

Creating the Optimal Product Business Management System for Social and Enterprise Development

Shih-chung Liao*

Abstract

Purpose - This paper examines product design management, the current design focus of which has shifted to the need to produce innovation applications that can effectively respond to the market's consumption changes in a timely manner.

Research design, data, methodology - This study discusses several methodologies that are widely used in experimental processes, such as fuzzy theory, multi-criteria decision-making theory, and managing decision making. The designers will better understand their customers by applying these methodologies. This study examines how the current trend in product innovation design observes customer needs, controls innovation, and stimulates design ability.

Results - This paper takes innovative telephone design as an experimental case to investigate how to create a product using market-oriented and customized management concepts and creative design abilities.

Conclusions - If accompanied by an innovative product value chain, a product can further the development of enterprise management, now the main element of every developed country's social and economic development.

Keywords : Fuzzy Theory, Innovation Design, A Decision Making Technology System, Multi Criteria Decision Making (MCDM), Product Design Managing.

JEL classifications : G11, G33, M41.

1. Introduction

When facing this competitive era on product and globalization, it is important to create new designs. The new designs may break the stereotype of traditional designs. This situation leads the designing team into innovation competition. On the other hand, the enterprises now face many management dilemmas and must take the team into internationalization, which means the application of creative product design to produce the varieties, functions, appearance, user, market compartment, price diversity, etc. in order to satisfy the consumers'

needs.

In the past, the key of successful product design relies on the accumulation of experience and comments of the users for years to cultivate the capability of the product designers. Whereas this method must be changed due to the current trend is prone to demand-oriented of customers. Research on the usability improvement is important and includes the style and management of the product, the sense and sensibility of designers, the trend of the product market, the modification of traditional management methods, the prediction on product fashion, the decision on creative product strategy, and the decision of the best policy. These are the critical factors which can produce the value of the products to satisfy the convenience of customers. The two ways to predict the future value include period parameters and the attribution. Basically, the process from taking the mode into practice to reveal the good fortune and convenience can precisely predict the technique development in the future, demand, and service time (Tseng, 2002).

In order to help enterprises today dealing with multi purposes in the market, the modification of organization in product strategy is needed. The product design not only requires expansion on dimensions, but also the extent in different development levels. Pursuit of high productivity is a crucial step for an enterprise. When company are sharpening their focus and looking for greater value, for example by investing in start-ups later when they have a stronger track record than used to be acceptable. In the developing world, solutions to local or national problems are increasingly relevant to international markets (Collins, 2010). Whether the enterprise can be sustainable depends on the transformation of innovative product design which plays an important role in this period. However, due to the limit on time and resources, the enterpriser cannot completely consider the problems of decision making.

The research model on traditional product design process is based on an optimization mechanism of choice. In substance, the calculation is based on a sequence of product design establishment. However, the strategy makers cannot understand the essence of the problem while facing a structural strategy problem, whether or not the optimization could calculate the result of product design. Whereas multi criteria decision making (MCDM) analyses tend to focus on the arrangement and distribution of purposes, especially under the situation that few coherent strategies were made (Carlos, 2004).

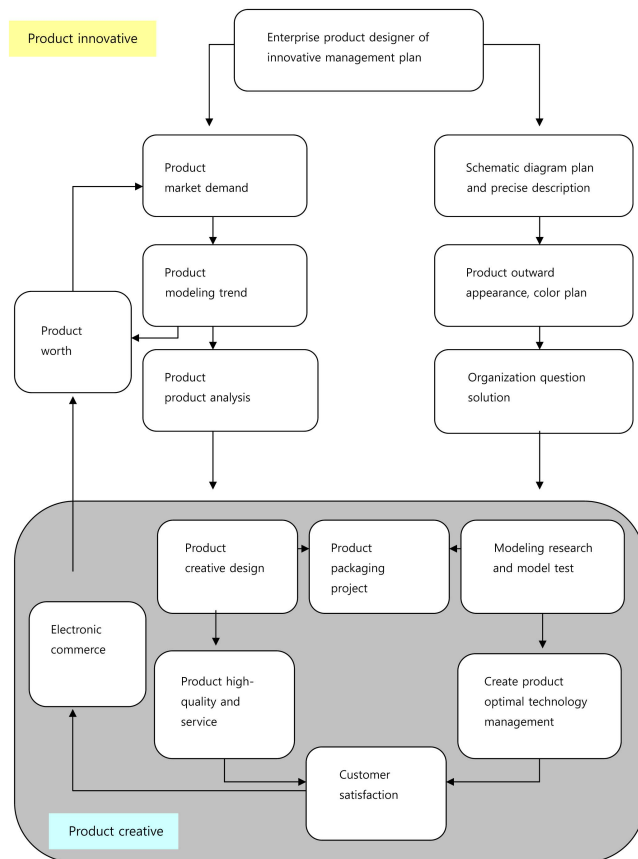
Previous researchers have developed various approaches to address this problem. For example, in the recent years, self learning and material exploring have become two of effective studying tools. While research in innovation management has provided many insights into

* Corresponding author, Department of Visual Communication Design, College of Planning and Design, Technology of Taoyuan Innovation Institute, Taoyuan, Taiwan 320, E-mail: liao1@tiit.edu.tw

specific aspects of innovation, the encompassing problems confronting general managers, especially managers of small and medium-size firms, have been overlooked in the development of innovation management tools (Igartua et al., 2010).

