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THE EFFECTS OF TRAFFIC NOISE ON HOUSE  
RENTING AND SELLING PRICES  
CONCERNING RESIDENTIAL AREAS:  
CASE OF SULAYMANIYAH CITY CENTER

MASTER'S THESIS

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**Abstract:**

Should be the the goal of the enlightened Governmental regulations to protect citizens from the harmful effects caused by the noise of traffic, including those generated by the noise. People have the right to choose the nature of the acoustic environment, as it should not be imposed by others, The problem of traffic noise considered as one of the main problems that have been imposed on the people in Sulaymaniyah city center, which began to take a serious economic and social dimensions, affects the decision-making process in the real estate market. And consequently, this research analyzes the impact of traffic noise pullotion in the sale and rent prices of residential property in Sulaymaniyah city center, the results of Research has confirmed an clear and negative effect the traffic noise on residential real estate prices in Sulaymaniyah city center and the proof of this an excess of supply of real estate in (noisy and dusty) areas and the lack of demand for real estate in areas close to the traffic. Finally, the research commanded range of important recommendations, such as: necessity control the noise pollution at the level of governments and companies, either at the companies level by choosing vehicles that release less sound and the use of sound control devices of high efficiency, either at the government level to determine the volume level or prevent annoying noises (painful), through legislation and laws of environmental protection and impose fees and raise awareness.

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## List of Abbreviation

dB .....	Decibels
NO <sub>x</sub> .....	Nitrogen monoxide
SO <sub>2</sub> .....	Sulfur dioxide
VOC .....	Volatile organic compounds
O <sub>3</sub> .....	Ozone
CO <sub>2</sub> .....	Carbon
CH <sub>4</sub> .....	Methane
N <sub>2</sub> O .....	Nitrous Oxide
SPSS .....	Statistical Package for Social Sciences

# **Chapter One**

## **Introduction**

## **Introduction:**

Traffic noise has the form (traffic pollution) source of concern to doctors and psychologists and economists for quite some time. Perhaps it is due to the negative effects of noise pollution and a lot of attention focused on the noise in cities (Diana. 2010). And was able to the human to make noise due to the establishment of roads for cars and railways and aircrafts and machines for agricultural and industrial purpose. As it is well known that the transport activity brings a lot of benefits to the economy and due to the fact it is, increases production and efficiency and also connects producer and the customer also connects regions, countries and continents and contributes to economic development, And enable the global market. But in spite of benefits there are external costs of transport represented in (congestion, accidents, air pollution, climate change, noise) and centers that sends the traffic noise has significantly affects on the decision making process in the real estate market, Where the affects on houses and rents prices. As the polluted areas houses with noise are subject to impairment and expensive costs to prevent or reduce the noise. The phenomenon of the noise of cars spread significantly in Sulaymaniyah province, as a result of high dependence on cars for transport operations, And increase the number of cars has made modern life painful Especially in its center, and then the attendant health and economic risks on the individual.

## **The Aims of the Study**

### **Research Aim:**

The research aims to shed light on the concept of traffic noise pollution in general and in particular in the Sulaymaniyah City Center , and show the impact of traffic noise on the sale and rent prices of the housing real estate in the Sulaymaniyah City Center, and detecting efforts to tackle noise problems and try to reach the most important implications of borne out of the reality of real estate in the bustling areas on the fields of economic and social development, particularly the field of health is the influencing factor in the life of the population.

### **Problem of the Research:**

The problem of noise pollution, Considered one of the main problems facing the countries of the world, which began to take a economic and social a dangerous dimensions, especially after the economic and industrial and technological development which accompanied by many dangerous environmental problems at the local and international level. The excess noise occupies the second place immediately after the water pollution between environmental issues of interest to them, The problem of the traffic noise is one of the major problems facing the city center of Sulaymaniyah, which began to take a serious economic and social dimensions, and affects on the decision making process in the property market.

**Significance of the Research:**

The importance of the research based on how to bring out and show the basic aspects related to the problem of traffic noise pollution in the Sulaymaniyah city center, meaning that the increase in traffic - in general - and increase the movement of vehicles in particular, is one of the most important characteristics distinguishing development in the Sulaymaniyah city center, The movement of traffic increases much more than the Development of cities, and the more traffic in the city has increased the higher noise in the streets, so this is the first research ever dealing with the impact of traffic noise on the sale and rent prices of the housing real estate in the Sulaymaniyah city center.

# **Chapter Two**

## **Literature Review**

### **2:1 Background of the study:**

On the other hand, the German Environment Ministry estimated that the noise of the cars and planes and factories and other kills (2000) person per year, infecting hundreds of thousands of heaviness hearing and lack of concentration and sleeping disorders, And of a recent study published in Berlin about the kids indicating and showed that the noise reason of the weakness in the children's immunity and promotes the risk of allergic illnesses and weakening their ability to learn, And the study included 400 children between the ages (5-11 years) living in the (Osterode) area in Germany and have undergone the supervision of doctors, specialists entire month in one of the sanatoriums (Bahrani, 2009).

There are negative effects from highways on land values. A less desirable effect on property values is created by adverse highway influences which may affect certain locations and/or types of land use. Improvements that result in externalities such as the degradation of water quality or increased safety hazards can effectively decrease property values (HBS, Inc.,1999).

Most research focusing on the detrimental effects of freeways on property values have been limited to adverse impacts on residential land uses. Highway noise is generally considered the most important of such adverse effects (Palmquist, 1980).

Many researchers have identified significant negative impacts of freeway development in specific areas. However, most acknowledge that there may be both positive and negative effects working together. For example, properties located very close to major expressways may be positively influenced by accessibility improvements, but at the same time adversely affected by highway-generated noise and air pollutants (Gamble, et al, 1978).

Public transport refers to buses, subways, cars. Properties in high proximity to highways are 8-10 % cheaper than those in a quiet area (Klein, 2007). Real estates close or next to railways present a 6-7 % decrease in its market value. It is worth mentioning, though, that the unwillingness of a potential buyer, if only the distance and not the noise is considered, can reduce further the value (Brinckerhoff, 2001).

## **2:2 The concept of noise pollution:**

In this issue we will Exhibiting some of the concepts and definitions of noise pollution and are as follows:-

1- The noise which its severity and intensity Increased and came out of the ordinary and the normal limit to the extent that cause the harm and damage to humans and animals and plants, and all components of the environment (Shahata, 2006).

2- Any undesirable sound cause a nuisance to humans and hurt him, The World Health Organization defines human health, It means not only being free of disease, but rather social and psychological wellbeing, and the noise can be considered harmful to the health according to that definition (Wahbi, 2001).

3- Any undesirable sound to hear, Is any sound affects hearing and lead to stress ourselves and lack of comfort (Abid & Sfariny, 2004).

4- Are those voices that man does not correspond to hear it and does not have relaxes, So the voices are coarse and irregular, does not lead as a whole to the clear meaning contrary to musical melodies which warmly received the human, Plus it's high-frequency voices which leads to strongly eardrum vibration, (Alesawy,2005).

5- The noise has known as (overlapping range of high sharp and undesired voices, causing a nuisance to humans and provoking him, And generates the effects of stress and digestive system and heart disease (Aqil,et al, 2004).

6- The noise is defined as undesirable sound, Environmental noise consists from all the undesirable sounds in our communities except arises in the workplace, The environmental noise pollution is a form of air pollution and poses a threat to the health and well-being, ( Lisa and Louis ,2007). In view of these definitions, The noise pollution consists of the following elements:

1- The undesirable sound.

2- Harms all living beings in the environment.

3- The Costs of the external noise.



This means the noise pollution: Is the undesirable sound, Harms all living beings in the environment and The costs of the external noise. The noise pollution can be economically defined as: It is the negative external costs, and is a form of environmental pollution, and undesirable by the producer, as well as consumption processes which have detrimental effects on individuals and communities, ( Michael and Denise ,2012). In summary the noise is the social costs imposed on others.

### **2:3 The factors which upon the effects of the noise pollution:**

- 1- The length of exposure to noise: Where the influence and degree of risk is directly proportional to the length of exposure to noise.
- 2- Sound intensity and its degree: The more intensity of sound Caused the largest negative effect.
- 3- The sound Acute: The sounds Acute are most influential of the Boor sounds.
- 4- The distance between the sound source and the listener: the more closer of person to the sound source its influence on him was tougher and stronger.
- 5- The Sudden sound: Sound sudden or interrupted sound is more influential on human than the continued noise. (Fakhri, 2015).

### **2:4 Characteristics of the noise pollution:**

The noise is different from other pollution of the environment factors in many respects, the most important:

- 1- The noise multi-source: There is everywhere, and not easy to control as is the case with other factors such as water or air pollution.
- 2- Effect of The noise cuts off once when it stops, meaning it does not leave behind it a clear impact on the environment, and nothing of it left around us, and so Effect of The noise is a temporary Effect which with its interruption ends.

3- The noise is different from other pollution of the environment factors because significantly it's a Local, in the sense that we do not feel it, but next to the source only, and its effect do not spread or moved to the another place, as in the case of air or water pollution that moves from one area to another, or from one state to another. (Islam, 1997).

### **2:5 Types of the noise pollution:**

The noise pollution can be divided according to the source and strength of its effect and its continuation into three types, namely:

Firstly, in terms of the source and it is divided into two types:

1- Natural noise: Caused by the sounds of nature, such as volcanoes, explosions and sound of firecrackers.

2- Human noise: is the noise caused by different human activities.

Secondly, In terms of continuity, and it is divided into two types:

1- Chronic noise: We mean constant exposure and permanently to noise. (Saadalddin, 1997), which is more influential than the second type because it causes permanent hearing weakness. (Wartan & Abdullah, 2013).

2- Temporary noise: This type of pollution is less dangerous to humans in general, and the very least damage to his health in particular, such as The noise caused by exposure to the voices of shots or exposure to the high noise for a fixed term, such as those from crowded places or inside factories and workshops as a result of the voices of the machines. (Shahata, 2006).

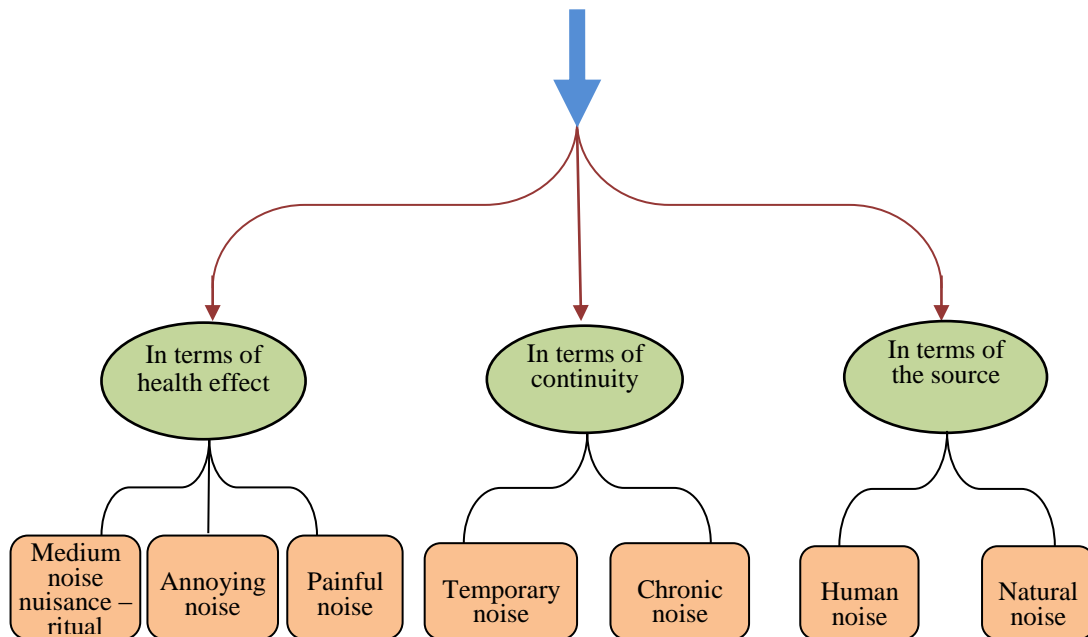
Thirdly, in terms of health effect:

1- Painful noise: When the levels exceeding (120) Decibels where causing damage to health or wounds to the one who Exposed to it.

2- Annoying noise: When the levels exceeding (80 - 120) Decibels where causing pain for more than 8 hours daily to the one who Exposed to it.

3- Medium noise nuisance – ritual: When the levels exceeding (45 - 80) Decibels where causing damages to health may continue for months or years. (Wartan & Abdullah, 2013), Based on the above, it can reach the following chart that shows the sources of the noise pollution.

Figure (1) types of the noise pollution



(Smaqae, 2016)

## 2:6 The Economic Dimension of Noise Pollution:

1- Health costs that concern individuals affected and the economic system as a whole, especially the costs of treatment of diseases and health problems.

2- Productivity losses in occupational locations: As the worker is the most important element of the output element, the preservation of his health is one of the most important Assisting Factors to the continued production and increasing worker productivity. So increasing the noise is one of the factors that lead to a shortage of production. We can say that the The noise reduces of production and damages the quality and requires an increase in the will and attention and mental effort and cause of nervous tension (Amran & Alrafaaiy, 2013).

3- Costs of non-material because of the losses the quality of life which is a pivotal.

