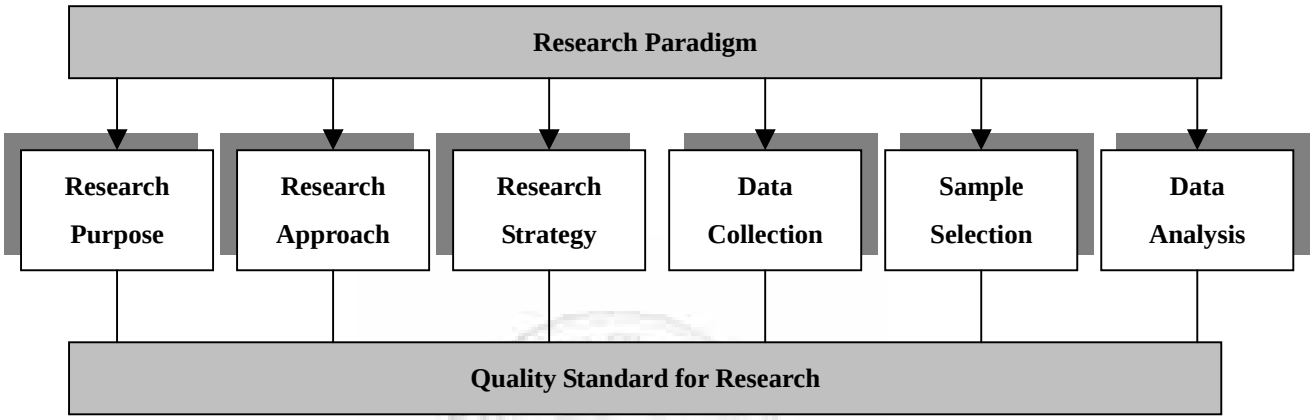
Chapter3 – Research Methodology

This chapter describes the methods used in this thesis, which best fit this study. This chapter will provide us with a guideline on how to collect process and analyze data. There is a presentation of the research design with data collecting methods and process.

The research methodology that will be used for collecting the data necessary to answer the research questions is a series of steps followed in this study. According to Foster (1998), the following figure says the research paradigm to satisfy certain standards.



Source: Foster (1998)

Figure 3- Research Paradigm

3.1 Research Purpose

Research can be done in many ways and most types of research can be classified according to how the researcher knows about the problem before starting the investigation. According to Yin (1994), there are three ways of research available when dealing with a research problem exploratory, descriptive, or explanatory (Casual study).

Exploratory studies tend toward loose structure with the objective of discovering future research tasks. The immediate purpose of exploration is usually to develop hypotheses or question for further research. The essential between descriptive and explanatory lies in their objective. If the research is concerned with finding out who, what, where or how much, then the study is descriptive. If it is concerned with learning why that is, how one variable produces change in another, it is casual. In an explanatory study, we try to understand the relationship of price variable and the number of hot yoga population change, relation of age, occupation, gender behavior on the purchase decision.

3.2 Research Approach

The choice of research approach is not only dependent on researcher's epistemological position and pre knowledge, but should also be influenced by the research questions we set out to illuminate (Yin,1994). Two choices of research approach are available, either the qualitative or the quantitative approach. A qualitative approach provides a deeper understanding of the phenomenon under investigation. Moreover, qualitative data are characterized by the richness and fullness based on your opportunity to explore a subject. Quantitative researchers measure and analyze casual relationships, methods are used within natural science, the meanings are often derived from predictions about the future (Asim and Hashmi,2005).

As this research aims to capture hot yoga practitioners sensitivity to price and the major factors influencing in the decision making process, from sample's characteristics that will be tested quantitatively. Therefore, this research is a statistical study and its research approach is quantitative.

3.3 Research Strategy

There are three major research strategies : experiments, surveys and case studies. This is agreed upon by Yin,1994, but he also complements these strategies with archival analysis and history. What strategy to use in the research according to Yin (1994), will be determined by looking at three different conditions. The three conditions are: the type of research question posed and extent of control an investigator has over actual behavioral events and the degree of focus on contemporary as opposed to historical events. Figure 3.3 shows how Yin (1994) related each condition to the five research strategies.