This study commences by conducting a product styling task in which 12 test subjects are asked to concretize their aspirations. As each test subject describes the telephone, an innovative designer progressively generates the corresponding form. Then the use of the various expression modes at different product band and modes of the styling process are analyzed. The present results provide an innovative foundation for the future development of an investigation approach for product design.

Next, according to analytical hierarchy process, this study set up a product decision making system, Fuzzy set theory, and the multi criteria decision making analysis in order to produce the best quality and best service for consumers, to establish the marketing predominance in the market, and to create the best benefit in product, for detail in Figure 1.



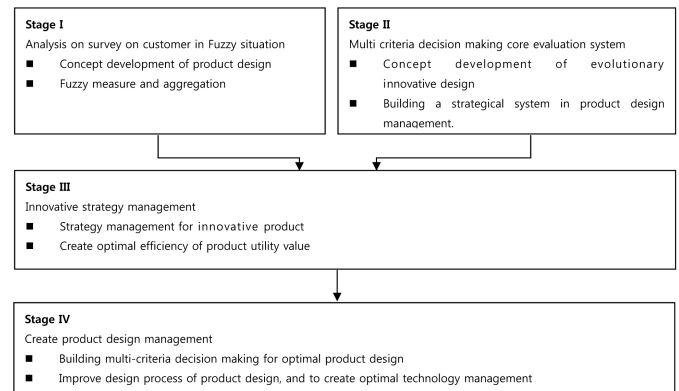
<Figure1> A decision making technology system

The rest of this paper is organized as follows. The review of strategic proposed method is discussed in section 2. Case studies 1: Data analysis and results in section 3. Case studies 2: Product decision making system in section 4. Section 5 presents a discussion of implementation and conclusions.

This research obtains valid questionnaires to be the research target

samples. The researchers mainly focus on evaluating the preference of values among users. So the goal is to create a feasible progress chart in the shortest time to deal with problems encountered.

Because the model of innovative product design is a totally new challenge for enterprises, the difficulty and risk of failure are much higher than those long period routine tasks. Learning the research method of creative product designing can be beneficial to the design control of new products to complete goals successfully. Divide the research methods into four stages in this article in Figure 2.



<Figure 2> Create product design stages for enterprise economical development

2. Research method

2.1. Stage I: analysis on survey on customer in Fuzzy situation

2.1.1. Concept development of product design

Adequate information and data are needed while strategy maker's face the problems during the procedure of product design. However, the data or information may contain multi-uncertainty or Fuzzy situations hence, they have to adapt Fuzzy theory and MCDM theory analysis, that is, one kind of programs and techniques of designing plan to solve the problems in product designing. Therefore, the enterprise can be recreated in the future.

The main point of the research of Fuzzy theory is that we can possibly obtain intelligent brief system within access and set a matrix. By the result, the model can apply the linear and non-linear recursive methods during the period. In fact, the problems can be solved with using the well-formed concept, knowledge, information, and technique in designing. These methods depend on good knowledge models and expansion ability, which focus on limited, but effective sustainable learning (Hu et al., 2003).

2.1.2. Fuzzy measure and aggregation

The purpose of Fuzzy theory is to assist strategy makers in realizing the product quality for consumers' demands including safety, usability, price, function, material, main faculty, and etc., and also in simplifying the product. In addition, the product designers can know

the demand model of consumers with using various design techniques and methodologies to complete the synthetic drilled by analyzing the appearance and color in nowadays in various products. Therefore the designers can solve the existing problems for product users; moreover, these processes can promote the design of product creation.

Mainly, this study roughly judges the demands of the products by using the methods of product design and production, and then analyzes the purpose of demands on the first hand. Here are the processes of the execution:

- (1) Calculate the evaluation of each demand and give weight according to its importance.
- (2) Calculate the evaluation of design demands, and then make Fuzzy calculation of weight according to customer evaluation, afterward, to establish the demand and the Fuzzy situation of design.
- (3) Give unification of the result values above.
- (4) Calculate the weight and priority of the related factors.

2.2. Stage II: multi criteria decision making core evaluation system

2.2.1. Concept development of evolutionary innovative design

During the process of development of evolutionary innovative in designing high quality products, the designers must understand the oral-required qualities of demands and take those elements into consideration for the experimental samples. These elements include quality, usability, material, price, battery, and etc. The strategy makers enable

to evaluate product designs by calculating these elements.

In the beginning, researching and creating a new product are in a Fuzzy field. To make a better plan, the designer mainly focuses on multi-purpose achievements. The establishment of multi purposes can be suitable to the demand of customers in order to improve product designs in the best situation through several steps. First, it makes regular standards and systemic ally turns it into the features according to demands. Then, let the features go to every part of functions and parts of the product. Third, it makes a process of production.