4- Emissions centers of the traffic noise significantly affect on the decision-making process at the real estate market. And the effects on housing and rents prices are also important dimensions of economic, housing in the polluted by the noise areas are exposed of impairment and expensive to prevent or reduce noise (Michael Getzner and Denise Zak Vienna, 2011), and it is one the environmental factors and key determinants of the of real estate prices. And it includes the landscape, exposure to sunlight and its proximity to natural attractions, and in large urban places (Adam, Agnieszka, & Monika, 2011).

### **2:7 The rates and levels of exposure to noise allowed globally:**

Many researchers and standard commissions have cared in many countries to determining exposure to noise levels and rates of time and the nature of the risks arising from bypass the those rates and levels. And the World Health Organization had identified that the level (70 dB) LAeq is the highest rate of external noise can be exposed members of the society. (Shahata, 2012) As provided for the European standard specifications, as an for the protection of majority of the audience in the public areas of the inconvenience, and the noise average should be no more than (55 dB) LAeq, and the time of disappear of the gabmust be less than a second. (Alazazi, 2011).

### **2:8 The noise levels in the city comparing with the global levels:**

The noise levels in the city are considered high when compared to the global limits, Where reaches to the (70-80) dB in most of the main streets, But these levels are expected to go up as a result of increasing the number of cars which are the main source of noise in the city, as a result of the rapid development and the significant growth in vehicle ownership. And Table (1) shows us the level of allowable noise. (WHO, 2001).

Table (1), As a guiding statement shows us the level of allowable noise for each use, according to the world Health Organizations report. (WHO, 2001).

Type of activity and use	The noise level equivalent Leg dB (A)	Type of activity and use	The noise level equivalent Leg dB (A)
Automated traffic routes side	70	External residential spaces	55
Out of school	55	Outside the suburban Housing	45
Inside the Houses	35	Inside the bedrooms	30
Inside hospitals and Sanatoriums	30	Inside patient rooms	More than 30

## 2:9 The city of Sulaymaniyah:

Sulaymaniyah is a wonderful city in Kurdistan-Iraq. It began constructed at (1784) by Ibrahim Pasha of Baban. In terms of management, Sulaymaniyah is a governorate belongs to KRG. The Kurdistan Regional Government was formed in 1992 by the Kurdistan National Assembly. Sulaymaniyah considers as a center of great scholars, poets, writers and high-educated persons. In 2014, it became a cultural capital of Kurdistan Region. ([www.sleman.gov](http://www.sleman.gov))

### Sulaymaniyah Demographic:

In 1820, only 36 years after the creation of the city, a British man named Rech visited the city and estimated that its population was more than ten thousand. According to Iraqi government documents, by 1947 the number of residents had increased to 23,475 by 1998 to 548,747 and in last census to 829,245 at 2015. The center of the city consists of 58 neighborhoods. (Salih, 2015)

### Sulaymaniyah Geography:

Sulaymaniyah located between latitude (34-36) degrees on equator and longitude (45-46) degrees to eastern of earth. It surrounded by ranges of mountains of Azmar, Goizha, Barzn and Qiwan. These ranges consider as an important tourism place. Its weather affects by the Mediterranean Sea, which is cooler and rainy in winters, and it is dry and warm in summers. (Ali, 2014)

#### **Sulaymaniyah Economy:**

In terms of security, Sulaymaniyah is stable, which leads to economic boom across the city in sectors such as industrial, trade, agriculture and tourism. In terms of industry, It has a group of factories such as factories of cement, iron and sugar production. In terms of trade, there is a strong flow of trade due to the location of Sulaymaniyah, which is close to Iranian border and it has two border crossing points that are Bashmakh and Parwezkhani. In terms of agriculture, Sulaymaniya has a fertile land which suitable especially for cultivating wheat and barley.

In terms of tourism, there are several resorts such as Ahmedawa, Sarchinar, Dokan, Sartaki Bamo, KunaMasi, Azmar, Qaradakh, Chamirezani, Sargalu and Bargalu, as well as there are two dams (Dokan and Darbandikhan). Furthermore, there is an ancient cave in Sulaymaniyah called Hazarmerd, a huge number of local and foreigner tourists visit the cave in every years. ([www.krso.net](http://www.krso.net))

#### **2:9:1 Traffic in the Sulaymaniyah city center:**

Transportation brings a lot of benefits to the economy and due to the fact that it lead to increased production and efficiency and also connects between producer and the client, and connects also regions and countries and continents, and contribute to economic growth and the global market empowerment, but in spite of the benefits there are external costs of transport is the:

- 1- Congestion: Those external costs felt by users in the travel.
- 2- Accidents: This aspect represents a relatively large part of the total external costs (particularly for the road transport), and as a consequence occurring of traffic accidents, Such as (the cost of compensation for material damages, medical costs, loss of production, administrative costs and non-material costs - pain – grief).

3- Air Pollution: This side of the external factors lead to different types of external costs in reference to the health (cardiovascular diseases, respiratory system caused by polluted air), its impact on ecosystems and biological diversity (the most important is Nitrogen monoxide (NO<sub>x</sub>), and Sulfur dioxide (SO<sub>2</sub>), and Volatile organic compounds (VOC), and the indirectly polluter ozone (O<sub>3</sub>).

4- Climate Change: According to the Commission of the European Union, almost (20%), of the total global warming was buried gas emissions from transport emissions, those emissions which have many effects such as (health, ecosystems is stirred in biological diversity, increase in extreme weather events, and agricultural impacts or with regard to the sea level rise). There are three underlying gas emissions from transport, namely: Carbon (CO<sub>2</sub>), Methane (CH<sub>4</sub>), and Nitrous Oxide (N<sub>2</sub>O).

5- The Noise: This side of the external costs includes two important elements: The costs of social discomfort, leading to social and economic costs, such as restrictions on the enjoyment of free time, and Health damages such as hearing corrupt, cardiovascular risk, and increasing blood pressure and hormonal changes, All of this leads to many kinds of costs, such as medical costs, lost productivity and increasing death rate.(CRISTEA et al, 2013).

## **2:10 The real estate market in the Sulaymaniyah city center:**

### **2:10:1 The concept of real estate:**

It includes the earth and all plant, machinery ancillary permanently, real property includes everything in the real estate definition in addition to the legal part and any rights or privileges related to ownership of the property.([www.tsweekonline.com](http://www.tsweekonline.com)).

**2:10:2 Classification of real estate in the Sulaymaniyah city center:**

- 1- Residential real estate (House, apartments, villas).
- 2- Commercial real estate (Shops, Commercial centers, administrative buildings, Theaters).
- 3- Industrial real estate (Factories, Stores).
- 4- Agricultural real estate (Farms, Groves).
- 5- Real estate for special purpose (Mosques, Churches, Governmental Lands, Hospitals, Schools).

**2:10:3 The main factors affecting the residential real estate prices in the Sulaymaniyah city center :**

1- Economic Circumstances:

Where the higher income of an individual is, whenever his requirements changes for owning or renting residential property, whether a house, apartment or villa, because he can spend more money. An increasing demand for these types of properties will be reflected in higher prices in general, and vice versa. ([www.en.lamudi.sa](http://www.en.lamudi.sa)).

2- Real estate finance benefit prices:

Many people buy their residential property by real estate financing, whether the rent ends with ownership or through the mortgage that works on the margins of a limited profit. The lower of profit percentage will increase the demand for the purchase of Residential real estate, and vice versa, This is due several factors such as the confidence of customer in the real estate market and the possibility of paying monthly installments. (<http://ara.tv/v3evc>).

3- Demand and Supply situation:

It is one of the main factors, where the greater demand for real estate as compared the proportion of the offers, affects on the price rises, and vice versa. (KAROKI, 2013).



4- The political stability:

We find that the price of real estate in a safe and a stable environment completely different from the another price in a turbulent and unstable environment , as happened in the region of Kurdistan, since the vibration of the political situation and the war on terrorism is reflected in the decline in demand for real estate in the region, but on the other hand because of the high number of refugees and displaced persons from Mosul and Tikrit and Anbar, was the reason for the rise in property prices in the Sulaymaniyah city center. (KAROKI, 2013)

5- Availability of basic services:

Services such as water and sanitation services, and telephone services and electricity services, where the presence of these services and others affects the high price of the property, and vice versa. ([www.en.lamudi.sa](http://www.en.lamudi.sa)).

6- Age of Property:

Whenever a new real estate price was higher, and whenever the property was an old price was less. Because of the extinctions, maintenance and other expenses. (<http://ara.tv/v3evc>)

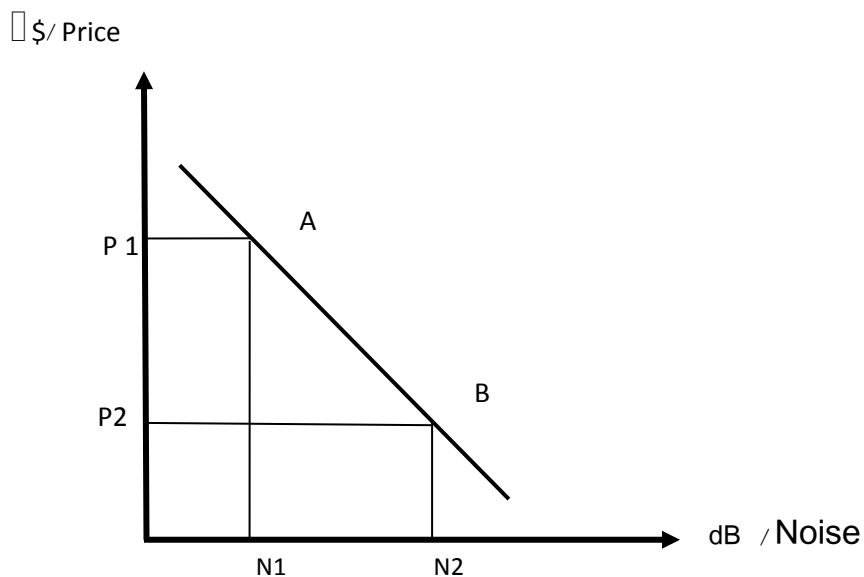
7- Location:

The Closeness of the real estate to particular objects raise its value, and its Closeness to other things that might reduce its value. For example, The Closeness of the real estate to the commercial complexes, schools, parks and places of worship and entertainment, hospitals, raising the value of the property, either Closeness of the real estate to the factories or noise sources that are hazardous to health could reduce its value. ([www.tsweekonline.com](http://www.tsweekonline.com)).

#### 2:10:4 The relationship between traffic noise and the sale and rent price of the residential real estate:

There is an inverse relationship between traffic noise and the sale and rent prices of the residential real estate, provided the stability of other factors affecting the rent and residential real estate prices, as whenever the noise increased (the traffic) whenever the price of the sale and rent of residential real estate fell and vice versa. This is due to the difference between the houses located in the bustling and dusty streets price, and houses that are located in a quiet, clean streets in the same area. This is due to the pursuit of the people behind the best quality of life (less noise and less pollution and more safety), and so on, and that means people are willing to pay a higher price in a quiet location. (Smaqaiy, 2016). As is the placement in the figure (2).

Figure (2), The relationship between traffic noise and the sale and rent price of the residential real estate:



(Smaqae, 2016)

# **Chapter Three**

## **Materials and**

## **Methods**

### **3:1 Plan of the Research:**

For the purpose of reaching the objective of the research and verification of the hypothesis laid, The research is divided into Six ways:

3:1:1 The methodology procedures of the Research:

1-Research Type: This research is descriptive analytical researches which interested in collecting data about aspects of pollution (noise) in the Sulaymaniyah city center, and its impact on the price of the sale and rent of residential property, and analyzing their to get specific results about it.

2- The Methodology used: This research depends on the economic survey through the random sample by selecting (1656) offices and companies, and the research samples amounted (177), office and a real estate companies.

3- Data collection tools: The researcher prepared a questionnaire has been designed in a modular closer to the standards then to the questionnaire so that he can processing their data statistically and identify the relationship between the its elements in whole or in part, the researcher has adopted the following procedures in the design of the questionnaire:

A) Viewing studies and previous researches and theoretical writings related to the subject of current research.

B) Determine the most important indicators and axes related to the subject of current research.

C) The questionnaire was designed in order to achieve the answer to research questions and includes five questions, and had put a questionnaire for the five degrees for the answers are: strongly agree, agree, neutral, do not agree, do not strongly agreed, and has been given weight to each response and respectively are: 1, 2, 3, 4, 5.

### **3:1:2 Research Questions:**

The research questions been directed in the fieldwork to a random sample of owners of offices and real estate companies, because it ensures the demand and supply of real estate over the property and understand the desire and the quality customers demand on the one hand and the extent of appease or complaint population on the other hand, And the most prominent questions were directed to the owners of offices and real estate companies in the Sulaymaniyah city center were as follows:

- 1- Do you think the traffic noise will affect on the price to reduce the sale of real estate?
- 2- Do you think the traffic noise will affect on the rent of real estate?
- 3- Do you think the traffic noise will affect on the resale of real estate?
- 4- Do you think the noise of traffic in residential areas will make people to choose another place for living ?
- 5- Do you think that people can make difference between the price of noisy areas and the price of non-noisy areas?
- 6- Do you think that the noisy area makes people to sale a larger house and buy a smaller one in the same area with a better traffic noisy?

### **3:1:3 Research Hypothesis:**

Research is based on the hypothesis whereby: traffic noise has obvious and a negative effect in selling and rent prices of residential property in the Sulaymaniyah city center.

