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Fourth Phase

Statistical Study of House Price Changes from some Community areas in Erbil

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Abbreviated

Generally after Obtaining data on house prices over time from 2018 to 2022 in an area based on statistical techniques and analysis with Statigraphs program selected the best model for forecasting next year, and comparing the changes that occurred after the forecasts.As a result of the analysis we did for each of the areas, model (H) (Sampling exponential smoothing with alpha=0.3358) was selected as the best model for the area of 100 meters and 150 meters because they had the lowest (AIC) among the other models M (ARIMA (2.02)) was the best model for the 200-meter house area because it had the lowest AIC compared to the other models.

Introduction

Erbil has become an important residential center and real estate market, and in most important parts of the city, apartments and high-rise residential towers have been completed or are under construction. Owners of companies and experts in the housing sector revealed that the peaceful situation, security, economy and market movement in the city, has made people in Erbil looking for good places to live. "Compared to other cities, Erbil has a very good market for apartments and housing projects and many foreigners and companies either buy or rent apartments," said the sales director of a large real estate company. There are several zones in Erbil, including the Golden Zone, Erbil - Koya and Diamond Zone, which includes the Pirmam - Shaqlawa road, the security and peace in Erbil, a reason for the increase in apartment projects and residential towers They buy a lot of apartments, some for rent and others for profit.

According to the data of the Investment Board and Real Estate Companies, the real estate market is one of the most active markets in the Kurdistan Region and the center of this business is Erbil, which has invested $ 11 billion and 102 million. A company in Erbil puts thousands of apartments and towers on the market every few months and most of them are sold. Residential projects range from six towers to eight to 10 towers and more, including several floors of apartments.

Sardar Azad, a property consultant and director of a real estate company, said: "A group in Erbil brought two new residential apartment projects to the market, which will be about 3,000 apartments and located on 150-meter and 120-meter streets In this study, we present the changes in house prices in Shawesi community of Diamond Zone in the past few years and forecast house prices for the next few years for houses with areas between (100, 150, 200) meters.

Diamond Zone

Work is currently underway on this zone, which is expected to become one of the most beautiful zones in Erbil

Masif Shaqlawa road and 150 meters road will become a diamond zone in the near future. Many various projects will be built in this zone in the near future. At the same time, there are many beautiful projects that many people have turned to this zone

Characteristics of Diamond Zone projects

- First: away from the crowds in the city
- Second, they have a lot of greenery
Third, most of the projects in this zone are built with high quality
- Fourth: They include different systems such as (solar energy), central air conditioning VRF, garbage, smart home and intercom) and many other systems
- Fifth: Security

The most important projects of the Diamond Zone (Green Zone) are: Cane CASA, Kory Village , Qaywan Merado r, Mass City , Zine Cit y, ASCO, Deplmomat , Grand Majdy Mall , Var Park , Arbil Midean City , Ferdos City , Sana Cit y, Kavar City , Zeren City , Saferan City , Future City ، Shawes Community and Pirzin Community.

Shawes Community

Shawes or the old Shawesi village or the present town of Shawesi is a village about 8 kilometers from the capital Erbil. Shawes community was originally a village in the Erbil plain. With the expansion of Erbil, Shawes community expanded. In the early 1970s, a number of houses were built by the former Iraqi government Four different places of this community land has been distributed to citizens, Shawes is located on Masif Salahuddin Street between the two strategic streets of Erbil, 150 meters street and 120 meters street and only 20 minutes away from Erbil Castle. The boundary of Shawes municipality starts from the two-sided main road of Erbil - Shaqlawa. The beginning of the two-sided main road of Shawes to the end of Kolaki Bachuk village Bachuk to behind the police college, the old road of Kesnazan covers all neighborhoods within the municipalities and the villages around Shawes, including (Kolaki Gara and Kolaki Bachuk), as well as the farms, forests and villas built by people Police College and Snow City.

The population of Shawes is (5000) households, Kolaki Gowra village is (250) households, Kolaki Bachuk village is (75) households, Kalakin and surrounding farms are (1250) households, Bafrin City is (200) households The population of the community is (27100) people if each household has (4) members. Property prices in this area are increasing day by day due to the importance of its geographical location.

Distribution of neighborhoods in Shawes community

Shawes community consists of eight areas, each of which includes several neighborhoods: Ashti, Newroz, Gulan, Shawesi New, Azadi, Gund, Safin, September, each of which includes several neighborhoods.

As you can see in the picture below:

After searching the real estate agency to get information about the price of houses in the community between 2018 to 2022 and receiving a large number of agreements between buyers and sellers, we received the price of houses with an area of   (100, 150, 200) meters. Prices varied from neighborhood to neighborhood, but in general the prices were as follows:

Area	Year	Minemam Price $	Maximam Price $
100 m	2018	27000	40000
100 m	2019	27000	40000
100 m	2020	33000	50000
100 m	2021	33000	50000
100 m	2022	40000	65000

Area	Year	Minemam Price $	Maximam Price $
150 m	2018	32000	48000
150 m	2019	32000	48000
150 m	2020	40000	55000
150 m	2021	40000	55000
150 m	2022	50000	75000

Area	Year	Minemam Price $	Maximam Price $
200 m	2018	40000	52000
200 m	2019	40000	52000
200 m	2020	50000	62000
200 m	2021	50000	62000
200 m	2022	60000	90000

The above table shows the general price of houses in 2018 before 2022 for each (100m, 150m, 200) meters.

Showing the cases received for each area separately and also showing in Chart :

Tayble 1 : House prices area 100 m from 2018 to 2022.

Date	Price $	Area 100m	Neighborhood
03.02.2018	$208.00	100	Nawroz
11.02.2018	$135.00	100	11 Aylul
13.02.2018	$220.00	100	Gundy Shawes
14.02.2018	$120.00	100	Azady
17.02.2018	$148.00	100	11 Aylul
19.02.2018	$125.00	100	11 Aylul
27.02.2018	$325.00	100	11 Aylul
28.02.2018	$200.00	100	Ashty
06.03.2018	$320.00	100	Nawroz
09.03.2018	$340.00	100	Nawroz
12.03.2018	$196.00	100	Azady
16.03.2018	$200.00	100	Shawesy Nwe
14.04.2018	$224.00	100	Azady
24.09.2018	$240.00	100	Shawesy Nwe
20.10.2018	$180.00	100	Azady
23.10.2018	$295.00	100	11 Aylul
03.11.2018	$255.00	100	11 Aylul
11.11.2018	$260.00	100	Azady
17.11.2018	$220.00	100	Shawesy Nwe
21.11.2018	$215.00	100	Shawesy Nwe
05.12.2018	$223.00	100	Azady
07.12.2018	$277.00	100	Shawesy Nwe
04.01.2019	$320.00	100	Nawroze
22.01.2019	$205.00	100	Azady
22.01.2019	$210.00	100	Azady
23.01.2019	$325.00	100	Shawesy New
03.02.2019	$250.00	100	Azady
04.02.2019	$248.00	100	Gundy Shawes
07.02.2019	$200.00	100	11 Aylul
12.02.2019	$278.00	100	11 Aylul
13.02.2019	$290.00	100	Azady
17.02.2019	$255.00	100	Safen
25.02.2019	$390.00	100	Gullan
25.02.2019	$249.00	100	Gullan

Date	Amount	Quantity	Name
01.03.2019	$210.00	100	Azady
01.03.2019	$227.00	100	Gullan
03.03.2019	$262.00	100	Shawese Nwe
03.03.2019	$227.00	100	Shawse Nwe
10.03.2019	$270.00	100	Gundy Shawes
10.03.2019	$240.00	100	Azady
12.03.2019	$250.00	100	Shawesy New
13.03.2019	$260.00	100	Azady
13.03.2019	$179.00	100	Gundy Shawes
16.03.2019	$228.00	100	Azady
16.03.2019	$210.00	100	Ashty
17.03.2019	$170.00	100	Gullan
19.03.2019	$200.00	100	Nawroz
28.03.2019	$333.00	100	Safen
28.03.2019	$200.00	100	Safen
28.03.2019	$275.00	100	Shawse Nwe
30.03.2019	$380.00	100	Ashty
30.03.2019	$326.00	100	Shawesy New
02.04.2019	$241.50	100	Azady
05.04.2019	$290.00	100	Gundy Shaews
11.04.2019	$301.00	100	Nawroz
16.04.2019	$300.00	100	Nawroz
17.04.2019	$320.00	100	Nawroz
21.04.2019	$326.00	100	Ashty
28.04.2019	$218.00	100	11 Aylul
30.04.2019	$257.00	100	Safen
30.04.2019	$285.00	100	Safen
04.05.2019	$325.00	100	Shawesy Nwe
04.05.2019	$325.00	100	Shawse Nwe
05.05.2019	$265.00	100	Safen
05.05.2019	$285.00	100	Shawse Nwe
05.05.2019	$285.00	100	Shawse Nwe
14.05.2019	$250.00	100	Shawse Nwe
14.05.2019	$250.00	100	Shawse Nwe
16.05.2019	$385.00	100	Shawse Nwe
17.05.2019	$240.00	100	Shawse Nwe
17.05.2019	$249.00	100	Shawse Nwe
29.05.2019	$300.00	100	Azady
10.06.2019	$285.00	100	Shawse Nwe
10.06.2019	$285.00	100	Shawse Nwe
12.06.2019	$233.00	100	Azady
12.06.2019	$233.00	100	Azady
16.06.2019	$303.00	100	Safen
04.07.2019	$200.00	100	Shawse Nwe
08.07.2019	$298.00	100	Ashty
15.07.2019	$310.00	100	11 Aylul
21.07.2019	$183.00	100	Safeen
23.07.2019	$310.00	100	Shawse Nwe
26.07.2019	$315.00	100	Nawroz
30.07.2019	$290.00	100	Shawesy New
01.08.2019	$340.00	100	Safen

04.08.2019	$360.00	100	11 Aylul
15.08.2019	$210.00	100	Safeen
23.08.2019	$253.00	100	Azady
24.08.2019	$210.00	100	Ashty
25.08.2019	$225.00	100	Ashty
28.08.2019	$286.00	100	Shawse Nwe
29.08.2019	$250.00	100	Azady
03.09.2019	$276.00	100	Gullan
05.09.2019	$368.00	100	Gundy Shawes
15.09.2019	$360.00	100	Gullan
23.09.2019	$400.00	100	Gullan
27.09.2019	$365.00	100	Gullan
02.10.2019	$280.00	100	Azady
17.10.2019	$350.00	100	11 yllul
18.10.2019	$264.00	100	Shawesy New
25.10.2019	$325.00	100	Azady
31.10.2019	$220.00	100	Gundy Shawes
05.11.2019	$235.00	100	Gundy Shawes
06.11.2019	$340.00	100	Nawroz
10.11.2019	$225.00	100	Kalaken
23.11.2019	$210.00	100	Ashty
23.11.2019	$272.00	100	11 Aylull
30.11.2019	$242.50	100	Nawroz
02.12.2019	$290.00	100	Gundy Shawes
08.12.2019	$170.00	100	Gundy Shawes
24.12.2019	$315.00	100	Gullan
09.01.2020	$275.00	100	Nawroz
11.01.2020	$225.00	100	11 Ayllul
05.02.2020	$245.00	100	Gullan
07.02.2020	$260.00	100	Gullan
08.02.2020	$310.00	100	11 Aylul
10.02.2020	$280.00	100	Shawesy New
10.02.2020	$345.00	100	Azady
13.02.2020	$410.00	100	Gundy Shawes
17.02.2020	$250.00	100	Azady
24.02.2020	$345.00	100	Nawroz
27.02.2020	$338.00	100	Gundy Shawes
27.02.2020	$210.00	100	Gundy Shawes
18.03.2020	$400.00	100	11 Aylul
20.03.2020	$420.00	100	Safen
29.03.2020	$310.00	100	Safen
05.04.2020	$238.00	100	Gundy Shawes
13.04.2020	$370.00	100	Gundy Shawes
28.04.2020	$270.00	100	Azady
03.05.2020	$310.00	100	Safen
07.05.2020	$400.00	100	11 Ayluul
29.05.2020	$290.00	100	Nawroz
08.06.2020	$294.00	100	Shawesy Nwe
14.06.2020	$255.00	100	Gundy Shawes
20.06.2020	$223.00	100	Gundy Shawes
28.06.2020	$247.00	100	Gundy Shawes

