BAUXITE CONTAMINATION IN KUANTAN EFFECT ON THE PROPERTY OF THE HOUSING VALUE

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Thesis submitted in fulfillment of the requirements
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ABSTRAK

Pada masa kini, perlombongan adalah penting untuk sumber pendapatan terutamanya bagi negara yang kaya dengan sumber mineral. Peningkatan permintaan daripada sektor industri tempatan dan antarabangsa telah meningkatkan pengeluaran sumber mineral seperti bauksit. Harga pasaran yang tinggi dan permintaan bauksit dalam pelbagai sektor telah memberi manfaat kepada Malaysia. Walau bagaimanapun, dalam mengejar keuntungan, banyak faktor-faktor negatif seperti pencemaran alam sekitar dan kesannya keatas kesihatan manusia dan masyarakat setempat. Oleh itu, isu ini perlu diberi perhatian oleh pihak berkuasa untuk memastikan masyarakat hidup dalam suasana harmoni dan keselesaan. Objektif kajian ini adalah untuk mengkaji faktor-faktor yang boleh mempengaruhi harga perumahan, menentukan bagaimana bauksit memberi kesan kepada nilai hartanah perumahan dan juga mengkaji hubungan yang wujud antara bauksit dan nilai hartanah kediaman. Berdasarkan gabungan kajian literatur dan soal selidik, kajian ini menerokai pencemaran seperti pencemaran udara, pencemaran air dan pencemaran bunyi yang berlaku semasa operasi perlombongan bauksit dan kesan perlombongan bauksit kepada kesihatan manusia dan juga hubungan antara bauksit dan nilai hartanah kediaman. Kajian ini dijalankan dengan menyediakan dan menyebarkan 50 set soal selidik kepada responden untuk mendapatkan maklumat dan pandangan mereka mengenai kesan-kesan pencemaran alam sekitar, masalah kesihatan berlaku dan sejauh mana bauksit memberi pengaruh terhadap hartanah kediaman mereka. Kemudian, jumlah hasil 50 set soalan yang telah lengkap, digunakan untuk analisis kuantitatif. Keputusan dianalisis melalui kaedah SPSS dengan menggunakan statistik deskriptif dan kaedah indeks purata. Kebanyakan responden memberi maklum balas dimana perlombongan bauksit memberi kesan buruk kepada mereka. Pencemaran habuk adalah yang tertinggi dengan 4.82%, pencemaran air pula ialah 4.76% diikuti oleh 4.58% indeks purata pencemaran bunyi. Banyak kesan buruk juga berlaku ke atas nilai hartanah kediaman seperti habuk yang tersebar di mana-mana menyebabkan rumah kotor sekaligus mengurangkan nilai estetika rumah mereka. Oleh itu, penduduk bersetuju bahawa pencemaran bauksit memberi pengaruh terhadap nilai hartanah kediaman terutamanya penduduk yang tinggal berdekatan kawasan perlombongan bauksit.

ABSTRACT

Nowadays, mining is important and a source of income especially for a country rich in mineral resources. Increasing demand from domestic and international industrial sectors has increased the production of mineral resources such as bauxite. The high market price and demand of bauxite in various sectors have been beneficial for Malaysia. However, in the pursuit of profit, a lot of negative factors such as environmental pollution and human's health have affected the local community. Therefore, this issue should be taken seriously by the authorities to ensure that the community live in harmony and comfort. This research objective is to study the factors that can effects the housing prices, determine how the bauxite affects the property of the housing value and also examine the relationships exists between the bauxite and the property of the housing value. Based on a combination of literature review and questionnaire survey, this research explores contamination such as air pollution, water pollution and noise pollution that occurs during bauxite mining operations and the impacts of bauxite mining to human health and also the relationship between the bauxite and the property of the housing value. The research was conducted by provide and spread 50 sets of questionnaire survey to the respondents to obtain information about the impacts of environmental pollution, health problem occur and how far bauxite contamination effect the property of the housing value. Then, the total results of 50 complete sets of questions used for quantitative analysis. The results were analysed through SPSS methods using descriptive statistics and using average index methods. Most of the respondents give feedback that bauxite mining adverse impact on them. Dust pollution is the highest with 4.82, water pollution by 4.76 followed by 4.58 of average index of noise pollution. Many bad impacts also occur on the property of the housing value such as the dust deposited everywhere resulted the dirty house as well as decrease the aesthetics value of house. Therefore, residents agreed that bauxite contamination affects the value of residential property, especially people living near mining bauxite plant.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

The difference housing property value in an urban area is said to be influenced by or dependent on the quantity and quality available in every location. The strategic residential area for example has many facilities such as distance to schools, city, petrol station can affect the property of the housing value. The distance to the city centre is the most important factor in differentiating the value of housing prices. There are several factors affects the market price of the property. One of the factors to be discussed is impacts of implementation bauxite mining to housing property value.

The study was made as a result of the pollution happen from bauxite mining in Kuantan. Human beings have used minerals almost ever since they existed. The ages of human developments have coincided with the use of minerals. The modern urban industrial economy cannot survive without minerals and metals, so we cannot wish away mining. Minerals can be described by various physical properties, which relate to their chemical structure and composition.

A mineral is an element or chemical compound that is normally glassy and that has been formed as a result of geological processes. They are several of mineral in our earth. Aluminium is one of the important mineral for human in modern day life which is spreading in Kuantan. In the last few years, Malaysia has become an exporting of bauxite to China. Malaysia is currently the leading countries in exporting the bauxite to China compared to Australia and Indonesia because of lower cost of the road transport compared to other countries. Bauxite has become important economic resources as the exportation in Malaysia.

However, the uncontrolled of bauxite mining has great potential in contribute the bad effects on the environmental, health and housing property value in that affected areas. In addition, bauxite mining may also impact negatively on the exterior of buildings or property as well as other side effects. As the issue of the bauxite contamination is a factor not be considered in the determination of housing prices, then a study should be done to see how far the relationship between the effects of the bauxite and the property of the housing value itself.

Bauxite is usually a soil or formation of rock that contained aluminium hydroxide minerals. From the perspectives of industrial, the Bayer process plant can be used to extract the alumina from bauxite. Mostly, Aluminium has been extracted from bauxite. This is due to Bauxite contained harmful metal such as Aluminium (Al), Copper (Cu), Magnesium (Mg), Sodium (Na), Zinc (Zn) and Arsenic (As) (Gow and Lozej, 1993).

According to Imani (2016), a laterite soil has formed bauxite as a rock that has been soluble from silica and other soluble materials in subtropical or a wet tropical condition. Besides, bauxite is a main ore of aluminium and most of the aluminium that commonly using in the industry is mainly extracted from the bauxite. The bauxite ore which is the aluminium hydroxide contained about 32-52 percent of bauxite residue. The higher concentration of bauxite will greatly affects the ecosystem, habitat and there are also harmful to human health.

The human health problems caused by the bauxite mining lead to affect the residents such as contracted with Alzheimer, breast cancer and autism disease resulting from immune cascade problem due to high toxicity of aluminium's presence. In other words, this study was to identify whether a buyer is considering the issue of bauxite in the area during the purchasing or the offer price for a residential property in the area.

Over exposure of aluminium hydroxide can effects human health for instance coughing, redness of the skin, following with peeling and itching eyes are the effect from exposure of bauxite dust. There are many problem also resulting pollution, bauxite mining can lead to the uncontrollable water pollution, air pollution, soil contamination and also lead to human health problems (Lad and Samant, 2015). Bauxite mining activities that occur affect water resources in the contaminated area as well as a

negative impact on groundwater and surface water. Bauxite mining and related activities such as blasting, removal of ore, the movement of heavy vehicles contributed to the adverse effects of small springs and streams that supply water to the main river and disrupt the flow rate of the river.

It can be observed through the turbidity in the rivers and streams, especially in the rainy season, are very high due to intense soil erosion. The impact of bauxite mining has led to the destruction of aquatic habitats, increased run-off and contamination of drinking water supplies. Problems such as increased runoff, degradation of aquatic habitat, sedimentation, erosion and increased concentration of chemicals constituents are the effects of surface mining (Rathore and Wright 1993).

Uncontrolled of bauxite mining activities can cause air pollution which gave negative impact on human health, aesthetic value, damage the structure of the building and changing weather conditions (Mohamad Rozainee, 1994). Furthermore, the polluted air will cause a negative impact on building materials and prevention is important to maintain a building (IFAWPCA Convention, 1983). This problem will involve high maintenance costs of the building or property involved in that contaminated area.

The main environmental issues are dust caused by the bauxite mining. Dust completely covers a very large area that affect residential areas, habitats and agricultural of the bauxite exploitation site. This dust consists of emissions of toxic chemicals added to natural radiation product which in the long term can contribute to the lung cancer for the residents in the contaminated surrounding area.

The research was conducted to investigate the relationship between bauxite and the property of the housing value. The purchase of housing property is a considerable investment for an individual. Each buyer will normally be concerned on the values and the benefits of houses and often hope that their homes can give more comfortable and safe all the times.

1.2 Problem Statement

Specifically, the bauxite contained harmful metal such as Aluminium (Al), Copper (Cu), Magnesium (Mg), Sodium (Na), Zinc (Zn) and Arsenic (As) (Gow and Lozej, 1993) which can cause many problems both to humans and environmental. In 2014, Malaysia exported nearly one million tonnes of bauxite and this number increased dramatically to 20 million tons for year of 2015 (Khalid. K,2016). The bauxite mining in Kuantan, Pahang has become the main focus because it provide a highly income.

According to Utusan Online (2016), Tengku Mahkota Pahang, Tengku Abdullah Sultan Ahmad Shah expressed his concerns on the bauxite mining that happens at Felda Bukit Goh, Kuantan, Pahang and others contaminated area. Mining processes creates a potential negative impact on the environment both during the mining operations and for years after the mine is closed. Bauxite mining affects the respiratory system, pollutes the environment and defaces property. Dust can be seen deposited everywhere in the villages, example on the building such as roofs, on walls and many residents uncomfortable with this situation.

These resulted difficulties for the residents who live nearest residential area to always maintain the cleanliness of residence thus affect the aesthetic value of housing itself and also the soil becomes acid and accelerates the corrosion of metalwork on buildings. In addition, the bauxite contamination were impact on air, water, land, noise, wildlife and other biological resources, significant social impact as well as it impact to housing property.

1.3 Aim and Objectives of Study

To identify how far bauxites contamination effects on the property of the housing value.

Objectives

i. To study the factors that can effects the housing prices.

ii. To determine how the bauxite affects the property of the housing value.

iii. To examine the relationships exists between the bauxite and the property of the housing value.

1.4 Scope of Study

Several scopes were outline in order to achieve objectives. The context of study will focus on the factors that can increase or decrease in property prices in Kuantan. Since, the bauxite mining issue is a huge topic in Kuantan, the study will focus on bauxite mining in Kuantan only. The residential that affected and near with the location of bauxite mining will be respondent for this research. This research focus on perceptions respondents towards impact of bauxite contamination to the housing property value as well as to examine the relationships exists between the bauxite and the property of the housing value.

1.5 Significance of Study

The findings of this study will give understanding to people about the impacts of bauxite mining towards environment, health and impacts of bauxite contamination on the property of the housing value. Considering that the main purpose of this study is to identify the impacts of bauxite contamination on the property of the housing value.

By knowing the degree of environmental effect of bauxite mining activities on the valuation of residential property can help valuers and property consultants about the effects of bauxite mining on residential property values. If the appraiser knows that the issue of bauxite mining affected the value of real estate, then this can be used by evaluators in estimating the affordable value of property on the contaminated airspace and its surroundings.

In addition, knowledge about the factors that impact on the property of the housing value would assist the consultant in advising on appropriate development patterns to be designed that may face the risk of contamination of the impact of bauxite mining activities that not regulated.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The purchase of housing property is a considerable investment for an individual. Each buyer will defend the values and the benefits which would be obtained in the future. Good homes can make the occupants feel more comfortable and safe all the times. Works such as modify, maintenance and landscaping can preserve the life span of the residence as well as to increase the price of housing property in the future.

However, there are several factors affects the market price of the property. One of the factors is impacts of implementation bauxite mining to housing property value. Uncontrolled bauxite mining activities by irresponsible people were cause a lot of harm to people and its environment rather than profit.

In the year of 2016, the study on the several locations affected by the bauxite contamination in Kuantan included Bukit Goh, found that the pollution index exceeded the level of dangerous which is reaches up to 468. The problem of pollution happened in Kuantan can affect the health of occupants and structure building as well as impacts the housing property value.

Moreover, this research is to find out on how far the impacts of this Bauxite mining activities may affect the market value of the housing property. Other factors that affect the value of housing properties will be discussed in general terms in the next section.

2.2 Housing Property Value

According to Pahang Property Valuation Department (2015), recently the values of property in Kuantan have been falling down which is caused by uncontrolled bauxite mining activities. The property's value such as houses and commercial centres in several locations near the bauxite mining especially in the residential housing at Bukit Goh, Gebeng, Balok and Berserah had going down and there had been no statement of anyone selling their property because of this problem.

2.3 The General Definition of Housing Property Value

Definitions regarding the featured in this chapter are like real estate, residential properties, and types of residential properties, property market value, housing property market value, real estate cycles, price and the value.

