

**NUCLEAR POWER ACCEPTANCE IN TAIWAN-A SURVEY STUDY OF
CITIZENS IN THE NANZI AREA**

By East Chiu

邱省彌

Submitted to the Faculty of
Department of International Affairs in partial fulfillment
Of the requirements for the degree of
Bachelor of Arts in International Affairs

Wenzao Ursuline College of Languages

2019

WENZAO URSULINE UNIVERSITY OF LANGUAGES DEPARTMENT OF
INTERNATIONAL AFFAIRS

This senior paper was presented

by

East Chiu

邱省彌

It was defended on

November 30th, 2019

and approved by

Reviewer 1: Shao-Tzu Wu Assistant Professor, Department of International Affairs

Signature: _____ Date: _____

Reviewer 2: Yuan Ming Chiao Assistant Professor, Department of International Affairs

Signature: _____ Date: _____

Advisor: Daniel Lin, Associate Professor, Department of International Affairs

Signature: _____ Date: _____

Copyright © by East Chiu 邱省彌

2020

Nuclear Power Acceptance in Taiwan: A Survey Study of Citizens in the Nanzi Area

Sheng-Mi Chiu 邱省彌

Wenzao Ursuline University of Languages, 2019

ABSTRACT

In Taiwan, nuclear policy has been always a thorny issue. It often relates to political conflict of various interests. In this background, people in Taiwan seem not really having a consensus on the use of nuclear energy. To understand people living in the most polluted area in Taiwan, this survey study collected 249 valid questionnaires from Nanzi citizens to explore their perspectives to various nuclear issues.

The findings showed that most citizens held positive attitude toward nuclear usage. Also, most subjects had basic cognition of nuclear power. The level of their cognitions influenced their degree of acceptance of nuclear power. People without political preference were more willing to pay close attention to nuclear issues. This research increased our understanding of the Nanzi residents' perceptions on nuclear energy and contributed to people's understanding of Taiwanese attitude toward nuclear power.

Keywords: Nuclear power, Nanzi, Nuclear cognition, Nuclear acceptance

Table of Content

INTRODUCTION.....	- 1 -
Background	- 1 -
Energy Density.....	- 3 -
Referendum.....	- 3 -
Motivation	- 4 -
Research Purpose.....	- 5 -
Research Question	- 5 -
Contribution	- 5 -
Limits	- 5 -
Delimits	- 6 -
LITERATURE REVIEW	- 7 -
Nuclear Power	- 7 -
History of Nuclear Power.....	- 7 -
Debates on Nuclear Power Generation	- 8 -
Nuclear Acceptance	- 9 -
Demand of Taiwanese	- 9 -
Development of Nuclear Policy	- 10 -
Debates on the Nuclear Policies	- 11 -
Nuclear Power Acceptance in Taiwan.....	- 12 -
Development of Nuclear Policy in Taiwan	- 12 -
Political Party to the Nuclear Policy	- 13 -
Observed Problem of These Policies	- 14 -
Significance of Nanzi Area	- 16 -
History of Nanzi Area	- 16 -
Connection to Nuclear Power Acceptance	- 17 -
METHODOLOGY	- 19 -
Research Design	- 19 -

Sources of Data.....	- 20 -
Instrumentation and Data Collection	- 20 -
Tools for Data Analysis	- 21 -
DATA ANALYSIS	- 22 -
Data Introduction	- 22 -
Basic Information	- 22 -
Factor Analysis	- 23 -
Factor Discussion.....	- 26 -
Research Question One	- 27 -
Filter of the Level of Understand Toward Nuclear Issues	- 29 -
Finding One	- 30 -
Research Question Two	- 30 -
Diversified Development of Energy Policy.....	- 32 -
Finding Two	- 34 -
Research Question Three	- 34 -
Finding Three	- 37 -
CONCLUSION.....	- 38 -
Discussion	- 38 -
Finding One	- 38 -
Finding Two.....	- 38 -
Finding Three.....	- 39 -
Research Conclusion.....	- 39 -
BIBLIOGRAPHY	- 41 -
APPENDIX.....	- 44 -
Questionnaire.....	- 44 -
Coding Book.....	- 48 -

INTRODUCTION

Background

Nuclear power is a very important power. It provides about 11% of electricity every year, and it is also the second largest source of low-carbon power.¹ Therefore, it widely adopted in each country since it rather cheaper than the other resources if the one lack of natural resources. It might cause a lot of problems, however, after that the nuclear power still developing in most of countries. For example, after the 311, Japan almost suspend all the nuclear power plant, nevertheless, they still restart few of the power plants due to the huge amount of expenses on the fuel. People in there aware that nuclear power still irreplaceable. Abe, who stands for relaunch the nuclear power, win the election, which also indicated that Japan people could not sustain their supply without nuclear power. Germen also hit the barrier because of no nuclear power project, but high electricity price, high carbon dioxide emissions, lots of social problem happened still shake the determination of German government.²

Taiwan is very suitable for nuclear power generation because lack of natural resources. Taiwan had four nuclear power plants, three of them were in service. Fourth plants still mothball. The risk of nuclear power being magnified in Taiwan. The Democratic Progressive Party (PPT) has a policy of phasing out nuclear power by 2025.³ Compared to the goal of 2025, Tsai administration still have lots to work.

¹ World Nuclear Association, "Nuclear Power in the World Today," last modified Feburary 2019, accessed April 5, 2019.
<http://www.world-nuclear.org/information-library/current-and-future-generation/nuclear-power-in-the-world-today.aspx>.

² The Wall Street Journal, "World's Dumbest Energy Policy," last modified Jan 29, 2019, accessed April 9, 2019. <https://www.wsj.com/articles/worlds-dumbest-energy-policy-11548807424>.

³ World Nuclear Association, "Nuclear Power in Taiwan," last modified November 2018, accessed April 5, 2019.

Taiwan is not mature enough to adapt the green energy generation currently. The green energy generation means use solar power, wind power, hydroelectric power, etc. Generally, the green energy power will not cause the carbon dioxide in the process. Currently, government focus on develop wind power and solar energy. However, both method all faced the dilemma.

In the solar energy, government tried to appeal Taiwan people to install the solar panel on the roof. In the same time, the extra electricity residents could sell back to the TPC. But this kind of policy need the complete support of law, and our law still immature to attract people's incentive. On the other hand, the wind power demand huge territories. Therefore, Taiwan government decided to push offshore wind power generation, but the cost was relatively high. This method is to build the wind power turbines in the ocean which would not occupy the land space. It might sound work, nevertheless, the cost of the offshore wind power is twice of onshore wind power.⁴ Generally, the wind power in worldwide were mainly onshore, the offshore just for complement. Also, the power spiked period in Taiwan was summer, However, Taiwan prevailing northeast monsoon, the peak of wind power only in fall and winter, wind power generation would be useless during the time we need most.

Second, Taiwan is an island, if Taiwan government decided to decline the ratio of nuclear power generation to develop renewable energy, in the transition period, the proportion of thermal and gas generation will raise. Taiwan rely on import energy, such as gas or coal, which might increase the price of electricity. Thirdly, our population density was ranked eighth. We do not have enough territories to set the green power facilities since most of them were low energy density.

<http://www.world-nuclear.org/information-library/country-profiles/others/nuclear-power-in-taiwan.aspx>.

⁴ 陳立誠, 能源與氣候的迷思, 2兆元的政策失誤 (獨立作家, May 26, 2015).

Energy Density

The energy density means the energy produce in every unit area. One of the weakness of green energy is low energy density.⁵ In this condition, energy density require a huge land than the nuclear power or thermal power, etc.

In Taiwan, hydroelectric power generation is the main method of renewable energy. Although Taiwan have abundant water resources, it is hard to break through the upper limit of hydroelectric power generation since Taiwan island was long and narrow.

