國 立 交 通 大 學

管理科學系 碩士班

碩士論文

消費者參與客製化過程以及提供範例對產品滿意度的
影響

The Effects of Providing Examples and Customer

Participation on Product Satisfaction

研 究 生 ： 黃以江

指導教授 ： 張家齊 博士

中華民國 九十六年 八月

中 文 摘 要

大量客製化可以被廣泛的定義為一個可以讓消費者共同參與設計產品的過程，消費者可以透過這個過程讓產品本身或是公司提供的服務，更符合他們的需求。在這個以消費者為中心的經濟社會裡，消費者越來越想要有機會可以自己設計自己想要的產品。本篇研究旨在探討顧客參與設計對產品滿意度的影響，並研究在顧客知覺到不同的客製化難易度下，滿意度的變化情形。結果指出提供一個簡單的設計範例給顧客—顧客感受到較容易進行客製化—較能夠有效的增加顧客滿意度；另外，客製化產品符合顧客自我概念的程度，也在顧客參與和產品滿意度的關係中扮演的中介的角色。

Abstract

Mass customization is broadly defined as "a customer co-design process of products and services which meet the needs of each individual customer with regard to certain product features." In this consumer-centric economy, more and more consumers desire the opportunity to design their own product. This study investigated the effects of customer participation on satisfaction and the moderating effect of examples provided in co-design. The results showed that the effect of customer participation is contingent upon whether the example provided is easy or hard to achieve. Customer participation can yield the highest level of customer satisfaction while an example is provided in the co-design process than when no example or difficult example is provided. The author also examined the mediation effect of self-congruity on the relationship between customer participation and satisfaction.

Acknowledgement

There are many individuals who have helped guide and support me through the past several months. First of all, I must sincerely appreciate Dr. Chang Chia-Chi—a best supportive and patient advisor. Her insights and encouragement has consistently inspired me and kept me on the right track, from the beginning of this study to its finish. Chang taught me how to think more in-depth, and how to conceptualize these thoughts that could be studied and discussed. I hope that I could learn more from her, and contribute to the world just as what she has been doing.

Second, I must thank for my parents, since they could forgive me that I have not been with them for several months. Their phone calls were always my energizer. Thanks also to my best friend Sherry. I think I spent more time with her discussing my study and life than with anybody else. Other individuals who should not be unacknowledged include Vilina Chen, Wish Liao, and other "teammates" in the Chia-Chi's group, who have provided such excellent and useful academic support to me.

Last, but certainly not least, there are my friends, Eric Wang, Felix Chuang, and other friends, who have always supported and encouraged me. Thank you for always being at my side.

2007/08/29 Hsinchu

Table of Contents

List of Tables

List of Figures

Chapter 1 – Introduction

1.1 Research Background

Since firms and enterprises can acquire their customers' data dynamically and

effectively because of the advances in information technology, the more finer

segmentation seems possible to be realized (Kara & Kaynak, 1997). An increasing

number of companies in different industries have successfully implemented the strategy

of customization, such as Adidas and DELL. The project Mi Adidas allows consumers

to order unique footwear by specifying their preferences. Being one of the largest

computer retailers, DELL provides customers the opportunity to configure the

components of computers, including CPU, Operation System and so forth. With limited

resources, companies may not always afford the highest level of customization. Mass

customization based on efficient and flexible modulization design is the most

commonly adopted strategy. It offers firms the ability to strike the balance between

allowing customers to select and customize their products for better fit their needs and

cost effectively.

After the industrial revolution in the eighteenth century, manufacturing has been

about producing more and more stuff in an efficient way (mass production) so that

consumers can buy products at low prices yet may not be best-preferred. With the

increasing purchasing power of customers, they will be less likely to compromise for

less preferred products and more willing to pay the premium in order to obtain exactly what they need. Pine, Peppers, and Rogers (1995, p. 103) argued that "Customers, whether consumers or businesses do not want more choices. They want exactly what they want—when, where, and how they want it—and technology now makes it possible for companies to give it to them." Mass customization is about producing the "right stuff" (Cox & Alm, 1998).

Mass customization is also an important issue to transform and improve our high-technology industry in Taiwan. An international conference about mass customization was held by Industrial Technology Research Institute (ITRI) in 2006. How to apply the concept of mass customization was mainly discussed in the conference, and ITRI addressed that the time for the firms in Taiwan to apply approaches of mass customization is coming up.

As mass customization becomes an increasingly popular strategy, it is important to identify the determinants of mass-customization success. Da Silveira et al. (2001) pointed out that customer-driven design is one of the enablers in the core of mass customization system. They maintain that successful mass-customizing strategy for firms involves offering suitable conditions for the customer "to initiate the design process of a product" (Da Silveira et al., 2001, p. 6). Therefore, the purpose of this study is to identify the optimal conditions in which customers can feel more

comfortable while interacting with firms. We intend to investigate the effects of customer participating in the design process on product satisfaction while providing different conditions.

1.2 Research Objectives

When providing suitable conditions for customer to design a product that they want, marketers should ensure that customers are not confused or frustrated while facing a customizing task. Since companies engaging in mass customization tend to offer customers various features and options for customers to configure their own products and services, customers who are lack of prior related knowledge might have the difficulty in finding what they really want in the huge number of potential options (Huffman & Kahn, 1998). Customers who are lack of related knowledge or ability may find the design process difficult for them to achieve without external help. To provide some cues or hints may help participants when they are involving in the customization process. Particularly, when customers are involved in co-designing their own products, external help such as an example provided as cues as to how design customized products might be critical in influencing a customer's overall evaluation of the whole customization process. However, customers be intimidated by an example that is too difficult to achieve and therefore feel more frustrated in the customizing process and

3

less willing to participate. Maybe not all aids or external inspirations consistently are

effective in guiding customers throughout the whole customizing process. What should

firms do in order to provide the proper help so that customers will be more willing to

participate in the customizing process? Furthermore, if the co-designed product could

be higher evaluated than those not co-designed, does there any possible factors

mediated the relationship between customer participation and satisfaction? Could

participants feel the co-designed product more congruent with their self-images? These

are the issues that we would like to explore in this study.

1.3 Research Process

The research flow is as followings:

Figure 1 Research Flow

```
┌─────────────────────────────────────────────────┐
│           Deciding Research Direction            │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│                Literature Review                 │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│     Developing Research Structure and Hypotheses │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│         Developing Measurements of Variables     │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│             Pretest and Modifying Scales         │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│                Designing Scenarios               │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│             Sampling and Collecting Data         │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│                  Analyzing Data                  │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│     Research Results and Examining the Hypotheses│
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│      Conclusion, Limitations, and Future Research│
└─────────────────────────────────────────────────┘
```
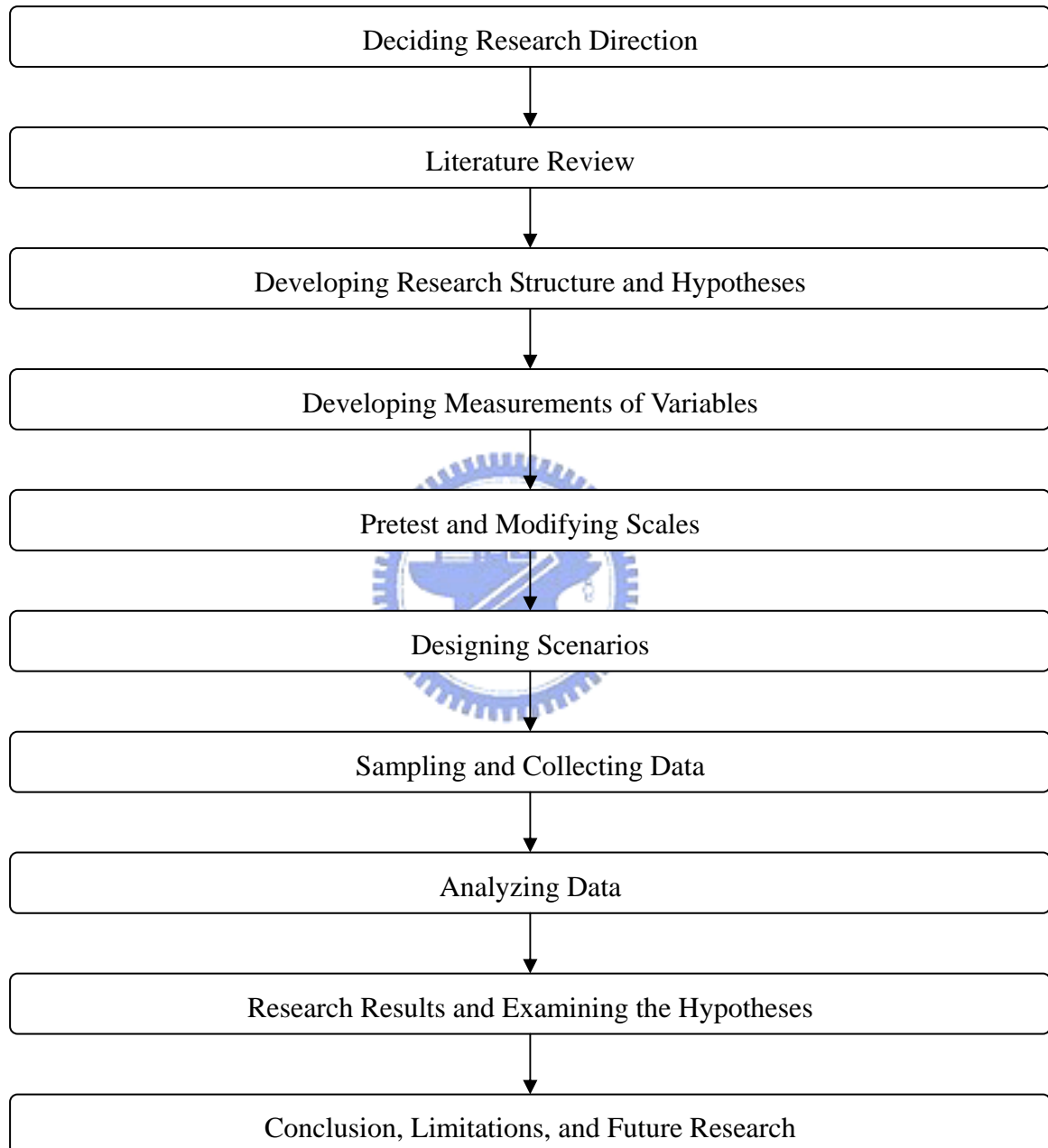
Chapter 2 - Literature Review

2.1 Research Framework

The major focus of this research is to analyze whether easy or hard or none

presence of an example provided would affect customers' satisfactions of final outputs.

