AWARENESS OF GREEN TECHNOLOGY IN CHINESE NEW VILLAGE (CHINESE NEW VILLAGE TANGKAK 1)

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A project report submitted in partial fulfilment of the requirements for the award of the degree of Bachelor of Science (Hons.) of Quantity Surveying

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DECLARATION

I hereby declare that this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at UTAR or other institutions.

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APPROVAL FOR SUBMISSION

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ABSTRACT

Global awareness toward environmental friendly issues which caused from the side effect of irresponsible human activities lately had become a popular topic among the public and thus give arise of awareness from everyone in relation to the importance of environmental issues. The Green Technology was therefore had been introduced by Malaysia government as a measure to mitigate the environmental problems. Green technology is expected to mark its footprint on the improvement of environment and human health. Malaysia government had promoted four major areas of green technology in our country, which are energy, building, water and waste management, and transportation sector. With that in mind, the National Green Technology Policy was formulated by the Ministry of Energy, Green Technology and Water (KeTTHA) and launched on 2009 in order to reflect the government's effort in pushing green technology and enhancing environmental sustainability. This research had been conducted to examine the level of awareness of Chinese New Village community within nation on adoption of green technology. While due to time limitation, this research only focused on a community, Chinese New Village Tangkak 1, which situated in the state of Johor, Malaysia. An interview with the village headmen and questionnaire surveys were employed to collect the information and data to examine the level of awareness of Chinese New Village Tangkak 1 community on the adoption of green technology. The summary results showed that majority of the villagers are aware about the green technology and willing to implement certain practices to save the environment. Few recommendations had been suggested by the researcher to increase the level of awareness of community on the adoption of green technology. Lastly, this research had met the aim and objectives that previously set by the researcher.

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LIST OF SYMBOLS / ABBREVIATIONS

LED	Light Emitting Diode
ACEM	Association of Consulting Engineers Malaysia

CHAPTER 1

INTRODUCTION

1.1 Rationale of the Research

Construction industry normally is one of the largest industries in a country. The contribution of this industry towards the economic in the particular country is significantly. Construction industry also create numerous of employment opportunities for the community. Besides that, resources that consumed by this industry is staggeringly high if compare to other industries. Therefore, the construction industry had been criticized by public as a most environmentally unfriendly industry due to the inefficient of raw material and energy utilisation, waste producing, pollution created and so forth. Various environmental problems are therefore occurring from these inefficiency resources utilisation activities.

In 21st century, global awareness toward environmental friendly issue had become more and more aware as the side effect of irresponsible human activities had caused lots of damage to the environment such as sea-level rise, ocean and ice sheet dynamics and extreme climatic changed. In order to mitigate these impacts, the government have launched a series of steps to overcome the problems. One of the steps that carry out by Malaysia government is promote the green technology in various industries within the country. Besides that, the government also encourage the public to consume the green products which is reusable and recyclable in the future. Thus, we should aware of the environmental issues and try to adopt some of the green technology in our daily life. Under this research, the researcher would like to study the government's objective on the effectiveness of green technology in

Chinese New Village community through the data obtain from the Chinese New Village community about the awareness of the adoption and application of green technology.

1.2 Aim and Objectives

1.2.1 Aim

The researcher's aim for conducting this research is to study the government's objective on the effectiveness of Green Technology in Chinese New Village community within the country.

1.2.2 Objectives

1. To collect the data on the level of awareness of Chinese New Village community on the adoption of Green Technology.
2. To define and study the scope of Green Technology.
3. To create the awareness of Green Technology towards the Chinese New Village community.

1.3 Scope and Limitation of Research

For the purpose to produce a dissertation that fulfills the requirement within the limited duration, it is important to determine the scope of study and limitation for the research. The overall dissertation is based on the objectives and thus the final output is achieving all the objectives of the research. This research is limited to the study of the Malaysia government's objective on the effectiveness of Green Technology in the community and it is concentrate on the level of awareness of Chinese New

Village community on the adoption of the Green Technology in their daily life. Due to the time limitation and budget constraint, researcher is only able to carry out the research on a Chinese New Village, which is Tangkak 1. Apart from that, researcher will also study about the principle of green technology, elements and characteristics of green technology, government policy on green technology and information about Chinese New Village community.

1.4 Report Layout and Contents

1.4.1 Introduction

This chapter will begin by briefly mention about the statement of problem that are relevant to researcher's investigation study. The aim and objectives of the research that going to be carry out by the researcher will also clearly define under this chapter. Moreover, the researcher would highlight the finite scope of study and list down the limitation of research in order to produce a complete dissertation within the time frame provided. Lastly, this chapter will end with the report structure and some briefly contents of other chapters.

1.4.2 Literature Review

This chapter is about the review of the literature which related to the areas of studies for this research. It will introduce the green technology terms and the major areas that adopted the green technology concepts. In addition, this chapter will also contain the roles of Malaysia government under the initiative and promotion of green technology in the country. Following part of this chapter will consider about the Chinese New Village communities in the country and concentrate on the Chinese New Village community where the survey questionnaires will be carry out at that particular village.

1.4.3 Research Methodology

This particular chapter will describe the basic research plan, which is how the dissertation will be carrying out. Under this chapter, the research methodology will be discussed and select the research methodology to be use to carry out the research. Furthermore, the methods to collect information and data which related to the dissertation will list down under this section as well as the methods to analyses the questionnaire results.

1.4.4 Conclusions and Recommendations

The last chapter will summarising and make the conclusions for the research from the findings, whether the findings achieve the aim and objectives for the research. After make the conclusions for the research, the researcher will present some recommendations based on the findings that collected.

CHAPTER 2

GREEN TECHNOLOGY

2.1 Definition of Green Technology

The term “green” refers to particularly concerned about protecting the environment, which include the plants and animals that grow in it. While the term “technology” is refers to the application of knowledge for practical purposes. Green technology is the application of the environmental sciences to conserve the natural environment and well utilise the natural resources in order to minimize and reduces the negative impacts of human involvement.

Green technology also known as environmental technology or either clean technology. Green technology encompasses a continuously evolving group of methods and materials, from techniques for generating energy, waste reduction in the fields of energy, green buildings, green design, green purchasing, green chemistry, green nanotechnology to non-toxic cleaning products.

Green technology also demonstrates as better, cleaner and more efficient methods and devices which less risky and less harmful on ecological resources. “Green technology refers to products, equipment or systems which satisfy the following criteria:

- It minimizes the degradation of the environment
- It was zero or low green house gas (GHG) emission is safe for use and promotes healthy and improved environment for all forms of life
- It conserves the use of energy and natural resources

- It promotes the use of renewable resources

(Definition of Green Technology by KeTTHA, 2010)"

2.2 Goals of Green Technology

Technology can play a major role in green efforts and it has the ability to reverse some of the mistakes society have made in the past. The present expectation from green technology is that this field will bring innovation and changes to the daily habitual habits of society. Severe goals that contribute the developments in this rapidly growing field include:

- Sustainability – The core of green technology is sustainable development and as a solution for environmental issues. Sustainable development is a pattern of resource use that aims to meet the needs of society in ways that can continue indefinitely into the future without damaging or depleting natural resources. In short, meeting presents needs and without compromising the ability of future generations to meet their own needs.
- "Cradle to cradle" design – A radical change in industry, which switch from a "cradle to grave" cycle to a "cradle to cradle" cycle of manufactured products. This design using environmentally safe and healthy materials; design for material re-utilization and essentially waste free. "The overall idea behind cradle to cradle is that waste equals food. This means that all products must be able to return to the earths lifecycles (Michael Braungart & William McDonough, 2002)".
- Source reduction – Source reduction is an effort to reducing or eliminating the amount of waste at the source by modifying production processes, promoting the use of non-toxic or less-toxic substances, implementing conservation techniques, and re-using materials rather than putting them into the waste stream. Concept of "Reduce, Reuse, Recycle" is a subset of waste reduction, which includes reducing disposal quantities, recycling and pollution risk. "Ideally, source reduction simplifies life so that people

consume less stuff and obtain goods by creating new from the old (Source Reduction, 2001)".

- Innovation – A new and innovative methods and materials used to developing an alternatives to current technologies, for example whether fossil fuel or chemical intensive agriculture, which have been demonstrated to damage health and the environment. Alternatives technologies that created shall be more environmentally friendly and not harmful to peoples.
- Viability – Creating a center of economic activity that related with green technologies and products that environment friendly. In order for green technology to have an impact on the environment and sustainable for long term, it must speeding their implementation and creating new green careers that truly protect the planet.

2.3 Major Areas of Green Technology in Malaysia

The global green revolution is here and there are so many different types of green technology that is expected to mark its footprint on the improvement of environment and human health. The green technology has already showed much promise in terms of delivering the finish product in other developed countries and Malaysia are just in the stage where the green technology is being implemented. There are four major areas of green technology that promoted by government Malaysia, which are energy, building, water and waste management, and transportation sector.

2.3.1 Energy Sector

One of the important parts of green technology for current issue is energy, the resources that powers the world. Energy generation and consumption is a major sector of green technology in country as energy plays a crucial role in all that we do. Energy generation under green technology refers the energy supplies that apply green

technologies in power generation and in the energy supply side management, including co-generation by the industrial and commercial sectors.

Renewable energy is the solution for depletion fossil fuel reserves as renewable energy is natural energy and is replenished constantly through earth's mechanisms. These technologies diminishing energy consumption from oil and fossil fuel generated electricity, conserves our land, water and air from hazardous component that we directly and indirectly emit. Renewable energy is most often derived from natural resources, such as solar energy, wind power, hydropower and so forth. Another important requirement of the energy generated is the sustainable development, which would not produce any harmful to environment and able to reuse or recycle the waste that created.

Figure 2.1: Solar panels system for home
(Source from: http://www.purelysolarpower.com/homemade-solar-panels/)

Renewable energy and energy efficiency are always said to be the twin pillars of sustainable energy under this sector. Energy efficiency is all about reducing the amount of energy that required carrying on any activities in daily life, from production stage until the end user. "Improvements in energy efficiency are most often achieved by adopting a more efficient technology or production process. There are various motivations to improve energy efficiency. Reducing energy use reduces energy costs and may result in a financial cost saving to consumers if the energy savings offset any additional costs of implementing an energy efficient technology.

Reducing energy use is also seen as a key solution to the problem of reducing greenhouse gas emissions (Efficient energy use, 2011)".

Figure 2.2: LED tube fluorescent light
(Source from: http://www.supplierlist.com/wholesale50-tube_light-40214.htm)

2.3.2 Building Sector

Another important part of green technology is under building sector as building is an essential need for humans. As the human population is a country increase, the built environment will expands consequently. "In order to mitigate the impact of buildings along their life cycle, Green Building has emerged as a new building philosophy, encouraging the use of more environmentally friendly materials, the implementation of techniques to resources and reduces waste consumption, and the improvement of indoor environmental quality, among others (Daniel Castro-Lacouture, Jorge A. Sefair, Laura Florez, Andres L. Medaglia, 2008)".

Green building is also known as green construction or sustainable building. Green building may be defined as building practices, which strive for integral quality that including of economic, social, financial and environmental in a broad way. Therefore, the rational use of natural resources and appropriate management of the building stock will contribute to saving scarce resources, reducing energy

consumption, and improving environmental quality. Economically, green building technology saves on costs throughout the life of the building by using life cycles cost analysis to determine the expense of a building using green building technologies.

The practices or technologies that employed in green building are constantly evolving and may be differing from region to region; there are fundamental principles that persist from which the method is derived:

- Siting and structure design efficiency

  The siting and orientation of buildings has a big influence in building performance as the heat from sun rises and sets will affect the occupants' comfort within the building. The concept and design stage is one of the major steps in a project life cycle, as it has the largest impact on cost and performance. Designing environmentally optimal buildings, the objective is to minimize the total environmental impact associated with all life-cycle stages of the building project.

- Energy efficiency

  Green building is often including measures to efficient energy use, which purposely to reduce costs as well as the reliance on natural resources. To increase the efficiency of building envelope refers to the barrier between conditioned and unconditioned space, the utilization of high efficiency windows and insulation in walls, ceiling and floors were introduced. In addition, effective window placement can provide more natural daylight and ventilation, thus lessen the electric lighting and ventilation system.

- Water efficiency

  Reducing water consumption, ensure waste water is minimise and protecting water quality are key objective in green building. The protection and conservation of water throughout the life of a building may be accomplished by increase using the water that is collected, used, purified, and reused on-site. Waste water may be minimized by utilizing water conservation fixtures and the use of greywater for on-site use will minimize demands on the local aquifer.

- Materials efficiency

  The selection and awareness of the impact of specifying materials is an essential part of the approach to green building design. Selection for building materials must consider the manufacturing, transportation, durability and performance of the materials themselves. Building materials should be extracted and manufactured locally to the building site to minimize the transportation. Utilize re-used or recycling building materials salvaged from demolition sites or renovations in the construction project are able to lowering the carbon footprint of the project, providing they are still durable and efficient.

Figure 2.3: Eco-Terr floor tile

(Source from: http://www.coveringsetc.com/EcoTerrHome.aspx)

- Indoor environmental quality enhancement

  The Indoor Environment Quality (IEQ) was created to provide and examine the comfort, well-being, and productivity of building occupants. IEQ as the name implies, refers to the quality of the air within a building environment. Indoor air quality seeks to reduce volatile organic compounds (VOC) and other air contaminants as these gases and contaminants have a detrimental impact on occupants' health and productivity. During the design and construction process, choosing construction materials and interior finish

products with zero or low emissions of toxic gases will increase a building's IEQ.

- Operations and maintenance optimization

  In order to remain the sustainable of a building in its design and construction, the green building must operated responsibly and maintained properly. Every aspect of green feature in a building is integrated into the operations and maintenance phase of a building's life. Ensuring operations and maintenance are part of the project's planning and development process which will help retain the green criteria designed of the project.

- Waste reduction

  Green architecture also seeks to reduce waste of energy, water and materials used during construction, from initial stage until the completion stage of construction. A well-designed building will help reduce the amount of waste generated by the occupants. Recycling the demolition debris and reuse it in a new construction project will effectively reduce the waste from demolition works.

2.3.3 Water and Waste Management Sector

Water is the most important natural resources as it is the most basic human need in daily life. Efficient management and optimum utilization of water resources, therefore is one of the great significance to the overall development of country. Water management is the activity of planning, developing, distributing and managing the optimum use of water resources. It may encompass of management of water treatment of drinking water, sewage or wastewater, rain water and so on.

One of the technology that integrate in water management that applying and developing in our country is the management of rainwater, which is rainwater harvesting management. Rainwater harvesting is the accumulating and storing rainwater from the roofs of buildings and tents. It has been used to provide drinking

water, water for livestock, and water for irrigation or to refill aquifers in a process called ground water recharge. Water is becoming a scarce resources and considered as a liquid gold in future, thus harvested rainwater become an important contribution to the availability of freshwater needs. The rainwater harvesting systems can be simple construct from inexpensive local materials, and thus can be afford by local community. Roof rainwater harvested with good quality may not require treatment before consumption, while the roof rainwater harvested with lower quality may useful for daily household duties.