2.4 Real Estate

According to Omar (2003), real estate is the property that consists of land and buildings on it including natural resources such as uncultivated flora and fauna as well as water and minerals. Real estate can be categorized into three broad based on its use, namely residential, industrial and commercial. Examples of residential real estate include vacant land or open spaces, houses, condominiums, and town homes. Examples for the industrial real estate are mining, factories and farms while for commercial property are warehouses, office buildings and retail stores. The real estate also can be defined as services obtained through the use when it is seen from aspect of Economics (Shafer, 1975).

There are 5 Categories or type of property. It is as follows:

1. Agricultural
2. Residential
3. Part Residential Part Commercial
4. Commercial
5. Industrial

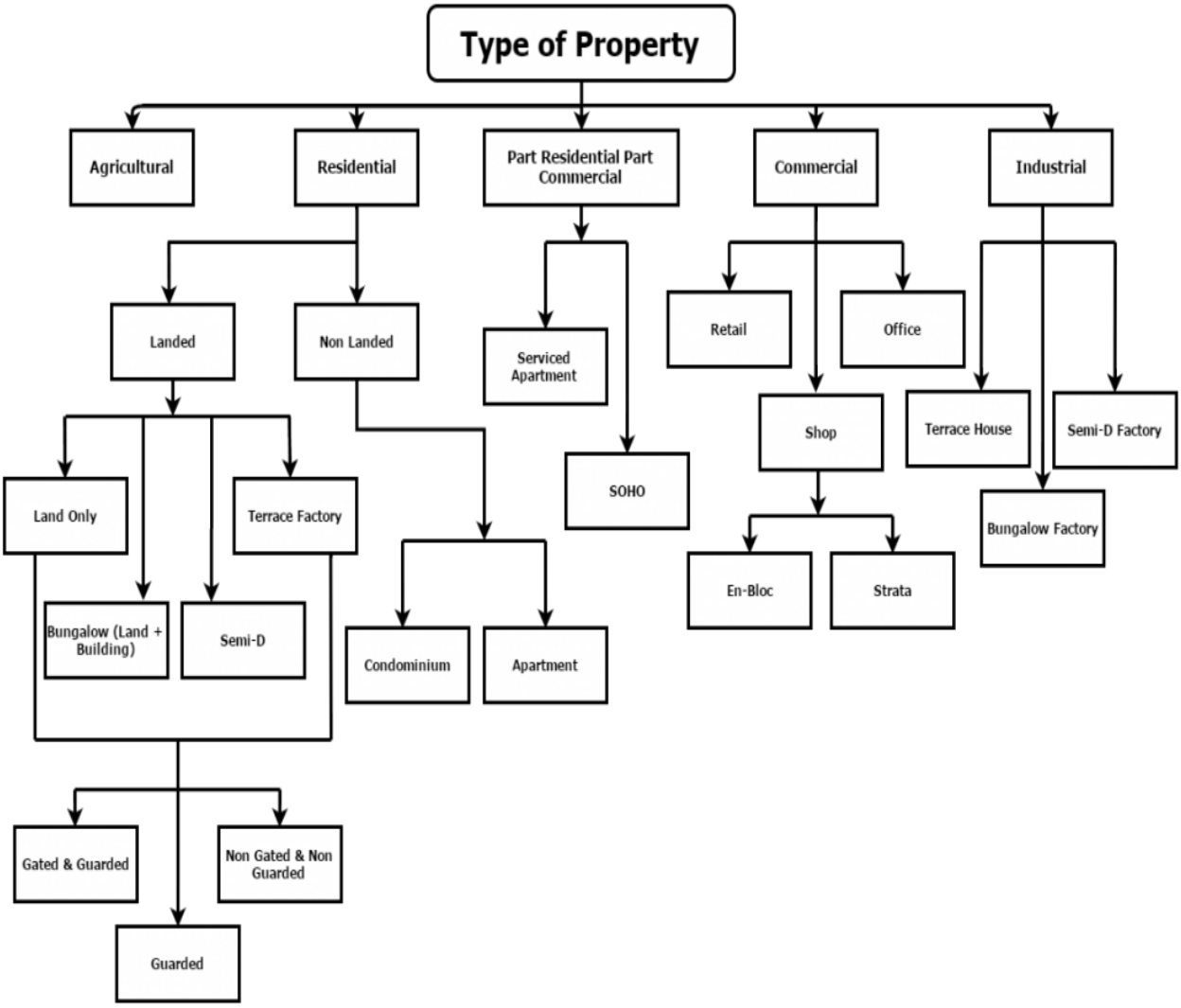

Figure 2.3.1: Type of property (Shafer, 1975)

2.3.2 Residential Property

According to Lynos (1982), residential property is defined as property that is used or zoned for the use of the accommodation unit such as homes, condominiums, townhouses or apartments. The national land codes 1965 under section 116 have stated that residential property is included in the category of "buildings".

Uniform Building by-laws 1984 also defines a residential property as a building or part thereof was designed, matched or used as a place of residence for human beings. For residential development in normal circumstances, it will be carried out by a different development agency and the different size of the development undertaken (Ernest, 1994).

Housing is defined as a building constructed for the purpose to live in by humans and is usually inhabited by one family (Hawkins, 2008). Therefore, housing can be defined as a cluster of houses consists of several units focused on an area and capable of becoming a commodity (Dali, 2005). The houses also have become a fundamental requirement similar to food and beverage in everyday human life.

According to Amin (2010), a good home must be able to fulfil all the physical requirements, whether social or psychological needs. As the physical requirements, the house should be able to provide protection and ensure the safety of its residents. In the terms of social needs, a good home should be able to give freedom of leisure to the residents in doing activities that would like to be made without any obstacles. For the aspects of psychological needs, the home should need privacy by give a time to be alone to its residents to seek peace.

The study in Australia shows that since 1972, the housing price increases very quickly compared to the average cost of construction, household income and average rental. The house can be considered as an important thing where people will allocate a large amount of their income to buy a home (Costello et al., 2010).

According to Bourne (1981), in addition to view housing as a physical structure that provides protection to the residents, it is also a main agenda in every country in the world. Housing is important to a country's economic growth as it will not only be consumer goods but also serve as a kind of investment.

2.3.2.1 Type of Residential Property

Residential properties may contain for single family or multifamily housing, for non-commercial functions. Residential property built is different according to their specific classification (Jaafar, 2011). Therefore, the classification made will have differences in terms of the price, quality of building materials, structure and design, acreage and so on (Nazaruddin, 2002).

The house can be categorized into several types, such as:

1. Terrace House
2. Town House
3. Semi-D
4. Bungalow
5. Apartments
6. Flats
7. Condominium

2.3.3 Property Market Value

The market value was estimated amount for which an assets need to exchange on the date of valuation with a reasonable price value among a willing seller and a willing buyer in an arm's duration transaction after right advertising and marketing. Sellers and buyers in a transaction are required to produce the supply and demand that aims to stabilize the prices (Ahmad, 1998).

In addition, it should be sold in the open market and enough marketing in which both parties must knowledgeably regard real estate, prudently and without compulsion. According to Shim et al. (1996), the property market value is defined as a business that exists between two people those who offer real estate with real estate's buyers. The property market value can be affected by various factors such as supply and demand, inflation, loan interest rates and so on.

2.3.4 Housing Property Market Value

Interactions that occur between supply and demand will cause the balance of the price achieved at a certain level. However, the balance in the housing market are difficult to achieve because of other factors such as economic, social, political, and legal are influenced (Mahamud, 2004).

According to Bloch (1997), there are various factors that can cause instability in the housing property market such as psychological, speculation, migratory, financing, and Government policy. The global financial crisis by the year of 2007-2010 also has a significant impact to the housing property market value. For example, the housing property market for the United States recorded a decline in house price which is about 34% starting from the end of the year of 2006 to the first quarter of 2009.

2.3.5 Real Estate Cycle

Real Estate Cycle referred as suitable time for supply of new products (Roulac, 1996). According to Yew (1999), the movement of the real estate cycle could be shown through flow value of transaction and number of transactions taking place in the property market. While the strategies and results of the transactions also affect real estate cycle (Roulac, 1996). On the other hand the demand side measurement based on the model of real estate cycles (Witten, 1987).

Real estate cycles in the market are important to ensure that housing development more dynamic and viable (Pyhrr et al., 1990b). Such things as each development project carried out should look to the market readiness to receive new products. Real Estate Cycle is an economic phenomenon in economic variables related to properties in a specific period of time (Iman, 2006). This cycle also price and rent trends in a housing property including changes in the supply and demand (Thomsett and Thomsett, 1994).

According to Jaafar (2011), property market cycle can be characterized in different parts, as shown in Figure 2.1 below.

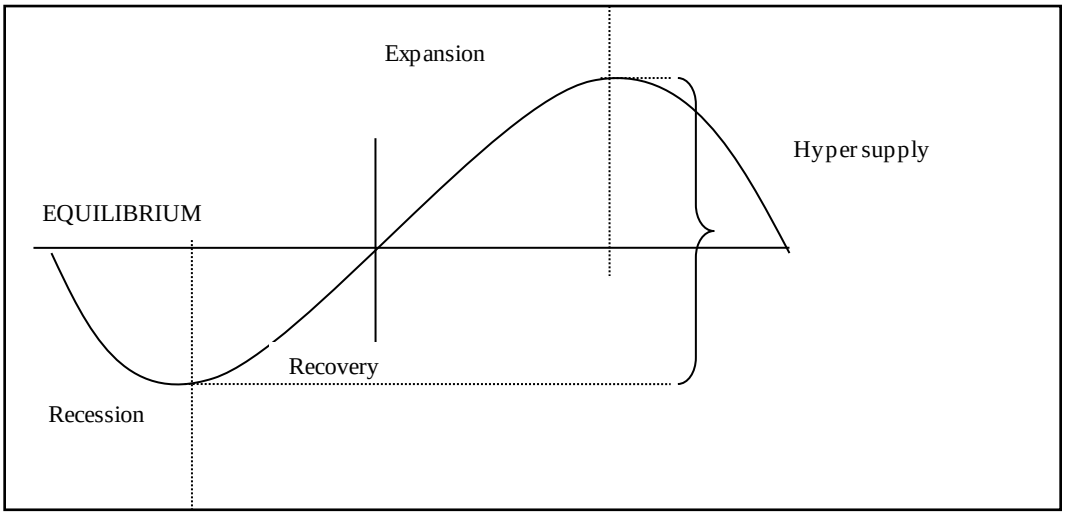

Figure 2.3.5: Real estate market cycle (Jaafar, 2011:19)

Phase 1: Recovery

The recovery phase is shown the property sector began to increase in prices and rentals from previous sluggish market conditions. As recovery maintains, landlords can increase prices at a slow pace (at or under inflation). Regularly, the Federal Reserve assists by means of lowering interest rates to stimulate the economy. This makes properties more worthwhile. The demand for real estate began to increase and meet demand (Hargreaveas and McCarthy, 1995).

Construction activities being carried out in order to meet the increasing demand. Recovery can be seen by the symptom such as the reducing of unemployment rate, rising of aggregate demand, restoration of local investors in the market, and active in property market again (Lau, 2004). According to Jaafar (2011), the property market has influenced according to changes in the economy. Therefore, the recovery of the property market will depend on the economic country itself.

Phase 2: Expansion

At this phase, the prices are at the highest level. This is the phase where sellers try to release their property to reap the maximum benefits in accordance with the nature of the investment that is buying the house at the lowest price and sell them back at a higher price. This means that price and rent has reached the highest level that can be obtained in a real estate cycle.

Phase 3: Hyper supply

When there is deterioration in market cycle, the market cycle is actually a state of decline (Samuelson and Nordhaus, 2004). This stage occurs after the real estate decline of prices and rentals. According to Hargreaves and McCarthy (1995), this process will take a long time and the decline in real estate prices caused by supply exceeding demand from users. In the phase, sellers are willing to lower the price of property so it can be sold as there is a lack of demand from buyers. This situation resulted in investors less interested to invest in real estate (Hargreaves and McCarthy, 1995).

Phase 4: Recession

This phase shows the situation where rents or property values decreased at the lowest level. According to the Tee (1995), this situation occurs when property supply beyond demand either due to an increase in supply or due to collapse in the country's economy. Construction activity also decreased as a result of excess supply (Thomsett and Thomsett, 1994).

2.3.6 Price

According to Wurtzebach and Miles (1994), prices show the value estimated by a person in the form of money. Kok (2002) also described price as a sum of money as consideration in a transaction where the buyer pays to the seller to obtain goods or services. Prices do not reflect the value. Price influenced by the knowledge of buyers and sellers and skills to bargain between buyer and seller.

2.3.7 Concept of Value

The definition of value will be described on the basis of a wide range of opinion and the factors that influence the value of the property.

2.3.7.1 Definition of Value

According to American Institute of real estate Valuer in writing Ismail (2003), the value is the highest price estimated in terms of money that created out of an interest in property if the transferred in the open market with reasonable time to get a buyer who has knowledge of the potential land use. The value also is the price that can be accessed by the seller and are willing to be paid by real buyers willingly without any compulsion.

It can be concluded that there are some elements in give the definition of the value of including the highest price expected, the value is in the form of money, reasonable time, values exist after the evaluation is made, knowledge of the real estate as well as buyer and seller without compulsion.

2.4 Factors That Affects the Property Prices

2.4.1 Location Attributes

Location of a property will be considered in the valuation process. There are many measurements for the location attributes, such as location and accessibility, neighbourhood, transportation, structural attributes and facilities. These sub-factors will be discussed in this chapter.