2.2.2. Building product design of decision support systems

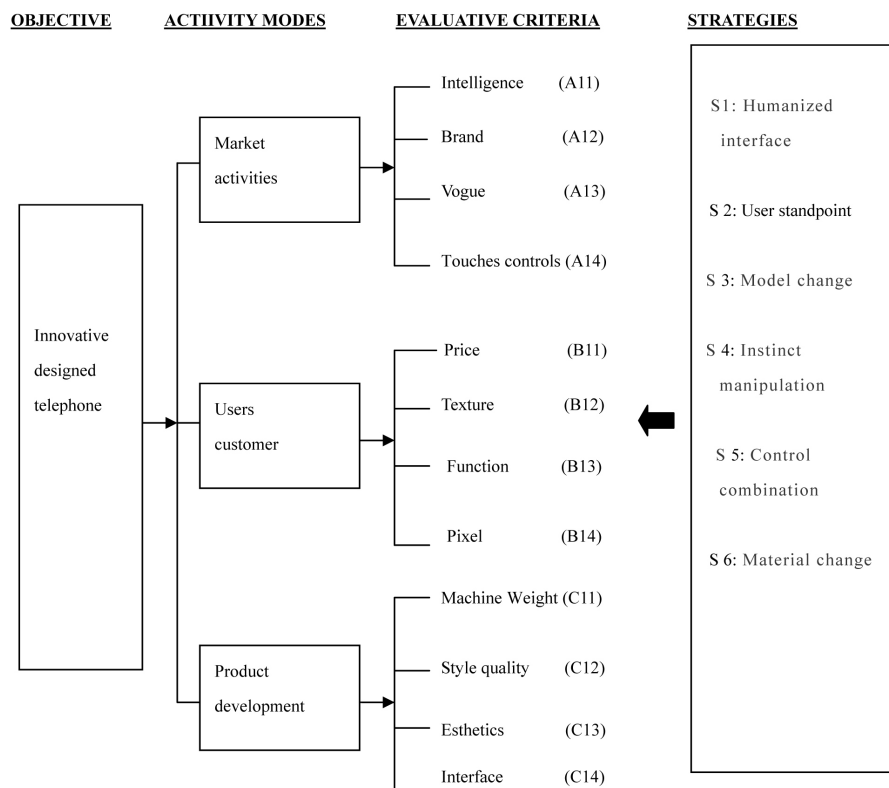
A hierarchy system for innovative designed telephone research focuses on a modeling approach and a set of mathematical tools that were derived from research on intelligence systems, namely, modeling. The results indicate that Fuzzy system models generally perform likely or better than both linear and nonlinear regression methods in terms of model fit.

Evaluation methods not only are taken as a solution to the traditional product design, but also to modify the efficiency of the design itself. Therefore, strategy makers can get the division by dividing the available questionnaire replies according to their features, as Figure 3.

2.3. Stage III: innovative strategy management

2.3.1. Strategy management for innovative product

After collecting the questionnaires, the researchers are going to quantify the product designing on the beginning of the experiment.



<Figure 3> Building product design of decision support systems

We use Hierarchical Clustering to design a series of virtual creative products and services. Comparing with similar desire and demand, we have to divide various customers into groups. We can realize the demand intensity and propose so the overall product makes it convenient and practical to use for customers. Moreover, we can realize the demand of customers and achieve the required service.

The rankings of innovative designs will take the design as a priority in the first step of product design. The success of the product sale in the market mainly depends on its design. Meanwhile, the product design influences a lot in the quality and cost and development processes.

2.3.2. Create optimal efficiency of product utility value

The trend of humanized facility changes the interface. In the past, keyboard and mouse are mostly required as the interface between human beings and computers. By the improvement of technological products, friendly human computer interaction popularizes the innovative design application, and leads the prosperity in the technological industry. And humanized facility will be taken into consideration in the designing.

The application of innovative design can stimulate the product design. Therefore, how to efficiently apply the innovative interface, to explore new usages, and to facilitate the users to use the interface intuitively have become the mainstream of design. An empirical case of R&D innovation performance will be illustrated to show that the rough sets model and the flow network graph are useful and efficient tools for building R&D innovation decision rules and providing predictions (Wang et al., 2010).

2.4. Stage IV: create product optimal technology management

2.4.1. Building multi criteria decision making for optimal product design

Multi criteria decision making involves determining the optimal alternative among multiple, conflicting, and interactive criteria. Many methods are based on multiple attribute utility theory.

This study shows that the results are identical. It also shows that the satisfaction of human computer interaction is the highest after the measurement, representing human computer interaction is more beneficial than others. For example, goal programming is an analytical approach devised to address decision making problems where targets have been assigned to all the attributes and where the decision maker is interested in minimizing the non-achievement of the corresponding goals (Carlos, 2004).

2.4.2. Improve product design process, and to create optimal efficiency

Techniques for machine learning have been extensively studied in recent years as effective tools in data mining. Although there have been several approaches to machine learning, we focus on the mathematical programming approaches in this paper. The environment of

decision making changes over time. Therefore, we have to revise knowledge obtained from data mining according to the change of environment. To this end, additional learning becomes an important task in machine teaching (Hirota et al., 2005).

3. Case studies 1: data analysis and result

3.1. Problem description

Analyze the demand of telephones according to Fuzzy situation. With the technological design, the product must be friendly designed in its human computer interaction. It will be more popular in the screen of analysis. Innovative design telephone products can strongly accelerate the product design to new trend.

The esthetic value is highly praised in the innovative designed. With the combination of wisdom, fashion, and various materials, it can definitely get out of the stereotype of traditional ones to create a classic one made in high quality and humanized. Form inferring the innovative designed phone, we can list the rankings as Intelligence, Brand, Vogue, Touches controls, Price, Texture, Function, Pixel, Weight, Style, Esthetics, Interface, and etc.

