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篇名：

The Change of Mailiao Township—The Product of the Sixth Naphtha Cracker

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Abstract

Sometimes, we can see that the news about air pollution has been getting worse in recent years. Besides, the pollutants emitted from Formosa Plastics Corp' s sixth naphtha cracker in Mailiao Township, Yunlin County, is also a public concern. Because Yunlin County is our hometown, our group is rather interested in this problem, we conducted a research about the issue with a view to contributing our efforts to resolve the problem. Therefore, to understand the impact of the pollution emitted from the sixth naphtha cracker, we made questionnaires to gather the perspective from the local residents in order that our group can organize and analyze the data we received and found the most helpful method between the residents and the sixth naphtha cracker.

Keywords : the sixth naphtha cracker, air pollution, the perspective of the local

I. Introduction

I.1 Motivation

Nowadays, the problem of air pollution is getting worse and worse. People often hear about news reporting Yunlin is among the counties which have bad air quality. Besides, we often learn many events about air pollution from the news on the television and the internet. Every time we see these news, their topics always are written “The Sixth Naphtha Cracker in Mailiao Township, Yunlin County.” According to public medias, there are a lot of harmful materials emitted from The sixth naphtha cracker in Mailiao Township, Yunlin County, including Carbon monoxide, Carbon dioxide, dust mites and so on. If we breathe the poisonous air into our body over a long period of time, it could make a negative impact on the health of our body. As one of the member of local residents in Yunlin County, we should have much more awareness about this issue and discover how to resolve the problem.

I.2 Purpose

It is fact that animals, plants and human beings in the world need sufficient sunlight every day, while the problem about air pollution caused holes on ozone layer, which not only disorders the rotation of the four seasons but also increases the tendency that people get skin disease. To stop the problem of air pollution from getting more serious, which is to achieve the goal of protecting the Mother Nature and the health of human beings. Therefore, the study group wants to reveal this problem to the public and raise more awareness of the issue. In this way, people, animals and plants may grow healthily under the effort of the study group.

According to XXX, the sixth naphtha cracker provides employment opportunities and schooling sponsorship for the locals, which is necessary for many residents to make ends meet. To better this research, the study group investigate the perspective of the residents by sending out 100 designed questionnaires.

I.3 Study Questions

To further understanding the air pollution in Mailiao, the study group concluded to 3 study questions :

- (1) What are the impacts the sixth naphtha cracker make to the locals as to economic and environmental aspects?
- (2) What are the opinions that the local residents take on construction of the sixth naphtha cracker?
- (3)What may be the best solutions to the problem created by the sixth naphtha cracker, and is there any balance between the interests of the company and the benefits of the residents?

II. Literature Review

II.1 Atmosphere

The atmosphere refers to mixed gases covering the surface of the earth 1000 kilometer above. The gas between the surface and the atmosphere, which all creatures on earth live on, is called air. So strictly speaking, air is part of the atmosphere.

The composition of the atmosphere seldom changes except that carbon dioxide, ozone and water vapor change in different places and different time. The amount of other composition scarcely has evident changes. The main reason that the composition of the atmosphere seldom changes is that air in the atmosphere would spread and be able to mix with other gas. In other words, the air can automatically regulate the amount of its elements through natural recycling mechanism.

II.1.1 The function of the air

- (1) It protects the creatures in the world from the direct harm of the radiation, ultraviolet radiation and meteorites from the space.
- (2) It maintains the thermal equilibrium of the world, which enables creatures to survive in the environment with appropriate temperature.
- (3) It provides the gas which human beings and other creatures need.

II.2 Atmospheric pollutants

With advanced technology, our living environment as well as animals and plants' have been polluted seriously. Accordingly, with lasting damage on our ecosystem, all creatures, including human beings, would surely be under the threat of poor health and even of extinction.

Although the atmosphere has the function to automatically adjust its ingredients in the air, the progress of technology still do harm to the original recycling function, such as

factories emitting oxide in company with much nitrogen, vehicles giving off dust and exhaust gas, or chlorofluorocarbons produced in using daily supplies. As long as the gas grows too much, it would have a great deal of negative impact on our ecosystem. Briefly speaking, these harmful gases would cause the disorder in the atmosphere's auto adjustment.

The meaning of air pollution is that air contains impurity. When breathing, we also breathe in some harmful substances which later have terrible influence on our body. Nonetheless, the major reason causing major air pollution is the exhaust from factories, automobiles, scooters, bush fires and so on.