2.4.1.1 Location and Accessibility

The location refers to the location of the properties. These factors will directly affect accessibility. Accessibility refers to the amount of time to specific destination within a certain distance. According to Faith and Hamidi (2005), the property prices will be reduced when the distance is far from the centre city. This is because there are high demands for property located in urban areas.

Buyers will usually choose a location that is close to work or close to the city centre. According to Theriault et al. (2004), the price of the property located in the city centre is high and the price will decrease when a property farther away from the city centre. This is because the city is a focus area for the human activities regards to economic, social and real estate market activity (Faith and Hamidi, 2005).

2.4.1.2 Neighbourhood

A housing neighbourhood is located in a residential area and have similar physical, environmental, social and economic characteristic. Before a household buy the property, they will consider the quality of its potential neighbourhood such as school, police station and public service provided to that neighbourhood.

Households would prefer to stay close to the public services, considering that the return on their housing investment will be highest. A good neighbourhood will give positive impact to the property. This is because house buyers are willing to pay extra for a house with good environmental qualities, (Tan Teck Hong, 2008).

2.4.1.3 Transportation

Transportation factor is linked with the accessibility factor. It refers to the buyers who do not have their own car, and they need public transport go to other places. According to Cooper, & Ryley (2000), transport accessibility is measured by travelling item, convenience, and availability of different transport modes and the transport is frequently used by resident.

Residents usually prefer convenience public transport that can take them to their place of employment, shopping, food court and other places. There is a positive influence of good public transport service on housing prices.

2.4.1.4 Structural Attributes

According to Chin, Chau & Ng (2004), the structural attributes is very important to a value of property and it gave positive impacts on house prices. This attributes include the number of rooms and floor area which relatively important.

There are a lot of attributes, such as built up area, the size of living and dining area, number of bedrooms and bathrooms in a house, car porch, age of building, height of building, tenure, quality of finishes and the internal and external structure of a house.

According to Wong and Wolverton (2002), the height of building will influence the price of property. The different floor level, thus the view of the building also will be different. Increasing years of occupation cause the condition of the building depleted and eventually the cost for future maintenance will increase.

2.4.1.5 Facility

Infrastructure and public facilities that provided are capable of affecting the property market value. Infrastructure is a key in growth and development country (Chatterjee and Morshed, 2011). Infrastructure may be associated with the provision of roads, electricity, water and sewage, drainage, transport and communications either by the government or through privatization.

Kovacs and Spens (2006), transport infrastructure, including road, rail, sea transport (maritime), and air (plane). While public facilities may be associated with the provision of hospitals, institutions education, recreation areas, shopping centres, and so on. Provision public facilities are also seen to have a relationship with a factor location and accessibility and neighbourhood factors. This is because the facilities public in that area affect the choice of location subsequently affect the price of residential property.

2.5 Bauxite

Almost all of the aluminium that has ever been produced has been made from bauxite. Aluminium is the most abundant metal in the earth's crust. Bauxite is the main raw material used in the commercial production of alumina and aluminium metal. It is a rock formed from a laterite soil that has been severely leached of silica and other soluble materials in a wet tropical or subtropical climate.

Mining is an important economic activity in many countries all over the world. It is an essential human activity to provide rough materials for the society. Aluminium has so many applications, it is impossible to imagine a world without it. The amazing, unique qualities of this metal give it an almost endless range of applications, from transport, building, packaging, electrical applications and medicine.

2.5.1 Impacts of Bauxite to Environment

In order to meet the ever increasing demands of the modern society, the mineral production in country is continuously increasing along with the scale of mining operations. Modern mining is an industry that involves the exploration for and removal of minerals from the earth, economically and with minimum damage to the environment.

Mining is important because minerals are major sources of energy as well as materials such as fertilizers and steel. However, bauxite mining is known to be environmentally destructive. According to Lad and Samant (2012), the nature of mining processes creates a potential negative impact on the environment both during the mining operations and for years after the mine is closed.

The mining activity has an important environmental impact on air, water, land, noise, wildlife and other biological resources as well as it has a significant social impact too. Although, bauxite mining exploitation offers many benefits in term of economy and social, bauxite mining also has a significant effect on natural environment. According to Tsekpo (2002), farmer faces the problem for farming due to mine.

According to Gendron (2013), bauxite is usually strip mined, a method that leads to vast open pits of devastated land, significant environmental degradation, and the disruption or even destruction of local wildlife, water flows and other environmental and eco-logical processes.

2.6 Type of Environmental Effect

2.6.1 Air Pollution

All methods of mining affect air quality. According to Behera (2015) aluminium smelter plant discharges hundreds of tons of fluoride in to the environment contaminating the ecosystem around the plant. Metallic shiny aluminium powder dust can be seen deposited everywhere in the villages, example on the building such as roofs, on walls, on trees and vegetation and in wells of drinking water. People that live near the bauxite mine usually have being exposed to the dust and mud that contain very harmful toxic of heavy metal such as aluminum, copper, iron, lead and cadmium.

Bauxite mining, which is considered as surface mining, is land extensive, dusty and noisy. The amount of alumina spilled on the environment and a cloud of dust being carried along the way to export the bauxite have effect on the environment itself. It has been argued that the dust is chemically inert. However, it adversely affects the respiratory system, pollutes the environment and defaces property. These resulted difficulties for the residents who live nearest residential area to always maintain the cleanliness of residence thus affect the aesthetic value of housing itself and also the soil becomes acid and accelerates the corrosion of metalwork on buildings.

One of the greatest impacts is the hazard posed by air pollution to the health of the local population. The common diseases found in the area are cough, asthma, flu and tuberculosis (Asare and Darkoh, 2001). According to Ahmad, K, Ahmad, and Rao (2014), the condition air quality was seriously affected by the mining activities not only in the mining area but also in the nearest residential area. These pollutants can be a health hazard, exacerbating various respiratory disorders not only the workers but also with the common masses living in the nearest residential area.

Figure 2.6.1:1: Examples air pollution covered by red dust in Kuantan (Abdullah and Mohamed, 2016)

Figure 2.6.1:2: Example of red dust deposited on window (Abdullah and Mohamed, 2016)

2.6.2 Water Pollution

Water is one of the most important substances on earth. All plants and animals must have water to survive. If there were no water, there would be no life on earth. Most significant impact of a bauxite mining project is its effects on water quality and availability of water resources within the project area (Miller, 2010). The water polluted by the bauxite mining and impacts will be impressed by the people.

The pollution on the water that has been contaminated with bauxite is no safe for the resident to use for their daily necessary. Some irresponsible people have been doing the illegal activities that resulted on heavy pollution of water and river. For example, the wash water that contains a higher concentration of heavy metals such as Aluminum and iron will flow into the water stream and contaminated the raw water used by the resident and it will also affect the residents if they are consuming them (Aryee et.el, 2002).

According to Council (2000), Acid Mine Drainage (AMD) is the mining industry greatest environmental problem and its greatest liability, especially to any waterways. An acid generating mine has the potential for long-term, devastating impacts on rivers, streams and aquatic life.

The aqua-habitat in the river also affected, the aquatic organism is one of the food sources to the people lives near the river. In addition, there is no proper drainage system provided there and during the heavy rainfall, the runoff laden with bauxite sediment flows into the river and residential area nearby water bodies.

Figure 2.5.2:1: Examples of sea water was polluted by bauxite mining activity (The Star Online, 2015)

2.6.3 Noise Pollution

The use of machinery has led to an increasingly high noise levels in the mine. Sounds produced also from rock blasting with explosives, the use of machinery such as cutters loader, rock drills, diesel locomotives in underground miners and the gyrations. Large diesel electricity generators that produce multiple megawatt of electricity in some mines prove hazardous noise.

The sound effects are loud noises and the vibrations from the blasts can lead to damage to the auditory system, cracks in buildings, pressure and discomfort to the residents who live nearby the bauxite mines (Akabzaa and Darimani 2001). In addition, this problem will affected people within the surrounding communities. The buildings were cracked whereas those are very close to the mining site experienced a lot of broken glasses and other glassware in their homes.

2.7 Health Effect

According to Yeboah (2008), illegal bauxite mining activities effect on health on surrounding communities. The impact of environmental problems has culminated into a health problems with a high prevalence of diseases such as respiratory tract infections and skin diseases. Health impacts of mining can be divided into two categories which are accidents and the effects of radiation and lung disease (Aswathanaryana, 2003). In terms of health hazards four types can be distinguished on the physical, chemical, biological and mental hazards.

2.7.1 Physical Hazard

According to Aswathanaryana (2003), physical hazards such as vibration, noise, explosions and accidents, floods and various forms of dust, fine particles and aerosols by causing fibro genetic and carcinogenic included in the category of physical hazards.

2.7.2 Chemical Hazard

According to Aswathanaryana (2003), chemical hazards arising from the chemical contamination in water, solid waste and air with the most common substances are carbon monoxide and dioxide, sulphur oxides, fluorine compounds and nitrogen oxides.

2.7.3 Mental Hazard

According to Aswathanaryana (2003), mental hazards involved with mining including stress, anxiety, claustrophobia, or irritability involved with the awareness dangerous worksites. Tiredness and disorders also can affect a person's work performance (Aswathanaryana 2003).

2.8 Impacts of Bauxite Mining To Housing Property

The valuation of property, compensation, building and crops are the major of problem which affected by mining (Twerefou, 2009). According to Ghana Chamber of Mines (2008), about 84% of the recipients claimed that the value of compensation received by them is below the losses they had suffered regards to land, structures, immovable assets and incomes. These findings are similar with other studies where the compensation received by victims is not worth with the loss they had suffered, particularly in relation to land and crops.

According to Downing (2002), illegal bauxite mining activities have an impact on the loss of physical and non-physical assets including homes, communities, income earning assets, culture, social structures, networks and associations, among others also involves health risks and disruption of daily activities.

According to Behera (2015), dust can be seen deposited everywhere in the villages, example on the building such as roofs, on walls, on trees and vegetation and in wells of drinking water. People that live near the bauxite mine usually have being exposed to the dust and mud that contain very harmful toxic of heavy metal such as aluminum, copper, iron, lead and cadmium.

However, it adversely affects the respiratory system, pollutes the environment and defaces property. These resulted difficulties for the residents who live nearest residential area to always maintain the cleanliness of residence thus affect the aesthetic value of housing itself and also the soil becomes acid and accelerates the corrosion of metalwork on buildings.

According to Andoh (2002), noise distraction and vibrations caused by blasting in bauxite mining areas leads to cracks in the residence housing while the sound of traffic movements to and from the bauxite mining area is a major disruption to the mining community. Noises in the mining area interfere with human activity such as sleep, fear and fright, speech and hearing as well as stress related illnesses such as hypertension.

In short, impacts of implementation bauxite mining also gave effect to the residential housing property value as wells as people who live nearest the bauxite mining area are exposed to danger and safety are not guaranteed.

2.9 Conclusion

Based on the statement above shows that the effects of bauxite mining activities which are nearest to residential housing affects the housing property value. This is shows that the bauxite contamination against environmental pollution and human health can provide impacts of residential properties.

The negative impact is meant the impact on the building and aesthetics of the building itself. This will indirectly increase the cost in terms of maintenance, its impact on the marketability and its impact on the income to be earned.

In addition, negative effects on health caused by bauxite mining activities will affected to cause disease and exposure to hazards indirectly the marketability of residential properties will be reduced because typically, a good and safe environment is an important factor in buying a residential property.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter is intended to give an explanation of the study approach and methodology adopted and is used to achieve objectives of the study which covering various aspects ranging from the study approach to explains about how data will be collect and analyse. The methodology of the study is very important because it can provide guidance to the study and it will determine whether the researcher chooses the right way to get data accurately and how to interpret the data.

The research methodology is planned to facilitate the review process and to ensure that the study is in line with the objectives set. To achieve objectives, namely study factor that can affects the property of housing value, determine how bauxite affects the property of housing value and also examine the relationship exists between bauxite and the property of housing value.

This whole chapter will describe how the data were collected. There are two data types, namely primary data and secondary data. Primary data more complicated because it comes from the study by the researcher itself, for this study, the questionnaire is conducted. Meanwhile, secondary data achieved by reading from a journal, article, books, internet sources and so on.

Several analysis methods are used to analyse the frequency, average index and the higher ranking. Besides that, the researcher will define how many samples that needs to gain and what type of data analysis method that can interpret the data.

3.2 Study Area

The study was conducted in Kuantan, Pahang. Kuantan is a district and the state capital of Pahang, Malaysia. The National Physical Plan 2005 identified Kuantan as one of the future growth centres and a hub for trade, commerce, transportation and tourism. Kuantan is the social, economic and commercial hub for the East Coast of Peninsular Malaysia due to its strategic location. Rapid development has transformed and modernised in Kuantan.

The location of this study will be made general and randomly. It is difficult to cover all bauxite mining area in Kuantan. This study will focus on bauxite mining area affected in Felda Bukit Goh, Gebeng, Balok, Bukit Sagu, RTP Bukit Goh, Kg.Padang, and Perlabuhan, Sg. Karang and Sg.Ular, Kuantan. Felda Bukit Goh is one of the famous areas for bauxite mining in Kuantan.

Lately, many contractors come to negotiate with owner of the land to buy their land for mining purpose. Felda Bukit Goh has been established on 1967. Felda Bukit Goh Kuantan located about 25 kilometres from Kuantan city. This area is agriculture land the area cover up total 2831.86 hectare. Majority people live in Felda Bukit Goh are Malay. The lands in Felda Bukit Goh become valuable after the mineral bauxite have been meeting.