The analysis task comprised of the following product occurrence problems:

- (1) Product brand feature: The innovative thinking of product design value chain focuses on the expansion of the maximum of service value. To provide the best service, designers need to realize the demand by the end-user's standpoints, solutions, diversities, and benefits. And we can find the correct solution to study the diversity of the service of the product.
- (2) Product mechanism of evolution: With MCDM theory, it is mainly confirmed that the most appropriate solution of innovative designed telephones that have differences between function, appearance, user, market segmentation, and price. Then product designers will adequately adapt the feature of groups of multi-criteria to plan the designs properly as well as to make it the marketing strategy, hoping to improve the benefits.
- (3) Design of interface and elements: The advantages of innovative designed telephone come from the control of interface design, reduction of production cost, and industry clustering. Those advantages are beneficial to the development of newly consumed products.
- (4) Analytical hierarchy process for evaluating criteria: In order to deal with the highly competitive era of today's product, strategy makers can choose the best solution policy among the various choices by the reliability of analytic hierarchy process.
- (5) The decision system of more than targets: Comprehended above, the detection applies many attribute rating techniques to gain homologous results through the effect valuation dimensions analysis. The evaluating machine disclosed that the interacting benefit and satisfaction with the person are a high result to represent values of a person machine interaction to benefit more than other factors like community decision.

- (6) Multi criteria decision making: The MCDM problems with dependence and feedback effects are difficult for the decision maker. Although have been widely used to deal with this problem, some shortcomings should overcome for proving the satisfaction solution.
- (7) The result of the optimal quantification: Different factors may influence the satisfaction in different industries like tourism, food industry, general merchandise industry, retail business, manufacturing industry, and etc. Appropriate strategies are required to improve consumer's satisfaction.
- (8) Establish product design model: While setting an object in designing a model, make sure what kind of style pleases the customer most. It plays the most important role in designing. Then combine with the style and composition to make innovative creation and to reshape the overall design fashion. For example, manipulating the various changes of product in 3 dimensions shows a beautiful style and then produces the model drawing which is suitable to customer demands.

3.2. Analysis on survey on customer in four stages objective situation

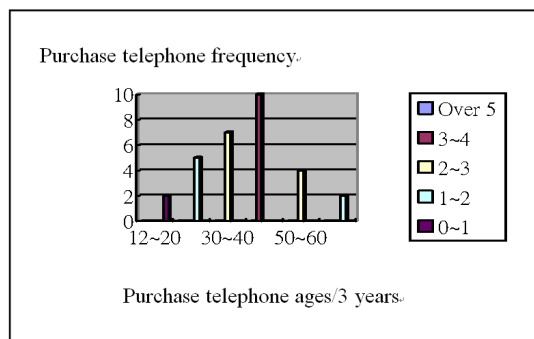
According to Figure 2, the analysis task comprised of four stages:

- (1) Analysis on survey on customer in Fuzzy situation.
- (2) Multi criteria decision making core evaluation system.
- (3) Innovative strategy management.
- (4) Create product design management.

3.2.1. Stage 1: analysis on survey on customer in Fuzzy situation

3.2.1.1. Establishing the frequency distribution and modes of the number of descriptions employed to complete the task

It is observed that the least number of descriptions used is 60. The majority of the subjects were utilized between 60 descriptions. In usage of 60 descriptions, the choice of purchasing telephones was made most frequently for telephone ages/3 years, as Figure 4.

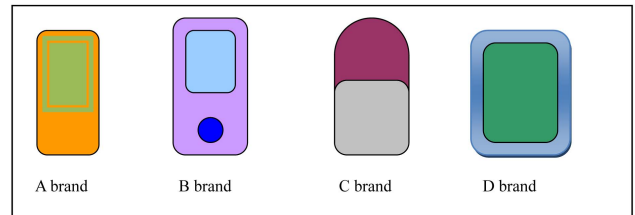


<Figure 4> Frequency distribution and purchase telephone ages/3 years

3.2.1.2. Expression telephone activity modes

Regarding to 60 descriptions, Figure 4 displays that the frequency distribution of descriptions are listed as purchases telephone brands,

features in Market activities, Users' customs, Product developments, and expression support numbers. For example, innovative designed telephone screen and the features of innovative designed telephone play two of critical factors in the experimental outcome. This shows that the solution lies in the combination of feature design brand, A, B, C, and D in Figure 5.



<Figure 5> Expression telephone activity brands

The outstanding performance of innovative designed telephone brand in the competitive market is accomplished within the promising R&D and design according to the market.

3.2.1.3. Telephone brand

The outstanding performance of innovative designed telephone brand in the competitive market is accomplished within the promising R&D and design according to the market and customer demands. Therefore, it is important to specifically realize the demand of customers according to their various demands, and to satisfy individual demands among all sorts of consumers. The 60 descriptions were mingled randomly and then provided to each expert.

The combination of designed in innovative designed telephone brand (A) gets the optimal efficiency in product design. It contains a completely profound function and system.

3.2.1.4. Determining of evaluating criteria of designed telephone

The researchers set up telephone brand decision system by decomposing the problem into a hierarchy of interrelated elements Table 1.

<Table 1> Telephone brand and feature

Telephone brand and feature			
Brand	Market activities	Users customer	Product development
A	34	32	30
B	13	10	11
C	2	1	1
E	6	6	7

These 60 descriptions were evaluating criteria of designed telephone provided to each element, as Table 2.

<Table 2> Innovative designed telephone for evaluating criteria

Innovative designed telephone for evaluating criteria		
Elements	Frequency	Percentage
Market activities	6	10%
Users customer	23	44%
Product development	24	46%

To combine of designed feature in innovative designed telephone for evaluating criteria Product development, 46% of the 60 descriptions reach the optimal evaluating criteria frequency in product design.

