SAVONIA

Survey of air purifier market acceptance in China

Shan Yang

Bachelor's Thesis

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SAVONIA UNIVERSITY OF APPLIED SCIENCES

THESIS
Abstract

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Author(s) Shan Yang			
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Supervisor(s) Jari-Pekka Jääskeläinen Virpi Oksanen			
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Abstract

In recent years, air cleaner products have drawn a wide attention due to the extensive concern of air pollution in China. The study aims at research market acceptance of air purifiers. Meanwhile, an outlook of present market and competitive environment were introduced for driving forces of the research as background knowledge.

In this thesis, a theoretical framework was designed to express the theory of customer acceptance, which provided theoretical support for the analysis process in the research. Two main theories were presented in the thesis: technology acceptance model (TAM) and innovation diffusion theory (IDT). In addition to the theory background, the quantitative research method was taken into use in this study.

The result of the study found that the present air purifier market in China is not mature. The present sales are grown by the stimulation of haze in certain season each year rather than by the awareness of the relationship between air quality and health. Lack of relevant knowledge of air pollution and air cleaner products makes the market acceptance lower than hypothetical. Furthermore, the awareness of the air purifier brand from different countries was also analysed and explained in the conclusion.

Keywords
Air purifier, market acceptance, IDT, TAM

CONTENTS

APPENDICES

1 INTRODUCTION

The initiative of this study is start from news about China air pollution and the photo of air purifier shown on social platform in 2015. At that time my parents called and told me that when they are exposed to outdoor air, for example when on their way to work, their throat will pain and felt uncomfortable when breathe. I was worried about my parents' health and started to search online about air purifier and anti-dust mask. During this searching process I began to be interested in Chinese air purifier market.

1.1 The target of the thesis

At the beginning the thesis was expected to give an outlook of Chinese air purifier market. However when I did my preliminary survey in my home town, a surprised point came to my eyes, that sixty-three percentage of respondents willing to purchase an air purifier but hundred percentage of them only know very basic about air purifier. And the more I considered about it, the more information and details came into my mind. Therefore the topic was detailing to customer behaviour in Chinese air purifier market. Nevertheless, when I was collecting relative resources, more details things came into my mind and I still felt the topic was too wide to study with. That's why finally my topic changed to customer acceptance of air purifier in China.

The goal of this thesis is to research to what extend do customer know about air purifiers and will it affect purchase. To interpret this purpose in more specific, objectives are shown as follows:

1) To learn about customer awareness of air purifier in current China
2) Generally to understand customer acceptance of air purifier in China
3) To assess the influence of customer's understanding on customer purchase

1.2 The restriction of the work

Due to the limitation of labour force and academic support, this research includes several restrictions.

1.2.1 The air purifier

According to the different use of air purifier, it could be classified into three types: air purifier for civil use, air purifier for commercial use, air purifier for industrial use. This thesis basically focus on the research of civil use air purifier because of the lack of

background information and high difficulties in data collection in both commercial use and industrial use air purifier. For researcher who interested in this topic could also wide the study range to people's acceptance of other two types of air purifier.

Besides, there are also different kinds of air purifier which use different technology to clean air, such as filter and electrostatic adsorption. And this thesis only study people's acceptance to general air purifier product rather than people's specific attitude to each types of air purifier. It is because the present Chinese air purifier market is not mature enough to do a such specific research. However, with the development of this market, the research detailing in specific types of air purifier will be worth to work on.

1.2.2 The geographical area

Due to the limitation of time, labour force and academic background, the sample cannot be taken from each city of China and the number of respondents from different areas is not in an average level. For people who interested in this topic can work more on larger sample group to get more precise conclusion and more detail findings in this research field.

Moreover, with time goes by, many independent variables such as the education situation and average income level might get changed and those changes can also bring changes in research results and conclusions.

1.3 The structure of the thesis

The goal of this thesis is to study the Chinese air purifier market acceptance. The whole thesis consists of seven chapters. The first chapter tells about where does the topic initially comes from and the restrictions of the study. The second chapter gives an outlook of present air purifier market situation in China as research background. Chinese present air pollution situation and present air purifier market scale are discussed in this chapter. Two theories that used in this research are introduced in the third chapter. Both technology acceptance model and innovation diffusion theory are explained with the connection to this research target respectively. In chapter four research method and process are explained in details to proof the validity and reliability of this research. Then in chapter five the result of the research which surrounds the test of hypothesis is given as the core of this research. Finally the conclusion of the whole thesis and discussion of this study are presented in chapter six and seven respectively.

2 AIR PURIFIER MARKET IN CHINA

This chapter gives an outlook of present air purifier market situation in China as research background. Chinese present air pollution situation and present air purifier market scale are also discussed in this chapter

2.1 Present air pollution in China

In last three decades, the rapid development of Chinese economy brings many people in china out of poverty and a well-off living standard, however, it also has make air pollution become one of the most serious environmental problems in China. According to the data provided by China National Environmental Monitoring Centre in 2015, generally 60% days the air quality in 74 countries in China can reach a satisfactory level, and 40% days the air pollution passed the safety standard. China now applies Technical regulation on Air Quality Index since January 2016 and the standard based on AQI is shown as follows: 0-50 good, 51-100 moderate, 101-150 lightly polluted, 151-200 moderately polluted, 201-300 heavily polluted, and >300 severely polluted. (Regulation on air quality index 2016)

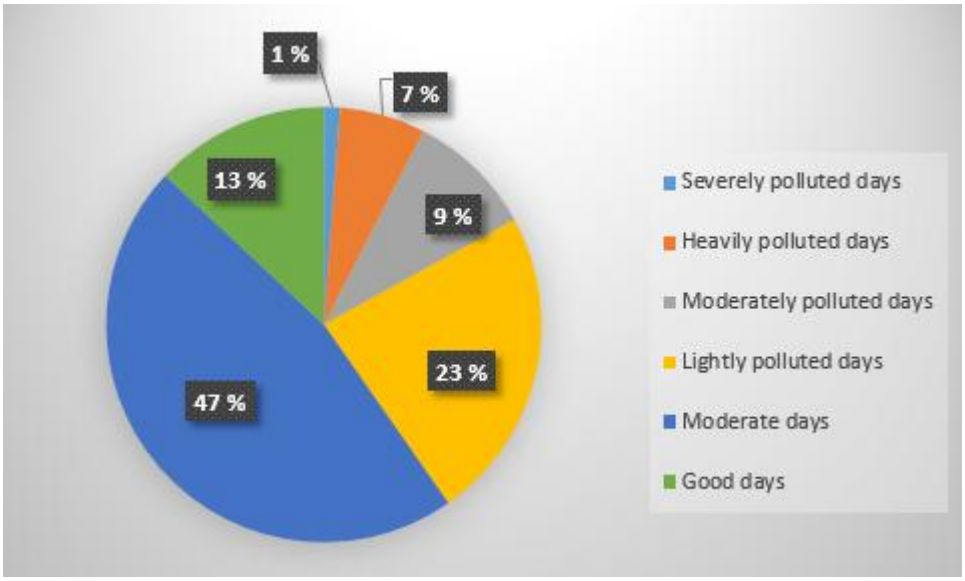

Figure 1 Air quality in 74 countries in China from Jan to Mar in 2015

Based on the green paper on climate change (2013) which provided by Chinese Academy of Social and Sciences, in 2013 China suffered the most serious air pollution since 1961.(Wang & Zheng, 2013) In 8th December 2015, emergency measures were took effect firstly in Beijing since government issued its highest level of warning for heavy haze three years ago. Air pollution has been a hot topic both on internet and on publication. More and more people in China start to pay attention to air quality

in their living city especially those who live in urban area. People's high attention to air problem leads to a sharp rising in the demand of air purifier products and anti-dust mask.

