東海大學餐旅管理學系碩士論文

飲料甜度對感官滿足與健康觀點之爭辯

The conflict between sensory pleasure and health concern on beverage sweetness

碩士班研究生 賴怡如

指導教授 陳錚中 博士

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　　　餐旅管理　　　研究所　　　賴怡如　　　君所提之論文

飲料甜度對感官滿足與健康觀點之爭辯

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誌謝

『一分耕耘，一分收穫』，這兩年來在研究所的努力總算有了收穫，回想過去奮鬥熬夜的日子，每一步都走得不輕鬆，而論文得以順利完成，有太多的人需要感謝，豈是一語能道盡，僅以此文來表達我的誠摯謝意。

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賴怡如

謹誌於東海大學 餐旅管理學系碩士班

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飲料甜度對感官滿足與健康觀點之爭辯

摘要

本研究目的在於探討飲料中的糖分以及飲料甜度高低和健康資訊對消費者滿意度之影響，運用愉悅喚起支配(PAD)理論對研究主題進行探討，以了解消費者對於糖分的需求行為，並透過實驗法，提供健康資訊（正向知識／負向知識）和四種不同的甜度的飲料（0度、3度、9度、12度）作為自變數，而願意購賣飲料支付的金額和對飲料的評分為依變數。問卷調查以194位台灣中部大學生為樣本，運用SPSS軟體，以敘述性統計、T檢定和ANOVA為主要分析方法。研究結果顯示含糖較多的飲料並不會導致更高的消費者滿意度，研究也證實知識對消費者行為與滿意度的影響，正負面健康資訊對不同飲料甜度的消費者滿意度具有不同的干擾效果，其中尤以負向健康資訊的干擾效果較大。最後，本研究並針對研究發現的意涵與未來研究建議進行討論。

關鍵字：甜度、健康資訊、消費者滿意度、 PAD 理論

The conflict between sensory pleasure and health concern on beverage sweetness

ABSTRACT

This study is aimed primarily at exploring the influences of different sweetness level of beverages and health information on consumer satisfaction. The application of the Pleasure-Arousal-Dominance (PAD) theory applied to understand consumer demand for sugar. This study used experimental method, providing health information (positive knowledge / negative knowledge) and four different sweetness drinks (0, 3, 9, 12 degrees) as the independent variables, and willingness to pay and scoring of sample as dependent variables. Questionnaires were distributed to student of Central Taiwan. A total of 194 completed valid questionnaires were used SPSS to descriptive statistics, T test and ANOVA for the analysis. The results showed that beverages with higher level of sugar do not lead to higher customer satisfaction, and also validated the knowledge affects consumer behavior and satisfaction. Moreover, the results supported the moderating role of health information between the different sweetness beverage and consumer satisfaction. Negative health information have more influence particularly. Finally, the implications of these findings and the directions for future research are discussed.

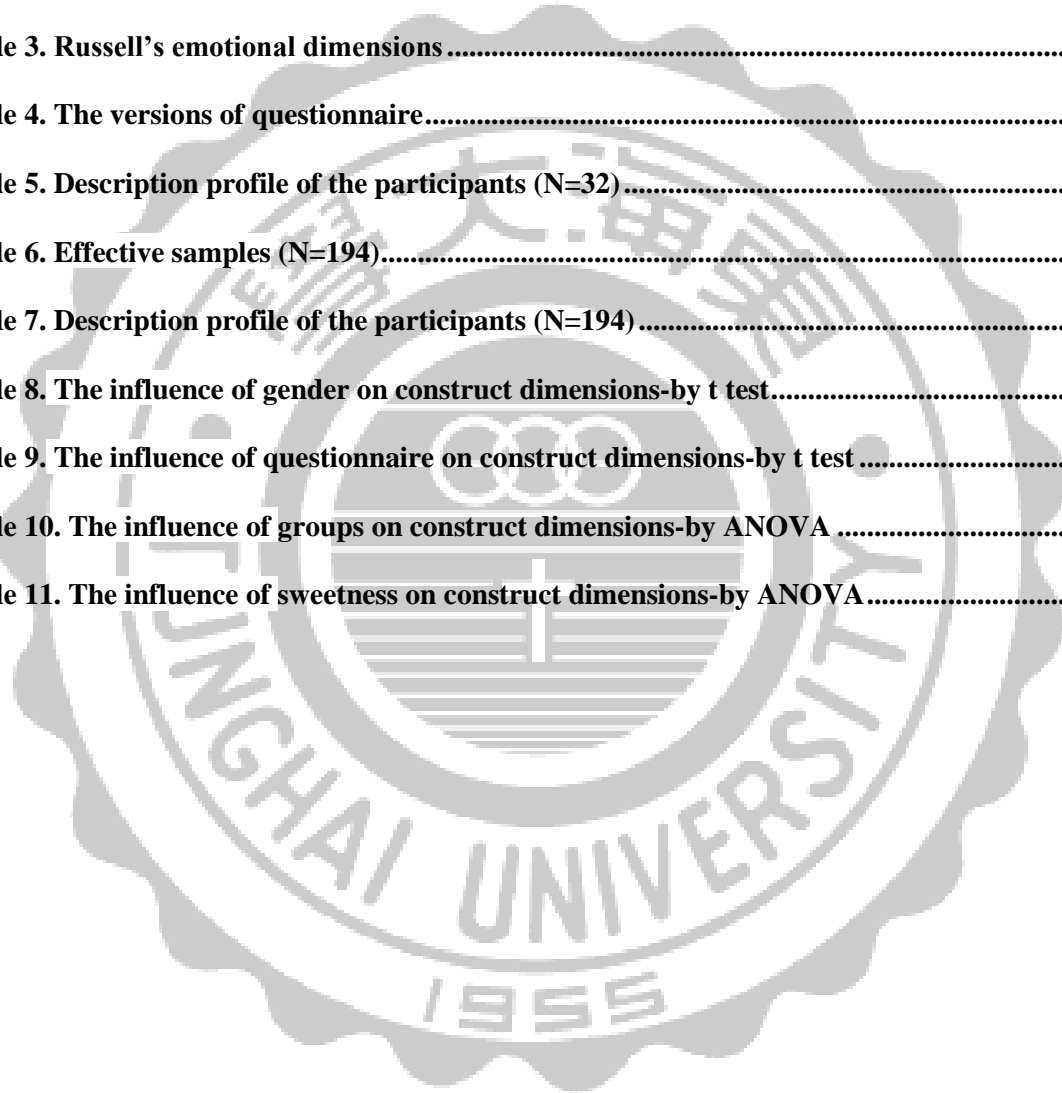*Keywords:Sweetness, Health information, Consumer satisfaction, PAD theory*

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1
INTRODUCTION

70% of our body components are water and appropriate intake of drinking water is good for health. However, it is unhealthy when we drink too much sugary drinks. In the term of Directorate-General of Budget, Accounting and Statistics, Executive Yuan, R.O.C. (Taiwan) (2011), the category of food, beverages and tobacco (16.2%) ranked second in household consumption expenditure, just below the category of residential services, utilities and fuels (24.4%). There are 161,091 stalls which categorized snacks, food and beverage in Taiwan. Compared with past five years, it increases 9,745 stalls and is over fifty percent of all categories stalls in Taiwan (Taiwan Provincial Government, Accounting and Statistics Department, 2008).

According to the statistics of Taiwan Beverage Industries Association (2012), the total number of beverage which Taiwanese brought is 1.9 hundred million liters. Compared with the data of 2011, it has grown 1.02 million liters (Taiwan Beverage Industries Association, 2012). It is perceived that beverage plays an important role in the Taiwanese consumer market. For example, 75% of junior high school students chose sugary beverage to be snack and half of them bought sugary beverage two or three times a week (Lee, 2002). Moreover, stores selling sugary beverage are everywhere including in schools and there are a large number of beverage stores around the Taiwan. It's common to see people hold their beverages in the streets everywhere. Because of that, manufacturers produce a greater variety of beverages to cater to customer's demand in order to attract them to drink more. As a result,

consumers gain too much calorie unknowingly and it raises the probability of chronic diseases such as heart disease, apoplexy, diabetes, hypertension and other diseases. It has become a new health risk factor.

Foreign studies also point out that children's consumption of sugary beverage and excessive amount of juice can cause obesity (Dennison, Rockwell and Baker, 1997 ; Ludwig, Peterson and Gortmaker, 2001). Intake of sugar-sweetened beverages for children and adolescents has been shown to associate with obesity significantly (Kavey, 2010). Larger consumption of sugar-sweetened beverages at the age 5 is associated with higher percentage of body fat, waist circumference, and BMI-for-age percentile from ages 5 to 15 (Fiorito, Marini, Francis, Smiciklas-Wright and Birch, 2009). Sweetened beverages with higher sugar are associated with a constellation of cardiovascular risk factors, both independently and through the development of obesity (Kavey, 2010). Obesity is strongly connected with the development of hypertension, dyslipidemia, type 2 diabetes, and the metabolic syndrome (Freedman, Mei, Srinivasan, Berenson and Dietz, 2007 ; National Institutes of Health, 1998). If human beings drink a lot of sugary drinks, it would have less nutritional value on the human body, and may even reduce the intake of nutritious foods, which in turn causes cause nutritional imbalance, even affect children and adolescent health and development (Dan, 2002). Therefore, it would certainly be a heavy burden on our country's medical resources.

According to World Health Organization (Steyn, Myburgh and Nel, 2003), scholars point out that eating too much sugar-added food increases the risk of certain chronic diseases, especially dental cavity and obesity, and is

even associated with the incidence of type 2 diabetes. Eating too much sugar is therefore a big problem. In order to solve this problem, foreign governments have to develop regulations to reduce the purchase of sugary drinks or unhealthy food, for example, Norway's government implement a VAT on sugar and chocolates (Hawkes, 2007) and South Australia is the first country to ban sugary drinks and high-fat snacks sold in schools (Stenberg, Elovainio, Chisholm, Fuhr, Perucic, Rekve and Yurekli, 2010). These showed that both domestic and foreign researchers have pointed out the negative impact of sugary drinks on human body. Therefore, countries have attached great importance to the related issues of sugary drinks, and attempted to take high-sugar food away from people.

Nowadays, although some of hand-shake beverage manufacturers provide the service in which each customer can adjust the sugar level of beverage, such as no sugar, less than half sugar, half sugar, more than half sugar, or full sugar, servicers have no common standard in sugar adding. Due to different standard of sugar adding, the same sugar level for different servicers could make a huge difference. The different standards of sugar adding not only increase difficulty for consumers to adjust the sugar intake to their own need, but also let consumers take in more sugar unconsciously.

Moreover, most manufacturers expect that consumers generally have "sweet tooth", so it's very likely that actual sugar added into drinks is much more than we perceived. Human being eats sweet food, because the brain naturally creates delight perception to make them happy (Booth, Higgs, Schneider and Klinkenberg, 2010). As early as 1982, Hirschman and

Holbrook observed the behavior of human beings consumption and defined enjoyable consumption as the aspects constructed with multi-senses, imaginations and emotions about personal consumption experience in consumption behaviors. In addition, enjoyable consumption is able to arouse customers' emotional consonances and create delightful and dazzling satisfaction. Mehrabian and Russell (1974) proposed the three-factor theory which is Pleasure, Arousal and Dominance, we can believe that pleasure of sweet food significantly affect our consumption. Hence, it will increase their willingness to purchase products when consumers buy products with happy mood. By contrast, consumers' willingness to buy products will be reduced or avoided it when they are having negative feelings.

To review the past literature, the issues which have impact on consumer behavior in the joy of composition with the sugary drinks are very rare. Furthermore, whether or not the amount of added sugar in sugary drinks will affect consumers' consumption of sugary drinks and their feeling of pleasure after drinking. Because of this, it makes the motivation for this study. The result of this study could give beverage manufacturers and the researchers of related issues some advice and suggestions for improvement. Therefore, this study from the manipulation of sugary drinks to consumers' value perception is based on the above points, following the two purposes of this study:

1. To explore enjoyable feeling with higher satisfaction caused by the sugar in sugar beverage which provides consumers.
2. To examine moderating effect of health information on consumer satisfaction.