To illustrate the components related to air pollution more clearly, the study group organized two tables as follow. One is associated with categories of atmospheric pollutants, main source and influence to the environment, and the other is on the composition of the pure dry air around earth's surface.

Categories of atmospheric pollutants		Main source	Influence to the environment
Carbon oxides	Carbon monoxide (CO)	Decomposition of the withered twigs and rotten leaves from the nature and incomplete combustion of fossil fuels, which generaye carbon monoxide.	It disables blood from delivering oxygen and could smother people to die.
	Carbon dioxide (CO ₂)	With enough oxygen, complete combustion of fossil fuels generates carbon dioxide.	When the concentration of carbon dioxide is too high, it increases the temperature of the surface of the earth.
Sulfur oxides	Sulfur dioxide (SO ₂)	The exhaust of sulfuric acid factories and petroleum refineries as well as combustion of sulfur involved in coal and gasoline used by thermal power plants generate sulfur dioxide. Then, sulfur dioxide is affected with oxygen and sulfur trioxide will be generated.	<ol style="list-style-type: none"> 1. It stimulates the organs of animals, makes forest wither or decays buildings. 2. It form the acid rain, which make crops and forest dead.
	Sulfur trioxide (SO ₃)		
Nitrogen oxides	Nitric oxide (NO)	The exhaust emitted from Internal combustion engine of transportation (engine), fertilizer plants and thermal power plants includes nitric oxide. Nitric oxide will combine with oxygen and generate nitrogen dioxide after giving off into the air.	<ol style="list-style-type: none"> 1. It decreases the ozone in the ozone layer, which leads to creatures sufferin the damage from the intense ultraviolet rays. 2. It forms photochemical smog. 3. It causes the acid rain, makes crops wither and decays buildings.
	Nitrogen dioxide (NO ₂)		

Hydrocarbon, alkane, alkene, alkyne and aromatic	Incomplete combustion of fuel of transportation, petroleum refining, oil gas of gas station, volatilization of industrial solvent, biogas, landfills, etc, will generate substance of hydrocarbon.	<ol style="list-style-type: none"> 1. It will do harm to body. 2. It will generate poisonous substance from photochemical smog. 3. Aromatic hydrocarbon such as benzene, toluene, biphenyl, and so on have been classified as carcinogen.
Chlorofluorocarbons (CFCs)	Refrigerant of refrigerator and air conditioner, aerosol, blowing agent, etc.	It will cause ozone hole.
Dust, aerosol, acid fog, solid particles.	Natural phenomenon such as big dust storm or the exhaust from factories and vehicles.	<ol style="list-style-type: none"> 1. Tiny particle involved in fog emitted from factories and vehicles will affect respiratory system.

Table 1 : Categories of atmospheric pollutants, Main source and Influence to the environment

Ingredient	Chemical formula	Volume %
Nitrogen	N ₂	78.09%
Oxygen	O ₂	20.94%
Argon	Ar	0.93%
Carbon dioxide	CO ₂	0.0318%
Other gas		0.082%

Table 2 : The composition of the pure dry air around earth' s surface

II.3 Pollutant Standards Index

People can refer to PSI, Pollutant Standards Index, as medium to understand how the circumstance may take effect on human body. The explicit data is shown in the following table.

The number of each index	Influence to health
0~50	Good
51~100	Moderate
101~199	Bad
200~299	Very bad
300~500	Harmful

Table3 : Pollutant Standards Index

II.4 Atmospheric Pollution Prevention and control law

(1) A monitor system should be established in the environmental mechanism to supervise

the quality of air in long time and hence prevent that excessive pollution from doing more harm.

- (2) People should avoid producing a great amount of carbon dioxide. That is, we have to use solar energy, electricity and so on instead of fossil fuels.
- (3) Authorities need to take heed of the sources of the pollution at any time and strictly control the exhaust gas emitted from the all sorts of transportations and factories, such as demanding gas containing SO_2 , which is generated by burning coal and oil to be processed through desulphurization and dust elimination; To purify the exhaust gas emitted from vehicles, authorities should request all vehicles be armed with the catalytic converters with a view to converting carbon monoxide to carbon dioxide, hydrocarbons to water and carbon dioxide, or deoxygenizing oxide of nitrogen to nitrogen gas.
- (4) People should use hydro fluorocarbons excluding chlorine rather than chlorofluorocarbons which would destroy ozonosphere.

III. Methods

Although the study had a general idea about the sixth naphtha cracker by gathering the information, to get more comprehensive concept, the study group decided to achieve this goal through the opinions of the local residents.