Referendum

Taiwan's nation currently still needs nuclear power. In 2018's referendum, seventh act: "Do you agree the electricity output of thermal power plants should be lowered by at least 1 percent per year on average?" and eighth act: "Do you agree Taiwan should not construct any new coal-fired power plants including the Shen'ao Power plan which has been temporarily announced to stop expansion?" both pass the settlement. However, in sixteenth act: "Do you agree the continuation of using nuclear energy-based power-generating facilities in Taiwan?" also pass the settlement. The results showed that our nations believe we can keep using the nuclear power and reduce thermal power generation at same time.⁶ Therefore, in 2019, Taiwan's government also meet the demand of referendum to revise the Electricity Act stop using nuclear power generation before 2025.

⁵ 陳立誠, 台灣的能源災難 (宋政坤, Febrary 2018), 3.

⁶ 中選會, "台灣公民投票 2018," last modified November, 2018, accessed Nov,2018, April 9, 2019. http://referendum.2018.nat.gov.tw/pc/zh_TW/IDX/indexFF.html.

Motivation

Many Taiwan people did not really have a consensus about nuclear power. People were misleading by the wrong message, for example, there were lots of wrong information on the internet or mass media. Normally, people would believe what they saw instead of thinking. It is not only put the blame to mass media or other interest group, even our government did not convey the correct information about nuclear power. It is obvious to see political power intervention the media.

According to President Tsai's energy policy goal in 2025, the ratio of energy supply should be renewable power 20%, natural gas 50%, coal 30% and 0% of nuclear power. Government tried to replace the nuclear power by the green energy generation and raised the gas power generation as well to stable the power supply. However, government did not really evaluate Taiwan's situation properly. According to the data provided by TPC, Taiwan's renewable supply only account for 5% in 2018⁷. Compared to the goal of 2025, Tsai administration still have lots to work.

Therefore, to understand the attitude of citizens who live in the most polluted area would be very important. Nanzi, in Kaohsiung city ranked 525th in the Pm2.5 world ranking and it's the top in Taiwan.⁸ If Taiwan decided to phase out the nuclear power, the first affected city might be the Nanzi, which suffered from air pollution.

⁷ 台灣電力公司, "再生能源發展概況," last modified April 9, 2019, accessed November 1, 2019. <https://www.taipower.com.tw/tc/page.aspx?mid=204>.

⁸ IQAir AirVisual, "World Most Polluted Cities 2018 (Pm2.5)," accessed April 7, 2019. <https://www.airvisual.com/world-most-polluted-cities?continent=&country=&state=&page=1&perPage=50&cities=T2nap5QamgYjAPmKt,>

Research Purpose

The purpose of study is to identify the nuclear power acceptance in the Nanzi area and Citizen's cognition toward nuclear power.

Research Question

1. What is the influence of people's level of understanding on their attitudes toward nuclear acceptances?
2. What are the differences between male's and female's attitudes toward nuclear Issues?
3. What is the relationship between nuclear power acceptance and party affiliations?

Contribution

The finding of this research is to understand the citizens' attitude in the Nanzi area. To clarify the opinion of people who live in high-polluted area would be important since they were impact on the nuclear policy. It also helpful to the similar research that trying to figure out Taiwan people's attitude toward nuclear power.

Limits

Personally, the research not a special field of nuclear power study, also not capable to do the research compare each power generation. Therefore, it is hard to compare to those academic papers. This research tried to focus on the people's attitude toward this big issue, to observe the difference between citizens.

Delimits

As a college student, it was unaffordable to investigate big range, not only the time limit but also the economic aspect, so Nanzi area was the best choice for me since its significance, which could represent the most polluted area in Taiwan.

LITERATURE REVIEW

Nuclear Power

History of Nuclear Power

Nuclear was produced for the war in the beginning. In 1939 to 1945, most of the nuclear power was designed for the atomic bomb. After the end of the war, people saw the power and potential of this energy, the intention change into the electricity purpose.⁹ The first nuclear power plant Calder Hall was built in Windscale, England, in 1956. At that moment the universal change the view about this destructive energy. Since that time the nuclear power became the commercialize and adapted to variable countries, but still some of countries committed to R&D the nuclear energy as the military purpose in that period, such as America and Soviet Union. During the cold war, both powers competed to each other by producing the nuclear bomb and caused the balance of terror. After the sign of the NPT (Treaty on the Non-Proliferation of Nuclear Weapons), international society started to constraint the usage of nuclear power. However, things really improved until the dismissed of Soviet Union, both super powers don't need to produce that much atomic bombs anymore. Currently, the trend of nuclear power became energy usage.

⁹ World Nuclear Association, "History of Nuclear Energy," last modified April 2019, accessed April 29, 2019.
<http://www.world-nuclear.org/information-library/current-and-future-generation/outline-history-of-nuclear-energy.aspx>.

However, the prospect of this new energy steadily deteriorates. Lots of nuclear disaster happened such as 1979 Three Mile Island accident or 1986 Chernobyl disaster, these tragedies let people shake people's confidence toward this new energy. Thus, many scientists tried to reduce the impact of nuclear power. For example, Finland build up a place for permanent nuclear waste storage.¹⁰ It was a 400 meters deep cave. Face the struggle of nuclear power, Finnish decided to make friend with it. On the other hand, some of the countries seek for the alternative resources such as Germany. Their government hardly push the renewable power generation to replace nuclear power.

Debates on Nuclear Power Generation

Nuclear power generation is widely use currently. Many developed or developing countries took use of nuclear energy. It has many advantages such as no carbon emission, cost-effective, reliable and stable.¹¹ Most important, it meets our demand of decline climate change. Many scientists had point out that human kind should decrease the greenhouse gas emission so as not to endanger the living of creatures or even self-destruction. Because human already noticed the power of this energy, the nuclear power generation indirectly solve the problem of this universal issue since its no carbon emission. Although gas fired power generation also can reduce the air pollute, but the cost was high. Some of voice support this idea to use nuclear as our future main method of power generation.

¹⁰ 端傳媒 x 公視獨立特派員, "走進芬蘭核廢墳場，一探關於「十萬年」的信心和懷疑," accessed November 1, 2019. <https://theinitium.com/article/20190606-taiwan-pts-finland-nuclear/>.

¹¹ EDF ENERGY, "What Are the Advantages of Nuclear Energy?," accessed April 29, 2019. <https://www.edfenergy.com/for-home/energywise/what-are-advantages-nuclear-energy>.

There still lots of unsolved problem in this new power generation. The disadvantages included the store of nuclear waste, potential devasting and the cost of one nuclear power plant is expensive.¹² Not many countries affordable for its disadvantages especially the undeveloped countries. Also, the power plants rely on high technology that it's impossible to those countries build themselves. Moreover, this kind of energy generation would produce the nuclear waste which might release the radiation if did not process it properly. However, human is incapable to handle the nuclear power waste, what we do is to store those radioactive waste and waiting it decays with time. Not in my back yard, also called NIMBY. No one expect the waste being putted in the community, people's concern is that the radiation might cause harm to their body or even their children. We all know that it reduced the carbon emission, cost relative cheap compare to other energy generation, but we just do not want it in our living environment. Therefore, the biggest issue currently is how to decompose the nuclear wastes and where to build such facilities to store.

Nuclear Acceptance

Demand of Taiwanese

The demands of Taiwanese were very complicated. Many people are trying to understand especially the government officials since it dominant the future of government. In political perspective, nuclear issue usually being manipulate as chips. Superior went through the operation of nuclear issue to steady its regime. Political parties or interest parties take use of media to publicize its opinion might cause the chaos since do not have consensus. Usually, people care about their living standard since it is the most intuitive thing that impact their livelihood. However, nuclear

¹² CONSERVE ENERGY FUTURE, "What Is Nuclear Energy?," accessed November 1, 2019. https://www.conserve-energy-future.com/disadvantages_nuclearenergy.php.