CHAPTER 2
LITERATURE REVIEW

2.1 Global beverage market

Global beverage market consists of retail sale of bottled water, carbonates, concentrates, functional drinks, juices, RTD (ready to drink) tea and coffee, and smoothies. Based on the data (Global - Soft Drinks, 2011), it finds that it grew at a fairly steady rate during the period 2006-2010 and the overall market growth was expected to accelerate in the forthcoming five years. The market generated $452,450.5 to $492,407.4 million in 2006 to 2009 respectively and created total revenues of $503.7 billion in 2010 (see Figure 1), representing a compound annual growth rate of 2.7% for the period spanning 2006-2010 (Global - Soft Drinks, 2011). Moreover, this figure also shows that the sale of beverage was rising progressively from 2006 to 2010 and this market grew by 2% in 2010 to reach a volume of 457,370.8 million liters. Therefore, it can find more and more sale in daily consumption and the astounding market value in the global beverage market. Moreover, the global soft drinks market is forecast to have a volume of 522,841.5 million liters in the future. Accordingly, Global beverage market is popular in the world and produce huge revenue in global economy.
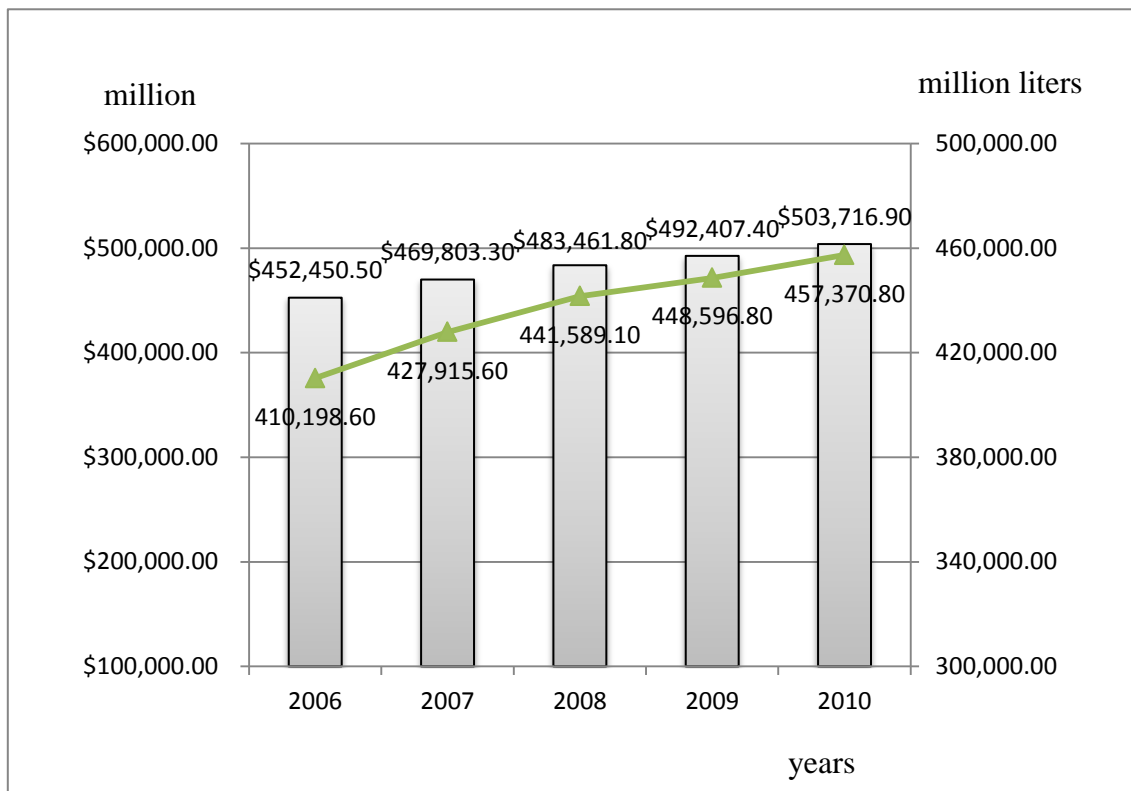
Figure 1. Global beverage market value and market volume

There are many categories in the beverage market and carbonates is the largest segment of the global beverage market, accounting for 40.6% of the market's total value (Global - Soft Drinks, 2011). Consequently, the market has the presence of leading players such as The Coca-Cola Company, PepsiCo, and Nestle and the biggest channel of beverage is supermarkets or hypermarkets. Besides, the market is relatively fragmented, with the top three players having 42.3% of beverage market (Global - Soft Drinks, 2011). The Coca Cola Company and PepsiCo are famous for coke, which is a carbonated beverage and Nestle in the third place is a major manufacturer in chocolate-based and malted drinks. The market share of them shows that consumers are influenced by brand powerfully. Based on this evidence, it could deduce that the most popular beverage in the world is carbonates and

the producer would like to produce more carbonates than others to cater to customers in order to increase revenue. Moreover, the channel of supermarkets or hypermarkets is over the half of channels which have access to beverage. It means that people usually buy beverage in the supermarkets or hypermarkets and as the chain of supermarket increases, buyers increases.

In table 1, it finds the market is divided into four segmentations -America, Europe, Asia- Pacific and Africa and Middle East, following 38.2%, 37.3%, 22.0% and 2.5% respectively. In contrast with areas, both of America and Europe are major consumer areas in the world. According to information, The Coca Cola Company and PepsiCo also originated from America. It is possibly the reseason why America is the biggest beverage market. However, disregarding nationality and age, the statistics demonstrates that most people in the world love drinking beverage.

Table 1. Global market segmentation (Global - Soft Drinks, 2011)

Category	% share
America	38.2%
Europe	37.3%
Asia- Pacific	22.0%
Middle East	2.5%
Total	100.0%
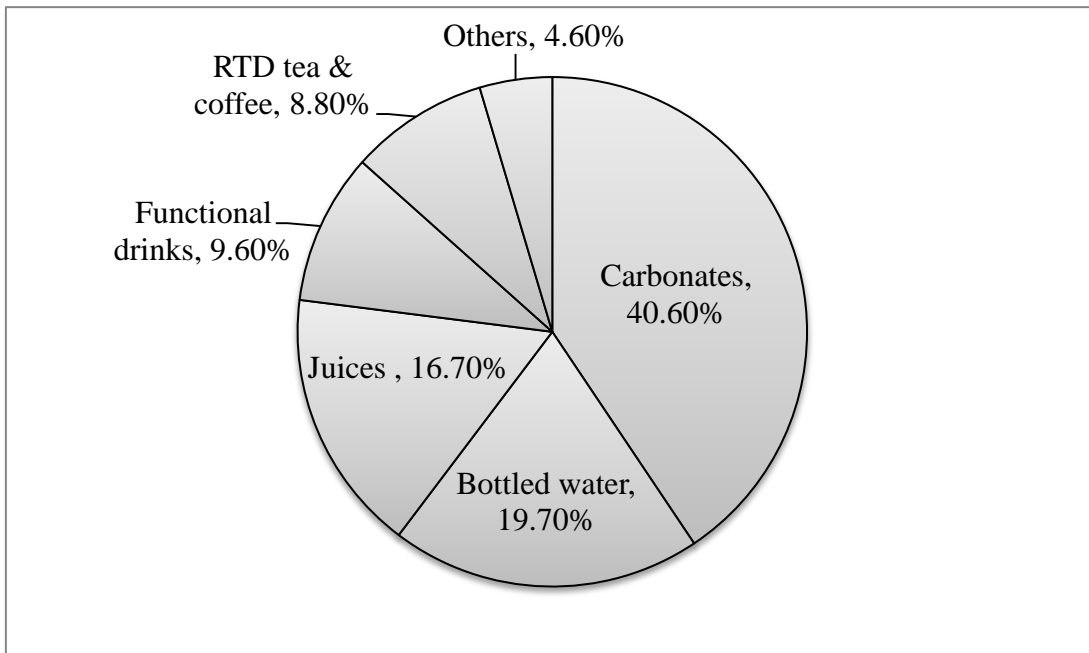
Figure 2. The category of global beverage

2.2 Beverage market in Taiwan

Taiwan account for 1.8% of the Asia-Pacific soft drinks market value (Taiwan - Soft Drinks, 2011). In Figure 3, it confirm that beverage market in Taiwan was raising and market value grew by 3.2% in 2010 to reach a value of $2,083.7 million. Same as the global beverage market, the market of Taiwan is forecasted to be growing and generate a basketful of revenue in Taiwan. In other words, no matter in Taiwan or global market, both data demonstrated booming development in soft drink market. Moreover, besides bottled water, beverage have more than seventy percentage in market share. That is so incredible maket value in the market.
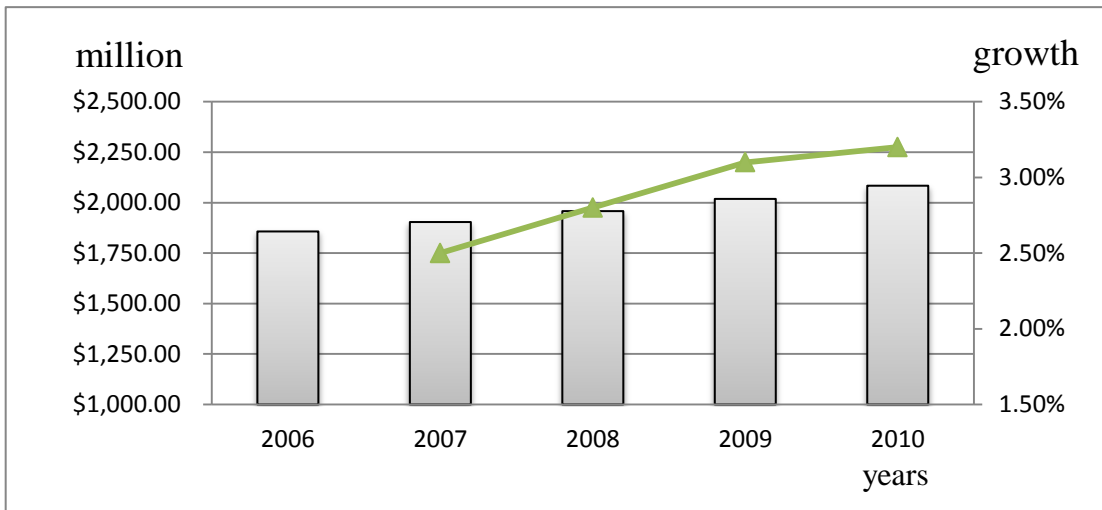
Figure 3. Market value of Taiwan beverage
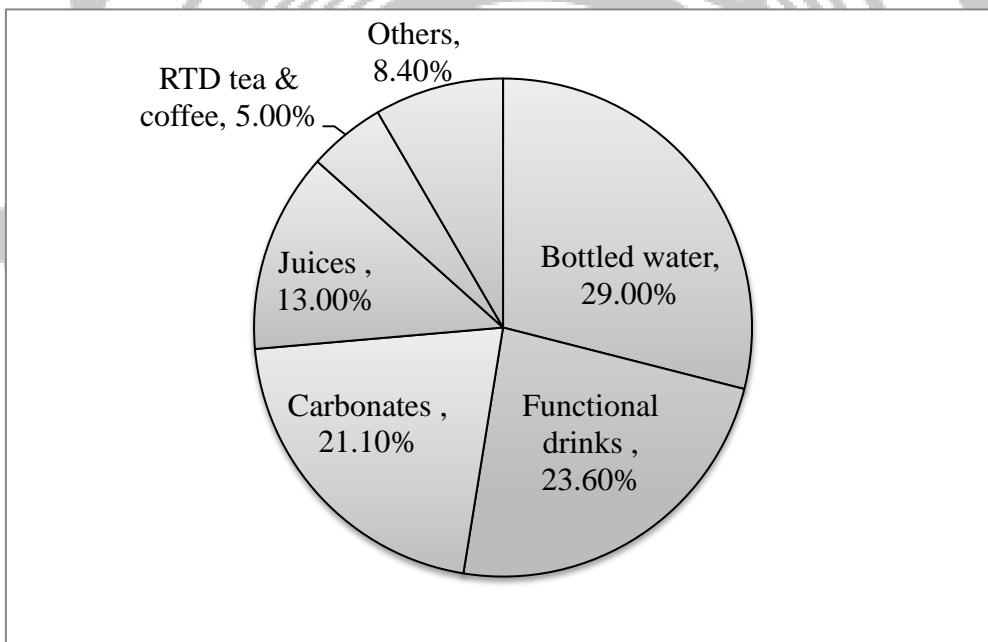
Figure 4. The category of beverage in Taiwan

According to information from Taiwan Beverage Industries Association (2012), there are about 1200 drink-manufacturers in Taiwan and small and medium-sized enterprises are the majority. Beverages become one of the necessities in daily life, so the scale of beverages market is huge and playes a significant role in economy in Taiwan. Although Uni-President Enterprises

Corp, Vitalon Foods Co., Ltd. and The Coca-Cola Company are the top three distributorships in the world, Taiwanese beverage market is still highly fragmented, with the top three players holding only 24.4% (Taiwan - Soft Drinks, 2011) of the total market. This indicates that smaller producers are important and successful in this market and the fragmentations reduce competition. The same as distribution channel in globe, supermarkets and hypermarkets are the biggest channels in Taiwanese beverage market. Based on the information from the survey of family income and expenditure in 2011, it inferred that the food and non-alcoholic beverages have huge percent in Consumption expenditures and are placed the second of all expenditure items.