III.1 Participant

For the sake of essay, the study group made a piece of questionnaire to help our group to understand the opinion to the air pollution in Mailiao Township of the residents there. We gave away 110 questionnaires to real local residents in Mailiao, however, the study group conducted 100 pieces in total since 10 pieces within were invalid. In other words, the validity of our result is 90.9%.

III.2 Instruments

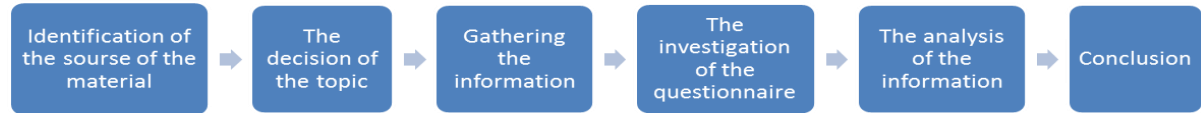
The questionnaire was mainly designed for the teenagers and the mid-aged. To the effect that the locals in Mailiao would provide their precious opinions for further analyzation and investigation, Therefore, after days of discussion, the study group pose question items concerning the following six main points :

- (1) The personal information about participants
- (2) Who has higher satisfaction to the quality of the air?
- (3) What influence on the body does the air pollution have?
- (4) Why do the residents approve or disapprove the construction of the sixth naphtha cracker?

(5) Have the residents ever regretted the decision you had made?

(6) How to decline the air pollution efficiently?

III.3 Procedure



Graph1 Procedure of questionnaire

We analyzed the data and questions, and got the result into each blank below. According to analysis, we discovered the viewpoint of the local to air pollution and the methods to resolve air pollution.

IV. Analysis

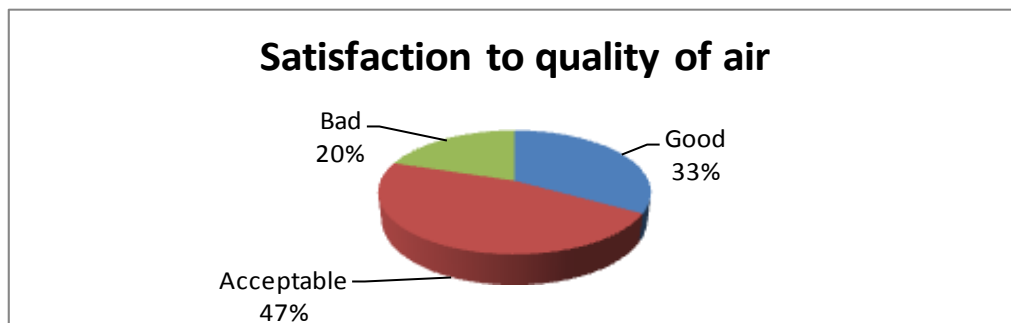
IV.1 Satisfaction to quality of air

According to the result of the survey, the study group discovered that about 46.7% residents thought that the air quality is acceptable, 33.3% of residents thought considered it good, and the rest (20%) bad. (For more information, please see Table4)

There is little difference, though, between the percentage of Good and Bad. However, if the air get worse gradually, the residents who thought the air quality is acceptable(46.7%) would surely merge into the people who thought the air is bad (20%), so chances are that more residents must fell dissatisfied with the air quality.

Gender/Age	Good	Acceptable	Bad
Male	17.20%	24.1%	10.3%
Female	16.1%	22.6%	9.7%
Teen	16.6%	23.2%	10.0%
Mid-aged	16.7%	23.5%	10.0%

Table 4 The investigation to the satisfaction to quality fair



Graph 2 Pie chart of satisfaction to quality of air

IV.2 Influence of air pollution on body

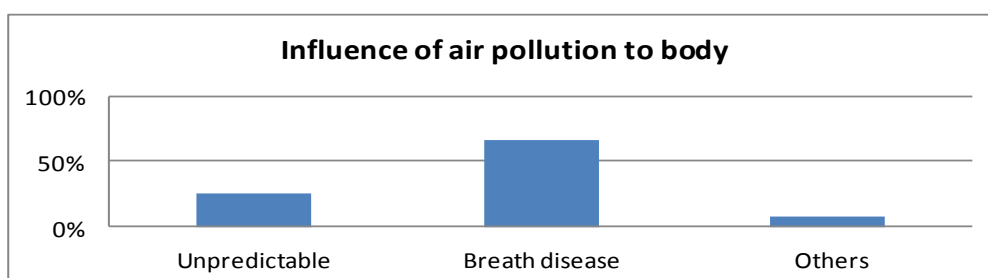
The residents who thought air pollution made impact on body accounted for 80%, and

20% of people thought there is no difference. Obviously, most of the residents got equal common sense.