Here is our main conceptual model in this study (Figure 2), and those variables will be

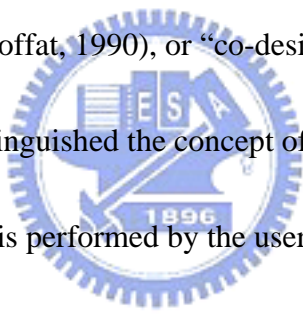discussed in the following literature reviews.

Figure 2 Research Framework
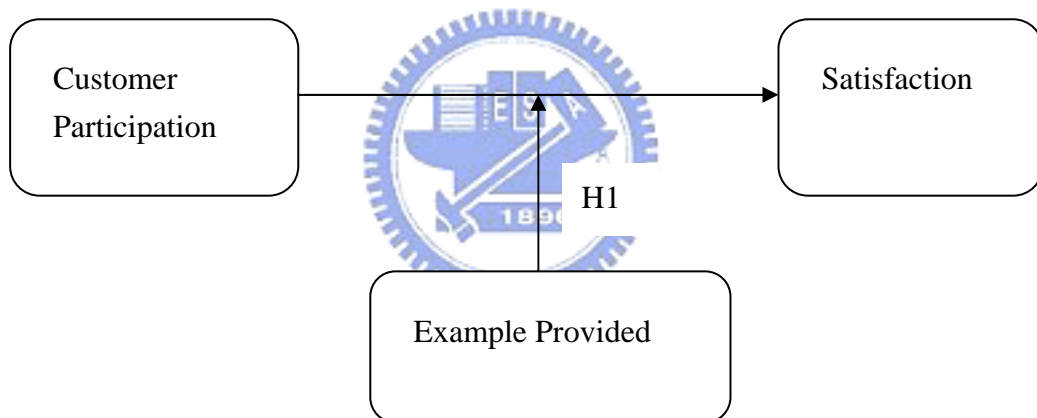
2.2 Customer Participation in Customization Process

Early research has proposed that consumption increasingly becomes part of

productive process, a feature that distinguishes between the modern and postmodern

marketer-consumer relationships (Firat, Dholakia, & Venkatesh, 1995). In the most

recent view, customers can play an active role in mass customizing process. They

should not be viewed as just passive receptacles, but a source of productivity gains in

service industry (Fitzsimmons, 1985; Lovelock & Young, 1979). For example,

customers can carry their food to tables and even clean the table after they finished the

meal in fast-food restaurants. Firms are increasingly providing customizing process

rather than finished products in the future. In some cases, when consumers are highly

involved in the design or development process, it is difficult to differentiate between

producer and consumer. Since the design and production is initiated by the consumer,

they becomes "prosumers" (Moffat, 1990), or "co-designers" (Kubiak, 1993).

Prior literature has distinguished the concept of personalization from

customization. Customization is performed by the user (Altan, 2003) and is more

in-depth individualization than personalization, which is performed by the company

and may be seen as an iterative process (Adomavicius & Tuzhilin, 2005; Vesanen &

Raulas, 2006). Customer Participation that we focus in this study is performed and

initiated by the user or purchaser, thus that is consistent with the denotation of

customization.

Customer participation have been defined as the extent to which customers are

involved in producing and delivering the product in previous study (Dabholkar, 1990).

Da Silveira et al. (2001) have identified eight different levels of mass customization

ranging from pure customization to pure standardization: design, fabrication, assembly, additional custom work, additional services, package and distribution, usage, standardization. Design, the highest level of mass customization, referred to the process in which a product is totally designed by a user. It allows customer to design all the features including the product, how the product could be delivered, and to what extent could the customer participate in the whole process.

Mass customization may be an essential determinant to increase the customer satisfaction in the competitive cyberspace-commerce environment. Recent research (Kramer, 2003) has demonstrated that, holding other variables constant, the product that was co-produced by customer would be perceived to better fit to a customer's preferences. Evidence has shown that co-design of apparels allows customers to feel more comfortable with the final product if customers found it easy to design (Ulrich, Anderson-Connell, & Wu, 2003). The successful customization program of *Mi Adidas* launched in selected markets in 2001 also suggests the higher customer satisfaction associated with customization. The price of the tailored shoes were about 30% above the price of in-line product (Berger & Piller, 2003).

When customers co-design a product, they are creating experience with and connection to this product, Norman (2005) suggested that the most intimate and highly self-relevant object for the consumer might be those that are made or customized by

themselves. He also argued that if the product could arouse some stories or memories

for the consumer, the appearances or usability of the product might not be as

important as in the other cases. This emotional link between customers and the

customized product is likely to be strengthened through customer participation, thus a

customer would be more likely to keep it.

Bateson (1985) asserted that customers might have the propensity to choose the

"do-it-themselves" approach across many services, even when the service that might

be more expensive or less convenient than traditional services.

In general, consumers who participated in designing their own products will be

more satisfied with the product than those who did not participate in the design

process. However, if customers feel like facing with "mass confusion" (Huffman &

Kahn, 1998) instead of mass customization, they would be likely dissatisfied since it

might be difficult to make choice in such large amount of options. We will discuss

more in-depth in the following section.
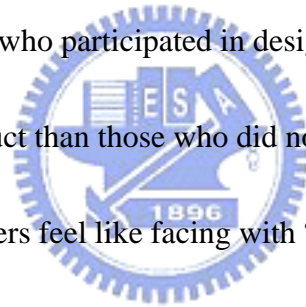
2.3 Example Provided in Co-design

Babyak (2006) has proposed the question as to "how many consumers will have

the creativity, desire, time, and energy to customize or design their own products,"

especially in the society of fast living rhythm. He also agreed that the choices reflecting

lifestyle and self-image would require more decision-making efforts than usual ones. It

is conceivably that not every person would like to choose customized services which

might require much customers' input.

Huffman & Kahn (1998) asserted that customers who are frustrated or

disappointed with a series of complicated decision-making task may not be satisfied

with the customizing strategy. One of implications from their study is that the more

complex the customizing task, the more possibility that facilitating the customizing

process would lead to higher satisfactions. In our study, participants are involving with

a design task that can be viewed as facing with infinite choices, since there are millions

possible compositions of lines, abstracts, objects, and colors which provided in the

design interface. Schwartz (2004, p. 71) proposed that "although some choice is

undoubtedly better than none, more is not always better than less," particularly a

customized offer which allows the consumer to design their own product is a task with

high degree of autonomy of decision-making. Too many choices provided for meeting

the various customers' needs may sometimes lead to misery and thus becomes as a

psychological burden for customers, especially for "maximizers" (Schwartz, 2004). A

maximizer will always try to find the best available alternatives, whereas a "satisficer"

can accept a "good enough" option. Customers sometimes have not enough clear

knowledge or ability of what better solution corresponded to their needs (Berger &
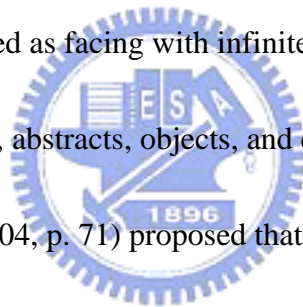
Piller, 2003). Therefore, mass customization seems not always a synonym for satisfaction, especially when the consumer perceives difficult to process the customizing service.

In order to attain higher customer satisfaction, what firms can do to decrease the perceived difficulty of the co-design will have the need to be focused. Decision aids would be helpful for making online purchase process easier and increase perceived quality (Karaatli, 2002). To extend that applications of online decision aids, customers might expect some decision aids in traditional shopping process, especially when customers facing with numerous options. Research showed that if customers think that they could better identify the appropriate products than the firm, customers' participating would empower them to perceive more behavioral control, which would result in higher evaluations of products (Godek, Yates, & Yoon, 2002).
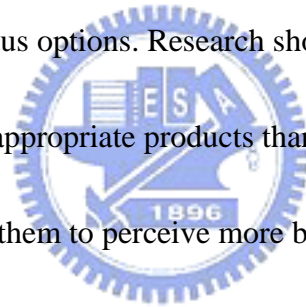
In our case, since we offer an opportunity to permit customers to design their own product, they may need to construct a possible image in their minds. Thus, providing some inspirations or stimulus may let participants obtain directions in such an unconcrete process. If customers receive appropriate cues which would inspire them, such as an easy example, they are able to modify it into better-preferred one or imitate some designing skills, so that customers may perceive the co-design as an easy task. An easy task is more likely to let them feel more confident and willing to participate. On

the contrary, if we offer customer a complicated and hard example, they might perceive

the co-design as a difficult task, and thus their confidence and willingness to participate

might be declined. It is reasonable that providing proper hints might be helpful for

customers to reduce efforts while they are designing products, since the conditions that

will make customers feel more straightforward about the customizing process.

We suggested that the moderate and adequate example provided could assist or

relieve the consumers who are stuck in the confusing or complicating design process,

and not only to provide the customized product but also proper aids for customers

would facilitate the customizing process and increase satisfactions.

Accordingly, the following hypothesis was formulated:
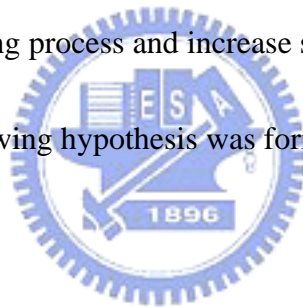
Hypothesis 1: The positive effect of customer participation on satisfaction

will be enhanced when provided with an easy example than provided with a

difficult or no example.

2.4 The Role of Self-Congruity

All commodities can provide two kinds of values for consumers, functional and

symbolic. Symbolic values can be derived from experiences of styles, textures, and

elements of products. Products with higher symbolic values are more possible to be of

higher prices or sales (Jhan, 2005). Products of greater symbolic values can contribute

to help customers fortify their self-image (Tan & Chua, 2003). Possessions close to a

person are possible to be clues to understand the person's personality. For example,

"possessions often reveal characteristics of their owners" (Richins, 1994, p. 522), which

suggested the inseparable relationships between consumption and self-image.