As mentioned before, the purpose of this research is to find the major determinants affecting member's decision making"

In terms of the researcher's ability to manipulate variables, Mc Graw (2003) differentiates between experimental and ex post facto designs. In an experiment, the researcher attempts to control and/or manipulate the variables in the study. It is enough that we can cause variables to be changed or held constant in keeping with our research objectives. Experimental design is appropriate when one wishes to discover whether certain variables produce effects in other variables. Experimentation provides the most the affect on price increasing on the number of yoga members powerful support possible for a hypothesis of causation.

Table 3.3 Related to each condition to the five research strategies

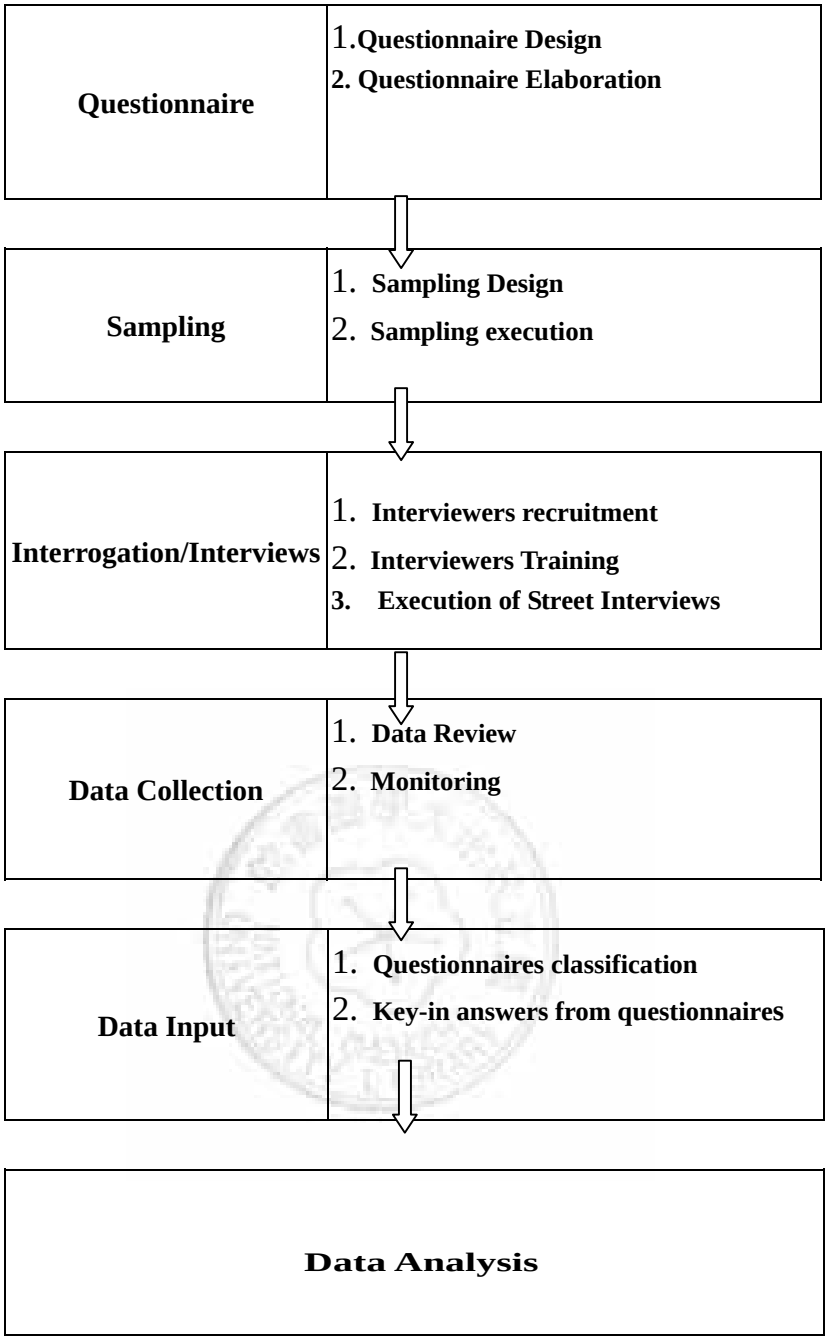
Strategy	Form of Research Question	Requires control over behavioral event?	Focuses on Contemporary events?
Experiment	How, Why	Yes	Yes
Survey	Who,What,Where,How much	No	Yes
History	Who,What,Where,How much	No	Yes/No
Archive Analysis	How, Why	No	No
Case Study	How, Why	No	Yes

