conduct a test for the equality of variances.

$$\begin{cases} H_0: \sigma_x^2 = \sigma_y^2 \\ H_1: \sigma_x^2 \neq \sigma_y^2 \end{cases}$$

$$S_x^2 = 1025.33863$$

$$S_y^2 = 273209.8822$$

$$F_0 = \frac{S_x^2}{S_y^2} = \frac{1025.33863}{273209.8822} = 0.003752934$$

$$A \equiv \left[F_{1-\alpha/2, n_x - 1, n_y - 1}, F_{\alpha/2, n_x - 1, n_y - 1}\right] \equiv \left[F_{0.975,9,9}, F_{0.025,9,9}\right] \equiv [0.24, 4.03] \ \overrightarrow{F_0 \notin A} \ \ reject\ of\ H_0$$

$$\begin{cases} H_0: \mu_x \leq \mu_y \\ H_1: \mu_x > \mu_y \end{cases}$$

$$\nu = \frac{\left(\frac{S_x^2}{n_x} + \frac{S_y^2}{n_y}\right)^2}{\frac{\left(S_x^2/n_x\right)^2}{n_x + 1} + \frac{\left(S_y^2/n_y\right)^2}{n_y + 1}} = 11.08$$

$$t_0 = \frac{\bar{X} - \bar{Y}}{\sqrt{\frac{S_x^2}{n_x - 1} + \frac{S_y^2}{n_y - 1}}} = -7.066133387$$

$$A \equiv (-\infty, t_{\alpha,v}] \equiv (-\infty, t_{0.05,11}] \equiv (-\infty, 1.796] \ \overrightarrow{t_0 \epsilon A} \ \ Acceptance\ of\ H_0$$

6- Conclusion:

Based on the simulation results, it can be claimed that if gas stations incur higher costs for employing their operators and hire more workers to prevent any driver from refueling their own vehicle, they can significantly reduce the waiting time for customers and, more importantly, increase their profits.