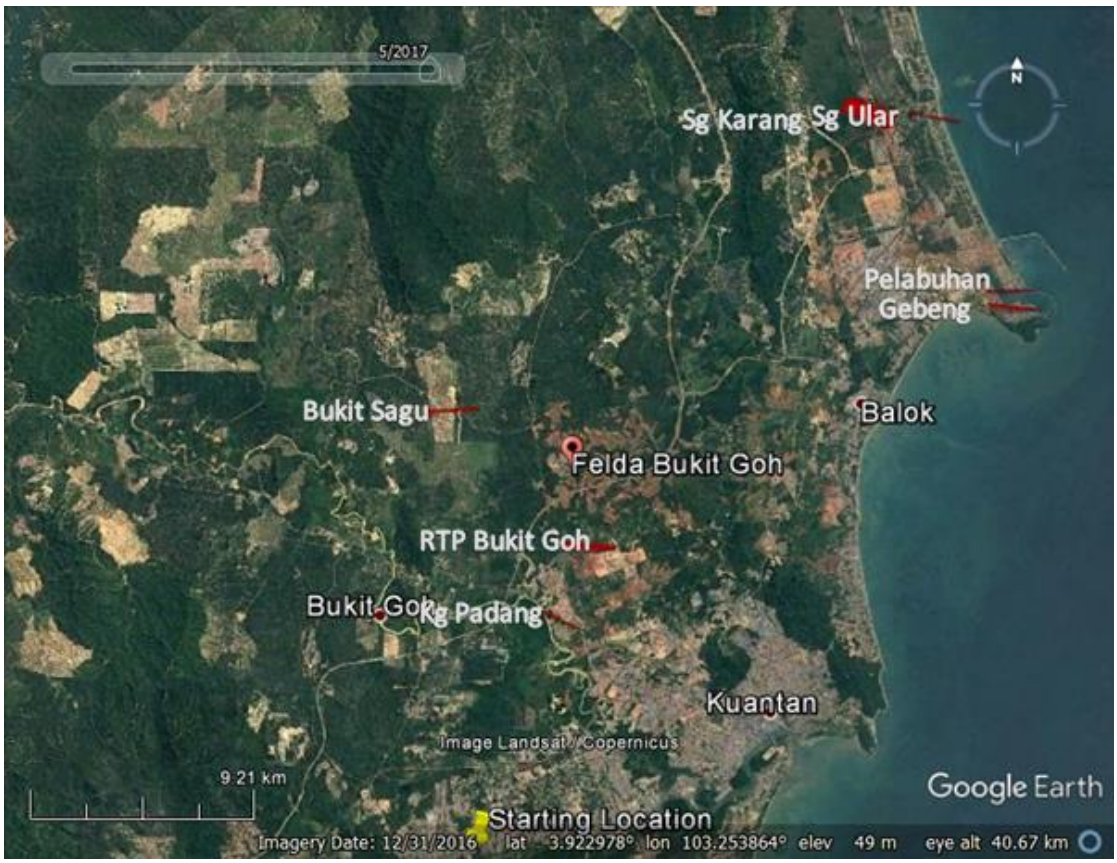

Figure 3.1: Location of bauxite at areas in Kuantan, Pahang

3.3 Structure Flowchart

Figure 3.1 shows the steps from the beginning to the end of the research. In the first step, the researchers used the previous studies as a guideline. To get the data, the researchers designed a questionnaire to determine and achieve the objectives. The respondent that researcher target was the people in neighbourhood area near the base of mining bauxite.

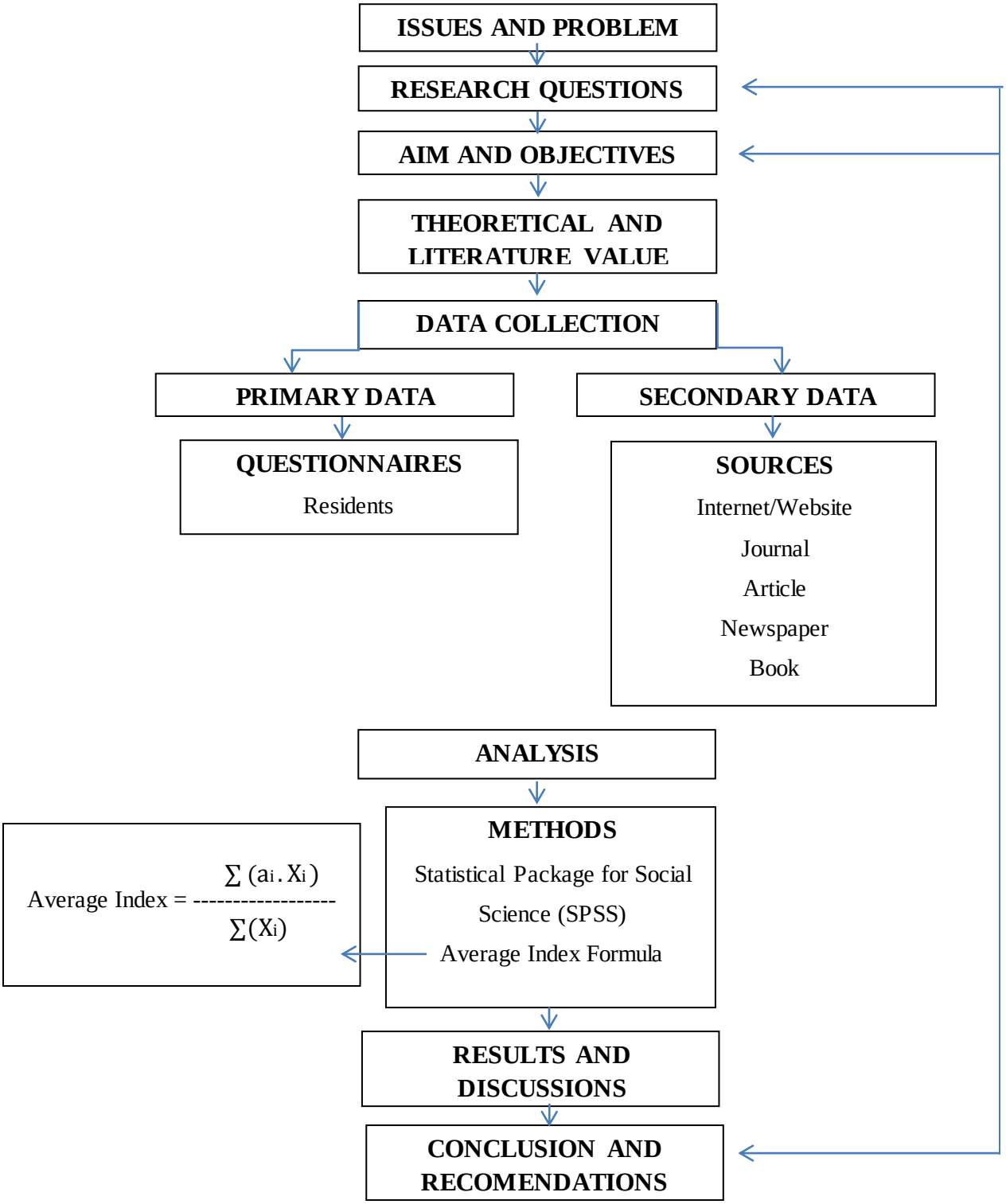

Figure 3.3: Flow chart of the whole activities in this research

3.4 Study Method

Methodology of study includes data collection techniques, questionnaire design and data processing and analysis. This section is important in explaining how the study will be conducted to obtain reliable results.

Generally, the data to be collected in this study can be classified into two, namely primary data and secondary data. Primary data is data obtained from the questionnaires that will be distributed to the respondents. This data will be collected from the sample survey of residents in neighbourhood area near with bauxite mining base. Secondary data gathered from review of reports of past studies, researchers, journals, magazines, books and other publications.

3.5 Questionnaire

This study will use a quantitative method. Quantitative method is the data collect by distributing the questionnaire to the respondents. The questionnaire is used to get the data form the resident who lives nearest the bauxite mining plant to get view from their behalf. This is very important to get data from the society that in fact they are the user of the building.

The information that would be obtained from the user is the questionnaire related about the impacts of bauxite mining to environmental such as air, water and noise pollution. In addition, the questionnaire related to the health symptoms, impacts of bauxite mining to housing property and factor affects the property prices also need from resident's view.

The data is needed to provide the question to be asked in order to get the correct respond from the users. Brainstorming also need to identify the questions is appropriate to get the data from the users. The last step is questionnaires distribution to the respondents.

3.6 The Target Population

In this studied, the target population is the neighbourhood that occupying or living in the residential area. The population of this study is the number of population in the area of Kuantan Local Authority that are 450,211 residents occupied the area (Pahang Statistics Department, 2010).

In term of sample size, there is no definite answer to the question "How large should a sample be?" this requires judgments of feasibility and cost against representativeness. There is no point in taking huge samples when smaller ones produce the same result. Therefore, the sample sizes in this survey are 50 respondents from 450,211 populations.

3.7 Data Processing and Analysis

3.7.1 Software Statistical Package for Social Sciences (SPSS)

Data analysis method for questionnaire will analyse by using Statistical Package for the Social Science (SPSS) system. SPSS software is the use of data management and analysis. The researcher choose to use the SPPS system because the SPSS system can take data from any types of file and over that SPSS system will generate the data result into charts, graph, and tabulated reports easily.

In SPSS system researcher, will analysis the result by using these types of data analysis, which are descriptive analysis, correlation and so on. But in this study, I just use the method of statistical analysis frequency and descriptive analysis method. Generally, this statistical analysis showed the percentage of times and frequency of each variable, and descriptive analysis use to describe the characteristics of variable. According to (Patel, 2009), descriptive statistics analysis is usually used to describe variables and this method is performed by analysing one variable at a time.

3.7.1.1 Frequency distribution

There are several different kinds of descriptive statistics, which includes frequency distribution, central tendency and standards deviation. The simplest way to see how the data are distributed across the categories of a variable is to set up a frequency distribution of a variable. Besides that, this would give the number of cases that fall into each of the categories of the variable and the percentage of the total number of cases they represent.

3.7.2 Data Analysis Using Average Index Methods

To measure the data obtained from respondents, the data frequency will be analysed by using the average index formula. The aim of this formula is to determine the ranking of parameters for each answer of the questions. For every question there are five parameters that should be used by the respondents as an option to answer the questionnaire. The five options given are most frequent, frequent, fair, less frequent, and least frequent.

The average index is calculated on the formula by Assef et al (1996), as follow:

$$\text{Average Index} = \frac{\sum (a_i . X_i)}{\sum (X_i)} \qquad (3.7.2)$$

Where,

ai is a constant expressing weight given to i

Xi is the variable that expressing the frequency of degree of Important of each option,

X1 expressed the frequency of most frequent response

X2 expressed the frequency of frequent response

X3 expressed the frequency of fair response

X4 expressed the frequency of less frequent response

X5 expressed the frequency of least frequent response

Table 3.1: Showed the average index and the rating scale uses the method by Abdul Amjid et al (1997) as follow.

Average Index	**Rating Scale**
Most Frequent	5.00 – 4.01
Frequent	4.00 – 3.01
Fair	3.00 – 2.01
Less Frequent	2.00 – 1.01
Least Frequent	1.00 – 0.00

Table 3.1: Rating scale of average index

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter discusses deeply about the result from the data collected from questionnaires survey. This chapter is to analyse and summarize the data collected. The significant results were critically discussed. The discussion focuses on determining the bauxite contamination in Kuantan effect on the property of the housing value. The questionnaires were distributed to the 50 respondents who is nearly the affected area.

The questionnaire survey is regarding the bauxite effect on the environmental impacts of air, water and noise pollution and impacts bauxite mining to health and housing value. Others factor that effect the property of housing value also discusses in this chapter in order to find out the cause of price increases on the housing property value.

Based on the methodology of the study described from the previous chapter, findings from the questionnaire survey were plotted into graphical and table form in order to interpret the data for each topic discussed. This is due to give exact description and makes the readers more understanding in regards to the topics.

Besides that, the ranking was done by using Statistical Package for Social Science (SPSS) and average index method and the ranking was made based on the frequency obtained and comparison between every data becomes more apparent in the ranking form.

4.2 Demographic Factors

This part discusses about general information regards of the gender; race, age, marital status, occupation, distance house from bauxite mining plant and years of staying at their houses.

4.2.1 Age of Respondents

Firstly, this analysis will be discussed on the age of residential at Felda Bukit Goh, Balok, Gebeng, Kg Padang, Kuantan and others nearest affected areas. To simplify the process of analysis, the age of the respondent was between aged group of 15 to 24 years old, 25 to 34 years old, 35 to 44 years old, 45 to 54 years old and 55 and above.

Table 4.1 shows that the most respondents consist ages of 15 to 24 and 25 to 34 years respectively represent 64% and 26%. Although a lower percentage of respondents' age in that area aged 35 to 44 and 45 to 54 years represent 4% and 6% respectively. Thus, it shows that most of the respondents in the area, in age of 15 to 24 years old.