In table 2, it found that families living in Taipei city spend much more money on food and non-alcoholic beverages than others. Moreover, compared to regions of the average expenditure of food and non-alcoholic beverages, Northern Taiwan is in first place, and then Southern Taiwan, Central Taiwan and East Taiwan in order. It deduced that family in Northern Taiwan have more consumption power in food and non-alcoholic beverages. Although the expenditure statistics reveal expenditure of food and non-alcoholic beverages in Northern Taiwan is higher, people who lived in Chiayi County and Chiayi City have more willingness to consume food and non-alcoholic beverages than other regions. This report is is a special outcome and shows the importance of expenditure of food and non-alcoholic beverages on this island.

Table 2. Average Family Expenditure per Household by Areas

Region		Food and non-alcoholic beverages ① (NT$)	Consumption expenditures ② (NT$)	Percent ①/②	Rank
Northern Taiwan	New Taipei City	109957	745901	14.74%	11
	Taipei City	143530	996646	14.40%	15
	Taoyuan County	125929	822232	15.32%	9
	Hsinchu County	112478	907729	12.39%	19
	Keelung City	119742	718329	16.67%	5
	Hsinchu City	120871	982122	12.31%	20
	Yilan County	92450	602332	15.35%	7
Central Taiwan	Taichung City	109312	726320	15.05%	10
	Changhua County	102851	579670	17.74%	3
	Nantou County	96518	629379	15.34%	8
	Yunlin County	70832	491428	14.41%	14
	Miaoli County	84698	656067	12.91%	17
Southern Taiwan	Tainan City	97558	630810	15.47%	6
	Kaohsiung City	100876	686354	14.70%	12
	Pingtung County	70846	558868	12.68%	18
	Chiayi County	103697	520344	19.93%	1
	Chiayi City	113584	616177	18.43%	2
	Penghu County	82870	486598	17.03%	4
East Taiwan	Hualien County	81341	554335	14.67%	13
	Taitung County	59228	435401	13.60%	16
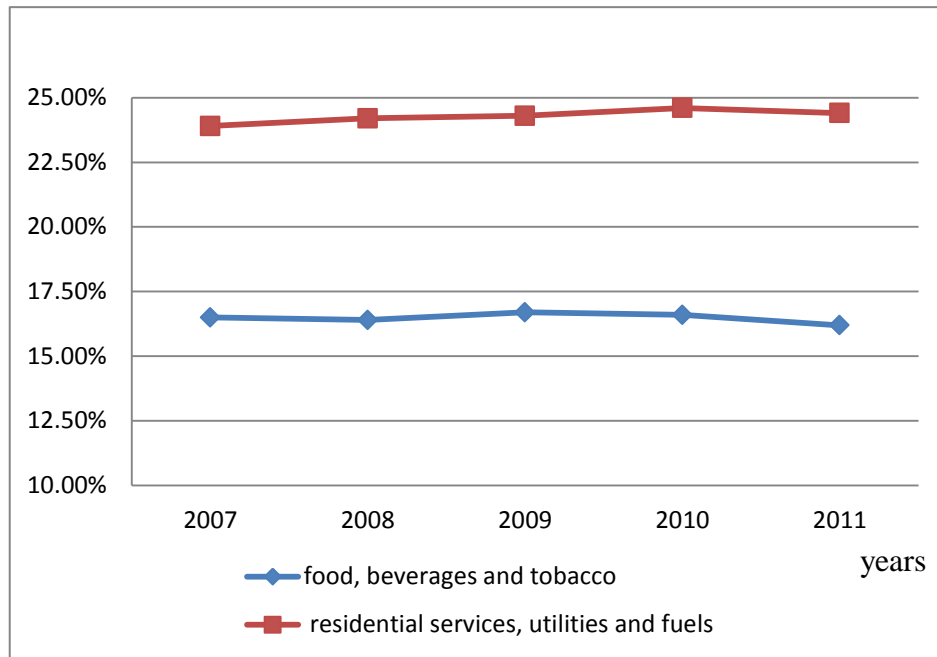
Figure 5. The percent of household consumption expenditure

With the economic standards rising, the diversification of domestic consumption, selling the product of beverage everywhere and the factor that foreign enterprises import and export trade and expanding products flow distribution, making the drinks as people one of the daily diet of consumer goods. In 2009, the most profitable industry in Taiwan was Beverage industry, precision instruments, pharmaceuticals and hygiene in order (CommonWealth Magazine, 2009)**,** and the purchase of beverages averages nearly two billion liters from 2000 to 2006. Knowing from these statistics, people rise in beverage demand and put a cardinal role in consumption. Moreover, according to statistics from Taiwan Beverage Industry Association (2011), the output value of beverage market was up to 47.5 billion in 2009 and the amount of new products were reach up to 292 in domestic market. In the term of Directorate-General of Budget, Accounting and Statistics, Executive Yuan, R.O.C.(Taiwan) (2011), the category of food, beverages and tobacco which

ranked second in household consumption expenditure from 2007 to 2011, just below the category of residential services, utilities and fuels. All of these dates showed the domestic beverage market is huge and hot in demand. The Taiwan Beverage Industry Association (2011) pointed out that the total sales of beverage run up to 807,126,717 liters in the first half of 2011 and that was 81% in total beverage market. Because of this, we can see people like to drink sugary beverage and find out vast amount of sales.

2.3 Sugary drinks

Reviewing the past literature which focused on sugar drinks, it found that most of the subjects are students. Yeli (2009) points out 22% of the students took up to 7-9 cans of sugary drinks within a week, and 44.7% students who drink sugary drinks took into about 1001-2000 kcal which are equivalent to eating four bowls of beef noodle soup in a week. Xue's (2007) also demonstrates that about 98% of the students have the behavior of drinking sugary drinks occasionally within a week and 83% of the students have always been in the habit of continuous consumption of sugary beverages ; Fernandes (2008) presents that 26% of children get soft drinks at school easily and students from low-income families and black non-Hispanic children are more likely to consume more soft drinks. Kavey (2010) pointed out the 5 to 17 year-old schoolchildren in community reveal that obesity has increased more than fivefold, from 5.6% in 1973-1974 to 30.8% in 2008-2009 and the study discovers that female dietetics students aged 18 to 20 showed soft drink intake is significantly associated with intake of confections, 100% vegetable and fruit juices, diet soft drinks, energy, and carbohydrates (Yamada,

Murakami, Sasaki, Takahashi and Okubo, 2010). From those studies, it could find that it is a general phenomenon that most students drink sugary drinks and more than half of the students who takes drinks as a habit. They gradually substituted water for sugary drinks. Furthermore, the adults are also accustomed to drinking drinks. As a result, people would unknowingly intake too much sugar when drinking drinks.

John Tung Foundation investigated nutrients of 411 packaged beverages and 12 hand-cranked chain beverage stores. The sampling drinks have 10 percent to 16 percent of sugar on average. White gourd tea become the sweetest drink in this survey, followed by pearl milk tea. Drinking over a cup of 700cc White gourd tea is equivalent to eating 25 cubes of sugar, as high as 20% of sugar content. It definitely have a great impact on health. Moreover, it is out of question that consuming too many sugar-sweetened drinks can greatly contribute to obesity and people don't really focus on some varieties of drinks such as pure fruit juices and smoothies which are perceived as "healthy options" and are also very high in sugar (BBC, 2012). In addition, the hand-shake drinks Is made by the mixed syrup, spices, pigment, without adding any natural fruit juice. Drinking too much of them not only affect health but also result in addiction to sugar, increasing the risk of metabolic syndrome, the probability of pancreatic cancer and affect children's growth. It also found the top 10 leading causes of death in Taiwan (Department of Health, Executive Yuan, 2012), which include heart disease, diabetes and hypertension. And the intake of too much sugar maybe one of the reason causing those diseases.

In conclusion, all research illustrates that people are in taking an excess of sugar from sugar drinks, which can lead to such health problems as teeth decay (Moynihan, 2005；Steyn, Myburgh, and Nel, 2003), poor nutrition, obesity(Caroline,2004;Nissinen, Mikkila, Ma¨nnisto¨, Lahti-Koski, Ra¨sa¨nen, Viikari and Raitakari, 2009；Hawkes, 2004；Mann, 2003) and increasing triglyceride levels which may increase your risk of heart disease (CNN, 2011). Moreover, People who drink one or more soft drinks a day have a more than 50 percent higher risk of developing the heart disease precursor metabolic syndrome, which is a constellation of health problems and strongly linked to developing heart disease, stroke, and diabetes (Caroline, 2004) than people who drink less than one soda a day (CNN, 2007). Also, it lead to either intake of too many calories, which causes obesity or replacing meals with snacks. Therefore, those unseen sugars eventually become the "sweetest trap".

2.4 Theory of pleasure, arousal and dominance

In early period, the situational impact on consumers is most limited in the scope of psychology. Until 1968, Sandell began to join the situational factors in the study of consumer behavior. Belk (1975) used the SOR (stimulas-organism-the response to stimulus-organism-response) psychology model which was the first system research on consumer behavior. Thereafter, more and more scholars have proposed that situational factors are an important factor influencing consumer behavior or attitudes (Ward, Robertson, 1973；Harrell, Hutt and Anderson, 1980；Milliman, 1982；Cote, McCullough and reilly, 1985).

In 1974, Mehrabian and Russell issued the emotional factor of the PAD (Pleasure and Arousal, and Dominance, pleasure - arouse - disposable) theory, which confirmed that the emotional state of consumers purchasing products or services would influence consumers' willingness to buy and Russell and Pratt (1980) also advocated that "evoke" and "pleasure" can explain all of the emotional reaction in the various characteristics of the emotional environment and pleasure is also most widely used argument situational in affecting consumer behavior (Yan, 2008). At the same time, Russell and Steiger (1982) also proposed that "evoke" and "pleasure" were the main dimensions of emotional response, which could explain the emotional diversity, so other factors didn't need to be considered (Russell, 1983). In the description of Russell's study, this model has three characteristics: 1. two dimensions, "Pleasant – unpleasant" and "arousal – sleepy", could interpret and judge emotional description ; 2. a description of the mood were bipolar ; 3. any kind of emotions was made from evoke and pleasure.

In the process of consumption, consumers may change with the emotional impacts or stimulants, so it could produce the consumption emotions (Tsen and Chen, 2009). The PAD theory is often used in the field of environmental psychology, architecture, retail and marketing. For example, Tsen and Chen (2009) indicated the noticeable correlation between "pleasure emotion" and "arousal emotion" with the shape of packaged drinking water design ; however, the "dominance emotion" did not have any relationship with it ; Van Raaij (1989) pointed out that if an advertisement could lead to feelings of pleasure and arouse awareness, it will guide people to concentrate

16

on the brand and the presented message of the advertisement ; Tsai and Hsu (2007) applied theories of emotion to designing questionnaires to investigate and explore consumer's nostalgia emotions in tourism.
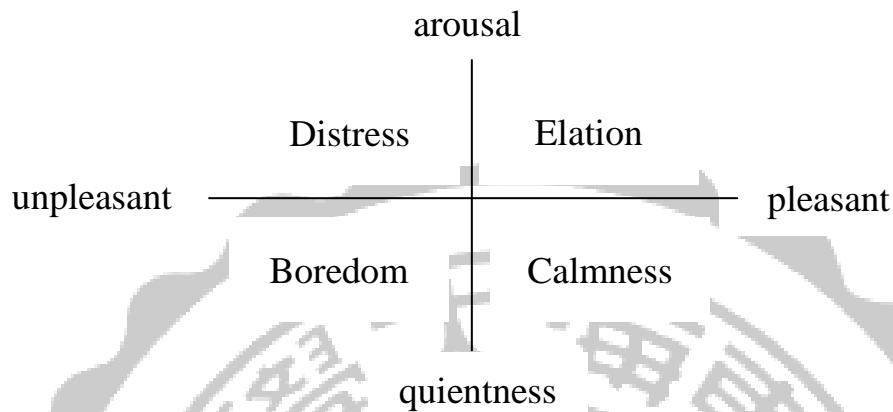
Figure 6. The Affect Circumplex (Russell, 1980)

Table 3. Russell's emotional dimensions

Fields	Dimensions
Pleasant─Arousal	Happiness, excitement, joy, pleasure, surprise
Pleasant─Quietness	agreement, satisfaction, peace, quiet, calm, relaxed, tired
Unpleasant─Arousal	Vigilance, fear, tension, anger, frustration, anger, grief
Unpleasant─Quietness	Miserable, sad, depression, sadness, boredom, haggard

2.5 Pleasure from sugar

According to Booth, et al.(2010), when consumers eat sweets and drink

sweet beverage, their brains naturally creates delightful perception to give them pleasure. Although Individual's emotional reaction is inherent, it more or less shows their psychological reaction from facial expressions. When human being is in a positive mood, his face reveals smile or other positive emotions naturally. On the contrary, when human being conveys the sad and bad feeling, it causes facial expressions different from that caused by the feeling of pleasure. The past studies have confirmed that whenever consumers eat foods with sugar, their face will reveal a pleasant emotion, just like lips rising, showing a good mood. The emotional message of pleasure shown in the face was also most likely to be perceived are a emotional response (Sauter, 2010). When consumers reveal a pleasant emotional response, it indicates that consumers are in a positive emotional situation.