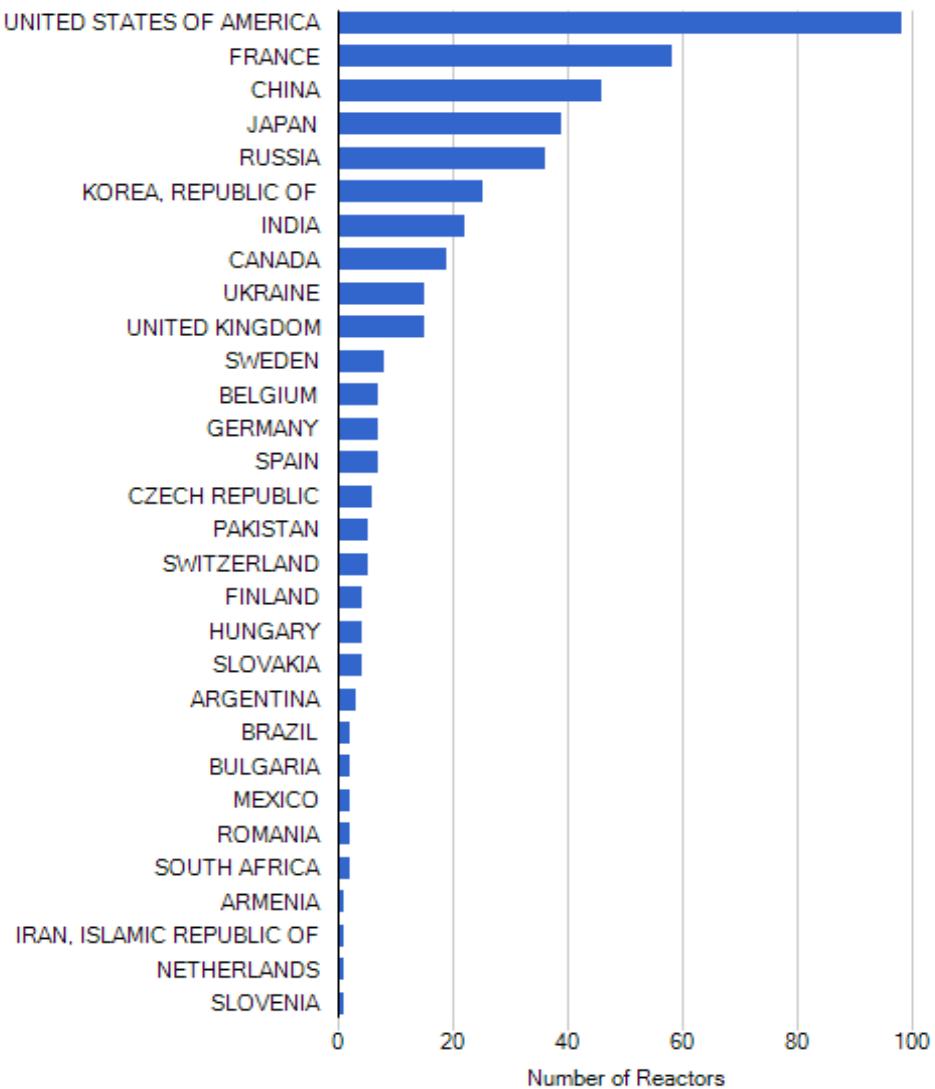
power is a complicated issue. On the one hand, nuclear did solved the problem of carbon emissions, low expense also stable the electricity price, but on the other hand, its potentially devastating also deter the voice. Generally, people like a quiet, fast and cheap energy, common people not really care about the carbon emissions or climate change especially when they do not have a good life. Therefore, the demand of Taiwanese become a complicated issue since it is very contradictory.

Development of Nuclear Policy

Most of time government tried to find the balance between the nuclear energy usage and public opinion. It is the key whether they can re-election in the next year. The trend of the world is to decrease the nuclear power since the potentially devastating. Firstly, nuclear power is a very high threshold industry, it demands huge funds to build a power plants, only few of countries capable to build one themselves. So many limits let the nuclear power tend to centralize in minor countries. For example, in 2017, the USA, France and China account for majority of nuclear generation in the world.¹³ The statistic shows that only minority of developed countries capable to handle the huge amount of nuclear power plants. It is hard for developed countries to build a nuclear power plant.

Many of countries now tried to decline the usage of nuclear power and transform to other alternative power such as wind and solar power. The uncertainty of nuclear power and high threshold make lots of countries seek for renewable energy to replace the nuclear power. However, not all the countries succeed.

¹³ IAEA, "Operational & Long-Term Shutdown Reactors," accessed June 3, 2019. <https://pris.iaea.org/PRIS/WorldStatistics/OperationalReactorsByCountry.aspx>.



Sources: IAEA PRIS Database

Debates on the Nuclear Policies

In democratic country, the nuclear policy usually being operated as a chip. It might cause the problem the policy being formulated by the government not really meet the maximum benefits to all the nations. Basically, there are two factions, one stands for nuclear power, another rejects the nuclear power. The government's policies usually influenced by these two major voices. The one who stands for nuclear power promote its stability and low carbon emission, they think nuclear power could

be a way to solve the climate change. Another voice thinks human should develop the green energy instead of such dangerous power, currently people are not capable to handle nuclear power. However, the mass media exaggerate the impact of nuclear power since political reason. In Taiwan, we can obviously observe that media was operated by political power. Parties paid for the media to separate specific issue to control public opinion. In fact, this not only happened in Taiwan, many democratic countries all face this awful situation. In confront of these two factions, government's decision blow hot and cold. It is tough to make decision on both side since they must put their re-election into consideration. No single political party could afford the outcome. That is why Taiwan's nuclear policies always changing.

Nuclear Power Acceptance in Taiwan

Development of Nuclear Policy in Taiwan

The development of Taiwan's nuclear policies also followed the global trend to decrease the nuclear power generation. Most Taiwan people still fear about the nuclear power. Taiwan at the earthquake zone, nations afraid of the disaster like 311 would happen in Taiwan. Also, the nuclear wastes currently are putted in power plants and Lanyu. In 2002, TPC (Taiwan Power Company) promised to move out the nuclear waste storage from Lanyu, however, TPC still tried to find a place to store the waste. NIMBY problem also happened in this case. Whenever a new place being putted into consideration, the citizen in that place would against the government, NIMBY almost happened in every method of power generation even green energy, but people's reaction to nuclear power is much serious compare to other resources. Thus, until now TPC cannot find a suitable place for storage.

Secondly, in the election of president in 2018, PPT parties promised that nuclear power generation will all be shut down before 2025. In the referendum of 2018, the result puzzled the government. Therefore, government noticed that it is impossible to stop all the nuclear power plants in 2025 and revise the law. These results also indicated that Taiwan people really do not have consensus of nuclear power.

Political Party to the Nuclear Policy

In Taiwan, nuclear energy always not a simple issue to whole nations. It involved to the political factor. Basically, PPT hoped to replace the nuclear power by the renewable power generation. In the past, they support, or launch varies of protest action on anti-nuclear power. In the legislation, they keep pushing forward the related bills to accomplish their goal. From Andy Stirling's exclusive interview, he mentioned that if government tried to get rid of an old system to build up a regime, "qualities of democracy" was very important.¹⁴ The qualities of democracy include Transparency and accountable.

On the other hand, KMT party compared to PPT party, their opinion toward nuclear issue were not that identical. Their attitude to the nuclear power also relative loose. They think whether to shut down or not still have space for discussion, maybe we do not need to shut down all the nuclear power but to decrease the using amount. Therefore, it is quite normal to see KMT party assail PPT's policy.

¹⁴ Taiwan Environmental information Center, "透視「非核不可」迷思（三）：正視核能科技的政治性，讓能源辯論「轉大人」，" last modified July 25, 2019, accessed Novemeber 1, 2019.
<https://e-info.org.tw/node/219229>.

Currently, government tried to replace the nuclear power by the renewable power generation. The final goal of Taiwan government is to develop this method to complete replace nuclear power. However, the opposite party, KMT, criticism PPT party shut down all the nuclear power plants hastily would lead the shortage of electricity. Also, before the renewable energy generation become mature, government would rely on thermal power generation which increase the carbon emission and cause the air pollution. That is the reason why Taiwan's nuclear policy always blew hot and cold and do not had a conclusion.