The percentage of unpredictable consequences from long-term accumulation of harmful substances accounted for 25%, the percentage of breath disease accounted for 66.7% and the percentage of people who thought it will make other disease accounted for 8.3%. Based on the revelation of the index of the outcome the percentage of the air pollution influencing body's breath is higher than the rest.

Gender/Age	Unpredictable	Breath disease	Others
Male	12.9%	34.4%	8.3%
Female	12.1%	32.3%	4.0%
Teen	12.5%	33.2%	4.1%
Mid-aged	12.6%	33.5%	4.1%

Table 5 The investigation of the influence of air pollution on body



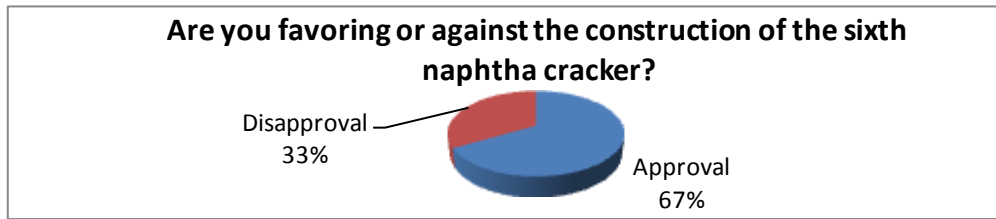
Graph3 The histogram of influence of air pollution to body

IV.3 Opinions on the construction of the sixth naphtha cracker?

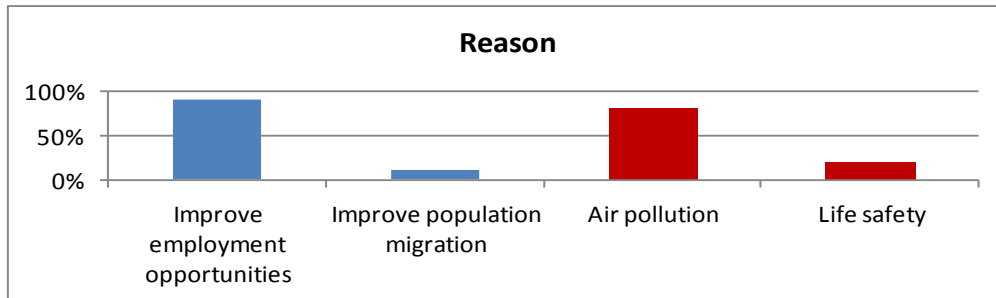
The percentage of people favoring the construction accounted for 66.7%. The main reasons behind favoring are that the corporation provided employment opportunities (90%) and improvement in the phenomenon of immigration (10%). On the other hand, the percentage of people against construction accounted for 33.3%. Besides, the reasons are that the security of life was faced with problems (ex: explosion will cause fire) (20%) and air pollution (80%). Thus, as the investigation revealed, the percent of approval is 33.4% higher than that of the disapproval. The main reason is that even with the air pollution, the residents take more emphasis on living expenses than physical health.

Reason	Approval		Disapproval	
	Improve employment opportunities	Improve population migration	Air pollution	Life safety
Male	46.4%	5.2%	41.3%	10.3%
Female	43.6%	4.8	38.7%	9.7%
Teen	44.8%	5.0%	39.8%	40.2%
Mid-aged	45.1%	5.1%	10.0%	10.0%

Table6 The investigation of opinions on the construction of the sixth naphtha cracker



Graph4 Pie chart of opinions on the construction of the sixth naphtha cracker



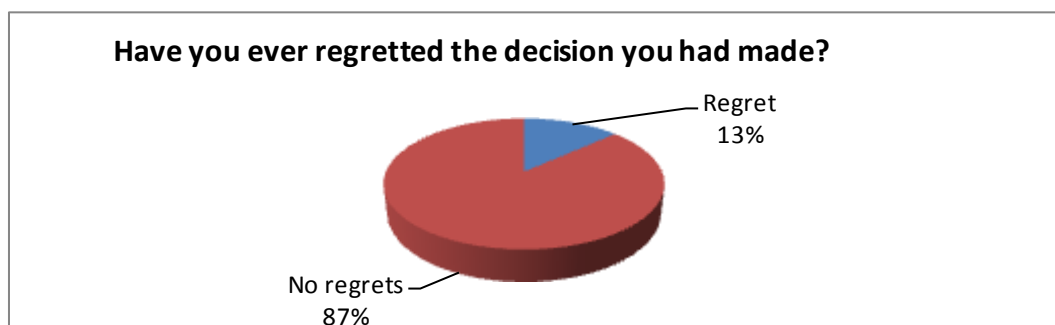
Graph5 Histogram of the reasons different opinions on the construction of the sixth naphtha cracker

IV.4 Reflection on the decision the residents made earlier.