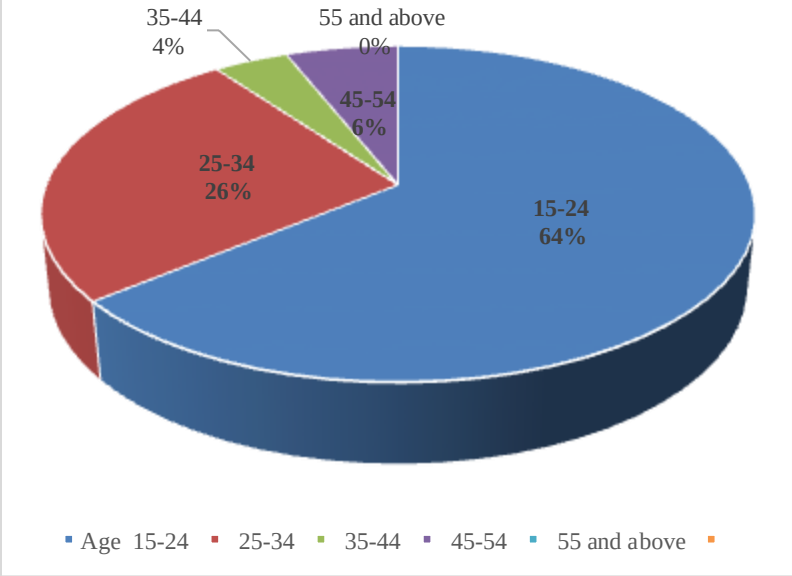

Figure 4.2.1: Age of Respondents

4.2.2 Gender of Respondents

From the survey, there were 50 respondents selected communities in the nearest bauxite mining areas. Regards to gender, seventeen of the respondents, representing 34% of the total number respondents were male and the remaining thirty-three, representing 66% were female respondents taken as samples for this study. This shows that both males and females have suffered from the impacts of bauxite mining in that area.

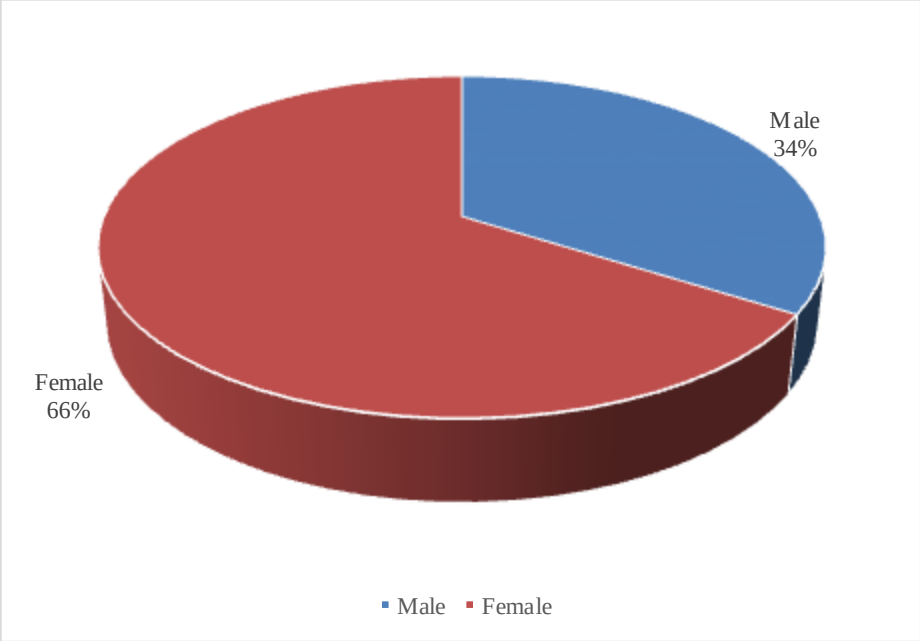

Figure 4.2.2: Gender of Respondents

4.2.3 Race of Respondents

Besides, in terms of race, the majority of respondents living in nearest bauxite mining areas mostly is Malay, which is 92% followed by Indian, which is 6% and Chinese, which is only 2%. Therefore, the majority of households society living are Malays.

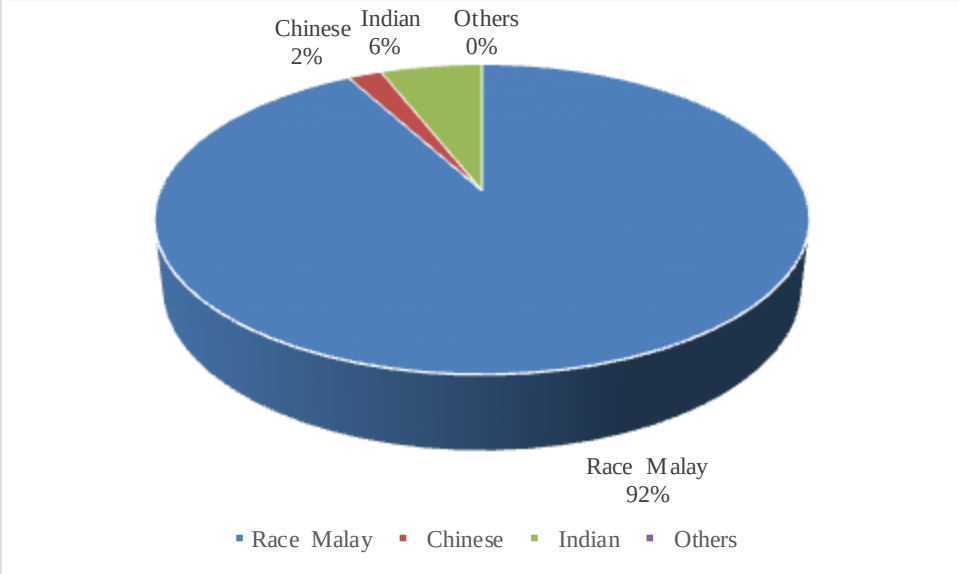

Figure 4.2.3: Gender of Respondents

4.2.4 Status of Respondents

There were thirty-three of the respondents, representing 66% of the total number respondents were married and the remaining seventeen, representing 34% were still single. This shows that majority people lives in that area might been have a big family with their children. It can be said that bauxite mining activities can also affects regardless of all ages.

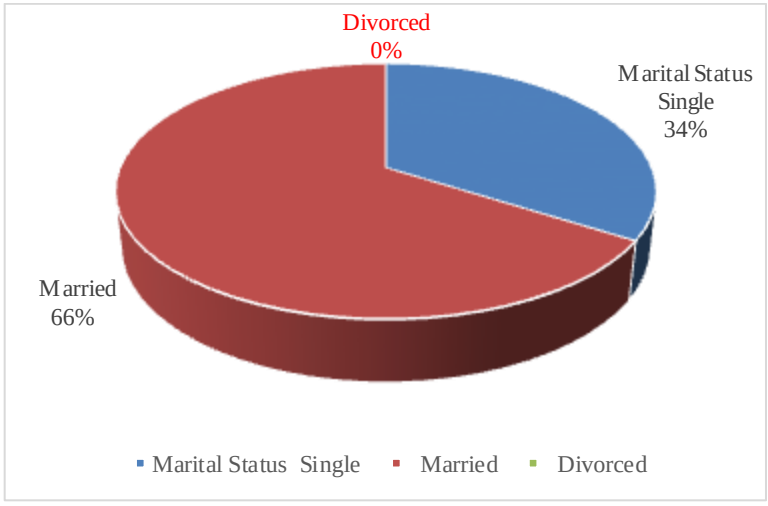

Figure 4.2.4: Status of Respondents

4.2.5 Occupation of Respondents

The areas are dominated by student, which is 34%. The result shows that about 22% of the respondents were unemployed. Jobs in teachers, services and others sectors follow the order. The land is the most important resource to the people. The mining activity would have a major impact on the lives of the greater majority. Therefore, bauxite mining can lead to mental hazards and subsequently, affect a person's work performance.

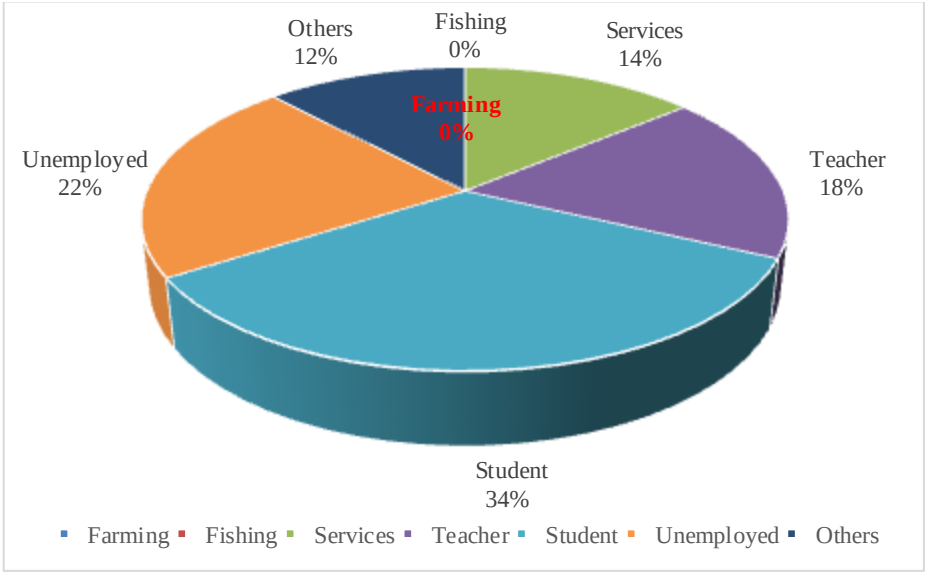

Figure 4.2.5: Occupation of Respondents

4.2.6 Distance House from Bauxite Mining Plant

Majority of the respondents live about 6 and above kilometre from the bauxite mining plants, which represented 50%. The second highest respondents are live about 0.5 – 1 km from the bauxite mining area, which have eleven of the respondents, representing 22% of the total number of people. The rest of the respondents live 2 – 3 KM and 4 – 5 KM distance house from bauxite mining plant in that area represent 20% and 8% respectively. The plant located near with residential and impact on environment will be more seriously. The nearest of bauxite plant will increase the level of affecting impact. For example, the house such as floor, windows or walls will be filled with dust pollution resulting from bauxite contamination.

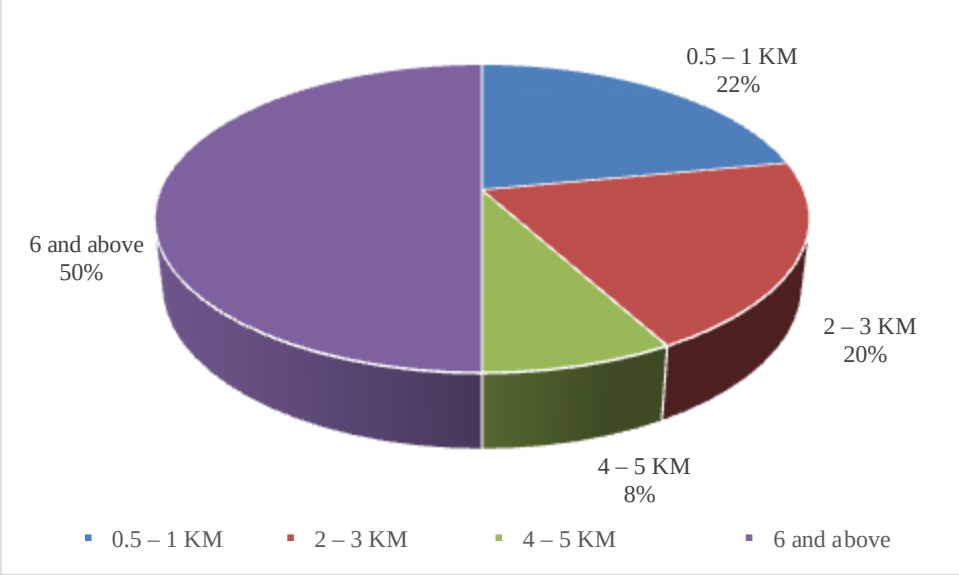

Figure 4.2.6: Distance House from Bauxite Mining Plant

4.2.7 Number of Years Staying the House

Respondents were living in mining communities for periods ranging from one year to more than ten years (including exploration period). 32% of respondents, forming a greater majority have lived in the community for ten years or more. Besides, respondents who live below 5 years led by 34% and the rest were shown at figure 4.27 below.