\* Null hypothesis: Traffic noise has not effect in selling and rent prices of residential property = HO

\* Alternative hypothesis: Traffic noise has effect in selling and rent prices of residential property = H1

#### **3:1:4 Sincerity of the questionnaire Validity:**

The virtual sincerity of the questionnaire has been verified for the submission of (6) referees specialists in the economy and the environment, and the phrases which got less than (70%) has been excluded of the approval of the referees on the validity.

#### **3:1:5 Framework of the Research:**

- The Location Frame: City of Sulaymaniyah.
- The human frame: a sample of offices and real estate companies in the Sulaymaniyah city center.
- The Timeframe: included the time that data has been collected for the research from the date of (03/ May / 2016) till (16 / May / 2016).

#### **3:1:6 The extraction results and data Processing:**

The Researcher adopted at the dump the data and tabulation and preparing statistical equations using an automated computer program Statistical Package for Social Sciences (SPSS) , were also taking into account the scientific method at the analysis of the results to achieve the goals of research.

**Sample of Questionnaire Research model**

YÜZÜNCÜ YIL UNIVERSITY

INSTITUTE OF SOCIAL SCIENCES

ECONOMIC DEPARMENT



This is questionnaire of a scientific research.

The Dissertation " The Effects Of Traffic Noise On House Renting And Selling Prices Concerning Residential Areas: Case Of Sulaymaniyah City Center”

Researcher: Mohammed Abdul Kareem Mohammed

Supervisors: Dr. Meryem Samırkaş KOMŞU \ Yüzüncü Yıl Uni.\ College of Admin. & Eco.

Supervisors: Dr. Ayuob Anwar Hamad SMAQAE \ Salahadden Uni.\College of Admin. & Eco.

To: Real estate offices owner,

We are doing a scientific research, the title of the research “The effects of traffic noise on house renting and selling prices concerning residential areas" your opinion regarding below points will lead an important role on the research. The all information will be used for research purpose only.

Please tick (☐) the answer which is your opinion for the below question.

1- Do you think the traffic noise will affect on the price to reduce the sale of real estate?

( ☐ ) Strongly Disagree.                      ( ☐ ) Disagree.                      ( ☐ ) Neutral.

( ☐ ) Agree.                      ( ☐ ) Strongly Agree.

2- Do you think the traffic noise will affect on the rent of real estate?

☐ Strongly Disagree.                      ☐ Disagree.                      ☐ Neutral.

☐ Agree.                      ☐ Strongly Agree.

3- Do you think the traffic noise will affect on the resale of real estate?

☐ Strongly Disagree.                      ☐ Disagree.                      ☐ Neutral.

☐ Agree.                      ☐ Strongly Agree.

4- Do you think the noise of traffic in residential areas will make people to choose another place for living ?

☐ Strongly Disagree.                      ☐ Disagree.                      ☐ Neutral.

☐ Agree.                      ☐ Strongly Agree.

5- Do you think that people can make difference between the price of noisy areas and the price of non-noisy areas?

☐ Strongly Disagree.                      ☐ Disagree.                      ☐ Neutral.

☐ Agree.                      ☐ Strongly Agree.

6- Do you think that the noisy area makes people to sale a larger house and buy a smaller one in the same area with a better traffic noisy?

☐ Strongly Disagree.                      ☐ Disagree.                      ☐ Neutral.

☐ Agree.                      ☐ Strongly Agree.

Thank you for your cooperation



# **Chapter Four**

## **Result and Discussion**

#### **4:1 Display and analysis of results associated with questions research**

Statistical treatment methods

The researcher has unloaded and analysis of the questionnaire through the statistical Program SPSS was used the following statistical tools:

- Percentages and Frequences, the arithmetic mean and weighted, median and standard deviation.
- Bar Chart.
- Cronbach's alpha test and Reliability Statistics-Split-half
- Pearson correlation matrix and tested.
- Kolmogorov-Smirnov test for Normal distribution.
- One-Sample-Chi-Square test for Normal distribution.
- One-Sample Wilcoxon Signed Rank Test.
- Spearman correlation coefficient (nonparametric).
- Levene's Test of Equality of Error Variances.
- Durbin-Watson test.
- Regression analysis, t-test and F-test.
- Estimate the coefficient of determination.
- Principal Component Analysis

**4:1:1 The research sample:**

Form questionnaire was distributed to a sample of (177) Researched in the Kurdistan Region – Sulaemanya city center and the results were as follows:

First: described the research variables and diagnosis:

Will be in this analysis to calculate the number of frequencies, percentages and the cumulative percentages to the questionnaire which included (6) questions, Answers of researchs were summarized her through the tables and figueres of the following:

- The First question:

Table (4:1): Frequency Distribution for First question

Choice	Frequency	percent	Cumulative Percent
Strongly Agree	111	62.712	62.712
Agree	17	9.6045	72.3165
Neutral	35	19.774	92.0905
Disagree	13	7.3446	99.4350
Strongly Disagree	1	0.5650	100
Total	177	100	

Through Table (1) note that strongly agree proportion (62.712%) of respondents On the first question, which states (Do you think the traffic noise will affect on the price to reduce the sale of real estate), and with the proportion agree totaling (72.3165%), This is evidence of an awareness among citizens about the noise disturbing and painful for them and this leads to the effect of the low selling price of real estate. the neutrals was (19.774%) this means there is a proportion not sure about the impact of traffic noise on low price of real estate, and this shows a clear economic impact of noise on the price of real estate.

While it was Disagreed by (7.3446%) and with the proportion of strongly disagree totaling (7.9096%). The following figure shows the bar chart for proportions of answers the first question:

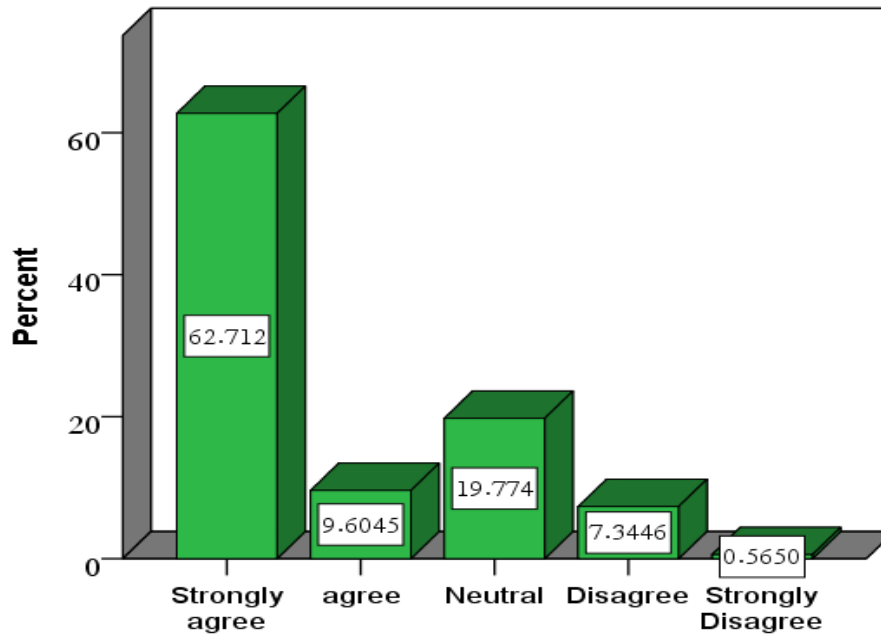


Figure (4:1): Bar Chart for first question

- The Second question:

Table (4:2): Frequency Distribution for Second question

Choice	Frequency	percent	Cumulative Percent
Strongly Agree	34	19.209	19.2091
Agree	54	30.508	49.717
Neutral	38	21.469	71.186
Disagree	41	23.164	94.350
Strongly Disagree	10	5.6497	100
Total	177	100	

Through Table (2) note that strongly agree proportion (19.2091%) of respondents on the second question, which states (Do you think the traffic noise will affect on the rent of real estate), and with the proportion agree totaling (49.717%) This indicates the presence of economic vision of the citizen who lived a rented, despite their need for housing in areas far from the noise of the traffic areas. the neutrals was (21.469%), While it was Disagreed by (23.164%) and with the proportion of strongly disagree totaling (28.8137%) But this percentage does not care about the effect of noise on their health because they are obliged housing in the vicinity of the noise of the traffic areas.

The following figure shows the bar chart for proportions of answers the second question:

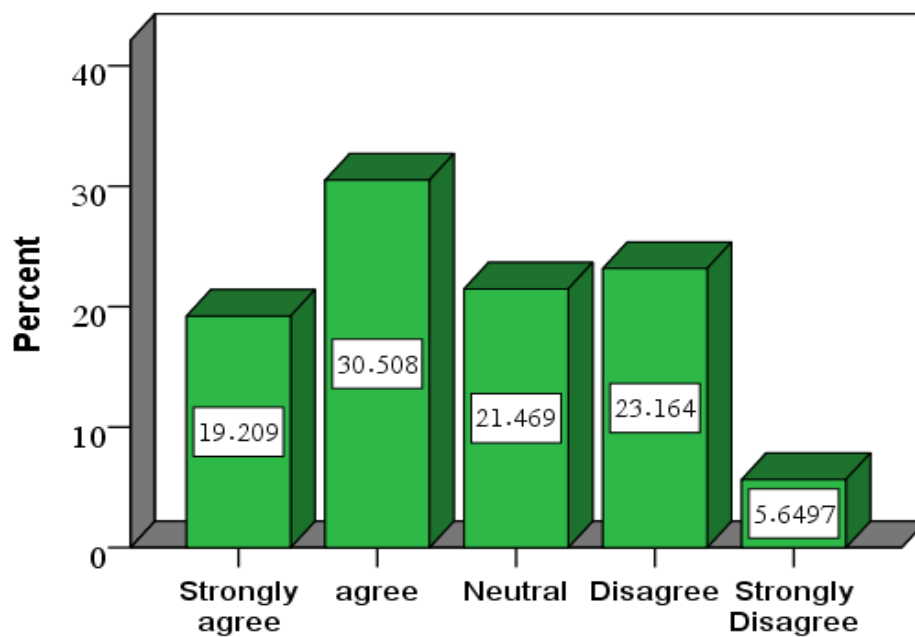


Figure (4:2): Bar Chart for Second question

- The Third question:

Table (4:3): Frequency Distribution for Third question

Choice	Frequency	percent	Cumulative Percent
Strongly Agree	68	38.418	38.418
Agree	62	35.028	73.446
Neutral	32	18.079	91.525
Disagree	14	7.9096	99.435
Strongly Disagree	1	0.5650	100
Total	177	100	

Through Table (3) note that strongly agree proportion (38.418%) of respondents on the third question, which states (Do you think the traffic noise will affect on the resale of real estate), and with the proportion agree totaling (73.446%) as a result Housing of proportion of the population in the vicinity of the noise of the traffic areas, noise caused negative impact on their health and sense of economic decisions to sell their property more than once. the neutrals was (18.079%), while it was Disagreed by (7.9096%) and with the proportion of strongly disagree totaling (8.4746%).

The following figure shows the bar chart for proportions of answers the third question:

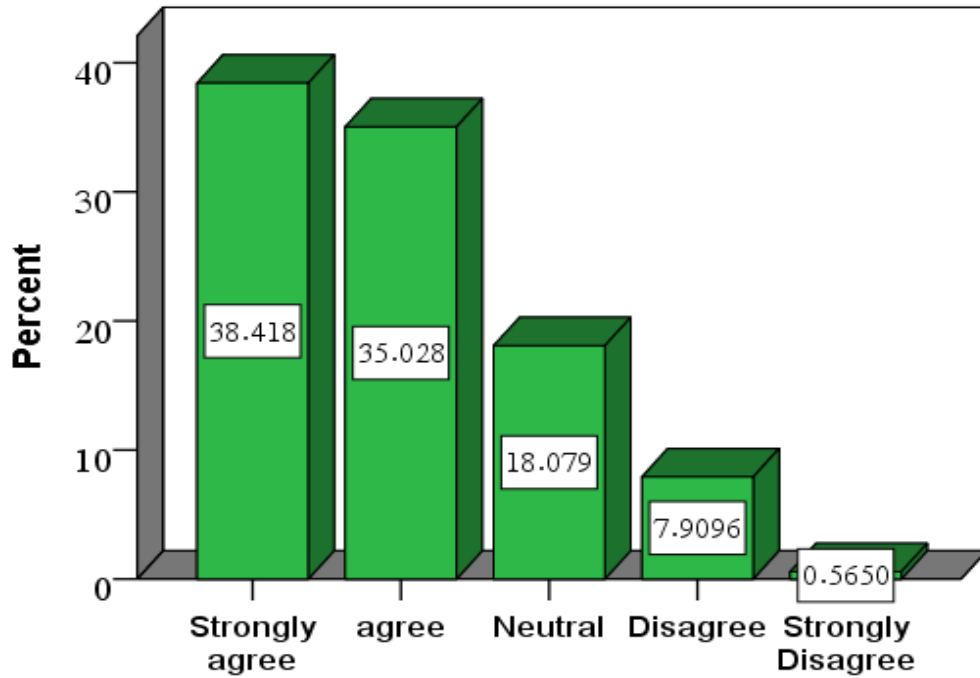


Figure (4:3): Bar Chart for Third question

- The Fourth question:

Table (4:4): Frequency Distribution for Fourth question

Choice	Frequency	percent	Cumulative Percent
Strongly Agree	66	37.288	37.288
Agree	61	34.463	71.751
Neutral	39	22.034	93.785
Disagree	10	5.6497	99.435
Strongly Disagree	1	0.5650	100
Total	177	100	

Through Table (4) note that strongly agree proportion (37.288%) of respondents on the fourth question, which states (Do you think the noise of traffic in residential areas will make people to choose another place for living), and with the proportion agree totaling (71.751%) This percentage evidence of the desire of citizens to keep away from suspicions and possibilities when requested a property away from the noise of nearby the traffic areas as much as possible. The neutrals was (22.034%), while it was Disagreed by (5.6497%) and with the proportion of strongly disagree totaling (6.2147%).The following figure shows the bar chart for proportions of answers the fourth question:

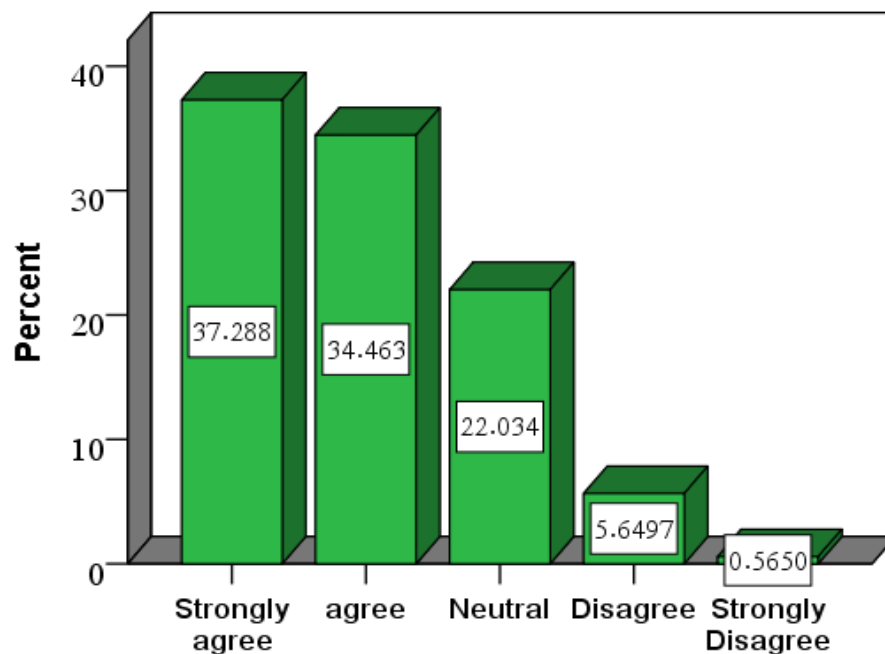


Figure (4:4): Bar Chart for Fourth question



- The Fifth question:

Table (4:5): Frequency Distribution for Fifth question

Choice	Frequency	percent	Cumulative Percent
Strongly Agree	65	36.723	36.723
Agree	61	34.463	71.186
Neutral	39	22.034	93.221
Disagree	11	6.2147	99.435
Strongly Disagree	1	0.5650	100
Total	177	100	

Through Table (5) note that strongly agree proportion (36.723%) of respondents on the fifth question, which states (Do you think that people can make difference between the price of noisy areas and the price of non-noisy areas), and with the proportion agree totaling (71.186%) This percentage evidence of the desire of citizens to keep away from buying real estate in noisy and dusty areas, whether that was for comfort or for the move away from the negative effects of health or stay away because of safety, based on the above, it can be said that the presence of noise or lack of leads to a decline in real estate prices, because it makes anxiety and fear and prevention, in the result leads to a decline in real estate prices, located in the bustling and dusty areas. The neutrals was (22.034%), while it was Disagreed by (6.2147%) and with the proportion of strongly disagree totaling (6.7797%).

The following figure shows the bar chart for proportions of answers the fifth question:

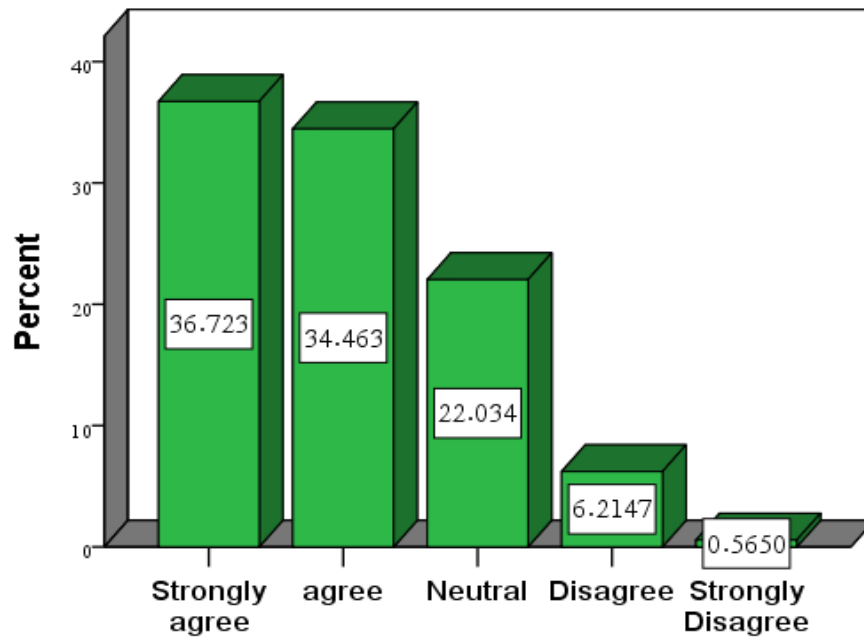


Figure (4:5): Bar Chart for Fifth question

- The Sixth question:

Table (6): Frequency Distribution for Sixth question

Choice	Frequency	percent	Cumulative Percent
Strongly Agree	47	26.554	26.554
Agree	32	18.079	44.633
Neutral	71	40.113	84.746
Disagree	26	14.689	99.435
Strongly Disagree	1	0.565	100
Total	177	100	

Through Table (6) note that strongly agree proportion (26.554%) of respondents on the sixth question, which states (Do you think that the noisy area makes people to sale a larger house and buy a smaller one in the same area with a better traffic noisy), and with the proportion agree totaling (44.633%) This percentage evidence of the fear and uncertainty about the effects of traffic noise on their health and well-being, and this is tacit acknowledgment the toggle economic profit welfare by favoring housing in a small space instead housing in a property with a large area, but close to the traffic noise. The neutrals was (40.113%), while it was Disagreed by (14.689%) and with the proportion of strongly disagree totaling (15.254%). The following figure shows the bar chart for proportions of answers the sixth question:

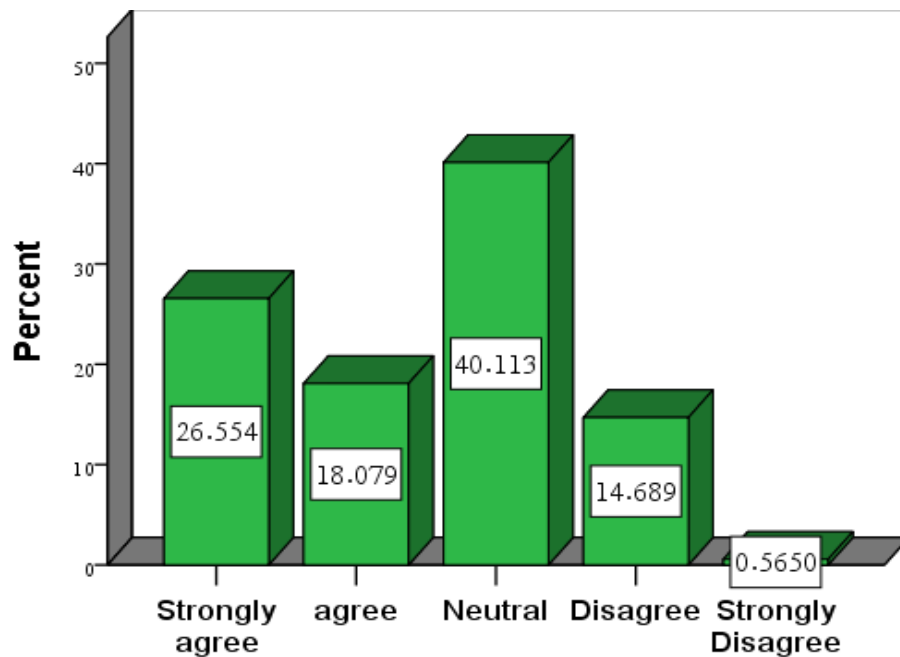


Figure (4:6): Bar Chart for Sixth question

The arithmetic means of each of the equation from questionnaire study evaluated by Likert scale (pentagon), is calculated by dividing the four distances over (5) that result in the length of the class (0.8) and becomes a distribution evaluating the weighted mean according to the following table:

Table (4:7): Weighted mean levels

Weighted Mean	The level
1 – 1.79	Strongly Disagree
1.8- 2.59	Disagree
2.6 – 3.39	Neutral
3.4 – 4.19	Agree
4.2 – 5	Strongly Agree

On this basis, the level question means according to the importance and the degree of agreement with the assumptions of the thesis and summarized in the following table:

Table (4:8): Descriptive Statistics

	Minimum	Maximum	Mean	Std. Deviation	The level
q1	1	5	4.27	1.051	Strongly Agree
q3	1	5	4.03	.968	Agree
q4	1	5	4.02	.935	Agree
q5	1	5	4.01	.944	Agree
q6	1	5	3.55	1.055	Agree
q2	1	5	3.34	1.192	Neutral
Valid (listwise)	N177				

Through a table (8) we note that all the answers to the questionnaire questions ranged from the number one (Strongly Disagree) and number five (Strongly Agree), The first question has a higher average agreement reached (4.27) and level (Strongly Agree), followed by the third question with an average agreement reached (4.03) and level (agree), while the second question is in ranked last with an average agreement of (3.34) and level (neutral).

The following figure illustrates this.

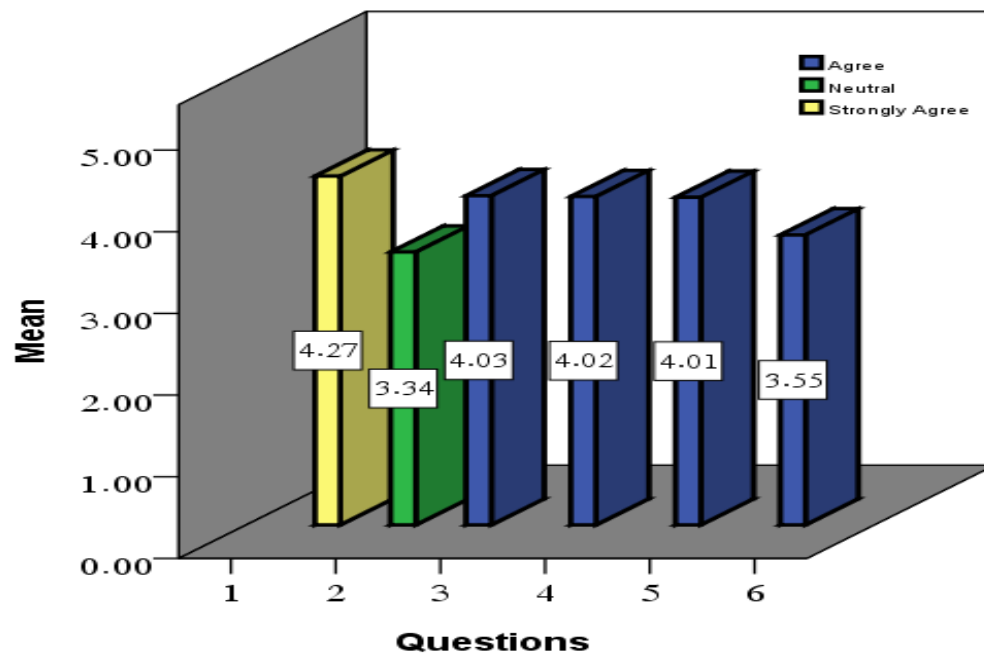


Figure (4:7): Bar Chart for means of questions

Second: Test reliability coefficient and Validity of the questionnaire (consistency):

Table (4:9): Reliability Statistics

Cronbach's Alpha	Validity	N of Items
0.963	0.9813	6

The reliability coefficient Cronbach's alpha for each questionnaire questions for the measurement tool has a high degree of consistency and the truth because it is greater than 60% and therefore means there is an internal consistency of the questions the questionnaire in general.

Has also been making sure the credibility and reliability of the answers to the questionnaire using the Split-half coefficient and the results are summarized in the following table:

Table (4:10): Reliability Statistics-Split-half

Cronbach's Alpha	Part 1	Value	.924
		N of Items	3a
	Part 2	Value	.943
		N of Items	3b
	Total N of Items		6
Correlation Between Forms			.913
Spearman-Brown Coefficient	Equal Length		.955
	Unequal Length		.955
Guttman Split-Half Coefficient			.953

a. The items are: q1, q2, q3.

b. The items are: q4, q5, q6.

The reliability coefficient Cronbach's alpha for each half of the questionnaire questions for tool measurement with a high degree of consistency and the truth because it is equal to 92.4% for the first half and equal to 94.3% for the second half and the strength of the correlation between the two halves equal to 91.3%, as the value of Guttman Split-Half Coefficient equal to 95.3%, which are all greater than 80% and therefore means there is an internal consistency of the questionnaire questions.