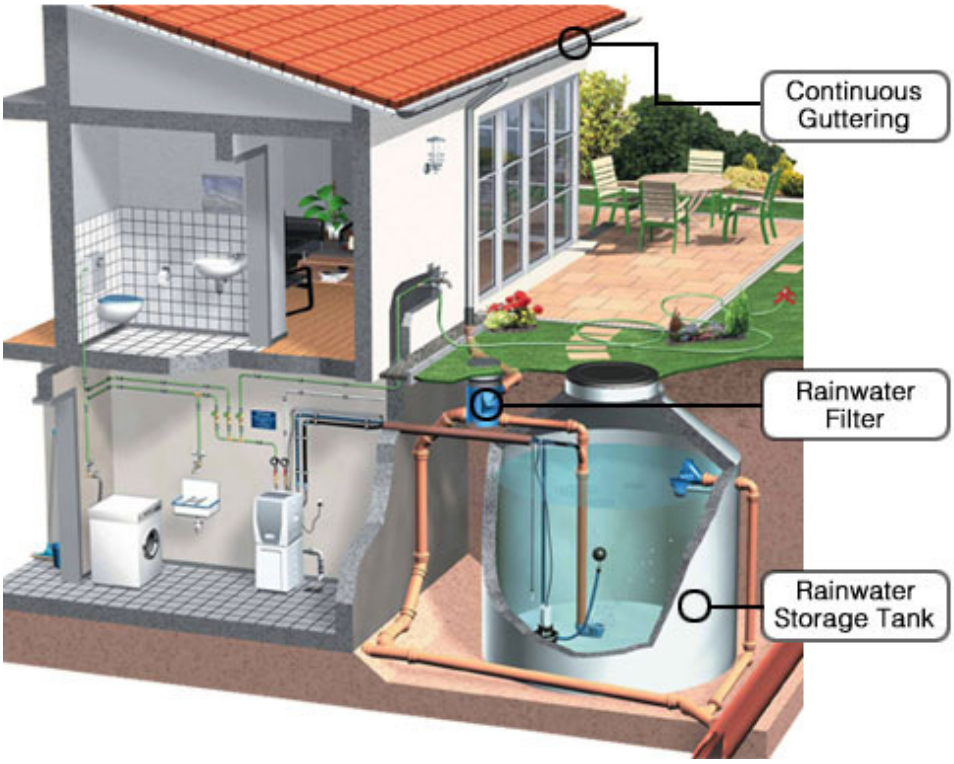

Figure 2.4: Concept of rainwater harvesting system
(Source from: http://www.bluegranola.com/tag/rainwater-harvesting/)

"Malaysia's 27 million people generate about six million tons of sewage every year, most of which is treated and released into the rivers (Malaysia: Water & Wastewater Treatment, 2009)". Thus, proper treatment of sewage is paramount to preserve the environmental pollution. Sewage treatment refers to the process that removes the majority of the contaminants and microorganisms from waste-water or sewage. Sewage treatment in done in multi-step procedures that removes or change different types of material in stages, so at the end both a liquid effluent and sludge

suitable for disposal to the natural environment or reuse as farm fertilizer. By using advanced technology it is now possible to re-use sewage effluent for drinking water if there is no another solution to provide water to the population.

The concept 3R that refers to reduce, reuse, and recycle, which need to be integrate into water management in order to optimum use of water resources. Reduce water use and water losses is the first step in water reduction, as it is the most important factor in using water more efficiently. The second step is reuse, which means use the water that has already been used once in daily life such as flush the toilets, wash floor and water garden. This is done normally with water that is not heavily contaminated with waste and does not harmful to environment. The last step is recycling, and generally it includes some type or technology the clean the water and use these recovered water.

2.3.4 Transportation Sector

Transportation is an essential part for urban citizens and it may be the key to going green. Hence, it is important to incorporate the green technology in the transportation sector and green transportation is a part of it. Green transportation refers to any means of transport with low or no negatively impact on the environment, which includes walking, cycling, green vehicles, and public transportation.

Recently with the constant increase in petrol prices, every country is looking for alternative way to reduce the consumption of petrol in transportation sector. The solution will be in hybrids, which is hybrid vehicles. Hybrid-electric vehicles or HEVs as people are commonly known are vehicles that combine of both internal combustion engine and electric motors. There is a computer system in the hybrid that makes decisions on which energy sources to use at different times and thus maximizes the efficiency of the vehicle while providing the same level of comfort and safety as conventional car.

"A hybrid vehicle would results in the reduction of carbon dioxide emissions and fuel costs as the need for filling up petrol decreases immensely. There is an automatic shutoff system in hybrid cars which enables the engine to shut off when the vehicle comes to a stop. This system restarts the vehicle automatically when the accelerator is pushed. This technology enables the hybrid to conserve energy that would otherwise be wasted when the car is idling. A hybrid emits up to 97 per cent less toxic emissions. Hybrids can also run on alternative fuels thus increasing fuel options. It also results in a decreased dependency on fossil fuels (Gregory John Basil, 2010)".

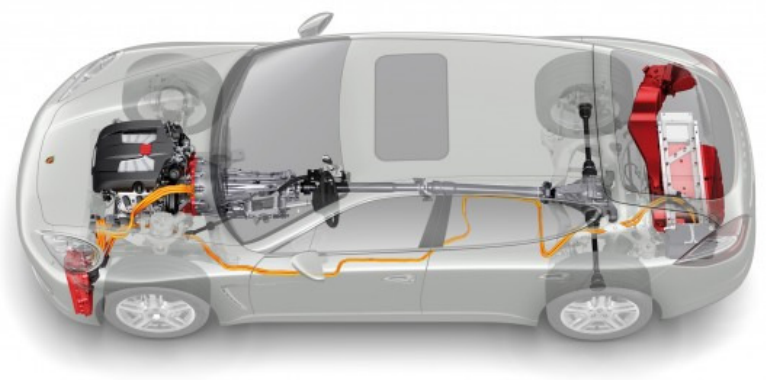

Figure 2.5: Porsche Panamera S hybrid car
(Source from: http://www.gizmag.com/porsche-panamera-s-hybrid/17910/)

In consideration of global urgency to reduce dependence on fossil fuels, palm oil biomass therefore offers a great potential as cost-effective feedstock for biodiesel. By using palm oil biomass as feedstock for biodiesel, it is of reducing carbon dioxide emissions by more than 80%.

"Palm oil, like other vegetable oils, can be used to create biodiesel for internal combustion engines. It can be either a simple high quality processed palm oil mixed with petro-diesel, or processed through transesterification to create a palm oil-methyl ester blend which meets the international EN 14214 specification. Biodiesel can be used in any diesel engine when mixed with petrol diesel. The majority of vehicle manufacturers limit their recommendation to 15% biodiesel blended with petro diesel (The Use of Palm Oil as Biofuel and Biodiesel, 2010)". By using

biodiesel, it is reduces greenhouse gas emissions better than gasoline, ethanol, and conventional diesel. Besides that, it can help shift the energy use to renewable.

2.3.5 Green Products Sector

Green products would be another important key to going green as products are basic essential element for peoples every day. Green products can most simply be defined as those that are less damaging for the environment and conserve of the planet than previously available or competing products used for the same or similar purpose. The amount of energy that consumed by each family can be reduce by preventing the waste of heat and electricity in buildings and by switching to efficient lighting and household electrical appliances.

Typically around 25% of the average home energy budget is spent on lighting the home and therefore the use of energy efficiency light is encourage nowadays in order to reduce the consumption of the energy. Thus, by changing the standard fluorescent lamps with the high efficiency fluorescent lamps will provide better light quality compared with standard fluorescent lamps of the same wattage and reduce energy consumption up to 10% energy saving. Other than that, the life span for high efficiency fluorescent lamps is longer than standard fluorescent lamps.

Lighting offers great opportunities for improving efficiency as much of the energy use for lighting today is wasted as heat rather than used for illumination. By switching the regular light bulbs with the compact fluorescent lamps (CFLs) is able to reduce the energy consumption as CFLs provides the same amount of light as an ordinary bulb, but consume about 75 percent less energy and thus saving money on electric bills. In addition, the life span for the CFLs is 10 times longer than standard light bulbs.

Kettle or electric boiler is one of the indispensable appliances in any kitchen. For that reason, a series of energy efficient electric kettle were invented in order to saving energy. An energy efficient kettle is equipped with measuring guide and flat

heating element. The used of measuring guide element allowing exactly fill for the amount of water require and flat heating element allowing it to heat the water quickly and using less energy. The energy efficient kettle is thought to save more than 50% of the electricity usually used to boil a kettle.

Similar efficiency gains can be realized with other household appliances in every family. Probably the only appliance in the home that is always switched on is the refrigerator and obviously means that it consumes more electricity than any other household appliance. With inverter technology, however, there can be up to 40 percent less electricity usage, which translates to daily energy savings. By integrate the intelligent inverter technology in refrigerator; it is capable of varying its power usage. This intelligent technology also generates a stable cooling temperature and enables great efficiency in operation.

The washing machine is a costly appliance to operate due to the amount of water used and the energy consumed can take up a large portion of domestic electrical and water bills. Therefore, it is important to choosing an Energy Star qualified washing machine in a family as it may reduce the energy and water bills dramatically. Based on the information from U.S. Department of Energy, an Energy Star rated washing machine use about 37% less energy and use over 50% less water compare with regular washers.

Another way to going green is purchasing the appliances with Energy Star label. “Energy Star is the symbol for energy efficiency. It’s a label created by the U.S. Environmental Protection Agency and the U.S. Department of Energy to help consumers save money and minimize air pollution. An appliance receives the Energy Star rating if it is significantly more energy efficient than the minimum government standards, as determined by standard testing procedures. The amount by which an appliance must exceed the minimum standards is different for each product rated, and depends on available technology. Energy Star rated products are usually among the most efficient available today (Energy-Efficient Appliances, 2010)”. The Energy Star label can be found on washing machines, clothes dryers, refrigerators, dishwashers, televisions and room air conditioners. Therefore, it is encouraged to choose and purchase the household appliances which are more energy efficient.

2.4 Roles of Government in Green Technology

2.4.1 Government Initiative in Green Technology

The Malaysian government has been embarking on a series of initiatives to promoting the green technology and it has been given a central role. For instance, the Ministry of Energy, Green Technology and Water (KeTTHA) has been advocating green technology by the formulation of the National Green Technology Policy, re-structuring the Malaysia Green Technology Corporation/ GreenTech Malaysia and the establishment of the National Green Technology Council.

The establishment of National Green Technology Council is to ensure the effective implementation and high-level coordination between the stakeholders and beneficiaries. “The council is chaired by the Prime Minister Datuk Seri Najib Tun Razak, with the primary aim to manage and guide the development of the legal and regulatory requirements concerning green technology. It also aims to streamline and manage roles in relation to green technology that overlap among the various ministries (L.N.Gomez, 2010)”.

The Ministry of Housing and Local Government are reviewing the Uniform Building By-Laws to further promote the use of green technology in construction sector. Putrajaya and Cyberjaya are being developed as pioneer townships, which convinced as a “garden city, intelligent city” to showcase the advances in green technology.

Besides that, the Malaysian government has also established a fund, the Green Technology Financing Scheme (GTFS), with an amount RM1.5 billion, for soft loans to encourage the use and supply of green technology in country. Under this scheme suppliers are entitled to a maximum financing of RM50 million while consumer companies are entitled to a maximum financing of RM10 million.

2.4.2 National Green Technology Policy

The Malaysian government has been focusing on developing green technology in four major areas, which include energy, buildings, water & waste management, and transportation. With that in mind, the National Green Technology Policy was launched on 2009 and reflects the government's efforts in pushing green technology and enhancing environmental sustainability. The policy focuses on fostering more Foreign Direct Investment (FDI) in green technology as well as promoting more Domestic Direct Investments (DDIs) and local industry participation.

"The National Green Technology Policy has five main objectives:

- Reducing the energy usage rate at the same time increasing economic growth;
- Facilitating the growth of the green technology industry and enhance its contribution to the national economy;
- Increasing the national capability and capacity for innovation in green technology development and enhance Malaysia competitiveness in GT in the global arena;
- Ensuring the sustainability of development and conserving the environment for future generations; and
- Enhancing public education and awareness in green technology while encouraging its widespread use.

The National Green Technology Policy is be used as a driver to accelerate the national economy and promote sustainable development. The new policy is based on four pillars:

- Energy - Seek to attain energy independence and promote efficient utilization;
- Environment - Conserve and minimize the impact on the environment;
- Economy - Enhance national economic development through the use of technology;
- Social - Improve the quality for life

(National Green Technology Policy, 2009)"

2.4.3 Government Incentives To Go Green

The Malaysian government has given great focus to green development in recent years. For instance, the National Budget has identified green technology as an important sector in the country's economic development and included provisions to enhance development in this area in the form of incentives and tax deductions. Other than that, government procurements also give priority to products and services that comply with green technology standards.

"From a tax perspective, the Malaysian Government has in the past introduced a series of tax incentives to encourage companies to be environmentally friendly by investing in energy efficient systems and generation of energy using renewable energy sources. These tax incentives include accelerated tax depreciation and 100 percent additional write off in the form of investment tax allowance for energy savings capital expenditure (Margaret Lee, 2010)".

2.4.4 Green Building Index Malaysia

The Green Building Index (GBI) is an environmental rating system for buildings developed by PAM (Malaysian Institute of Architects) and ACEM. The GBI introduced by the Malaysian government in May 2009, is country's recognized rating system for evaluating the environmental design and performance of Malaysian buildings. The GBI is developed specifically for the Malaysian tropical weather, environmental and developmental context, cultural and social needs.

The GBI initiative aims to assist the building industry in its march towards sustainable development. It also aims to raise the awareness of environmental issues and responsibility amongst the stakeholders in construction industry as well as the public. Applications to rate a building as green building will be based on the six (6) main criteria: energy efficiency, indoor environment quality, sustainable site planning & management, materials & resources, water efficiency, and innovation.

"The Green Building Index environmental rating system is created to:

- Define green buildings by establishing a common language and standard of measurement
- Promote integrated, whole-building design
- Recognize and reward environmental leadership
- Transform the build environment to reduce it's environmental impact
- Ensure new buildings remain relevant in the future and existing buildings are refurbished and upgraded properly to remain relevant

(Green Building Index, 2009)"

Figure 2.7: The logo of GBI

(Source from: http://pamsabah.com/archives/3177)

CHAPTER 3

CHINESE NEW VILLAGES

3.1 Introduction of Chinese New Villages In Malaysia

3.1.1 The Birth of Chinese New Villages

Chinese New Villages, or commonly known as New Villages among the Chinese community in Peninsular Malaysia , are formed around the emergency period (1948-1960), most of the New Villages are now more than 50 years old. Basically the New Villages are Chinese dominant, except some in a few states. The establishment of the New Villages in Malaysia was primarily for restoring national security and to segregate the villagers from the early Malayan Communist Party during the Malayan Emergency. It was part of the Briggs Plan, a military plan devised by British General Sir Harold Briggs in the anti-communist war in Malaya, primarily by cutting them off from their sources of support amongst the population. Therefore, a massive program of forced settlement was undertaken; peoples were eventually removed from the land and housed in guarded camps called “New Villages”. The resettlement in the New Villages was provided with basic public facilities.

3.1.2 Population and Housing

Most of the New Villages were built during the early period of the Emergency period (1948-60) in order to resettle the rural squatters in an effort to cut off the ties between the villagers and the communists. According to the data reported by Ministry of Housing and Local Government on 2002, there were 450 New Villages throughout Peninsular Malaysia and the population of the New Villages is estimated 1,256,067 peoples. Based on the data provided by the Department of Statistics on 2000, about 82% of the population in New Villages are ethnically Chinese. The ethnic Malays take up about 13%, ethnic Indians 4% and others roughly 1%. The housing stock in the New Villages stood at 176,096 computed from statistics provided by the village headmen during the 2002-2003 New Villages Survey. Thus, New Villages as other settlement should be viewed as an integral part of the national habitat.