With an ex post facto design, investigators have no control over the variables in the sense of being able to manipulate them. They can only report what has happened or what is happening. It is important that the researchers using this design not influencing the variables; to do so introduce bias. The researcher is limited to holding factors constant by judicious selection of subject according to strict sampling procedures and by statistical manipulation of findings.
This research doesn't have any control over the variables, it is then an ex post facto design. This study focused on contemporary event as questionnaire and interviews are conducted to collect data from potential yoga practitioners.
As a result of above discussion, it reveals that this study is a *survey.*

3.4 Research Design

This classification distinguishes between monitoring and interrogation/communication processes.
The former includes studies in which the researchers inspect the activities of a subject or the nature of some material without attempting to elicit responses from anyone. In each case the researcher notes and records the information available from observations. In the interrogation/communication study, the researcher questions the subjects and collects their responses by personal or impersonal means. The collected data may result from 1) interview or telephone conversation, 2)self-administered instruments sent through email, left in convenient locations, or transmitted electronically or by other means, or 3)instrument presented before and/or after a treatment or stimulus condition in an experiment.
This research is an *interrogation study* which uses questionnaires in order to collect information. These questionnaires are given to consumers from Shin-Yi and Ta-An districts.

3.4.1 Research Flow



Source: This study

3.4.2 Questionnaire Design

This questionnaire is designed to understand the relevant population in the emerging yoga industry in Taipei, capturing the following dimensions:

- ***Consumer Lifestyle:*** how lifestyle affect their perception and the optimal price they are willing to spend in a hot yoga class.
- ***Consumer Buying Strategies:*** What variables of interest may participate in their decision

making process. Priorities of concerns in their buying processes .

- ***Price selection and pricing sensitivity:*** How sensitive consumers are price changes towards and what is the relative increase in number of participants when a price changes.

This questionnaire is designed with the purpose to obtain the major parameters of concerns from consumers in their buying processes, and implicitly find the "optimal "price of this industry, where players could swim peacefully in their pool without over-price-attack.

3.4.3 Sampling Method

Sample statistics are used as estimators of population parameters. The sample statistics are the basis of our references on the population. Depending on how measured questionnaires are phrased, each may collect different type of data.

There are several decisions to be made in securing a sample. Each requires unique information.

- ***Size of Sample:*** In reality, how large a sample should be is a function of the variation in the population parameters under study and the estimating precision needed by the researcher. In this resaerch, ***420 questionnaire***s were collected, with 95% confidence level and ±5% tolerance.

- ***SamplingFrame:*** The population consists of individuals living in Taipei city with the age ranging from ***20~45 of ag***e.

- ***Sampling Method:*** In this research direct interviews and questionnaires were conducted in Taipei ***Chung-Hsiao East Road*** **and** ***Hsin-Yi Road*** (View Show), heart of the city where we can approach our targeted population ranging from ***20~45 years old.***

- **The Time Dimension:** This research is conducted only once, therefore it is cross-sectional study:
  Interviews / questionnaires data collection are conducted from ***October 20~October 31,2007.***

- **Sample Proportion:**

Gender	Forecast number of samples
Female	280
Male	120

Age	Forecast number of samples
20 ~29years old	150
30 ~39 years old	150
40 ~45 years old	100

The proportion of gender and age population from the total 420 questionnaires from this design is as follows:
Gender: Male to Female = 1~2.33 proportion.
Age: This part of proportion is determined according to my observation.