With the development of economy and the improvement of technology, people especially who live in city is enjoying an easy lifestyle. Online shopping, meal delivery service, work with computer etc. increase the time people spend at home and office. However, the indoor air quality can be affected by outdoor air quality, outdoor air pollution contaminate indoor air. Meanwhile, most indoor pollution is caused by the using of unprocessed solid fuels in cooking and heating stoves and the resultant high outdoor concentrations can significantly raise indoor air pollutant level. (Sinto, Smith, Hu &Liu) If all the doors and window are closed, the indoor air quality is possible worse than outdoor air quality.

2.2 Present air purifier market scale in China

The increasing demand of air purifier lets many companies see the business chance in China. From 2003 to 2010, the main air purifier brand in Chinese market was Yadu which took up around 80 percentage of market share. And within two years from 2010 to 2012, there were around 50 air purifier brands in the market, most of them are foreign brands. Philip, Panasonic, Sharp and Yadu all together took up 77 percentage of the whole Chinese market share. In present Chinese air purifier market, there are over 200 national enterprises produce air purifiers without count enterprises which own international well-known brand in. 86% percentage of those air purifier producer located in southeast of China, especially in Yangtze river delta and Pearl river delta.(PIM LTD. 2014) And along with the expand of air purifier market, many home appliance enterprises start to entry this industry, such as Ecovacs, a company basically focuses on house cleaning product, entered air purifier market in 2013.

As the table 1 shown below, from 2012 to 2015 both sales volume and sales kept an increasing trend. One interesting phenomenon is the year on year growth of sales and sales volume have an increasing trend from 2012 to 2013 and reach the highest point in 2013, then decreasing sharply in 2014 and kept decreasing trend till 2015.

Table 1 Air purifier market scale in China from 2011-2015

Year	Sales Volume (million)	Year on year growth	Sales (million yuan)	Year on year growth
2011	112	-	2300	22%
2012	126	12.5%	3100	40%
2013	353	324.6%	8500	176%
2014	510	44.8%	11500	35.5%
2015	514	0.8%	11700	1.4%

The other interesting phenomenon is during the whole 2015, sales of previous three quarters kept in a minus degree when compared with the same quarter in last year. However, in the last quarter of 2015 the sales has a surprising increase, especially in December sales volume jumped to 122 million, and the year basis was 179.2%. This phenomenon was caused by haze appears in that period of time, serious air pollution promote the increasing sales of air cleaner.

However, a large amount of air purifier brands appear in the market brings both customers and producers problems. For customers the problems are how to find a satisfied air purifier and which brand should be chosen. For air purifier producers the problems are how to let their products and their brands get to know and be chosen by customers.

2.3 Policy and regulation for air purifier in China

Air purifier is a new product in China that get to know by people with the help of serious air pollution in recent years. According to product life cycle theory, author considers air purifier product in China is now on the growth stage which means there is more competitors in the market. The previous national standard for air purifier was launched in 2002 which is too old to regulate the present air purifier market in China. “The previous national standard on indoor air cleaners did not take into consideration the consumers to filter PM2.5 or increased frequency of use.” Said Song Guangsheng, the director of the National Indoor Environment and Indoor Environmental Product Quality Supervision Centre. The lack of clear product standard not only leads to a chaotic air purifier market but also makes customers difficult to recognize which kinds of air purifier really works. (Xu & Zheng, 2014) And the consequence is people are easy to buy product of exaggerated advertising and cheap price but useless in purify air.

In order to regulate air purifier market order, GB/T 18801-2015 the new national standards set for air purifier was drafted in 2014, issued in 2015 and launched in March 2016. According to Ma Dejun, the head of the authority that responsible for setting up the new standard, “in new standards, some latest international metrics, like CADR (Clean Air Delivery Rate)-which specify cleaning capacity, are adopted to evaluate an air purifier quality. Original standards, like CCM (Cumulate Clean Mass)-which specify when a filter needs to be replaced, and the life expansion of the purification are still included in the new standards. Apart from these core indicators, the new standard set also has standards for efficiency and noise level of an air purifier.”

The issue of environment-related laws and regulations like new Environmental Protection Law of the People's Republic of China somehow affect the sales of air purifier in 2015, however if consider in a long run, those laws and regulations are making a positive contribution to the development of air cleaner market in China.

2.4 Competition in air cleaner market in China

Till the end of 2015, air purifier product brands in the market can be classified into three categories. One is brands from Japan such as Panasonic, Sharp and Daikin. The products of those brands usually have numbers of proprietary technology and excellent innovation ability which ensure the usefulness of products. Besides, household appliances and digital products of brands like Panasonic and Sharp entered Chinese market at an early time and achieved brand loyalty in domestic market. These ensures air cleaner of Japanese brands a high competitiveness. The other one is brands from Europe such as Philips, Blue air, and Honeywell. Air purifier products of those European product also have high quality and patented technology, however when compared with Japanese brands, they are not well-known by Chinese market. Therefore the comprehensive competitiveness of European brands in Chinese market is weak than Japanese brand. Air cleaners of Japanese and European brands usually in high price and take over 60 percent of market share in China. The last one is brands from China such as Yadu, Chuangmai, Midea, and Gree. Although brands like Midea and Gree is well-known in China, lacking of focusing on air cleaner technology weaken their competitiveness in the market. Other brands like Chuangmai who focusing on developing air purifier product but not famous also takes a small share of this market.

3 MODELS OF CUSTOMER ACCEPTANCE

Two theories that used in this research are introduced in the third chapter. Both technology acceptance model and innovation diffusion theory are explained with the connection to this research target respectively

3.1 TAM (Technology Acceptance Model)

There are several theories concerning the research of acceptance behaviour, such as Theory of Reasoned Action, Theory of Planned Behaviour, Innovation Diffusion Theory, Task-technology Fit and The Unified Theory of Acceptance and Use of Technology. Technology Acceptance model is the most typical theory in the research of customer acceptance behaviour. (Chen, 2016)

Technology Acceptance Model was put forward by Davis in 1989 when he used Theory of Reasoned Action to research user acceptance to information system. The TAM consists of two main elements: perceived usefulness which was defined by Davis as “the degree to which a person believes that using a particular system would enhance his or her job performance” and perceived ease of use which was defined by Davis as “the degree to which a person believes that using a particular system would be free from effort” (Davis 1989). Technology Acceptance Model considers actual system use which is decided by behavioural intention, while behavioural intention is decided by attitude toward using and perceived ease of use. Attitude toward using is decided by the perceived usefulness and perceived ease of use, while perceived usefulness is decided by perceived ease of use and external variables.

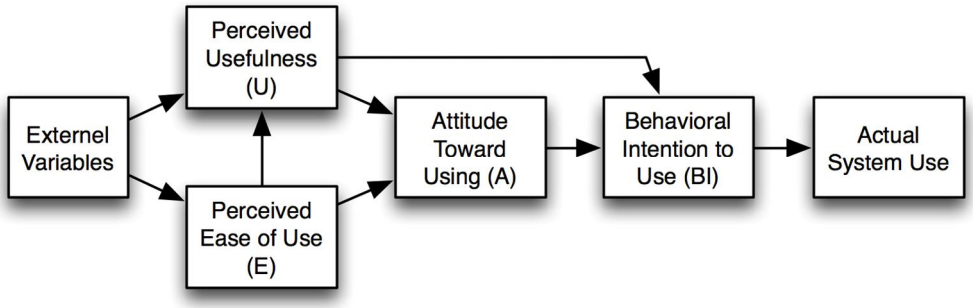

Figure 2 First modified version of TAM (Davis, Bagozzi and Warshaw, 1989)

Figure 2 above describes the primary completed TAM model. To exam this model, Davis, Bagozzi and Warshaw use this model to conduct a longitudinal study and the

result indicated that “both perceived usefulness and perceived ease of use were found to have a direct influence on behavioural intention”. (Chuttur, 2009) Therefore, the resultant model is shown in figure 3.