3.2.2. Stage 2: multi criteria decision making core evaluation system

3.2.2.1. Evaluating criteria of designed telephone

This stage generates input telephone data consisting of pair wise comparative judge of decision elements. The plan tested individually on Mode 1 Market activities: Intelligence A(11), Brand A(12), Vogue A(13), Touches controls A(14), Mode 2 Users customer: Price B(11), Texture B(12), Function B(13), Pixel B(14), Mode 3 product development: Weight C(11), Style C(12), Esthetics C(13), Interface C(14), and etc, as Table3.

<Table 3> Evaluating criteria of designed telephone

Evaluating criteria of users customer				
Evaluating criteria elements	20~30Ages	30~40Ages	40~50 Ages	Mean
1. Market activities	0.8	0.7	1.0	0.83
Intelligence	0.9	0.9	0.7	0.83
Brand	1.0	0.8	0.6	0.8
Vogue	0.7	0.7	0.7	0.7
Touches controls				
2. Users customer	0.9	1.0	0.8	0.9
Price	0.8	0.9	0.8	0.83
Texture	1.0	0.8	0.7	0.83
Animation Function	0.5	1.0	0.6	0.7
Pixel				
3. Product development				
Machine Weight	0.4	0.4	0.5	0.43
Style quality	0.8	1.0	0.9	0.9
Interface	0.7	0.8	0.6	0.7
Total	9.1	9.8	8.5	0.76

To combine of designed feature in evaluating criteria of designed telephone for evaluating criteria 30~40 ages, 9.8 from all descriptions get the optimal evaluating criteria of users customer in product design.

3.2.2.2. Calculating synthetic utilities

(1) Determine the aggregating of the decision elements to arrive at a set of ratings for the alternatives and strategies.

(2) Show the overall number of descriptions supplied in each modes and customs like depending on mode product innovative development gets the optimal purchase in product design.

(3) The purchase telephone design of interface and elements

First of all, horizontal line represents that the battery is full of electronic energy, and the user hasn't made a call. Second, as the communication frequency grows, the curve of drop down expresses in battery consumption. Three represents that under the consumption, the innovative designed telephone mode product developments can extend its using time.

Due to the variety of telephones, the designer adapts the innovative design process to get the overall information through the interface and elements. This will be used to construct the function structure model, and to study the virtual construction to make it into practice.

(4) The decision system of more than targets in purchase product

Depending on 60 descriptions, the discrimination is 6 customer groups, and mode 4 product developments: Machine weight, Style quality, Esthetics, and Interface. Using the decision system of more than targets decides the preference of product. The first group emphasizes interactive benefit; the second emphasizes quality, and the third emphasizes functions. Their preferences are style quality and esthetics. So a chart is made to show the group preferences in Table 4.

<Table 4> Consumers preference of products

Group user hobby	User values
First group mode	Machine weight
Second group mode	Style quality
Third group mode	Price
Four group mode	Function

(5) Create product optimal technology management

Calculating data from 60 descriptions, 6 customer groups demonstrate five main means which are 0.06, 0.15, 0.21, and 0.58 as their preference values. In addition, Machine weight is 0.06, Style quality 0.15, Price 0.21, and Function 0.58 in Table 5.

<Table 5> Number of descriptions supplied in each customer group

Customer groups							
Third group mode	1	2	3	4	5	6	Mean
Machine weight	0.08	0.05	0.07	0.05	0.05	0.06	0.06
Style quality	0.16	0.14	0.15	0.14	0.15	0.14	0.15
Price	0.21	0.18	0.24	0.21	0.19	0.23	0.21
Function	0.54	0.59	0.63	0.58	0.57	0.57	0.58

In Table 5, in order to get the final question point and then to solve the problem in Function, the researchers design the research method to achieve customer purchase product satisfaction.

3.2.3. Stage 3: innovative strategy management

According to Table 5, using data from 60 descriptions, this analysis discloses on the elements of innovative designed telephones: Mode 1 Market activities: Intelligence A(11), Brand A(12), Vogue A(13), Touches controls A(14), Mode 2 User's custom: Price B(11), Texture B(12), Function B(13), Pixel B(14), Mode 3 Product innovative development: Weight C(11), Style C(12), Esthetics C(13), and Interface C(14).

Depending on the development of telephone industry, the necessity of low cost, high flexibility in the superiority of production, and the demand of humanized product should be controlled to influence the concept of design and the development of crucial modules enormously, as Table 6.

<Table 6> Establish the user's telephone of performance matrix

Evaluation Strategy	Use's telephone of performance matrix											
	A11	A12	A13	A14	B11	B12	B13	B14	C11	C12	C13	C14
S1: Humanized Interface	(0.8,0.6)	(0.8,0.7)	(0.7,0.7)	(0.8,0.8)	(0.9,0.9)	(0.6,0.6)	(0.9,0.9)	(0.6,0.6)	(0.5,0.5)	(0.9,0.9)	(0.8,0.8)	(0.7,0.7)
S 2: User standpoint	(0.8,0.8)	(0.7,0.9)	(0.8,0.8)	(0.8,0.8)	(1,0.9)	(0.5,0.6)	(0.8,0.8)	(0.7,0.7)	(0.6,0.7)	(0.9, 0.9)	(0.7,0.7)	(0.8,0.8)
S 3: Model change	(0.6,0.6)	(0.6,0.9)	(0.8,0.8)	(0.7,0.7)	(0.9,0.9)	(0.7,0.8)	(0.9,1)	(0.6,0.6)	(0.7,0.7)	(1,1)	(0.8,0.8)	(0.6,0.6)
S 4:Instinct Manipulation	(0.8,0.7)	(0.8,0.7)	(0.6,0.7)	(0.7,0.7)	(0.8,0.8)	(0.8,0.7)	(0.8,0.9)	(0.8,0.7)	(0.7,0.7)	(0.9,0.8)	(0.7,0.7)	(0.7,0.7)
S 5: Control combination	(0.8,0.5)	(0.7,0.8)	(0.5,0.6)	(0.8,0.7)	(0.9,0.9)	(0.7,0.7)	(1,0.9)	(0.7,0.7)	(0.7,0.8)	(0.9,0.9)	(0.8,0.9)	(0.7,0.6)
S 6:Material change	(0.7,0.8)	(0.8,0.6)	(0.5,0.5)	(0.7,0.7)	(0.9,0.9)	(0.7,0.7)	(0.9,0.9)	(0.8,0.8)	(0.9,0.8)	(0.9 0.8)	(0.7,0.5)	(0.7,0.7)