After being customized, the final product may appear as a unique one to

customers. Ann Marie, Seung-Eun, & Grace (2004) examined that there was a positive

effect of perceived uniqueness of product on willingness to join co-design. Their results

indicated that firms that offer customizing products should focus on the design process

that creates a remarkable experience, as this may differentiate the consumer from others.

Previous study (Johar & Sirgy, 1991) also maintained that high self-congruity could

increase the possibility of attitude change. Customers' positive attitude would be

enhanced by improving self-image congruence, since the greater the congruence, the

greater the satisfaction of self-esteem needs. Jamal (2004) also proposed that customers

would feel more satisfied with a brand that are more congruent with their self images.

When participating in the design process, the self-image could be enhanced as

the consumer is positioned as a producer in the market (Firat et al., 1995). The process

of creating a customized product is like a process of production. Early research also

suggested that augmentation of the self-concept can be enhanced "through an

intra-action process whereby an individual communicates with himself through the medium of goods-symbols, thus supporting his self-concept" (Grubb & Grathwohl, 1967, p. 27). A process of participation would create unique experiences in the shopping process for the product. This experience of participating may establish the specific connections between the customer and the product, which elicit more self-relevance with products.

Sirgy (1985) demonstrated that the congruity of self-image and product-image had positive effects on purchase motivation. Previous study also suggested that the congruity of self-image could be an effective predictor of product satisfaction (Sirgy, Dhruv, Tamara, Jae-ok, & et al., 1997). In addition, "consumers with increasing augmented purchasing power are increasingly attempting to express their personality by means of individual product choice" (Berger & Piller, 2003, p. 42), thus they are more likely to be satisfied with idiosyncratic customized products than generic product. The co-produced product may not have best functional features, but it could be special or favorable since it expresses the individual's characteristics.

Research proposed that customers would focus on symbolic cues of products and match these cues to their self-image, that the matching process could lead to a more persuasive advertising message via self-congruity route (Johar & Sirgy, 1991). Similarly, we want to examine that final outputs which are tailored through customer

participation may be more congruent with a customer's self-image, and can possibly

satisfy the customer more. Self-congruity referred to "the degree of matching

product-related cues to self-image" of co-designers in this study.

According to H1, the mediation effects of self-congruity would vary across the

levels of example provided. Since providing an easy example could facilitate the design

process, participants would more easily customize a product, which might be more

congruent with their self-images. On the other hand, while providing a hard example,

customers would feel difficult to design so that the output could be few congruent with

self-images. Since providing a hard example would be likely to cause confounding or

frustrating feelings, the absence of example in the design process would possibly be

better than presenting a hard example.
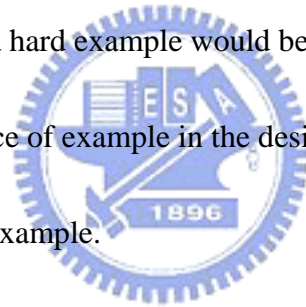
Thus, the following hypotheses were developed:

H2a: The mediation effect of self-congruity will be stronger when provided an

easy example than a hard example.

H2b: The mediation effect of self-congruity will be stronger when provided no

example than a hard example.

Chapter 3 – Research Methodology

3.1 Overview

The objectives of this experiment are divided into two parts. First, the study tends to investigate the value of customer participation. To satisfy customers, being the cornerstone of the marketing concept, is mostly the highest-order goal of a firm. We would like to explore in what conditions customer participation could be an effective strategy in mass customization. Besides, design-related ability is self-assessed by participants since customers' participation would need some product-related experiences and knowledge which could facilitate the procedure of selecting and configuring products. If consumers are able to make decisions for preferred options through the designing process, they would probably perceive more benefit from co-design program. A covariate is a source of external variation that when removed from the dependent variable, it could reduce the magnitude of the error term. The self-assessed ability is prior measured as a covariate to control this possible effect caused by individual differences. An ANCOVA was conducted to test Hypothesis 1 that asserted the moderating effect of example provided on the relationship between customer participation and satisfactions.

Furthermore, the analysis of mediation effect of self-congruity was conducted by following the principles described by Baron & Kenny (1986) which would be

examined more in-depth in Chapter 4.

3.2 Stimulus and Manipulation of Customer Participation

The principle considered in selecting the product as the stimulus in our study is

that the product category has to be one which is available and has the need to be

customized. An associated concept is the uniqueness of the customer's needs which is

about the relevant demand pattern (Christopher, 1995). That means to what extent does

the customer care whether is customized product or not. For a counterexample, tissues

are not suitable for this study since most of consumers are low involved in its

purchasing process.
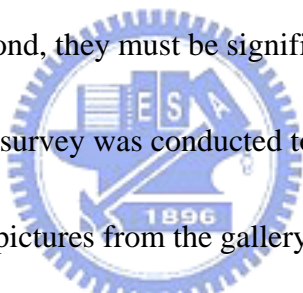
Some researcher has discussed the applications of mass customization on

apparel industry (Anne Marie, 2005; Anonymous, 1998; Kamali & Loker, 2002; Ulrich

et al., 2003), and we could find that there are many websites offering custom service for

clothing, such like *www.customink.com* and *www.DesignAShirt.com*. Therefore, the

author selected customizing T-shirt as a stimulus. We tended to let respondents design

their favored pictures on the T-shirt, and the style of the T-shirt was controlled as the

most common one.

Since the ease of use of software was not concerned in this study, we chosen an

easy flash provided on the webpage: *www.mrpicassohead.com* (see Appendix 3), which

was developed by Ruder Finn Interactive Co., as the tool for the subjects to design

pictures on the T-shirts.

3.3 Pretest on Example Provided

Examples were selected to affect the perceived difficulty of the co-design task,

and we decided to choose two pictures from the gallery of *www.mrpicassohead.com*,

one is easy and the other is complicated. Two criteria were considered to select the

appropriate example pictures: first, the two pictures must be perceived as same

appealing for participants; second, they must be significantly different on perceived

difficulty. Accordingly, a pilot survey was conducted to determine the stimulus pictures.

At first, we picked six pictures from the gallery, and we conducted a survey on

Internet. After collecting 115 respondents, the author decided the two pictures (see

Appendix 3) by the two principles for the use of example provided. The statistical

results shown that there were no significantly differences on the appealingness (p

$= .428$) and were significantly different on perceived difficulty ($p < 0.05$) between the

two chosen pictures.

3.4 Experimental Design and Respondents

A 2×3 factorial experiment with 30 respondents per cell was conducted (Table

1), which consisted of two levels of customer participation (participation, non-participation), and three levels of perceived difficulty which were manipulated by providing no example, easy example, and hard example. The dependent variables of interest were self-congruity and satisfaction.

Table 1 Cells of Experimental Design

		Example Provided		
		No	Easy	Hard
Mass customization	Participation	A	C	E
	Non-Participation	B	D	F

NOTE: A、B、C、D、E、F represents the satisfaction of the product in each condition.

Respondents were provided incentives and volunteer college and graduate students and their ages were all between eighteen and twenty-five years old.   Though there were more male (115 of 180) in this study, there were no significant effects of gender on perceiving appealing (n.s., $p = .855$) and difficulty (n.s., $p = .411$) of the example in the pretest.   Because respondents were required to come to the laboratory for this study, all respondents were contacted near or within the campus.   Each of 210 respondents was scheduled for a laboratory appointment, and 180 of them have

successfully completed the experiment.

3.5 Procedure

Only one participant was appointed at one time, and every one of them was randomly assigned to each cell.   In the first part of this study, all participants were self-reported their ability about design a T-shirt, then they were exposed to the contexts which asked them to use the *mrpicassohead* for designing what picture they like. One-third of them were provided no example, and each half of the rest was provided with an easy or a hard example respectively. The descriptions for scenarios used in the study are shown in Appendix 2.
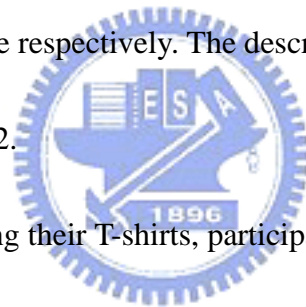
After finished designing their T-shirts, participants were divided into two groups. Each participant in the target group was measured the self-congruity and product satisfaction of their own work, whereas each respondent in the control group would be assigned a picture made by other one participant and answered questions about it. In order to ensure that each respondent received the same degree of appealingness, we applied the yoked-control technique. For example, each respondent in the cell of control group was exposed to the picture designed by each participant in the corresponded cell of target group, and they were paired together (see Table 1: A→B, C →D, E→F). In addition, participants who were provided example and assigned to

participation group were assessed the perceived difficulty, confidence and willingness to design.

It was noted that even those respondents in the non-participation cells have used the *mrpicassohead* for a while, that the main reason is for controlling the using experience.

3.6 Measurements

In this study, questionnaires used for operationally measuring the constructs were mainly modified from previous research for more suitable in the customization context, and all construct were measured by multiple items.   All items were measured using a seven-point Likert-type scale (1 = strongly disagree; 7 = strongly agree), except customer satisfaction.
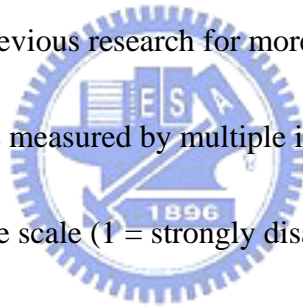
3.6.1 Measures of Independent Variable and Covariate

Customer participation was a two-level variable which was decided by whether the respondent have designed the T-shirt and evaluated it or just experienced the design tool.

The measurement of perceived difficulty of example provided was consisted of four items which were adapted from previous studies (Anckar & Walden, 2000;

Compeau & Higgins, 1995; Lin, 2006) for perceived ease of use and self-efficacy, and

each statement was answered on a seven-point agree-disagree scale. The result of

assessing perceived difficulty was also taken as a manipulation check for example

provided.