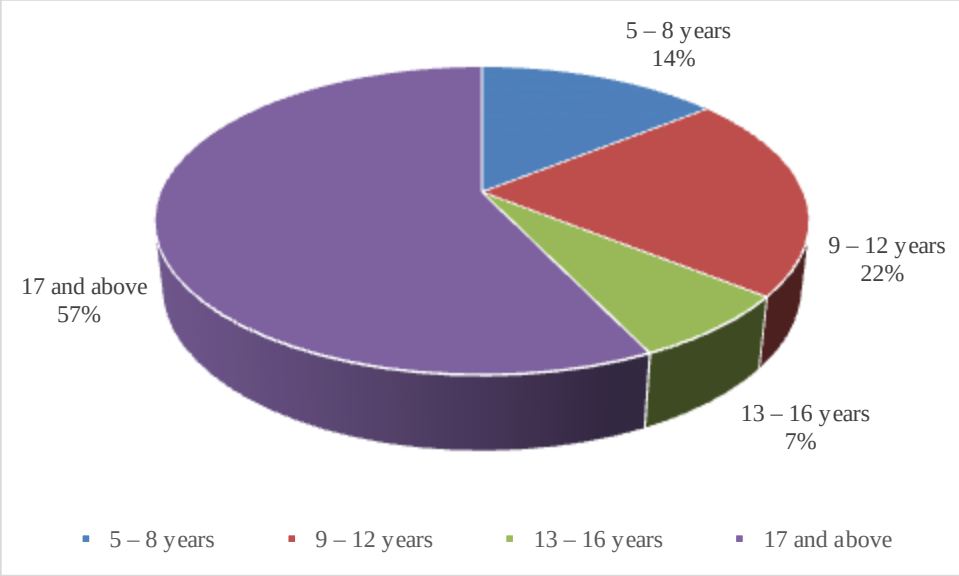

Figure 4.2.6: Distance House from Bauxite Mining Plant

4.3 Impacts of Bauxite Mining To Environmental

From the survey, it was found that the majority of respondents were aware of the environmental impact of bauxite mining occurs in their surroundings. First ranking was 4.82% of average index respondents chose the most impact was the pollution from dust pollution. Second ranking was the water pollution, which 4.76% of average index and lastly, noise pollution is the third-highest ranking of average index at 4.58%.

The majority of respondents felt that the mining of bauxite has given severe impact on the environment. They are aware of the environmental impact of pollution happen around their surroundings area. From the study, showed that the majority agreed bauxite mining only have bad impact on the environment rather than benefits.

4.3.1 Environmental Impacts

Based on this survey that has been made, mostly residents agree that the bauxite mining gave bad effect to the environment with 4.64% of average index. The major part of the environmental impact survey achieved a high score and residents

strongly agree that the dust, water and noise are a major environmental impact in their area with sit at second top ranking.

This study showed that residents gave negative feedback about the bauxite. From that survey, we know that residents in that area feeling not comfortable with this situations. If the bad impact of bauxite is higher compares to good impacts it would be a problem to the people for a long time and their future. So in order to avoid those problem occur from become more serious, the bauxite mining activities must properly handle and manage.

Table 4.2: Impacts of bauxite mining to environmental

Bauxite's impacts	**Rating of frequency**												**Average Index**	**Ranking**
	1		2		3		4		5		Total			
	N	%	N	%	N	%	N	%	N	%	N	%		
a) Mining will give environmental impacts to environment	0	0.0	0	0.0	4	8.0	10	20.0	36	72.0	50	100	4.64	1
b) Bauxite mining cause environmental impacts to residential area	0	0.0	1	2.0	1	2.0	14	28.0	34	68.0	50	100	4.62	2
c) Dust Pollution, Noise Pollution ,Water Pollution and Solid Waste are the major environment impacts from bauxite mining operation	1	2.0	1	2.0	3	6.0	9	18.0	36	72.0	50	100	4.56	3
d) Bauxite mining did not give any benefit to society in your area	1	2.0	5	10.0	11	22.0	15	30.0	18	36.0	50	100	3.88	4
e) Bauxite mining give good impacts to residents	16	32.0	11	22.0	11	22.0	7	14.0	5	10.0	50	100	2.48	5

4.3.1.1 Dust Pollution

Dust pollution is one of the pollution that occurs due to the bauxite mining operations. In this case, we can see the source of dust contamination occurred in that area. Top ranking with 4.64% of average index showed that mostly respondents agree that mining site operations that nearly with the resident's house were the factor of dust

pollution such as the process of excavation close to their homes and the dust produced from bauxite trucks along the road. Previous study found that, the use in heavy machineries in exploiting the minerals of bauxite can generates more dust and noise.

Second top ranking with 4.62% of average index was agree that the road and house become dirty and another environmental problem was road damage with red dust because of the over load bauxite carry by the lorry or trucks bauxite. Sometimes this problem might also lead to an accident to other road users. Then, 4.46% of average index said that, the bauxite land which not covers up properly when to transfer from the plant to the port by lorry was the cause of dust pollution occurs.

Besides that, 4.44% of average index of the respondents said that the dust pollution was increase due to the bauxite mining activities. The nearest residential mostly experience the red in dust colour which entered their houses. The dust made their houses looked dirty due to the dust which is stuck at their windows, floor and wall. The transportation that used the main road with 4.44% of average index was sit at the fourth-ranking. Their perception of the bauxite mining is high.

The remaining statement such as resident always close a door and window, frequent cleaning the house due to the dust and wearing a mask when stay outside to protect them from contamination was another problem associated was sit at bottom ranking. Based on that survey, it can be said that, only the residents who live nearest the bauxite mining plant would experience this problems. Usually, resident who live about 0.5-1KM would affected more by dust to compare with others

Table 4.3: Impacts of bauxite mining to air pollution

Bauxite's impacts	**Rating of frequency**												**Average Index**	**Ranking**
	1		2		3		4		5		Total			
	N	%	N	%	N	%	N	%	N	%	N	%		
a) Mining site operations are nearly with the residents house also factor of dust pollution	1	2.0	0	0.0	2	4.0	10	20.0	37	74.0	50	100	4.64	1
b) The road and house	0	0.0	1	2.0	4	8.0	8	16.0	37	74.0	50	100	4.62	2

become dirty and damage because of over load bauxite carry by the lorry														
c) The bauxite land did not cover up properly when to transfer from the plant to the port by lorry increase the dust pollution	1	2.0	1	2.0	2	4.0	16	32.0	30	60.0	50	100	4.46	3
d) Bauxite mining increase the dust pollution in your area	1	2.0	1	2.0	3	6.0	15	30.0	30	60.0	50	100	4.44	4
e) Factor dust pollution happen are from the transportation activity that used the main road of residential area	0	0.0	1	2.0	4	8.0	17	34.0	28	56.0	50	100	4.44	5
f) Always close a windows and door to protect from dust pollution	2	4.0	0	0.0	4	8.0	20	40.0	24	48.0	50	100	4.28	6
g) Always maintain the cleanliness of your house due to dust from bauxite mining activity	2	4.0	2	4.0	9	18.0	14	28.0	23	46.0	50	100	4.08	7
h) Wearing a mask when stay outside from house	2	4.0	3	6.0	15	30.0	11	22.0	19	38.0	50	100	3.84	8

4.3.1.2 Water Pollution

Within this part will discuss about the effect of water pollution in that area. Most of the respondents agreed that negative impacts of the water pollution are water scarcity, river red mud, aquatic habitat affected with 4.68% of average index. Second ranking, 4.64% of average index, was the dirty water from cleaning lorry and bauxite in process of bauxite mining have go through to river and drainage.

Third ranking was the habitat in river has been affected because of increasing level of acid of water from the bauxite. Then, residents also agreed that the bauxite mining activity produce water pollution in their area. For ranking 5^{th} and 6^{th}, residents agreed that the dirty water have not been filter and they decide to buy a water filter to protect clear water with average index, 4.14% and 4.08% respectively.

Table 4.4: Impacts of bauxite mining to water pollution

Bauxite's impacts	Rating of frequency												Average Index	Ranking
	1		2		3		4		5		Total			
	N	%	N	%	N	%	N	%	N	%	N	%		
a) Negative impacts of the water pollution are water scarcity, river red mud, aquatic habitat affected	0	0.0	1	2.0	1	2.0	11	22.0	37	74.0	50	100	4.68	1
b) The dirty water from cleaning lorry and bauxite in process of bauxite mining have go through to river and drainage	0	0.0	1	2.0	1	2.0	13	26.0	35	70.0	50	100	4.64	2
c) The habitat in river have been effected because of increasing level of acid of water from the bauxite	0	0.0	1	2.0	0	0.0	15	30.0	34	68.0	50	100	4.64	3
d) Bauxite mining activity produce water pollution in your area	2	4.0	0	0.0	1	2.0	16	32.0	31	62.0	50	100	4.48	4
e) The dirty water have not been filter	1	2.0	3	6.0	7	14.0	16	32.0	23	46.0	50	100	4.14	5
f) Buying a water filter to protect a clear water	1	2.0	5	10.0	7	14.0	13	26.0	24	48.0	50	100	4.08	6

4.3.1.3 Noise Pollution

Based on this survey, it can be said that the noise pollution happens in the resident's area because of the bauxite mining especially this noise pollution impacts the resident who live near the bauxite mining area with the distance of 0.5-1KM with led as the first ranking with 4.62% of average index.

According to the survey, bauxite mining contributes the noise pollution in that area with sit at second ranking of average index, 4.56%. The vibrations, loud noise, headache and loss of peace are the several negative impacts happen in that area was the third ranking with 4.52% of average index. Those vibrations also gave impacts to the resident who lives nearest the mining plant and that vibration would make the resident felt uncomfortable and feel worried if the vibration affect their performance of house and invited to crack due to the mining activities.

Most respondents agree with this statement. The noise pollution happen must come from something, the source of this noise are from the blasting, heavy machinery and truck. This entire activity source to noise pollution in that area and most of the respondents agree with this statement with 4.46% of average index.

For ranking 5th, 6th and 7th, residents agreed that loud noise and vibrations impacts are from the lorry and blasting, bauxite mining activity contribute the noise pollution in their area and lastly gave impact such as headache and loss of peace happen due to the sound of the lorry that use the road near with the residents area and power of blasting at plant operation with average index, 4.46%, 4.44% and 4.40 % respectively.

In this section most of the respondents strongly agree that the locations near with the resident area are the most factor of noise pollution happen. If this location a far from the residents area it will minimize the noise pollution. This statement get strongly agree from the respondents.

Table 4.5: Impacts of bauxite mining to noise pollution

Bauxite's impacts	**Rating of frequency**												**Average Index**	**Ranking**
	1		2		3		4		5		Total			
	N	%	N	%	N	%	N	%	N	%	N	%		
a) The location near with the resident area are the most factor of noise pollution happen	0	0.0	1	2.0	3	6.0	10	20.0	36	72.0	50	100	4.62	1
b) Noise pollution produce negative impacts to residents	0	0.0	1	2.0	2	4.0	15	30.0	32	64.0	50	100	4.56	2
c) Vibrations, Loud noise, Headache and Loss of peace are the several negative impacts happen in your area	0	0.0	1	2.0	3	6.0	15	30.0	31	62.0	50	100	4.52	3
d) The main sources of noise pollution happen in your area are from the blasting, heavy machinery and truck transport	1	2.0	1	2.0	2	4.0	15	30.0	31	62.0	50	100	4.48	4
e) Loud noise and	1	2.0	0	0.0	2	4.0	19	38.0	28	56.0	50	100	4.46	5

vibrations impacts are from the lorry and blasting														
f) Bauxite mining activity contribute the noise pollution in your area	1	2.0	1	2.0	4	8.0	13	26.0	31	62.0	50	100	4.44	6
g) Headache and loss of peace happen when the sound of the lorry that use the road near with the residents area and power of blasting at plant operation	2	4.0	0	0.0	3	6.0	16	32.0	29	58.0	50	100	4.40	7

4.4 Impacts of Bauxite Mining To Health

Previous studies have found that the land degradation caused by gold mining is referred to as chemical pollution from the extraction process imposed the burden on the environment together with harmful implications for human health (Yelpaala, 2004). Table 4.4.1 shows that health symptoms were divided into three types, which are the general symptoms, respiratory and skin symptoms.

4.4.1 General Problems

From this survey, first ranking of general symptoms experienced with 4.02% of average index was stress of noise. This was because, some respondents complained that the excavating machine used to extract the bauxite from the earth was sound noisy and disturbed their sleep.

This stress increased because of some mining companies completed operations at night and started back early in the morning. Second ranking of general symptom was headache with average index, 3.96%. This was because the sleep of adult respondents was bothered by the noise and the presence of red dust can lead to headaches.

The third ranking with 3.68% of average index was tiredness. This symptom is not good for human health. That because, the performance at work or school will be

low due to fatigue effects of bauxite mining disturbance. For ranking 4th, 5th, 6th and 7th, residents agreed that the impact of bauxite mining affect health such as anxiety, vomiting, muscle cramp and diarrhea with 3.58%, 3.08%, 2.90% and 2.76% of average index respectively.

Table 4.6: The health symptoms reported by respondents

Types of Health Symptoms	**Rating of frequency**												**Average Index**	**Ranking**
	1		2		3		4		5		Total			
	N	%	N	%	N	%	N	%	N	%	N	%		
a) Stress of noise	1	2.0	5	10.0	6	12.0	18	36.0	20	40.0	50	100	4.02	1
b) Headache	3	6.0	2	4.0	9	18.0	16	32.0	20	40.0	50	100	3.96	2
c) Tiredness	4	8.0	2	4.0	10	20.0	24	48.0	10	20.0	50	100	3.68	3
d) Anxiety	4	8.0	3	6.0	14	28.0	18	36.0	11	22.0	50	100	3.58	4
e) Vomiting	7	14.0	6	12.0	17	34.0	16	32.0	4	8.0	50	100	3.08	5
f) Muscle cramp	8	16.0	8	16.0	19	38.0	11	22.0	4	8.0	50	100	2.90	6
g) Diarrhea	10	20.0	7	14.0	20	40.0	11	22.0	2	4.0	50	100	2.76	7

4.4.2 Respiratory Problems

From this survey from the respondents, the highest ranking for symptoms of the respiratory tract was difficulty in breathing (3.82%), dry cough (3.76%) and followed by cough with phlegm (3.64%). While, at the bottom ranking was asthma (3.30%), and bronchitis (2.92%). These complaints were due to mining activities at the peak before the moratorium was enforced.