While the values of the correlation matrix between questionnaire questions under the Level of significance (0.05) and obtain the following results:

Table (4:11): Correlations matrix

	q1	q2	q3	q4	q5	q6
q1	Pearson Correlation	1	.775**	.858**	.820**	.834**
	Sig. (2-tailed)		.000	.000	.000	.000
q2	Pearson Correlation	.775**	1	.809**	.804**	.821**
	Sig. (2-tailed)	.000		.000	.000	.000
q3	Pearson Correlation	.858**	.809**	1	.922**	.895**
	Sig. (2-tailed)	.000	.000		.000	.000
q4	Pearson Correlation	.820**	.804**	.922**	1	.946**
	Sig. (2-tailed)	.000	.000	.000		.000
q5	Pearson Correlation	.834**	.821**	.895**	.946**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
q6	Pearson Correlation	.676**	.792**	.770**	.800**	.818**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
N		177	177	177	177	177

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Through a table (11) we note that there is a strong correlation extrusive (because all of them are positive and greater than 67%) and very significant questions of the questionnaire (since all of p-values are equal to zero and are less than 5% level of significance).



Third: Test data distribution:

Here will test questionnaire answers and means have a normal distribution or not through the use of non-parametric test (Kolmogorov-Smirnov) and on which determines the tool and the appropriate test to test the research hypotheses, test the following hypotheses:

Null hypothesis: the means of the questionnaire answers her normal distribution.

Alternative hypothesis: the means of the answers the questionnaire does not have a normal distribution.

The test results are summarized under the significance level (5%) by the following table:

Table (4:12): One-Sample Kolmogorov-Smirnov Test

		q1	q2	q3	q4	q5	q6	y
N		177	177	177	177	177	177	177
Normal Parameters a,b	Mean	4.27	3.34	4.03	4.02	4.01	3.55	3.8701
	Std. D.	1.051	1.192	.968	.935	.944	1.055	.94351
Most Extreme Differences	Absolute	.385	.206	.227	.225	.221	.254	.123
	Positive	.242	.159	.158	.148	.146	.254	.116
	Negative	-.385-	-.206-	-.227-	-.225-	-.221-	-.180-	-.123-
Kolmogorov-Smirnov Z		5.118	2.740	3.013	2.992	2.940	3.378	1.639
Asymp. Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.009

a. Test distribution is Normal.

b. Calculated from data.

Through a table (12) we note that the means of the questionnaire equations (y) and all the answers to the questionnaire are not distributed normally because the p-value equal to (0.009) and zero which is lower than the significance level (0.05), and all z-values greater than (1.282) and on this basis will be selection tests of the nonparametric To test the significance of the means of the impact of traffic noise on the sale and rental of residential property prices in the Kurdistan region. The following figures represent observed and expected data,  $\chi^2$  use test for each question:

Q1:

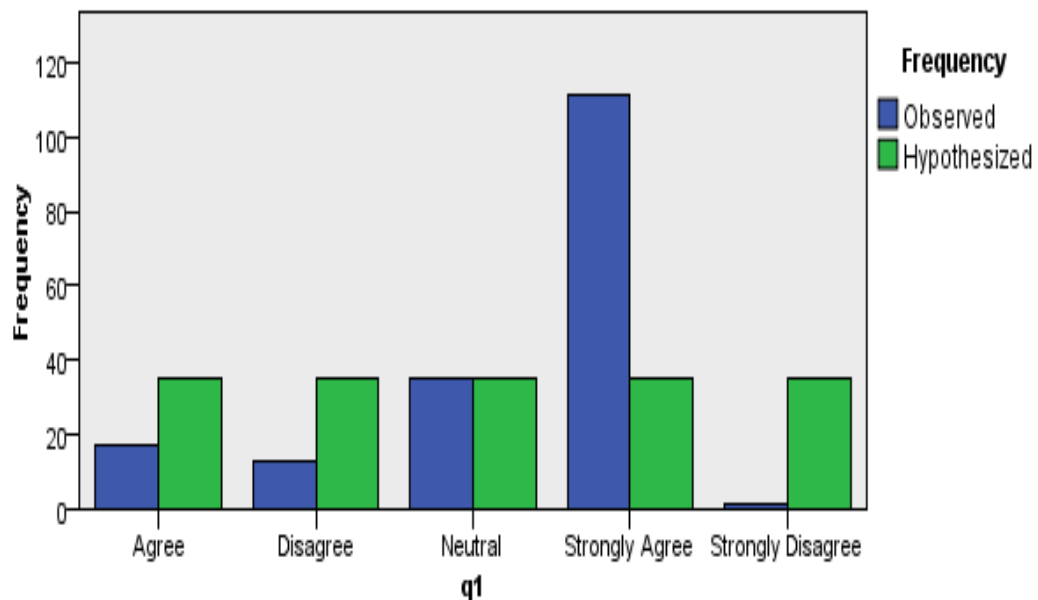


Figure (4:8): One-Sample Chi-Square Test for q1

Figure (8) shows the observed and expected frequency (There are 0 cells (0%) with expected values less than 5, the minimum expected value is 35.4) for the first question, which geted on the value of  $\chi^2$  calculated equal to (218.621), the largest of its value Tabulated under the significance level of 5% and degrees of freedom (4) which is equal to (9.49) and p-value is equal to zero and is less than the significance level of 5%, which means that there is a difference significant between the bserved frequency and expected normal distribution and therefore the answers to the first question does not have a normal distribution.

Q2:

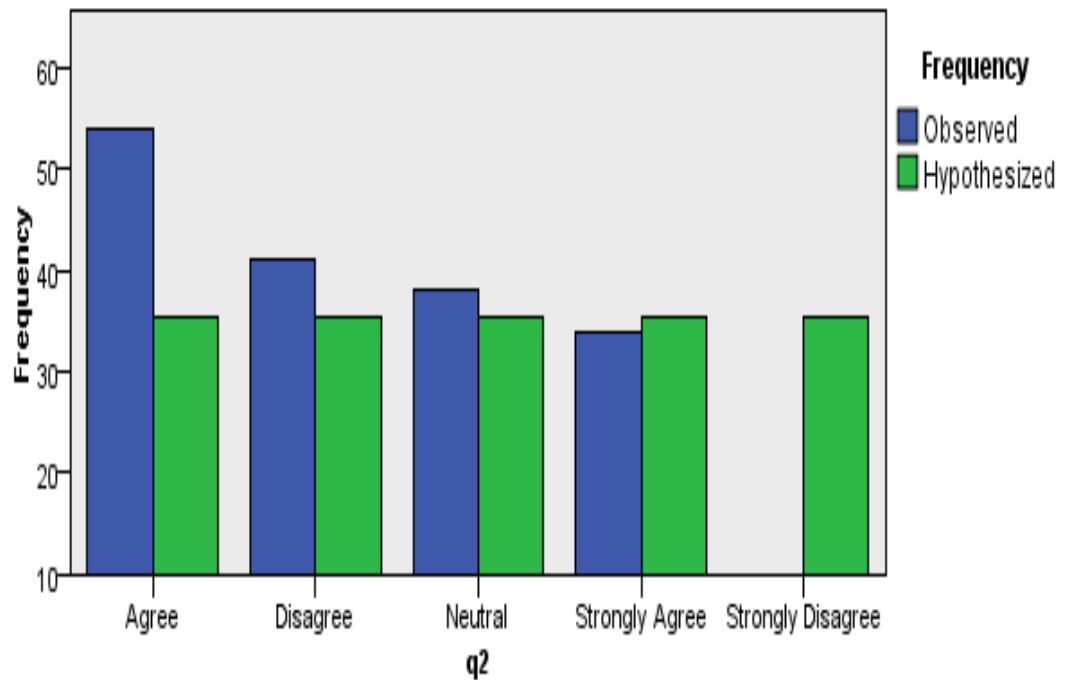


Figure (4:9): One-Sample Chi-Square Test for q2

Figure (9) shows the observed and expected frequency (There are 0 cells (0%) with expected values less than 5, the minimum expected value is 35.4) for the second question, which geted on the value of  $\chi^2$  calculated equal to (29.13), the largest of its value Tabulated under the significance level of 5% and degrees of freedom (4) which is equal to (9.49) and p-value is equal to zero and is less than the significance level of 5%, which means that there is a difference significant between the observed frequency and expected normal distribution and therefore the answers to the second question does not have a normal distribution.

Q3:

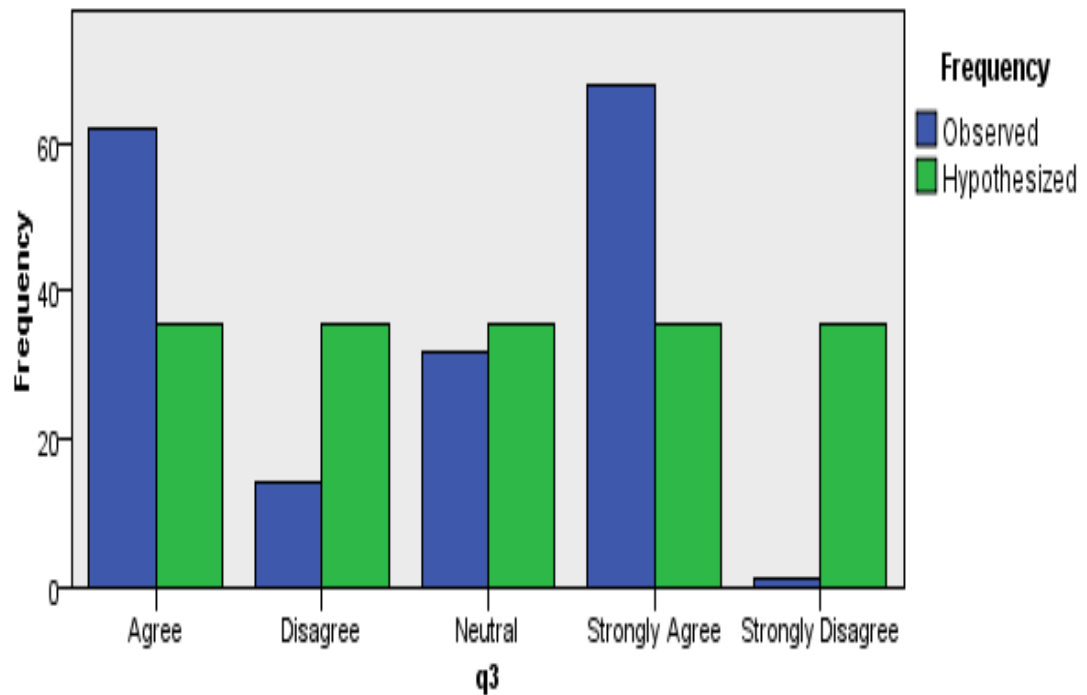


Figure (4:10): One-Sample Chi-Square Test for q3

Figure (10) shows the observed and expected frequency (There are 0 cells (0%) with expected values less than 5, the minimum expected value is 35.4) for the third question, which geted on the value of  $\chi^2$  calculated equal to (96.701), the largest of its value Tabulated under the significance level of 5% and degrees of freedom (4) which is equal to (9.49) and p-value is equal to zero and is less than the significance level of 5%, which means that there is a difference significant between the observed frequency and expected normal distribution and therefore the answers to the third question does not have a normal distribution.

Q4:

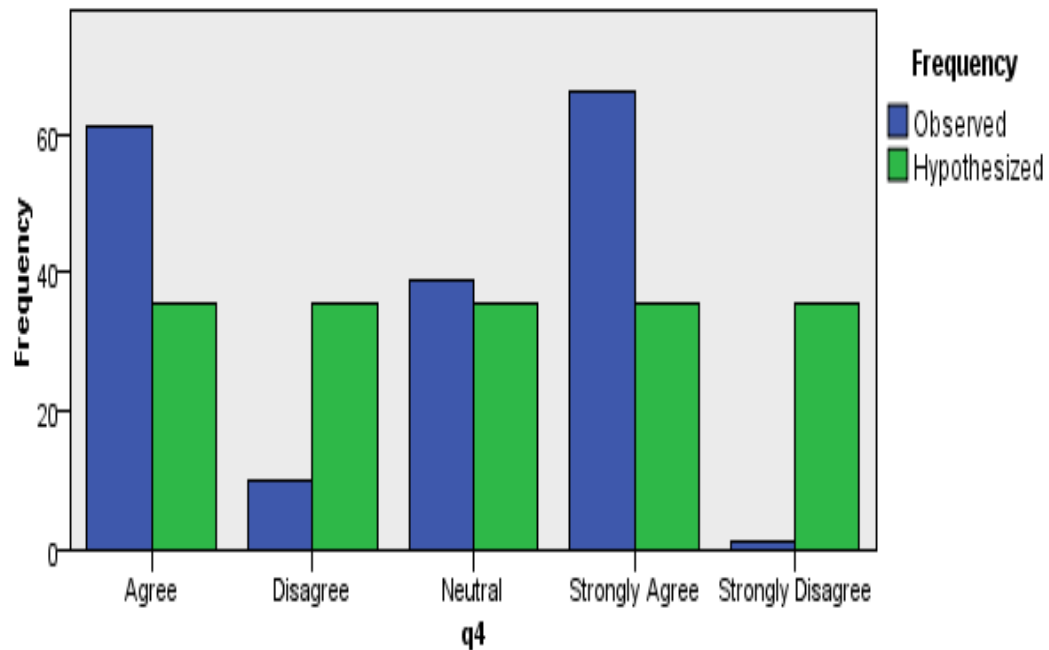


Figure (4:11): One-Sample Chi-Square Test for q4

Figure (11) shows the observed and expected frequency (There are 0 cells (0%) with expected values less than 5, the minimum expected value is 35.4) for the fourth question, which geted on the value of  $\chi^2$  calculated equal to (79.714), the largest of its value Tabulated under the significance level of 5% and degrees of freedom (4) which is equal to (9.49) and p-value is equal to zero and is less than the significance level of 5%, which means that there is a difference significant between the observed frequency and expected normal distribution and therefore the answers to the fourth question does not have a normal distribution.