Sugar gives consumers who drink sugary drinks feelings of delight. Moreover, when consumers feel thirsty and drink more drinks, they will get highly subjective feeling of pleasure to stimulate the response of emotions message (Berridge and Winkielman, 2003). According to Booth, et al.(2010), the human being who face sweet foods show the discordant response in behavior and mental. Human being like eating sweets from natural instincts, even if knowing the excessive intake of sugar is harmful to health. However, human being still choose sweets and enjoy the delightful feeling from consuming sugar. Sugary drinks have become a favorite for children in Taiwan. They are addicted to sugar which brings delightful feelings, just like a couple in love every day and a day of separation seems as long as three autumns.

2.6 The relationship between drinks and physiological reaction

There is some scientific supports that sweets and products with sugar have been used in eating for comfort (Elfhag, Tholin and Rasmussen, 2008 ; Striegel-Moore, Morrison, Schreiber, Schumann, Crawford, and Obarzanek, 1999). This research found that beverage intake may have a role in optimising work-related psychological states and performance (Bryan, Tuckey, Einöther, Garczarek, Garrick, Bruin, 2012). Therefore, sugar-sweetened drinks are linked to emotional eating in adults. An association between external eating which means eating in response to external stimuli, just like when being exposed to sight of foods and sugar-sweetened soft drinks in particular, is most apparent for men (Elfhag, Tynelius and Rasmussen, 2007). There are specially gender differences in types of food for emotional eating ,for example, men for emotional eating consume soft drinks rather than sweets (Elfhag, et al., 2007). However, the association between soft drinks and eating behavior is weaker in children, and this could be due to the fact that the children's soft drink intake is more affected by their parents' soft drink intake (Grimm, Harnack and Story, 2004 ; Elfhag, et al., 2008).

The behavior of drinking soft drinks could be associated with external influences. Most soda commercials are designed to be attractive to youth. Young women consum more sugar-sweetened soda when exposed to soda commercials while watching a movie (Koordeman, Anschutz, Baaren, Engels, 2010). Drinking more extra soda per day could lead to weight gain (Apovian, 2004). In addition, studies have shown that, personal demand for sweets will

be different in a different emotional state. When under pressure, women will increase the consumption of sweets to reduce the pressure or diminish uneasy and anxious feelings (Oliver, Wardle and Gibson, 2000；Epel, Lapidus, McEwen and Brownell, 2001；Klein, Faraday, Quigley and Grunberg, 2004). Eating sweets which bring pleasure can help relax the emotion and ease the pressure, so the pressure is no longer breathless. Although many literatures have pointed out that eating too much sugar increase the rate of disease, sugar-added products generated feelings of pleasure which enable consumers to enjoy the pleasant atmosphere surrounded by falling in love with sweets.

2.7 Knowledge affects behavior

There are many definitions in the past literatures. Scholars proposed various comments on definitions of knowledge. Pragmatically knowledge begins from data, and then develops into a worthy serial connection between information and knowledge (Grover, Davenport, 2001). In general, when the data is integrated and passed into the meaningful structure, it turns into significative messages which can be used in context and prediction. At this stage, the message becomes valuable knowledge (Tuomi, 1999).

Many studies have pointed out that knowledge would influence or predict the mutual relations of attitudes and behavior (Laroche, Toffoli, Kim and Muller, 1996 ; Laroche, Bergeron, Tomiuk and Barbaro-Forleo, 2002 ; Kruse and Card, 2004). Moreover, the results have been proved in customer behavior in many investigations (Biehal and Chakravarti, 1983 ; Lynch,

Marmorstein and Weigold, 1988 ; Rao and Monroe, 1988). For example, the study discovered customers used information they memorized to make a decision (Lynch, et al., 1988) ; Rao and Monroe (1988) found product knowledge influences evaluation of products. With regard to knowledge and behavior, there are huge different connections between the type of background, knowledge and different individuals. However, it is true that there is relevance between knowledge and behavior (Rosenthal, 2011). Ajzen (1991) published theory of Planned Behavior which showed that knowledge coonects with behavioral control. In other word, the more particular issues people understood, the more behaviors would be directed by them (Rosenthal, 2010). Furthmore, EKB model showed that it is unquestionable that knowledge affects behavior (Engel, Miniard and Blackwell, 1995), so that product knowledge also influences consumer behavior.
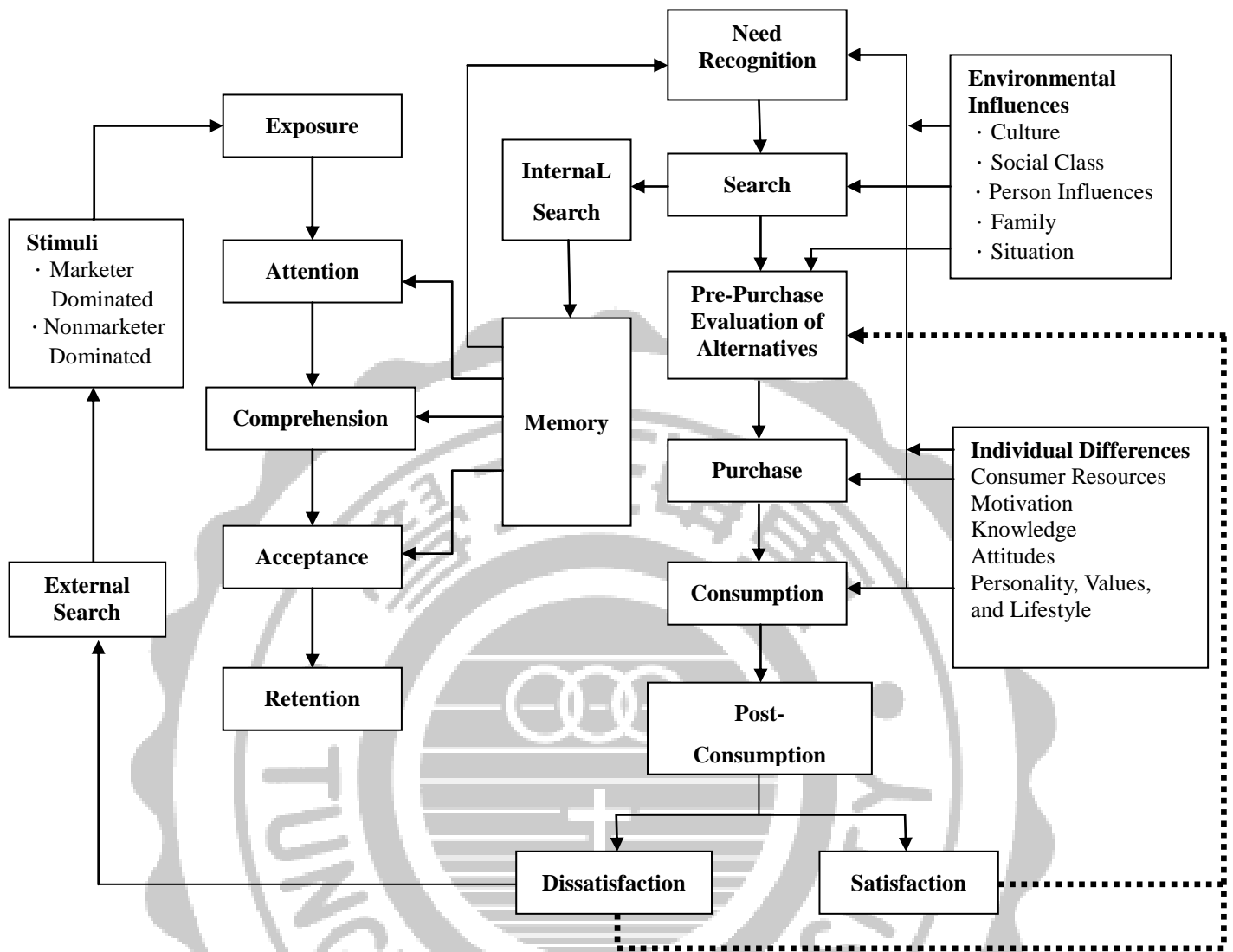
Figure 7. EKB model

(Engel, Miniard and Blackwell, 1995)

In the definition of consumer's information, Brucks (1985) proposed the theory which is the most widely used in the definition and application in consumer knowledge. It divides consumer's knowledge into three categories : subjective knowledge, objective knowledge and experience-based knowledge. Based on the three different types of knowledge, the level of impact on consumer's behavior is not the same. On the other hand, Alba and Hutchinson (1987) advocated consumer product knowledge consists of two parts, namely,

familiarity and professional level. The former points out the experience in which consumers buy or use product, the latter indicates consumers have some professional knowledge of the products.

Moreover, consumers who are more capable of making accurate judgments and comparing differences within the same type of products, such as finding products of better quality, or evaluating the differences between target products and the others. Brucks (1985) showed that prior prouduct knowledge does enhance the consumer's ability to obtain new information and increase search performance. In other words, if consumers have more objective knowledge, it causes them to search for more information and also allows consumers to distinguish the appropriate product characteristics well. Also, many studies proved prior product knowledge has an impact on the activities of information processing (Chase, Simon, 1973；Chi, Glaser and Rees, 1981；Chiesi, Spilich and Voss, 1979；Larkin, Simon and Simon, 1980).

Besides, Park and Lessig (1981) considered that consumer knowledge also influences decisions by two ways, one is expert consumers have more ability to distinguish the similar product attributes than novice consumers, and the other is the expert consumers are more thoughtful and decision-making to make the best product choice. Accordingly, consumers used their familiar knowledge to make a decision. In recent year, the related knowledge issue have been discussed, for example, Henderson and Henderson (2010) implicated the information of 'everyday knowledge' is patients desired about how the health condition will affect their everyday life；Banaghan and

Hilderand (2011) used knowledge structures approach to measure brand personalities of automobile and soft drink ; Zhao and Tsai (2011) demonstrated that duration knowledge increases the extremity of affective experience ; Praxmaber (2011) proved transportation have a positive influence on brand attitude which is in message strength, involvement and prior knowledge in customer behavior ; Xu and Jr (2011) showed females know more brand knowledge of cleansing gel than males did ; Macinnis and Folkes (2010) showed original product knowledge about consumer behavior and human being behavior change human being behavior. All literatures illustrates knowledge affect behavior.

2.8 The moderating effect of health knowledge

Product knowledge mainly refers to a particular product cognitive knowledge and understanding of this product of consumers, including the past experience with the product (Beatty, and Smith, 1987). Generally speaking, knowledge is information stored in mind and it will affect consumers' decision (Engel, Blackwell and Miniard, 1993). By reviewing literatures, it showed that there are many scholars studying consumer behavior and some of them have found that consumers' knowledge have a certain impact on consumer behavior. For example, Biehal and Chakravarti (1982, 1983) researched the relationship between process and memory in consumers' choices and show that consumers' choices were made after learning of information. Consumers would make decisions based on different types they memoried in the past.

The individual's behavior will be influenced by the knowledge they have. Therefore, health knowledge will determine person's behavior of food consumption and the attitude of healthy diet. Since 1990, researches of health-related knowledge, education and health behavior have emerged and discussed health behaviors, including smoking, drinking, exercise, and nutritional intake (Kenkel,1991 ; Hsieh, Yan, Liu and Lin, 1996 ; Jariyam, Blaylock and Smallwood, 1996). Li (2009) deemed that the better consumer's cognitive attitude of health can be better than poor cognitive attitude of health in the performance of health behaviors. Kenkel (1991) used direct questions to understand the extent of disease which may happen and measured individual health knowledge and explored the impact of health knowledge to health behavior. For example, Nayga (2000) talked about the serious problem of obesity from the relationships between educational attainment, health knowledge and health and he proposed the most effective methods of health education is emphasizing the effects of adverse eating habits and health disease factors. Some scholars found that labeling cigarette warning coercively will significantly reduce the demand for cigarettes (Hamilton, 1972 ; Ippolito, Murphy and Sant, 1979 ; Lewit, Coate and Grossman, 1981 ; Schneider, Kleinand Murphy, 1981). The researchers used Bayesian model to analyze process of personal health beliefs changed by the new message (Chern, Loehman and Yen, 1995) and it showed that health messages will affect choice of food in personal.

Kenkel (1991) first proposed education improved personal health knowledge, and then help people to choose a healthier lifestyle. Although reason which education affected health not entirely because of the raising

health knowledge, education and health knowledge still have the positive correlation. Finding in the literature showed consumers knowledge of health may causes from the accumulation of health behavior from school education or personal family education and experience. The performance of health knowledge is direct a impact on health behavior. One the other hand, the character of work, innate genetic factors, diet habits, religion, marital status are also likely to have a great influence on health.