Here is a example question:

01. I think that it is time consuming to design this work.

Strongly Disagree   1   2   3   4   5   6   7   Strongly Agree

Measuring the construct of self-assessed ability based on the measurement of

prior knowledge. Previous research suggested that we could distinguish subjective

knowledge from objective knowledge conceptually (Brucks, 1985; Selnes & Gronhaug,

1986). Studies in consumer behavior have used self-assessed measures for assessing

subjective knowledge (e.g., Johnson & Russo, 1984).   The author modified the scale

from Chan-Wook & Byeong-Joon's (2003) study for the relationship between product

involvement and prior knowledge, which included three items.   And for more

completeness in our research, the author added one more question into the scale, so that

the self-assessed ability was measured by a four-item scale, such as:

01. Compared to other people, I think that my ability about painting is excellent.

Strongly Disagree   1   2   3   4   5   6   7   Strongly Agree

3.6.2 Measure of Dependent Variables

The self-congruity were assessed with the new method of measuring self-image congruence designed by Sirgy et al. (1997). Respondents were first exposed to an instruction:

"Take a moment to think about [product x]. Think about the kind of person who typically uses [product x]. Imagine this person in your mind and then describe this person using one or more personal adjectives such as, stylish, classy, masculine, sexy, old, athletic, or whatever personal adjectives you can use to describe the typical user of [product x]" (Sirgy et al., 1997, p. 232).

After they have written down those adjectives, respondents would indicate to what extent they disagree or agree the statements as following for example:

01. Wearing this T-shirt is consistent with how I see myself.

Strongly Disagree   1   2   3   4   5   6   7   Strongly Agree

The other two items were also adapted from Sirgy et al.'s study (1997), which were listed in the Appendix.

The satisfaction scale was modified from Spreng, MacKenzie, & Olshavsky's (1996) study for a reexamination of the consumer satisfaction, which included five semantic differential items anchored as "very dissatisfied/very satisfied," "very

displeased/very pleased," "very uncomfortable/very comfortable," "very dislike/very

like," and "very frustrated/very contented."   The author also consulted the study of

consumer satisfaction by Westbrook & Oliver (1981).

The complete details for the questionnaire are attached in Appendix 1 & 2.

Chapter 4 – Results

4.1 Manipulation Check and Data Analysis

4.1.1 Manipulation Check

It is shown that perceived difficulty of the provided hard example is

significantly higher than which of the provided easy example (t-statistics = 6.761, $p <$

0.001).   Besides, respondents were asked to rate how appealing did they feel about the

two pictures (from 1 point to 7 points), and it was shown no differences on the

appealingness of the two chosen pictures (t-statistics = 0.271, $p = 0.506$).   The means

were listed on Table 2.

Table 2 Descriptive Statistics of Manipulation Check

Variables	Groups	N	Mean	Std. Deviation
Perceived difficulty	Easy	60	3.80	1.069
	Hard	60	5.07	0.995
	Total	120	4.44	1.211
Appealingness	Easy	60	4.57	1.577
	Hard	60	4.48	1.780
	Total	120	4.53	1.675

4.1.2 Factor Analysis

As an examination of the factorial validity of those scales, we conducted the

factor analysis, and the result was reported as following Table 3.1 and 3.2. This factor

analysis was divided into two parts: one was for scales presented on all types of

questionnaire and the other one was for those scales specifically assessed in the context

of providing an example. Before the factor analysis, the KMO statistic was reported as

0.871 and 0.791 respectively, and the Bartlett's test of sphericity was all significant ($p <$

0.001), that shown the data was adequate for proceeding the factor analysis.   We used

the principal axis method for extraction and proceeded the direct oblimin rotation.

With few exceptions, items assigned to each dimension consistently have high

factor loadings.   Item loadings that are less than 0.40 are not shown.
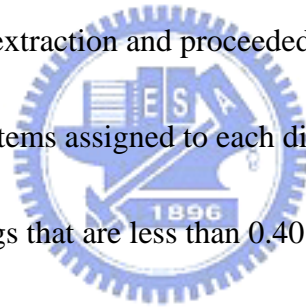
Table 3.1 Factor Analysis (i)

	Factor		
	1	2	3
SAA1		.458	
SAA2		.932	
SAA3		.600	
SAA4		.806	
SC1			-.581
SC2			-.899
SC3			-.750
SAT1	.802		
SAT2	.860		
SAT3	.625		
SAT4	.950		
SAT5	.887		

Extraction Method: Principal Axis Factoring.   Rotation Method: Oblimin with Kaiser Normalization.

Table 3.2 Factor Analysis (ii)

	Factor		
	1	2	3
PDcheck1		.554	
PDcheck2		.661	
PDcheck3		.960	
PDcheck4		.466	
WTC1	.696		
WTC2	.956		
WTC3	.875		
WTC4	.819		
CON1			.734
CON2			.913
CON3			.754
CON4			.696

Extraction Method: Principal Axis Factoring.   Rotation Method: Oblimin with Kaiser Normalization.

4.1.3 Reliability

The reliabilities are above .7 across all factors, which shows the high internal

consistency of each item of the same factor (see Table 4).

Table 4 Reliability Statistics

Factors	Cronbach's α	N of Items
Self-Assessed Ability	.783	4
Perceived Difficulty	.712	4
Confidence to CoDesign	.907	4
Willingness to CoDesign	.930	4
Self-Congruity	.878	3
Satisfaction	.942	5

4.2 Hypothesis Testing

4.2.1 Hypothesis 1 and the effect of Customer Participation on Satisfactions.

Table 5 Descriptive Statistics of Satisfaction

Dependent variable: satisfactions

	Example provided								
	None			Easy			Hard		
	Mean	Std. Deviation	N	Mean	Std. Deviation	N	Mean	Std. Deviation	N
Participation	4.53	1.25	30	4.89	0.82	30	4.54	1.14	30
Non-Participation	3.69	1.32	30	3.13	1.15	30	3.92	1.25	30

Table 6 exhibited that mean values of satisfaction in target group with

participation were all higher than that in each cell without participation respectively.

The author conducted an ANCOVA (Table 6) for testing Hypothesis 1, which the

self-assessed ability was taken as a covariate. As the main effect of customer

participation on satisfactions was examined (F-statistics = 41.525, $p < 0.001$),

Hypothesis 1 could be supported that the interaction effect between customer

participation and example provided was statistically significant (F-statistics = 4.012, p

< 0.05).

Table 6 Summary of ANCOVA

Dependent Variable: Satisfaction

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Cov(Ability)	9.229	1	9.229	7.007	.009*
Participation	54.696	1	54.696	41.525	.000**
Example Provided	1.129	2	.564	.428	.652
Interaction	10.568	2	5.284	4.012	.020*
Error	227.874	173	1.317		
Total	3351.640	180			

*. P <0.05

**. P <0.001

For further confirmed Hypothesis 1, we examined the mean differences between

target group and control group among the three levels of example provided. Results

showed that the mean differences of satisfaction between target and control groups

were stronger when an easy example was provided (F-statistics = 4.133, $p < 0.05$) in the

design process than a hard (LSD post-hoc test, $p = .039 < 0.05$) or no example provided

(LSD post-hoc test, p = .007<0.05). This result could be presented more clearly in

Figure 3 and Figure 4.

Table 7 Adjusted Means of Satisfactions

	Example provided		
	None	Easy	Hard
Participation	4.57	4.90	4.54
Non-Participation	3.71	3.12	3.86
Adjusted Difference	0.87	1.75	0.60

Figure 3 Differences between NoP and P group
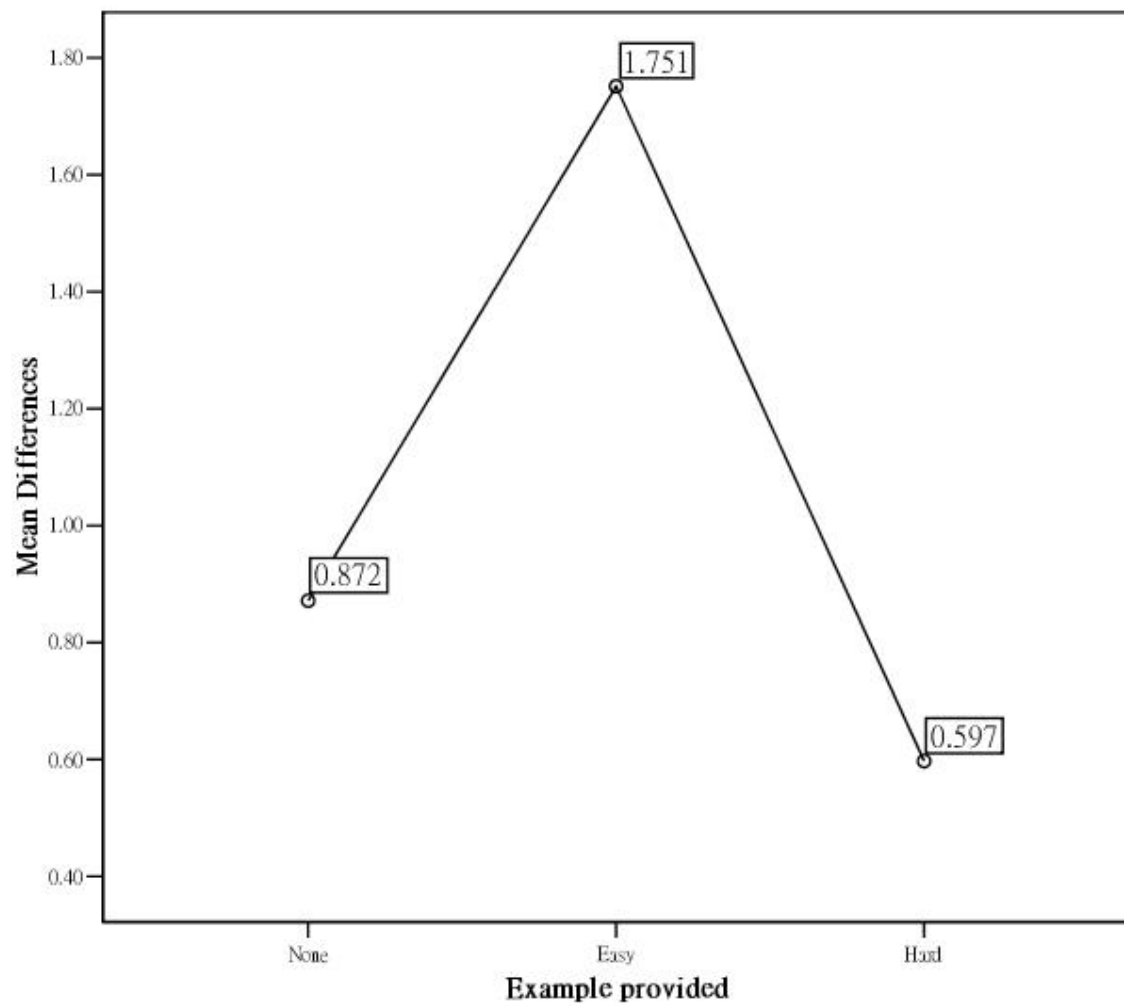
It could also be discovered that the interaction effect was ordinal (see Figure 4), since the main effect of customer participation was statistically significant (F-statistics $= 41.525$, $p < 0.001$) on satisfaction. The results indicated that encouraging customer co-design would successful raise the satisfaction of a customized product in our case.