Q5:

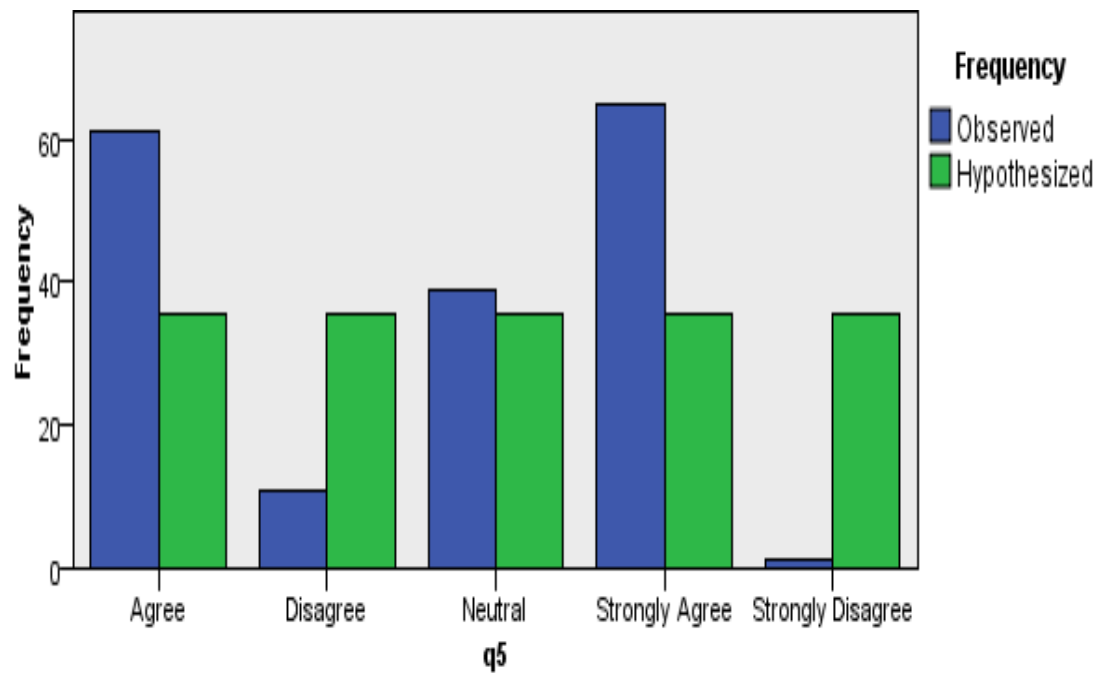


Figure (4:12): One-Sample Chi-Square Test for q5

Figure (12) shows the observed and expected frequency (There are 0 cells (0%) with expected values less than 5, the minimum expected value is 35.4) for the fifth question, which geted on the value of  $\chi^2$  calculated equal to (93.876), the largest of its value Tabulated under the significance level of 5% and degrees of freedom (4) which is equal to (9.49) and p-value is equal to zero and is less than the significance level of 5%, which means that there is a difference significant between the observed frequency and expected normal distribution and therefore the answers to the fifth question does not have a normal distribution.

Q.6:

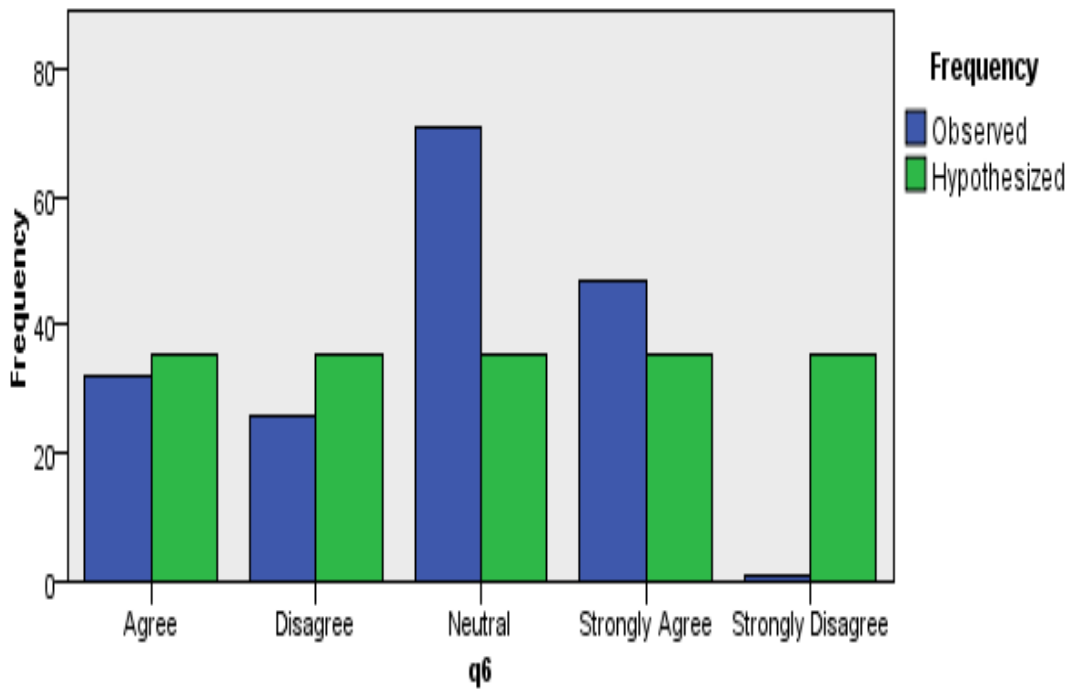


Figure (4:13): One-Sample Chi-Square Test for q6

Figure (13) shows the observed and expected frequency (There are 0 cells (0%) with expected values less than 5, the minimum expected value is 35.4) for the sixth question, which geted on the value of  $\chi^2$  calculated equal to (75.853), the largest of its value Tabulated under the significance level of 5% and degrees of freedom (4) which is equal to (9.49) and p-value is equal to zero and is less than the significance level of 5%, which means that there is a difference significant between the observed frequency and expected normal distribution and therefore the answers to the sixth question does not have a normal distribution.

Mean of answers:

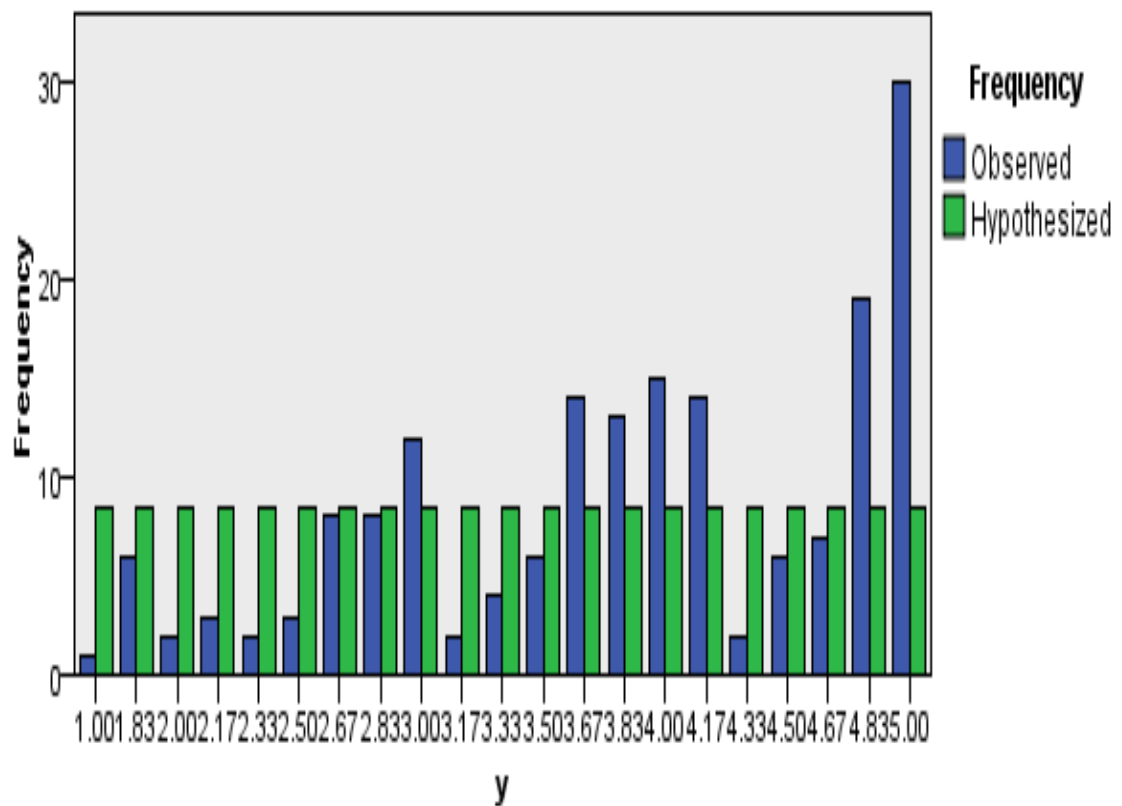


Figure (4:14): One-Sample Chi-Square Test for means

Figure (14) shows the observed and expected frequency (There are 0 cells (0%) with expected values less than 5, the minimum expected value is 8.429) for the means of questions, which geted on the value of  $\chi^2$  calculated equal to (122.814), the largest of its value Tabulated under the significance level of 5% and degrees of freedom (20) which is equal to (31.4) and p-value is equal to (0.009) and is less than the significance level of 5%, which means that there is a difference significant between the observed frequency and expected normal distribution and therefore the means of answers does not have a normal distribution.



Fourth: test hypotheses of the study:

The study covered the test three types of basic hypotheses concerning means first, the relationship second and third studies the effect, as follows:

A: Hypotheses of the means:

$H_0$ : There is no important for traffic noise effect on real estate renting and selling prices concerning residential.

$H_1$ : There is important for traffic noise effect on real estate renting and selling prices concerning residential.

Will be here to test for the importance of the impact of traffic noise on the sale and rental of residential property prices in the Kurdistan region by testing the importance of the means to the questionnaire questions which were answered by the (177) Researched according to Likert scale quintet depending on the extent of their agreement with the hypothesis of the research and specifically test arithmetic mean equal to the (3) of the respondents (because mean of Likert equal to 3) against the arithmetic mean is greater than the number (3), But here will be equal to the median test (3) rather than the arithmetic mean of the distribution because the data do not have a normal distribution, and on this basis test was used and non-parametric Wilcoxon to one sample under a significance level (0.05), It summarized the results in the following table:

Table (4:13): One-Sample Wilcoxon Signed Rank Test

Median test value = 3						
Median	p-value	t-tabulated	t-calculated	Standard Error	Dif. Of medians	Result
4.000	0.000	1.96	8.977	613.572	1.000	Sig.

Through a table (13) note that median of the Answers agreement with the hypothesis of the impact of traffic noise on the sale and rental of residential property prices in the Kurdistan region is equal to (4), the largest median by Likert scale (1) While the p-value equal to (0.000) which is lower than the level of significance of 5% (t-calculated was (8.977) which is greater than the t-tabulated value (1.96).

Which means rejection of the null hypothesis and accept the alternative hypothesis which states that there is important for traffic noise effect on real estate renting and selling prices concerning residential in the Kurdistan region by the surveyed sample views and tested, and the following figure illustrates this:

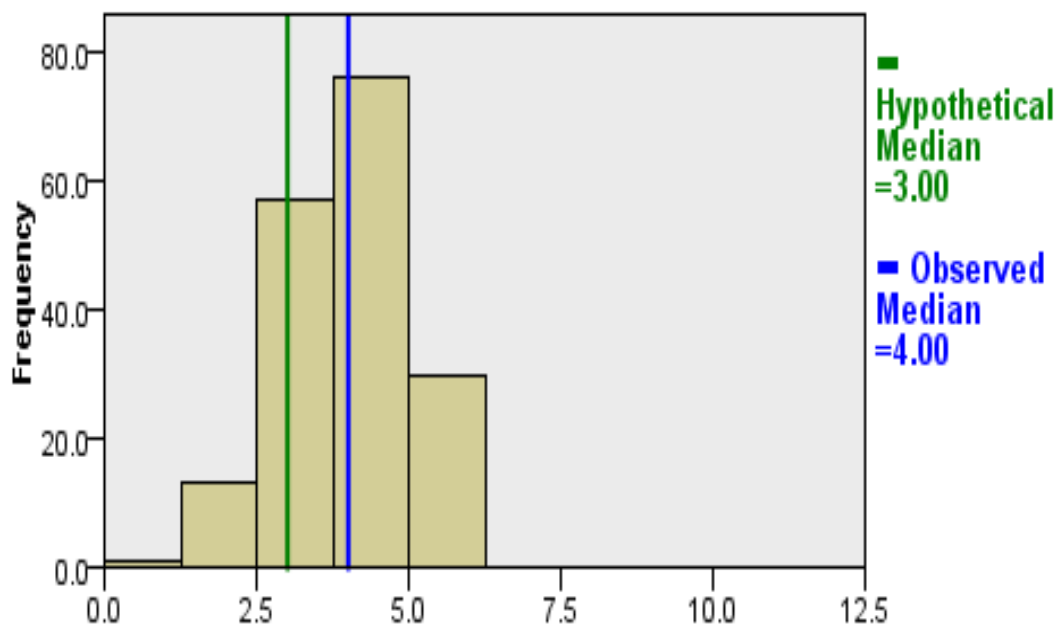


Figure (4:15): One-Sample Wilcoxon Signed Rank Test of y

B: Hypothesis of correlation:

$H_0$ : There is no correlation between the questions and sales prices and rental residential real terms.