3.1.3 Economic Activities

The economic activities in most of the New Villagers have always been closely related with the availability of land and other employment opportunities in and around the area. “During the initial years of the New Villages establishment, the main occupations of the residents were related to agriculture. Since 1970s, as Malaysia became more industrialized, economic activities of the New Villages have gradually evolved. While some villages are still characterized by agricultural activities, others have been transformed into wage-earning and small-scale industrial areas in varying degrees (Lim Hin Fui & Fong Tian Yong, 2005)”. According to the data provided by Lim & Soong on 2002, by 1995 the proportion of the New Village labour force in agriculture activities 43%, commerce 18%, wage earning 18%, public sector 3% and other 18%. Other area of potential growth is the development of small and medium industrial enterprises. About 23% of the New Villages were involved in various kinds of industrial activities in 2002.

3.1.4 Educational Progress

With the establishment of the New Villages more than 50 years ago, one of the basic facilities was the presence of the national-type Chinese primary school. Even though the villagers faces economic hardship in the early years of resettlement, they continued to send their children to the primary schools for at least a few years of education, as these schools that not only knowledge is imparted but more importantly the good values of the Chinese culture such as morality, filial piety, mutual help and cooperation are directly or indirectly passed down from one generation to another. In general, the educational facilities in the New Villages could be considered satisfactory. Most of the New Villages had pre-school facilities and primary schools within villages. Based on the data from Department of Statistics on 2000, the educational attainment of the 15-64 years old group in the New Villages was 30% primary education, 41% upper secondary education and 5% tertiary education.

3.1.5 Social, Cultural and Religious Practices

The formation of the New Villages has not only created a unique physical landscape of human settlement in Malaysia but contained in it a rich mixture of social, economic, cultural and religious aspects of the villages. There are five common places of worship found in and around the villages, i.e. Chinese temples, mosques, suraus, Hindu temples, and churches. Festivals and religious celebrations result in cohesion that unites the family members, groups and the community as a whole. These social and cultural activities even bring together members and supporters of different dialect groups, Chinese associations and political parties. Neighbourhood ties are also evident among the villagers. All these create a feeling of closeness and enable villagers to help one another in times of need and emergencies.

3.2 Chinese New Village Tangkak 1

3.2.1 General Information of Tangkak

Tangkak, which is a district capital of Ledang, situated in the state of Johor, Malaysia. It is close to the neighbouring district of Muar, also known as Bandar Maharani and roughly about half an hour drive from the town centre of Tangkak. Tangkak town have a nickname as “Textile Town”, because of its many textile shops in the town. The town also near to the Gunung Ledang (Mount Ophir), the highest mountain in Johor, the distance between the mountain and town is only 17km. Tangkak has an extensive network of roads in good condition and complete basic facilities, such as police station, fire station, hospital, clinics, bus station, Tenaga Nasional Berhad, Telekom Malaysia, and Majlis Daerah Tangkak. Appendix A shows the basic facilities in the town.

Figure 3.1: The location and boundary of the village

(Source from: http://maps.google.com.my/maps?hl=en&tab=wl)

3.2.2 Information of Chinese New Village Tangkak 1

Chinese New Village Tangkak 1, which is the first new village in the town and therefore named as New Village Tangkak 1. According to the data provided by the Majlis Daerah Tangkak, there were 195 housing stock in the new village. Even there are 195 houses in the new village, but there were not all the houses in the village used for residential purpose. Some of the houses are using as store by businessmen who doing business in the town and some were used as temple since the village was built. Additionally, few houses in the village were abandoning due to the bad condition of the house.

Based on the information provided by the village headman, there were about one hundred and seventy five (175) households in New Village Tangkak 1. The population of the village is roughly estimated 910 peoples and each household generally has approximately five (5) to six (6) family members. The premises in the village are constituted from brick and wooden houses, some of the village houses are show in Appendix B. About 98% of the population in the village are ethnically Chinese and ethnic Indians take up about 2%.

The economic activities in the village are mostly involving in agriculture activities, such as rubber tapping, oil palm fruit harvesting, and farming. A small portion in the village is involving in the commerce, operating a small business in front of the house, for instance grocery stall, other foods stall. Other than that, a very little amount of villagers in the village will engage in education sector as the primary school is located within the village. While the young generation in the village, which are not interested in agriculture activities, are mostly involve in wage earning in the town. Only a small portion of the villagers are involved in other sectors. Appendix C is showing some economic activities in the town.

There has a primary school, named Sekolah Jenis Kebangsaan Cina Chi Ming 2, located just beside the village. The primary school is show in Appendix D. Almost all the Chinese villagers in the new village send their children to this primary school for six years of education. Some of the Indian villagers also send their children to this Chinese primary school to study. Other than that, there was a Chinese temple in

the village since the village was built, villagers praying at the temples seeking peace, health, prosperity, good education, and sometime the advice from deities when encounter problems.

The basic infrastructure and utilities in the village are provided and maintenance well. For instance, the roads in the village are under good condition and the street lamps functioning well on night time. All the basic utilities needs by every household are provided as well, for example electric and water supply, telecommunications system, and solid waste disposal systems.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 Research Methodology Concept

Research strategy can be defined as the way in which the research objectives can be questioned. There are two types of research strategies, namely, 'quantitative research' and qualitative research'. Deciding on which type of research to follow, depends on the purpose of the study and the type and availability of the information which is required (Dr S. G. Naoum, 1998).

Quantitative research is 'objective' in nature. It is defined as an inquiry into a social or human problem, based on testing a hypotheses or a theory composed of variables, measured with numbers, and analysed with statistical procedures, in order to determine whether the hypothesis or the theory hold true (Creswell, 1994). Quantitative data is, therefore, not abstract, they are hard and reliable; they are measurement of tangible, countable, sensate features of the world (Bouma and Atkinson, 1995).

Qualitative research is 'subjective' in nature. It is draw attention to meanings, experiences (often verbally described), description and so on. The information collected in qualitative research can be classified under two categories of research, namely, exploratory and attitudinal. Exploratory research is used when there have a limited amount of knowledge about the topic to study. "The purpose of exploratory research is intertwined with the need for a clear and precise statement of the recognized problem. Attitudinal research is used to 'subjectively' evaluate the

opinion, view, or the perception of a person, towards a particular object. The term object is referred to as an attribute, a variable, a factor or a question (Dr S. G. Naoum, 1998)".

4.2 Information and Data Collection Method

4.2.1 Personal Interview

The personal interview is a major technique for collecting factual information as well as opinions. It is a face-to-face interpersonal role situation in which an interviewer asks respondents questions designed to elicit answers pertinent to the research hypothesis. The questions, their wording and their sequence define the structure of the interview (Nachmias and Nachmias, 1996). Interviews can be categories into three forms, which are unstructured, semi-structured and structured.

Unstructured interview uses 'open-ended' or 'open questions' and the questionnaire is often pitched at a very general level so that the researcher can see in what direction the interviewee takes things in their response. Semi-structured interview is more formal than unstructured interview in that there are a number of specific topics around which to build the interview. This form of interview uses 'open' and 'closed-ended' questioning but the questions are not asked in a specific order and no schedule is used. While the structured interview, questions are presented in the same order and with the same wording to all interviewees. The interviewer will have full control on the questionnaire throughout the entire process of the interview (Dr S. G. Naoum, 1998).

4.2.2 Questionnaire Survey

The questionnaire is a structured technique for collecting primary data through the survey. It is a series of written or verbal questions for which the respondent provides answers. Questionnaires are classified into two types which are the open ended form or unrestricted type, and the closed ended form or restricted type. Open-ended questions have the advantage of giving an opportunity to respondents to express their views on the subject but can be rather difficult to analyse the results later. By contrast, closed-ended questions require a short response and their analysis is straightforward.

4.3 Data Analysis Method

4.3.1 Frequency Distribution

When there require to summarizing the large amounts of raw data, there is often useful to distribute the data into categories or classes and to determine the number of individuals or cases belonging to each category. This is called category frequency and it can be presented in the form of tabulation, a bar chart, a pie chart or a graph (Dr S. G. Naoum).

4.3.2 Coding Open Ended Method

This type of method to analyse open-ended questions is to code the information in terms of ideas and themes. The purpose of coding such questions is to reduce the large number of individual responses to a few general categories of answers that can be assigned a numerical code. Coding is the process of identifying and classifying each answer with a numerical score or other character symbol.

4.4 Research Methodology Selection

After discuss different concept of research methodologies, the selection of research methodologies for this research are determine. Personal interview and questionnaire are select and use to carry out this research. The questionnaire is set based on the concept of qualitative and quantitative research method.

The information and data are collect through the personal interview, for instance, some of the information and data of Chinese New Village Tangkak 1 is collected through interview with village headman and the data of housing is obtained through interview with the personnel of Majlis Daerah Tangkak. Questionnaires are distributed to villagers in the village in order to investigate their level of awareness of green technology. The data collected from questionnaires are therefore analysing through frequency distribution method.

CHAPTER 5

RESULTS AND DISCUSSIONS

5.1 Data Collection

5.1.1 Selection of Targeted Group

The targeted group of this research are the villagers that residing in the Chinese New Village Tangkak 1. Approximately 36% of the household selected randomly within the new village were involved in the research. In addition, an interview with the village headmen had been carried out to obtain the information about the village and fill up the survey questionnaire.

5.1.2 Distribution of Questionnaires

With the intention to produce a reliable research, the answered survey questionnaires with a minimum 30% of total households in the village was a requirement to achieve this purpose. The author has distribute out 100 sets of survey questionnaire form to the villagers and only 63 sets of completed survey questionnaires were successfully gathered afterward, which is about 36% of the total household.

5.1.3 Problems Encountered during the Survey

The problems that the author has encountered during the survey are the location of the selected new village and the time constraint to carry out the survey. The location of the selected new village is situated on the state of Johor, which is far away from Kuala Lumpur. Owing to this reason, it is difficult for the author to travel to the selected village frequently to carry out the survey. Besides that, due to the time constraint for the submission of this research, it has restricted the time for the author to carry out the survey questionnaires.

5.2 Data Analysis

5.2.1 Section A: Demographic Information

Question 1: Number of family members per household

Table 5.1 - Number of family members per household

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1	1.6	1.6	1.6
	3	4	6.3	6.3	7.9
	4	15	23.8	23.8	31.7
	5	18	28.6	28.6	60.3
	6	17	27.0	27.0	87.3
	7	6	9.5	9.5	96.8
	8	2	3.2	3.2	100.0
	Total	63	100.0	100.0	

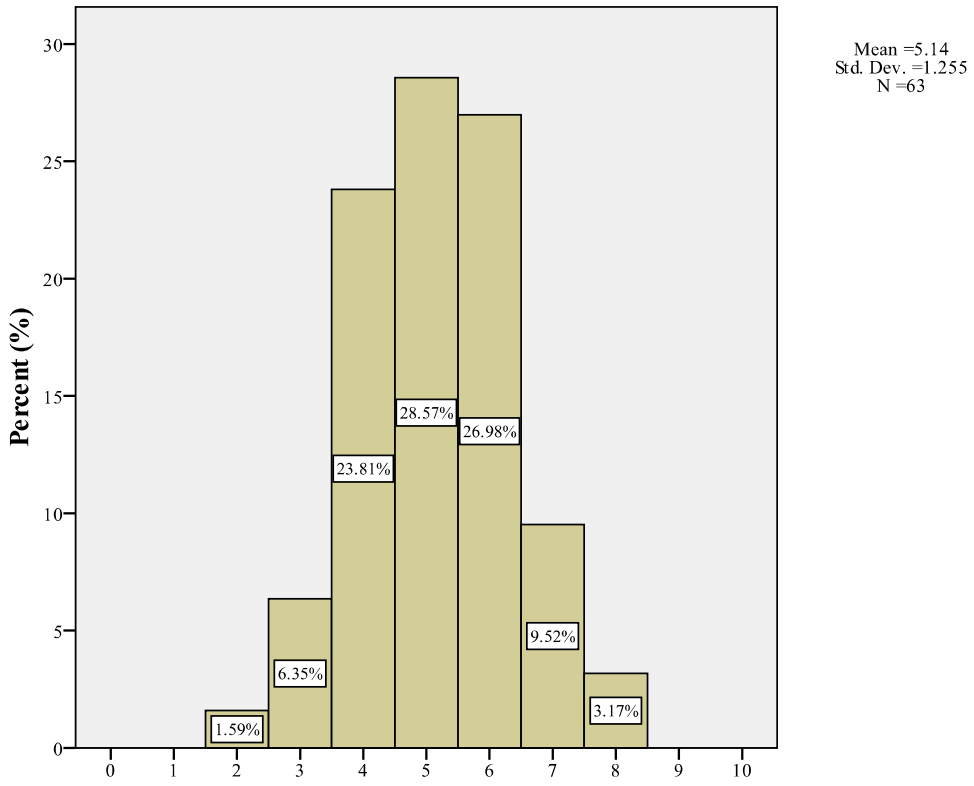

Figure 5.1 - Number of family members per household

Table 5.1 and figure 5.1 above show the summary of the results for number of family members per household in the village. The highest percentage of the total survey has five (5) family members, which is about 28.6% and the mean is 5.14. According to the data as described in Chapter 3, generally each household in the village has approximately five (5) to six (6) family members. The table shows that about 27% of household in the village has six (6) family members and following by four (4) family members in a household with 23.8%. About 9.5% and 6.3% of total respondents has seven (7) and three (3) members in each family respectively. About 3.2% or two (2) household from the total survey has eight (8) family members in a family. While the least family members in a household from the total survey are two (2) members, which is about 1.6%.

Question 2: The age range of the family members (You may tick more than one)

Table 5.2 - Age range of the family members

		Responses		Percent of Cases
		N	Percent	
Age	1-10 years old	13	7.0%	20.6%
	11-20 years old	55	29.7%	87.3%
	21-30 years old	22	11.9%	34.9%
	31-40 years old	18	9.7%	28.6%
	41-50 years old	50	27.0%	79.4%
	>50 years old	27	14.6%	42.9%
Total		185	100.0%	293.7%

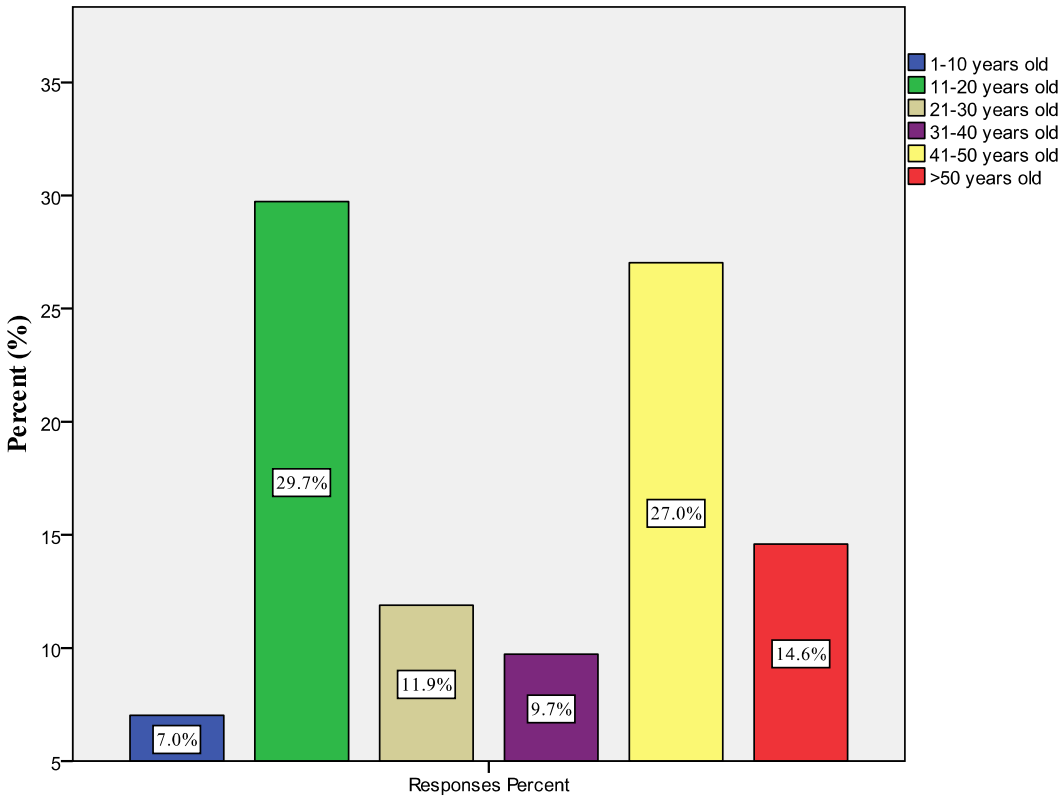

Figure 5.2 - Age range of the family members

Table 5.2 and figure 5.2 above are the summary of the results for number of family members per household in the village. Based on the analysed data from the returned questionnaire, an age range of 11-20 years old family members within a family

constitute highest proportion in total respondents with 55 out of 63. The reason behind is the family members under this range of age mostly are study in primary or secondary school and therefore stay with their parents in the village. The second highest ticked age range of the family members is 50 out of 63, which is an age range of 41-50 years old. Twenty seven (27) and twenty two (22) of the total respondents has family members in the age range of over 50 and 21-30 years old correspondingly. Eighteen (18) household has family members in an age range of 31-40 years old. Lastly, only thirteen (13) household has family members in an age range of 1-10 years old as most of the young family members are working at other city and has their own family at there as well, therefore their children also stay together with them in the city. For that reason, only a small portion of children in the age range of 1-10 years old stay in the village.