According to the survey, only 13.3% participants revealed that they regretted about their decision they had made because they didn't realize the sixth naphtha cracker will have such great influence on the local environment and security. In contrast, 86.7% didn't regret because they thought you cannot eat your cake and have it, that is, the residents desired better chances for good jobs, and they were willing to sacrifice other things, including the fresh air. Consequently, the study group can infer that most people didn't feel regretful even though their environment was endangered.

Gender/Age	Regret	No regrets
Male	6.9%	44.7%
Female	6.4%	42.0%
Teen	6.6%	43.2%
Mid-aged	6.7%	43.5%

Table7 The investigation of reflection on the decision the residents made earlier



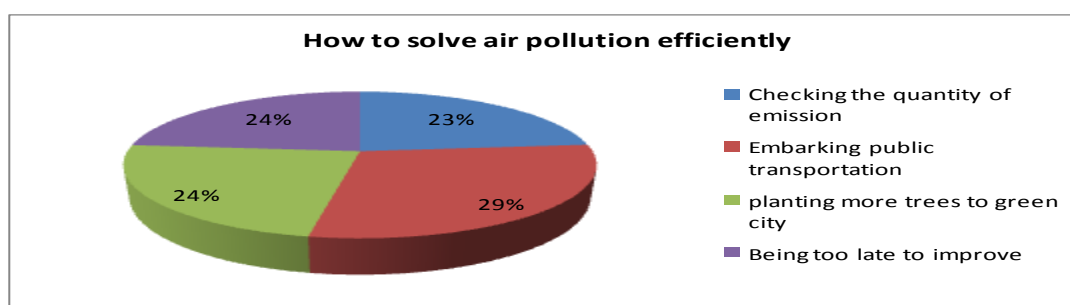
Graph6 Pie chart of reflection on the decision the residents made earlier

IV.5 Ways to solve the air pollution efficiently

76.4% of the residents considered it being still possible to improve air pollution, and the methods included regular checkup on the emission of exhaust gas (23.5%), often embarkation on public transportation (29.4%) and planting more trees (23.5%). Nevertheless, 23.6% thought it being too late to restore the damaged environment. In conclusion, most people considered that even though air pollution became more serious, but if the procedures mentioned above were to be conducted, the quality of air might recover.

Gender/Age	Checking the quantity of emission	Embarking public transportation	Planting more trees to green city	Being too late to improve
Male	12.1%	15.2%	12.1%	12.2%
Female	11.4%	14.2%	11.4%	11.4%
Teen	11.7%	14.6%	11.7%	11.8%
Mid-aged	11.8%	14.8%	11.8%	11.8%

Table8 Opinions on ways to solve air pollution efficiently



Graph7 Pie chart of ways to solve air pollution efficiently

V. Conclusion

Based on the analysis above, our group concluded the result found in the questionnaires and organized as the following :

- (1) The satisfaction to quality of air of men is higher than that of women, and the satisfaction to quality of air of the mid-aged is higher than that of the teens.
- (2) The influence of air pollution matters more to men than women, and the same issue between the mid-aged and the teens reveals no evident difference.
- (3) The main reason why almost one third of the residents (regardless of age or gender) approve the construction is that the sixth naphtha cracker could provide them with employment opportunities.
- (4) Nearly half of the residents have never regretted about their decision of approving the construction of the sixth naphtha cracker.

- (5) Most of the participants agreed that checkup on the emission of exhaust gas regularly, embarkation of public transportation, and greening city through planting trees are best methods to improve the quality of air.

It seems that we inevitably have to confront severe air pollution. Recently, governments and medias have keeping telling everyone to establish the values of protecting our mother nature. However, when people watch the news or ads about quality of air, they tend to get numb about it. The consequence reveals that the quality of air in Taiwan is like a chronic disease keeping harming one's health, which, eventually, would end up as a no turning back situation. So, now, we have to raise the awareness of people to change the quality of air, in particular, the residents living in the areas which have air pollution.

VI. Reference

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VI.2 Information from the internet

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