Date	Amount	Quantity	Name
28.06.2020	$215.00	100	11 Aylull
01.07.2020	$300.00	100	Gundy Shawes
01.07.2020	$229.00	100	Safen
03.07.2020	$326.00	100	Gullan
11.07.2020	$395.00	100	Ashty
18.07.2020	$350.00	100	Ashty
20.07.2020	$290.00	100	Shawse Nwe
25.07.2020	$290.00	100	Gullan
27.07.2020	$270.00	100	Shawse Nwe
06.08.2020	$333.00	100	Nawroz
15.08.2020	$242.00	100	Gullan
20.08.2020	$215.00	100	Nawroz
23.08.2020	$266.00	100	Azady
25.08.2020	$230.00	100	Gullan
01.09.2020	$255.00	100	Azady
05.09.2020	$300.00	100	Azady
06.09.2020	$296.00	100	Azady
07.09.2020	$328.00	100	Azady
10.09.2020	$250.00	100	Azady
13.09.2020	$350.00	100	Gullan
14.09.2020	$270.00	100	11 Ayllul
17.09.2020	$345.00	100	Azady
19.09.2020	$380.00	100	Ashty
21.09.2020	$400.00	100	Gullan
23.09.2020	$285.00	100	Azady
25.09.2020	$238.00	100	Safen
26.09.2020	$227.00	100	Shawse Nwe
30.09.2020	$400.00	100	Gullan
17.10.2020	$310.00	100	Azady
18.10.2020	$254.00	100	Safen
21.10.2020	$220.00	100	Gullan
21.10.2020	$290.00	100	11 Aylul
22.10.2020	$245.00	100	Gullan
27.10.2020	$310.00	100	Gundy Shawes
30.10.2020	$230.00	100	Gullan
04.11.2020	$275.00	100	Azady
08.11.2020	$250.00	100	Ashty
12.11.2020	$315.00	100	Azady
19.11.2020	$210.00	100	Safen
21.11.2020	$250.00	100	11 Atlull
23.11.2020	$280.00	100	11 Aylul
05.12.2020	$290.00	100	11 Ayllul
11.12.2020	$324.00	100	Nawroz
16.01.2021	$375.00	100	Nawroz
16.01.2021	$333.00	100	Nawroz
24.01.2021	$339.00	100	Nawroz
27.01.2021	$320.00	100	Nawroz
28.01.2021	$270.00	100	11 Ayllul
06.02.2021	$286.00	100	Gullan
08.02.2021	$280.00	100	Gullan
10.02.2021	$250.00	100	11 Aylul

Date	Amount	Qty	Name
16.02.2021	$305.00	100	11 Aylul
17.02.2021	$182.00	100	11 Aylul
08.03.2021	$340.00	100	11 Aylul
12.03.2021	$346.00	100	11 Aylul
06.04.2021	$350.00	100	Safen
11.04.2021	$350.00	100	Shawse Nwe
17.04.2021	$340.00	100	Safen
18.04.2021	$275.00	100	Ashty
23.04.2021	$450.00	100	Nawroze
29.04.2021	$366.00	100	Shawse Nwe
03.05.2021	$293.00	100	11 Ayllul
05.05.2021	$266.00	100	Gullan
12.05.2021	$275.00	100	11 Aylull
23.05.2021	$395.00	100	11 Aylull
25.05.2021	$335.00	100	Safen
29.05.2021	$471.00	100	Safen
01.06.2021	$275.00	100	11 Aylull
01.07.2021	$360.00	100	21 Gullan
01.07.2021	$300.00	100	Gundy Shawes
13.07.2021	$480.00	100	Ashty
17.07.2021	$238.00	100	Gunde Shawes
20.07.2021	$410.00	100	Ashty
05.08.2021	$240.00	100	Safen
11.08.2021	$390.00	100	Azady
11.08.2021	$220.00	100	11 Aylul
12.08.2021	$325.00	100	Shawese Nwe
15.08.2021	$250.00	100	Nawroz
17.08.2021	$277.00	100	Shawse Nwe
23.08.2021	$262.00	100	Azady
24.08.2021	$228.00	100	Gullan
30.08.2021	$262.00	100	Ashty
05.09.2021	$450.00	100	Ashty
21.09.2021	$235.00	100	Shawse Nwe
24.09.2021	$262.00	100	Nawroz
20.10.2021	$280.00	100	Azady
03.12.2021	$298.00	100	11 Aylull
05.12.2021	$285.00	100	Gundy Shawes
12.12.2021	$446.00	100	Ashty
21.12.2021	$232.00	100	Azady
26.12.2021	$275.00	100	Azady
06.01.2022	$281.00	100	Azady
12.01.2022	$260.00	100	Azady
01.02.2022	$255.00	100	Azady
02.02.2022	$345.00	100	Kalachin
02.02.2022	$215.00	100	Shawse Nwe
06.02.2022	$490.00	100	Safen
11.02.2022	$498.00	100	Nawroz
12.02.2022	$265.00	100	Kalachin
13.02.2022	$510.00	100	Gunde Shawes
03.03.2022	$318.00	100	Shawse Nwe
15.03.2022	$470.00	100	Shawse Nwe

Date	Price $	Area	Neighborhood
30.03.2022	$220.00	100	Safen
01.04.2022	$250.00	100	Ashty
02.04.2022	$325.00	100	11 Ayllul
05.04.2022	$237.00	100	Kalachin
13.05.2022	$453.00	100	Shawse Nwe
19.05.2022	$560.00	100	Gunde Shawes
19.05.2022	$363.00	100	Gundy Shawes
21.05.2022	$340.00	100	Azady
25.05.2022	$350.00	100	Azady
03.06.2022	$456.00	100	Nawroz
04.06.2022	$355.00	100	11 Aylul
05.06.2022	$450.00	100	Nawroz
12.06.2022	$316.00	100	Gullan
06.07.2022	$570.00	100	Nawroz
08.07.2022	$283.00	100	11 Ayllul
09.07.2022	$422.00	100	11 Aylul
13.07.2022	$302.00	100	Azady
14.07.2022	$362.00	100	Azady
06.09.2022	$490.00	100	Gundy Shawes
21.09.2022	$610.00	100	Nawroz
21.09.2022	$480.00	100	Nawroz
27.09.2022	$615.00	100	Nawroz
03.10.2022	$635.00	100	Nawroz
11.10.2022	$641.00	100	Ashty
17.10.2022	$506.00	100	Azady
18.10.2022	$606.00	100	Ashty
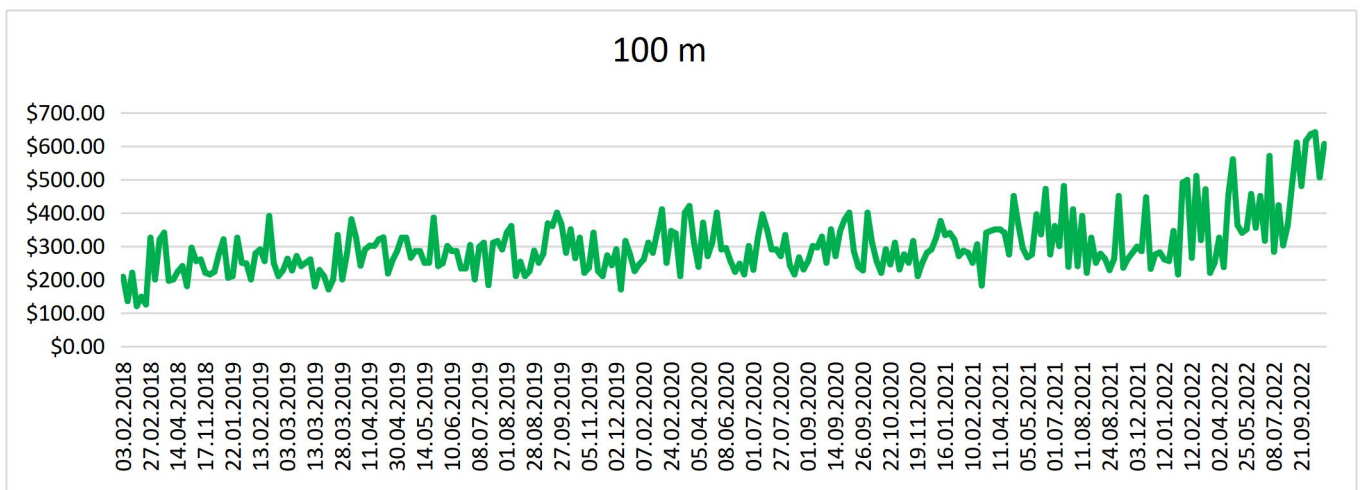
Figure 1 House Price Area 100

Table 2 : House prices area 150 m from 2018 to 2022.

Date	Price $	Area 150m	Neighborhood
01.04.2018	$370.00	150	Shawesy Nwe
05.07.2018	$320.00	150	11 Aylull
24.09.2018	$215.00	150	Shawesy Nwe
04.10.2018	$280.00	150	Shawesy Nwe

05.10.2018	$267.00	150	Shawesy Nwe
09.10.2018	$218.00	150	Shawesy Nwe
20.10.2018	$260.00	150	Shawesy Nwe
24.10.2018	$190.00	150	Gullan
27.10.2018	$323.00	150	Shawesy Nwe
30.10.2018	$300.00	150	Shawesy Nwe
30.10.2018	$193.00	150	Shawesy Nwe
08.11.2018	$145.00	150	Shawesy Nwe
16.11.2018	$395.00	150	Shawesy Nwe
01.12.2018	$300.00	150	Gullan
05.01.2019	$290.00	150	Gundy Shawes
30.01.2019	$405.00	150	Shawse Nwe
01.02.2019	$350.00	150	Shawse Nwe
15.02.2019	$328.00	150	Shawse Nwe
20.02.2019	$420.00	150	Shawse Nwe
02.03.2019	$400.00	150	Shawse Nwe
04.03.2019	$530.00	150	Gullan
04.03.2019	$290.00	150	Shawesy Nwe
10.03.2019	$310.00	150	Shawse Nwe
14.03.2019	$410.00	150	Azady
19.03.2019	$370.00	150	Gullan
24.03.2019	$315.00	150	26 Gulan
01.04.2019	$302.00	150	Shawesy Nwe
14.04.2019	$340.00	150	Gundy Shawes
22.04.2019	$540.00	150	Shawesy New
05.05.2019	$230.00	150	Gullan
16.05.2019	$385.00	150	Shawse Nwe
16.06.2019	$303.00	150	Safen
29.06.2019	$320.00	150	Azady
05.07.2019	$300.00	150	11 yllul
14.07.2019	$168.00	150	Safeen
05.08.2019	$455.00	150	Shawse Nwe
24.08.2019	$270.00	150	Gullan
29.08.2019	$290.00	150	Gundy Shawes
01.09.2019	$225.00	150	Gundy Shawes
07.09.2019	$400.00	150	Gundy Shawes
24.09.2019	$339.00	150	Shawesy New
30.09.2019	$400.00	150	Ashty
30.09.2019	$380.00	150	Shawse Nwe
01.10.2019	$395.00	150	Shawse Nwe
15.10.2019	$290.00	150	Gundy Shawes
06.11.2019	$270.00	150	Gullan
13.11.2019	$305.00	150	Shawesy New
26.11.2019	$415.00	150	Shawesy New
26.11.2019	$375.00	150	Shawesy New
23.12.2019	$316.00	150	Shawse Nwe
30.12.2019	$335.00	150	Shawesy New
04.01.2020	$260.00	150	Gundy Shawes
25.01.2020	$580.00	150	Gullan
01.02.2020	$275.00	150	Gundy Shawes
01.03.2020	$267.00	150	11 Ayluul