Observed Problem of These Policies

Government should evaluate Taiwan's situation properly and find a suitable nuclear policy. There are four dilemmas that Taiwan's energy policies faced. First, Taiwan is a dependent electrical grid, however, European countries have a large synchronous grid that when they encounter the shortage, they could borrow the electricity from other countries.¹⁵ This also helpful to solve the transition period of adapting renewable power generation. Taiwan is an independent sea island and the closest country would be China. It is impossible to Taiwan build a submarine power grid connect with China due to political reasons.

Secondly, according to the statistic of IEA, Taiwan's energy self-sufficiency was ranked countdown to eighth place in 2017.¹⁶ According to the data provide by Bureau of Energy, our self-sufficiency energy only account for 2%.¹⁷ Most of our fuels for power generation were import with 47% oil, 13% gas, 6.3% nuclear fuel and 30% Coal. Our nearby country Japan pass the "The 5th Strategic Energy Plan" to raise the

¹⁵ JRC Smart Electricity Systems and Interoperability, last modified 16 April, 2019, accessed April 29, 2019. <https://ses.jrc.ec.europa.eu/transcontinental-and-global-power-grids>.

¹⁶ IEA Atlas of Energy, "Overall Energy Self-Sufficiency," accessed November 10, 2019. <http://energyatlas.iea.org/#!/tellmap/-297203538/1>.

¹⁷ Ministry of Economic Affairs, 能源供需概况分析 (Bureau of Energy, 2019), accessed November 1, 2019.

ratio of nuclear power generation and renewable power generation. Separately 20-22% and 22%-24%. Japan also the sea island like Taiwan, there self-sufficiency was ranked countdown to tenth place in 2017. They also noticed that nuclear power was necessary currently. If Taiwan wants to rely on the gas fired power generation to pass over the transition time, the electricity price will collapse since the expensive cost of gas fuel.

Thirdly, Taiwan's territory is small. In the chapter of background had mentioned that the concept of energy density. If government really want to develop the green energy, the problem of Taiwan's limited territory was a big problem. Among Taiwan's renewable energy, hydroelectric power generation account for nearly 40% and was the biggest power generation in Taiwan's renewable power generation¹⁸. However, it encounter the obstacle to break through the upper limit since size and terrain of Taiwan island.

Taiwan government's policies toward nuclear power should be the same no matter change the ruling party or not. That means the nations should build a consensus to nuclear power policy, however, among the fight of two major party, it is very difficult to let people build up a consensus. Like now the PPT party tried to replace the nuclear power generation by green energy, still a minus voice who stand for nuclear power against government's policy. They think government should re-consider about the possibility of nuclear energy. Therefore, indefinite the policy that Taiwan truly demand was the unsolved problem to Taiwan's nuclear issue.

¹⁸ 台灣電力公司, "再生能源發展概況," last modified April 9, 2019, accessed November 1, 2019.
<https://www.taipower.com.tw/tc/page.aspx?mid=204>.

Significance of Nanzi Area

History of Nanzi Area

Nanzi area is the heartland of heavy industry. In the past, Nanzi area have the first processing zone in Taiwan. Government set up Nanzi processing zone to expand the foreign trade and attract the investment. Also, China Petroleum Corporation set up the refinery in Nanzi, in 1968, the first naphtha cracking plant located in Nanzi, in 1975, the second plant also located in here. During these times, the pollution arouses the citizens' dissatisfaction. In 1994, CPC planned to set up the fifth naphtha cracking plant in Nanzi become a trigger. Citizens launched a series of protest in Houjing. Citizens and students cooperate with each other against the government. In 1990, in the permission of government, they hold the first referendum for this issue, sixty percent of people rejects the plan. It's a milestone of environmental movement after lifting the martial law. Although the referendum did not change the result, but the government committed to the citizen to move out the plant in twenty-five years.¹⁹ It is hard to see this kind of movement during that time because people were not get used to protest to government. Thus, it is a valuable experience not only to Nanzi but also Taiwan's environment awareness.

¹⁹ 廖于璋 李根政, 堅持 : 後勁反五輕的未竟之路, ed. 透南風工作室 (台灣: 透南風工作室 October 21, 2015), 73.

Connection to Nuclear Power Acceptance

Nuclear power is a very complicated issue. Its thorny problems had been introduced in the previous section. Most of group who support nuclear power claimed it met our demand of reduce the output of thermal power generation. Nanzi area is the most polluted place in Taiwan with top ranked city who suffer the most air pollution in Taiwan.

The reason why collected the data from this area is because Nanzi area used to be the place full of heavy industry. Although many of factory already moved out, the pollution never stop. There still have a processing zone in Nanzi. Even nowadays the pollution incident happened. For example, there was a water pollution incident been discovered in 2019.²⁰ The reagent of electronic parts manufacturing was drained into the groundwater. Luckily, there was no citizen drink groundwater nowadays in the community, but the incident still shocked local people. Therefore, it is obvious to see Nanzi still suffer from the external cost of heavy industry.

The experience of citizens in here cooperate to against the government was also connected to the essence of citizen participation. They have such valuable experience to the environment issue. Nuclear should be public transparent, every citizen has the discretion of nuclear power's death or live. Thus, if current government decided to give up nuclear power, the percentage of other power generation such as thermal power generation and gas power increased. Government already revise The Electricity Act Article 95" The nuclear-energy-based power-generating facilities shall wholly stop running by 2025." Which means PPT noticed that it is hard to shut down all the nuclear power facilities in 2025 though they did not give up. The renewable power generation still immature enough to sustain the power supply from nuclear.

²⁰ Liberty Times Net, "高雄楠梓加工區污染 擴至區外," accessed November 1, 2019.
<https://news.ltn.com.tw/news/life/paper/1279441>.

The citizens in Nanzi had such experience about the air pollution. No matter government decide whether nuclear power was usable or not. Citizen's point of view toward this issue would be significant to the future of our energy policies. To sum up, Nanzi's significance had the representative to help us understand Taiwan people's nuclear power acceptance.

METHODOLOGY

Research Design

This research is one-case survey study base on the opinion of citizen's opinion. In the previous chapter shows that citizen's opinion toward single issue such as nuclear power generation might influenced the decision of the policy maker, to understand what citizens are thinking is very important. However, do citizens really understand nuclear issue or not which might bring a big change to our country. Thus, it adapted the survey research to investigate the nuclear acceptance in Nanzi area to find the current situation. The final goal is to realize how deep the citizens' understanding toward nuclear issue and what their opinion to this energy. To observe the relationship of indicator and see what kind of indicator will affect the citizens' perspective. Therefore, we could figure out citizens' basic cognition of nuclear power, what kind of people support nuclear power who do not support it and what is the reason behind their decision.

The questionnaire divided into two part. First part of questionnaire is to understand the means subjects used to receive the new information and their attention toward nuclear issues. In the second part test subjects' level of understanding toward nuclear power, then in the end of questionnaire have ten questions to understand subjects' acceptance to nuclear power generation.

Sources of Data

The study would be conducted in the Kaohsiung, Nanzi area. Thus, the data is come from the questionnaire that issued to the Nanzi citizens. As the questionnaire to investigate their attitude toward nuclear issues. In the past heavy industry still brings the negative effect to this place, such as water pollution and air pollution, citizens in Nanzi suffer the external impact from varies pollution. Toward this neoteric energy, nuclear. What is the basic understanding of Nanzi people and what they expect to the policy? The questionnaire will collect the data from three main section of Nanzi area, Houjin, Nanzi and Youchang to separate the samples of respondents from 2019 July 1 to August 1.

Instrumentation and Data Collection

This research uses the questionnaire as the instrument. Then the procedure will randomly issue the survey questionnaire to the Nanzi people on the street. The location will average assign in the three section of Nanzi. In the Nanzi section, questionnaire was issued in Nanzi train station. Houjin section was issued near the Nanzi processing zone. Youchang section was issued in the community of Youchang neighborhood. Before every questionnaire, to ask the participants' household registration to make sure they live in Nanzi area. People who living in Nanzi for decades long or their residence address used to register in Nanzi also acceptable. In the same time, to use the Internet platform to support the data collection. Post the questionnaire on the facebook Nanzi community group to ask the member to fill in. The content of website questionnaire is same as the street one. The version on Internet was design as the google form to fill in. The built-in function of google form also helpful to collect and sort out the data.