The results in Table 6 establish the user's telephone of performance matrix. Fuzzy sets are adapted in the strategy of business administration. Take telephones for an example, there are creative designs to choose in the establishment of production, all of which point to the division in humanized interface, user standpoint, model change, instinct manipulation, control combination, material change.

ities: Intelligence A (11)4.6, Brand A (12)5, Mode 2 User's custom: Price B (11)5.4, Function B (13)5.4, and Mode 3 Product innovative development: Style C (12)5.5 and Esthetics C (13)4.6, if the criteria are substitutive and independent, as Figure 6.

<Table 7> Calculating telephone synthetic utilities

Evaluation Strategy	Use's telephone of performance matrix												Mean
	A11	A12	A13	A14	B11	B12	B13	B14	C11	C12	C13	C14	
S1: Humanized Interface	0.8	0.8	0.7	0.8	0.9	0.6	0.9	0.6	0.5	0.9	0.8	0.7	0.7
S 2: User standpoint	0.8	0.9	0.8	0.8	1	0.6	0.8	0.7	0.6	0.9	0.7	0.8	0.8
S 3: Model change	0.6	0.9	0.8	0.7	0.9	0.8	0.9	0.6	0.7	1	0.8	0.6	0.77
S 4:Instinct Manipulation	0.8	0.8	0.7	0.7	0.8	0.8	0.9	0.8	0.7	0.9	0.7	0.7	0.78
S 5: Control combination	0.8	0.8	0.6	0.8	0.9	0.7	1	0.7	0.8	0.9	0.9	0.7	0.8
S 6:Material change	0.8	0.8	0.5	0.7	0.9	0.7	0.9	0.8	0.9	0.9	0.7	0.7	0.77
Total	4.6	5.0	4.1	4.5	5.4	4.2	5.4	4.2	4.2	5.5	4.6	4.2	4.62

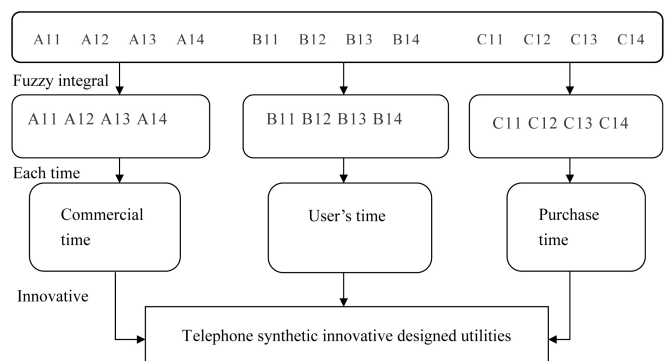
Hence, according to the criteria quantification, it chooses the innovative plan as the optimal plan. It is optimal production. Considering the elements of price, benefit, and usage, it has more chances to choose the most appropriate plan. Therefore, in the actual design process, this study adapts the membership functions in Fuzzy Theory for searching the relevance between each feature and obtains the best result in quantification, as Table7.

In Table7, in order to calculate telephone synthetic utilities and then solve the problem in evaluation strategy, the researchers design to achieve telephone values of criteria.

3.2.4. Stage 4: create optimal product design management

According to Table 7, calculating telephone synthetic utilities results, Fuzzy synthetic utilities to innovative product design, and telephone values strategies, the strategy establishes good collecting telephone values of criteria. This is the best strategy when telephone customer and enterprise would like to engage in Mode 1 Market activ

Telephone factor analysis



<Figure 6> Result of creative optimal product design management

3.3. Case studie 2: building a product design for optimal technology management

According to Figure 3, the product design model is adapted for

stimulating the proper solution to satisfy consumers with various points of views. However, multi decision making theory would be widely adapted in the long term, uncertain environment. With this strategy, the decision maker can realize the optimal mode of the solutions to problems.

So the designer must realize and analyze the features of product before making design drawing, including striking a balance between the relationship of cost and user satisfaction, which is highly emphasized in this research.

3.3.1. Activity modes

According to the telephone industry market and the coming Innovative management trend, the competition in the innovative telephone market will be for sure in the future. This activity mode include product design position and market strategy, product management, creation of R&D value, design of organization structure of R&D, performance management and development mechanism. So the decision maker must set the industry goal and strategy to reflect market competition.

3.3.2. Evaluative electronic commerce

Through using 60 descriptions and data from the user questionnaire survey form, in order to analyze innovative designed telephone, the product market can be divided into Market activities: value chain (A1), wise management (A2), product quality (A3), and research & development (A4); for User's custom: product management (B1), customized service (B2), marketing (B3); and for Product innovative development: R&D structure technique (C1), service quality (C2), management model (C3), and market environment (C4). Telephone enterprise management ranks into 5 points. Which include: product scarce for 1 point, product difficulty in imitation for 2 points, product not substitution for 3 points, and product value for 4 points, And the result reveals that product not substitution and product value are optimal in innovative designed telephone, as Table 8.