05.03.2020	$385.00	150	11 Ayluul
10.03.2020	$385.00	150	11 Ayluul
21.03.2020	$350.00	150	Shawesy New
14.05.2020	$298.00	150	Gundy Shawes
23.06.2020	$275.00	150	Gundy Shawes
25.07.2020	$390.00	150	Gullan
27.07.2020	$310.00	150	Gundy Shawes
14.08.2020	$478.00	150	Shawesy New
31.08.2020	$350.00	150	Shawse Nwe
09.09.2020	$455.00	150	Gullan
09.09.2020	$487.00	150	Gullan
15.09.2020	$543.00	150	Gullan
19.09.2020	$440.00	150	Shawesy New
22.09.2020	$380.00	150	11 Ayluul
22.09.2020	$560.00	150	11 Aylull
25.09.2020	$365.00	150	Shawesy Nwe
26.09.2020	$350.00	150	Shawesy Nwe
23.10.2020	$345.00	150	Gullan
09.11.2020	$535.00	150	Gullan
15.11.2020	$400.00	150	Shawse Nwe
24.11.2020	$443.00	150	Gullan
04.01.2021	$385.00	150	11 Aylull
16.02.2021	$360.00	150	Shawesy New
04.03.2021	$375.00	150	Shawse Nwe
04.03.2021	$390.00	150	Shawse Nwe
07.03.2021	$363.00	150	Shawesy New
07.03.2021	$277.00	150	Shawesy New
29.03.2021	$340.00	150	Gullan
01.04.2021	$365.00	150	Nawroz
01.04.2021	$615.00	150	Ashty
03.04.2021	$360.00	150	11 Aylul
05.04.2021	$331.00	150	11 Aylul
06.04.2021	$397.00	150	Shawse Nwe
25.04.2021	$410.00	150	Shawse Nwe
01.06.2021	$470.00	150	Shawse Nwe
06.06.2021	$355.00	150	Gundy Shawes
07.06.2021	$480.00	150	Shawse Nwe
13.06.2021	$445.00	150	Shawse Nwe
13.08.2021	$422.00	150	Shawse Nwe
28.08.2021	$220.00	150	Shawesy New
30.08.2021	$430.00	150	Shawesy Nwe
30.08.2021	$480.00	150	Shawse Nwe
01.09.2021	$430.00	150	Gullan
01.09.2021	$495.00	150	Shawse Nwe
27.09.2021	$438.00	150	Gullan
07.11.2021	$615.00	150	Gullan
04.12.2021	$390.00	150	Shawse Nwe
17.01.2022	$350.00	150	11 Aylul
15.03.2022	$357.50	150	Kalachen
15.03.2022	$405.00	150	Gullan
02.04.2022	$427.00	150	Ashty

Date	Price	Area	Neighborhood
10.05.2022	$480.00	150	Azady
20.07.2022	$385.00	150	Gullan
20.07.2022	$387.00	150	11 Aylull
01.08.2022	$500.00	150	26 Azady
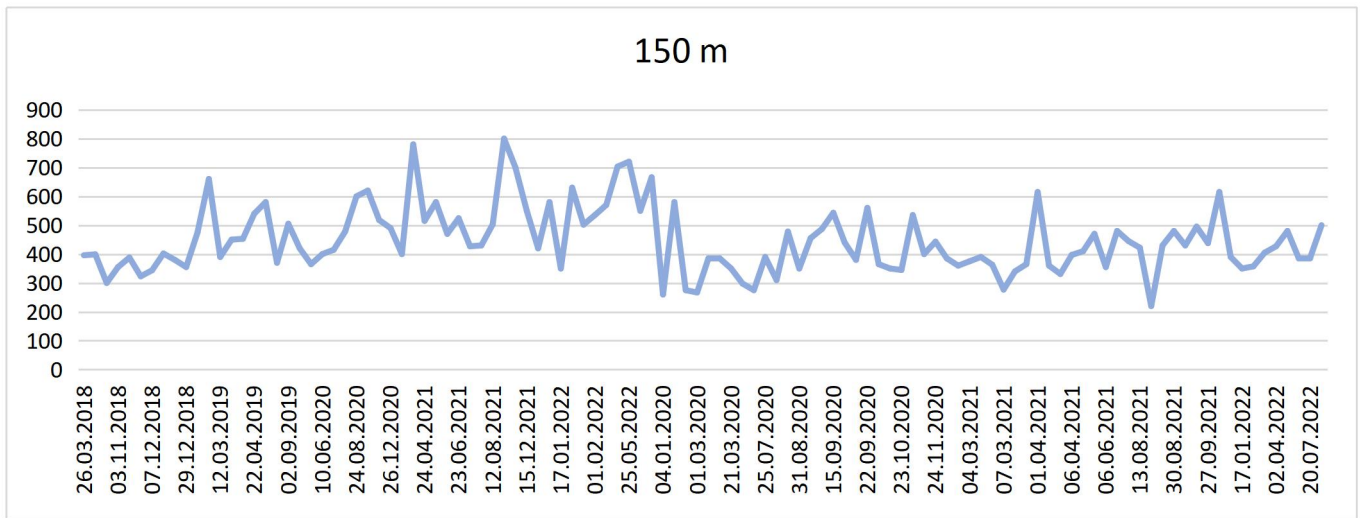
Figure 2 House Price Area 150

Table 3 : House prices area 200 m from 2018 to 2022.

Date	Price	Area	Neighborhood
26.03.2018	$396.00	200	Ashty
18.05.2018	$399.00	200	Safen
06.07.2018	$300.00	200	Azady
03.11.2018	$355.00	200	11 Aylul
30.11.2018	$388.00	200	Shawesy Nwe
02.12.2018	$323.00	200	Shawesy Nwe
07.12.2018	$344.00	200	Shawesy Nwe
12.12.2018	$402.00	200	Safen
22.12.2018	$380.00	200	Shawesy Nwe
29.12.2018	$355.00	200	Shawesy Nwe
01.01.2019	$475.00	200	Gundy Shawes
18.01.2019	$660.00	200	Gundy Shawes
12.03.2019	$390.00	200	Shawse Nwe
04.04.2019	$450.00	200	11 Aylul
09.04.2019	$453.00	200	Gundy Shawes
22.04.2019	$540.00	200	Gundy Shawes
18.06.2019	$580.00	200	Gullan
04.07.2019	$370.00	200	Shawse Nwe
02.09.2019	$505.00	200	Azady
14.11.2019	$420.00	200	Shawse Nwe
02.12.2019	$365.00	200	Azady
10.06.2020	$400.00	200	Safen
17.08.2020	$415.00	200	Krychyan
17.08.2020	$478.00	200	Shawesy New
24.08.2020	$600.00	200	Shawse Nwe

Date	Price	Area	Name
25.08.2020	$620.00	200	Safen
11.11.2020	$518.00	200	Shawse Nwe
26.12.2020	$490.00	200	Ashty
06.01.2021	$400.00	200	Azady
24.02.2021	$780.00	200	Gullan
24.04.2021	$515.00	200	Shawse Nwe
23.05.2021	$580.00	200	Gundy Shawes
02.06.2021	$470.00	200	Azady
23.06.2021	$524.00	200	Gullan
10.08.2021	$427.00	200	Shawsy Nwe
12.08.2021	$430.00	200	Gullan
12.08.2021	$503.00	200	Gullan
01.09.2021	$800.00	200	Shawse Nwe
05.12.2021	$700.00	200	Shawse Nwe
15.12.2021	$550.00	200	Shawse Nwe
17.12.2021	$420.00	200	Shawse Nwe
03.01.2022	$580.00	200	Gundy Shawes
17.01.2022	$350.00	200	Safen
19.01.2022	$630.00	200	Shawse Nwe
23.01.2022	$502.00	200	Ashty
01.02.2022	$535.00	200	Azady
01.03.2022	$570.00	200	Azady
03.03.2022	$703.00	200	Azady
25.05.2022	$720.00	200	Shawse Nwe
13.07.2022	$550.00	200	Gullan
04.12.2022	$666.00	201	Shawse Nwe
04.12.2022	$666.00	201	Shawse Nwe
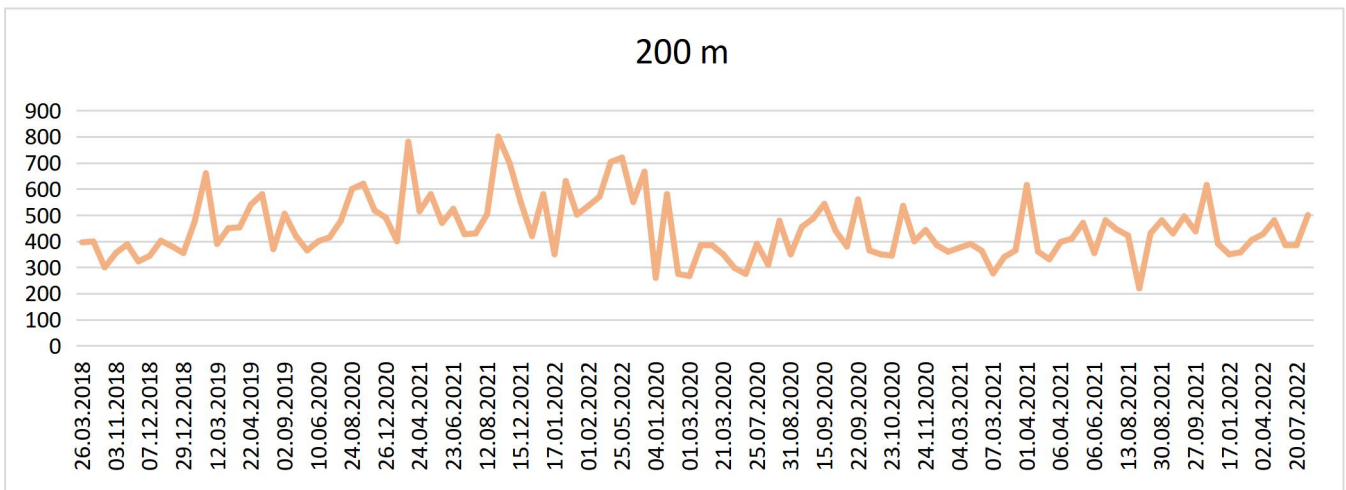
Figure 3 House Price Area 200

The above tables show the cases taken from the agreements between the buyer and seller in the offices, the total number of cases in all three areas are { 425 } cases, most of the cases are houses with an area of   100 meters The first is due to the economic level of the population of the area that the largest number of sales in this area, the houses with an area

of 200 meters, the number of cases received from { 110 } cases comes second in sales. Case consists of

In general, house prices have been increasing year after year due to several main reasons such as:

1- Not giving land for building houses.

2- Preventing the construction of unauthorized houses (encroachment).

3. Arrival of immigrants.

4. Rural and urban replacement, because many rural residents move to the cities will increase the demand for housing and prices will rise.

5. Self-shrinkage. People who want to have several small properties resort to selling large properties.

6- Good and abundant services in the area such as (electricity, water, roads, etc.).

7- Close to public places such as (markets, malls, parks, government offices, hospitals, etc.).

8- Location strategy, having many residential projects.

Shawes is one of the communities located in the Diamond Zone, which is one of the reasons why the price of property in general is constantly rising.

Forecasting and selection of the best model

Time series

Time series is statistical data that we arrange and present in a chronological order spreading over a period of time. Time series analysis is a statistical technique dealing with time series data. According to Spiegel, "A time series is a set of observations taken at specified times, usually at equal intervals." In statistics, for time series analysis two main categories of models are popular. Let us discuss the Models of Time Series Analysis in details.

Models Time series

1- MOVING AVERAGE

The moving average model is probably the most naive approach to time series modeling. This model simply states that the next observation is the mean of all past observations.