Tools for Data Analysis

Use the T-test to understand the correlation of gender reflected on nuclear issue, in the profile, to see what the differences were inflect on the understanding of nuclear issues, cognition, or the nuclear acceptance between male and female. The one-way ANOVA could be used in the understanding of the political preference and understanding of nuclear issue of subjects which might influenced the result of their attitudes toward nuclear issues and impact on the nuclear acceptance. To clarify their basic cognition toward nuclear power, there were some questions design for distinguish the groups. Finally, the questionnaire had designed some question to test their basic understanding to nuclear issue, to make sure the subjects really have the basic cognition to nuclear power generation. In the end, exclude the invalid questionnaire, the approach of identified was in the part two of the questionnaire. 7-1 to 7-10 had designed an attitude scale and some of them were ask the same attitude from opposite way. A valid respond should have same attitude consistently.

DATA ANALYSIS

Data Introduction

These data were collected during July 1, 2019 to August 1, 2019 for one-month, after excluded the useless one, the total amount were 249 questionnaires, most of respondents were male with 32 girls and 217 boys. The subjects were the citizens from Nanzi area, range from 16 to over 60 years old. In addition, considered political tendency, most respondents thought they were neutral. In the coding part, the coding book was putted in the appendix.

Basic Information

The first part of questionnaire was to understand the major method of how subjects receive the information. Majority of subjects sought information from internet, second is television. The results showed that nowadays citizens rely on internet or cellphone to get the new information. In this case, the media was crucial to the audience's perspective. In the part two of questionnaire, there were 120 out of 249 people ever seen the nuclear issue in mass communication media three times in the past month, almost account for half of people. Therefore, to test the understanding of citizens about nuclear generation in Taiwan, question had designed in part two, no.4, what's the nuclear power generation ratio in Taiwan currently. The answer should be about 10%. However, only 133 out of 249 people choice the right option, half of people still do not understand the nuclear ration in Taiwan.

In the part two, no.5, the comparison of advantage and disadvantage of nuclear power generation. The data display that citizens thought there were two major advantage of nuclear power generation, first is no air pollution and second is high efficiency power generation. On the other hand, half of citizens thought the major disadvantage was nuclear waste. We could see a common thing is that the raise of environment awareness. This break the expectation majority of citizen do not like nuclear power since its potentially devastating. The result demonstrate that people care more about environment but not the horror to this power. Citizens now seek an approach of power generation which bring low or no air pollution and have high efficiency. Government tried to work hard on green energy, however, the way how to use green energy efficiently also be the concern nowadays. The nuclear waste still the biggest problem of nuclear generation, government still have no idea where to restore nuclear waste.

Factor Analysis

In the end of part one and part two had the attitude scale to test the subject. Subject needed to choose 1 to 5 to answer the question. According to Statistics Solutions²¹, "The purpose of factor analysis is to reduce many individual items into a fewer number of dimensions. Factor analysis can be used to simplify data, such as reducing the number of variables in regression models." Hence, factor analysis can be use on minimize the amount of research direction. This would helpful for classify the factor precisely, then found three major fact and being named in the table 1.

²¹ Statistics Solutions, "Conduct and Interpret a Factor Analysis," accessed October 1, 2019. <https://www.statisticssolutions.com/factor-analysis-2/>.

Table 1. Summary of Exploratory Factor Analysis Results for Nanzi Citizen's Attitude Toward Nuclear Power

Factors	Questions	Factor Loading
1. Nuclear Attention	3-1. I would use two or more means to get the information of nuclear issues. 3-2. When I receive new information, I would search for more relate information 3-3. I would try to understand the nuclear issues. 3-4. I would discuss nuclear issues with people around me. 3-5. I think nuclear issue occupy an important position in Taiwan.	.649 .852 .874 .738 .564
2. Nuclear Tendency	7-1. I think nuclear energy have necessity. 7-2. I have a fear of nuclear energy. 7-3. I think nuclear is usable if it managed 7-4. I think it's possible to reduce the air pollution by nuclear power generation. 7-5. I think Taiwan should diversified development on power generation include nuclear energy. 7-6. I think Taiwan should seek for other method of power generation to replace nuclear power generation.	.814 .694 .845 .797 .792 .588
3. Decision Making for Nuclear Policy	7-7. Taiwan is capable to completely replace nuclear power generation by green power generation 7-8. I understand Taiwan government's nuclear policy currently. 7-9. Nuclear policy might be operated in politics. 7-10. Government's nuclear policy would influence the decision of vote.	.701 .566 .628 .663

factor loading less than 0.5 was suppressed

These factors with factor loadings over than 0.5, In the 7-2 “*I have a fear of nuclear energy.*” 7-6 “*I think Taiwan should seek for other method of power generation to replace nuclear power generation.*” and 7-7 “*Taiwan is capable to completely replace nuclear power generation by green power generation.*”, the question was asked in the opposite way, hence, they were being recoded before the factor analysis.

First factor from 3-1 to 3-5, these questions were to test for understand subjects' attention toward nuclear issues, from the approach they get nuclear information, whether willingly search new information, discuss with their friends or family etc., these questions showed their concern on nuclear issue, thus, for the convenience of survey it named as *Nuclear Attention*.

Second factor from 7-1 to 7-7 tested the subjects' attitude toward the nuclear power. The necessity of nuclear power, did they fear about it, did they think it controllable, replaceable. These questions can understand their tendency. Therefore, for the convenience of survey it named as *Nuclear Tendency*.

Third factor from 7-8 to 7-10 understood the behavior of decision making reflect on government's nuclear policy, did they understand the current nuclear policy, was nuclear manipulated, did policy impact the vote decision, these questions understood the behavior impact on nuclear policy, thus, for the convenience of survey it named as *Decision Making for Nuclear Policy*.

Finally, 15 questions could be classified into three factors, subjects' attitude divided into five scores, from 1 to 5, such as extremely disagree (1), disagree (2), neutral (3), agree (4), extremely agree (5). With factor score 1 to 5 could easily figure out the distribution of three factor. Because all of factor loadings were positive value, weighted average was appropriate for calculation. Take the formula of factor 1 *Nuclear Attention* as example:

$$\text{Score1} = \frac{(3-1*0.649+3-2*0.852+3-3*0.874+3-4*0.738+3-5*0.564)}{(0.649+0.852+0.874+0.738+0.564)}.$$

The variables times their factor loadings, the total divided by the sum of the factor loadings, the range scores were from 1 to 5.

Factor Discussion

This section examined the data with SPSS t-test and one-way ANOVA to figure out whether the variable in understanding of nuclear power, gender, political tendency etc. can influenced their nuclear acceptance.

Table 2. The Three Factors' Means

	Minimum	Maximum	Mean	SD
<i>Nuclear Attention</i>	1.61	5.00	3.78	.83
<i>Nuclear Tendency</i>	1.00	5.00	4.10	.76
<i>Decision Making for Nuclear Policy</i>	1.00	5.00	3.77	.72
N=249				

The Mean of these three factors all held high scores, thus, the general distribution of data could see majority of citizen held high attention and tendency on nuclear power, and it did influence their decision on the vote. *Nuclear Tendency* got the highest scores among three factors ($M=4.10$), followed by *Nuclear Attention* and last *Decision Making for Nuclear policy* ($M=3.77$). Thus, majority of citizens should hold positive attitude to the nuclear power.

Research Question One

First question is “What is the influence of people’s level of understanding on their attitudes toward nuclear acceptance?” The nuclear acceptance attitude scale was respectively anti-nuclear, limited use, support nuclear, no comments., thus, to clarify did they concern about this issue, subject who had highly concerned will spontaneous discuss or finding the data about nuclear issue. After the one-way ANOVA, the descriptive statistics with citizens’ acceptance level across the nuclear attention were reported in Table 3.