Nowadays, consumers get health information easily from family, school, workplace and the media and thereby affecting consumer behavior and health behavior. For example, Kenkel (1991) pointed out that school education and the degree of health have positive relationship. Learning complete health knowledge in the childhood education from school could help consumers choose healthy lifestyle accurately. Therefore, we could understand the importance and influence of health knowledge. Personal consumption behavior will vary. Consumers selected sugary drinks, they would be in accordance with preferences and habits and even health knowledge. Consequently, the consumer behavior of purchasing beverage will be influenced by product-related knowledge.

CHAPTER 3
METHODOLOGY

3.1 Research framework

This chapter verifies the assumptions of the previous section mentioned in research. This study is mainly based on experimental method to test subjects by giving the "health information" and "the sweetness level of drink" to manipulate. The study assigns subjects who join this test to eight different groups and records the amount of voluntary payment in final as a measurement indicator of sugary drinks "satisfaction".
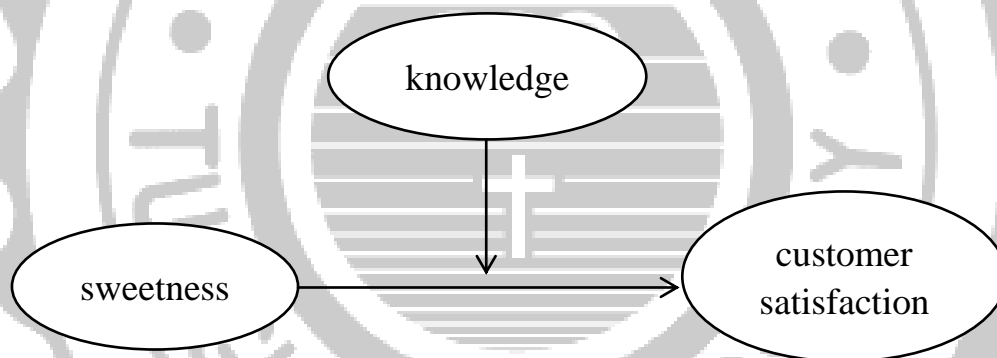
Figure 8. Research framework

3.2 Subject

Many studies that used research methods which investigated the choices of diet would choose college students as subjects for experiments in the past (Yaniv and Schul, 1997 ; Levin and Huneke, 2000 ; Park, Jun and MacInnis, 2000 ; Levin, Prosansky, Heller and Brunick, 2001 ; Levin, Schreiber, Lauriola and Gaeth, 2002 ; Novemsky and Kahneman, 2005 ; Brenner,

Rottenstreich, Sood and Bilgin, 2007 ; Biswas and Grau, 2008 ; Jasper and Ansted, 2008). Moreover, Consumer population of beverage industry is focused on consumer groups between the ages of 20 to 39. Due to people eating habits gradually westernized, cold drinks substituted for soups at dinner time, beverage stores set near school, convenient delivery service, and drinks prices agreed between NT $ 20 to 50, students became the main consumer group (Taiwan Institute of Economic Research, 2013). In order to test sweetness of beverage which influence consumer satisfaction, this study has also taken college students as the main subjects for laboratory experiments.

The main advantage of the experimental method is that it is able to clearly understand the causal relationship between the independent variables and dependent variables. Subject only has the difference of independent variables in different situations and it must be sure to control all possible interference to different subjects. Hence, when dependent variables have diversity, it is causes by independent variables. College students who have high homogeneity would make the results limited by external validity in this experiment. However, the homogeneous sample is more applicable to verify the theoretical model than the heterogeneous sample and avoid interference of difference of sample characters (Calder, Phillips, and Tybout, 1981). Moreover, many of the past studies chose college students as the main consumers of sugary drinks. Therefore, this study will also use college students as experimental subjects.

3.3 Statistical analysis

Descriptive statistics will be applied to describe the basic information of the sampling and confirm the representativeness of the group in this study. It will illustrate with the distribution of samples.

A t test is used to examine whether there is a significant correlation willingness to pay and gender, willingness to pay and different versions of questionnaires, scoring of sample and gender, scoring of sample and different versions of questionnaires.

One-way ANOVA is conducted to exmine whether there is a significant difference in dimension between willingness to pay and groups, scoring of sample and groups, willingness to pay and sweetness of samples, scoring of sample and sweetness of samples.

3.4 Pilot test

The pilot test is used to select the sweetness of the experimental drinks. Therefore, designing a sensory evaluation is essential. Sensory evaluation is used in experimental design and statistical analysis to use human being senses which is sight, smell, taste, touch and hearing for the purposes of evaluating consumer products. Scientist have developed sensory testing, then, very recently as a formalized, structured, and codified methodology, and they continue to set up new methods (Meilgaard, Civille, and Carr, 1991). Sensory testing can establish the worth of a commodity or even its very acceptability,

and evaluates alternative courses to select the optimized value.

3.4.1 *The project objective*

This test is expected to students for the test object and follows Booth, et al. (2010) survey of consumer preference for sweetness experiments as a model. Through hand-held refractometer determines different sweetness of green tea samples (from 0 degree up to 15 degree). It looks forward to imitating the research of Booth, et al. (2010) research to identify the students for the green tea sweetness preference curve, such as Figure 9 and to find the formal study requires reference of sweetness.
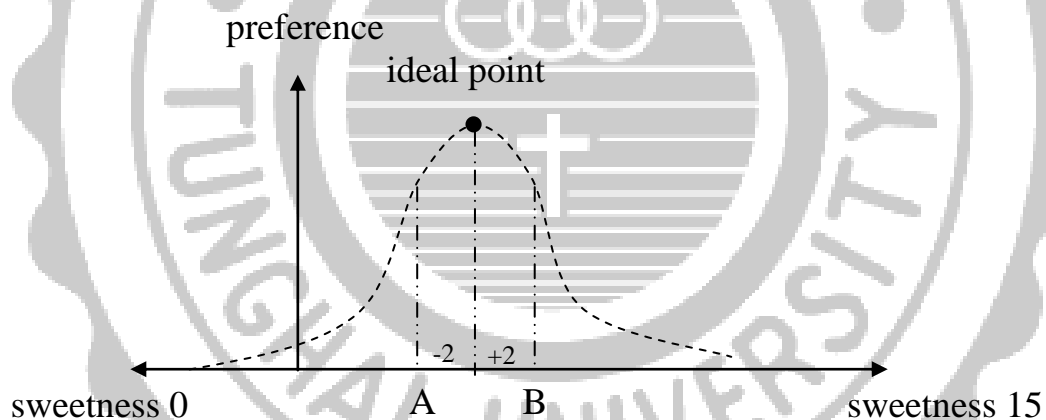
Figure 9. Hand-tea sweetness preference curve

(point A is reference of less sugar ； point B is reference of more sugar)

3.4.2 *The test objective*

There are six sweetness of green tea as the tasting samples : the sweetness of 0 degrees, 3 degrees, 6 degrees, 9 degrees, 12 degrees and 15 degrees. The past literatures choose students as subjects, so the experimental

subjects are also selected students.

3.4.3 *The test design*

In the choice of samples, the study chooses sugar-free green tea, and then adds fructose in order to make the six different samples under the normal temperature. After preparing samples, it select the same cup of a capacity of 50cc and with the 3-digit number as a label and than to refill them for test. This three-digit number for the distortion would make subjects unable to know the sweetness of the sample.

The study take one classroom as the experimental site (as figure 10). The desks are coded from one to six and each subjuct will be different, a glass of water and one slice of the toast for test. It offers a glass of water and one slice of the toast to each student to clear the sense of taste. Particularly, the order of six samples is different, and subjects have a certain distance apart in order not to interfere with each other.

Entrance
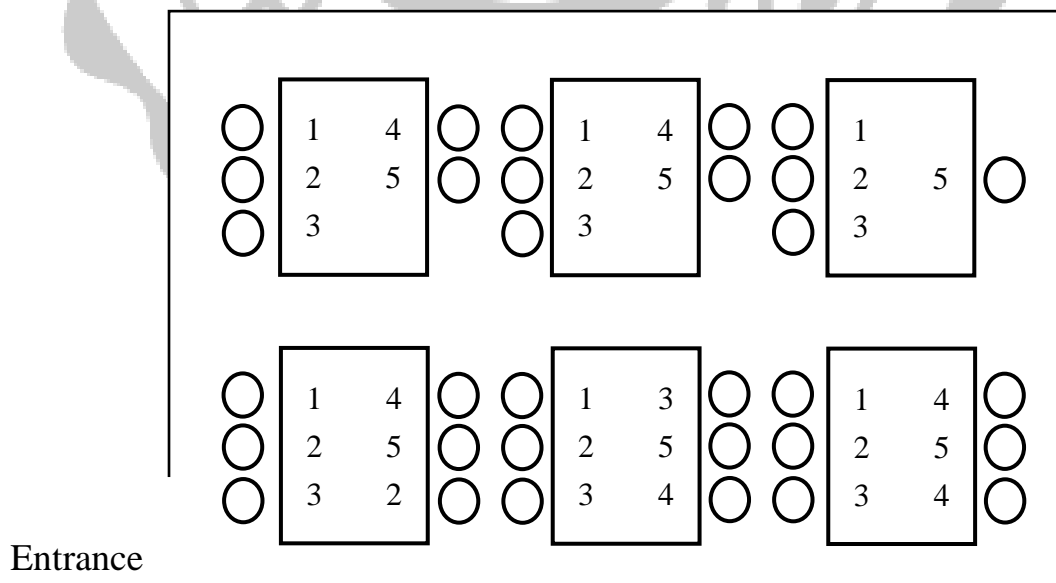
Figure 10. The arrangement of experimental site

The questionnaires consist of two sections with items assessing：(1) scoresheet of green tea, (2) Personal information. The former is measured on a seven-point Likert scale, with 1 representing "extremely dislike", 2 representing "stronglydislike",3representing"dislike",4 representing"ordinary", 5representing"like",6representing"strongly like",and7 representing"extremely like", respectively. Moreover, there are five versions of the order of the survey questions in order to diminish the expected sweetness of subjects for each sample.

Table 4. The versions of questionnaire

Sample code	The order in questionnaire				
	(1)	(2)	(3)	(4)	(5)
529 (0 degrees)	6	1	5	2	3
731 (3 degrees)	4	2	3	1	5
104 (6 degrees)	1	3	6	5	4
326 (9 degrees)	5	6	4	3	1
917 (12 degrees)	2	5	2	4	6
845 (15 degrees)	3	4	1	6	2

3.4.4 *The test conduct*

First, the assistant let students follow the instructions to enter the classroom to sit at the desks from number one to number six after preparing all the essentials. Second, began to give instructions for filling out the questionnaires as soon as all the students are already seated, and then they start to take the test. When the sensory test is finished, the assistant give each of them a small gift for showing appreciation.