Question 3: How much is your average monthly utility bill (electric & water) (RM)?

Table 5.3 – Average monthly utility bills (electric and water)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	31-60	7	11.1	11.1	11.1
	61-100	28	44.4	44.4	55.6
	101-130	16	25.4	25.4	81.0
	131-160	7	11.1	11.1	92.1
	161-200	5	7.9	7.9	100.0
	Total	63	100.0	100.0	

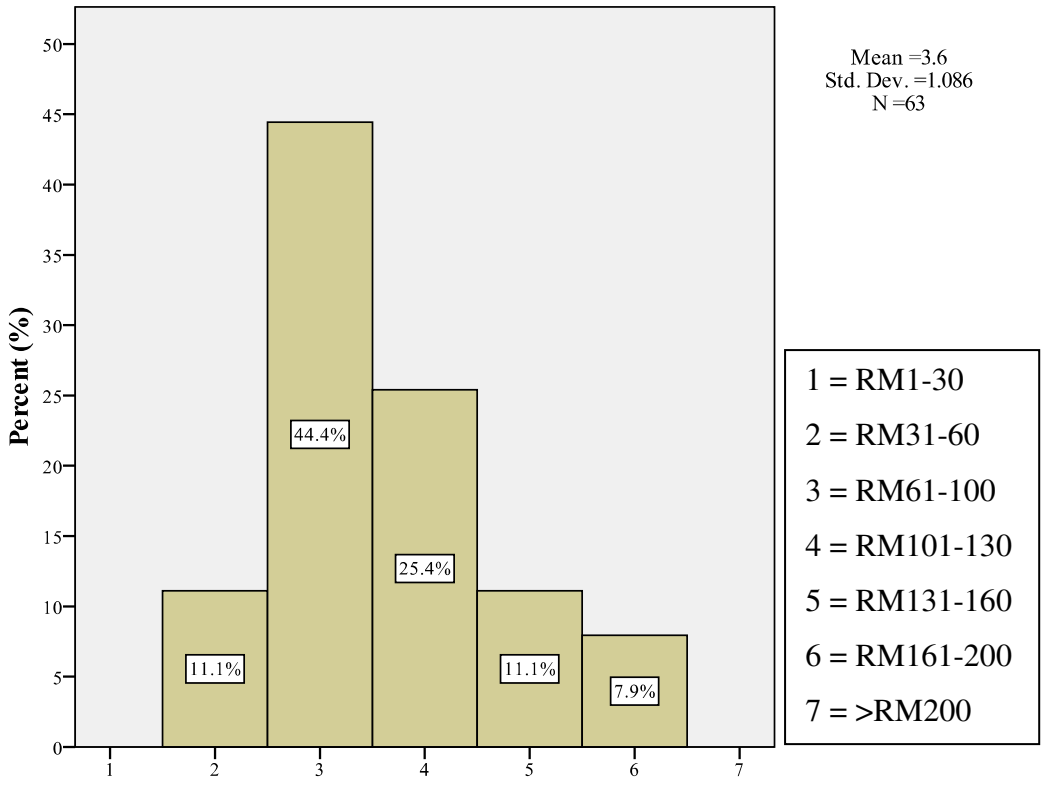

Figure 5.3 – Average monthly utility bills (electric and water)

Table 5.3 and figure 5.3 present the results of average monthly utility bill in a household which include electric and water charge. About 44.4% of total respondents' family average monthly utility bills are under range from sixty one to one hundred dollar (RM61 - RM100), which constitute highest percentage of total answered questionnaire survey. This is maybe because of most of the families in the village consume less electricity during daytime and does not utilise appliances that demand high electricity, thus save in bill. Probably, another reason is because the water and electric meter that currently using in each house is the old model and thus the cost for the utility bills will slightly lower compare to the bills that using the latest model meter. The second highest percentage of average monthly electric and water bills in a family is about 25.4%, the range from hundred and one to hundred thirty dollar (RM101 – RM130). Seven (7) household or around 11% of total respondents' average monthly utility bills within the range each from thirty one to sixty dollar (RM31 – RM60) and hundred thirty one to hundred sixty dollar (RM131 – RM160). Finally, about 7.9% of total respondents' household average monthly utility bills is from hundred sixty one to two hundred dollar (RM161 – RM200). This

is probably due to the household with more family members consumes more electricity and water during their daily life and subsequently has to pay for higher utility bills.

Question 4: What is your family average income (RM)?

Table 5.4 – Family average income (RM)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1001-2000	11	17.5	17.5	17.5
	2001-3000	44	69.8	69.8	87.3
	3001-4000	5	7.9	7.9	95.2
	4001-5000	3	4.8	4.8	100.0
	Total	63	100.0	100.0	

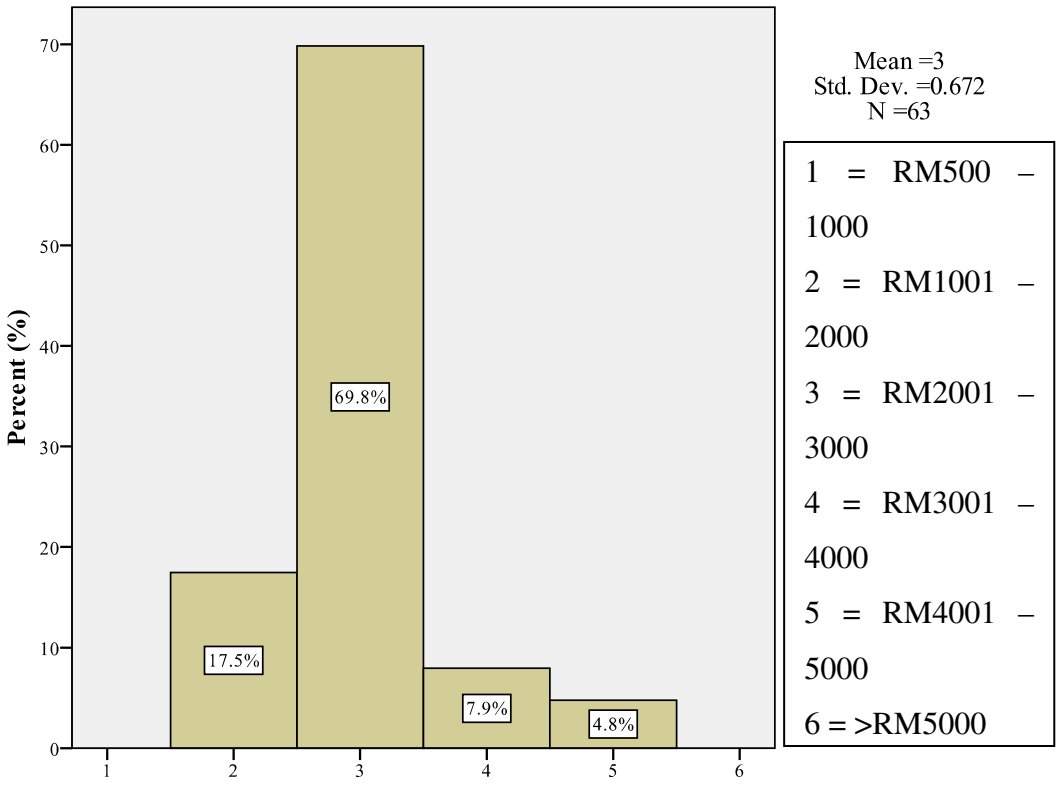

Figure 5.4 – Family average income (RM)

The results from the question four in questionnaire survey are fully presented in the table 5.4 and figure 5.4. About 17.5% or eleven (11) of total respondents' family has an average income in between thousand and one to two thousand dollar (RM1001 – RM2000). The family average income in between two thousand and one to three thousand (RM2001 – RM3000) make up highest percentage in total answered questionnaire survey, with about 69.8%. The possible reason is that most of the households in the village are engage in agriculture sector and the average income per month that they can gained from the commodity agricultural raw materials will normally fall under this range, that means most of the household in the villages are in the range of median household income. A small percentage (7.9%) of the family in total respondents has an average income in between three thousand and one to four thousand dollar (RM3001 – RM4000). Lastly, less than 5% of respondent's family has an average income in between four thousand and one to five thousand dollar (RM4001 – RM5000). This is probably due to the families are engage in commercial and own business sectors, therefore their monthly income is more stable and slightly higher than the families that engage in agriculture sector.

Question 5: Who is paying the utility bills commonly?

Table 5.5 – Common payer of the utility bills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Father	46	73.0	73.0	73.0
	Mother	11	17.5	17.5	90.5
	Daughter	1	1.6	1.6	92.1
	Son	5	7.9	7.9	100.0
	Total	63	100.0	100.0	

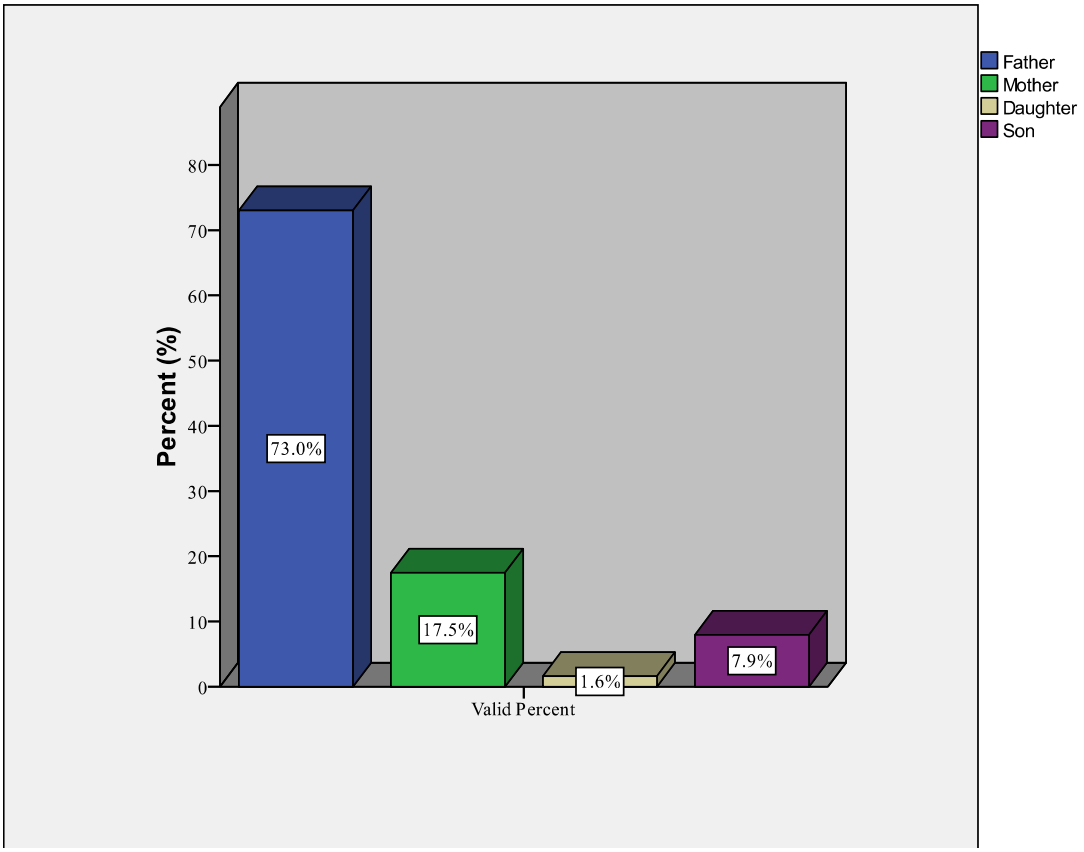

Figure 5.5 – Common payer of the utility bills

A summary of the results for question five in the questionnaire survey are show in table 5.5 and figure 5.5. According to the summary of the results, more than 70% of the respondents' family utility bills are pay by the father. The possible reason is father normally is a householder in a family and his income is the main source of income for a family; therefore he will also be the person that pays all the bills in the household. The mother is the payer for all the utility bills in a family constitutes about 17.5% from all the answered questionnaire survey and follow by the son, which is about 7.9% out of total respondents. Lastly, the daughter as the payer for the utility bills in a family form the least percentage of total respondents. The reason behind maybe because the daughters does not need to bear such burden in most of the family if their parents has income and hence they only subsidised some money for their parents when get paid from their works.

Question 6: What is your family's major source of income (from which sector)?