Table 3. Descriptive Statistics for Citizens’ Acceptance across Nuclear Attention

	N	Mean	SD
<i>Anti-nuclear</i>	12	3.87	1.108
<i>Limited use</i>	91	3.63	.788
<i>Support nuclear</i>	142	3.91	.803
<i>No comments</i>	4	2.67	.683

The statistics showed *Limited use* group was associated with numerically smallest mean level of nuclear attention ($M=2.67$) and the *Support nuclear* group was associated with numerically highest mean level of nuclear attention. ($M=3.91$) Also, the level of citizens' acceptance toward nuclear power generation had a significant impact on *nuclear attention* based on Levene's F test, $F (3, 245) = 4.75$, $p=0.003$. Citizens who Support nuclear 's held more *Nuclear Attention* than Limited use ($MD = 0.27$), $p =0.09$ and Anti-nuclear ($MD = 0.03$), $p = 0.99$ but was not statistically significant.

As the $p=0.003<0.05$, when there was a significant difference between the mean of group, post hoc could be conducted to find the significant difference between the group. The result of Tukey HSD showed as below:

Anti-nuclear (3.87)- Limited use (3.63) =0.24, $p=0.766$

Anti-nuclear (3.87)- Support nuclear (3.91) =-0.03, $p=0.999$

Anti-nuclear (3.87)- No comments (2.67) =1.2, $p=0.053$

Limited use (3.63)- Support nuclear (3.91) =-0.27, $p=0.054$

Limited use (3.63)- No comments (2.67) =0.96, $p=0.098$

Support nuclear (3.91)- No comments (2.67) =1.23, $p=0.015$

The data showed that there was a significant impact on the group of *Support nuclear* and *No comments*, $p=0.015<0.05$, *Support nuclear > No comments*.

Filter of the Level of Understand Toward Nuclear Issues

To understand how it influenced their attitude, this analysis selected those people who get the correct answer on the filter question, in part two of questionnaire, no.4 “*What is the percentage of nuclear power generation account for?*”. The people who really concerned about nuclear issues should know the ratio of nuclear power generation. In fact, only 133 out of 249 people answered the correct options. Their attitudes were respectively numerical from 1 to 3, 1 represented *Anti-nuclear*, 2 *Limited use*, 3 *Support nuclear*.

Table 4. Attitude Differences between Correct and Wrong Answer on Nuclear Acceptance.

	N	Mean	SD
10% (correct answer)	133	2.61	.56
30%	79	2.56	.61
60%	29	2.37	.62
90%	8	2	1.0

The subjects who got the correct answer had highest scores ($M=2.61$), and who answered the wrong answer were respectively 30% ($M=2.56$), 60% ($M=2.37$) and 90% ($M=2$). In addition, the farther answer was, the lower their level of acceptance was, hence, there was an implication in this section. More understanding of nuclear issues would increase the acceptance, and vice versa.

Finding One

First analysis showed two implications. First, no matter they support nuclear or not, the citizens all held a high attention on the nuclear issue. It means that citizens have basic cognition on the nuclear issues. Second, majority of citizens thought nuclear was usable, among 249 citizens, the Support nuclear (N= 142) and Limited use (N=91) account for 93% people held positive attitude on nuclear power. Citizens' *Nuclear Attention* did influence their attitude. In addition, the level of understanding toward nuclear issues had a significant impact on nuclear acceptance, and the more subjects understand, their acceptance would higher.

Research Question Two

Second question was "What are the differences between male's and female's attitudes toward nuclear Issues?" To test the hypothesis that *Nuclear Attention, Nuclear Tendency and Decision Making for Nuclear Policy* were associated with gender, an independent-samples t-test was conducted to compare these three factors in male and female. Table 5 compared the three attitude differences between male and female on three factors with t-test. In general, subjects all held the positive attitude on three factors. The data displayed as Table 5.

Table 5. Attitude Differences between Male and Female on Three Factors

	Groups	Mean	SD	t	p
<i>Nuclear Attention</i>	Male	3.83	.81	0.98	0.32
	Female	3.68	.68		
<i>Nuclear Tendency</i>	Male	4.11	.71	2.54	0.01
	Female	3.66	.97		
<i>Decision Making for Nuclear Policy</i>	Male	3.77	.75	0.89	0.37
	Female	3.67	.51		

There was no significant difference in the *Nuclear Attention* ($p=0.324$) and *Decision Making for Nuclear Policy* ($p=0.374$) in the scores for male and female. In *Nuclear Attention*, their means were 3.83 and 3.68, male were higher than female; in *Decision Making for Nuclear Policy*, their means were 3.77 and 3.67, male and female were quite same in this factor. In the other words, although both groups showed positive attitude, male had higher preference on it. In the *Nuclear Tendency* was a significant difference in the scores for male and female conditions; $t(247) = 2.54$, $p=0.015$, their means were 4.11 and 3.66. Male also had higher scores in *Nuclear Tendency* and the gap was extremely bigger compare to other factors. As the result, the data suggested that gender had an effect on *Nuclear Tendency*.

Diversified Development of Energy Policy

Roughly, male got more attitude scores in these three factors, especially in *Nuclear Tendency*, the mean difference was 0.45 the highest one among three factors. However, these three factors only proved that the citizens held positive attitude toward nuclear power. In the factor of *nuclear tendency*, question 7-5 “*I think Taiwan should diversified development on power generation include nuclear energy.*” and 7-6 “*I think Taiwan should seek for other method of power generation to replace nuclear power generation.*” asked subjects diversified development for power generation, in the other words, did the subjects think nuclear power generation can be used with other power generation simultaneously. The statistics displayed in table 6.

Table 6. Attitude Differences between Diversified Development

Questions	Groups	Mean	SD	t	p
7-5 <i>I think Taiwan should diversified development on power generation include nuclear energy</i>	Male	4.44	.84		
	Female	3.97	1.09	2.80	.005
7-6 <i>I think Taiwan should seek for other method of power generation to replace nuclear power generation.</i>	Male	3.05	1.20		
	Female	2.68	1.35	1.60	.11*

As observed in the table 6, in the question 7-5, it showed both genders held the positive attitude on it as the means 4.44 and 3.97, $p=0.005$. Both genders think diversified development of power generation should include the nuclear power generation. In addition, male had a significant difference on the 7-5. In the question 7-5 obvious mentioned that nuclear power generation should be include. This consequence was consistent with the analysis of the attitude differences on the factor of *Nuclear Tendency* that male support nuclear more than the female.

Secondly, both genders did not think nuclear power was replaceable, as the means 3.05 and 2.68, $p=0.11$. Male was relative neutral in the question 7-6, but Female even held the negative attitude on it. Therefore, the statistics showed the result that both genders agree Taiwan should diversified development on the power generation, also, nuclear energy should use for the power generation simultaneously. The result of these two questions indicated that citizens hope Government should not replace nuclear power by the other method of power generation.

There were two possibility to cause this situation. First, citizens do not trust governments nuclear policy, they do not think renewable power generation was mature enough to sustain the power supply without nuclear power. Secondly, citizen had high confidence regarding nuclear power. Despite it caused nuclear waste, citizen thought its advantage was better than disadvantage. We can trace this clue in the introduction of basic data. Some of countries already prove that nuclear waste can be solved.

Finding Two

To sum up, also two implications in this section. Firstly, both genders all held positive attitude on three factors, male were numerically higher than female and female were approaching to neutral on three factors. In the factor of *Nuclear Tendency*, male had a significant difference with female which means male's attitude score were relative higher on support the nuclear power than female. Second, both genders also held positive attitude that Taiwan should diversified develop on the method of power generation include nuclear power.

Research Question Three

Third question was “What is the relationship between nuclear power acceptance and party affiliations” party affiliations was respectively KMT (N=32), PPT (N=50), neutral (N=162) and other parties (N=3). To clarify the relation between nuclear power and political tendency, one-way ANOVA also apply in this research. As the table 7 displayed.