2-EXPONENTIAL SMOOTHING

Exponential smoothing uses similar logic to moving average, but this time, a different decreasing weight is assigned to each observation. In other words, less importance is given to observations as we move further from the present.

2-DOUBLE EXPONENTIAL SMOOTHING

Double exponential smoothing is used when there is a trend in the time series. In that case, we use this technique, which is simply a recursive use of exponential smoothing twice.

4-TRIPLE EXPONENTIAL SMOOTHING

This method extends double exponential smoothing by adding a seasonal smoothing factor. Of course, this is useful if you notice seasonality in your time series.

5-SEASONAL AUTOREGRESSIVE INTEGRATED MOVING AVERAGE MODEL (SARIMA)

SARIMA is actually the combination of simpler models that create a complex model that can present a time series exhibiting non-stationary properties and seasonality.

6-Autoregressive Integrated Moving Average Model

An ARIMA model is a class of statistical models for analyzing and forecasting time series data.

A) Stationery
1- Area 100m :
Befor Stationery ; Figure 4 time series for price 100 m
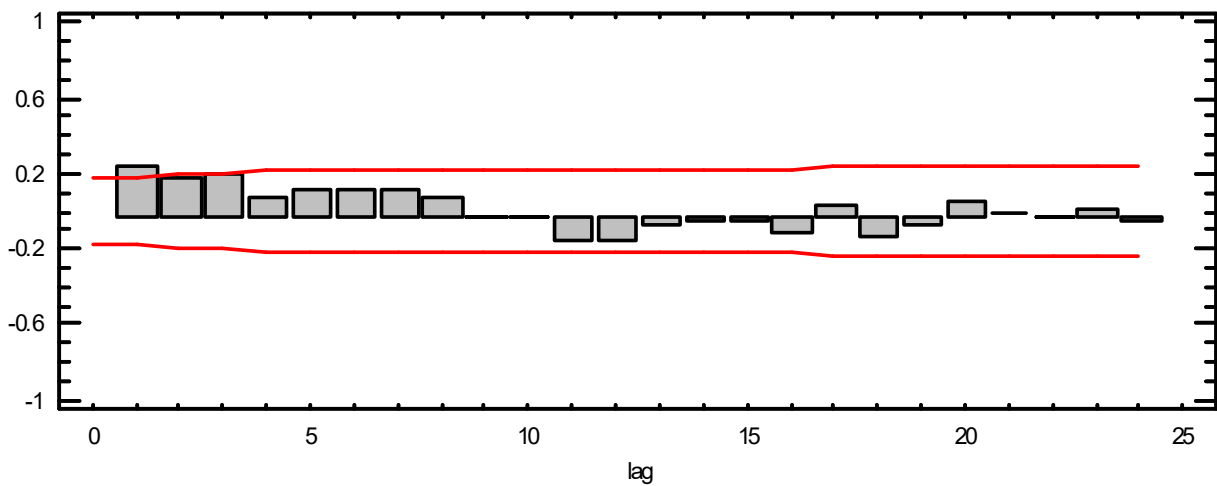

Figure 4 time series for price 100 m
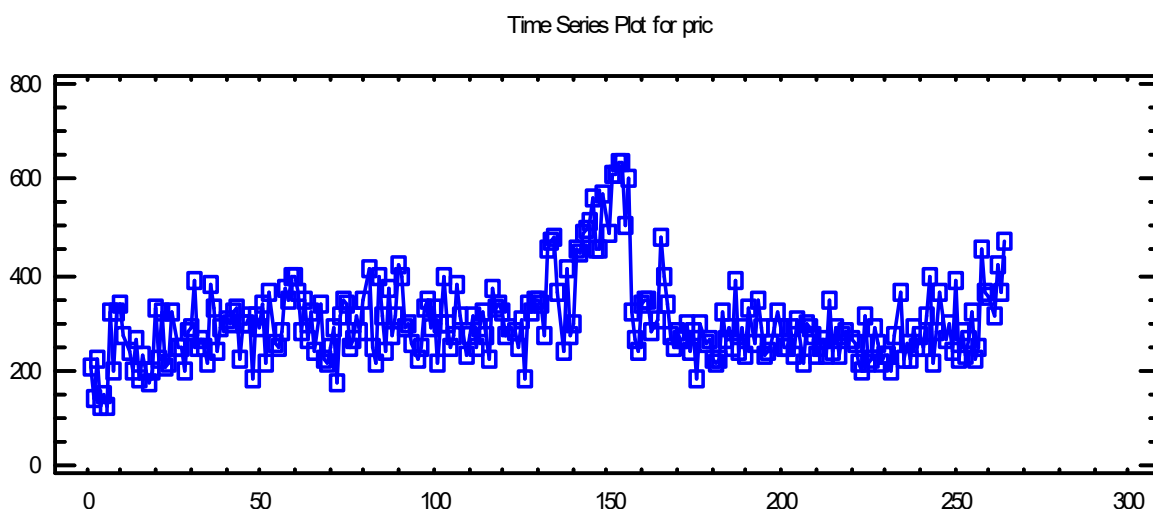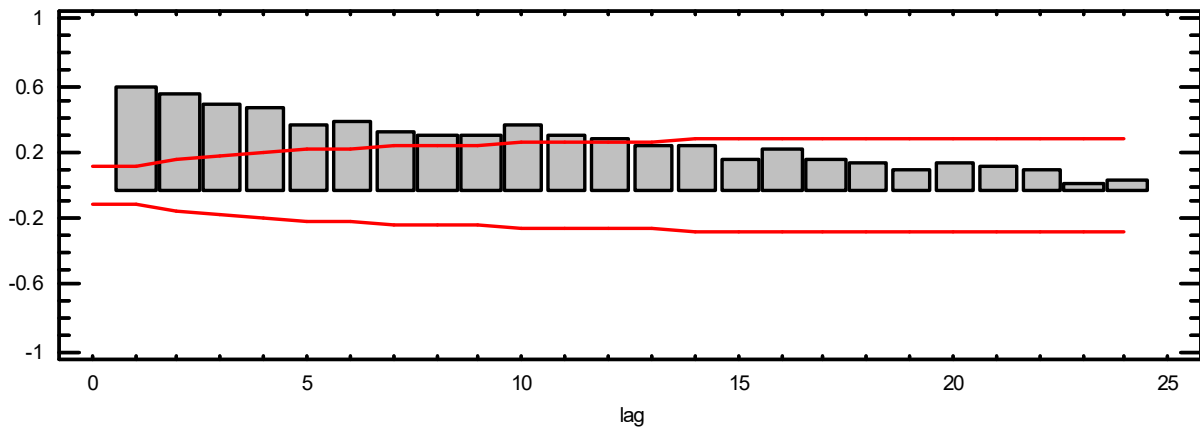
Figure 5 Autocorrelation for price 100 m

Estimated Partial Autocorrelations for pric
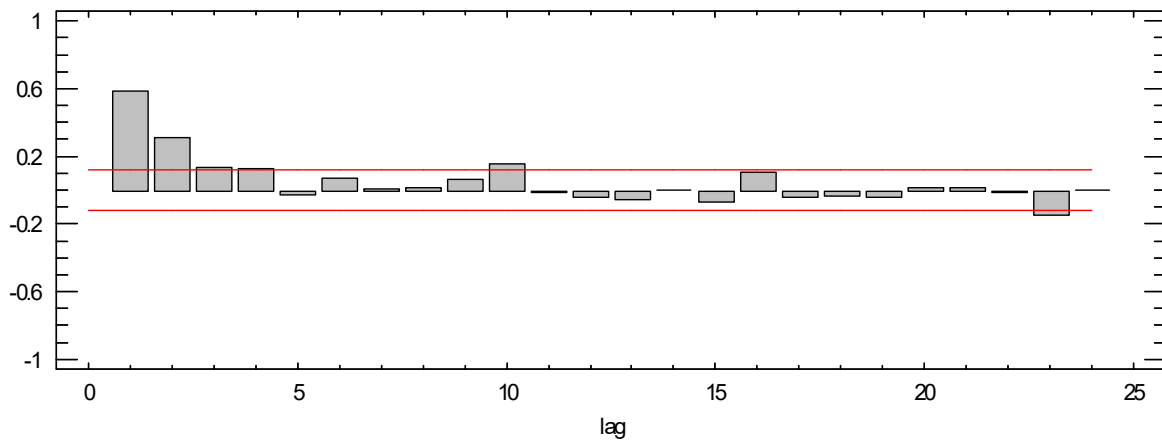
Figure 6 Partial Autocorrelation for price 100 m

Graph 1 shows that the mean is relatively stable, as is the variance.
Graphs 2 and 3 show that there is more than one deviation between the highest and lowest prices.

After Stationery ;

Time Series Plot for adjusted pric
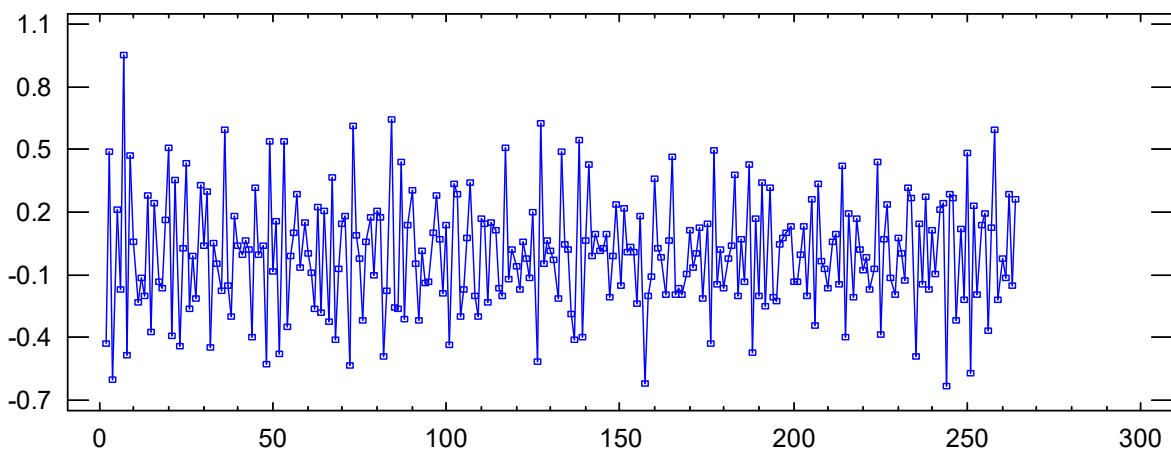
Figure 7 time series for adjusted price 100 m