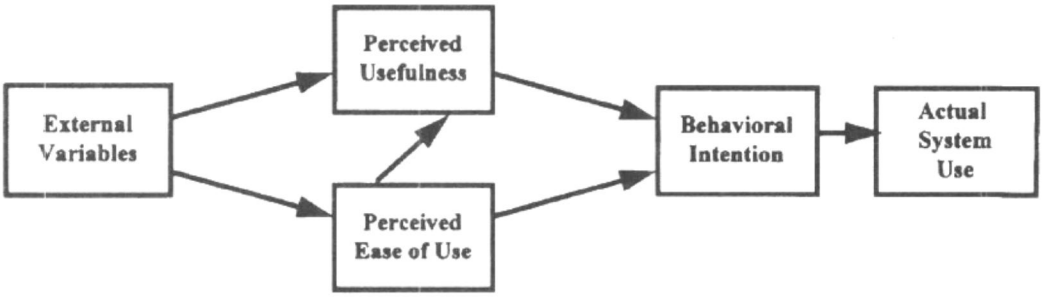

Figure 3 Final version of TAM (Venkatesh & Davis, 1996)

When this model is used in research customer acceptance of air purifier in China, perceived ease of use refers to people perceive air purifier is easy to use, perceived usefulness refers to people perceive air purifier is useful in clean the air. The degree of people’s perceived ease of using air purifier will determine the degree of perceived usefulness of air purifier. Behavioural intention in this case indicates willingness of purchasing an air purifier, and this purchasing behaviour is decided by people’s attitude towards air purifier.

Typically external variables included system characteristics, user training, user participation in design, and the nature of the implementation process (Venkatesh &Davis, 1996) In this case, author got inspiration from the innovation diffusion theory that external variables, such as communication channel, social system, etc. can be introduced into the model.

3.2 IDT (Innovation Diffusion Theory)

3.2.1 IDT in brief

Rogers put forward by the innovation diffusion theory in the middle of 20 century to study about how and when the innovations and new technologies are spread and get accepted by public. According to his theory, four main elements are included in the diffuse process: the innovation, communication channel, time, and a social system. Besides, Rogers separated accepter into five types: innovators, early adopters, early majority, late majority, and laggards.

In this case, the diffusion of air purifier purchasing behaviour includes four elements: air purifier itself, the communication channel between consumer and potential cus-

tomer, the diffusion time of air purifier adopt Chinese market, and the social system that air purifier consumer exited in. Air purifier product is a new product in Chinese market and gets known by customer because of the serious air pollution in recent years. Through public communication and interpersonal communication, air purifier quickly known by people. The time of air purifier diffusion is mainly decided by the innovation-decision of air purifier, the innovativeness of individual, and the rate of air purifier product adapt to a system. Finally, the diffusion of air purifier is happens in a social system, this system consist of interrelated units that engaged in joint problem solving to accomplish a common goal.

3.2.2 Four main elements in the Diffusion of Innovation

There are four elements in the innovation diffusion theory. The first one and also the core of this theory is innovation. Innovation defined by Roger is “an idea, practice, or object that is perceived as new by an individual or other unit of adoption”. (Roger 1983, 12) An air purifier is no longer a new product in overseas market, however in China it was known by people only in recent years due to the sever air pollution. According to Roger’s definition, an air purifier can be defined as an innovation in China. The second element is communication channel. A communication channel is “the means by which messages get from one individual to another”. (Roger 1983, 18) In this case, the communication channels are discussed from two aspects: public communication channel like internet and publications and interpersonal communication channel like relatives and friends. The third element is time. Roger gives three different definitions for time element. The time dimension is involved in diffusion in “1) the innovation-decision process by which an individual passes from first knowledge of an innovation through its adoption or rejection, 2) the innovativeness of an individual or other unit of adoption compared with other members of a system, and 3) an innovation’s rate of adoption in a system, usually measured as the number of members of the system who adopt the innovation in a given time period”. (Roger 1983, 20) In this study, the third definition is taken into use. The last element describes the place of innovation diffusion. Roger defines social system as “a set of interrelated units that are engaged in joint problem solving to accomplish a common goal”. (Roger 1983, 23)

3.2.3 A model of the innovation-decision process

The innovation-decision process consists of five stages. The first stage knowledge indicates a person start to know about one innovation and have a basic understanding to at least one of the innovation’s function. The next stage is persuasion which describes the attitude of one person towards one innovation, usually express as accept or reject. Then comes to decision stage that describes the action of a person

participate in an innovation and decide whether use this innovation. Then implementation stage is a person takes the innovation into practical use. The last step is confirmation for people to assess the consequence of using the innovation. Figure 4 gives a visual explanation of those five stages.

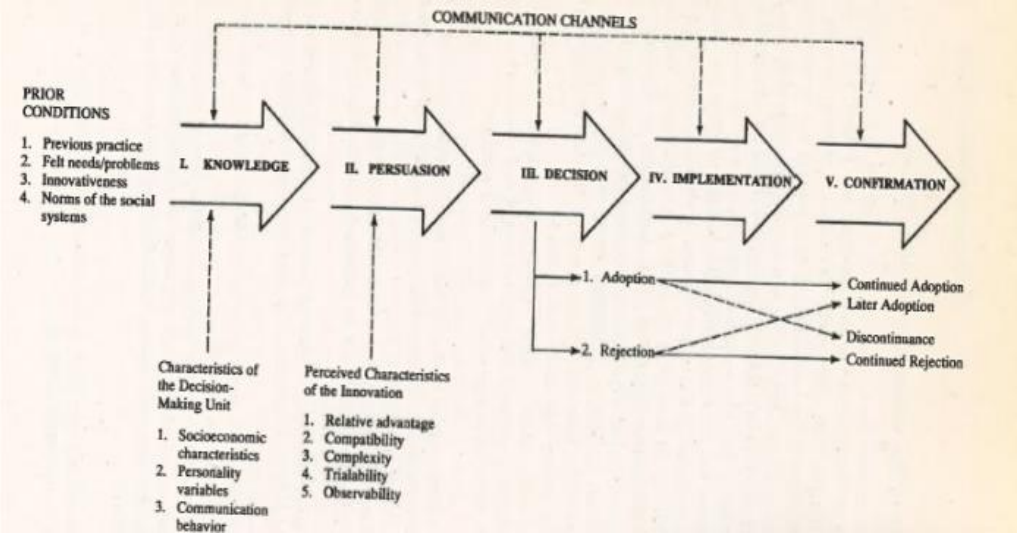

Figure 4 Model Five Stages in the Innovation-Decision Process (Roger, 1983)

3.2.4 The characteristic of air purifier diffusion

According to Rogers' theory, the time element of the diffusion process and the number of adopters allows the diffusion curve to be drawn. And usually it is an s-shaped curve. The radian of the s-shaped curve might change according to the changes in elements such as social system and innovation.

The curve shown below is drawn based on the sales of air purifier since 2011 to 2015. The data is from a third-part research institution (China Market monitor). From 2011 to 2012 the sales growth slowly, and a sharp increasing in sales happens since 2013 to 2014, after 2014 the sales started to increase at a lower rate. In this air cleaner case due to the difficulty of exam precise number of adopters, sales of air cleaners in each year is used as y-axis. Although Rogers's s-shaped curve is measured by time and the number of adopters, author considers the sales of air purifiers can also represent the number of adopters in a certain degree. Therefore, it is reasonable to say that the diffusion process of air purifiers matches the s-shaped curve in innovation diffusion theory.