Table 7. Descriptive Statistics for Citizens' Party Affiliations Across Three Factors

	Party	Mean	SD	p
<i>Nuclear</i>	<i>KMT</i>	3.78	0.98	
<i>Attention</i>	<i>PPT</i>	3.60	0.86	0.08
	<i>Neutral</i>	3.89	0.05	
<i>Nuclear</i>	<i>KMT</i>	4.19	0.47	
<i>Tendency</i>	<i>PPT</i>	3.82	0.86	0.04
	<i>Neutral</i>	4.1	0.78	
<i>Decision Making</i>	<i>KMT</i>	3.98	0.69	
<i>for</i>	<i>PPT</i>	3.74	0.75	0.15*
<i>Nuclear Policy</i>	<i>Neutral</i>	3.71	0.72	

In the political tendency, subjects' who selected KMT were 39, PPT 42, neutral 164 and other parties 4. Since the sample of other parties were too small, it was excluded in this data. There was no significant difference in the *Nuclear Attention* ($p=0.078$) and *Decision Making of Nuclear Policy* ($p=0.184$). However, in the factor of *Nuclear Tendency*, there was a significant difference ($p=0.102$). In the factor of *Nuclear Attention*, neutral group got the highest mean ($M=3.78$) and PPT group were the lowest ($M=3.6$). In general, three groups get similar scores in this factor. *Neutral group's* standard deviation was 0.05, this showed that the gap of Neutral group was very small. In *Nuclear Tendency*, KMT were the highest scores ($M=4.19$) and PPT were lowest one ($M=3.82$). The gap was the biggest among three factors with a significant difference. In *Decision Making of Nuclear Policy*, KMT also got the highest scores ($M=3.98$) and Neutral were lowest one (3.71).

In the factor of *Nuclear Attention*, there was a significant difference between the group ($p=0.04 < 0.05$). When there was a significant difference between the group, post hoc could be conducted. The data of Tukey HSD displayed as Table 8.

Table 8. Multiple Comparison of the Factor of Nuclear Tendency Between the Group of Political Parties

I	J	I-J	SD	p
KMT	Neutral	0.09	.81	0.80
	PPT	0.36	.68	0.08
Neutral	KMT	-0.09	.71	0.80
	PPT	0.27	.97	0.06
PPT	KMT	-0.36	.75	0.08
	Neutral	-0.27	.51	0.06

In the ANOVA analysis found that factor of *Nuclear Tendency* had significant difference. However, after the multiple comparison of Tukey, the result indicated that there was no significant difference between inner group of political parties on the factor of Nuclear Tendency.

Roughly, all the citizen keep intension on nuclear issues, there was no big difference between political parties. However, KMT held the highest attitude toward *Nuclear Tendency* and *Decision Making of Nuclear for Nuclear Policy*. Neutral groups got 3.89 highest scores on *Nuclear Attention*. In the same time, PPT were holding relative low attitude, but in general, they all held positive attitude on it. And governments' nuclear policy also influenced their vote decision. The same analysis to their attitude toward nuclear acceptance had been done, their attitudes were

respectively numerical from 1 to 3, 1 represented *Anti-nuclear*, 2 *Limited use*, 3 *Support nuclear* same as question two's research. Their mean from KMT to Neutral were respectively 2.68, 2.42 and 2.56. This data also presented the same situation with the similar variable *Nuclear Tendency*, with Top ranked KMT and the last ranked neutral.

Finding Three

To sum up, there were two implications in this section. First, regarding the three factors. All the subjects with different political preferences held positive attitude with KMT held top ranked score on *Nuclear Tendency and Decision Making of Nuclear policy*. Secondly, in the factor of *Nuclear Attention*, the data indicated that people who stay neutral will put more attention on the nuclear issues. Also, their standard deviation only 0.05, it told that all the subjects with neutral political preference's attitudes were similar.

CONCLUSION

Discussion

In this section, the findings of each research questions will be discussed. In addition, the meaning of every implication will also analyze. Used the collected data compared to the normal subjects or the possibilities of data displayed to find the implications. All the findings and what data displayed, subjects all held positive attitude to each scale.

Finding One

Finding one showed that *Nuclear Attention* did influence their acceptance, and more understood about nuclear, their acceptance higher. The result also responded to the high attitude to each question. This also proof that nations should participate in the decision making of nuclear policy. Transparent discussion the future direction of nuclear power in Taiwan could meet the demand of nations. In the literature review, unneutral of mass media made the news preconceived position. It was hard to tell that the information subjects receive was totally correct. Thus, this data only demonstrate that more information subjects receive, their acceptance higher. It was necessary to investigate subjects' preference of media.

Finding Two

Although male and female held positive attitude to three factors, male got higher in each factor but no significant differences. On the other hand, both genders agreed that Taiwan should diversified develop power generation include nuclear power. This result responded to the referendum that people agreed the continuation of using nuclear energy-based power-generating facilities in Taiwan. Although government revised the Electricity Act and revoke the goal of shut down all the nuclear power

facilities before 2025, president Tsai claimed that her government would not give up the goal of non-nuclear power. If government consist to reach their goal by replace the nuclear power generation with renewable power generation, then it is necessary government to formulate a series of complete supporting measures to stable the electricity supply.

Finding Three

Beside *Nuclear Attention*, KMT held highest scores on the other two factors. The data displayed that people who stay neutral more willing to pay attention on the issue of nuclear. That demonstrated party affiliations did make an impact on people's willingness. In the literature review mentioned that nuclear issues were complicated especially in the political perspective. Two biggest parties, KMT and PPT, each held different attitude toward this energy. It was obvious to see the biased report on the mass media to achieve political goals. The only solution of this issue was two parties could abandon all the prejudice and gain the consensus.

Research Conclusion

Although nuclear power and policies was influenced by political conflicts of various interests, citizens still concerned about nuclear issues. They all held positive attitude toward nuclear power. Basic on the research, most citizens rely on Internet of mass media as their means. As a media producer should not being affected by the interest or political parties; as a political partied or interest group should not operate the public opinion with wrong messages. The nuclear issues must be public transparent to let the nations participate in every procedure. The qualities of democracy should be promoted by everyone.

Majority of Nanzi citizen support nuclear power as the data displayed. In addition, they had the basic understanding to nuclear power as well which was out of anticipation. Considered to government's energy policy, it should include nuclear power as well. No matter our future's energy policy would be, it is very important to reach a consensus on the nuclear policy. This research help people to know citizen's attitude toward this important energy in Taiwan. Also, it benefited to other researcher who survey the similar research questions. Most important, it clarify the misunderstanding of the masses.

BIBLIOGRAPHY

Center, Taiwan Environmental information. "透視「非核不可」迷思（三）：正視核能科技的政治性，讓能源辯論「轉大人」." Last modified July 25, 2019, Accessed Novemeber 1, 2019. <https://e-info.org.tw/node/219229>.

CONSERVE ENERGY FUTURE. "What Is Nuclear Energy?" Last modified Accessed November 1, 2019.
https://www.conserve-energy-future.com/disadvantages_nuclearenergy.php.

EDF ENERGY. "What Are the Advantages of Nuclear Energy?" Last modified September 19, 2018. Accessed April 29, 2019.
<https://www.edfenergy.com/for-home/energywise/what-are-advantages-nuclear-energy>.

IAEA. "Operational & Long-Term Shutdown Reactors." Last modified 2019. Accessed June 3, 2019.
<https://pris.iaea.org/PRIS/WorldStatistics/OperationalReactorsByCountry.aspx>.

IEA Atlas of Energy. "Overall Energy Self-Sufficiency." Last modified 2017. Accessed November 10, 2019. <http://energyatlas.iea.org/#!/tellmap/-297203538/1>.