<Table 8> Results of innovative product designs for electronic commerce

Innovative product designs for electronic commerce											
Market activities (A1~A4)				User's custom (B1~B3)			Innovative development: (C1~C4)				Total
Item	A1	A2	A3	A4	B1	B2	B3	C1	C2	C3	
Product scarce	4	0	0	0	0	4	4	4	0	4	0
Product difficulty in imitation	18	6	9	6	54	0	9	18	45	9	186
Product not substitution	25	45	35	30	50	40	30	15	50	30	365
Product value	48	76	80	88	72	80	76	76	60	76	828
Sum	95	127	124	124	176	124	119	113	155	119	1399

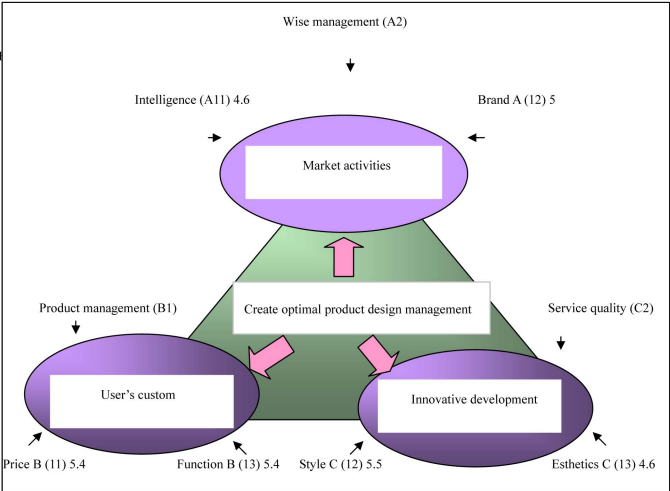
The combination of Innovative strategy management of designed telephone for Market activities: wise management (A2), User's cus-

tom: Product management (B1) and Product innovative development: Service quality (C2) gets the optimal innovative product designed management in design.

In Table 8 Innovative product designed technology management product not substitution and product value get the highest grades in the sum up. The result can be applied to realize the category of innovative management.

3.3.3. Result chart of create optimal product design management

Create optimal product design management, according to Table 7 and 8, the evaluation of products requires the intent combination of design techniques and user's, complete understanding of industry dynamic, application of management of innovative designed telephone management to users, integration of the interior and exterior resource, and establishment of organization construction. Therefore, it is necessary to create optimal product and customer value during enterprise transformation, as Figure7.



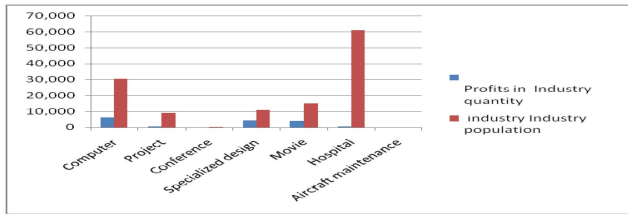
<Figure 7> Create optimal product design management

3.3.4. A decision making technology system approach for create optimal product design management in Taiwan industries

In Taiwan industries, it is constantly broadening the range of devices it offers- introducing devices to support specific applications and new form factors that meet the increasingly diverse needs of its customers and partners. And product portfolio offers easy-to-use solutions that embrace the full range of mobile multimedia resources, wireless anytime and Internet on the go.

It has invested in a strong R&D team accounting for 25% of the total headcount and a World-class high-volume manufacturing facility, both based in Taiwan industries.

In Taiwan (2006), industry and commercial statistical reports, decision support systems and electronic commerce is specialized design, as Figure8 and Table 9.



(Unit: new Taiwan dollar and hundred million yuan)

<Figure 8> A decision making technology system approach for create optimal product design management in Taiwan industries

<Table 9> A decision making technology system approach for create optimal product design management in Taiwan industries

(Unit: new Taiwan dollar and hundred million yuan)

Profits in industry		
	Industry quantity	Industry population
Service	4,050	15,093
Computer	6,288	30,476
Project	645	9,030
Conference	104	353
Specialized design	4,385	10,792
Movie	4,119	14,985
Hospital	535	61,061
Aircraft maintenance	40	-
Total	20,165	141,790

4. Discussion

As discussed, with the change of consumer's usage, the design trend of innovative designed telephones changes as well. Hence, the newly touch screen technologies have shown up. In the present study, we wish to improve the human-computer interaction benefit from the innovative screen. Therefore, how to explore the potential function demand of consumers providing innovative solutions and integrate the systems has become the challenge of designers.

In Figure 3, strategical system in innovative designed telephone, discusses the confirmation of demand items first by the method of evolution of innovative designed telephone, including making the demand items of users, collecting the demand widely, selecting the demand items, categorizing the demand item, and etc. Depending on these procedures, this study successfully creates the design value of production through technological innovation and creation of competitive advantages in strategy. And then the researchers observed the customer demands and propose the solution. Meanwhile, this study also applied diversity analysis to provide optimized technology management by initiation of product technology management and value.

In Figure 5, innovative telephone synthetic innovative measurements had shown telephone values of Fuzzy performance score with respect to criteria. This study explains that why the evolution of innovative designed telephone becomes the highest amongst the satisfaction of consumers. Known that the priority is the price and the second is the function.