3.5 Analysis Method

Data gathered from the questionnaires are conducted via SPSS (with the significance level α =.05) with the following statistical method to conclude data analysis.

- **Descriptive Statistic:**

  The goal of descriptive analysis is to provide a quantitative specification of the important sensory aspects of a product.

  - It deals with **perceptions** not with ingredients, causes or implications.
  - It does not ask questions about consumer acceptability.
  - It uses panels consisting of trained or calibrated observers.
  - It uses well-defined terminology.
  - Data are quantified through ratings of perceived intensities on scales.
  - It seeks to answer questions about how products differ on specific sensory bases.

Applications of descriptive analysis:

- Sensory diagnostics of ingredient, processing or packaging changes.
- Prediction of consumer acceptance.
- Correlation with instrumental measures.
- Matching of sensory profiles in quality assessments.

- **Hypothesis Testing:**

Setting up and testing hypotheses is an essential part of statistical inference. In order to formulate such a test, usually some theory has been put forward, either because it is believed to be true or because it is to be used as a basis for argument, but has not been proved, for example, claiming that a new drug is better than the current drug for treatment of the same symptoms.

In each problem considered, the question of interest is simplified into *two competing claim*s / hypotheses between which we have a choice; ***the null hypothesis, denoted H0,*** against the alternative ***hypothesis, denoted H1***. These two competing claims / hypotheses are not however treated on an equal basis, special consideration is given to the null hypothesis. We have two common situations:

The experiment has been carried out in an attempt to disprove or reject a particular hypothesis, the null hypothesis, thus we give that one a priority so it cannot be rejected unless the evidence against it is sufficiently strong. For example, H0: there is no difference in taste between coke and diet coke against H1: there is a difference.

The Steps for the null hypothesis

1. Formulate the null hypothesis H_0 and the alternative hypothesis H_1.
2. Test criterion：State the test statistic and the form of rejection region.
3. With a specified α, determine the rejection region.
4. Calculate the test statistic from the data.
5. Draw a conclusion：State whether or not H_0 is rejected at the specified α and interpret the conclusion in the context of the problem. Also, it is a good statistical practice to calculate the P --- value and strengthen the conclusion.

Test

(1.) Null hypothesis ： $\mu_1 - \mu_2 = \delta_0$ with *large samples*

Test statistic： $Z = \dfrac{\bar{X} - \bar{Y} - \delta_0}{\sqrt{\dfrac{S_1^2}{n_1} + \dfrac{S_2^2}{n_2}}}$

Alternative Hypothesis	Level α Rejection Region
$\mu_1 - \mu_2 > \delta_0$	R：$Z \geqq z_\alpha$
$\mu_1 - \mu_2 < \delta_0$	R：$Z \leqq -z_\alpha$
$\mu_1 - \mu_2 \neq \delta_0$	R：$\lvert Z \rvert \geqq z_{\alpha/2}$

(2.) Null hypothesis ： $\mu_1 - \mu_2 = \delta_0$ with *small samples*

Test statistic： $T = \dfrac{\bar{X} - \bar{Y} - \delta_0}{S_{pooled}\sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}}$ d.f. $=n_1+n_2-2$

Alternative Hypothesis	Level α Rejection Region
$\mu_1 - \mu_2 > \delta_0$	R：$T \geqq t_\alpha$
$\mu_1 - \mu_2 < \delta_0$	R：$T \leqq -t_\alpha$
$\mu_1 - \mu_2 \neq \delta_0$	R：$\lvert T \rvert \geqq t_{\alpha/2}$

(3.)