IQAir AirVisual. "World Most Polluted Cities 2018 (Pm2.5)." Last modified 2018. Accessed April 7, 2019.
<https://www.airvisual.com/world-most-polluted-cities?continent=&country=&state=&page=1&perPage=50&cities=T2nap5QamgYjAPmKt,>

JRC Smart Electricity Systems and Interoperability. Last modified 16 April, 2019, Accessed April 29, 2019.
<https://ses.jrc.ec.europa.eu/transcontinental-and-global-power-grids>.

Liberty Times Net. "高雄楠梓加工區污染 擴至區外." Last modified 2019. Accessed November 1, 2019. <https://news.ltn.com.tw/news/life/paper/1279441>.

Ministry of Economic Affairs. 能源供需概況分析. Bureau of Energy, 2019.

Statistics Solutions. "Conduct and Interpret a Factor Analysis." Last modified Accessed October 1, 2019.

<https://www.statisticssolutions.com/factor-analysis-2/>.

The Wall Street Journal. "World's Dumbest Energy Policy." Last modified Jan 29, 2019, Accessed April 9, 2019.

<https://www.wsj.com/articles/worlds-dumbest-energy-policy-11548807424>.

World Nuclear Association. "History of Nuclear Energy." Last modified April 2019, Accessed April 29, 2019.

<http://www.world-nuclear.org/information-library/current-and-future-generation/outline-history-of-nuclear-energy.aspx>.

World Nuclear Association. "Nuclear Power in Taiwan." Last modified November 2018, Accessed April 5, 2019.

<http://www.world-nuclear.org/information-library/country-profiles/others/nuclear-power-in-taiwan.aspx>.

World Nuclear Association. "Nuclear Power in the World Today." Last modified February 2019, Accessed April 5, 2019.

<http://www.world-nuclear.org/information-library/current-and-future-generation/nuclear-power-in-the-world-today.aspx>.

中選會. "台灣公民投票 2018." Last modified November, 2018, Accessed Nov,2018, April 9, 2019.

http://referendum.2018.nat.gov.tw/pc/zh_TW/IDX/indexFF.html.

台灣電力公司. "再生能源發展概況." Last modified April 9, 2019, Accessed November 1, 2019. <https://www.taipower.com.tw/tc/page.aspx?mid=204>.

台灣電力公司. "再生能源發展概況." Last modified April 9, 2019, Accessed November 1, 2019. <https://www.taipower.com.tw/tc/page.aspx?mid=204>.

李根政, 廖于瑋. 堅持：後勁反五輕的未竟之路. Edited by 透南風工作室. 台灣: 透南風工作室 October 21, 2015.

陳立誠. 台灣的能源災難. 宋政坤, February 2018.

陳立誠. 能源與氣候的迷思. 2 兆元的政策失誤: 獨立作家, May 26, 2015.

端傳媒 x 公視獨立特派員. "走進芬蘭核廢墳場，一探關於「十萬年」的信心和懷疑." Last modified 2019. Accessed November 1, 2019.

<https://theinitium.com/article/20190606-taiwan-pts-finland-nuclear/>.

APPENDIX

Questionnaire

親愛的小姐/先生：

您好，我是文藻外語大學國際事務系的學生，首先感謝您撥空協助問卷的填寫，本問卷為學術性質的調查研究，所有填答資料僅供學術研究使用，您的意見沒有對錯之分，內容絕對保密，敬請安心填答。

請仔細閱讀，依照文字描述與說明，選擇最應對自己情況的選項來做回答，再次感謝您抽空填寫，謝謝。

祝福您 健康愉快！

文藻大學國際事務系
指導老師：林建宏教授
學生：邱省彌 (0988150319)

楠梓地區居民對核能議題之問卷調查

【基本資料】

性別：男 女

年齡：16 歲以下 16-20 歲 21-29 歲 30-39 歲 40-49 歲
50-59 歲 60 歲以上

教育程度：國小 國中 高中〈職〉 大專〈學〉
研究所〈以上〉

個人每月所得：1 萬元以下 1~2 萬元 2~3 萬元 3~4 萬元 4~5 萬元
5~6 萬元 6 萬元以上

職業：軍警 公務人員 教育 商 工 農 醫療 服務業
家管 學生 無 其他_____

宗教信仰：基督教 天主教 佛教 道教 伊斯蘭教 無
其他_____

政治傾向：國民黨 民進黨 中立 其他_____

這一部份的問題主要是有關於施測者對於核能議題的獲取途徑，請依自身實際情況，在下列最適合的方格內打「✓」。

第一部分

1. 您通常透過何種方式取得新的資訊？

電視 報紙 網路 書籍 其他 _____

2. 請問您在過去一個月中，在各種媒體或者其他管道上聽到有關於核能議題之訊息約有幾次？

一次以下 兩次 三次以上

3. 您對於核能相關資訊通常...		非常不同意 1	不 同 意	普 通	同 意	非 常 同 意 5
3-1	我會用兩種以上的方式來取得核能議題的資訊。	<input type="checkbox"/>				
3-2	接收到新資訊時，我會想要在自己額外搜尋更多有關的	<input type="checkbox"/>				
3-3	我會主動想要了解核能議題。	<input type="checkbox"/>				
3-4	我會主動與身邊的人討論核能的議題。	<input type="checkbox"/>				
3-5	我認為核能議題對於台灣非常重要。	<input type="checkbox"/>				

這一部份的問題主要是有關於施測者對於核能議題了解程度，請依自身實際情況，在下列最適合的方格內打「✓」。

第二部分

立法院為了配合 107 年公投案第 16 條主文：您是否同意：廢除電業法第 95 條第 1 項，即廢除「核能發電設備應於中華民國 114 年以前，全部停止運轉」之條文，於 2019 年 5 月 7 日三讀修正電業法第 95 條條文，刪除第 1 項「核能發電設備應於中華民國 114 年以前，全部停止運轉」條文。

4. 您認為核能發電目前在台灣的占比約？

10% 30% 60% 90%

5. 以下為核能發電的優缺點，請就表中所開列之選項，針對各個優缺點加以評分，並勾選出認為最重要的優點及缺點。

優 點		缺 點	
(1)不會造成空氣汙染		(1)會產生放射性核廢料	
(2)原料便宜		(2)投資成本龐大	
(3)效率高且穩定		(3)輻射汙染具有潛在毀滅性	
(4)營運成本低		(4)核電用地汙染	
(5)原料取得充足		(5)排放熱水對周遭海域造成影響	

7.您對於核能發電的看法		非 常 不 同 意	不 同 意	普 通	同 意	非 常 同 意
7-1	我認為核能發電有必要性。	<input type="checkbox"/>				
7-2	我對核能發電抱有恐懼。	<input type="checkbox"/>				
7-3	我認為核能發電只要管理機制做得好就可以使用。	<input type="checkbox"/>				
7-4	我認為可以透過核能發電減緩空氣汙染。	<input type="checkbox"/>				
7-5	我認為台灣應該多元發展，其中包括核能發電。	<input type="checkbox"/>				
7-6	我認為台灣應該尋找其他替代能源來取代核能。	<input type="checkbox"/>				
7-7	台灣有能力可以完全透過綠能發電來取代核能。	<input type="checkbox"/>				
7-8	對於政府的核能政策，我充分了解。	<input type="checkbox"/>				
7-9	核能政策可能會成為政治操作的手段。	<input type="checkbox"/>				
7-1	政府核能發電的政策會影響我對於投票的選擇。	<input type="checkbox"/>				

8.綜合以上，你對於政府非核家園的看法

支持完全廢核 有限度使用 支持重啟核電 沒有意見

Coding Book

	Item	coding
Gender	boy	1
	girl	2
Age	under 16	1
	16-20	2
	21-29	3
	30-39	4
	40-49	5
	50-59	6
	Over 60	7
Education	elementary	1
	Junior	2
	High school	3
	College	4
	Graduate institute	5
Religion	Taoism	1
	Buddhism	2
	Christianity	3
	Islam	4
	none	5
Political tendency	KMT	1
	Neutral	2
	NPP	3
	DPP	4
Attitude scale	Extremely agree	5
	Agree	4
	Neutral	3
	Disagree	2
	Extremely disagree	1