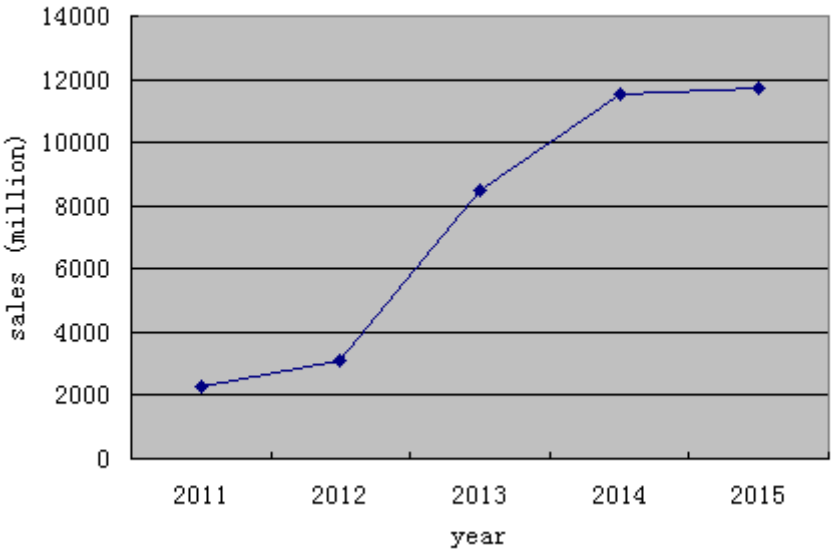

Figure 5 Sales of air purifier each year in China from 2011 to 2015

3.2.5 Types of accepter

Five types of accepter in the innovation diffusion process are provided: innovators, early adopters, early majority, late majority, and laggards. Line chart 5 provides a visual feature of innovation diffusion process that the innovativeness dimension is continuous. This chart is measured also by time and the number of adopters. And the five adopter categories are partitioned by lying off standard deviations from the average time of adoption. (Roger 1983, 281)

If take figure 5 and figure 6 into consideration together, standing at the 2015 point, the previous curve can be partitioned into three types: innovators, early adopters and early majority. However this partition is not permanent, it will change according to the time and sales of air purifiers in following years.

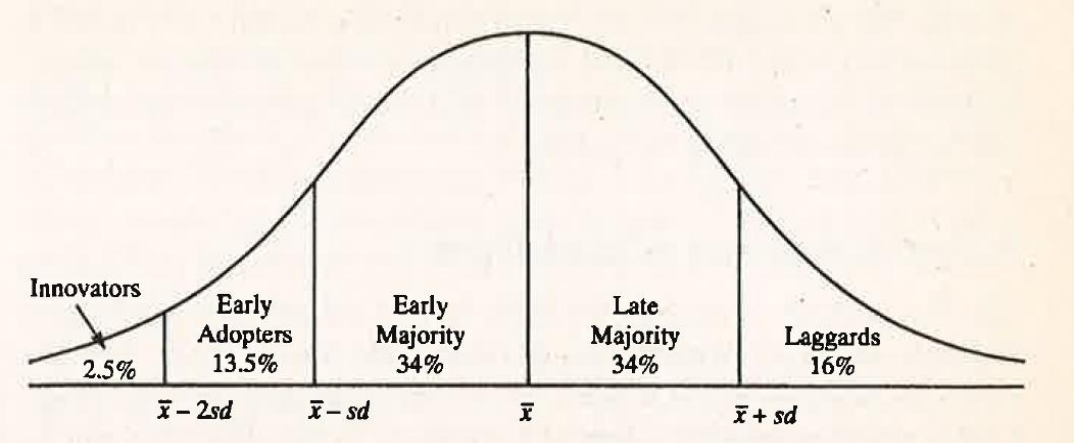

Figure 6 Adopter categorization on the basis of innovativeness (Roger 1983)

3.2.6 The negative affections of air purifier diffusion

The process of innovation always accompany with both positive affections and negative affections. Negative news of air purifier product mainly is the quality and usefulness of product. Before the new standard for air purifier product issued in 2015, the quality of air purifier in the market were uneven, even some useless products appeared in the market. This lead to consumers' negative experience to air purifier and more seriously, those consumers' negative experience and perceived useless can spread through internet and affect potential customer behavior. Beside, in 2015 the data fabrication of Xiaomi air cleaner reflected the credit crisis in the air cleaner market. This incident reminds all the producers that both marketing and core technology are important for achieves customers.

4 RESEARCH OF AIR PURIFIER MARKET ACCEPTANCE

Based on the type of this research and the selection of participate respondents, the non-experiment quantitative research method will be used for this research. The questionnaire survey method refers to the use of a sample drawn from the whole research object and a good designed questionnaire to get information researcher need. The collected data could be analysed in graph or table form which is more direct and obvious to reveal the result.

4.1 Research methodology

4.1.1 Data collection

This research is based upon both primary and secondary resources. The primary resource included data collected from people's respond to the questionnaire, and the secondary resources consist of abundant origins, such as books, company annual reports, journals, official websites, internet resources etc.

Method of data collection

The questionnaire includes single choice and multi-choice was made through Webropol. And as the target respondents are who now lived in China, the questionnaire will be applied both in Chinese and in English. Considering generally Chinese people whose age over forty is less likely to answer questionnaire online, and to reach respondents in this age region, part of the survey is done in paper questionnaire and hand out in the street. Candies and cookies were prepared as thanks gift. The other part of the questionnaire is distributed link online through social media such as Tencent QQ zone, WeChat, and Sina weibo to reach younger respondents.

The advantages of distributing questionnaire online are: 1) save cost and survey time, 2) more people from different geographical area can be reached. While doing face-to-face survey in the street, respondents can get answers directly from sender if they have any questions with the questionnaire, and the answers of respondents will be more accurate to describe their real idea. On the contrary, when respondents answer questionnaires online, they have higher risk of misunderstand questions than respondents who are doing the survey with the sender's help, therefore it may lead to less accurate answers.

Sample scale

In this questionnaire distribution, 245 questionnaires were collected, 170 questionnaires were collected through internet, and others were collected in streets. The street survey was started from 24 February and ended in 2 March. The online survey was started from 13 May to 23 May. The survey reached 245 respondents with an approximately 73 percent response rate.

4.1.2 Data analysis

The preparatory work of data analysis is to deduct the useless information and category the figures. The gathered data will be analysed by professional analytical tool in Webropol and expressed through Microsoft tools.

The process of data analysis is shown as follows:

1) Statistical description of the independent variables such as gender, age, education and geographical area will be expressed first.
2) Calculate and analyse the average value and standard deviation of independent variables and also gives a simple analysis of dependent variables.
3) Calculate and analyse correlation coefficient between variables.

4.1.3 Validity of the study

It is impossible to achieve 100 percent sure of any research conclusions, however one who works on research must try their best to avoid and reduce the possibility of getting inaccurate conclusions.

Validity is the main method used to evaluate research in quantitative methodological studies. Validity refers to how accurately the research explains or describes the event it is examining (Mikko spring 2012, 60). The research is valid in measuring people's acceptance to air purifier in China. In this research the data collected through questionnaire is all first-hand data and the questionnaire is designed according to the research object which means a high validity.

4.2 RESULT OF THE RESEARCH

4.2.1 Descriptions of respondent based on demographic variables

The analysis of demographic variables will firstly give descriptions to basic information of respondent, such as gender, income, education level, geographical area etc. will be illustrate with both value and percentage on the table or graph.