Figure 4 Interaction of Participation and Example Provided
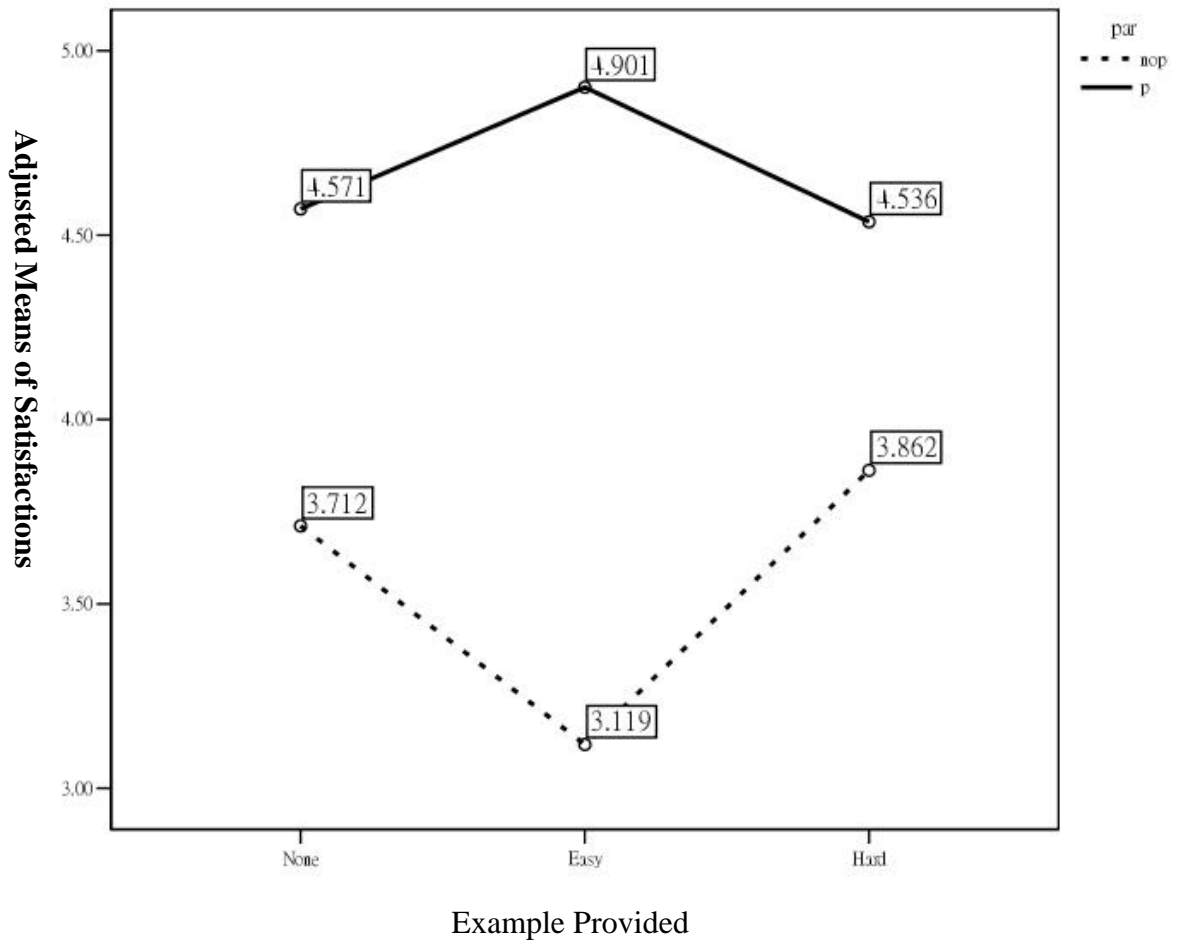
Example Provided

4.2.2 The Mediation Analysis

It could be discovered that the mean value of self-congruity in each cell of participation was higher than that in each corresponding cell of non-participation (Table 8), whether the easy or hard or no example provided. Then, the author proceeded the analysis by following the steps suggested by Baron & Kenny's (1986) research. In each varied condition of example provided, the following analysis was conducted to constitute that:

1. The independent variable (customer participation) has a significant influence on the proposed mediator (self-congruity) by regressing the mediator on the independent variable.

2. The independent variable is shown to significantly affect the dependent variable (satisfactions) by regressing the dependent variable on the independent variable.

3. When both the independent variable and the mediator are in the regression model, the mediator must significantly affect the dependent variable, and the effect of the independent variable on the dependent variable must be less than in the second regression model.

Table 8 Descriptive Statistics of Self-Congruity

	Example provided								
	None			Easy			Hard		
	Mean	Std. Deviation	N	Mean	Std. Deviation	N	Mean	Std. Deviation	N
Participation	4.11	1.22	30	4.12	1.19	30	4.03	1.39	30
Non-Participation	2.93	1.25	30	2.52	0.98	30	3.47	1.34	30

First of all, we directed the regression method to examine the first condition

listed above. Table 9 exhibited that customer participation has a positive effect on

self-congruity, except when a hard example is provided in the design process.

Table 9 The effect of customer participation on self-congruity when provided different example

Dependent variable: self-congruity

Example Provided	Standardized β	t	p-value
No Example	.435	3.681	.001*
Easy Example	.599	5.694	.000**
Hard Example	.207	1,608	.113

*. P < 0.05

**. P < 0.001

Second, Table 10 presented that customer participation significantly affect

satisfactions.

Table 10 The effect of customer participation on satisfactions when provided

different example

Dependent variable: satisfactions

Example Provided	Standardized β	t	p-value
No Example	.317	2.550	.013*
Easy Example	.665	6.777	.000**
Hard Example	.255	2.008	.049*

*. P < 0.05

**. P < 0.001

Afterwards, we conducted the path analysis to examine both direct and indirect

effects in the regression model that consisted of customer participation, self-congruity,

and satisfaction when different example was provided in the customizing process. The

parameters on those diagrams are the standardized regression weights, which referred

to the direct effect caused by each independent variable.

34

Figure 5.1 The Path Diagram (when no example was provided)
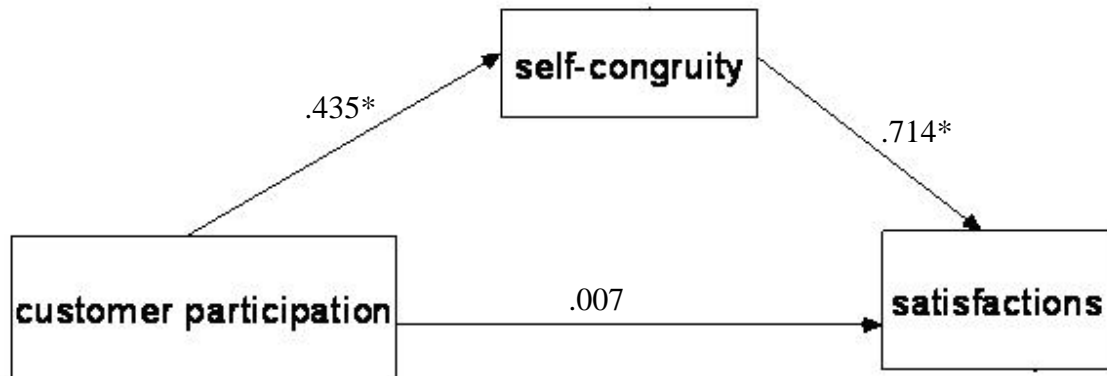
Figure 5.1 shows that the perfect mediation exists since customer participation

has no significant effect on satisfactions when the mediator (self-congruity) is

controlled. According to David A. Kenny's (2006) article, the amount of mediation

effect could be estimated by the indirect effect. Subsequently, a Sobel test is conducted

and its results indicates that the indirect effect of customer participation on satisfactions

via self-congruity is significantly different from zero (Test statistics = 3.29, $p < 0.001$),

and the amount of standardized indirect effect is calculated as 0.311.

Figure 5.2 The Path Diagram (when an easy example was provided)
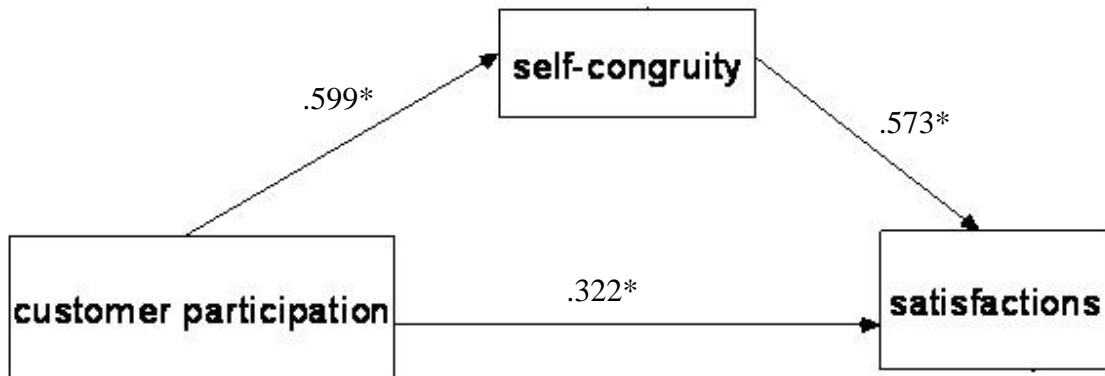
Figure 5.2 shows that self-congruity is partially mediating the relationship

between customer participation and satisfactions, since the main effect of customer

participation remains significant (t-statistics = 3.357, $p < 0.05$) after adding the

mediator into the regression model. The standardized indirect effect is .343, which is

significantly larger than zero (Sobel test-statistics = 4.132, $p < 0.001$).