3.4.5 *The test result*

There are 32 students participating in the pilot test. In the description of basic information, females (81.3%) are four times more than males (18.8%), and over half of them are in the age of 18 to 22. Most of them would choose the half sugar or less than half sugar of beverages when drinking. Moreover, over half of them (56.3%) drink beverages among 1 to 3 times and one fourth of them drank beverages among 4 to 6 times per week. The reuslt described that most students are addicted to drinking beverages, and it might become their diet habit.
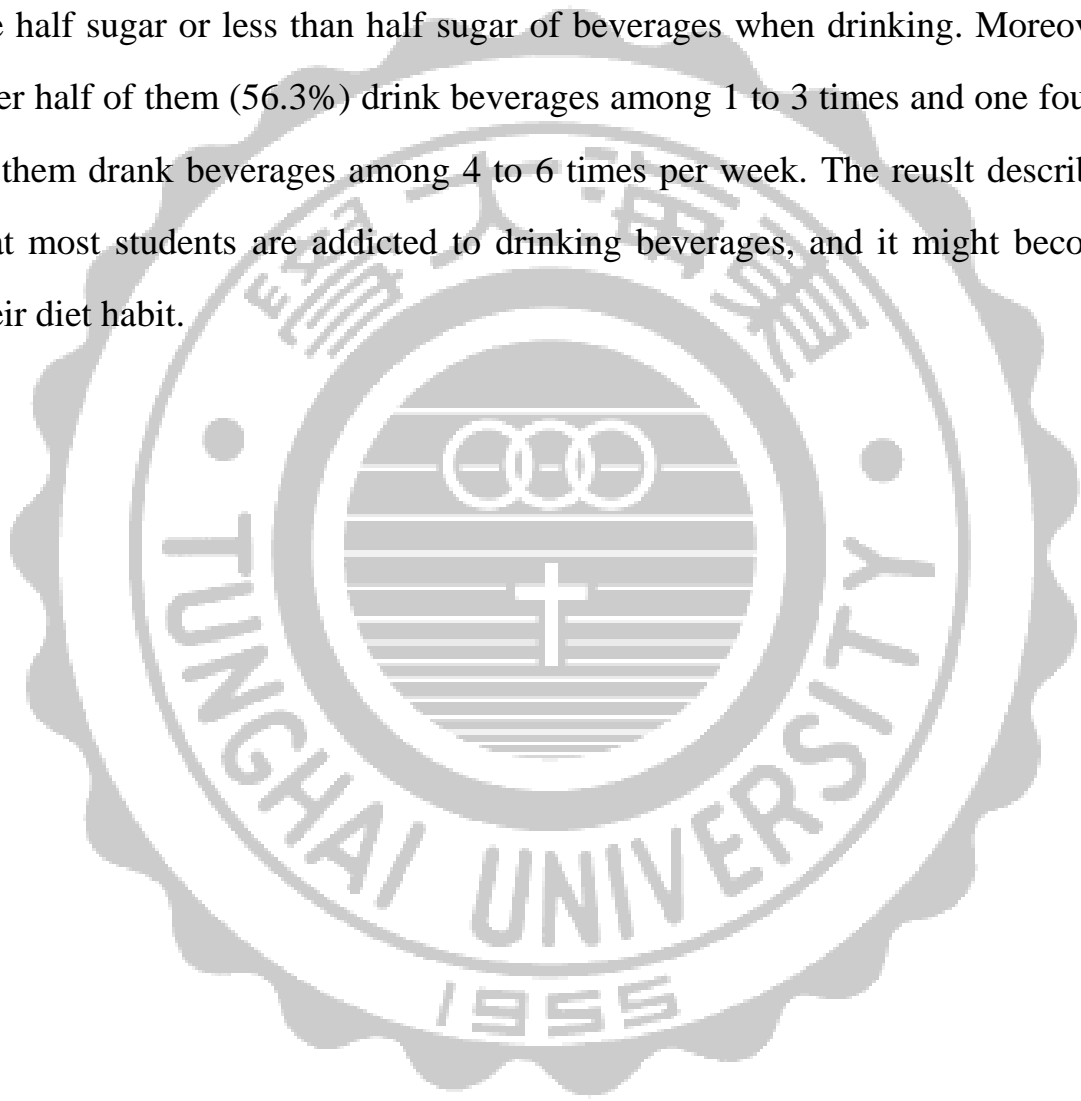
Table 5. Description profile of the participants (N=32)

		Frequency
Gender	Male	6 (18.8%)
	Female	26 (81.3%)
Age	18~20	22 (68.8%)
	21~23	9 (28.1%)
	Over 24	1 (3.1%)
Number of times of drinking	0	1 (3.1%)
beverages per week	1~3	18 (56.3%)
	4~6	8 (25%)
	7~9	5 (15.6%)
Sweetness of beverage	No sugar	3 (9.4%)
	Less than half sugar	10 (31.3%)
	Half sugar	15 (46.9%)
	More than half sugar	2 (6.3%)
	Full sugar	2 (6.3%)
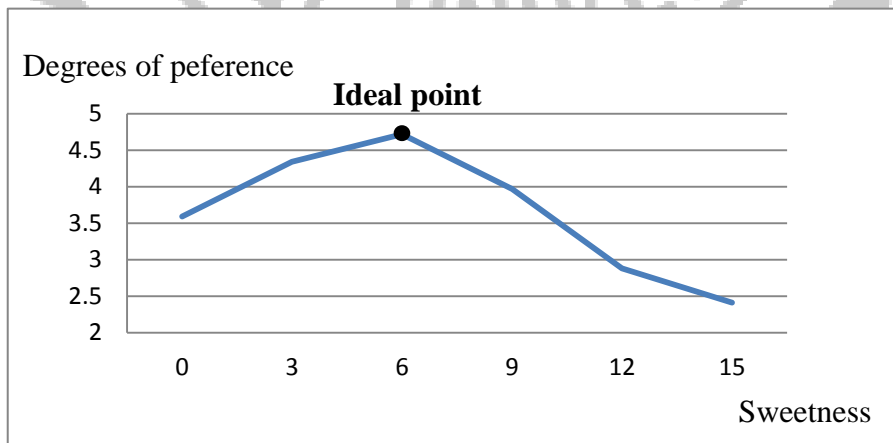
Figure 11. Green tea sweetness preference curve

Figure 11 imitates the research of Booth, et al. (2010) to identify students for the green tea sweetness preference curve. After calculating statistics, it showed average score of each sweetness level, with zero degrees (3.59), 3 degrees (4.34), 6 degrees (4.72), 9 degrees (3.97), 12 degrees (2.88), 15 degrees (2.41), respectively. This figure is the bell curve and illustrates 6 degrees of green tea was the ideal point of sweetness preference.

Figure 12. The actual circumstances of pilot test

3.5 The formal test

The experimental model uses between-subjects of factorial design and information reminder (positive knowledge /negative knowledge) and the sweetness of the sugary drinks (less sugar / more sugar) as independent variables, while ultimate consumer payment is dependent variable. The experimental design 2×4 ways of selling situations to reduce the interference of demographic variables and randomly assign four ways to each situation in

average. The students fill out the questionnaires in simulating situation and paid money in random. Therefore, it can observe the final satisfaction of green tea and the data analysis used SPSS 12 to test the hypothesis of statistical data analysis.

3.5.1 *Experimental subject*

The experimental method has an advantage in realizing the causal relationship between the variable, therefore, it usually adopts the highest homogeneity student groups as the sample in order to control moderating variables. However, external validity is limited which is the main shortcoming. In order to improve the external validity of this study, the sample in this experiment will be students at Tunghai University, and are chosen from various departments and years to avoid interference with the results.

3.5.2 *Experimental instrumentation*

The study provides two different questionnaires in this test. One includes general knowledge of green tea, and the other contains disadvantages of sugary beverages. The former describes the benefits of taking green tea, and then the later illustrates disadvantages of sugary beverages. Both of them consist of two sections of item assessing : (1) A short essay and multiple-choice questions (2) Personal information. Besides, it prepares thirty-three dollars which are composed of thirty- three coins.

The result of pilot test illustrates 6 degrees of green tea is the ideal point

of sweetness preference, so the study choose the sweetness above and below the the ideal point. Therefore, In the choice of samples, it selects four sweetness of green tea as the tasting samples, the sweetness of 0 degrees, 3 degrees, 9 degrees, and 12 degrees. The samples would be put in the same cups with capacity of 200cc. In addition, this study choose one classroom as a place of laboratory experiments

3.5.3 *Experimental process*

First, the assistants give students one of the two questionnaires randomly and ask them to read and answer four multiple-choice questions in the classroom. At the same time, student are requested to hold the money in their hand. According to past studies, human beings have a misconception when they hold money in the hand. They would think that they own those money. Eventually, the assistants will remind them to check and review the answers to make sure the students have received information clearly.

Second, the assistants supply one of the tasting samples to each student after they answered questions, and request them to drink more than a half of the tasting samples. At the same time, the students are informed that the green tea is a new product.

Third, the assistants ask them two questions. One judges the tasting samples by scoring them from 0 to 100, and the other asks them how much money they will be willing to pay for each sample. This design can easily calculate the amounts of money in accordance with their degree of preference.

This way makes the results closer to the actual situation. In the end, the assistants give each of them a small gift for showing appreciation.

Giving questionnaire randomly and holding money to read it

The assistants check and review the answers

Drinking more than a half of testing sample

Answering two more questions

Giving a small gift for appreciation
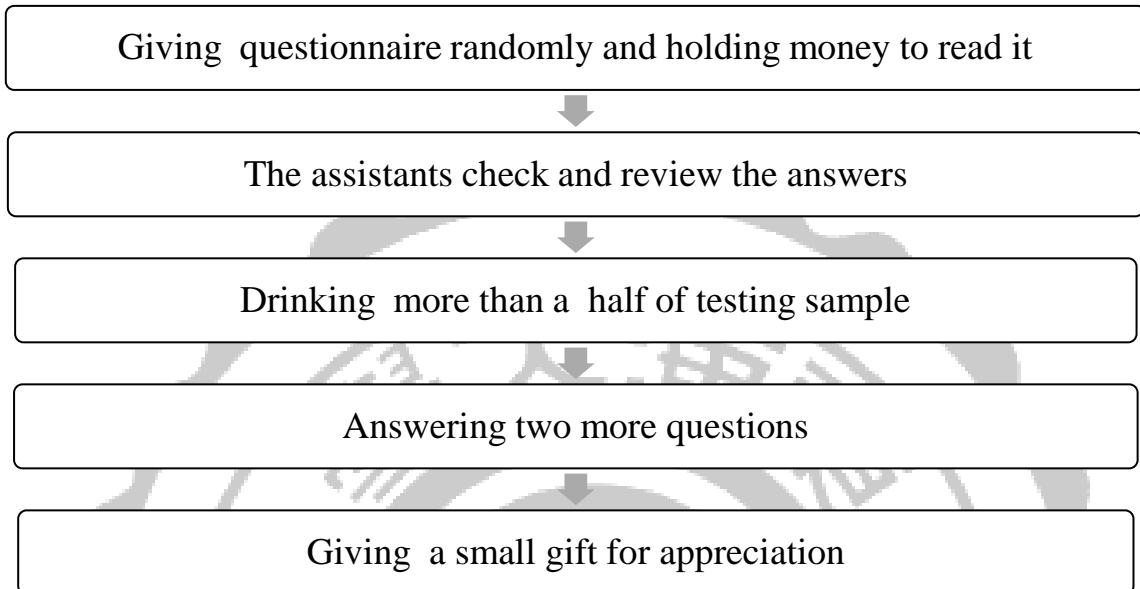
Figure 13. Experiment process
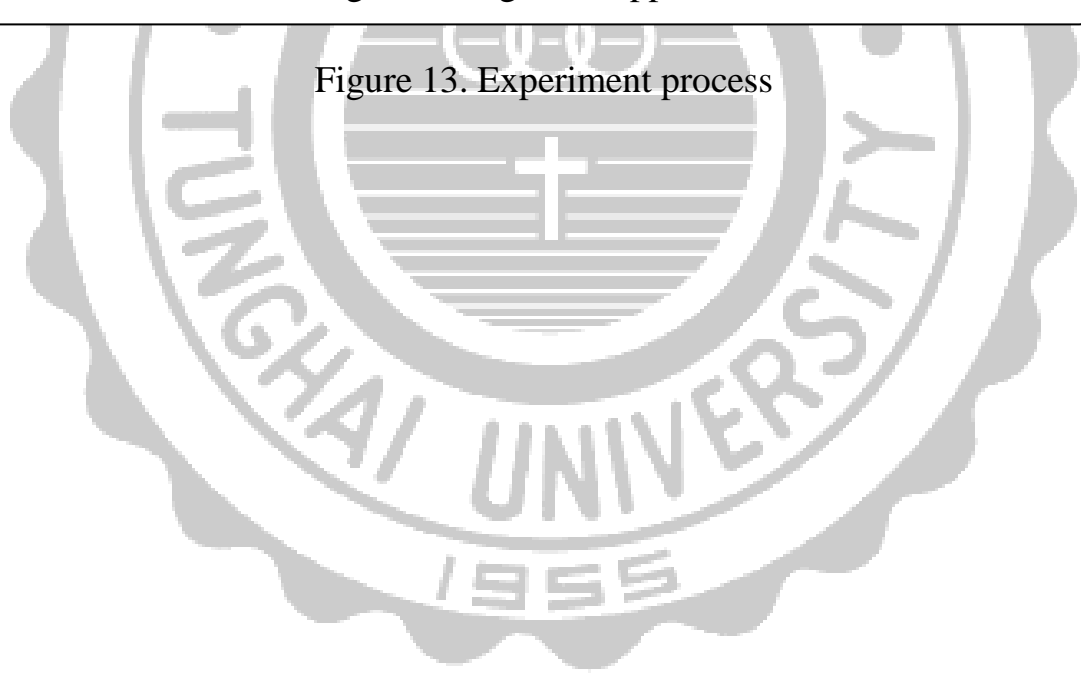
CHAPTER 4
FINDINGS AND DISCUSSION

4.1 Sample collection

According to experimental design, there are 2×4 ways of selling situations which are formed with information reminder (positive knowledge /negative knowledge) and the sweetness of the sugary drinks (0 degrees/3 degrees /9 degrees /12 degrees). Students are divided into eight groups in sample collecting. It collect 240 samples and there are 149 effective questionnaires. After examining those questionnaires, it find questionnairy for each sample size was so different. A huge gap of sample sizes causes analytical problems. It may become an error in analytical process. Therefore, in order to deal with this problem, doing the survey again. In the end, the number of overall questionnaires is 300, including 194 effective questionnaires and effective response rate is 64.7%. The survey is done in April, 2013 in Taichung city.