Table 2 General information on respondents

	Respondents	
Gender	Count	Percentage
Male	141	57.55%
Female	104	42.45%
Age category		
Under 20	7	2.86%
20-29	71	28.98%
30-39	100	40.82%
40-49	58	22.86%
50-60	11	4.49%
Education level		
Primary school	2	0.82%
Junior school	6	2.45%
High school	24	9.8%
Secondary technical school	13	5.31%
Junior college	48	18.78%
Bachelor	118	48.16%
Master	35	14.29%
Doctor	1	0.41%
Monthly income		
Under 2000	33	13.47%
2000-2999	50	20.41%
3000-3999	61	24.9%
4000-4999	44	17.96%
5000-5999	22	8.98%
6000-6999	13	5.31%
Above 7000	22	8.98%
Total	245	100.00%

The table above gave general information on respondents. As the basic report shown, there are 245 respondents from different area of China. A majority of respondent are

from 20 to 49, especially from 30 to 39. Most of people in this age region in China are employed and married which means they are financial independent and has purchasing power. There are small difference of male and female respondent, and to avoid deviation brings by this difference, the following analysis concerning gender will be calculated in percentage. As for education level, almost half percent of respondents hold a bachelor degree. It is followed by respondents graduated from junior college with 18.78%. The monthly income of most respondents are around 2000 to 4999 yuan, and approximate 23% of respondents have higher income which is over 5000 yuan each month.

4.2.2 Analysis of target variables association

- *Gender of respondents by awareness of air purifier*

The majority of the 245 respondents were male which accounts 57.6% and female respondents accounted smaller percentage than male respondents did. Table 3 gives a general outlook of male and female respondent awareness spreading in different awareness levels. The result of table 3 illustrates that generally most respondents know about air purifier fairly well. Both male respondents and female respondents who choose fairly well account over fifty percent of respective numbers. Very few of respondents know very well of air purifier, only 1.9% of female respondents and 4.3% of male respondents select this choice. Besides, less male respondents (31.2%) chosen know nothing about air purifier than female respondents (40.4%) did. Therefore generally male takes a dominant status on knowing about air purifier than female.

Table 3 Gender of respondent by awareness of air purifier

	How well do respondents know about air purifier			
	Very well	Fairly well	Not at all	Total
Male(*n*=141)	4.3%	64.5%	31.2%	100%
Female(*n*=104)	1.9%	57.7%	40.4%	100%

- *Satisfactory of indoor air quality in northern and southern China*

For geographical region variable, only 218 valid responses were collected which include 65 responses from northern China and the other 153 responses from southern China. Because of the obvious difference between the number of respondents from northern and southern China, the percentage were selected to explain the spread of figures.

One could see from the table 3 that indoor air quality is measured into four degrees: very satisfied, satisfied, fairly satisfied and unsatisfied. Over fifty percentages of respondents from both north and south part of China fairly satisfied with present indoor air quality. The difference is 40% of northern respondents are unsatisfied with their indoor air quality which is 10% more than respondents from southern China. Besides, the percentage of respondents from southern China who satisfied with indoor air quality was over 10% more than the percentage of respondent from northern China. Therefore a conclusion can be made that people from southern China are more satisfied with indoor air quality than people from northern China did.

Table 4 Attitude of respondent towards indoor air quality by geographical region

	Very satisfied	Satisfied	Fairly satisfied	Unsatisfied	Total
Northern China (*n*=65)	4.6%	1.5%	53.8%	40.0%	100%
Southern China (*n*=153)	3.3%	12.4%	54.2%	30.1%	100%

- *Purchasing intension*

As the figure 7 shown below, over 130 respondents who mainly willing to purchase an air purifier for children, and the number is over twice the number of respondents mainly willing to purchase for their parents and themselves. Author considered this result was caused by culture. First, as already discussed before, the age of most respondents are from 20 to 49, and in china it means most of those respondents has one or more children. In China, children are expected to be the future of a family and this country, and the close connection among family members make parents wishing to offer their children best living environment. Therefore, it can somehow explain why most respondents tend to buy an air purifier for children. Besides, the immunity of children are weaker than adult's and organs of children are not mature, therefore it is easy for respondents to consider children need an air purifier more than an adult need. Concluded from understanding of Chinese culture and attitude of Chinese parents towards children, more percentage of people tends to buy an air purifier for children.

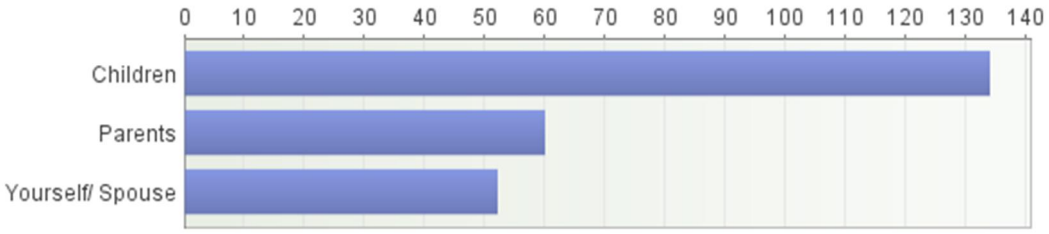

Figure 7 Tendency of purchasing intention

- *Brand popularity*

The following two charts described the popularity of air purifier brand in China. The most popular three brands are Gree, Media and Philips who all known by over 100 respondents. Figure 8 list brands from different countries and table 5 summarize the three main origins of those brands. Through those two pictures, it is not difficult to find that the all-around international brands are more well-known than specialty air purifier -brands. The reason is those all-around brands are already known by customers in China through their other products. The table 5 also shown that generally Chinese brands and Japanese brand are known by more people than and European brands are.

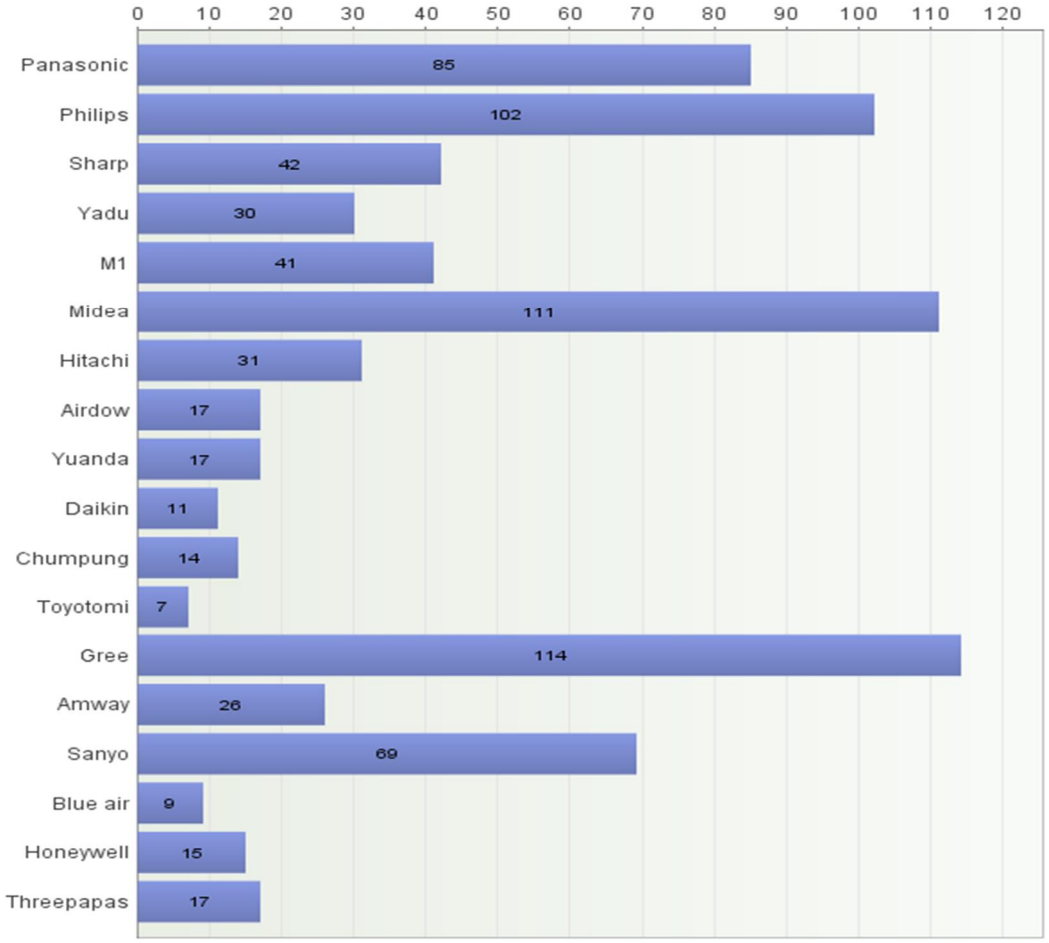

Figure 8 Brand popularity of air purifier in China

Table 5 Summary of brands popularity

Brand origin	Popularity	Number of brands
China	330	6
Japan and South Korea	259	7
Europe and the US	169	5