Figure 5.3 The Path Diagram (when an hard example was provided)
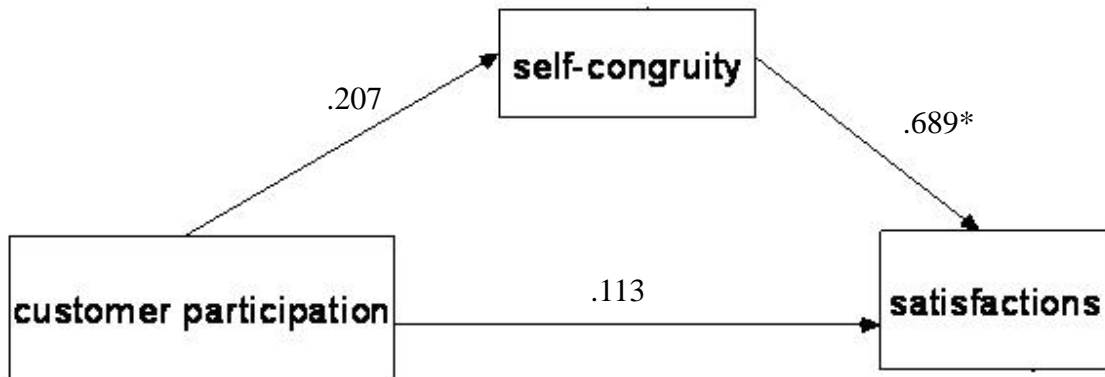
*. $P < 0.05$

Since the direct effect of customer participation on self-congruity is not

significant (t-statistics = 1.622, $p = 0.105$), the mediation effect of self-congruity does

not hold when a hard example is provided in the design process. Thus, Hypothesis 2a

and 2b are supported that the mediation effect of self-congruity will be stronger

whether an easy or no example was provided than a hard example was provided.

Chapter 5 – Discussion and Conclusion

5.1 The Summary of Results and Conclusions

The results indicated that the positive relationship between customer

participation and satisfaction is magnified when we provided an easy example picture,

which the moderating role was examined by the significance of interaction effect. In

order to further support our hypothesis, we confirmed our propositions by additionally

measuring the perceived difficulty, confidence to design and willingness to design. The

Results show that perceived difficulty was negatively correlated to the confidence of

customers ($\gamma = -.267$, $p < 0.05$), whereas the confidence of customers was positively

correlated to the willingness to design ($\gamma = .648$, $p < 0.001$). As we imagined, the more

difficulty the participant perceived the example, the less confidence they had, and thus

would have influence on their willingness to join the co-design process next time. It is

conceivably to assert that making customers feel easier and simpler when they are

participating in customizing process could both raise their satisfactions of the output

and willingness to participate again.

In our study, encouraging customer co-design would successful raise the

satisfaction of a customized product, since the main effect of customer participation is

demonstrated significant whether with an easy or hard or no example provided.

Respondents were all more satisfied with participation than without participation. The

author suggests the cognitive dissonance could be one possible reason. Since the design

process might be viewed as an extra effort which increased the negative feelings when

customers engaged in customization, they want to obtain the customized product but do

not want to pay extra works. Dissonance could be elicited as the participant making

some unwilling efforts to acquire the customized product. Aronson & Mills (1959)

maintained that people would value their additional effort and evaluate higher about the

product that produced from more effort than the product produced by less effort.

Customers may conceivably raise their evaluations of the outcome co-produced through

mass customization, as individuals may have the need to feel satisfied and enhance the

evaluations of their choices that reflect on the wisdom of their own behavior or

judgment (Hall & Dornan, 1988).
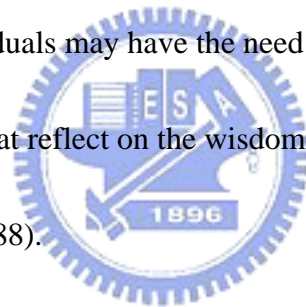
Other possible explanation is that when a consumer participates in co-designing,

they might be developing a feeling of ownership and do not want to interrupt the

customizing process. It could be likely to assert that the consumer is so involved in

customizing the product, they might express higher desire to own it.

It is suggested in our mediation analysis that asking the customer to participate

in designing their own product could increase the perceived congruence with the

self-image, thus the purchaser would be more satisfied because of the mediation effect

of self-congruity on satisfaction. Previous studies have mentioned the key role of

self-image of forming satisfactions (see Jamal, 2004; Wood, 1972). As being a perfect

mediator when no example provided for the customized offer, the self-congruity can

account for the most variation of satisfactions in mass customization. Moreover, we

could discover that only when an easy example was provided, the customers'

participation would directly affect the satisfaction, thus Hypothesis 1 was enhanced.

5.2 Implications

Much of the existing research have discussed the issue of mass customization

(Kubiak, 1993; MacCarthy & Brabazon, 2003; Tseng & Jiao, 1997), and most of them

have focused on how to implement it as an efficient strategy to companies. We have

demonstrated that offering the opportunity for the consumer to participate in

co-designing their product would possibly induce higher product satisfactions.

For offering more investigation on the point of view of consumer, we have

concentrated more on the decision aids for the consumer who might be stuck when

participating in a customizing process. Online decision aids were widely discussed in

some studies about online shopping behaviour (Karaatli, 2002; Pratibha, 2006), the

author suggested that providing some helping for customers who are involving with

customizing process can be a useful strategy as well. Companies which have already

provide the co-design process might want to provide some "examples" product when

the customer participating, since the participant could take the example as a reference

or they would be inspired for more creative ideas. Then, the customer could enjoy more

in the designing task, thus create the nice experiences with this product and impressive

image of the firm.

It is also noted that companies would be better to make their customers feel the

participation as an easy and interesting task, so that providing gorgeous but very

complicated example may not work on increasing benefits. Customers will agree that it

looks marvellous but they will feel that it is difficult for them to do as better as what

you provided. Hence, for more extended, the author proposes that the simple (but not

poor-class) messages will more useful for companies which have implemented the mass

customization than the costly complicated ones. To deliver an image that "customizing

is easy and achievable" may need to be considered when firms with customized service

are developing their advertising projects.

Mass customization is applied to many different product category, such like

Sears offering online tool kits for customers designing kitchens and rooms, 121Time

producing Swiss-made watches with almost infinite customization options (see Frank &

Ashok, 2006), and even web-based customized architecture (Stouffs, Tunçer, &

Sariyildiz, 2002). Since we have demonstrated that the self-image congruence has taken

an important role as the mediator, it is suggested that the product with high symbolic

value would be considered as a suitable product for requiring customer participation,

such as cars, watches, or clothes. Another implication of the self-congruity is that

companies could give their customers more autonomy when providing customized

services. The image itself that companies want to present is not important. The much

more valuable issue is that how congruent does the image is with the self-image of the

customer. Instead of designing alternatives or more options for the consumer, why not

consider to let the consumer design their own individual one that may possess higher

symbolic value for themselves, and thus the customer will be more satisfied.

5.3 Limitations and Future Research

A possible limitation of this study is the type of respondents used, which

students accounted for almost all respondents. This result might not be exactly fit the

whole society. Another possible limitation is that the respondents may not involve in

the experiment enough. Since they were not under the real situations of purchasing, or

they were going to do something later, the respondents might not focus on the

designing task. Besides, the experimental involvement of respondents is important for

measuring the reliable data, especially for the studies about customization. One paradox

for conducting an experiment about customization is that researcher may want to design

a real-life scenario which may cause the respondent lose patient. The more real scenario

will make respondents involve more, but it costs more time.

A counter-argument is proposed that encouraging customer to expand efforts in participation may not always be an attractive strategy because of the self-serving bias (Bendapudi & Leone, 2003). The self-serving bias refers to a person's tendency to claim more credits than a partner for success and less blame for failure in a situation in which an outcome is jointly produced (Wolosin, Sherman, & Till, 1973). Leone et al. (2003) have also proposed that increasing a customer's autonomy may reduce the self-serving bias. The effect of customer participation on product evaluation may need more and further research.

Another suggestion is that the attitudes toward the customer participation in co-design shall be measured and studied in future research. Purchase intention can be possibly taken into the model as a dependent variable, since there were already some studies discussing about the effects of store information or attitudes toward the brand on purchase intention (Dodds, Monroe, & Grewal, 1991; Spears & Singh, 2004)

It is recommended to add "price" as an independent variable in the future research, since the product with higher price has a higher symbolic value in the daily life. The author also proposes that there might be different effect of different product type on the relationship between customer participation and satisfactions. For instance, is it still suitable or workable to provide an easy example when customers are involving

with customizing a conspicuous good?

Except asking the customer to design images on the T-shirt, there are some other

levels of participation, such as requiring customers designing the whole T-shirt

including choosing the fabrics. If the designing process is more complicated, is the easy

example still effective on reducing the perceived difficulty?

Another related topic is the relationship between customer participation and

perceived product quality. Carroll and Thomas (1988) suggested that we could clarify

the concepts of easy to use and fun to use when talking about software quality, which

referred the ergonomic quality and hedonic quality respectively. It would be interesting

to know that the participation from customers will increase more perceived functional

quality or hedonic quality, therefore the effects of customer participation on

satisfactions would be more clarified.
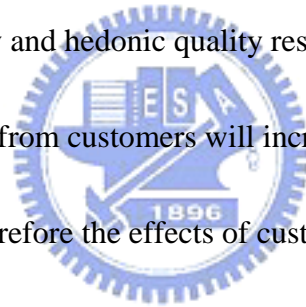
References

Adomavicius, G., & Tuzhilin, A. (2005). Personalization Technologies: A Process-Oriented Perspective. *Communications of the ACM, 48*(10), 83-90.

Altan, C. (2003). Personalization and Customization in Financial Portals. *Journal of American Academy of Business, Cambridge, 2*(2), 498.

Anckar, B., & Walden, P. (2000). Destination Maui? An Exploratory Assessment of the Efficacy of Self-Booking in Travel. *Electronic Markets, 10*(2), 10.

Ann Marie, F., Seung-Eun, L., & Grace, K. (2004). Individual Differences, Motivations, and Willingness to Use a Mass Customization Option for Fashion Products. *European Journal of Marketing, 38*(7), 835.

Anne Marie, L. (2005). The Style Incentive. *Potentials, 38*(9), 32.

Anonymous. (1998). Doing It Their Way. *Apparel Industry Magazine, 59*(5), 42.

Aronson, E., & Mills, J. (1959). The Effect of Severity of Initiation on Liking for a Group. *Journal of Abnormal Psychology, 59*(2), 177-181.

Babyak, R. (2006). Personalization Paradox. *Appliance Design,* pp. 5-5.