Estimated Autocorrelations for adjusted pric
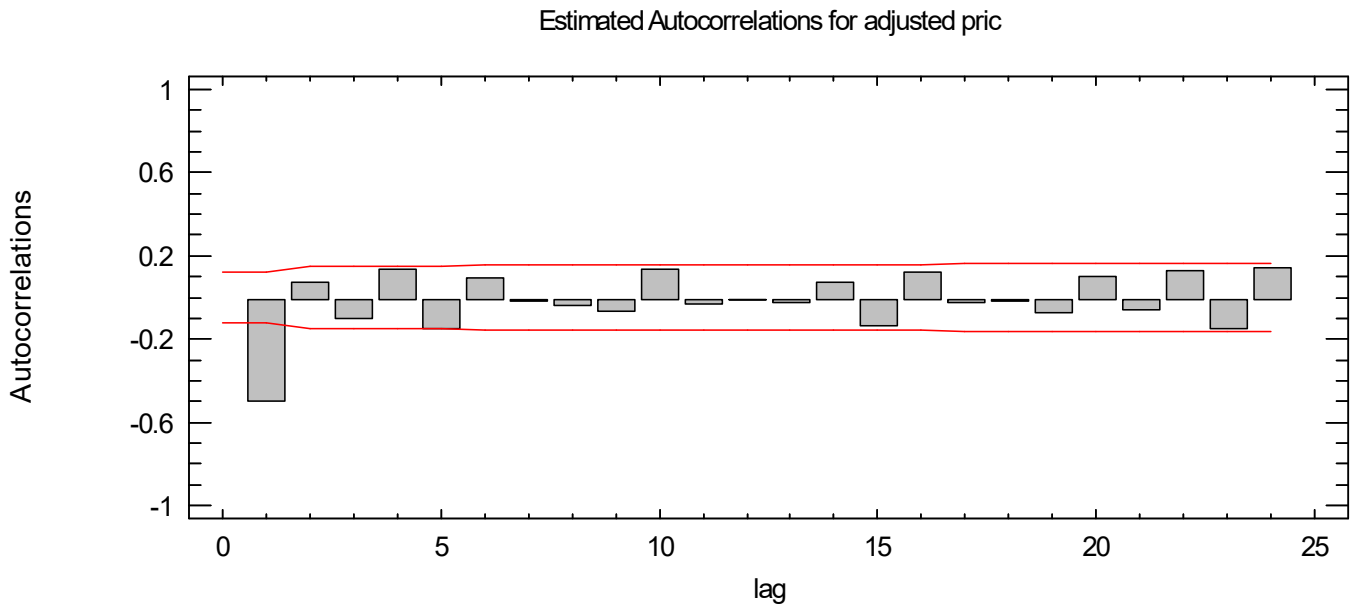
Figure 8 Autocorrelation for adjusted price 100 m
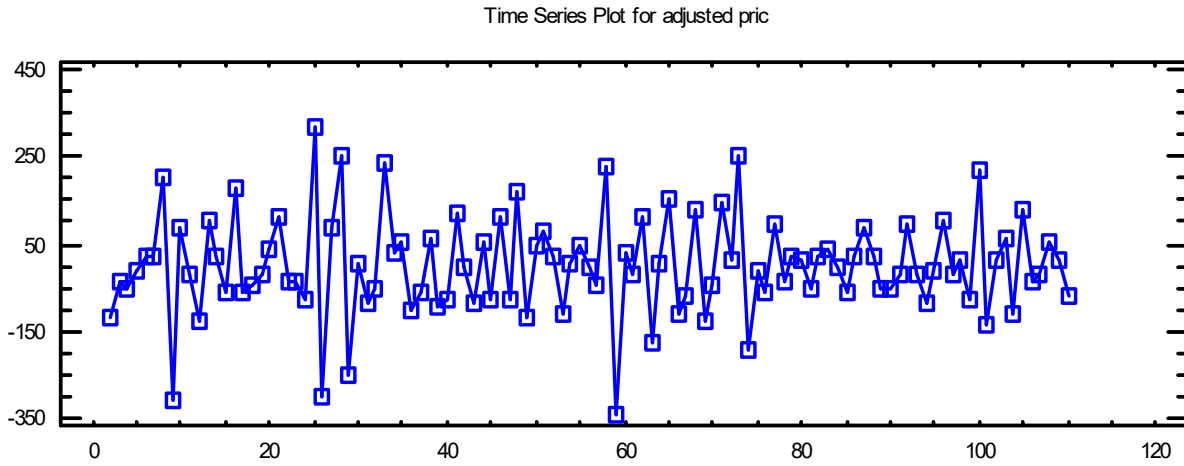
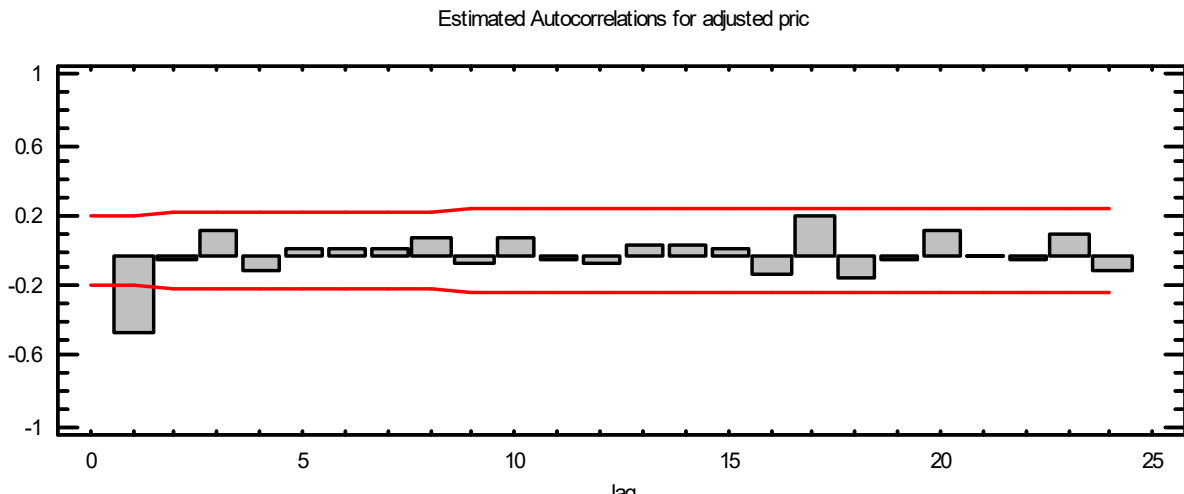Estimated Partial Autocorrelations for adjusted pric
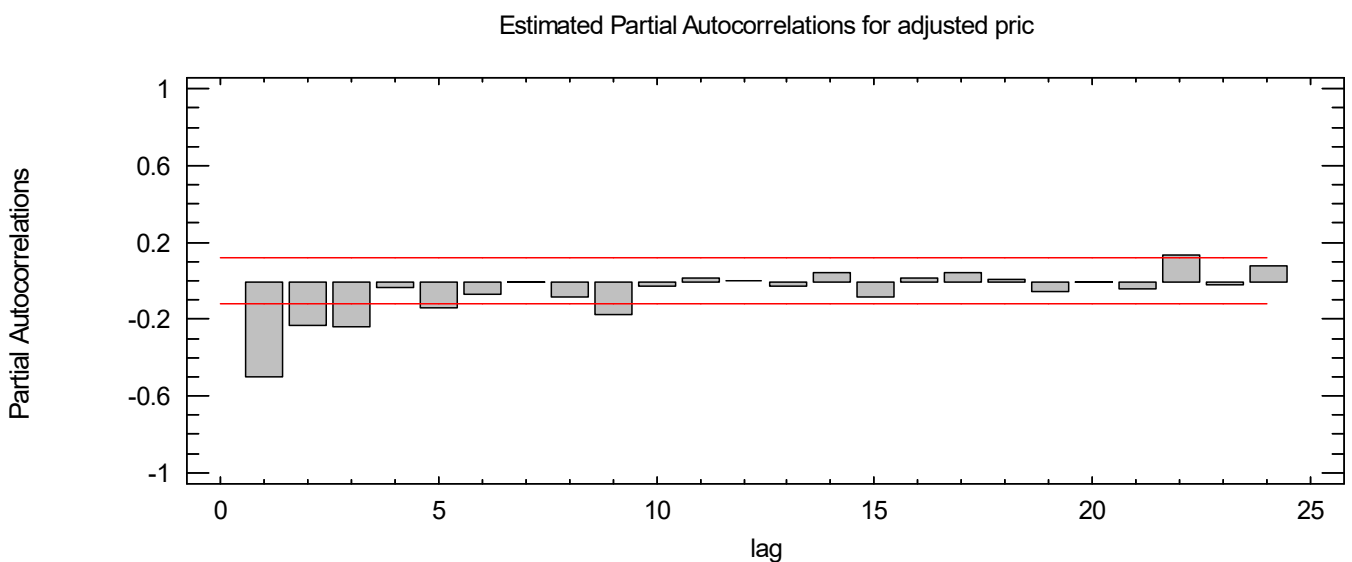
Figure 9 Partial Autocorrelation for adjusted price 100 m

After the adjustments were made, they were : Adjustments

(1) A natural log transformation was applied.

(2) Simple differences of order 1 were taken.

In the first graphs and third , it can be seen that the direction of the points is more straight with the horizontal line, and the height and low of the points are largely at the same level. graphs 2 and 3 show a small part of the highest and lowest points, which is very small and has little effect.

2- Area 150m :

Befor Stationery ;

Time Series Plot for pric
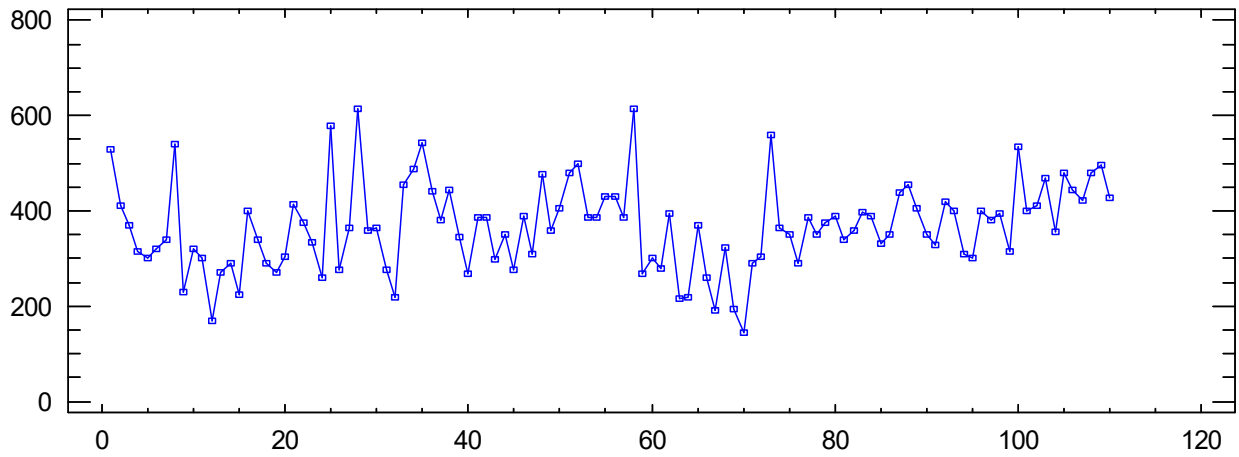
Figure 10 time series for price 150 m

Estimated Autocorrelations for pric

lag

Figure 11 Autocorrelation for price 150 m

Estimated Partial Autocorrelations for pric

lag
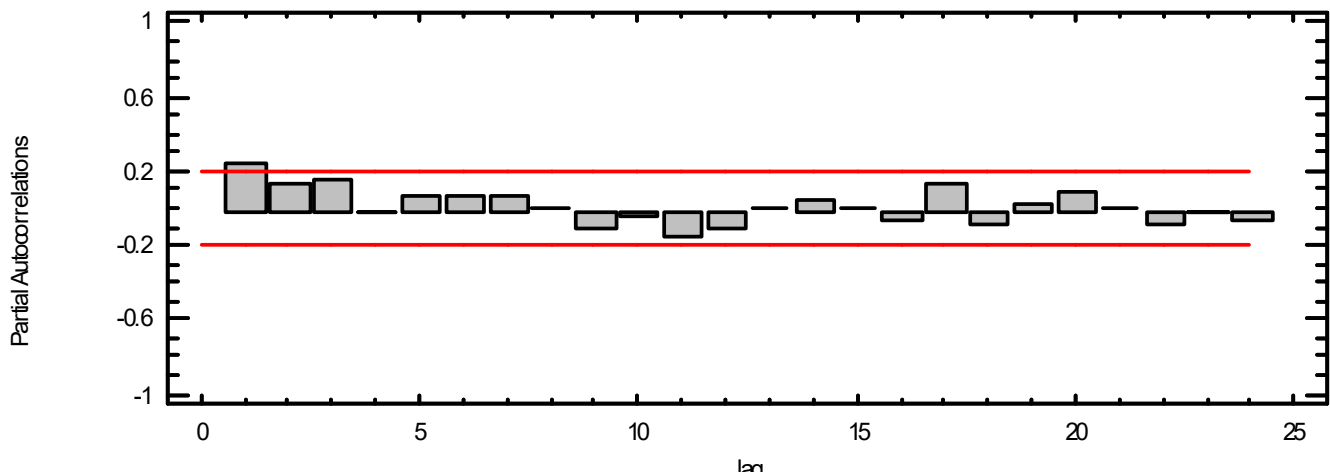
Figure 12 Autocorrelation for price 150 m

The above three graphs show the data of houses with an area of   150 m,
The first graph shows that it is not stable and has a slight upward trend.