Pearson`s χ^2 Test for Goodness of fit (Based on *large n)*

Null hypothesis H_0：$P_1=P_{10},\cdots,P_K=P_{K0}$

Test statistic $\chi^2 = \sum_{i=1}^{k} \dfrac{(n_i - np_{i0})^2}{np_{i0}}$

Rejection region $\chi^2 \geqq \chi^2_\alpha$, where χ^2_α is the upper α point of the χ^2 distribution with d.f = k-1 = (number of cell) –1

Source: *Richard A. Johnson / Gouri K.Bhattacharyya Statistics：Principles and method 4th Wiley.*

- **One –Way Analysis of Variance:**

In statistics, **analysis of variance** (**ANOVA**) is a collection of statistical models, and their associated procedures, in which the observed variance is partitioned into components due to different explanatory variables. The initial techniques of the analysis of variance were developed by the statistician and geneticist R. A. Fisher in the 1920s and 1930s, and is sometimes known as **Fisher's ANOVA** or **Fisher's**

analysis of variance, due to the use of Fisher's F-distribution as part of the test of statistical significance.

There are three conceptual classes of such models:

- Fixed-effects model assumes that the data come from normal populations which may differ only in their means. (Model 1)
- Random-effects models assume that the data describe a hierarchy of different populations whose differences are constrained by the hierarchy. (Model 2)
- Mixed effects models describe situations where both fixed and random effects are present. (Model 3)

In practice, there are several types of ANOVA depending on the number of treatments and the way they are applied to the subjects in the experiment:

- One-way ANOVA is used to test for differences among two or more independent groups. Typically, however, the One-way ANOVA is used to test for differences among *three or more* groups, with the two-group case relegated to the t-test (Gossett, 1908), which is a special case of the ANOVA. The relation between ANOVA and t is given as

  F = t squared.

- One-way ANOVA for repeated measures is used when the subjects are subjected to repeated measures; this means that the same subjects are used for each treatment. Note that this method can be subject to carryover effects.
- Factorial ANOVA is used when the experimenter wants to study the effects of two or more treatment variables. The most commonly used type of factorial ANOVA is the 2×2 (read: two by two) design, where there are two independent variables and each variable has two levels or distinct values. Factorial ANOVA can also be multi-level such as 3×3, etc. or higher order such as 2×2×2, etc. but analyses with higher numbers of factors are rarely done because the calculations are lengthy and the results are hard to interpret.
- When one wishes to test two or more independent groups subjecting the subjects to repeated measures, one may perform a factorial mixed-design ANOVA, in which one factor is independent and the other is repeated measures. This is a type of mixed effect model.
- Multivariate analysis of variance (MANOVA) is used when there is more than one dependent variable.

- **Chi-Squared Test:**

A **chi-square test** is any statistical hypothesis test in which the test statistic has a chi-square distribution when the null hypothesis is true, or any in which the probability distribution of the test statistic (assuming the null hypothesis is true) can be made to approximate a chi-square distribution as closely as desired by making the sample size large enough.

Specifically, a chi-square test for independence evaluates statistically significant differences between proportions for ***two or more groups*** in a data set.

- Pearson's chi-square test, also known as the Chi-square goodness-of-fit test, commonly referred to as *the* chi-square test
- Yates' chi-square test also known as Yates' correction for continuity
- Mantel-Haenszel chi-square test
- Linear-by-linear association chi-square test

In the social sciences, the significance of the chi-square statistic is often given in terms of a p value (e.g., $p = 0.05$). It is an indication of the likelihood of obtaining a result (0.05 = 5%). As such, it is relatively uninformative. A more helpful accompanying statistic is phi (or Cramer's phi, or Cramer's V).[1] Phi is a measure of association that reports a value for the correlation between the two dichotomous variables compared in a chi-square test (2 × 2). This value gives you an indication of the extent of the relationship between the two variables. Cramer's phi can be used for even larger comparisons. It is a more meaningful measure of the practical significance of the chi-square test and is reported as the effect size.

A chi-square test may be applied on a contingency table for testing a null hypothesis of independence of rows and columns, it is used to determine whether there is enough evidence to infer that two nominal variables are related and to infer that differences exist among two or more populations of nominal variables. Completing both objectives entails classifying items according to two different criteria.