- *Preferred elements of air purifiers by age categories*

Table 6 describes respondents' preferred elements of air purifiers under different age. Generally the function of an air purifier is concerned as the most important element chosen by 84% of respondents and the price of air purifiers took second highest percentage (61%) of selection by respondents. If take each elements into separate consideration, it is easy to find that respondents from different age categories have different preferences on each elements. For respondents under 20 year-old, most percentage (57%) of them select appearance among respondents from other four age categories. And 15% of them selected brand of an air purifier which is the lowest percentage among respondents from other four age categories. Therefore, a conclusion can be made that young people cares more on appearance and less on brand than people above 20. For respondents from 20 to 29, 31% of them selected technology and it shows that more people from this age category value technology. For respondents from 30 to 39, they care more on brand than other age categories.

Table 6 Preferred elements of air purifiers by age categories

	under 20 (*n*=7)	20-29 (*n*=71)	30-39 (*n*=100)	40-49 (*n*=56)	50-60 (*n*=11)
Appearance (23%)	57%	27%	18%	20%	36%
Price (61%)	71%	66%	56%	61%	73%
Brand (48%)	14%	41%	58%	46%	27%
Function (84%)	100%	86%	82%	86%	73%
Technology (20%)	14%	31%	18%	11%	9%
Others (9%)	0%	7%	13%	7%	0%

17 of respondents who choose others in the answer to preferred elements of air purifiers gives extra 5 preferred elements that they will concern when decide to buy an air purifier. Table 7 listed those five elements: ease of use, after-sale service, noise level, reliability and usefulness. Among all those five elements, 6 respondents mentioned that after-sales service and 5 respondents mentioned ease of use.

Table 7 Other mentioned elements

	Count
Ease of use	5
After-sale service	6
Noise level when using	1
Reliability	2
Usefulness	3

- *Preferred elements of air purifiers by gender*

Table 8 compared the male and female's preferred elements when choosing an air purifier. Function and price are considered as important elements by both male and female respondents. Appearance of an air purifier is more important for female than for male that 28% of female respondents selected appearance which is 9% higher than male respondents. 5 more percentage of male choose brand than female. And for other elements such as price, function and technology, more percentage of female choose those elements then male respondents. As this is a multi-choice question, it may illustrated that more female respondents are tend to choose more elements than male respondents which means that female prefer air purifiers of integrated advantages.

Table 8 Preferred elements of air purifiers by gender

	Male (*n*=141)	Female (*n*=104)
Appearance (23%)	19%	28%
Price (61%)	59%	64%
Brand (48%)	50%	45%
Function (84%)	82%	87%
Technology (20%)	18%	22%

- *Willingness of purchasing an air purifier under satisficing to indoor air quality*

As the table 9 shown, generally nearly fifty percentages of all 245 respondents are fairly satisfied with present indoor air quality, and 39% of them are unsatisfied. The table also expressed that 164 of respondents willing to buy an air purifier to improve indoor air quality while 81 of respondents not willing to. For respondents who not willing to purchasing an air purifier, more percent of them are very satisfied or satisfied with their present indoor air quality than respondents whose answer is no. Besides, more percent of respondents who willing to buy an air purifier is fairly satisfied or un-

satisfied with present indoor air quality. Therefore, the satisficing of indoor air quality can affect people's willingness of purchasing an air cleaner.

Table 9 Willingness of purchasing an air purifier under satisficing to indoor air quality

	Yes (*n*=164)	No (*n*=81)
Very satisfied (4%)	2%	6%
Satisfied (11%)	9%	15%
Fairly satisfied (47%)	47%	46%
Unsatisfied (39%)	42%	32%
No opinion /Don't know (0%)	0%	1%
Total	100%	100%

- Why not using an air purifier

As the figure 9 shown below, in this survey over 75% of respondents are not using an air purifier now which is triple more than respondents who are using one now.

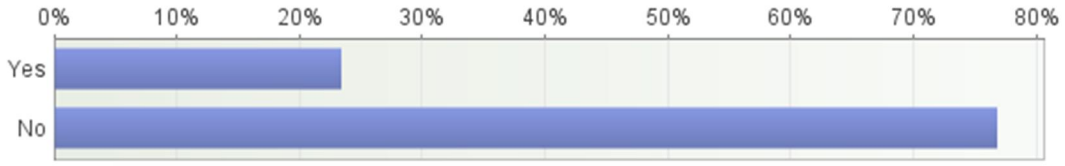

Figure 9 Percentage of whether using an air purifier now

For respondents who are not using an air purifier now, 52 of them gave reasons for not using, and some of them gave more than one reason. Table 10 summarized the reasons and percentages for each item. Not know much about air purifier, never thought of using air purifiers and satisfied with indoor air quality took most percentages of reasons for not using. It illustrated that many potential customer are not familiar with air purifier and have no concept of air cleaner products. Other reasons such as brand-choosing difficulty, perceive inconvenient to use also proof that air purifier market in China are now not mature, and potential customer need to be educated to learn more about air purifiers.

Table 10 Reasons for not using air purifiers

	Count	Percentage
Expensive	6	11.1%
Satisfied with indoor air quality	10	18.5%
Prefer aeration	3	5.6%
Perceive air purifiers are useless	6	11.1%
Know little about air purifiers	12	22.2%
Air pollution is only severe in several days, no need to buy an air purifier	2	3.7%
Perceive inconvenient to use an air purifier	1	1.9%
Never thought about using an air purifier	11	20.4%
Never heard about air purifiers	1	1.9%
Too much brands to choose one to buy	2	3.7%
Total	54	100%

- Analysis based on TAM

This is to analyze agreement or disagreement with opinions concerning attitudes of respondents towards air purifiers. An average figure calculation is used to combine the three separate tables for an easy reading. The smaller the figure is, the stronger people disagree with the items. 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5=strongly disagree. A conclusion that the attitude of most respondents tend to be neutral can be obtained from the table 11, for the average values of all those three items are around 3.5. Standard deviation indicates how much variation there have been in the response values. In this case, a low standard deviation indicates that there has not been significant disagreement between the respondents, whereas a high standard of deviation indicates that respondents have significantly disagreement. Among those three items, the highest standard deviation happened on improve life quality (1.12) and the lowest standard deviation is from perceive usefulness (0.95). Therefore the respondents have significant disagreement with air purifiers can improve life quality and have significant agreement with perceive usefulness of air purifiers if take those two into comparison. However, the standard deviation of all those three are around 1 which is small and indicated that generally respondents have significant agreement with attitude towards perceive usefulness, perceive ease of use and improve life quality. Consequently, respondents generally consider an air purifier can is easy to use, and is useful in clean air and improve life quality.