In the second and third graphs, only the first one is out, which is a small amount and has very little effect.

After Stationery ;

Time Series Plot for adjusted pric

Figure 13 time series for adjusted price 150

Estimated Autocorrelations for adjusted pric

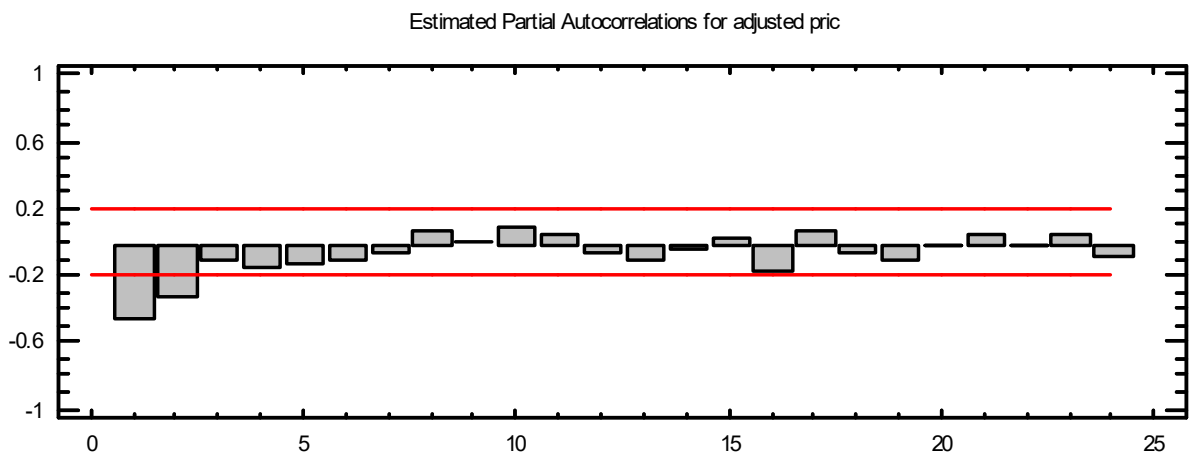Figure 14 Autocorrelation for adjusted price 150 m

Estimated Partial Autocorrelations for adjusted pric

Figure 15 Partial Autocorrelation for adjusted price 150 m

After the adjustment we made to fix the data (1) Simple differences of order 1 were taken. The first graph shows a good degree of stability, while the second and third graphs show a slight deviation that has very little effect.
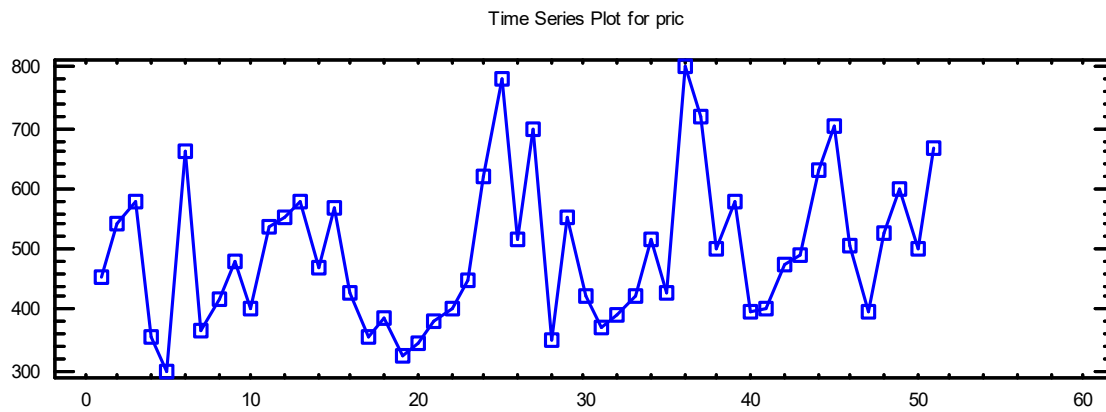
3- Area 200m :

Befor Stationery ;

Time Series Plot for pric

Figure 16 time series for price 200

Estimated Autocorrelations for pric

Figure 17 Autocorrelation for price 200 m

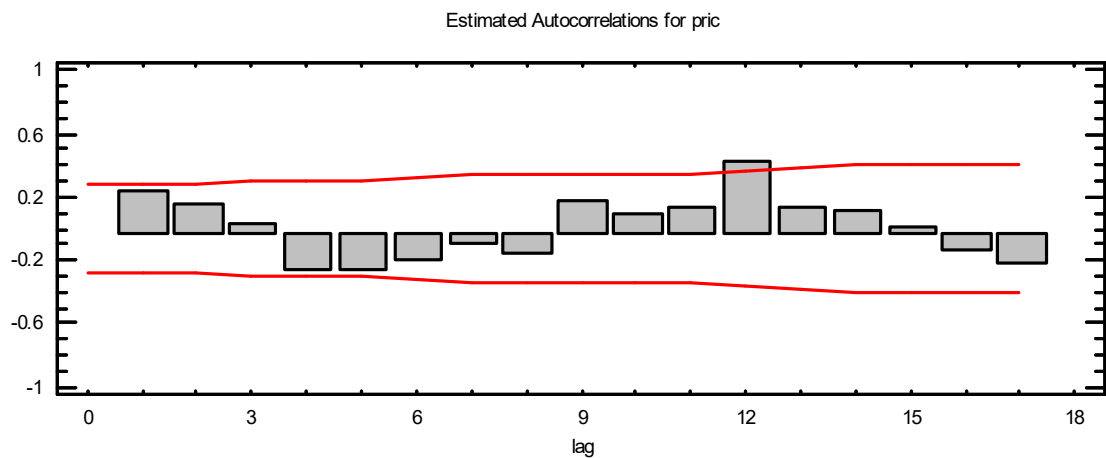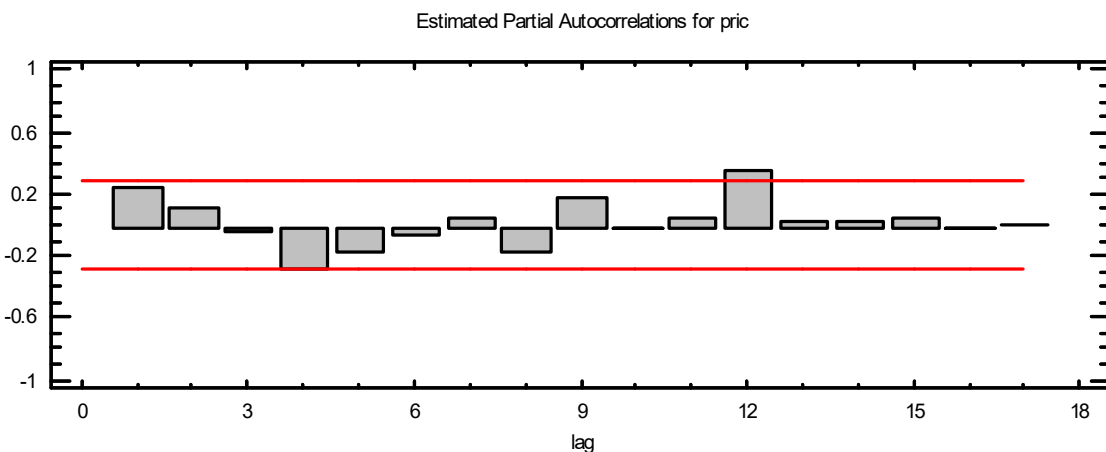Estimated Partial Autocorrelations for pric

Figure 18 Partial Autocorrelation for price 200 m

There is a lot of volatility in the first graph, but there are very few problems in the second and third graphs.
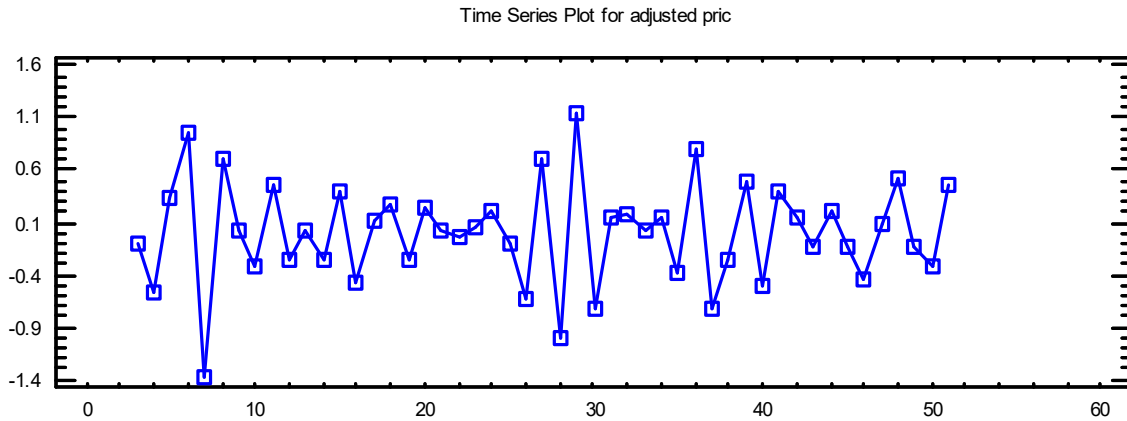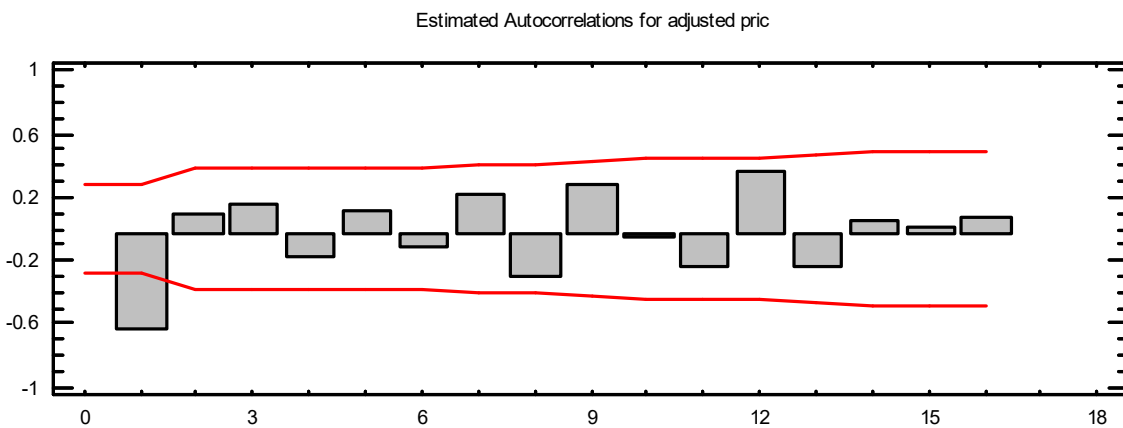
After Stationery ;

Time Series Plot for adjusted pric

Figure 19 time series for adjusted price 200

Estimated Autocorrelations for adjusted pric

Figure 20 Autocorrelation for price 200 m

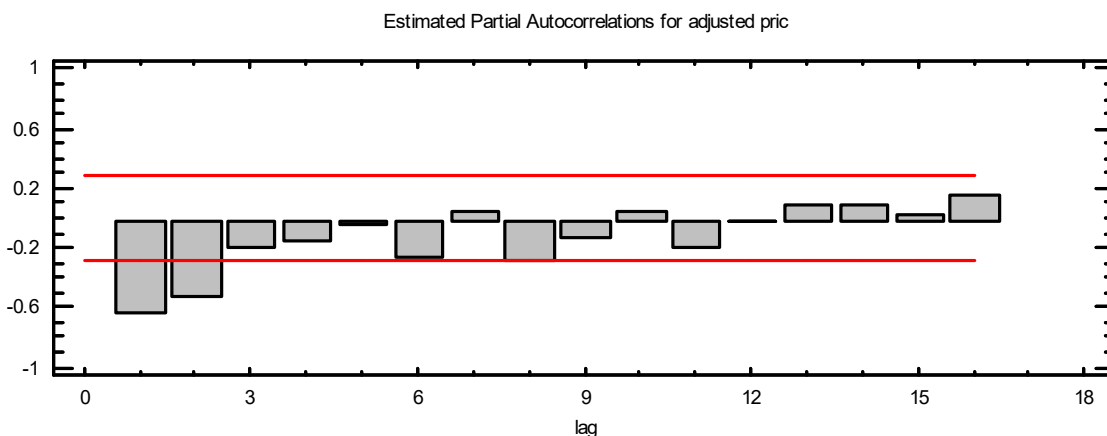Estimated Partial Autocorrelations for adjusted pric

Figure 21 Partial Autocorrelation for adjusted price 200 m

The result after the adjustment The data cover 51 time periods. Each value of pric has been adjusted in the following way:
(1) A natural log transformation was applied.