Table 4.6: The health symptoms reported by respondents

Types of Health Symptoms	Rating of frequency												Average Index	Ranking
	1		2		3		4		5		Total			
	N	%	N	%	N	%	N	%	N	%	N	%		
a) Difficulty breathing	2	4.0	4	8.0	8	16.0	23	46.0	13	26.0	50	100	3.82	1
b) Dry cough	1	2.0	7	14.0	10	20.0	17	34.0	15	30.0	50	100	3.76	2
c) Cough with phlegm	4	8.0	6	12.0	8	16.0	18	36.0	14	28.0	50	100	3.64	3
d) Asthma	11	22.0	2	4.0	9	18.0	17	34.0	11	22.0	50	100	3.30	4
e) Bronchitis	9	18.0	7	14.0	19	38.0	9	18.0	6	12.0	50	100	2.92	5

4.4.3 Skin Problems

Based on this survey, the increase in atmospheric of red dust bauxite to susceptible individuals, cause skin problems and the first ranking with 3.82% of average index was itchiness and redness with rashes came as second ranking with 3.62% of average index. Next, for ranking of 3rd and 4th, residents agreed that bauxite contamination would cause skin problem such as itchiness with freckle and swelling with 3.18% and 2.88% of average index respectively. That because, the bauxite dust contains heavy metals (chromium and nickel) that cause skin problems.

Accordingly to Hassan, et al. (2015), the headache has the highest prevalence of all symptoms exposed people. To the residents who live within a 5 km radius of the mine were three times more likely to have headaches. Skin irritations were common symptoms of low cyanide exposure. The results showed that people living near the mine were twice as likely to suffer from skin irritation.

Table 4.6: The health symptoms reported by respondents

Types of Health Symptoms	Rating of frequency												Average Index	Ranking
	1		2		3		4		5		Total			
	N	%	N	%	N	%	N	%	N	%	N	%		
a) Itchiness	2	4.0	4	8.0	10	20.0	19	38.0	15	30.0	50	100	3.82	1
b) Redness with rashes	4	8.0	3	6.0	13	26.0	18	36.0	12	24.0	50	100	3.62	2
c) Itchiness with freckle	7	14.0	4	8.0	19	38.0	13	26.0	7	14.0	50	100	3.18	3
d) Swelling/ edema	10	20.0	8	16.0	15	30.0	12	24.0	5	10.0	50	100	2.88	4

4.5 Impacts of Bauxite Mining To Housing Property

Based on the table 4.7, it was shows that the ranking of priority based on impacts of bauxite mining to housing property. The communities that involved have dissatisfaction on the red dust in the air, noise and heavy traffic. Activities that generate dust include site clearance and road building, open pit drilling and blasting, loading, movement of vehicles and operate in the waste rock as well as heap leach by the company during the processing of heap leach.

According to Akabzaa, et al., (2001), all fine dust at a high level of exposure has the potential to cause respiratory diseases and disorders and can worsen asthma patients. Previous studies have found that the source of vibration and noise in that area consists of air blast, mobile equipment and vibrations from blasting and others machinery. The impact of high sound and noises that have caused such damage to the auditory system cracks in buildings, stress and discomfort.

In order to rank, it shown those highest effects of mining to housing property was decreases in aesthetic value of housing which is 4.32% in the average index. Second ranking with 4.28% of average index was loss of beauty of building or house. Next, the third ranking with 4.24% of average index was dust deposited everywhere. For ranking of 4^{th}, residents reported that contamination of bauxite led to dust accumulated and dirtied their houses. Because of that, they agreed that bauxite

contamination causes them to frequent clean their house and for ranking 5th, the residents reported that additional costs incurred renovation due to impacts of bauxite mining.

For bottom ranking of 6th, 7th, 8th, 9th and 10th, residents agreed that the impact of bauxite mining cause residents nearest the bauxite mining plant felt fear of collapse building, agreed that this problems cause corrosion of metalwork on buildings, crack in house, leakage during rainfalls and attacks by reptiles and insect with 3.96%, 3.72%, 3.44%, 3.38% and 3.36% of average index respectively.

Table 4.7: The impact bauxite mining to housing property reported by respondent

4.5.1

Effects of Vibration and Cracks on Mining Communities	**Rating of frequency**												**Average Index**	**Ranking**
	1		2		3		4		5		Total			
	N	%	N	%	N	%	N	%	N	%	N	%		
1) Aesthetic value of housing decreases	1	2.0	1	2.0	6	12.0	15	30.0	27	54.0	50	100	4.32	1
2) Loss of beauty of building	1	2.0	2	4.0	5	10.0	16	32.0	26	52.0	50	100	4.28	2
3) Dust be seen deposited everywhere eg: window, roofs, walls	1	2.0	2	4.0	5	10.0	18	36.0	24	48.0	50	100	4.24	3
4) Always clean the house caused by dust	3	6.0	0	0.0	5	10.0	18	36.0	24	48.0	50	100	4.20	4
5) Extra cost incurred on renovation	2	4.0	3	6.0	5	10.0	17	34.0	23	46.0	50	100	4.12	5
6) Fear of collapse of building	3	6.0	1	2.0	13	26.0	11	22.0	22	44.0	50	100	3.96	6
7) Corrosion of metalwork on buildings	3	6.0	3	6.0	12	24.0	19	38.0	13	26.0	50	100	3.72	7
8) Cracks in buildings	5	10.0	4	8.0	12	24.0	22	44.0	7	14.0	50	100	3.44	8
9) Leakages during rainfalls	2	4.0	13	26.0	8	16.0	18	36.0	9	18.0	50	100	3.38	9
10) Attack by reptiles and insect	6	12.0	5	10.0	12	24.0	19	38.0	8	16.0	50	100	3.36	10

4.6 Factors That Affects the Property Prices

4.6.1 Pollution resulting from bauxite mining activities

Table 4.6: The Pollution resulting from bauxite mining activities reported by respondents

Factor affects the property prices	Rating of frequency												Average Index	Ranking
	1		2		3		4		5		Total			
	N	%	N	%	N	%	N	%	N	%	N	%		
a) Air pollution	0	0.0	1	0.0	1	0.0	4	8.0	44	50	50	100	4.82	1
b) Water pollution	1	2.0	0	0.0	1	2.0	6	12.0	42	84.0	50	100	4.76	2
c) Noise pollution	0	0.0	1	2.0	3	6.0	12	24.0	34	68.0	50	100	4.58	3

4.7 Factor affects the property prices

Table shows that the ranking and average index of other factors apart from the problem of bauxite from the result of questionnaire. There are five factors which are location, neighbourhood, structural attribute, facilities and transportation. The first ranking was factor of location, with led 4.44% of average index.

Next the 2nd and 3rd ranking was, neighbourhood and structural attribute with the range of average index of 4.28% to 4.24%.The fourth ranking was consider the facilities in assessing the value of a residential property with the average index of 4.18%. Lastly, the fifth ranking was transportation, with the average index of 3.72%. In short, factors of this category play an important in determining the prices of housing property.

Table 4.6: The factor affects the property prices reported by respondents

Factor affects the property prices	Rating of frequency												Average Index	Ranking
	1		2		3		4		5		Total			
	N	%	N	%	N	%	N	%	N	%	N	%		
a) Location and accessibility eg: distance close to the center city or work	2	4.0	0	0.0	5	10.0	10	20.0	33	66.0	50	100	4.44	1
b) Neighbourhood eg: close to the public services; school, police station, etc	1	2.0	1	2.0	7	14.0	15	30.0	26	52.0	50	100	4.28	2
c) Structural attributes eg: size of land, size of building, design of house, etc	0	0.0	2	4.0	9	18.0	14	28.0	25	50.0	50	100	4.24	3
d) Facility eg: near to the hospitals, shop, petrol station, institutions education, recreation areas, shopping centers, etc	1	2.0	2	4.0	9	18.0	13	26.0	25	50.0	50	100	4.18	4
e) Transportation eg: public transport	7	14.0	0	0.0	11	22.0	14	28.0	18	36.0	50	100	3.72	5

4.8 Summary

From the results showed that most respondents showed more on negative impact on the responses of bauxite mining. They know and feel as they lives close bauxite mining plant areas. The operations have affected their daily life activities. From the results also showed that people in that affected area aware about the bauxite mining impacts on environment. In addition, resident's perception about mining bauxite is negative. So it can be conclude that, many bad effects came from bauxite mining which also cause negative effect to the property of the housing value.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Introduction

After a study done on the sources obtained in respect to the bauxite contamination effect on the property of the housing value as well as analyse and explain the data obtained from the survey questionnaire, the last stage of this research is to produce conclusion and recommendations of the study.

The findings of the results will be made by refer to the objectives of the research. This part is important for assessing whether the information have been undertaken in this study could achieve the objective of the research. Further, proposals for future research in related fields of study will also be provided.

Mining is temporary economic activity which left the long-term social, economic and environmental impacts. Otherwise, the study comes to a better understanding of the environmental impacts that occur in the area contaminated by bauxite in Kuantan. The study also provides information about the environmental impact that makes society feel uncomfortable with their surroundings. Bauxite mining gave benefit for the national economy but it does not provide good benefits for people who are lives close to bauxite mining plants.

The government has given a lot of focus on the bauxite mining in order to get the profit from trade. Unfortunately, the government ignore the people health. The government trying to become professionals in the issues of bauxite but the problem always comes around. In order to benefit from bauxite mining for the economy, the public should not be overlooked and it should be parallel.

Basically, this study aimed to examine the effects of bauxite contamination on the property the housing value. This study focuses on the problem of pollution caused by bauxite contamination from the aspect of environment, health and also their impact on residential properties value. Other factors were also examined to determine how far these factors can affect the value of a residential property. To assess the effectiveness of the study, the bad effects resulting from contamination of bauxite was examined.

Next, the questionnaire was provided and the respondents involved in selection consisted of people living in areas contaminated by bauxite in Kuantan. From the chapter two which is literature review, all the information regards of bauxite is acquired. After completion of the study data were collected and compiled, the analysis was conducted on these data using the methods of statistical and the average index.

Both of these methods are applied through the use of computer software to obtain the desired results. The computer software involved was the Statistical Package for Social Sciences (SPSS) software and using the formula of average index to determine the frequency and find out the highest ranking. Overall analysis of the study was presented in detail in Chapter 4, which is in the form of tables and descriptions. The next part will discuss the conclusions of the study with reference to the objectives of the research.

5.2 Assessment Objective Reviews

The first and second objectives are achieved through literatures and theories. The third objective is accomplished throughout the data and information gathering from the questionnaire survey that has been conducted.

5.2.1 Objective 1: To study the factors that can effects the housing prices.

This objective has been achieved through a review of the literature conducted and discussed in Chapter two where all impacts due to bauxite mining contamination were listed. The pollution such as, air pollution, water pollution, noise pollution and others impacts on human health and housing property value was discussed.

There are several factors that can increase or decrease the housing property in Kuantan such as location attributes, location and accessibility, neighbourhood, transportation, structural attributes, facilities. The presence of bauxite mining in Kuantan has led to the pros and cons. Bauxite mining activities illegally and uncontrolled by irresponsible parties have caused pollution, social impact, human health as well as property of the housing value.

All these problems we have categorized in the questionnaire so that respondents will gave feedback on their behalf. The questionnaire was given to 50 respondents in that affected area and from the questionnaire, we can easily get the get their views about this issue and finally can relate with the objective.

After analysing the questionnaires using analysis of SPSS software and Average Index, the study was found that contamination of bauxite have brought many bad influences and concluded that bauxite contamination can affect the property of the housing value. It can be seen that bauxite mining can be the factor that can effects the housing value.

For other factors such as location and accessibility, neighbourhood and structural attributes have an influence on the rise in property of the housing value. In addition, facility and transportation only affect moderately on rising prices. This means that not all of these factors affecting the increase in the price at the same level. So, it can be conclude that we achieved the first objective in this study.

5.2.2 Objective 2: To determine how the bauxite affects the property of the housing value.

The second objective has been achieved by the literature review conducted and discussed in Chapter three. In Chapter two, we have discuss about the problems that happen due to bauxite mining activities which affected to the environmental, health and housing property value. Research has found that bauxite mining activities have negative impacts on the environment, health risks, disruption of daily activities and also to its buildings or house.

Besides, the bauxite mining activities affect the aesthetic value of housing such as resident need to maintain the cleanliness of their house due to dust deposited everywhere. Bauxite mining activities affect the aesthetic value of housing such as resident need to maintain the cleanliness of their house due to dust deposited everywhere. Bauxite mining activities make the soil becomes acid and accelerates the corrosion of metalwork on buildings and vibrations caused by blasting in bauxite mining areas leads to cracks in the residence housing.

Generally, people need a good and safe environment in buying a residential property. With absence of bauxite contamination, it can be concluded that the most residents agreed that the bauxite mining gave many bad effect rather than good impacts on society. So, it can be said that impacts of bauxite contamination can affect the property of the housing value as well.

5.2.3 Objective 3: To examine the relationships exists between the bauxite and the property of the housing value.

From the chapter two, we have discussed about the problems that happen because of the bauxite mining activities which affected to the environmental, health and housing property value.

From the questionnaires and analysis of the question using SPSS software and methods of Average Index, it found that the behaviour of buyers have a positive relationship with the demand and supply of residential properties as well as household income.