Table 11.1 Attitude towards air purifiers

	average	Standard deviation
perceive usefulness	3.51	0.95
perceive ease of use	3.43	1.01
improve life quality	3.47	1.12

Mann-Whitney is a non-parametric test which tests if the means of the two groups differ from each other. Letter p is used to indicate the value of the test. When the value of p smaller than 0.05, meaning the significant statistical association. To define the degree of significance, stars are used in table 12. If the value of p is smaller than 0.05 but bigger than 0.01, one star is given to express the low significant statistical association between two variables. If the value of p is smaller than 0.01 but bigger than 0.001, two stars are given. If the value of p is smaller than 0.001, three stars are given to express the high significance.

Correlation coefficient is used to define the degree of relationship between two variables. Letter r is used to represent the value of correlation coefficient. Theoretically, the value of correlation coefficient can be taken from -1 to +1. A correlation coefficient close to +1 indicates that two variables are covary positively while a correlation coefficient close to -1 show that two variables are inversely related. And if the value of r closes to zero, it means the variables are unrelated. (Ghauri & Gronhaug 1995, 175)

In this case, according to technology acceptance model, author made four hypothesises. First, people perceive an air purifier is easy to use and people perceive an air purifier is useful in clean the air are correlated. P-value is 0 meaning those two variables are high significant associate. The value of r is 0.67 which is bigger than 0.5 and smaller than 0.8 meaning that the two variables are medium positively related. Second, people perceive an air purifier is useful in clean the air and people are willing to buy an air purifier are correlated. P-value is 0.002 smaller than 0.01 indicates a medium significant association between two variables. A minus value of r, -0.42 which is bigger than -0.5, indicate a low inversely correlation between two variables. Third, people perceive an air purifier is easy to use and the willingness to buy an air purifier is correlated. The value of p (0.288) is bigger than 0.05, shown that there is no significance and correlations between those two variables. Fourth, people consider an air purifier can improve their life quality and the willingness of purchasing an air purifier is correlated. P-value (0.013) is smaller than 0.05 expresses a low significance, and a minus r which is bigger than -0.5 indicates a low inversely correlation between two variables. Consequently, the third hypothesis is rejected, and the other three hypothesises are approved.

Table 11.2 Attitude towards air purifiers

	r	p	Significance
Perceived ease of use→ Perceive usefulness	0.67	0.000	***
Perceived usefulness→ Willing to buy an air purifier	-0.42	0.002	**
Perceived ease of use→ Willing to buy an air purifier	-0.15	0.288	-
Improve life quality→ Willing to buy an air purifier	-0.34	0.013	*

p<0.05: * p<0.01: ** p<0.001: ***

5 CONCLUSION

The thesis aims at Chinese air purifier market. The objective of this study was to know about customer acceptance of air purifier in China. Furthermore, the study introduces the present market situation and competitive environment of air cleaner products, which driving forces of the research as background knowledge.

In summary, the thesis consists of six chapters: Chapter 1 introduced the target of the study and the restriction of the survey. Chapter 2 covered the present air pollution and market situation of air cleaners in China. Policy and regulations concerning air cleaner products also help to identify the pattern of market. Chapter 3 provided the theory support of the innovation acceptance, which is the core of this thesis. Chapter 4 illustrated research methodology and the result of the research. Chapter 5 summarized the conclusion of the whole study. Finally the shortage and experience during this study process were discussed.

Generally, the air purifier market in China now is not mature. Many people lack of relevant knowledge of air pollution and air cleaner products. The present sales are grown by the stimulation of haze in autumn each year. Most people consider air purifiers are easy to use and also useful in clean the air and their life quality can be improved by the work of air purifiers. Nevertheless the data tendency is not obvious to strongly agree with ideas above. The reason might be respondents are not familiar enough with air purifier and cannot give their clear opinion of the questions. Moreover, six small conclusions are made according to the survey result. First, the understanding level of air purifiers can be different by gender. Generally male understand more about air cleaner than female. Second, people care most about the function and price of an air purifier. In comparison, female cares more on appearance while male care more on brand. Third, people in southern China are more satisfied with the air quality than people in northern China are. Therefore one important reason for not using or purchasing an air purifier is people are satisfied with the present indoor air quality. Fourth, more people tend to buy an air purifier for children than for parents or themselves. Fifth, air cleaner products of Japanese and Chinese brands are more popular than European and American brands in China. There are two reasons possible for this phenomenon. One is European brands focus more on Europe market than Asian market. Second is the marketing strategy of European brands are difficulty to reach Asian market due to the cultural difference. Sixth, nowadays the rate of using air cleaner products is lower than other countries such as Japan and the US.

The new environmental protection laws and relevant regulations for air cleaner products were issued in 2015, which gives a frame for the development of air purifier market in the future. For air purifier producers, more education concerning the principle of air cleaners should be sales to potential customers. Things like data fabrication will only decrease market acceptance.

6 DISCUSSION

During the process of writing this thesis, theories were learnt and practiced in this study. Two cherish experience that learnt from this study will be discussed below. One is concerning theory part and the other one is regarding data part.

It is important to write a questionnaire design plan before start to design a questionnaire. Writing a questionnaire design plan can not only help to understand the meaning of each question and deepen the understanding of thesis target, but also decrease the possibility of missing important questions. What target does this thesis wish to achieve, what answers does the survey wished to get. Make sure each question is valuable and try to find theory support for why does the question is designed like that. a questionnaire design plan was not written before designed the questionnaire, questions were designed directly according to thesis target and that made mistakes in the survey. The problem in this survey is author realized that one important question was missing after the questionnaire was sent, so one more question was added to the questionnaire when some of the respondents already answered the questionnaires. The consequence is for the question that added afterwards less number of respondents was collected than other questions, and the unequal number of respondents brings two negative affections. First, it made the analysis process complicated. To get equal number of respondents, all respondents' answer have to be download to excel, and then delete useless data, then upload new data to Webropol for calculating and analysing. Second, modified data to get equal number of respondents decreased the number of respondents for that question, but also decreased the reliability of analysis in that question..

The other thing that considered worth discussing is the using of theories or models. Two theories were used in this thesis: innovation diffusion theory and technology acceptance model. Both two models were put forward centuries ago, and have been improved and developed with their adopting in different subjects and research. Innovation diffusion theory and technology acceptance model are two excellent theories in research customer acceptance to a new product. However, the origin of both two theories is focus on certain aspects and is limited to be used in my thesis. Therefore I plan to combine those two theories and to set up a new model for my research. However, if build a new model, the analysis part will become much complicated and will take more time for this thesis, besides, it may also over a bachelor thesis level. For those reasons, I gave up this idea and put the model that combined from two theories mentioned above here for people who are also interested in this topic.