$H_1$ : There is correlation between the questions and sales prices and rental residential real terms.

It was estimated correlation between each question and the total mean for traffic noise effect on real estate renting and selling prices concerning residential by using a non parametric correlation coefficient (because the data do not have a normal distribution) Specifically Spearman correlation coefficient and tested under the 5% significance level and summarized the results in the following table:

Table (4:14): Correlation of Spearman

	q1	q2	q3	q4	q5	q6
Correlation Coefficient	.837**	.932**	.929**	.936**	.938**	.891**
y Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
N	177	177	177	177	177	177
Ranking	6	3	4	2	1	5

\*\*. Correlation is significant at the 0.01 level (2-tailed).

Through a table (14) we note that there is a correlation extrusive (positive) is very significant between each questionnaire questions and sale prices and rental of residential property since p-value is equal to zero and is less than a 5% level of significance which means rejection of the null hypothesis and accept the alternative hypothesis, which states that There is significant correlation between the questions and sales prices and rental residential real terms, And that the most powerful was 93.8%, a share of fifth question.

Followed by the fourth question correlation strength 93.6%, while it was the weakest of the share of the first question, which amounted to 83.7%.

C: Hypothesis of effect:

$H_0$ : There is no effect of the noise of traffic on the sale and rental of residential property prices.

$H_0$ : There is effect of the noise of traffic on the sale and rental of residential property prices.

To test the significant effect each question on the sale of residential real estate prices, an estimate regression models and determination coefficient for each of them, but we must make some standard tests required before estimating these models, namely:

1. The normal distribution of the random error:

It will test the normal distribution of random error, test following hypothesis:

$$\begin{array}{l} H_0 : e_i \quad \text{are} \quad \text{Normality} \\ \text{vs} \quad H_1 : e_i \quad \text{are} \quad \text{non} - \text{Normality} \end{array}$$

The distribution of the random error variable will be represented dependent variable (generalized mean of the responses to the questionnaire questions), which has been previously tested in the table (12) and was p-value equal to (0.009) which is lower than the level of significance (0.05) which indicates that the random error Which indicates that the random error does not normally distributed and therefore should use the appropriate linear estimation model data according to property "best linear unbiased estimate" (BLUE) and can not estimate the non-linear model.

## 2. Homogeneity of random error variance:

From the Important hypothesis that must be provided before the estimated regression model is the homogeneity of the random error variance  $V(e) = V(y) = \sigma^2$  and that there is a problem of the heterogeneity of the random error variation leads to erroneous and inaccurate estimates affect the efficiency of the estimated model, So we prefer homogeneity test before the estimation and test the following hypothesis:

$$H_0 : \sigma_{e_i}^2 \quad \text{are Homogeneous}$$

$$vs \quad H_1 : \sigma_{e_i}^2 \quad \text{are non-Homogeneous}$$

Using Levene's Test of Equality of Error Variances (F-test) and we get the following table:

Table (4:15): Levene's Test of Equality of Error Variances

F	df1	df2	Sig.
.191	1	175	.663

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

Through table (15) we note that the F-value calculated equal to (0.191), which is less than its tabulated under the significance level of 5% and degrees of freedom (1 and 175) which is equal to (3.84), which means accepting the null hypothesis which states that the homogeneity of the random error variance, this is confirmed by p-value which is equal to (0.663) which is greater than the 5% level of significance and therefore there is no problem of the heterogeneity of the random error variance.

## 3- Autocorrelation of errors problem:

From conditions of analysis Independence of the random error and the existence of a relationship between them leads to a problem in estimation therefore test the problem autocorrelation of the errors by using the test (Durbin-Watson), and test the following hypothesis:

$$H_0 : \rho_{e_i} = 0$$

$$vs \quad H_1 : \rho_{e_i} \neq 0$$

The test the hypothesis above under the 5% significance level and summarized the results in the following table:

Table (4:16): Durbin-Watson test

Model	Durbin-Watson
q1	1.774
q2	1.811
q3	1.704
q4	1.840
q5	1.738
q6	1.776

Through a table (16) we note that all the Durbin-Watson values for all models was larger than tabulated value under the significance level of 5% and the size of the sample (177) and for the one independent variable which is equal to  $(d_l = 1.65)$  and  $(d_u = 1.69)$  indicating acceptance of the null hypothesis which states that there is no problem autocorrelation for errors.

Through the three tests was ensuring the availability of the terms of estimating simple linear regression model and test the impact of each question as an independent variable (which represents the traffic noise) on dependent variable that represents the sale and rental of residential property prices, and test following hypotheses:

The first hypothesis:

$H_0$ : There is no effect of the first question on the sale and rental of residential property prices.

$H_1$ : There is no effect of the first question on the sale and rental of residential property prices.

To test the significantly effect the first question on the sale and rental of residential property prices, An estimate for simple linear regression and calculate the coefficient of determination and the results are summarized in the following table:

Table (4:17): The impact of the first question

Model	Unstandardized Coefficients			Sig.	F	R
	B	Std. Error	t			
1 (Constant)	0.440	0.132	3.323	.001	713.43	0.803
q1	0.804	0.030	26.710	.000		

a. Dependent Variable: y

Through a table (17) we note that the first question (coefficient of determination) explains 80.3% of the changes in the sale and rental of residential property price changes and linear regression appropriate model for such data because F-value equal to (713.43), It is the largest of tabulated value under the 5% significantly level and degrees of freedom (1 and 175) which is equal to (3.84) Therefore.

The estimated parameters significantly for following model:

$$\hat{y}_i = 0.440 + 0.804q1_i$$

Finally p-value is equal to zero and is less than the value of the significance level of 5%, which means rejection of the null hypothesis and accept the alternative hypothesis which states that the existence of a significant effect to the first question on the sale and rental of residential property prices.

The second hypothesis:

$H_0$ : There is no effect of the second question on the sale and rental of residential property prices.

$H_1$ : There is no effect of the second question on the sale and rental of residential property prices.

To test the significantly effect the second question on the sale and rental of residential property prices, An estimate for simple linear regression and calculate the coefficient of determination and the results are summarized in the following table:

Table (4:18): The impact of the second question

Model	Unstandardized Coefficients			t	Sig.	F	R
	B	Std. Error					
2 (Constant)	1.460	0.088		16.583	0.000	843.07	0.828
q2	0.720	0.025		29.036	0.000		

a. Dependent Variable: y



Through a table (18) we note that the second question (coefficient of determination) explains 82.8% of the changes in the sale and rental of residential property price changes and linear regression appropriate model for such data because F-value equal to (843.07), It is the largest of tabulated value under the 5% significantly level and degrees of freedom (1 and 175) which is equal to (3.84) Therefore, the estimated parameters significantly for following model:

$$\hat{y}_i = 1.460 + 0.720q_{2_i}$$

Finally p-value is equal to zero and is less than the value of the significance level of 5%, which means rejection of the null hypothesis and accept the alternative hypothesis which states that the existence of a significant effect to the second question on the sale and rental of residential property prices.

The third hypothesis:

$H_0$ : There is no effect of the third question on the sale and rental of residential property prices.

$H_1$ : There is no effect of the third question on the sale and rental of residential property prices.

To test the significantly effect the third question on the sale and rental of residential property prices.

An estimate for simple linear regression and calculate the coefficient of determination and the results are summarized in the following table:

Table (4:19): The impact of the third question

Model	Unstandardized Coefficients			Sig.	F	R
	B	Std. Error	t			
(Constant)	0.156	0.099	1.576	0.117	1480.21	0.894
q3	0.922	0.024	38.474	0.000		

a. Dependent Variable: y

Through a table (19) we note that the third question (coefficient of determination) explains 89.4% of the changes in the sale and rental of residential property price changes and linear regression appropriate model for such data because F-value equal to (1480.21), It is the largest of tabulated value under the 5% significantly level and degrees of freedom (1 and 175) which is equal to (3.84) Therefore.

The estimated parameters significantly for following model:

$$\hat{y}_i = 0.156 + 0.922q3_i$$

Finally p-value is equal to zero and is less than the value of the significance level of 5%, which means rejection of the null hypothesis and accept the alternative hypothesis which states that the existence of a significant effect to the third question on the sale and rental of residential property prices.

The fourth hypothesis:

$H_0$ : There is no effect of the fourth question on the sale and rental of residential property prices.

$H_1$ : There is no effect of the fourth question on the sale and rental of residential property prices.

To test the significantly effect the fourth question on the sale and rental of residential property prices.

An estimate for simple linear regression and calculate the coefficient of determination and the results are summarized in the following table:

Table (4:20): The impact of the fourth question

Model	Unstandardized Coefficients			Sig.	F	R
	B	Std. Error	t			
(Constant)	0.010	0.097	0.104	0.917	1657.42	0.904
q4	0.960	0.024	40.711	0.000		

a. Dependent Variable: y

Through a table (20) we note that the fourth question (coefficient of determination) explains 90.4% of the changes in the sale and rental of residential property price changes and linear regression appropriate model for such data because F-value equal to (1657.42), It is the largest of tabulated value under the 5% significantly level and degrees of freedom (1 and 175) which is equal to (3.84) Therefore.

The estimated parameters significantly for following model:

$$\hat{y}_i = 0.010 + 0.960q4_i$$

Finally p-value is equal to zero and is less than the value of the significance level of 5%, which means rejection of the null hypothesis and accept the alternative hypothesis which states that the existence of a significant effect to the fourth question on the sale and rental of residential property prices.

The fifth hypothesis:

$H_0$ : There is no effect of the fifth question on the sale and rental of residential property prices.

$H_1$ : There is no effect of the fifth question on the sale and rental of residential property prices.

To test the significantly effect the fifth question on the sale and rental of residential property prices, An estimate for simple linear regression and calculate the coefficient of determination and the results are summarized in the following table:

Table (4:21): The impact of the fourth question

Model	Unstandardized Coefficients		t	Sig.	F	R
	B	Std. Error				
(Constant)	0.044	0.091	0.481	0.631	1866.46	0.956
q5	0.955	0.022	43.203	0.000		

a. Dependent Variable: y

Through a table (21) we note that the fifth question (coefficient of determination) explains 95.6% of the changes in the sale and rental of residential property price changes and linear regression appropriate model for such data because F-value equal to (1866.46).

It is the largest of tabulated value under the 5% significantly level and degrees of freedom (1 and 175) which is equal to (3.84) Therefore, the estimated parameters significantly for following model:

$$\hat{y}_i = 0.044 + 0.955q5_i$$

Finally p-value is equal to zero and is less than the value of the significance level of 5%, which means rejection of the null hypothesis and accept the alternative hypothesis which states that the existence of a significant effect to the fifth question on the sale and rental of residential property prices.

The sixth hypothesis:

$H_0$ : There is no effect of the sixth question on the sale and rental of residential property prices.

$H_1$ : There is no effect of the sixth question on the sale and rental of residential property prices.

To test the significantly effect the sixth question on the sale and rental of residential property prices.

An estimate for simple linear regression and calculate the coefficient of determination and the results are summarized in the following table:

Table (4:22): The impact of the sixth question

Model	Unstandardized Coefficients			Sig.	F	R
	B	Std. Error	t			
6 (Constant)	1.076	0.120	8.997	0.000	593.614	0.772
q6	0.786	0.032	24.364	0.000		

Dependent Variable: y

Through a table (22) we note that the sixth question (coefficient of determination) explains 77.2% of the changes in the sale and rental of residential property price changes and linear regression appropriate model for such data because F-value equal to (593.614), It is the largest of tabulated value under the 5% significantly level and degrees of freedom (1 and 175) which is equal to (3.84) Therefore, the estimated parameters significantly for following model:

$$\hat{y}_i = 1.076 + 0.786q_{6i}$$

Finally p-value is equal to zero and is less than the value of the significance level of 5%, which means rejection of the null hypothesis and accept the alternative hypothesis which states that the existence of a significant effect to the sixth question on the sale and rental of residential property prices.

Fifth: (Principal Component Analysis):

Will be here analysis of regression for all the questions to gether and its impact on the sales and rental of residential property and the importance and rank each question and determine the percentage of interpretation that illustrated prices and considering that there is a strong relationship (correlation) between the independent variables

(questionnaire questions as in the table (11) through the use Principal Component Analysis and as follows:

Table (4:23): Total Variance Explained

	Comp- onent	Initial Eigenvalues <sup>a</sup>			Extraction Sums of Squared Loadings		
		Total	% Variance	ofCumulative %	Total	% Variance	ofCumulative %
Raw	1	5.368	84.662	84.662	5.368	84.662	84.662
	2	.387	6.097	90.759			
	3	.285	4.492	95.251			
	4	.167	2.641	97.892			
	5	.093	1.469	99.361			
	6	.041	.639	100.000			
Rescaled	1	5.368	84.662	84.662	5.111	85.188	85.188
	2	.387	6.097	90.759			
	3	.285	4.492	95.251			
	4	.167	2.641	97.892			
	5	.093	1.469	99.361			
	6	.041	.639	100.000			

Extraction Method: Principal Component Analysis.

a. When analyzing a covariance matrix, the initial eigenvalues are the same across the raw and rescaled solution.