Table 5.6 – Family's major source of income (Sector)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agriculture	37	58.7	58.7	58.7
	Industry (factory)	12	19.0	19.0	77.8
	Own business	1	1.6	1.6	79.4
	Home base business	4	6.3	6.3	85.7
	Commercial	8	12.7	12.7	98.4
	Education	1	1.6	1.6	100.0
	Total	63	100.0	100.0	

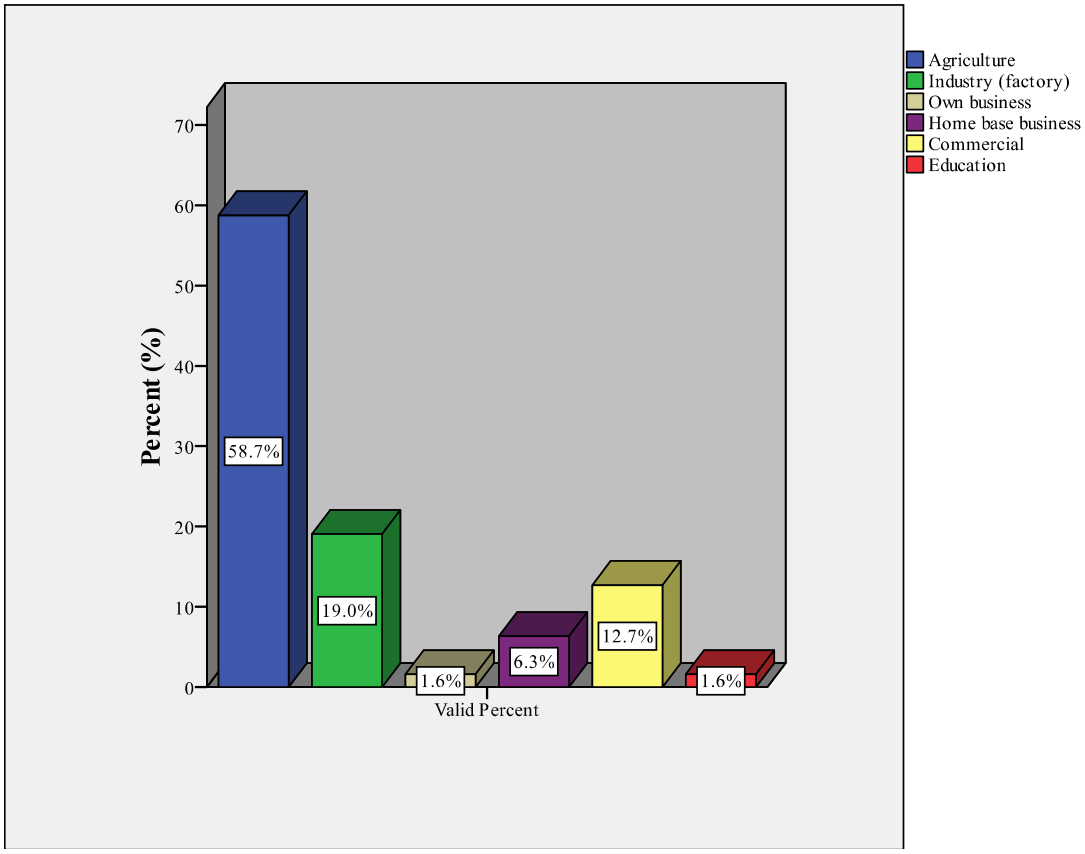

Figure 5.6 – Family's major source of income (Sector)

Table 5.6 and figure 5.6 shows the summary results of family's major source of income in the Chinese new village that obtained from answered questionnaire survey. From the table above, about 58.7% of the total respondent family's major source of

income is from agriculture sector as most of the family in the village are engage in the agriculture sector as before described in Chapter three. The industry sector is the second highest percentage of sector that a family's major source of income and follow by the commercial sector, which is about 12.7%. Next, about 6.3% of total respondents family's major source of income is from home base business. Two other sector gain an equal percentage of respondents, which are own business and education sector. Each sector has 1.6% of respondent as before stated only a small portion of villagers are engage in education and other sectors.

5.2.2 Section B: Awareness and understanding about Green Technology

Question 7: What is your understanding towards Green Technology? (Choose one or more)

Table 5.7 – Understanding towards Green Technology

		Responses		Percent of Cases
		N	Percent	
GT Understanding	Save energy	31	27.7%	49.2%
	Reduce the electric bill	14	12.5%	22.2%
	Friendly to the environment	31	27.7%	49.2%
	Reduce waste (Recycling)	32	28.6%	50.8%
	Not aware / no idea at all / Not familiar	4	3.6%	6.3%
Total		112	100.0%	177.8%

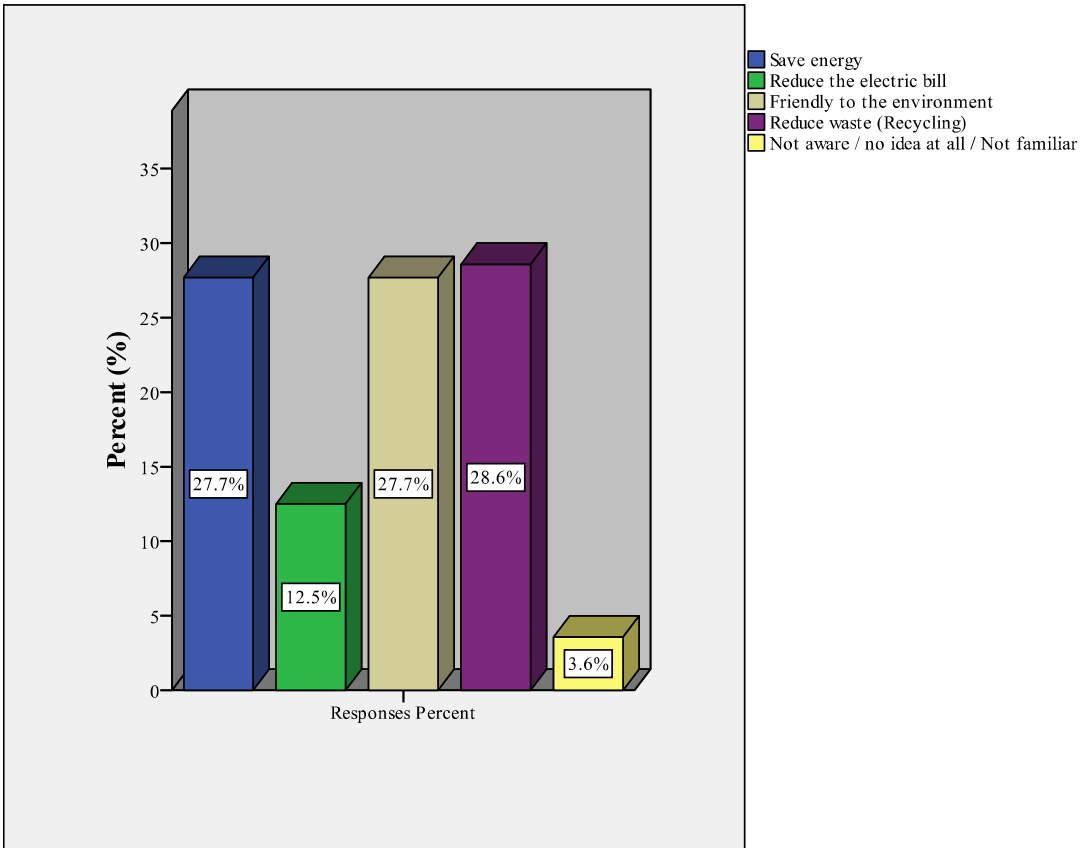

Figure 5.7 - Understanding towards Green Technology

The results of the villagers' understanding towards Green Technology from the questionnaire survey are fully presented in the table 5.7 and figure 5.7 above. Based on the table above, more than half of the respondents (50.8%) understand that reduce and recycle waste as a part of green technology. The probable reason may be due to the information providing to the villagers from the recycle centre within the village and the promo advertised by the government. Both saves energy and friendly to the environment obtained same percentage from the respondents and each part has 49.2% of respondents. Other than that, about 12.5% of total respondents understand that reduces the electric bill in their family as a part of green technology. Lastly, there are only 4 (3.6%) respondents are not aware and no idea at all towards the green technology. This is may be because of the lack of awareness and education of respondents to the term of green technology and it is still a relatively new concept in our country, thus not yet received sufficient attention.

Question 8: From where did you get to know about Green Technology?

Table 5.8 – Sources to know about Green Technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Newspaper	18	28.6	28.6	28.6
	Magazine	2	3.2	3.2	31.7
	Internet	3	4.8	4.8	36.5
	Advertising	27	42.9	42.9	79.4
	Tele-broadcasting	13	20.6	20.6	100.0
	Total	63	100.0	100.0	

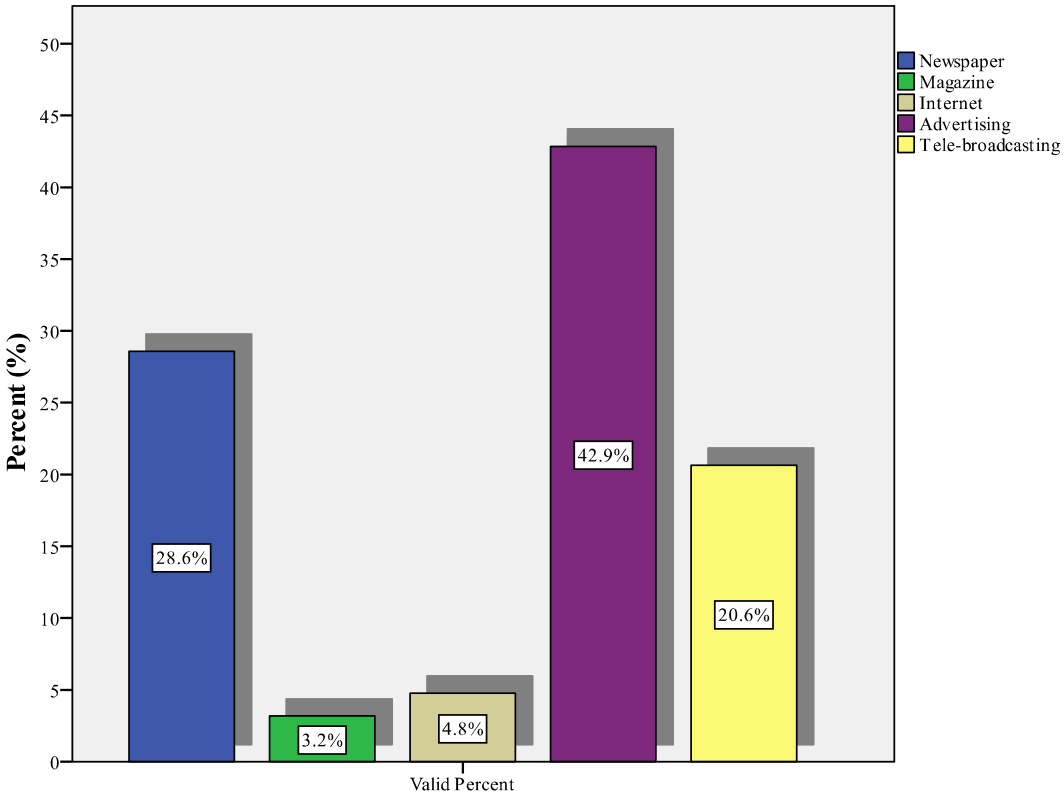

Figure 5.8 - Sources to know about Green Technology

There are various sources for the respondents to get know about the Green Technology, which are newspaper, magazine, internet, advertising, tele-broadcasting and others. Table 5.8 and figure 5.8 are fully presented the results from the questionnaire survey regarding the villagers by which source to know about Green

Technology. More than one third of the respondents know about the green technology through the advertising. The possible reason is most of the household family members in the village are watching the television programme after dinner or during free time. So they acquire the information about the green technology from advertising during television programme that they watched. Newspaper is second most (28.6%) chosen by the respondents as the source to know about the green technology and followed by the tele-broadcasting that make up about 20.6%. Internet is also one of the channels for the villagers to get know about green technology, but less than 5% of respondents gain the information of green technology through this channel. At last, only about 3.2% of respondents get know about the information of green technology through magazine. This probably because the selling price for the magazine is slightly higher compare to other reading materials and thus not much family members willing to purchase it.

Question 9: Did you buy any Green Technology products before?

Table 5.9 – Ever purchasing any green technology products

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	31.7	31.7	31.7
	No	43	68.3	68.3	100.0
	Total	63	100.0	100.0	

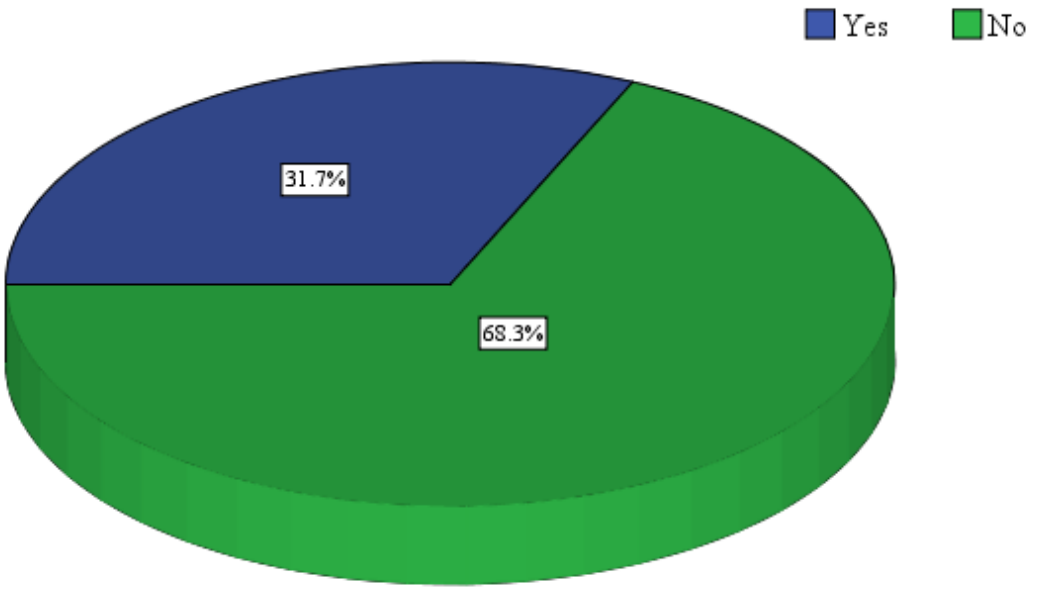

Figure 5.9 - Ever purchasing any green technology products

This question is intent to examine whether the respondents had purchase any green technology feature products before. From the questionnaire results showed above, less than one third of the respondents purchase any green technology feature products before. This probably because the respondents lack of awareness to the products with green features that available in the market and lack of promotion about the green technology products to the villagers. On the other hand, about 68.3% of respondents never purchase any green technology feature products before. The probable reason may be due to the selling price or initial cost of the products with green features is slightly higher than ordinary products and therefore unwelcome by the local community.

Question 10: “Buying Green Technology products cost more than ordinary products” Do you agree with this statement?

Table 5.10 – Purchasing GT products cost more than ordinary products

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	57	90.5	90.5	90.5
	Disagree	6	9.5	9.5	100.0
	Total	63	100.0	100.0	

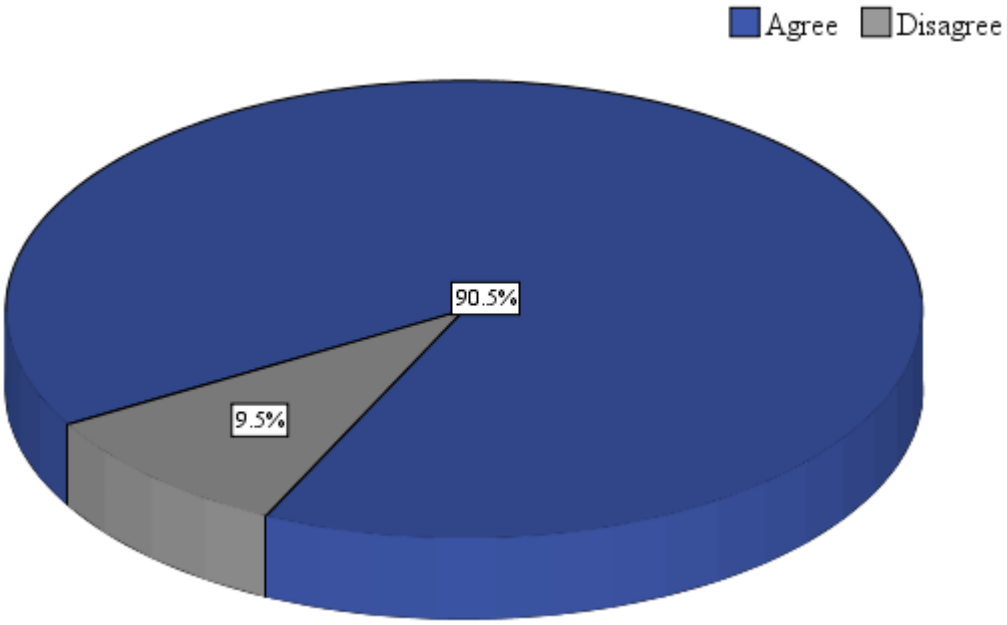

Figure 5.10 - Purchasing GT products cost more than ordinary products

A summary of the results for the respondents’ opinion regarding purchase the products with green technology features cost more than ordinary products are show in table and figure. According to table 5.10 and figure 5.10 above, more than 90% of respondents agree with that statement. The reason because the selling price for the products with green features in local market usually is more expensive than ordinary product. For that reason, it is clearly explain why most of the respondents agree that buying products with green features cost more than ordinary products. Only less than 10% of the respondents disagree with the statement and this is probably because they purchase the products during the promotional period, so they disagree that green

features products are expensive than ordinary products. Another reason may be the respondents take consideration of the operation and life cycle cost for the products rather than the initial cost.