(2) Simple differences of order 2 were taken.
The first graph has better rate stability than before, both mean and variance, and the second and third graphs have fewer problems.

B) Forcasting and selection of the best model

1- Area 100m ;

Models
(A) Random walk
(B) Constant mean = 300.004
(C) Linear trend = 284.854 + 0.114335 t
(H) Simple exponential smoothing with alpha = 0.3358
(I) Brown's linear exp. smoothing with alpha = 0.1526
(J) Holt's linear exp. smoothing with alpha = 0.3001 and beta = 0.0134
(M) ARIMA(1,0,1) with constant
(N) ARIMA(2,0,2) with constant
(O) ARIMA(0,1,1)
(P) ARIMA(1,0,2) with constant
(Q) ARIMA(2,0,1) with constant

Model	RMSE	MAE	MAPE	ME	MPE	AIC
(A)	79.4247	62.9582	22.1808	$1.72908E-14$	-3.80371	8.73841
(B)	87.8958	64.694	22.4986	$-7.66525E-14$	-7.78651	8.95231
(C)	87.629	65.4197	22.6453	$7.53606E-15$	-7.65257	8.9538
(H)	66.8495	52.3622	18.0681	2.42826	-3.23935	8.40489
(I)	68.8576	52.6273	18.1728	2.02914	-3.04965	8.46408
(J)	67.4866	52.8143	18.5565	-2.63071	-5.06679	8.43143
(M)	66.3989	53.0618	18.5225	1.66269	-4.16541	8.41409
(N)	66.0534	52.2794	18.2435	1.1077	-4.23337	8.4188
(O)	67.0889	52.472	18.0991	2.308	-3.29882	8.41961
(P)	66.419	53.0151	18.5073	1.18334	-4.29025	8.42227
(Q)	66.4198	53.0595	18.5254	1.07857	-4.32632	8.42229

This table compares the results of fitting different models to the data. The model with the lowest value of the Akaike Information Criterion (AIC) is model H, which has been used to generate the forecasts, Also, based on the minimum RMSE, model (N) is the best model because it has the lowest approximation.

Time Sequence Plot for Col_2

Simple exponential smoothing with alpha = 0.3358
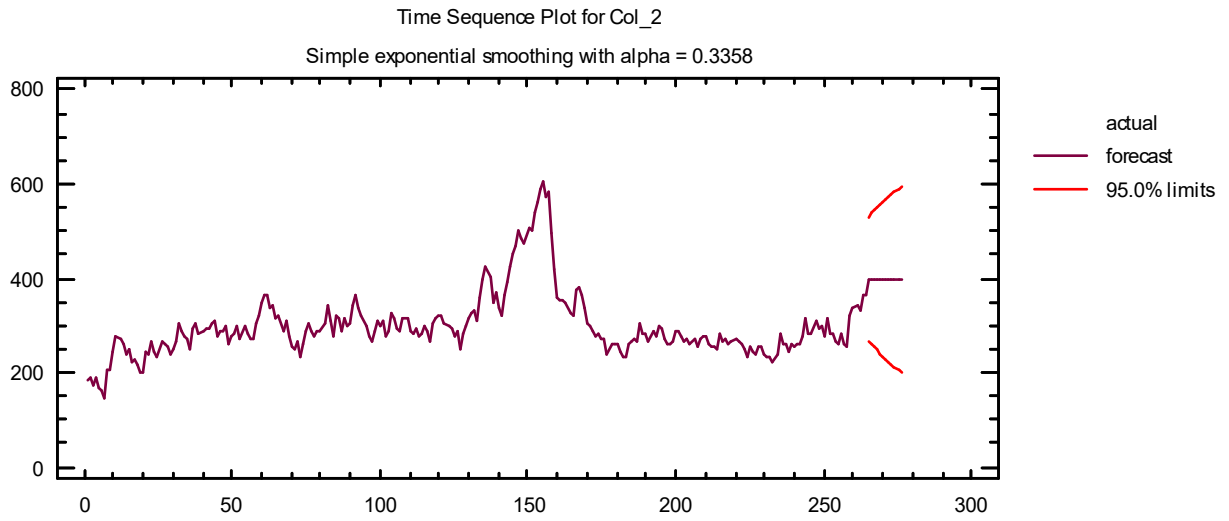
Figure 22 time squenus for price 100

Residual Autocorrelations for P

Simple exponential smoothing with alpha = 0.3358
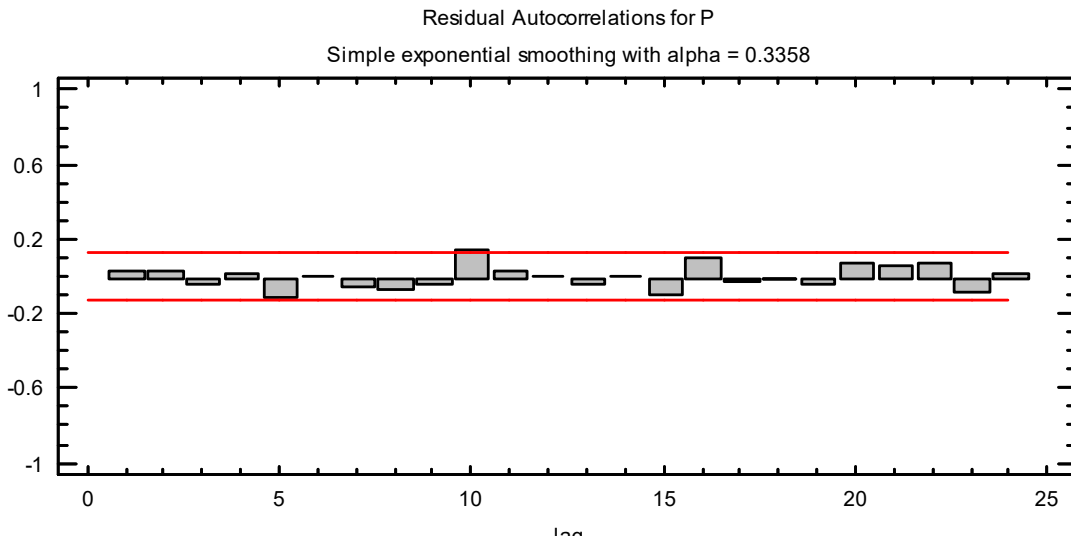
Figure 23 Residual Autocorrelation for Price 100

Residual Partial Autocorrelations for P

Simple exponential smoothing with alpha = 0.3358

lag

Figure 24 Residual Partial Autocorrelation for Price 100

2- Area 150m ;

Models
(A) Random walk
(B) Constant mean = 367.068
(C) Linear trend = 339.875 + 0.48996 t
(H) Simple exponential smoothing with alpha = 0.1968
(I) Brown's linear exp. smoothing with alpha = 0.0885
(J) Holt's linear exp. smoothing with alpha = 0.1434 and beta = 0.0266
(M) ARIMA(0,1,1)
(N) ARIMA(1,0,1) with constant
(O) ARIMA(0,1,2)
(P) ARIMA(1,1,1)
(Q) ARIMA(0,1,1) with constant

Model	RMSE	MAE	MAPE	ME	MPE	AIC
(A)	113.81	84.4317	24.4252	5.21499E-15	-4.96216	9.44182
(B)	92.3045	71.5512	22.0538	3.41061E-14	-7.31504	9.05019
(C)	91.4003	68.7049	21.1348	1.96368E-14	-7.07309	9.04868
(H)	90.2721	68.121	20.3188	2.7195	-5.33789	9.00566
(J)	92.2942	68.5236	20.2104	9.90288	-3.43771	9.06814
(M)	90.0596	67.4855	20.2444	1.18426	-5.64429	9.01912
(N)	89.1976	66.6951	20.1708	-0.98979	-6.70354	9.03625
(O)	90.2939	67.0935	20.1893	1.61669	-5.63537	9.0425
(P)	90.3271	67.1849	20.2029	1.48631	-5.6447	9.04324
(Q)	90.3988	67.3119	20.3283	-1.15259	-6.33938	9.04482

This table compares the results of fitting different models to the data. The model with the lowest value of the Akaike Information Criterion (AIC) is model (H), which has been used to generate the forecasts. Also, based on the minimum RMSE, model (N) is the best model.