Table 6. Effective samples (N=194)

Group	Sweetness	Information	Frequency
1	0 degrees	Positive knowledge	24
2	0 degrees	Negative knowledge	25
3	3 degrees	Positive knowledge	24
4	3 degrees	Negative knowledge	25
5	9 degrees	Positive knowledge	24
6	9 degrees	Negative knowledge	24
7	12 degrees	Positive knowledge	22
8	12 degrees	Negative knowledge	26

4.2 Descriptive analysis

There are 194 effective questionnaires in the formal study. According to the descriptive analysis, 69.1% of participants are female, while 30.9% of them are male and most of them are under twenty years old (53.6%). It figures out 52.1% of participants drank beverage one time per day.

Especially, 40.2% of participants drank beverage under one time per day or didn't have a habit of drinking. Few of them (4.1%) drank beverage over three times per day. In the choice of sweetness of beverages, they tended to choose less than half sugar (42.3%) and half sugar (36.1%).

Table 7. Description profile of the participants (N=194)

		Frequency
Gender	Male	60 (30.9%)
	Female	134 (69.1%)
Age	Under 20	104 (53.6%)
	21~23	63 (32.5 %)
	Over 24	27 (13.9%)
The time of drink beverage per day	Under 1	78 (40.2%)
	1	101 (52.1%)
	2	11 (5.7%)
	Over 3	4 (2.1%)
Sweetness of beverage	No sugar	26 (13.4%)
	Less than half sugar	82 (42.3%)
	Half sugar	70 (36.1%)
	More than half sugar	9 (4.6%)
	Full sugar	7 (3.6%)

4.3 The effect of gender on the construct dimensions

Table 8 indicates that when participants are asked to pay money which depend on preference of beverages, there are non-significantly different influences on willingness to pay between males and females (*p=0.956*). On the other hand, when participants score the sample with their preference after drinking, there are also non-significantly different influences on scoring of sample between males and females (*p=0.904*). In conclusion, the result points

out that gender does not impact on the construct dimensions.

Table 8. The influence of gender on construct dimensions-by t test

	Male	Mean	SD	t	p-value
Willingness to pay	Male	12.38	7.846	-2.277	0.956
	Female	15.21	8.053		
Scoring of sample	Male	58.52	22.083	-1.389	0.904
	Female	63.30	22.193		

Note: *$p<0.05$, **$p<0.01$, ***$p<0.001$

4.4 The effect of questionnaire on the construct dimensions

Table 9 figures out the result that participants are asked to pay money which depend on preference of beverages, there are non-significantly different influences on willingness to pay between questionnaires of positive knowledge and questionnaires of negative knowledge (*$p=0.810$*). Moreover, it also examines whether questionnaires have an impact on the other construct dimensions or not. Table 9 also shows this information, there are significantly different influences on scoring of samples between questionnaires of positive knowledge and questionnaires of negative knowledge *($p=0.001$)*. This result showes the content of questionnaire only influenced the dimension of scoring the samples.

Table 9. The influence of questionnaire on construct dimensions-by t test

	Questionnaire	Mean	SD	t	p-value
Willingness to pay	Positive knowledge	15.64	8.129	2.201	0.810
	Negative knowledge	13.11	7.870		
Scoring of sample	Positive knowledge	67.06	17.707	3.267	**0.001****
	Negative knowledge	56.89	22.193		

Note: *$p<0.05$, **$p<0.01$, ***$p<0.001$

4.5 The effect of groups on the construct dimensions

Table 10 shows the results from one-way ANOVA on the effects of groups on customer satisfaction. In the dimension of willingness to pay, there are significant differences among participants with different groups ($p=0.000$). It points out participants drank beverage of 12 degrees and received negative knowledge have more influence than other groups.On the other hand, there are also significant differences among participants with different groups ($p=0.000$) in the dimension of scoring of sample. A further post hoc test figures out group2 have significant differences among ther other groups. It shows drinking more sugar beverage with negative health knowledge significantly influence the dimension of scoring of sample.

4.6 The effect of sweetness on the construct dimensions

Sweetness of beverage is usually an important determinant in customer satisfaction. One-way ANOVA is conducted to distinguish the effect of different groups for the participants on the dimensions. The results in table 11 indicate that there are significant differences among different sweetness in customer satisfaction ($p=0.000$). A further post hoc test indicates sweetness

of 0 degrees had significant differences among other sweetness of samples in the dimension of willingness to pay and socring.

Table 10. The influence of groups on construct dimensions-by ANOVA

	Group	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Willing ness to pay	Mean	19.54	19.92	17.42	15.00	14.08	10.42	11.14	7.23
	F	10.548							
	Sig.	0.000***							
	Post Hoc Test	(21345, 34576, 5768)							
Scoring of sample	Mean	72.21	76.24	71.58	62.92	63.13	57.92	60.82	31.54
	F	15.012							
	Sig.	0.000***							
	Post Hoc Test	(2135476, 8)							

Note: *$p<0.05$, **$p<0.01$, ***$p<0.001$

(1) 0 degrees, positive knowledge (2) 0 degrees, negative knowledge (3) 3 degrees, positive knowledge

(4) 3 degrees, negative knowledge (5) 9 degrees, positive knowledge (6) 9 degrees, negative knowledge

(7) 12degrees, positive knowledge (8) 12 degrees, negative knowledge

Table 11. The influence of sweetness on construct dimensions-by ANOVA

	Group	(1)	(2)	(3)	(4)
Willingness to pay	Mean	19.73	16.18	12.25	9.02
	F	21.232			
	Sig.	0.000***			
	Post Hoc Test	(12, 23, 34)			
Scoring	Mean	74.27	67.16	60.52	44.96
	F	19.842			
	Sig.	0.000***			
	Post Hoc Test	(12, 23, 4)			

Note: *$p<0.05$, **$p<0.01$, ***$p<0.001$

(1) 0 degrees (2) 3 degrees (3) 9 degrees (4) 12 degrees

4.7 Examined moderating effect of health knowledge

Figure 14 and Figure 15 shows whether moderating effect or not. In Figure 14, 0 degrees is the highest score in curve 1 ,and then go down slowly with adding sweetness. On the other hand, 0 degrees is also the peak in curve 2, and descended rapidly in two parts which are from 0 degrees to 3 degrees and 9 degrees to 12 degrees. Moreover, two curves crossed between 0 degrees and 3 degrees, and curve 2 is higher than curve 1 on 0 degrees. there is a huge gap at 12 degrees.

When participants received positive health knowledge or negative health knowledge in this test, it shows the more sweetness beverage they drink , the less grade they decide to give. Specially, negative health knowledge get better score than positive health knowledge when drinking green tea without sugar. It means participants are more preferable sugar-free green tea than others when they received health knowledge. With sugar adding of samples, participants received negative health knowledge influenced on scoring significantly. This huge gap means participants greatly decreased customer satisfaction. The result figures out there is moderating effect of health knowledge on scoring.

Figure 15 shows the relationship between moderating effect of health knowledge on willingness to pay. The curves crossed between 0 degrees and 3 degrees. Curve 3 have higher score than Curve 4 at the 0 degrees and both of them are negative slope. Moreover, the gap become widen with more sugary samples and the maximum gap is at 12 degrees.

The result shows when participants drink beverages and receive knowledge at the same time, they are influence by knowledge and make different choice of willingness to pay. The lowest paying is beverage of 12 degrees. It points out participants do not pefer to drink more sugary beverage. Furthermore, the result shows there is moderating effect of health knowledge on willingness to pay.

According to past literatures, it demonstrated that knowledge influences customer behavior (Rosenthal, 2010 ; Engel, Miniard and Blackwell, 1995 ; Rao and Monroe ,1988 ; Ajzen, 1991). Futherover, health-related knowledge also have an impact on human being behaviors (Kenkel,1991 ; Hsieh, Yan, Liu and Lin, 1996 ; Jariyam, Blaylock and Smallwood, 1996 ; Chern, Loehman and Yen, 1995). Due to the result, it implies there are the moderating effect of health knowledge in this experimentation.
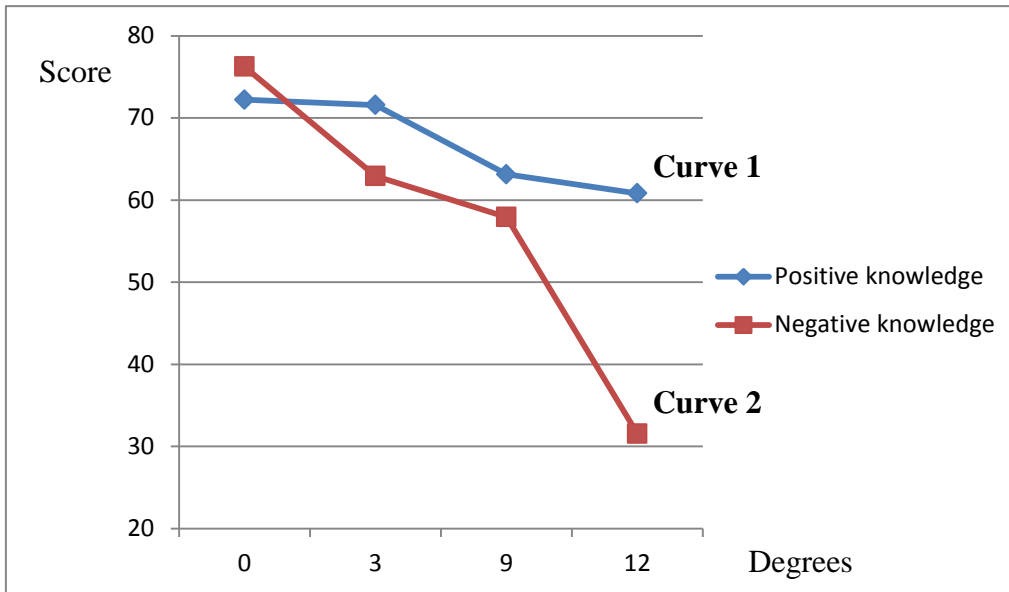
Figure 14. Mean of socring

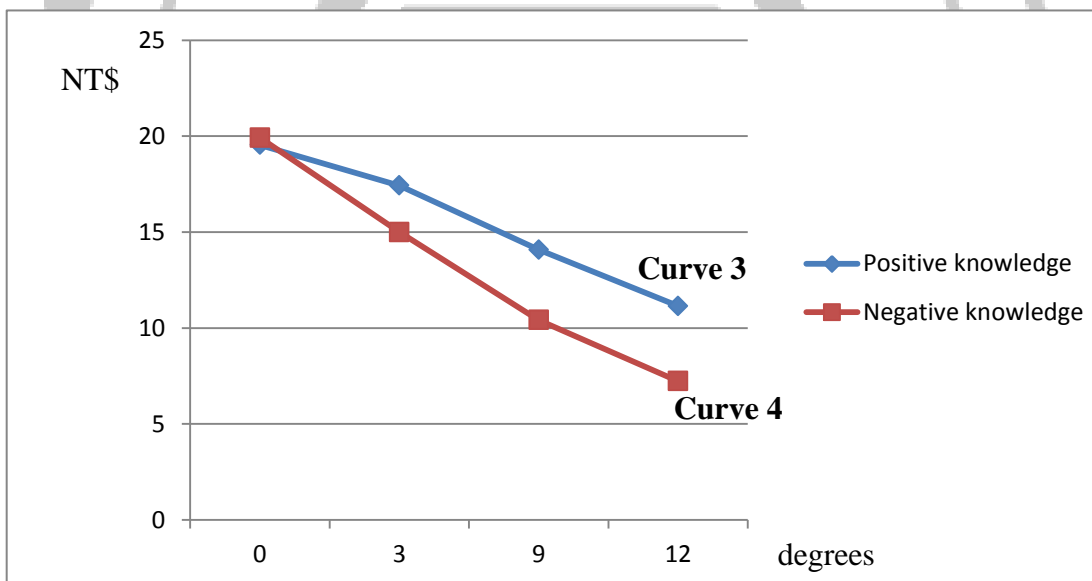(Curve 1: positive knowledge ; Curve 2: negative knowledge)

Figure 15. Mean of willingness to pay

(Crve 3: positive knowledge ; Crve 4: negative knowledge)

CHAPTER 5
CONCLUSION AND DISCUSSION

5.1 Conclusion and implications

Nowadays, most people make a habit of drinking beverage. There were 14,865 beverage stores in Taiwan (Taiwan Institute of Economic Research, 2012), and then sales value reached to NT $ 509.39 million (Taiwan Institute of Economic Research, 2013). The recently survey pointed out over half of people asked drink stores to redure sweetness when buying hand-shake beverages and they felt it was healthy. However, 16% of half-sugar drinks contains the same sugar as normal, and some half-sugar drinks even have higher sugar than full sugar drinks. There are only 23% of the half-sugar beverages really half sugar (John Tung Foundation, 2013). It means people trapped into sweet traps.