Question 11: Are you willing to start using Green Technology products instead of ordinary products?

Table 5.11 – Willingness to change to Green Technology products

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	58	92.1	92.1	92.1
	No	5	7.9	7.9	100.0
	Total	63	100.0	100.0	

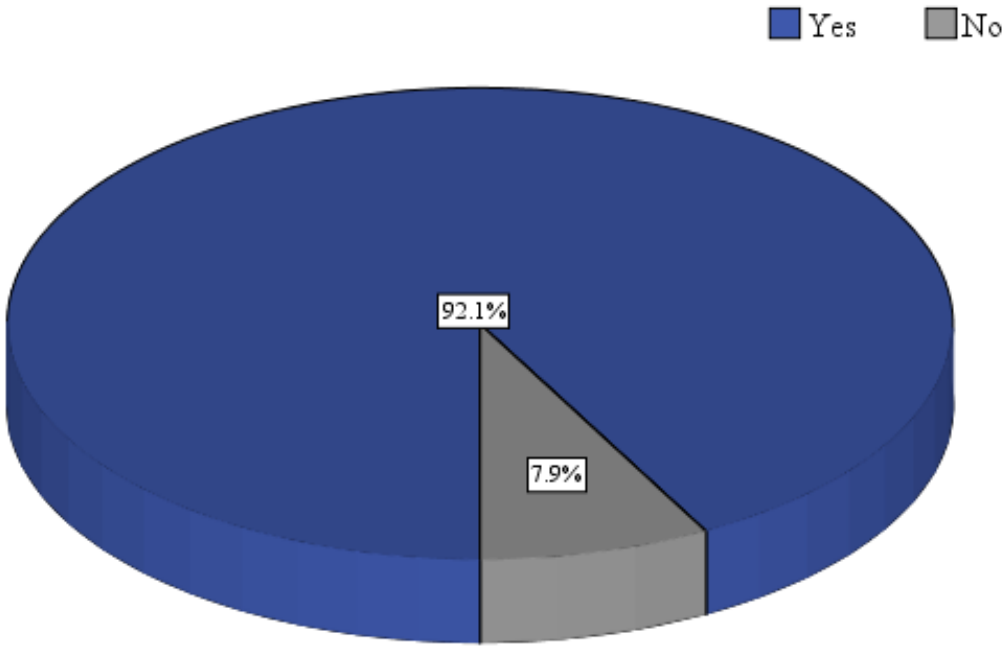

Figure 5.11 - Willingness to change to Green Technology products

The question that intent to examine the willingness of respondents to start using Green Technology products instead of ordinary products is set in the questionnaire survey and the results are presented in the table 5.11 and figure 5.11 above. Fifty

eight out of sixty three (92.1%) of respondents are willing to start using the products with green features instead of ordinary products. This is probably because the respondents start aware about the consequences of the global warming and the effects to their daily life. Another reason maybe the respondents know that they can save on the utility bills by using green features products in daily life and therefore willing to start use it afterward. Only 5 respondents are not willing to start using green technology products instead of ordinary products. The possible reason may be the respondents not willing to pay extra in the initial to purchase the products with green features or they are lack of awareness of the benefits that they can gain from green features products.

Question 12: What is the strongest reason which makes you think of changing to Green Technology products?

Table 5.12 – Reasons to change to Green Technology products

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Contribute to better world for future generation	17	27.0	27.0	27.0
	Save on bills	22	34.9	34.9	61.9
	Save the earth by reduce the consumption of available resources	21	33.3	33.3	95.2
	Influence from the people surrounding	3	4.8	4.8	100.0
	Total	63	100.0	100.0	

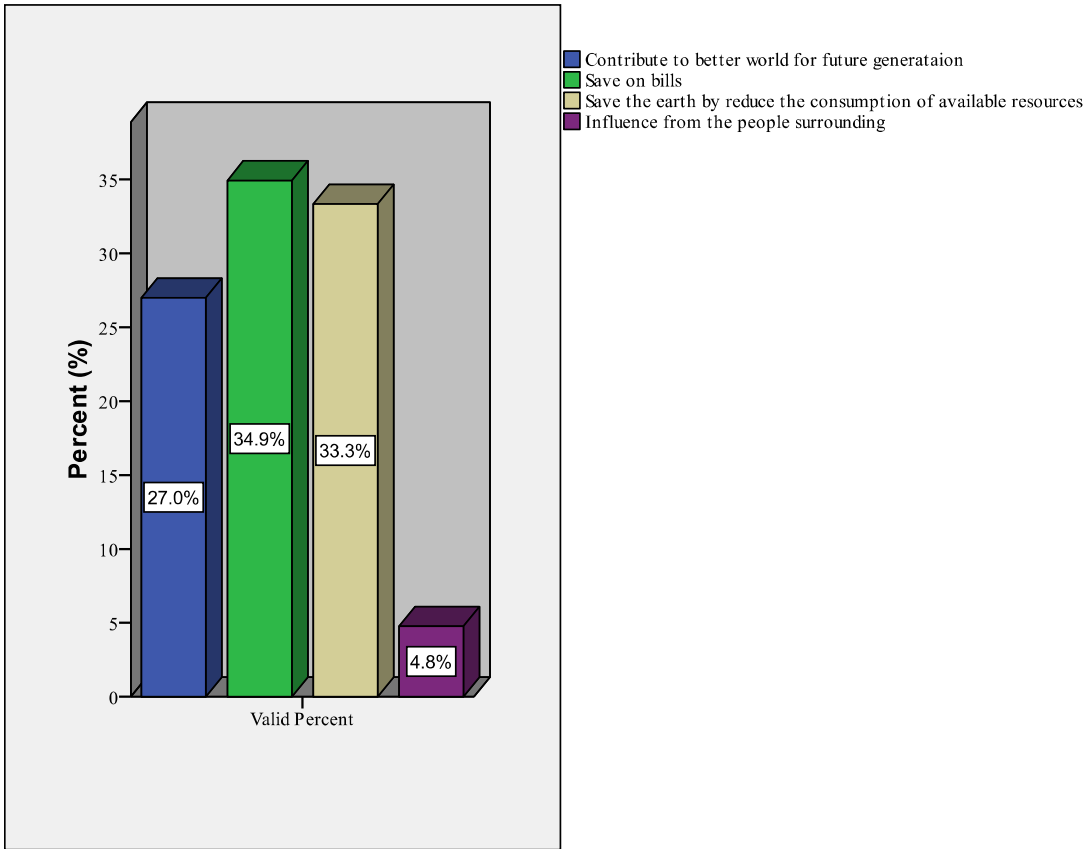

Figure 5.12 - Reasons to change to Green Technology products

Table 5.12 and figure 5.12 shows the results of the strongest reason that makes the respondents think of changing to Green Technology products. There are five reasons listed down under the questionnaire survey, but only four out of five had been chosen by all the respondents. The reason with the largest percentage choose by the respondents is save on bills, with about 34.9%. The likely reason may be as the respondents are consider about how much that they can save on the utility bills by changing to the products with green technology features. While the reason with least percentage chooses by the respondents is influence from the people surrounding, with less than 5%. This maybe because the respondents have their own opinions and ability to judge towards the purposes to changing the ordinary products with green features products. One third of the respondents had chose save the earth by reduce the consumption of available resources as the strongest reason to change to the green technology products and follow by the reason of contribution to better world for future generation, with about 27%.

5.2.3 Section C: Home appliances audit

Question 13a: Identify the household appliances currently available in your house.

Question 13b: Please identify if the selected appliances are made with green features.

Table 5.13 – Home appliances audit

Household appliances	(a)		(b)
	Yes (%)	No (%)	With green features (%)
A. Fluorescent light	68.3	-	31.7
B. Light bulbs	20.6	63.5	15.9
C. Kettle / Electric boiler	41.3	58.7	-
D. Refrigerator	84.1	-	15.9
E. Washing machine	79.4	11.1	9.5
F. Hi-fi	9.5	90.5	-
G. Television	93.7	-	6.3
H. Radio	90.5	9.5	-
I. Personal Computer	65.1	17.5	17.4
J. Power tools	7.9	92.1	-
K. Oven	28.6	71.4	-
L. Electric cooker / Stove	4.8	95.2	-
M. Electric gate	3.2	96.8	-
N. Electric heater	60.3	31.7	8.0
O. Jacuzzi	-	100.0	-
P. Iron	93.7	6.3	-

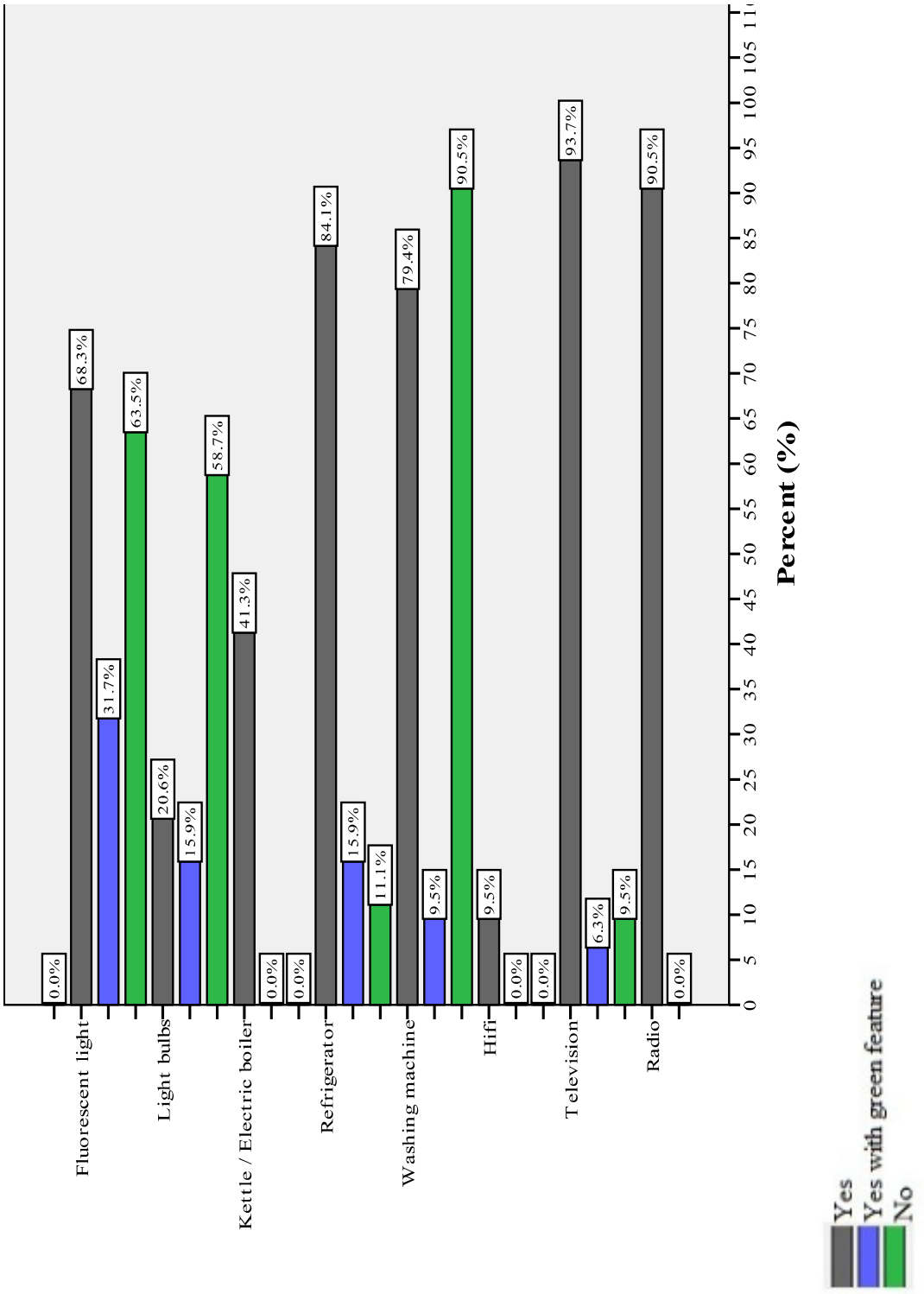

Figure 5.13 - Home appliances audit (Part I)

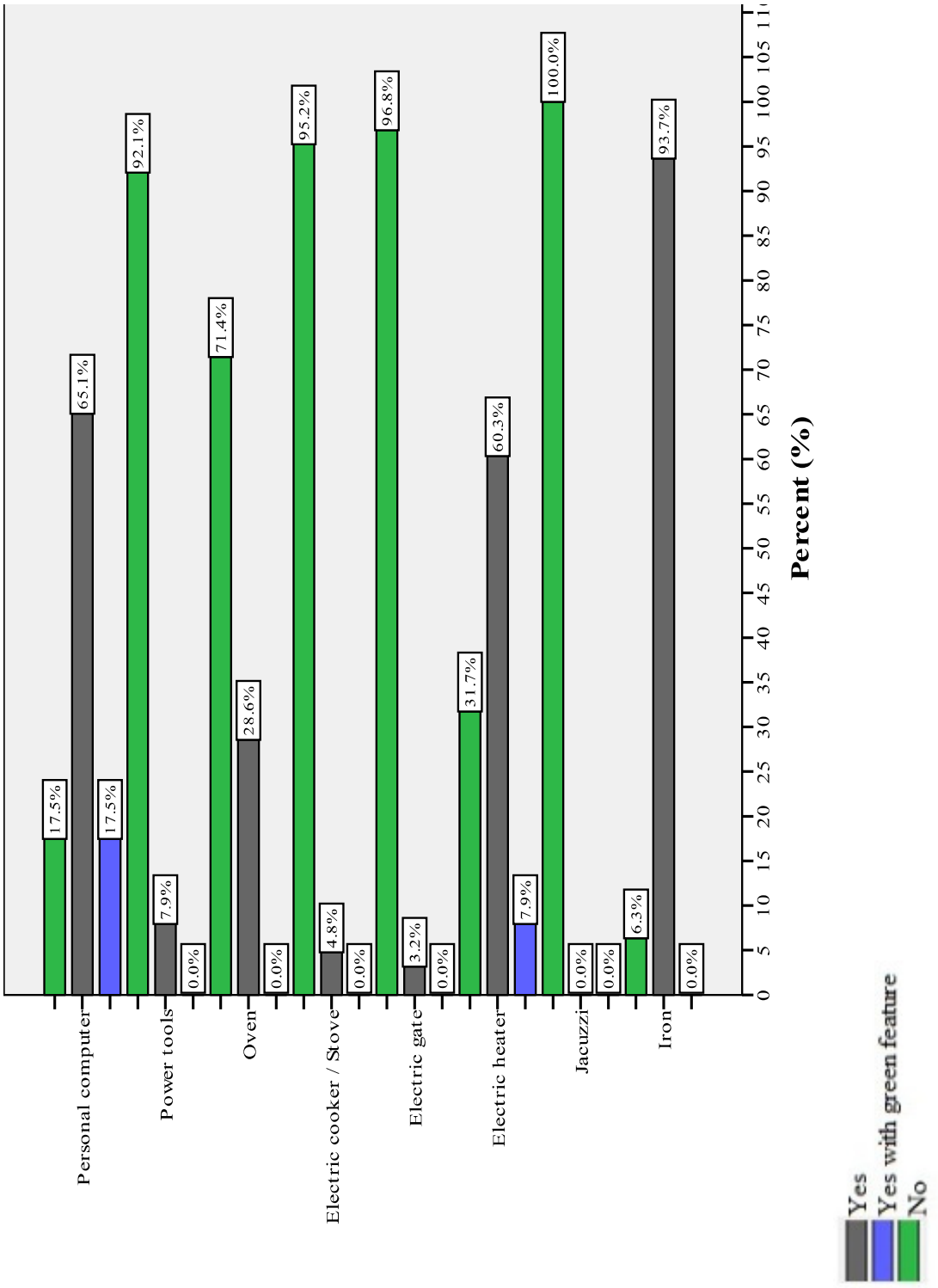

Figure 5.14 - Home appliances audit (Part II)

This question has been conducted to identify the electrical appliances that currently available in respondents' home and examine whether the selected electrical appliances are made with green features. The results from the questionnaire survey for this question are fully presented in table 5.13, figure 5.13 and 5.14. The results

are clearly shown that some of the household appliances are available in all the respondents' house, which are fluorescent light, refrigerator and television. The reason may because these kind of electrical appliances are the basic requirement for a family nowadays. Fluorescent light is the most common type of lighting in a residential house as it provides better quality of light and the life cycle cost is slightly cheaper than the light bulb. Refrigerator grants the respondents to store the foods and beverages in order to prevent the foods turn rancid and maintain the freshness of the foods at the same time. Television is one of the basic requirements for a family as it allows the respondents to receive the latest news and information from the television programme. From the results above, obviously that none of the respondents household acquire Jacuzzi in their home. The reason behind is because of the Jacuzzi is a luxury good and not a necessary for a household, thus all the respondents are not willing to purchase a Jacuzzi.