Buyer behaviour is based on the tastes and preferences of buyers on the types of residential property and the choices made by them are also influenced by others factors such as the location, neighbourhood, and structural attribute, facilities and transportation factors.

The results of the questionnaire have shown a lot of the negative effects of pollution and the overall impact of bauxite contamination which was resulted the lower purchase and decreased that demand for residential properties. It can be concluded that the relationships exists between the bauxite and the property of the housing value.

5.3 Conclusion

In conclusion, the research objective has been achieved based on the literature review from articles, journals and books and also from the findings of the questionnaire survey and the analysis results. From the results, the impacts of implementation bauxite mining activities have relationship with property of the housing value.

It is necessary to recognize the environmental and health hazards that come with mining to manage it appropriately. There are various types of pollution, such as air, water and noise pollution as discussed in the previous chapter which with their combined effects have resulted in a high prevalence of health complaints among the people who lives close to the mining area.

Besides, affected communities were depressed due to the noise, the dusty and dirty environment, polluted and affected water supply, congested traffic, roads damaged, and frequent cleaning properties. Finally, the stress eventually affected their physical systems (respiratory and skin symptoms were reported).

Therefore, psychosocial, environmental and health effects on the society was reported and would be worse if no appropriate measures are provided to protect the public welfare. Thus, it is recommended that proper standards procedures and governance should be carried out in the mining activities to prevent environmental degradation and threats to public health.

Other than that, the bauxite mining activities which nearest to the residential housing area were affected the housing of property value. Bauxite contamination gave impacts on environmental and human health as well as impacts on property of housing value. In addition, the negative impact also on the building and aesthetics of the building. This will indirectly increase the cost in terms of maintenance. From this study, it is concluded that bauxite mining activities can cause disease and exposure to hazards indirectly will reduces the marketability of residential properties.

5.4 Recommendation for Future Research

Interaction between bauxite mining and the environmental is always important. Therefore, more research needs conduct in a broader perspective about the environmental impact and bauxite mining. The residential area is always the target of environmental impact. The location of bauxite mining plant will also be a major issue for future research in order to ensure that the operations cannot be carried out near residential areas.

Besides, this study can be improve by conducting a survey with the same radius or distance between several others residential area that got the same impacts of bauxite. Comparison between the environmental impacts of same distance but different area will get new data and information. Different area will be give different environmental impacts. For the future studies the location of the study area should be added and emphasize with other area that affected.

This study could improve by adding some test tools to get accurate data on dust pollution and water pollution. Tools for contamination will provide more benefits for future research. The data about the pollution will give the studies more strong. Some of the tools for calculate the environmental impact would be a good thing in future studies.

This study can also improve if it involves the interaction between environmental and health effects. These two things are related to each other. The environmental impact will also give bad impacts on the health of residents in the surrounding area. If in future studies health will be also analyse it will give more various data and information about the studies. So that, the findings will be more accurate and give a big picture to researchers how strength of interaction influenced between environmental impacts on healthy of society.

REFERENCES

Hussain, N. H., Hashim, Z., Hashim, J. H., Ismail, N., & Zakaria, J. (16 June, 2017). Psychosocial And Health Impacts Of Bauxite Mining Among Felda Bukit Goh Communities In Kuantan, Malaysia.

Nathan Associates Inc. (2013). Economic Effects of Indonesia ‟ s Mineral-Processing Requirements for Export, (April).

Copeland, C. (2014). Mountaintop Mining: Background on Current Controversies. *Congressional Research Service*.

Council, B. W. and E. M. (2000). Acid Mine Drainage: Mining & Water Pollution Issues in BC. *Environmental Mining Council of British Columbia*, 28.

Plunkert, P. (2004). Bauxite and Alumina. U.S. *Geological Survey Minerals yearbook-2004*

Fares, A., Giri, C., Govil, K., Hartemink, A., Holmgren, P., Keita-ouane, F., Warren, A. (2014). Drivers of Land use Change. *States and Trends of the Environment* : 1987-2007, 1–34.

Lad, R.J. & Samant, J.S., 2015. Impact of Bauxite Mining on Soil: A Case Study of Bauxite Mines at Udgiri, Dist-Kolhapur, Maharashtra State, India. *International Research Journal of Environment Sciences*, 4(May 2011), pp.77–83.

Li, Z., Folmer, H., & Xue, J. (2016). Perception of Air Pollution in the Jinchuan Mining Area, China: A Structural Equation Modeling Approach. International Journal of Environmental Research and Public Health, 13(2), 735.

Martin Brueckner and Dyann Ross, Under Corporate Skies: A struggle between People, Place and Profit (Freemantle, WA: Freemantle Press, 2011).

Thomson. R (2014). World Silver Survey 2014- A Summary about The Major Sponsor of World Silver Survey 2014. The Silver Institute.

R. Ahmad. (2016, January 13). Pahang's bauxite fast running out. Pahang's Bauxite Fast Running out.

Sahu, H.B., Prakash, N. & Jayanthu, S., 2015. Underground Mining for Meeting Environmental Concerns – A Strategic Approach for Sustainable Mining in Future. Procedia Earth and Planetary Science, 11, pp.232–241.

M.Olivieira & M. Heemskerk. (2003). Perceptions of small-scale gold mining impacts: Results from focus group discussion in mining camps and affected communities. Tapanahonie & Brokopondo Regions, Suriname.

Gendron, R. S. (2013). Aluminum Ore the Political Economy of the Global Bauxite Industry.

Hong, B. D., Slatick, E. R., Pantos, E. R., & McMillian, T. (1995*). Longwall Mining. Energy Information Administration,* (March).

International Aluminium Intsitute. (2009). Fourth Sustainable Bauxite Mining Report 2008.

Mkpuma, R. O., Okeke, O. C., & Abraham, E. M. (2015). Environmental Problems of Surface and Underground Mining : a, 12–20.

Karim, F. N., & A. S. (2016, January 11). "BAUXITE: Illegal miners outnumber legal ones" "BAUXITE: Illegal Miners Outnumber Legal Ones"

L.D. Jones , D.V. Lefebure, G. O. and T. G. S. (1998). Major Silver Deposits of British Columbia. *Ministry of Energy and Mines Energy and Minerals Division Geological Survey Branch.*

Annual, U. L., Urban, J., Law, C., & Benoit, M. D. (1974). Strip Mining : Methods of Control by the Three Levels of Government, 8(January).

Ahmad, A. F., K, S. H., Ahmad, R. M., & Rao, R. J. (2014). Impact of Mining Activities on Various Environmental Attributes with Specific Reference to Health Impacts in Shatabdipuram , Gwalior , India, 3(6), 81–87.

Abdullah, N. I. (2015, November 26). 'No plans to stop bauxite mining' 'No Plans to Stop Bauxite Mining'

Asare, B. K., & Darkoh, M. B. K. (2001). Socio-Economic and Environmental Impacts of Mining in Botswana: A Case Study of the Selebi-Phikwe Copper-Nickel Mine. Eastern Africa Social Science Research Review, 17, 1–41.

Behera, P. K. (2015). International Journal of Economics & Socio-Economic Impact of Industrialisation and Mining on the Local Population : A Case Study of NALCO Industrial Area , Koraput, 4(8).

Bray, E. L. (2007). Bauxite and Alumina. US Geological Survey Minerals Yearbook–2002. …, 1(703), 26–27.

Britton, A., Lakhdari, R., Harvey, J., & Forster, S. (2015). *The Social and Economic Impacts of Gold Mining*, 1–40.

APPENDIX A
QUESTIONNAIRE

BAUXITE CONTAMINATION IN KUANTAN AFFECTS ON

THE PROPERTY OF THE HOUSING VALUE

Survey questionnaire below is set up to identify the factors that can affect property of the housing value, find out how the bauxite affects the property of the housing value and get opinion to analyse the impacts implementation bauxite mining activities to the property of housing value in Kuantan.

Please answer the following questions as accurately as possible.

SECTION 1: RESPONDENT PROFILE

No.	Question	Please tick (√) for your answer
1.	Gender	☐ Male ☐ Female
2.	Race	☐ Malay ☐ Chinese ☐ Indian ☐ Others (Please specify:.....)
3.	Age	☐ 15 – 24 years ☐ 25 – 34 years ☐ 35 – 44 years ☐ 45 – 54 years ☐ 55 and above
4.	Marital Status	☐ Single ☐ Married ☐ Divorced
5.	Occupation	☐ Farming ☐ Fishing ☐ Services ☐ Teacher ☐ Student ☐ Unemployed ☐ Others (Please specify:.....)
6.	Distance your house from bauxite mining plant	☐ 0.5 – 1 KM ☐ – 3 KM ☐ 4 – 5 KM ☐ and above
7.	Years of staying in town	☐ Below 1 years ☐ 1 – 4 years ☐ 5 – 8 years ☐ 9 – 12 year ☐ 13 – 16 years ☐ 17 and above

SECTION 2: QUESTION RELATED TO IMPACTS OF BAUXITE MINING TO ENVIRONMENTAL

Direction: *Please check and rate yourself honestly based on given statement using following scales:*

1	2	3	4	5
Strongly agree	Agree	Neutral	Disagree	Strongly disagree

No.	Bauxite's impacts	Average				
		1	2	3	4	5
1	**Environmental Impacts**					
	Mining will give environmental impacts to environment					
	Bauxite mining give good impacts to residents					
	Bauxite mining did not give any benefit to society in your area					
	Bauxite mining cause environmental impacts to residential area					
	Dust Pollution, Noise Pollution ,Water Pollution and Solid Waste are the major environment impacts from bauxite mining operation					
2	**Dust Pollution**					
	Bauxite mining increase the dust pollution in your area					
	Factor dust pollution happen are from the transportation activity that used the main road of residential area					
	The road and house become dirty and damage because of over load bauxite carry by the lorry					
	The bauxite land did not cover up properly when to transfer from the plant to the port by lorry increase the dust pollution					
	Mining site operations are nearly with the residents house also factor of dust pollution					
	Always close a windows and door to protect from dust pollution					
	Wearing a mask when stay outside from house					

	Always maintain the cleanliness of your house due to dust from bauxite mining activity					
3	**Water Pollution**					
	Bauxite mining activity produce water pollution in your area					
	Negative impacts of the water pollution are water scarcity, river red mud, aquatic habitat affected					
	The dirty water from cleaning lorry and bauxite in process of bauxite mining have go through to river and drainage					
	The dirty water have not been filter					
	The habitat in river have been effected because of increasing level of acid of water from the bauxite					
	Buying a water filter to protect a clear water					
4	**Noise Pollution**					
	Bauxite mining activity contribute the noise pollution in your area					
	The main sources of noise pollution happen in your area are from the blasting, heavy machinery and truck transport					
	The location near with the resident area are the most factor of noise pollution happen					
	Noise pollution produce negative impacts to residents					
	Vibrations, Loud noise, Headache and Loss of peace are the several negative impacts happen in your area					
	Loud noise and vibrations impacts are from the lorry and blasting					
	Headache and loss of peace happen when the sound of the lorry that use the road near with the residents area and power of blasting at plant operation					

SECTION 3: QUESTION RELATED TO IMPACTS OF BAUXITE MINING TO HEALTH

Direction: *Please check and rate yourself honestly based on given statement using following scales:*

1	2	3	4	5
Most Frequent	Frequent	Fair	Less Frequent	Least Frequent

No.	Types of Health Symptoms	Average				
		1	2	3	4	5
1	**General Problems**					
	Stress of noise					
	Headache					
	Anxiety					
	Tiredness					
	Muscle cramp					
	Vomiting					
	Diarrhea					
2	**Respiratory Problems**					
	Cough with phlegm					
	Dry cough					
	Difficulty breathing					
	Asthma					
	Bronchitis					
3	**Skin Problems**					
	Itchiness					
	Redness with rashes					
	Itchiness with freckle					
	Swelling/ edema					

SECTION 4: QUESTION RELATED TO IMPACTS OF BAUXITE MINING TO HOUSING PROPERTY

Direction: *Please check and rate yourself honestly based on given statement using following scales:*

1	2	3	4	5
Most Frequent	Frequent	Fair	Less Frequent	Least Frequent

No.	**Effects of Vibration and Cracks on Mining Communities**	**Average**				
		1	2	3	4	5
1	Dust be seen deposited everywhere eg: window, roofs, walls					
2	Always clean the house caused by dust					
3	Aesthetic value of housing decreases					
4	Cracks in buildings					
5	Loss of beauty of building					
6	Attack by reptiles and insect					
7	Leakages during rainfalls					
8	Corrosion of metalwork on buildings					
9	Extra cost incurred on renovation					
10	Fear of collapse of building					

SECTION 5: QUESTION RELATED TO FACTORS THAT AFFECTS THE PROPERTY PRICES

Direction: *Please check and rate yourself honestly based on given statement using following scales:*

1	2	3	4	5
Most Serious Problem	Less Serious Problem	A Fairly Serious Problem	Not a Serious Problem	Don't Know

No.	Factor affects the property prices	Average				
		1	2	3	4	5
1	**Pollution resulting from bauxite mining activities**					
	Air pollution					
	Water pollution					
	Noise pollution					
2	**Location attributes**					
	Location and accessibility eg: distance close to the center city or work					
	Neighbourhood eg: close to the public services; school, police station, etc					
	Transportation eg: public transport					
	Structural attributes eg: size of land, size of building, design of house, etc					
	Facility eg: near to the hospitals, shop, petrol station, institutions education, recreation areas, shopping centers, etc					