Through a table (23) note that the eigen value of the first component with a matrix variation amounted to (5.368), a significantly because it is larger than the one in while the rest of the ingredients were not significant because it was less than one, and that the proportion of interpretation of the first component of the price variation and rental of residential property reached 84.662 % after using the rotation process (Varimax) became the proportion explanation 85.188%. The following figure illustrates this:

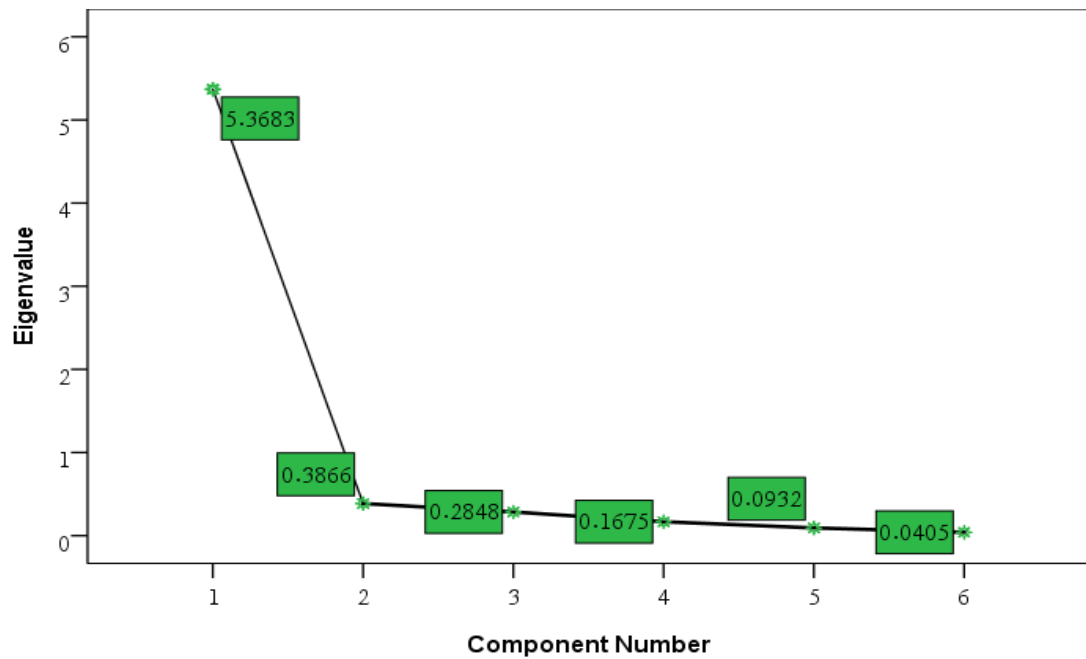


Figure (4:16): Scree Plot



While the importance ranking for each question from the questionnaire questions are shown in the following table:

Table (4:24): Component Matrixa

	Raw	Rescaled
	Component	Component
	1	1
q5	.901	.954
q4	.886	.948
q3	.913	.943
q2	1.093	.917
q1	.941	.895
q6	.927	.879

Extraction Method: Principal Component Analysis.

a.1 components extracted.

Through a table (24) note that the fifth question got the first place in the interpretation of the prices and rental of residential property variation because it got the largest proportion of the interpretation and the coefficient was (0.954), followed by the fourth question in the proportion of interpretation which amounted to (0.948) while the sixth question in the last place, The following model represents the first component after rotation:

$$\hat{y}_i = 0.895q1_i + 0.917q2_i + 0.943q3_i + 0.948q4_i + 0.954q5_i + 0.879q6_i$$

## 4:2 Discussions

According to "Ayoub Smaqayi" (2016), (the impact of traffic noise pollution in the sale and rent prices of residential property in Erbil). The study aims at analyzing the impact of traffic noise pollution in the sale and rent prices of residential property in Erbil, Which included the highlight of clear and negative effect the traffic noise on residential real estate prices in Erbil. he phenomenon of the sound of cars spread significantly in Sulaymaniyah city center, as a result of improved living standard of citizens.

### 4.2.1 Vehicle Noise:

The number of cars registered in the province of Sulaymaniyah is (249.715) cars in (2012) compared to (383.709) cars in (2015), a difference (133,994) cars. According to the latest statistics of the population center is the city of Sulaymaniyah (829,245) people, and that means every two people share one car, as is the placement in the table (25). as well as a large number of cars have not been registered yet in Sulaymaniyah governorate traffic Directorate, in addition to a lot of the cars that have registration plates of other governorates.

Table (4:25) the number of private cars registered in Sulaymaniyah traffic directorate:

the years	Vehicles number	Annual percentage change	population	Percentage share of Individual
2012	249,715	-----	776,063	3.11%
2013	305,061	18%	793,523	2.60%
2014	365,751	17%	811,257	2.21%
2015	383,709	5%	829,245	2.16%

The Source: The work of a researcher who depended on: The Ministry of Planning, the Central Bureau of statistics, the Directorate of Transport and Communications statistics, statistics private cars registered in the Directorate of Traffic until: (31/12/2012), (31/12/2013), (31/12/2014), (31/12/2015) pages: 12, 13, 17.

#### 4.2.2 Motorcycles noise:

The use of Motorcycles sources of loud noise, which has increased recently, similar to the number of cars. Where the number was (5328) motorcycles in (2012), reached to (10.862) motorcycles in (2015), with a difference of (5,534) motorcycles.( The Ministry of Planning,2013, 12) as is the placement in the table (26), as well as a number of motorcycles have not been registered yet in Sulaymaniyah governorate traffic Directorate. The motorcycles Launches annoying voices of up to (100-110) dB, so it's very annoying category.

Table (4:26) the number of motorcycles registered in Sulaymaniyah traffic directorate:

The years	Motorcycles number	Annual percentage change
2012	5328	-----
2013	7643	30%
2014	10371	26%
2015	10862	5%

The Source: The work of a researcher who depended on: The Ministry of Planning, the Central Bureau of statistics, the Directorate of Transport and Communications statistics, statistics private cars registered in the Directorate of Traffic until: (31/12/2012), (31/12/2013), (31/12/2014), (31/12/2015) pages: 12, 13, 17.

In summary that the traffic noise impact has bad economic decline in real estate prices near them, causing losses property, due to the lower value of buildings near the traffic noise the when be sold for fear of the dangers of noise.

## Conclusions

Through this research can be extract the following Conclusions:

1- The proportion of those strongly agreed reached (62.71%) of respondents On the first question, which states: (Do you think the traffic noise has an effect on reducing the sale price of real estate), with a proportion of total those agreed (72.31%) from a sample survey to find that the traffic noise has an effect on reduce the sale price of real estate in the Sulaymaniyah city center . Through the moral test the effect of the first question, we find that there is a significant effect for the first question to reduce the sale of real estate. This means rejecting the null hypothesis and accept the alternative hypothesis which states that the existence of a significant effect to the first question on the price of the sale and rent of residential property.

2- The proportion of those strongly agreed reached (19.20%) of respondents On the second question, which states: (Do you think the traffic noise has an effect on reducing the rent price of real estate), with a proportion of total those agreed (49.71%) from a sample survey to find that the traffic noise has an effect on reduce the rent price of real estate in the Sulaymaniyah city center. Through the moral test the effect of the second question, we find that there is a significant effect for the second question to reduce the rent of real estate. This means rejecting null hypothesis and accept the alternative hypothesis which states that the existence of a significant effect to the second question on the price of the sale and rent of residential property.

3- The proportion of those strongly agreed reached (38.41%) of respondents On the third question, which states: (Do you think the traffic noise has an effect on repeating selling of real estate), with a proportion of total those agreed (73.44%) from a sample survey to find that the traffic noise has an effect on repeating selling of real estate in the Sulaymaniyah city center. Through the moral test the effect of the third question, we find that there is a significant effect for the third question to repeating selling of real estate. This means rejecting null hypothesis and accept the alternative hypothesis which states that the existence of a significant effect to the third question on the price of the sale and rent of residential property.

4- The proportion of those strongly agreed reached (37.28%) of respondents On the fourth question, which states: (Do you think the traffic noise in your area make you prefer to live in another place), with a proportion of total those agreed (71.75%) from a sample survey to find that the traffic noise has an effect on in your area make you that prefer to live in another place in the Sulaymaniyah city center. Through the moral test the effect of the fourth question, we find that there is a significant effect for the fourth question to prefer to live in another place. This means rejecting null hypothesis and accept the alternative hypothesis which states that the existence of a significant effect to the fourth question on the price of the sale and rent of residential property.

5- The proportion of those strongly agreed reached (36.72%) of respondents On the fifth question, which states: (Do you think that there is a difference between the prices of houses located in the bustling and dusty streets and houses located in the quiet street in the same neighborhood), with a proportion of total those agreed (71.18%) from a sample survey to find that the Traffic noise has an effect on a difference in prices between the houses located in the bustling and dusty streets and houses located in the quiet street in the same neighborhood in the Sulaymaniyah city center. Through the moral test the effect of the fifth question, we find that there is a significant effect for the fifth question on a difference in prices between the houses located in the bustling and dusty streets and houses located in the quiet street in the same neighborhood. This means rejecting null hypothesis and accept the alternative hypothesis which states that the existence of a significant effect to the fifth question on the price of the sale and rent of residential property.

6- The proportion of those strongly agreed reached (26.55%) of respondents On the sixth question, which states: (Is traffic noise makes people with a large area houses to replace their homes with a smaller area which is located in a quiet street in the same neighborhood), with a proportion of total those agreed (44.63%) from a sample survey to find that the Traffic noise has little effect to make people to replace their homes with a large area houses with a smaller area which is located on a quiet street in the same neighborhood in the Sulaymaniyah city center enter.

This means rejecting null hypothesis and accept the alternative hypothesis which states that the existence of a significant effect to the fifth question on the price of the sale and rent of residential property.

Through the moral test the effect of the sixth question, we find that there is a significant effect for the sixth question on people to replace their homes with a large area houses with a smaller area which is located on a quiet street in the same neighborhood. This means rejecting null hypothesis and accept the alternative hypothesis which states that the existence of a significant effect to the sixth question on the price of the sale and rent of residential property.

Based on previous results were reached to verify the validity of the test and prove the hypothesis that has been formulated in the beginning of the research is as follows: the traffic noise has a negative impact clearly on the sale and rental of residential property prices in the Sulaymaniyah city center. The hypothesis is correct, based on all the questions which gave answers confirm that the traffic noise has the effect is obvious questions Find six, because more answers were formula (strongly agree and agree) that it confirms the existence of significant effect negative and clear noise traffic on residential property in the Sulaymaniyah city center.

## **Recommendations**

### **1- The Legislation of Environmental Protection:**

It is currently a system used in many countries and the environmental protection organizations codifying emission standards and trying to commit the different sectors with these standards, and in the Kurdistan Region to prepare for sound and noise specifications.

2- To impose a fee or tax on causing the noise for each (dB) exposed to the environment. For example, any sector causes one (dB) of the sound must pay half a dollar, and of course determine these fees must be equivalent the output for the specified pollution damage. In other words, the equivalent of avoiding this damage costs. This process is not easy, as well as to obtain accurate data on pollutants and their quantities emanating from all sectors needs to devices where the scientific and technical competencies available.

3- Spreading awareness: through various media by a statement notifying noise pollution on public health and quality of life.

4- The issuance of the necessary legislation and apply them firmly to prevent the use of car alarms and monitoring their engines and stop those engines that issued high voices.

5- Agriculture: plant the trees because they can absorbing a great deal of noise, especially pulsed noise. The planting trees such as (Casuarina) and (Neem) along the roads and streets helps to decrease noise in cities and towns.

6- For the companies and establishments must choose processes that release less voice or use devices with high efficiency controls the sound.

7- Preventing the use of car horn and radios in the streets of the city, for example, ten o'clock in the evening until six in the morning.

8- There should be the means and specific policies to combat the noise pollution, or reduce it to get it to the required rates environmentally.

9- The necessity to develop a comprehensive strategy for noise pollution in Kurdistan region includes practical steps to reduce noise pollution and the development of institutional capacities and develop them to improve the welfare of the people and ecosystem and maintaining.

10- Sulaymaniyah city exposed to the population explosion and the large number of imported vehicles, which led to high proportion of traffic noise and the city needs to set up a (Sub Way) that leads to reduce the proportion of traffic noise and be reflected positively on the noisy areas and crowded neighborhoods.

11- The necessity to build bridges of cooperation between the Kurdistan Regional Government and international institutions for the purpose of conducting surveys and discoveries of specialized areas that suffer from high noise pollution proportion of in preparation for finding their own scientific and technical processors.

12- The necessity for the health institutions its role in the conduct the necessary tests on residents of areas that suspect their exposure to pollution, especially noise pollution (painful) in order to early diagnosis of what suffering from it as a prelude to finding the right treatment.

13- Government should encourage support the car importer companies by tax exemption to bring hybrid cars.



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