According to the data collected from the questionnaire survey, it undoubtedly shown that most of the electrical appliances that currently available in respondent's house are regular electrical appliances, which is not incorporated with the green technology features. The appliances with green features that own by some of the respondents are fluorescent light, light bulbs, refrigerator, washing machine, television, personal computer and electric heater. The highest percentage of the electrical appliances with green features that currently available in respondents' home is fluorescent light, with about 31.7%. Personal computer that incorporated with energy saving features is the second highest percentage (17.4%) of the electrical appliances with green features that currently available in respondents' home. There are two types of electrical appliances with green features gain an equal percentage of users, which are light bulbs and refrigerator. Each kind of electrical appliances has about 15.9% of total respondents that own the particular appliance. In addition, about 9.5% of total respondents that possess the washing machine are using the washing machines that made with either or both energy and water saving features. The respondents that are using the electric heater with green technology features in their home are only about 8% of total respondents that own the particular appliance. Lastly, the television that is made with green features is the electrical appliance that least available in respondents' house, only with about 6.3% although every respondent acquire television in their house.

5.2.4 Section D: Implementation & the way forward of Green Technology in Chinese New Villages

Question 14: Do you know the nearest recycle bin/ recycle centre to your house?

Table 5.14 – Awareness of the nearest recycle bin/ recycle centre

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	54	85.7	85.7	85.7
	No	9	14.3	14.3	100.0
	Total	63	100.0	100.0	

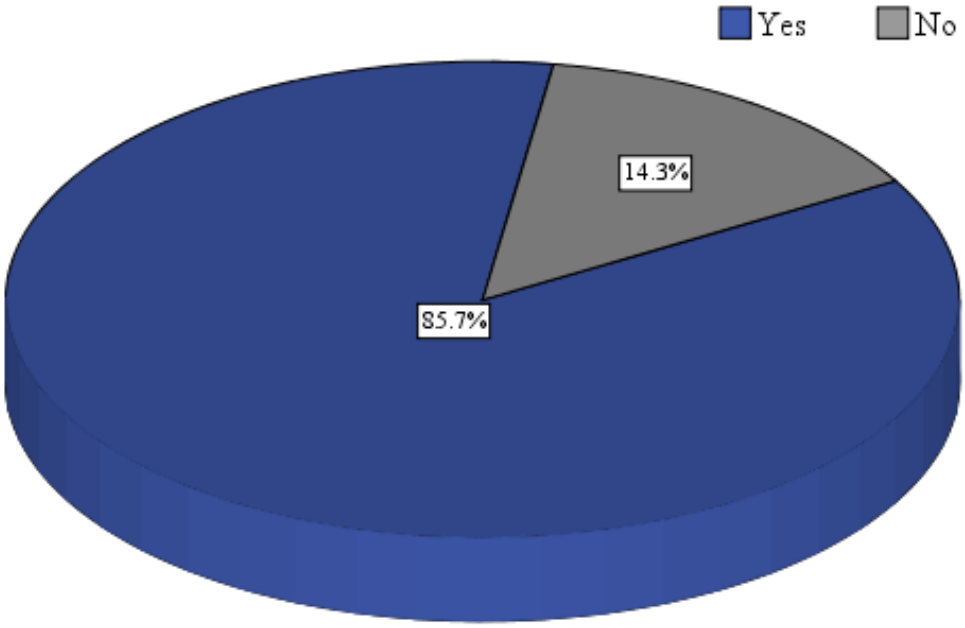

Figure 5.15 - Awareness of the nearest recycle bin/ recycle centre

The summary results from the questionnaire survey that examines the respondents' awareness of nearest recycle bin or recycle centre to their home are show in the table 5.14 and figure 5.15. From the questionnaire results, less than 15% of the respondents does not know about the nearest recycle bin or recycle centre to their home. The most likely reason may because the respondents do not aware the condition surrounding their home and lack of introduction and promotion of the recycle concepts to villagers in the village. As a result, they do not aware the nearest recycle bin or recycle centre to their house. While more than 85% of the respondents

are aware of the nearest recycle bin or recycle centre to their home due to there is a recycle centre located within the village. Another reason maybe because most of the respondents are aware about the concept of recycle and therefore aware of the location of recycle bin or recycle centre near their home.

Question 15: Have you ever joined any recycle campaign activities?

Table 5.15 – Participation in recycling campaign

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	38.1	38.1	38.1
	No	39	61.9	61.9	100.0
	Total	63	100.0	100.0	

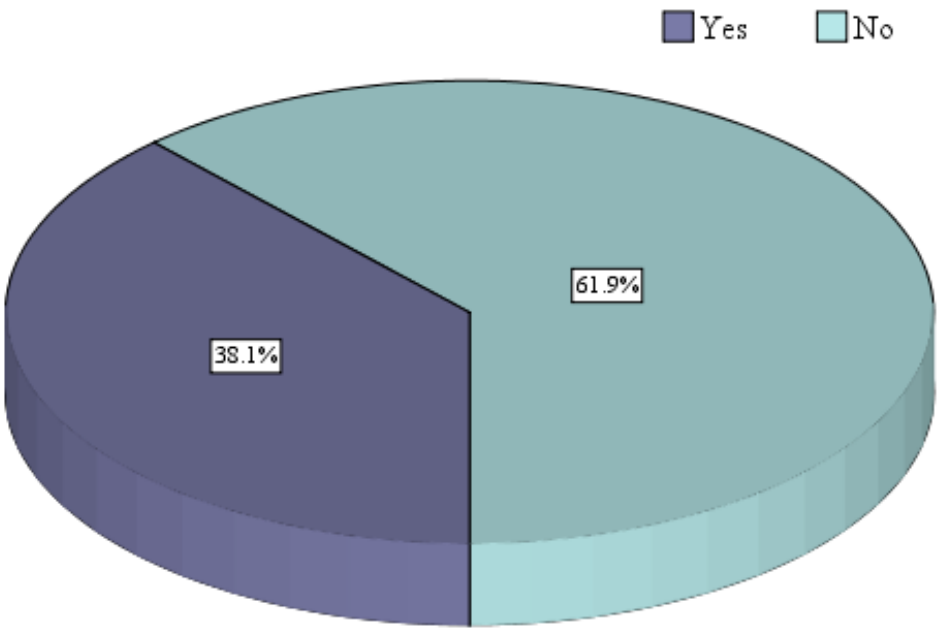

Figure 5.16 - Participation in recycling campaign

Table 5.15 and figure 5.16 above show the results of the respondents' participation of any recycle campaign activities before. Although most of the respondents are aware the nearest recycle bin or recycle centre from their home, but their participation of

recycle campaign activities are relatively less and only about 38.1% of the respondents had participate recycle campaign activities before. This perhaps because only a small portion of respondents understand the concept and importance of recycling. About 61.9% of the participants do not join any recycle campaign activities before. The reason may be due to the respondents are lack of awareness of recycle campaign activities that held in the village or surrounding area. Another reason that cause less participation of recycle campaign activities probably because the respondents do not know about the benefits that they can gain from the recycling.

Question 16: Do you separate the types of the rubbish accordingly?

Table 5.16 – Separation of rubbish

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	17.5	17.5	17.5
	No	52	82.5	82.5	100.0
	Total	63	100.0	100.0	

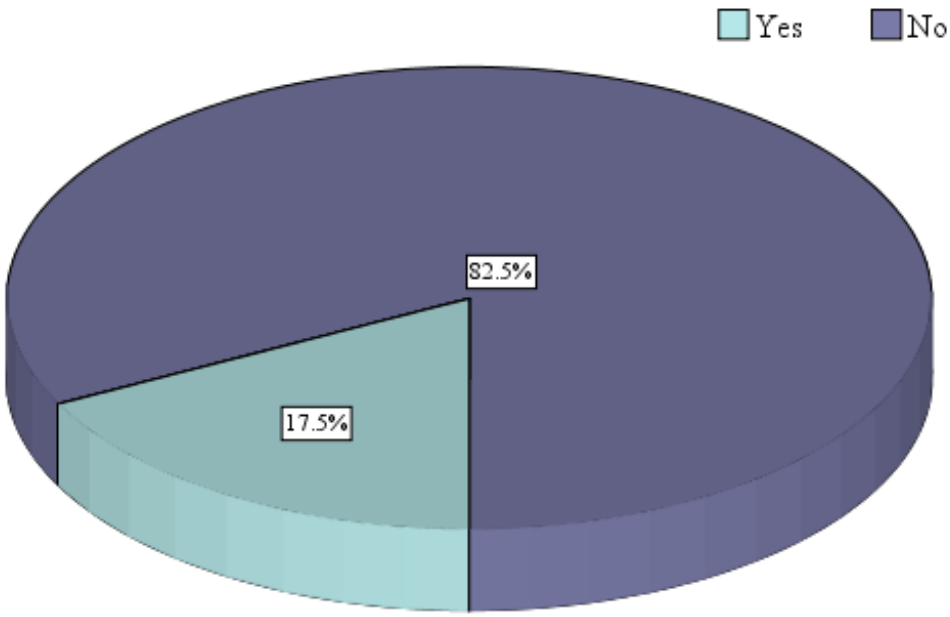

Figure 5.17 - Separation of rubbish

Every household produce waste in daily life, waste can be categories in recyclable waste and non-recyclable waste. This question is set in the questionnaire survey to examine whether the respondents has separate the types of the rubbish accordingly before throw away and the results are present in the table 5.16 and figure 5.17 above. From the results above, more than 80% of the respondents do not assort the types of rubbish accordingly before throw away. This probably because they do not aware some of the waste such as papers, metals, glass, plastics and cartons can be recycle and reuse afterward. Another reason maybe the respondents' household does not throw the rubbish into the dustbin based on the type of rubbish that can be recyclable or non-recyclable. For that reason, they will feel trouble to separate it accordingly when the dustbin is full and hence throw away the rubbish directly. Only a small amount of the respondents has separate the papers, cans and glass from other rubbish that cannot be recycle before throw away, with about 17.5%. This likely because only a small amount of respondents are aware of the benefits of recycling and willing to reduce the consumption of the available resources in order to contribute better world for their future generation.

Question 17: Do you comply with the government policy (No plastic day) by taking your own recycle bag rather than plastic beg while shopping?

Table 5.17 – Compliance with No Plastic Day

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	54	85.7	85.7	85.7
	No	9	14.3	14.3	100.0
	Total	63	100.0	100.0	

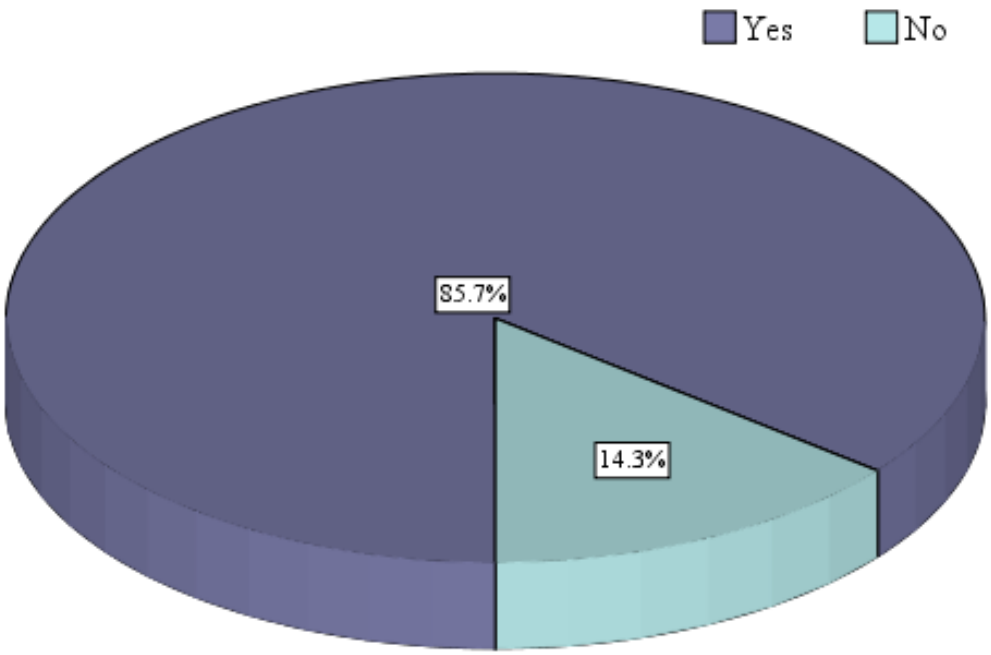

Figure 5.18 - Compliance with No Plastic Day

The table 5.17 and figure 5.18 shows the summary results of the respondents' participation to the "No plastic day" by taking own recycle bag rather than plastic bag while shopping that promoted by the government. The data shows that about 85.7% of the respondents do not bring their own recycle bag while shopping on "No plastic day". Only about 14.3% of the respondents bring their own recycle bag while go purchasing at shopping complex or some of the shops. The main reason is because the respondents forget to bring their own recycle bag to shopping on "No plastic day" and only realise it when they pay for the items that they purchase at cashier counter. Another reason is some of the respondents feel that bringing recycle bag is a troublesome matter and so they do not intend to bring recycle bag while go purchasing or shopping.

Question 18: Do you reproduce the waste food as other usage such as decomposed fertiliser or home-made detergent?