Baron, R. M., & Kenny, D. A. (1986). The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations. *Journal of Personality and Social Psychology, 51*(6).

Bateson, J. E. G. (1985). Self-Service Consumer: An Exploratory Study. *Journal of Retailing, 61*(3), 49.

Bendapudi, N., & Leone, R. P. (2003). Psychological Implications of Customer Participation in Co-Production. *Journal of Marketing, 67*(1), 14-28.

Berger, C., & Piller, F. T. (2003). Customers as Co-Designers. *Manufacturing Engineer, 82*(4), 42-45.

Brucks, M. (1985). The Effects of Product Class Knowledge on Information Search

Behavior. *Journal of Consumer Research, 12*(1), 1.

Carroll, J. M., & Thomas, J. M. (1988). Fun. *SIGCHI Bulletin, 19*(3), 21-24.

Christopher, W. L. H. (1995). Mass Customization: Conceptual Underpinnings, Opportunities and Limits. *International Journal of Service Industry Management, 6*(2), 36.

Compeau, D. R., & Higgins, C. A. (1995). Computer Self-Efficacy: Development of a Measure and Initial Test. *MIS Quarterly, 19*(2), 189.

Cox, W. M., & Alm, R. (1998). *The Right Stuff : America's Move to Mass Customization* (No. 1998 annual report): FEDERAL RESERVE BANK OF DALLAS.

Da Silveira, G., Borenstein, D., & Fogliatto, F. S. (2001). Mass Customization: Literature Review and Research Directions. *International Journal of Production Economics, 72*(1), 1-13.

Dabholkar, P. A. (1990). How to Improve Perceived Service Quality by Improving Customer Participation. *Developments in Marketing Science, 13*, 483-487.

Dodds, W. B., Monroe, K. B., & Grewal, D. (1991). Effects of Price, Brand, and Store Information on Buyers' Product Evaluations. *Journal of Marketing Research (JMR), 28*(3), 307.

Firat, A. F., Dholakia, N., & Venkatesh, A. (1995). Marketing in a Postmodern World. *European Journal of Marketing, 29*(1), 40.

Fitzsimmons, J. A. (1985). Consumer Participation and Productivity in Service Operations. *Interfaces, 15*(3), 60-67.

Frank, P., & Ashok, K. (2006). For Each, Their Own. *Industrial Engineer, 38*(9), 40.

Godek, J., Yates, J. F., & Yoon, Y. (2002). "Customization and Personalization: The Influence of Perceived Control and Perceived Capability on Product Evaluations". *Advances in Consumer Research, 29*(1), 157-157.

Grubb, E. L., & Grathwohl, H. L. (1967). Consumer Self-Concept, Symbolism and Marketing Behavior: A Theoretical Approach. *Journal of Marketing, 31*(4).

Hall, J. A., & Dornan, M. C. (1988). Meta-Analysis of Satisfaction with Medical Care: Description of Research Domain and Analysis of Overall Satisfaction Levels. *Social Science & Medicine, 27*(6), 637-644.

Huffman, C., & Kahn, B. E. (1998). Variety for Sale: Mass Customization or Mass Confusion? *Journal of Retailing, 74*(4), 491-513.

Jamal, A. (2004). Retail Banking and Customer Behaviour: A Study of Self Concept, Satisfaction and Technology Usage. *International Review of Retail, Distribution & Consumer Research, 14*(3), 357-379.

Johar, J. S., & Sirgy, M. J. (1991). Value-Expressive Versus Utilitarian Advertising Appeals: When and Why to Use Which Appeal. *Journal of Advertising, 20*(3), 23.

Johnson, E. J., & Russo, J. E. (1984). Product Familiarity and Learning New Information. *Journal of Consumer Research, 11*(1), 542.

Kamali, N., & Loker, S. (2002). Mass Customization: On-Line Consumer Involvement in Product Design. *Journal of Computer-Mediated Communication, 7*(4).

Kara, A., & Kaynak, E. (1997). Markets of a Single Customer: Exploiting Conceptual Developments in Market Segmentation. *European Journal of Marketing, 31*(11/12), 737-895.

Karaatli, G. M. (2002). *The Effects of Online Decision Aids, Product Knowledge, Extrinsic and Intrinsic Cues, and Purchase Involvement on Consumer Internet Shopping Behavior.* Unpublished Ph.D., Rensselaer Polytechnic Institute, United States -- New York.

Kenny, D. A. (2006). Mediation [Electronic Version]. Retrieved March 26 from http://davidakenny.net/cm/mediate.htm.

Kramer, T. (2003). *The Effect of Preference Measurement on Preference Construction and Responses to Customized Offers.* Unpublished Ph.D., Stanford University, United States -- California.

Kubiak, J. (1993). A Joint Venture in Mass Customization. *Planning Review, 21*.

Lin, H.-F. (2006). Understanding Behavioral Intention to Participate in Virtual Communities. *CYBERPSYCHOLOGY & BEHAVIOR, 9*.

Lovelock, C. H., & Young, R. F. (1979). Look to Consumers to Increase Productivity. *Harvard Business Review, 57*(3), 168-178.

MacCarthy, B., & Brabazon, P. (2003). In the Business of Mass Customisation. *Manufacturing Engineer, 82*(4), 30-33.

Moffat, S. (1990). Japan's New Personalized Production. *Fortune, 122*(10), 132-135.

Park, C.-W., & Moon, B.-J. (2003). The Relationship between Product Involvement and Product Knowledge: Moderating Roles of Product Type and Product Knowledge Type. *Psychology & Marketing, 20*(11), 977.

Pine Ii, B. J., Peppers, D., & Rogers, M. (1995). Do You Want to Keep Your Customers Forever? *Harvard Business Review, 73*(2), 103-114.

Pratibha, A. D. (2006). Factors Influencing Consumer Choice of A "Rating Web Site": An Experimental Investigation of an Online Interactive Decision Aid. *Journal of Marketing Theory and Practice, 14*(4), 259.

Richins, M. L. (1994). Special Possessions and the Expression of Material Values. *Journal of Consumer Research, 21*(3), 522.

Schwartz, B. (2004). The Tyranny of Choice. *Scientific American, 290*(4), 70-75.

Selnes, F., & Gronhaug, K. (1986). Subjective and Objective Measures of Product Knowledge Contrasted. *Advances in Consumer Research, 13*(1), 67-71.

Sirgy, M. J. (1985). Using Self-Congruity and Ideal Congruity to Predict Purchase Motivation. *Journal of Business Research, 13*(3), 195-206.

Sirgy, M. J., Dhruv, G., Tamara, F. M., Jae-ok, P., & et al. (1997). Assessing the Predictive Validity of Two Methods of Measuring Self-Image Congruence.

Academy of Marketing Science. Journal, 25(3), 229.

Spears, N., & Singh, S. N. (2004). Measuring Attitude toward the Brand and Purchase Intentions. *Journal of Current Issues & Research in Advertising, 26*(2), 53-66.

Spreng, R. A., MacKenzie, S. B., & Olshavsky, R. W. (1996). A Reexamination of the Determinants of Consumer Satisfaction. *Journal of Marketing, 60*(3), 15.

Stouffs, R., Tunçer, B., & Sariyildiz, S. (2002). *Examples of Web-Based Custom Design in Dutch Residential Developments.* Paper presented at the International Council for Research and Innovation in Building and Construction, Aarhus School of Architecture.

Tan, T. W., & Chua, H. M. (2003). Leveraging on Symbolic Values and Meanings in Branding. *Journal of Brand Management, 10*(3), 208.

Tseng, M. M., & Jiao, J. (1997). Case-Based Evolutionary Design for Mass Customization. *Computers industry Engneering, 33*, 319.

Ulrich, P. V., Anderson-Connell, L. J., & Wu, W. (2003). Consumer Co-Design of Apparel for Mass Customization. *Journal of Fashion Marketing and Management, 7*(4).

Vesanen, J., & Raulas, M. (2006). Building Bridges for Personalization: A Process Model for Marketing. *Journal of Interactive Marketing, 20*(1), 5-20.

Westbrook, R. A., & Oliver, R. L. (1981). Developing Better Measures of Consumer Satisfaction: Some Preliminary Results. *Advances in Consumer Research, 8*(1), 94-99.

Wolosin, R. J., Sherman, S. J., & Till, A. (1973). Effects of Cooperation and Competition on Responsibility Attribution after Success and Failure. *Journal of Experimental Social Psychology, 9*(3), 220-235.

Wood, D. A. (1972). The Effects of Work Involvement When Relating Job Attitudes and Behavior. *Academy of Management Proceedings*, 189-191.

詹偉雄. (2005). *美學的經濟*: 家庭傳媒城邦分公司.

翁鵲嵐, 鄭玉屏 & 張志傑. *情感設計*: 譯自 Norman, D. A. (2005). *Emotional Design: Why We Love (or Hate) Everyday Things*.

Appendix 1. Measures of Dependent Variables (English Questionnaire)

First of all, we'd like to thank you for joining this experiment, and this is a questionnaire for studying the consumer behavior.   Your responses will be used for academic research only.   We will not disclose your personal information, please take your time to answer the following questions completely.   Thank you for your patience and valuable participation!
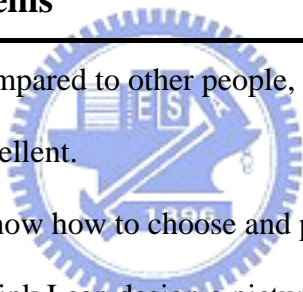
Best regards,
National Chiao Tuang University
Management Science Department
Student: I-Chiang Huang
Advisor: Chia-Chi Chang   2007/05

Variable	Items
Self-Assessed Ability	1. Compared to other people, I think that my ability about painting is excellent. 2. I know how to choose and purchase nice clothes for myself. 3. I think I can design a picture for T-shirts on my own, which satisfies me. 4. As to picking out nice clothes, I am an experienced buyer.
Perceived Difficulty	1. I think that it is time consuming to design this picture. 2. I don't have confident to design this picture. 3. For me, it is very hard to design this picture on this tool. 4. After saw this pictures, I think that it is hard to design my favorite pictures on this tool.
Appealingness Check	1. I think this picture looks very appealing.