Examing past literatures, the issues which have an impact on consumer behavior in the joy of composition with the sugary drinks are limited. Therefore, this experiment is aimed at exploring enjoyable feeling caused by the sugar in beverage which provides consumers with higher satisfaction. The result validated more sugary beverages do not lead to higher customer satisfaction. Pilot test imitated the research of Booth, et al. (2010) to identify students for the green tea sweetness preference curve. It showed the figure is the bell curve and illustrated 6 degrees of green tea was the ideal point of sweetness preference. Moreover, it examined moderating effect of health information on consumer satisfaction. Past studies pointed out health-related

knowledge have an impact on human being behaviors (Jariyam, Blaylock and Smallwood, 1996). Our results indicated that preference of sugar beverage is higher than others and preference curve turned bell curve into negative slope curve. The reason for the change is moderating effect of health information. Moreover, negative health information influences on customer satisfaction more than positive information. Based on t test and ANOVA, it figured out gender is non-significantly different influences on customer satisfaction, and the content of questionnaires have an impact on scoring of samples. Besides, both sweetness of sample and different groups influence on customer satisfaction significantly.

Too much sugar of drinks is unhealthy. However, intake of sugar creates delight perception to make people happy (Booth,et al., 2010), so they couldn't help but buy beverages. This study can contribute to manufacturers. Manufacturers used to believe adding more sugar in beverages can attract customers, but the result supported a view that beverages of more sugar do not lead to higher customer satisfaction. Becase of that, manufacturers don't need to add too much sugar in beverages anymore. They can reduce amout of sugar in beverages and use health information to catch customers' attraction. Moreover, manufacturers can achieve the goal of cost down .

5.2 Limitation and Further Research Opportunities

5.2.1 *Limitation*

This study is mainly based on experimental method to test subjects,

using willing payment instead of the actual purchase situation. Although internal validity is high and control various external factors effectively, the situation is still slightly inferior to actual purchase behavior. But if we want to do research in beverage stores, the noise (environment, different drinks, different sweetness and different staff member) may cause variables to influence the results. Moreover, it is almost impossible for manufacturers to set a space for the experiments in rush hours, and experiment may also interfere with operation of the beverage store. It is so difficult to find manufacturers to cooperate with, so experimental method still apply to the study.

In the process of experiment, subjects are asked to fill in questionnaires and the assistant stays in the same space, so it may cause the possibility of Hawthorne Effect. Because of that, the assistant is kept at a distance of about 150 cm to reduce the incidence (Hall, 1990). Besides, the assistants do not look at subjects during the test and the questionnaires are made anonymous from Hawthorne Effect. On the other hand, each subject is tested separately to prevent interference from other subjects. It eliminates Pygmalion Effect from experiment.

5.2.2 *Further research opportunities*

There are various ways to transmit knowledge, such as watching videos and reading articles. This study use the method of reading articles to let participants receive knowledge. According to the past researches, the sign is interpretable (Kan, Lu, 2008 ; Su, Yen and Lee,2007). Future research could

use signs to examine moderating effect of health information on consumer satisfaction. Acording to past studies, it find that consumers who expored long-term information lead to different customer behavior (Peng and Kue,1994). In the experiment, we only select a short article to transmit knowledge. Therefore, we don't know the level of influence of such amount of knowledge, so future research could choose different amount of knowledge to examine the impact of moderating effect and compare with the results. Besides, the timing of receiving knowledge is another factor which influences the result. Future research should manipulate the timing of receiving knowledge to practically investigate the satisfaction. Furthermore, consumers who are expored to long-term information show different preference of sweetness. Future research can include the length of time of receiving information to clarify the influence of knowledge. The sense of sight often affects the feeling of the other senses, and then it can cause synesthesia, sensory stimulation, which will be spontaneous and take the initiative to cause another perception (Lu, Tang and Lu, 2005). The study examined customer satisfaction by sense of taste. Another direction of research could use sense of sight to evaluate customer satisfaction to make contribution to the same issue from another aspect.

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APPENDIX A- QUESTIONNAIRE OF PILOT TEST

第一部份：問卷內容

親愛的同學，您好：

　　非常感謝您撥冗填寫此份問卷。這是一份學術性的研究，本問卷以不計名的方式，您所填寫的資料僅作為研究分析使用，絕不作為其他用途，敬請根據您個人實際的感受或是看法放心作答，並請您不要遺漏任何一個問題，以確保此研究問卷的完整性，在此感謝您的幫助！！

　　敬祝

　　　　　　　　　　　　　　　　　　　　東海大學餐旅管理系暨研究所

　　　　　　　身體健康、順心如意　　　　指導教授：陳錚中 博士

　　　　　　　　　　　　　　　　　　　　研究生：賴怡如

　　　　　　　　　　　　　　　　　　　　Email：G10066010@thu.edu.tw

請依照下列說明作答：	非常討厭	很討厭	討厭	普通	喜歡	很喜歡	非常喜歡
✧ 首先吃一小塊吐司並喝一口水，以清潔口中味道。 ✧ 依序品嘗每一杯不同甜度的綠茶，在飲用過程中盡量使樣品在口腔中接觸十秒以上。 ✧ 每次品評完樣品之間，請吃一小塊吐司並喝一口水，以清潔口中味道，再品嘗下一個樣本。 ✧ 依據個人偏好程度，給予1到7的分數。							
1. 樣本 104	1	2	3	4	5	6	7
2. 樣本 529	1	2	3	4	5	6	7
3. 樣本 845	1	2	3	4	5	6	7
4. 樣本 731	1	2	3	4	5	6	7
5. 樣本 917	1	2	3	4	5	6	7
6. 樣本 326	1	2	3	4	5	6	7

第二部分：基本資料

填答說明：請在適當□內打 ✓ 即可。所有問項皆為單選題，請勿漏答。謝謝！

1. 您的性別：　　□男　　　　　□女

2. 您的年齡：　　□未滿18歲　　□18-20歲　　□21-23歲 □24-26 歲　　□超過26歲

3. 請問您平均每週喝幾次飲料：　□0　　□1-3 □4-6 □7-9 □10 以上

4. 請問您購買飲料時， 最常選擇的甜度為：　□無糖　□微糖　　□半糖　　□少糖　□正常糖

5. 請問您最常購買飲料的店家為？ _____

＊此問卷作答結束，非常感謝您的作答＊

親愛的同學，您好：

感謝各位撥空參與這次活動！下列敘述之小短文為關於綠茶的基本知識，包含其製造方法和功效。請詳細看完整篇文章，且依據文中所述回答問題後，接續填寫基本資料，並請您不要遺漏任何一個問題，在此感謝您的配合！

敬祝

身體健康 順心如意　　　　　　　東海大學餐旅管理系暨研究所

指導教授 ： 陳錚中 博士

研究生 ： 賴怡如

Email ： g10066010@thu.edu.tw

【喝的蔬菜—綠茶】

茶為全世界排名在飲用水之後最為風行之飲品。綠茶是生茶的一種，經殺青、揉捻、乾燥，大部分白毫脫落，浸泡後為綠茶。綠茶含有維生素 A、D、E、C 等維生素，而且也富含豐富礦物質，例如鉀、磷、鎂、鈣、鐵等。綠茶茶葉中所含兒茶素多酚，具有清除自由基的功能。除此之外，綠茶還含有生物鹼，包括咖啡因、可可鹼和茶鹼，這些使綠茶對神經系統有刺激作用。此外，綠茶含有大量的食物纖維，絕對值得重視。

近年來許多研究報告皆指出，綠茶具有許多對人體有益的功效，包括對癌細胞有抑制效果、防止高血壓、控制膽固醇、預防食物中毒和蛀牙、有效防止老化和具有美肌的效果。綠茶具有抑制熱量被消化吸收的作用，再加上不含熱量，所以綠茶可稱為最實惠的減肥茶。自古以來，茶便一直有〝解酒劑〞之稱，換句話說，喝茶能夠達到消除宿醉之功效。綠茶含有咖啡因具有利尿作用，能促進人體新陳代謝，將體內酒精盡快排除體外。再者，咖啡因也具有提神的效果，讓頭腦保持清醒。綠茶好處多多，因此，有「喝的蔬菜」之美譽，正可謂名副其實！

➢ 詳細閱讀完畢後，請回答下列問題：

（　　）1. 請問綠茶的製造方法為何？

（A）生茶（B）熟茶（C）半熟茶 。

（　　）2. 綠茶含有很多對身體有益的成分，下列何項為綠茶包含的成分？

（A)電解質（B）兒茶素多酚（C)膠原蛋白 。

（　　）3. 許多實驗都指出綠茶對身體有益，下列敘述何者為**非**？

（A）多喝綠茶可抗氧化、抗發炎和抗癌。

（B）綠茶具有抑制熱量被消化吸收的作用。

（C）綠茶不包含任何維生素 。

（　　）4. 下列何項非文章中提及對綠茶的美譽？

（A）最實惠的減肥茶（B)解酒劑（C)清毒小幫手 。

➢ 基本資料：

填答說明：請在適當☐內打 ✓ 即可。所有問項皆為單選題，請勿漏答。謝謝！

6. 您的性別：　☐男 ☐女

7. 您的年齡：＿＿＿＿＿＿歲

8. 請問您飲用飲料的頻率：☐無 ☐一天一杯飲料 ☐一天兩杯飲料

☐一天三杯飲料 ☐一天超過三杯飲料

9. 請問您購買飲料時，最常選擇的甜度為：☐無糖 ☐微糖 ☐半糖

☐少糖 ☐正常糖

＊請確認所有問題皆回答完畢　非常感謝您的作答＊

親愛的同學，您好：

　　感謝各位撥空參與這次活動！下列敘述之小短文為關於綠茶的基本知識，包含其製造方法和功效。請詳細看完整篇文章，且依據文中所述回答問題後，接續填寫基本資料，並請您不要遺漏任何一個問題，在此感謝您的配合！

　　敬祝

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　　　　　　　　　　　　　　　　　　指導教授 ： 陳錚中 博士

　　　　　　　　　　　　　　　　　　研究生 ： 賴怡如

　　　　　　　　　　　　　　　　　　Email ： g10066010@thu.edu.tw

【含糖飲料不能說的秘密】

　　董氏基金會對市售的 411 項包裝飲料和 12 家手搖連鎖飲料店的營養成分進行調查，抽檢的飲料平均含糖量竟高達 10%到 16%。含糖飲料喝多了不但產生健康問題，也會造成身材大走樣，糖容易轉換成脂肪，囤積後形成〝肥胖〞。含糖飲料是肥胖的禍首，成為了最甜蜜的負擔。美國路易斯安那州大學研究證實，和固態食物相比，含糖飲料更讓人增加體重，同時，人體吸收飲料比固態食物更快，更容易感到飢餓。

　　當喝完一杯 700cc 的全糖綠茶時，就增加了 280 大卡，需要連續跑步一小時才能消耗掉這多餘的熱量！喝完一杯含糖綠茶只需要 20 分鐘內，但要花 3 倍的時間來消耗熱量，真是得不償失啊！這些一堆的壞處就是含糖飲料不能告訴你的秘密。消費者容易掉入甜蜜誘惑中，無形中得到相當驚人的熱量，導致肥胖人數快速上升！換句話說，多喝綠茶對健康有益，但喝多含糖綠茶則是百害無一益。

➢ 詳細閱讀完畢後，請回答下列問題：

（　　）1. 董氏基金會對市售飲料進行調查，抽檢的飲料平均含糖量為？

（A）6%~10%（B）10%~16%（C）16%~20% 。

（　　）2. 飲用一杯全糖綠茶需要連續跑步多久才能消耗所產生的熱量？

（A）0.5 小時（B）1 小時（C）1.5 小時 。

（　　）3. 國內外的調查都指出含糖飲料對人體無益，下列敘述何者為非？

（A）含糖飲料比固態食物更加讓人增加體重。

（B）含糖飲料是肥胖的禍首。

（C）綠茶是最實惠的減肥茶，所以多喝含糖綠茶可以幫助代謝又減肥。

（　　）4. 下列敘述何者正確？（A)不管是無糖或全糖綠茶皆有益身體健康。（B)微糖綠茶不甜，可以無上限的飲用。（C)喝含糖綠茶，會導致肥胖機率上升。

➢ 基本資料：

填答說明：請在適當□內打 ✓ 即可。所有問項皆為單選題，請勿漏答。謝謝！

10. 您的性別：　　□男 □女

11. 您的年齡：＿＿＿＿＿＿歲

12. 請問您飲用飲料的頻率：□無　□一天一杯飲料 □一天兩杯飲料

□一天三杯飲料　□一天超過三杯飲料

13. 請問您購買飲料時，最常選擇的甜度為：□無糖　□微糖　□半糖

□少糖　□正常糖

＊請確認所有問題皆回答完畢　非常感謝您的作答＊