Table 5.18 – Reproduction of waste food as other usage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	7.9	7.9	7.9
	No	58	92.1	92.1	100.0
	Total	63	100.0	100.0	

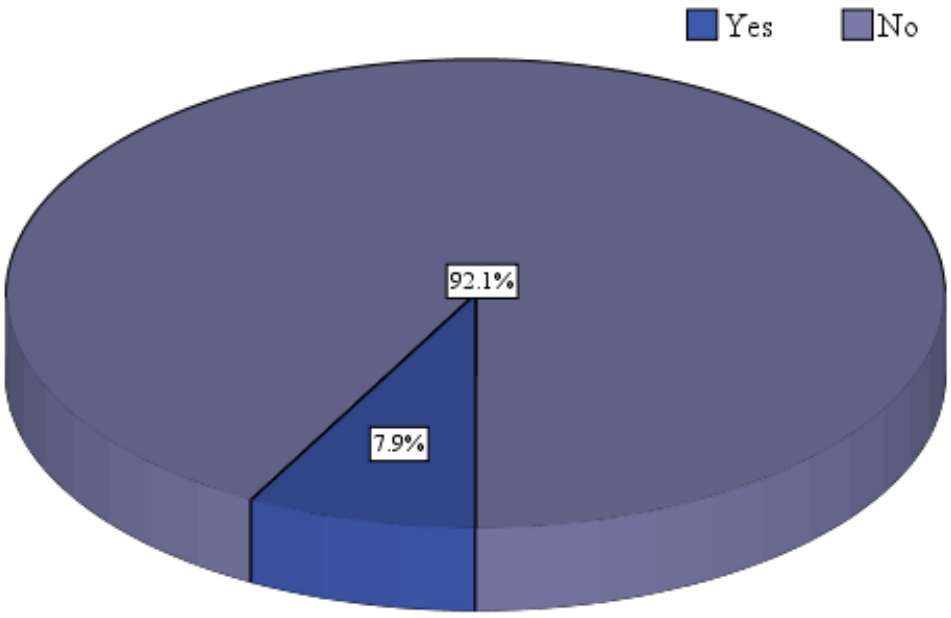

Figure 5.19 - Reproduction of waste food as other usage

This question is to examine whether the respondents has reproduce the waste food as other usage such as decomposed fertilizer or home-made detergent and the results from the questionnaire survey are fully presented in table 5.18 and pie chart above. The results clearly showed that more than 90% of the respondents do not reproduce the waste food as other usage. While only less than 10% of the respondents reproduce the residual waste foods from their daily meals as decomposed fertiliser for plants in front yard of their house and make use of the residual waste of fruits to produce home-made detergent to substitute the purchased detergent. This probably reason that only least percentage of the respondents are reproduce the waste food is

mainly because majority of the respondents are feeds their poultry or dogs with the waste foods that left from daily meal. Besides that, most of the respondents do not know the way how to reproduce the home-made detergent by using the residual waste of foods.

Question 19: Please tick (√) the level of importance about your consideration on buying Green Technology products.

Table 5.19 – Level of importance about consideration on purchasing GT products

	Level of Importance				
	Least (%)	Less (%)	Average (%)	More (%)	Most (%)
Durability	-	1.8	21.1	33.9	49.2
Cost/Maintenance Fee	-	7.3	26.3	33.9	39.0
Aesthetic (Design)	53.8	50.9	22.8	1.6	-
User Friendly	46.2	5.5	17.5	50.0	32.2
Multi-functionality	-	49.1	21.1	8.1	1.7

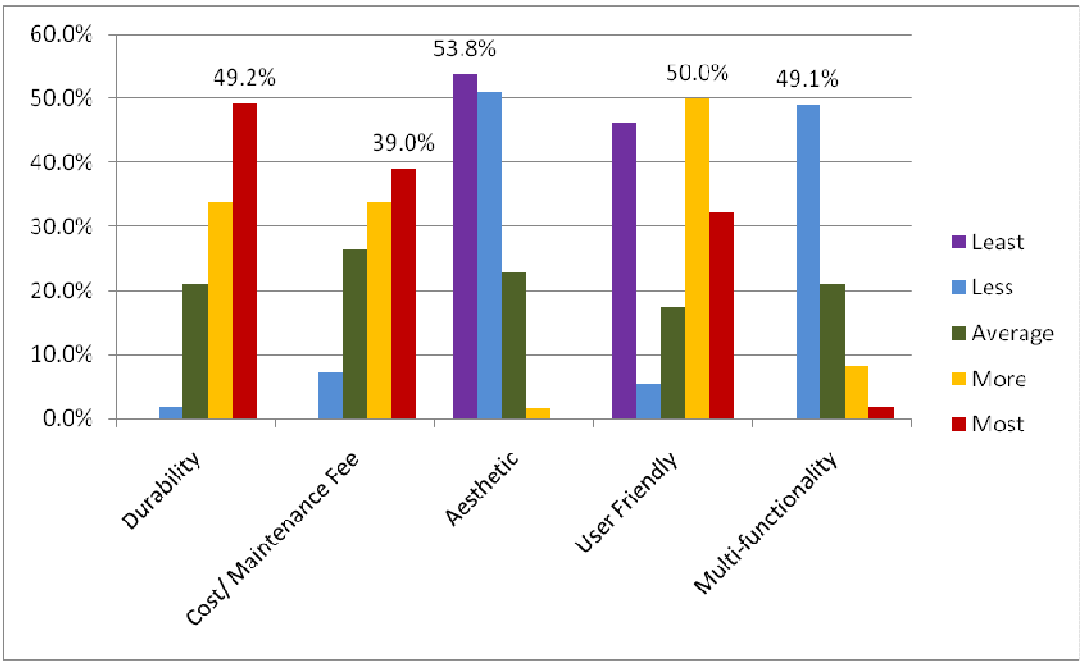

Figure 5.20 - Level of importance about consideration on purchasing GT products

A summary of the results for the question about the respondents' consideration on different criteria while purchasing products with green technology features are clearly presented in table 5.19 and figure 5.20. From the results above, there are two criteria of the products are choose as most importance consideration by respondents while purchasing green technology products and gain highest percentage from all the answered questionnaire survey, which are the durability of the product and the cost or maintenance fee for the products. Majority of the respondents think that durability of the product is most importance probably because they more emphasize on last longer lifespan for the product that purchased. Besides that, the respondents also choose the cost and maintenance fee as the most important consideration while purchasing products likely because they have to make consideration and comparison about the initial cost for purchasing the product and future maintenance cost. While the aesthetic of the product gain the highest percentage on the least importance consideration by the respondents when purchasing the green features product. This is because the respondents are mainly focus on the function of the product rather than the aesthetic. In addition, most of the respondents choose the user friendly of the product as more important consideration while purchasing the product with green feature. The reason behind is because majority of the respondents prefer to utilise the products that easy to use and learn use. Lastly, majority of the respondents think that multi-functionality of the product is less important consideration when buying the product. From the past experience of the respondents, the product with multi-functionality will breakdown easily after utilise for short period of time. For that reason, most of the respondents prefer the products with single functionality rather than multi-functionality.

"Saving the earth is a responsibility of all human nature in this planet"

Question 20: From the statement above, which of the approaches as below will be practiced as the first step in fulfilling your responsibility?

Table 5.20 – Priority in fulfilling the responsibility

Methods	Priority Level				
	Last (%)	Fourth (%)	Third (%)	Second (%)	First (%)
Purchasing Green Technology product	58.7	19.0	9.5	3.2	9.5
Reduce the usage of high energy product	15.9	20.6	31.7	25.4	6.3
Recycle and Reuse waste	-	30.2	25.4	20.6	23.8
Recommend the green products to other people	17.5	15.9	17.5	28.6	20.6
Attend talk and campaign about green technology	7.9	14.3	15.9	22.2	39.7

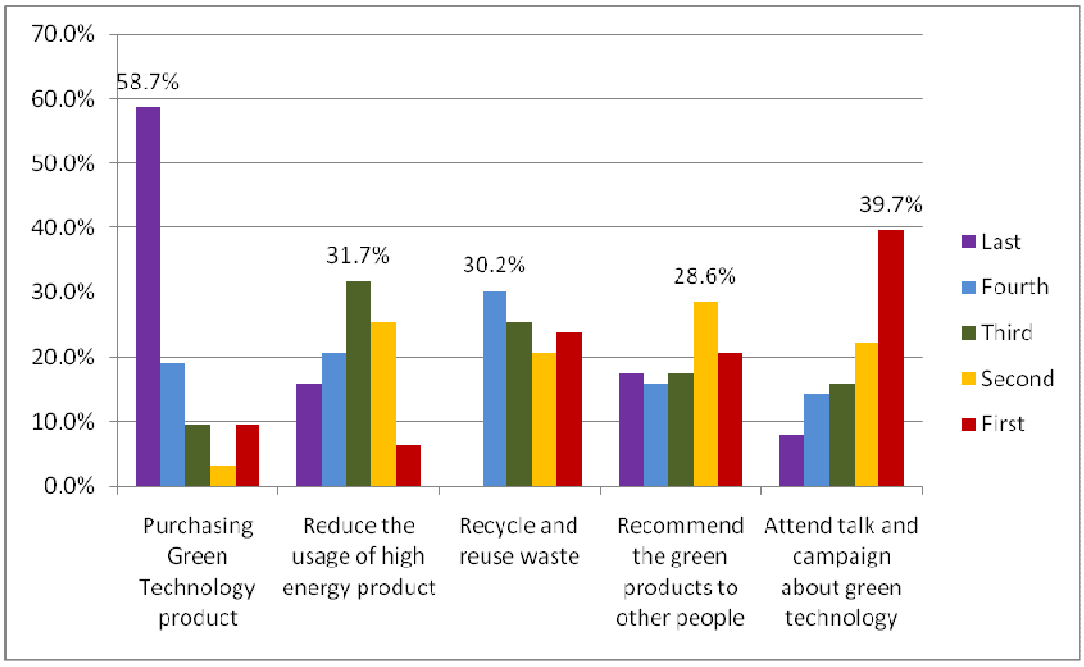

Figure 5.21 - Priority in fulfilling the responsibility

Table 5.20 and figure 5.21 shows the summary results of the priority level of approaches that will be practiced by the respondents in order to fulfilling their responsibility to saving the earth. From the results above, highest percentage (39.7%) of the respondents choose attend talk and campaign about green technology as their first step to be practice to fulfilling their responsibility to saving the earth as they will

gain knowledge and information about green technology when they attend talk and campaign. About 28.6% of the respondents choose recommend the products with green technology features to other people as second step to be adapted by them. In this case, the respondents will share their knowledge about the green technology that they gain from the campaign as well as recommend the green products to other peoples. The third step that most of the respondents (31.7%) will practice to fulfilling their responsibility is to reduce the usage of high energy product as the respondents think that by reducing the usage of high energy product will reduce the consumption of energy and thus reduce the consumption of available resources of the earth. The next step that most of the respondents will exercise in order to saving the environment is to recycle and reuse the wastes in their daily life, with about 30.2%. The reason is because by recycling and reuse the waste, it can reduce the waste as well as consumption of the available resources to manufacture or produce the products. The last step that will be run through by the respondents is to purchase the product with green technology feature with the highest percentage about 58.7%. The reason behind is because the existing ordinary products in the respondents house are still operable and therefore the respondents will only purchase and replace the product with green feature when the existing product break down.

5.3 Summary of Data Analysis

The survey and results show that most of the respondents have five or six family members and mostly under the age range of 11-20 years old and 41-50 years old. Highest percentage of the respondents' average monthly utility bill which include electric and water is around sixty one dollar to one hundred dollar (RM61-100) and commonly paid by the father within the household. Majority of the respondent are engage in agriculture and their family average income is around two thousand and one dollar to three thousand dollar (RM2001-3000).

Majority of the respondents are understood about the green technology as reduces waste by recycling and reuse the waste. Most of them are aware about green technology through the advertising and newspaper. Even though most of the

respondents aware about green technology, but only minority of them were bought green technology products before. It is because most of the respondents are agree that buying green products cost more than ordinary products. But, they are willing to start using green technology products instead of ordinary products after they realise about the benefits of the green products. While the strongest reason that makes them think of changing to green technology products is save on the monthly utility bill.

The results showed that most of the household appliances that currently available in the respondents' home are ordinary products and only a small percentage of the respondents are using green products. Most of the respondents are aware the nearest recycle bin or recycle centre from their home, but their participation through the recycle campaign activities are comparatively low. Besides that, most of the respondents do not separate the types of the rubbish accordingly before throw away as well as reproduce the waste food as other usage such as decomposed fertiliser or home-made detergent. However, majority of the respondents will bring their own recycle bag rather than plastic bag while shopping during no plastic day in the town.

From the survey results above, it prove that the most important criteria that will be take into consideration by the respondents while buying the green technology products are the durability and cost or maintenance fee of the product. Probably due to traditional thinking, most of the respondents perceived that the aesthetic of the product is least important than other criteria. The respondents are willing to attend talk and campaign in order to gain the knowledge regarding to green technology to fulfilling their responsibility to saving the environment. As conclusion, the respondents are aware about the green technology and willing to make change with their current lifestyle and start to purchase the green features products instead of ordinary products.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The awareness of the green technology in one of the Chinese New Village community within the nation has been studied in this research. Up till now, no research had been carried out to study the awareness of the green technology in the Chinese New Village community in the country. Therefore, the research presented in this dissertation is ground-breaking in the nation and useful for government in future planning.

According to the survey carried out, it has been possible to examine the level of awareness towards the green technology in the Chinese New Village Tangkak 1. After gone through the analysis from the replied survey questionnaire, the general conclusion on research intentions, based on the literature review and questionnaire survey results are as follow:

- The first objective is to collect the data on the level of awareness of Chinese New Village community on the adoption of Green Technology. According to the data obtained from the questionnaire survey, the adoption of the Green Technology in the selected village is still comparatively low. Obviously only a minority of the villagers are currently using the products with green features. Fortunately, majority of the villagers are willing to adopt the products with Green Technology features.
- The second objective of the research is to define and study the scope of Green Technology. From the literature review above, the definition and goals of

Green Technology had been clearly defined it. While the studied in the major areas of Green Technology as well as the roles of Government in Green Technology had clearly described the scope of the study.

- The last objective of this dissertation is to create the awareness of Green Technology towards the Chinese New Village community. Through the questionnaire survey had been carried out, the level of awareness of Green Technology among the villagers had been increased as they had gained more information and knowledge regarding to Green Technology from the survey questionnaire.

As a conclusion, it found that the research had reached the aim and objectives. The villagers are aware about the Green Technology and willing to implement certain practices in order to save the environment. It is also clear that further research is necessary in order to increase the level of awareness of Green Technology in other Chinese New Village in the country.

6.2 Recommendation

Based on the results of the survey questionnaire, few of the recommendations had been suggested in order to increase the level of awareness of Green Technology among the villagers and the adoption of products with green features. First and foremost, the government should enact a public policy which integrate the information and knowledge of Green Technology in the academic education especially for primary and secondary school, so that the children and youths will gain the knowledge of Green Technology during study in the school. Besides that, the government should not only award the rebate voucher for the consumers who purchase of 5-Star rated refrigerators, air-conditioner or chillers, however, the rebate voucher shall be award for the purchase of other kinds of electrical appliances with green technology features as well.

Advertising and newspaper are the medium that convey the information regarding to Green Technology to the community. For that reason, related authorities

are playing an important role to promote the Green Technology to public through the advertisement and newspaper. Government also play an important role to promote the adoption of Green Technology in Chinese New Village community, various campaigns and talk regarding to Green Technology shall be organised by related authorities in each village in the country. The survey results showed that most of the respondents willing to attend the talk and campaign to further understand and gain knowledge about the green technology.

Other measure that could be implemented by the government is to encourage local manufacturer to producing appliances or products that equipped with green technology features as well as provide subsidies for the manufacturer on materials that require to manufacturing the green products. By taking this measure, the manufacturing costs that require pay by the manufacturer will reduce and hence attract more manufacturers to producing green features products rather than ordinary products. Furthermore, the selling price for green products in market will reduce comparatively and therefore attract more consumers to purchase green products.

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