Willingness to Co-Design	1. I would be willing to pay more than usual for a co-designed cloth. 2. I like to participate in designing my own cloth. 3. I view a co-design process as an exciting experience. 4. I would be very interested in using co-design to create my own unique clothing design.
Confidence to Co-Design	1. I am confident to design my favorite picture on the T-shirt. 2. I feel confident to learn how to design a satisfied picture. 3. I am sure that the work co-designed by myself would satisfy me. 4. I am able to design my favorite picture on the T-shirt.
Self-Congruity	1. Wearing this T-shirt in consistent with how I see myself. 2. This T-shirt reflects who I am. 3. The kind of person who typically wears this T-shirt is very much like me.

Measures of Satisfaction

After you have bought this T-shirt, you would feel:

very dissatisfied	1 2 3 4 5 6 7	very satisfied
very displeased	1 2 3 4 5 6 7	very pleased
very uncomfortable	1 2 3 4 5 6 7	very comfortable
very dislike	1 2 3 4 5 6 7	very like
very frustrated	1 2 3 4 5 6 7	very contented

Appendix 2. Chinese Questionnaire (with participation & an example)

各位先生小姐您好:

　　首先,非常感謝您抽空參與本次實驗,這是一份有關遊戲與繪畫的研究,對於您所提供的任何資料、訊息我們將絕對保密;而您的寶貴意見將會提供本研究極大的幫助以及貢獻。衷心感謝您的合作與支持,

敬祝

　　　　　　　　身體健康　　萬事如意

國立交通大學管理科學研究所

指導教授: 張 家 齊　　博士

研 究 生: 黃 以 江　　敬上

以下問題皆沒有標準答案,請您憑自己的感覺填答即可!

◎ 閱讀下列敘述後,請圈選您認為合適的數字,1 代表非常不同意該敘述,7 代表非常同意該敘述。

01. 跟其他人比較起來,我覺得自己在美術方面的能力是十分優越的。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

02. 我能夠明確的知道如何挑選以及購買一件好看的衣服。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

03. 我覺得我可以靠自己的能力,而不靠其他人的協助,設計出令我滿意的 T-shirt 圖樣。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

04. 在挑選好看的衣服方面,我是個有經驗的買家。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

◎ 我們是一家提供創意 T-shirt 的商店，每一位顧客都可以使用**我們的設計軟體**，

設計出自己想要的 T-shirt 圖樣；**左邊是某位設計者的作品**，可供您參考，接

下來請您動手設計出**您想要的圖樣**吧!

Instruction:

1. 把想要的線條直接**拖拉**至畫布上即可。

2. 可選擇 **scale up**(放大)、**scale down**(縮小)、rotate(旋轉)、flip(翻轉)。

3. 按 Start over 可重畫。

Δ設計完後請通知實驗人員

並請留下 E-mail 以參加抽獎

◎ **請您再看看左邊那位設計者的作品，針對他的作品**，請問您的看法是：

01. 我覺得要設計出他的作品要耗費很多時間。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

02. 我沒有信心設計出這個圖案。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

03. 對我來說，使用該工具設計出這個圖案十分困難。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

04. 看到他的作品，我覺得很難使用這個工具設計出自己想要的 T-shirt 圖案。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

05. 我覺得他設計的 T-shirt 圖案很好看。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

◎ **如果還有再一次機會，請問您對以下敘述的看法是?**

01. 相較於一般的衣服，我願意多付一些錢購買自己參與設計的衣服。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

02. 我喜歡參與設計自己的衣服。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

03. 我認為參與設計自己的衣服是一個令人興奮的經驗。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

04. 我對參與設計一件自己的獨特衣服十分感興趣。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

05. 我很有信心可以設計出自己想要的 T-shirt 圖案。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

06. 我有信心學會如何設計出想要的作品。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

07. 我相信自己設計出來的作品會令我滿意。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

08. 我可以設計出自己最喜歡的 T-shirt 圖案。

非常不同意		1	2	3	4	5	6	7		非常同意

◎ **接著看看您的作品，假設您設計的 T-shirt 已經製作完成**，想像一下，通常是哪種類型的人會喜歡穿那件 T-shirt？接著在以下畫線處寫下一個或一些詞彙來形容這一類型的人，例如：年輕的、有型的、酷、俗氣的、頹廢的、可愛的……等等

Write Here: _____

_____

針對您的作品，請說明你是否同意以下敘述：

01. 穿著這件 T-shirt 能夠符合我對自己的觀感。

非常不同意		1	2	3	4	5	6	7		非常同意

02. 這件 T-shirt 能夠反映平常我是怎麼樣的一個人。

非常不同意		1	2	3	4	5	6	7		非常同意

03. 跟我同一類型的人平常也會穿像這樣的 T-shirt。

非常不同意		1	2	3	4	5	6	7		非常同意

◎ **我願意花費 _____ 元，購買我自己設計的這件 T-shirt。**

◎ **假設您已經買下了這件自己設計的 T-shirt，** 總體來說，您對這件 T-shirt 的感覺會是：

非常不滿意的	1	2	3	4	5	6	7	非常滿意的
非常不愉快的	1	2	3	4	5	6	7	非常愉快的
非常不適合的	1	2	3	4	5	6	7	非常適合的
非常不喜歡的	1	2	3	4	5	6	7	非常喜歡的
非常失望的	1	2	3	4	5	6	7	非常滿足的

◎ 請問您的性別是？　　　　　　　　　　　　　□男　　□女

◎ 請問您是否為學生？　　　　　　　　　　　　□是　　□否

Chinese Questionnaire (without participation but with an example)

各位先生小姐您好:
    首先,非常感謝您抽空參與本次實驗,這是一份有關遊戲與繪畫的研究,對於您所提供的任何資料、訊息我們將絕對保密;而您的寶貴意見將會提供本研究極大的幫助以及貢獻。衷心感謝您的合作與支持,
敬祝

                身體健康   萬事如意

                            國立交通大學管理科學研究所
                            指導教授: 張 家 齊   博士
                            研 究 生: 黃 以 江   敬上

以下問題皆沒有標準答案,請您憑自己的感覺填答即可!

◎ 閱讀下列敘述後,請圈選您認為合適的數字,1 代表非常不同意該敘述,7 代

   表非常同意該敘述。

01. 跟其他人比較起來,我覺得自己在美術方面的能力是十分優越的。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

02. 我能夠明確的知道如何挑選以及購買一件好看的衣服。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

03. 我覺得我可以靠自己的能力,而不靠其他人的協助,設計出令我滿意的 T-shirt
    圖樣。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

04. 在挑選好看的衣服方面,我是個有經驗的買家。

| 非常不同意 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 非常同意 |

◎ 我們是一家提供創意 T-shirt 的商店，每一位顧客都可以使用**我們的設計軟體**，

設計出自己想要的 T-shirt 圖樣；**請您在身旁的電腦上試用看看！**

Instruction:

4. 把想要的線條直接**拖拉**至畫布上即可。

5. 可選擇 **scale up**(放大)、**scale down**(縮小)、rotate(旋轉)、flip(翻轉)。

6. 按 Start over 可重畫。

Δ設計完後請通知實驗人員

並請留下 E-mail 以參加抽獎

請先不要翻下一頁   nops

◎ <u>**請看螢幕中兩位不同作者的作品**</u>，請問您<u>**針對左邊的作品**</u>看法是:

01. 我覺得設計出左邊這個圖案要耗費很多時間。

非常不同意		1	2	3	4	5	6	7		非常同意

02. 我沒有信心設計出左邊這個圖案。

非常不同意		1	2	3	4	5	6	7		非常同意

03. 對我來說，設計出這個圖案十分困難。

非常不同意		1	2	3	4	5	6	7		非常同意

04. 看到左邊的作品，我覺得很難使用這個工具設計出自己想要的 T-shirt 圖案。

非常不同意		1	2	3	4	5	6	7		非常同意

05. 我覺得左邊這個 T-shirt 圖案很好看。

非常不同意		1	2	3	4	5	6	7		非常同意

◎ <u>**再來看看右邊的作品，假設 T-shirt 已經製作完成**</u>，想像一下，通常是哪種

類型的人會喜歡穿那件 T-shirt？接著在以下畫線處寫下一個或一些詞彙來形容這

一類型的人，例如：年輕的、有型的、酷、俗氣的、頹廢的、可愛的……等等

Write Here: _____

_____

<u>**針對右邊的作品**</u>，請說明你是否同意以下敘述：

01. 穿著這件 T-shirt 能夠符合我對自己的觀感。

非常不同意		1	2	3	4	5	6	7		非常同意

02. 這件 T-shirt 能夠反映平常我是怎麼樣的一個人。

非常不同意		1	2	3	4	5	6	7		非常同意

03. 跟我同一類型的人平常也會穿像這樣的 T-shirt。

非常不同意		1	2	3	4	5	6	7		非常同意

◎ **我願意花費 _____ 元，購買<u>右邊</u>這件 T-shirt。**

◎ <u>假設您已經買下了右邊這件 T-shirt</u>， 總體來說，您對這件

　　 T-shirt 的感覺會是：

非常不滿意的	1	2	3	4	5	6	7	非常滿意的
非常不愉快的	1	2	3	4	5	6	7	非常愉快的
非常不適合的	1	2	3	4	5	6	7	非常適合的
非常不喜歡的	1	2	3	4	5	6	7	非常喜歡的
非常失望的	1	2	3	4	5	6	7	非常滿足的

◎ 請問您的性別是？　　　　　　　　　　□男　　□女

◎ 請問您是否為學生？　　　　　　　　　□是　　□否

Appendix 3. Experimental Tools

What tool respondents used to design their pictures in this study was as following.
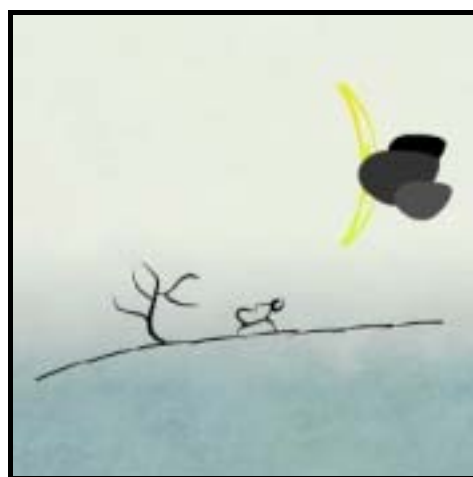
Figure 6 Screenshot of Mr. Picassohead

Figure 7 Selected Pictures for Manipulation of Difficulty

| **Hard** | **Easy** |