Figure 25 time squenus for price 150

Residual Autocorrelations for B

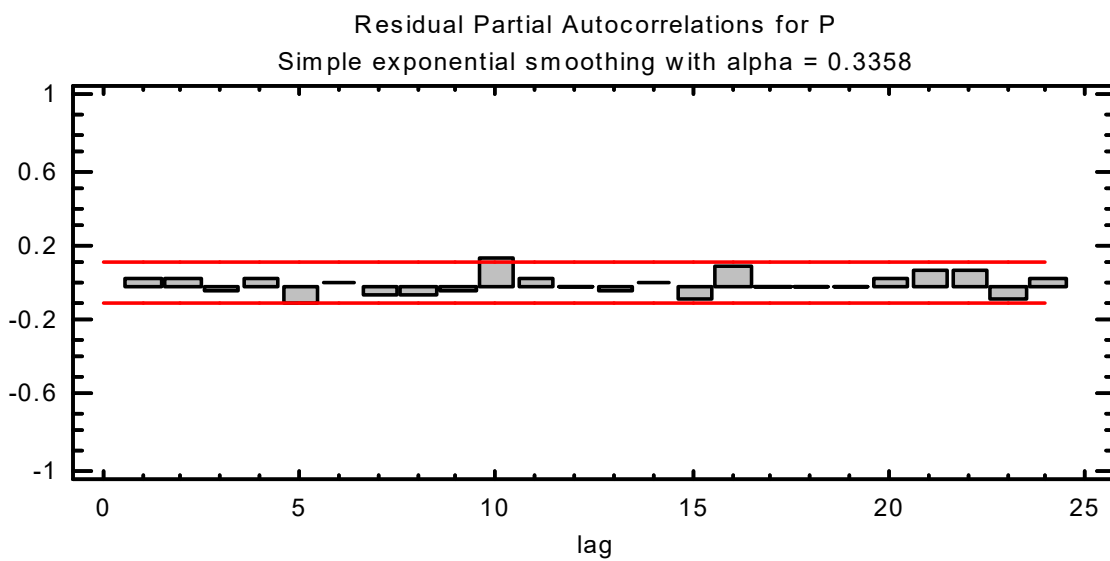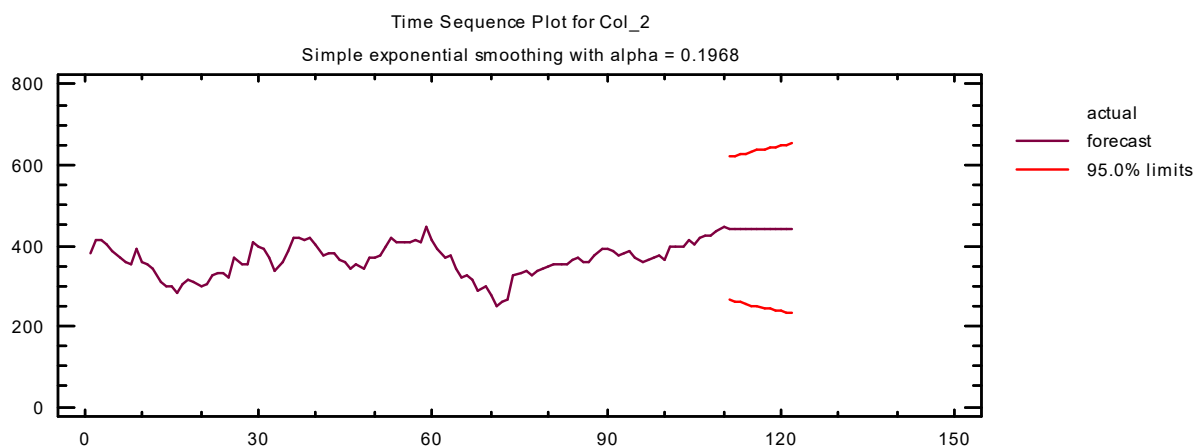Simple exponential smoothing with alpha = 0.1968
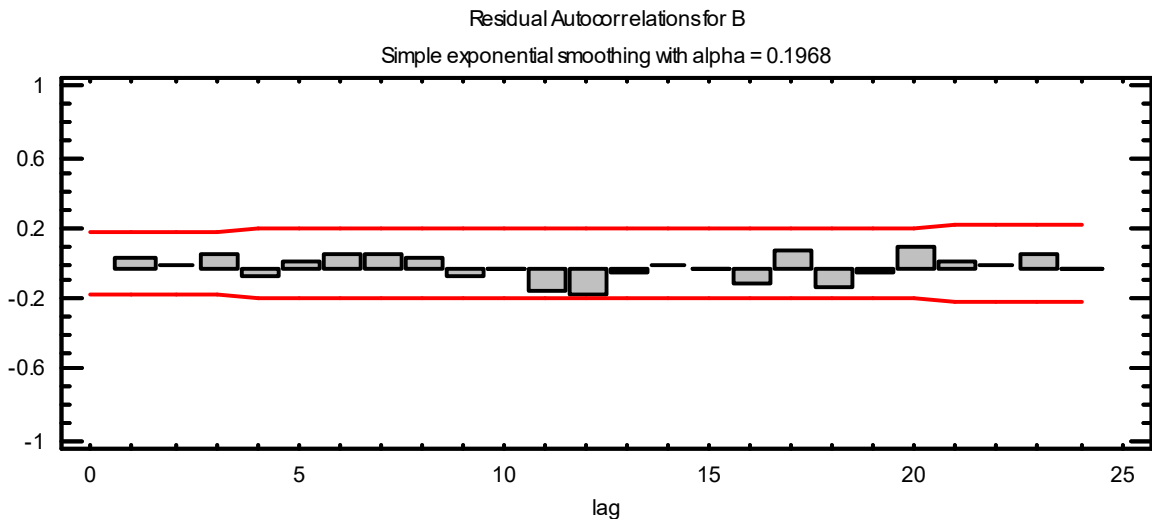
Figure 26 Residual Autocorrelation for Price 150

Residual Partial Autocorrelations for B

Simple exponential smoothing with alpha = 0.1968
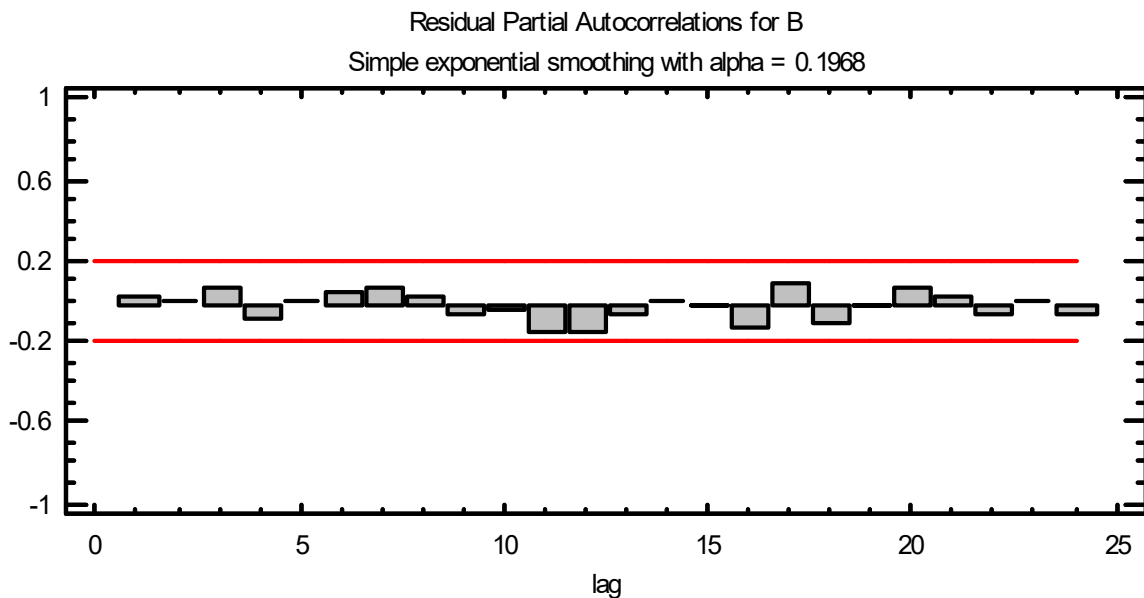
Figure 27 Residual Partial Autocorrelation for Price 150

3- Area 200m ;

Models
(A) Random walk
(B) Constant mean = 495.608
(C) Linear trend = 440.874 + 2.10516 t
(H) Simple exponential smoothing with alpha = 0.0548
(I) Brown's linear exp. smoothing with alpha = 0.0586
(J) Holt's linear exp. smoothing with alpha = 0.1192 and beta = 0.1197
(M) ARIMA(2,0,2) with constant
(N) ARIMA(1,0,0) with constant
(O) ARIMA(0,0,0) with constant
(P) ARIMA(0,0,1) with constant
(Q) ARIMA(0,1,1)

Model	RMSE	MAE	MAPE	ME	MPE	AIC
(A)	148.122	115.648	23.6988	9.09495E-15	-4.3693	9.93788
(B)	120.996	99.4671	20.8568	-1.78332E-14	-5.80444	9.59152
(C)	118.125	97.8903	20.3566	4.45831E-15	-5.37767	9.5827
(H)	122.132	97.0642	19.8058	11.5291	-3.28998	9.6102
(I)	124.714	98.3208	19.5415	21.9259	-0.875031	9.65205
(J)	128.188	102.227	20.9457	5.89263	-4.34112	9.74621
(M)	108.524	83.7662	17.5659	-2.70533	-4.88281	9.57002
(N)	119.533	97.5194	20.2802	0.471754	-5.32297	9.64561
(O)	122.2	99.4671	20.8568	-1.78332E-14	-5.80444	9.65054
(P)	120.284	97.8674	20.4047	0.229901	-5.47292	9.65814
(Q)	124.488	98.4858	20.1536	11.0982	-3.51055	9.68763

This table compares the results of fitting different models to the data. The model with the lowest value of the Akaike Information Criterion (AIC) is model M, which has been used to generate the forecasts. Also, based on the minimum RMSE, model (M) is the best model.

Time Sequence Plot for Col_2
ARIMA(2,0,2) with constant

Figure 28 time squenus for price 200
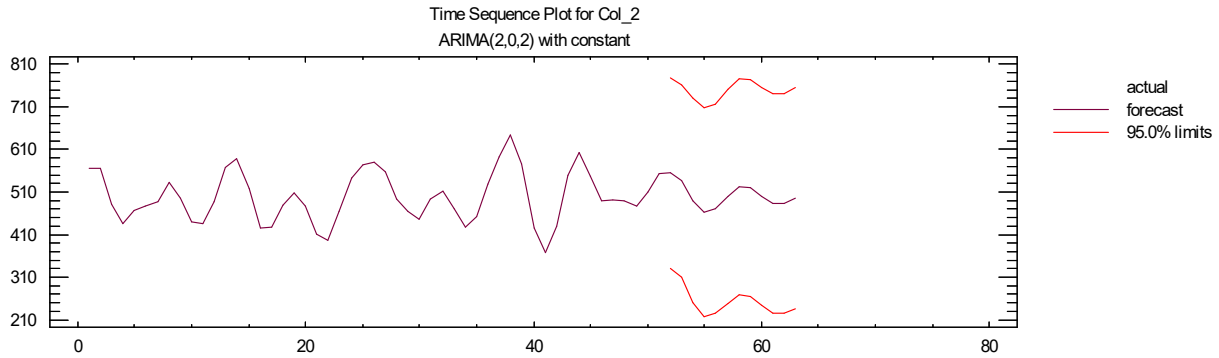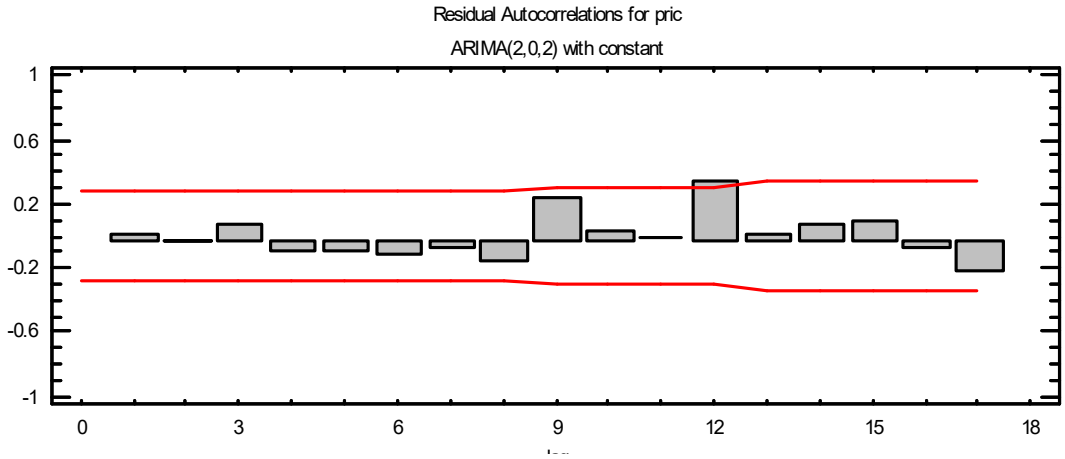
Residual Autocorrelations for pric
ARIMA(2,0,2) with constant

Figure 29 Residual   Autocorrelation for Price 200

Residual Partial Autocorrelations for pric
ARIMA(2,0,2) with constant

Figure 30 Residual Partial Autocorrelation for Price 200

CONCLUSION

According to the study, the price of each of the three areas of 100,150,200 will increase by 2023, which includes several main reasons These projects cause the price of houses with an area of 100 meters to rise more because of the high demand and the ban on the construction of houses with an area of 100 meters is the main reason for the price increase With the disappearance and reduction of the area of 100 meters, people with determined economic status will resort to buying these areas. At the same time, the study only worked on the area of the houses regardless of the type of house Doing this will change the price of a house in a certain area. With the strategic location of the place over time, people from outside the region, especially tourists, which is an important factor in the economy and causes house prices to rise in general.

Purpose of Research

The purpose of the study is to know the price of houses in the future and to integrate statistical techniques into the world of real estate, many other goals such as young people who want to get married and buy a house will be useful to prepare themselves Buying and selling houses will be very useful for them.

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