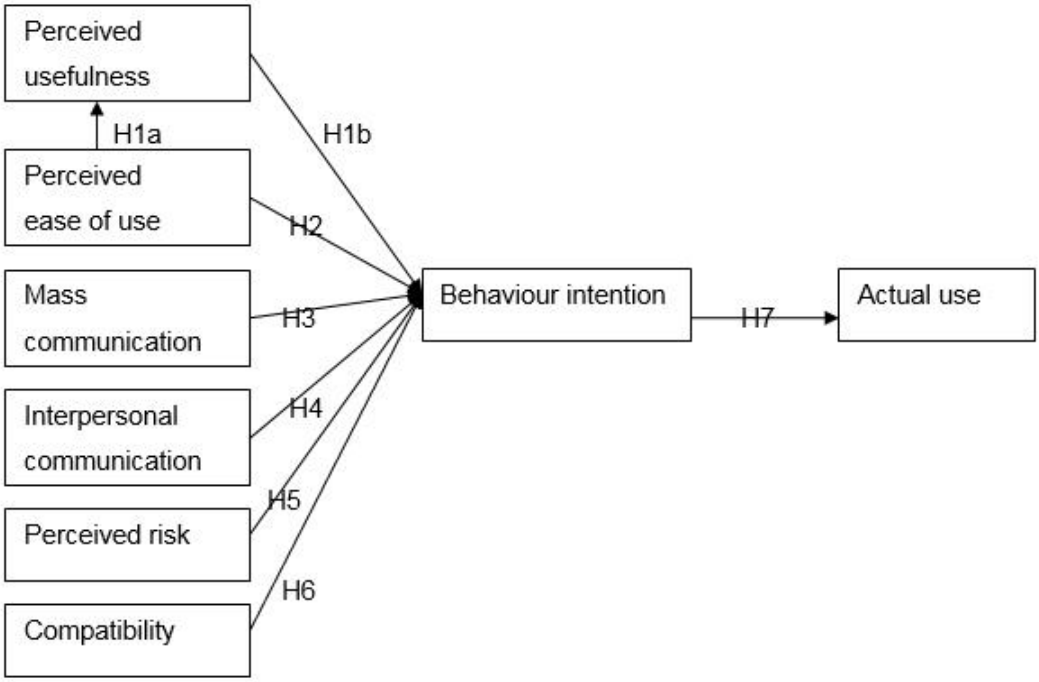

Figure 10 New model

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Appendix 1

Air purifier Market in China Survey

Welcome to a survey geared to mapping the market acceptance of air purifier! First we are going to ask you for some background information. Such questions are asked in order to be able to analyze the group level data gathered. The results of the survey will be handled with absolute confidentiality so that no information given by individual respondents can be identified. Your answers will take 5 minutes of your time.
Instructions: Tick correct option(s) or write your answer in the appropriate space.

1. Gender of respondent
   - ○Male
   - ○Female

2. Age of respondent
   - ○Under 20
   - ○ 20-29
   - ○30-39
   - ○40-49
   - ○ 50-60
   - ○Above 60

3. Highest education level of respondent
   - ○Primary school
   - ○Junior school
   - ○High school
   - ○ Secondary technical school
   - ○ Junior college
   - ○Bachelor
   - ○Master
   - ○Doctor

4. Monthly income
   - ○Under 2000
   - ○2000-2999
   - ○3000-3999
   - ○4000-4999
   - ○5000-5999
   - ○ 6000-7000
   - ○ Above 7000

5. Which city you live in China now?
   _____

6. Are you satisfied with present indoor air quality? How satisfied are you with the quality of the indoor air in your dwelling?
   - ○Very satisfied
   - ○Satisfied
   - ○ Fairly satisfied
   - ○Unsatisfied
   - ○No opinion/don't know

7. What will you do if you are not satisfied with the air quality in your dwelling?
   - ○Open the window (aeration)
   - ○Plants

〇Air purifier
〇Air freshener
〇Others

8. How much you know about Air purifier?
〇Very well
〇Fairly well
〇Not at all

9. Are you using air purifier in daily life?
〇 Yes
〇No

10. Where do you use air purifier?(Skip if the answer is No for Q8)
〇 Office
〇Car
〇Home
〇Other place_____

11. Will you buy an air purifier to improve indoor air quality?
〇Yes
〇No

12. Who you consider need an air purifier most?
〇Children
〇Parents
〇Yourself/Spouse

13. When you are buying the air purifier, what are your main concerns? (You may choose more than one option)
〇Appearance
〇 Price
〇 Brand
〇 Function
〇 Technology
〇 Others_____

14. Through which approach do you get to know about air purifier brand? (You may choose more than one option)
〇Publications (newspapers, magazines, journals)
〇Radio and television
〇Internet
〇Outdoor advertisement
〇Friends
〇Others
〇 Others_____

15. Have you ever heard about those air purifier brands? (You may choose more than one option)
〇Panasonic
〇Philips
〇Sharp
〇Yadu
〇 M1
〇Midea
〇Hitachi

- ○Airdow
- ○Yuanda
- ○Daikin
- ○Chumgpung
- ○Toyotomi
- ○Gree
- ○Amway
- ○ Sanyo
- ○ Blue air
- ○ Honeywell
- ○Threepapas

16. Which price region you can afford for an air purifier?
    - ○ Under1000
    - ○1000-1999
    - ○2000-2999
    - ○3000-3999
    - ○4000-4999
    - ○5000-5999
    - ○6000-6999
    - ○ Above 7000
17. Attitude towards air purifier (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly disagree)
    1) I consider an air purifier can improve my life quality 1 2 3 4 5
    2) I perceive air purifiers are useful in clean the air 1 2 3 4 5
    3) I perceive an air purifier is easy to use 1 2 3 4 5

Appendix 2

空气净化器市场接受度调查

您好！非常感谢您抽出时间填写这份问卷调查，本次问卷是为了了解中国市场对空气净化器的接受度，请根据您的实际情况填写，所有的问卷都是匿名的，问卷结果仅作为学术研究，不会外泄您的个人资料。衷心感谢您的配合与支持，祝您生活愉快！

注：在您倾向的选项前打钩，或在空白处填写您的意见即可。

1. 您的性别？

○男

○女

2. 您的年龄？

○20 以下

○20-49

○30-49

○40-49

○50-59

○60 以上

3. 您的教育背景？

○小学

○初中

○高中

○中专

○大专

○本科

○研究生

○博士

4. 您的月收入大概是？

○2000 元以下

○2000-2999 元

○3000-3999 元

○4000-4999 元

○5000-5999 元

○6000-6999 元

○7000 元以上

5. 您所在的城市？

---

6. 您对目前室内空气质量是否满意？

○满意

○良好

○一般

○不满意

○不知道

7. 您家如果有空气质量问题您会如何做？

○通风

○摆放绿植

○空气净化器

○空气清新剂

○其他

8. 您了解空气净化器吗？

○很了解

○有点了解

○几乎不了解

○不好说

9. 您目前正在使用空气净化器吗？

○是

○否

10. 您在什么场所使用？（上一题选否直接跳过）

○家里

○车内

○办公场所

○其他_____

11. 您是否愿意选购空气净化器来提高您的室内空气质量？

○愿意

○不愿意

12. 如果购买空气净化器，您主要是为了谁而购买？

○孩子

○父母

○自己/爱人

13. 如果购买空气净化器，在购买时的关注点是？（可多选）

○外观

○价格

○品牌

○功能

○技术专利

○其他_____

14. 您主要通过哪些途径了解空气净化器品牌的信息？

○平面媒体（报刊杂志）

○电视广播媒体

○网络媒体

○户外广告

○亲友介绍

○其他

15. 您听过以下哪些空气净化器品牌？(多选)

○松下(Panasonic)

○飞利浦(Philips)

○夏普(Sharp)

○亚都(Yadu)

○小米

○美的(Midea)

○日立(Hitachi)

○奥德奥(Airdow)

○远大(Yuanda)

○大金(Daikin)

○韩国清风(Chungpung)

○日本(TOYOTOMI)

○格力(Gree)

○安利(Amway)

○三洋(Sanyo)

○布鲁雅尔(Blue Air)

○霍尼韦尔(Honeywell)

○三个爸爸(Threepapas)

16．您可以承受的空气净化器的价格区间是多少？

○1000 元以下

○1000-1999 元

○2000-2999 元

○3000-3999 元

○4000-4999 元

○5000-5999 元

○6000-6999 元

○7000 元以上

17．您是如何看待空气净化器的？（1 代表非常不赞同，2 代表比较不赞同，3 代表不确定，4 代表比较赞同，5 代表比较不赞同）

1）我认为空气净化器可以提高我的生活质量	1 2 3 4 5
2）我感觉空气净化器有用	1 2 3 4 5
3）我感觉空气净化器操作方便容易使用	1 2 3 4 5


SAVONIA