In Table 4, the preference of product consumers has shown the subject used at least four expression modes through deep analysis to understand the crucial customer demand of innovative telephone. Then with the relative analysis of combination of exterior demand and interior quality production, the key and imply the variables were controlled to improve the quality to these crucial points, like web phone, which has been highly emphasized in its vocal quality and delicate simple style.

Therefore, in Figure 6 and 7, the research of innovative design telephone is in Fuzzy field in the beginning. MCDM system is mainly applied in using strategy to make product design and in setting the product standard. First, we systematically transform customer demand into product feature, and then expand to every part, and to plan the production process, controlling the manage points in each stage. Hence the designer can be suitable to customer demand and can be promoted with the optimal product design, the future research program of the current group includes:

(1) Product innovation

New functions applied to innovative designed telephone will achieve the goal of innovation and provide appropriate product and service during the transformation. And it can help the enterprise to get rid of traditional cost and management dilemma.

(2) Product legitimacy

Let customs understand how an effective plan, relating to the product, has reasonable and control in costs. Moreover, how it helps the designer work in designs, models, and analyzes also how detailed plans assist enterprises in analyzing stroke in event. The first steps, to understand how adjustment applies in strategy, reducing loss riding the company.

(3) Product value

Style, color, content, and service quality are very important in the overall appearance. Hence, improving aesthetics in the view customer is efficient to promoting competitiveness of enterprise, which has been an ultimate goal of every enterprise.

(4) Product performance

The results of Figure 8, with relative product performance, market performance, and the performance among consumers, the enterprise has established the efficient and competitive strategy. The enterprise can understand the change in global market everywhere anytime through the performance of global customer satisfaction index, and to catch up with international in service level, and promote satisfaction and reinforce the competitiveness.

5. Conclusion

Due to the competitive product market, designers should consider the factors like function, appearance, market compartment, and price diversity, etc. to create diverse products that make various consumers satisfy. Accordingly, it is a great challenge for designers in this competitive environment. It is significant that how they analyze the market status and performance to draw up the product positioning and strategy for creating new product value. The designers also need to understand costumers' requirements.

With the change of consumer's usage, the design trend for innovative designed telephones changes as well. Hence, the newly technology has shown up. This present study expects to improve the telephone interaction benefit from the product innovation. Therefore, how to explore the potential function demand of consumers, that is, providing innovative solutions and integrating different systems, has become the challenge for designers.

A decision making system for industries technology management, uses product innovation technology, promotes the diversification, implements the phases of the proposed methods, builds a hierarchical system in innovative designed telephones, innovative telephone synthetic innovative measurements, product strategy, and rich product creation for customer needs, and raises production efficiency and elastic delivery opportunity. In digital product design industries development and in accordance with adapting environment vicissitude, the industry promotes the new plans from improving organization constructions and adopts the authority of labor division and the effectiveness of research results in order to accelerate to achieve the industrial pursuing operation objectives.

Taking the case study of innovative designed telephones, this study has adapted the quantification solution like Fuzzy theory, product optimal technology management, and product competition. Also, this study emphasizes customers' needs to solve the problems, to design the optimal solution, to create the diversity to competitors, and to pursue the max sum.

Since this is a theoretical study, its results cannot be applied directly in the fields of practical product design. However, in future studies, the results of the present study are expected to provide a useful foundation to develop practical tools for innovative designs in telephone forms. In the design process of innovative designed telephones, some problems still need to be solved. Hence, it is essential to create innovative values, to get out of the dilemma, and to promote the strategy of new development of enterprise. With the promising thinking of wise management and customized management, it is possible to promote enterprises by the creative ability through the process in the market, such as programming, marketing, exploring, and designing. Above all, value chain making becomes the most val-

uable factor in the design.

Hence, in the competition, it becomes significant to apply fashion aesthetics as technological innovation for successfully achieving the goal of the delicate and creative design. Lastly, it achieves the goal of users' satisfaction toward the products.

Received: January 20, 2013.

Revised: May 27, 2013.

Accepted: June 17, 2013.

References

- Carlos, R. (2004), "A general structure of achievement functions for a goal programming model", *European Journal of Operation Research*, 3(153), 675-686.
- Collins, L. (2010), "Recession Pushing Innovation in New Directions", *Research Technology Management*, 2 (52), 35-39.
- Collins, L. (2010), "Nokia to Give Away Ideas and Innovations", *Research Technology Management*, 5(52), 19-32.
- Hirotsuka, N., Yun, Y., Asada, T. & Yoon, M., (2005), "MOP/GP models for machine learning", *European Journal of Operation Research*, 3(166), 756-768.
- Hu, J., Tan, B., Shabanov, N., Crean, K.A., Martonchik, J.V., Diner, D.J., Knyazikhin, Y. & Myneni, R.B. (2003), "Performance of the MISR LAI and FPAR algorithm: a case study in Africa", *Remote Sensing of Environment*, 88, 324-340.
- Igartua, J. I., Garrigos, J. A. & Jose, H.O. (2010), "How Innovation Management Techniques Support an Open Innovation Strategy", *Research Technology Management*, 3(53), 41-52.
- Tseng, F.M. & Tzeng, G.H. (2002), "A Fuzzy seasonal ARIMA model for forecasting", *Fuzzy Sets and Systems*, 3(126), 367-376.
- Wang, C.H., Chin, Y.C. & Tzeng, G.H. (2010), "Mining the R&D innovation performance processes for high-tech firms based on rough set theory", *Technovation*, 7(30), 447-458.