# Linking Design, Marketing, and Innovation: Managing the Connection for Competitive Advantage

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**Abstract**

Marketing should closely coordinate with product innovation. Not only will an effective connection of the marketing activity and design trigger product innovation in enterprises, it is a key factor to the product success in the market place. In practice, how to process product design so as to reach the goal of marketing during the innovation procedure? In the past, enterprises did have some concrete actions but empirical studies regarding the correlation model between marketing strategy and design strategy or even between marketing strategy and innovation are rarely seen. In the study, the author first synthesized viewpoints from literature on marketing strategy, product innovation strategy, and design strategy. Then managers at marketing divisions and R&D departments of the Taiwanese consumer electronic industry were interviewed. The fitness of theoretical models and the observed data was then verified by Structural Equation Modeling (SEM). From the 265 effective questionnaires, a proper fitness was found for the correlation theoretical model of marketing strategy, product innovation strategy, and design strategy, and the observed data. In enterprises, marketing strategy will influence design strategy, and at the same time, the marketing strategy will also influence design strategy through innovation strategy. Among these three variables, innovation strategy serves as an independent variable and intervene variable to design strategy.

**Keywords:** Marketing strategy, Innovation strategy, Design strategy, Product design.

## 1. INTRODUCTION

Product design and marketing are closely related to each other (Roy and Bruce, 1984; Souder and Moenaert, 1992; Souder and Song, 1997; Zhang et al., 2007; Luchs and Swan, 2011). During the process for a new product to enter the market, marketing department should exchange information and interact with design department continuously (Petiot and Grognet, 2006; Conway, 2007; Paul and Martin, 2007). An effective connection of the marketing activity and design is what triggers the product innovation (Gupta and Wilemon, 1990; Sherman, et al., 2000). It is a popular concept that “a product can be closer to the market if design guides marketing” and that “enterprises sell not only products but also design”(Sara and Michael, 2008; Bloch, 2011); namely, a good design not only brings profits to the enterprise but also provides consumers with cognition to product and good value of the enterprise image (Olins, 1990).

Taiwan electronics products feature modern appearance and diversity in function, creating many famous global brands such as Acer, Asus, Benq, HTC (Figure 1), the labor division and cooperation in marketing and design. For R&D personnel and product designers in these enterprises, not only do they have to pay close attention to the challenges from the change in the market place and take immediate responses to the actions from competitors, but they also need to complete the new product development by subtle product design according to the innovation strategy in the enterprises (Hsieh et al., 2006; Tsai, 2006; Luchs and Swan, 2011).

Souder and Moenaert (1992) consider it calls for the integration of R&D and marketing sectors in a company to successfully apply techniques. From a study on the interaction between R&D and

marketing departments, Gupta and Wilemon (1990) point out that the product innovation of hi-tech industry depends on the close coordination of R&D and marketing divisions. As a result, Sherman et al. (2000) claim that the functional integration of R&D and marketing sectors is a key factor for product development. Many scholars consider the integration of product design procedure can promote the NPD performance in enterprises (Carlsson, 1991; Griffin and Hauser, 1996; Gupta et al., 1985; Ruekert and Walker, 1987; Pinto et al., 1993; Rusinko, 1997; Song et al., 1997; Olson, 1994; Durward et al., 1998; Lau et al., 2007).


**FIGURE 1:** Famous electronics products of Taiwan.

In addition, many researchers assert that design can be an important integral resource to enterprises, a key mechanism for new product integration in enterprises and an important serial loop in the whole value chain of enterprises (Baxter, 1995; Olins, 1990; Fujimoto, 1991; Bruce and Jevanker, 1998; Twigg, 1998; Ge and Wang, 2007; Aydin et al., 2007). From studies of Chang and Hsu (2004) and Hsu (2006), it has been found that in terms of product design there are some special strategies and measures in Taiwanese enterprises. However, empirical studies regarding the correlation of marketing and strategies, especially the cooperation mode of enterprises are not seen.

In this study, managers at the marketing department and R&D department of Taiwanese consumer electronic industry are interviewed. The fitness of the correlation model and data observed was first verified. Then the influences marketing strategy of enterprises has on product innovation and design were analyzed. At last, the effects of marketing strategy on innovation strategy were examined to see whether the design strategies of products are influenced by marketing strategy.

## 2. LITERATURE REVIEW AND FRAMEWORK DEVELOPMENT

### 2.1 Effects of marketing strategy on innovation strategy

To attain the goal of product-variety marketing and provide varying products for customers, enterprises will emphasize the innovation strategies of their products for market segmentation in their product innovation (Hsu, 2011a). According to Baxter (1995), product innovations contain styling context, product symbolism, product function, and the like points of view. From the viewpoint of product design specification (PDS), Pugh (1991) looks into the perspectives of product performance, product life in service, maintenance, product size, product weight, aesthetics, appearance and finish, materials, product life span, standards and specifications, ergonomics, quality and reliability, product shelf life, testing, safety, product legal liability, installation and operation, and product disposal. Chang (1998) categorized the key points of product innovation into the following five facets: (1) change in product function, for example, change of product capability, function, and structure; (2) change in product use such as change in operation, carry along, maintenance, and storage; (3) change in product style including the change in product form, color, and graphics; (4) change in product cost including change of the

manufacturing cost and marketing cost; and (5) change in product package such as change of product packaging design as a part of the product innovation strategy. In addition, the marketing strategy is also related to the product innovation (Souder and Song, 1997), and marketing strategy can guide and enhance the quality of product innovations (Jeremy et al., 2005) and the execution procedure of product innovation (Luchs and Swan, 2011). David (2010) and Hsu (2011b) claim that product innovation can make possible the marketization of marketing strategy and can serve as the concrete criteria for the innovation analysis. Another hypothesis, therefore, is offered in this study:

*H1. Marketing strategy has a positive effect on product innovation strategy.*

### 2.2 Effects of marketing strategy on design strategy

Kotler (1997) defined marketing strategy as a series of principles for enterprises to serve their customers and to reach their goal of profit. Armstrong and Kotler (2003) claim that marketing strategy can guide enterprises to make most of their resources with an aim at better satisfying the target user group's needs so as to reach the marketing goal of the enterprise. Cravens et al. (1999) maintained that marketing strategy might cover branding strategy, low-cost strategy, channel strategy and innovation strategy. From the viewpoint of innovation strategy, there is a close tie between marketing strategy and product innovation. Besides, researchers have different ideas about marketing strategy. Among them, the combination of 4Ps (product price, place, promotion) is the most popular one for the category of marketing strategy (Kotler, 1997).

In launching new products to the market, it is necessary for units in every strategic layer to coordinate and fully fulfill the enterprise's strategy (Silbiger, 2005; Marxt and Hacklin, 2005; Veryzer and Mozota, 2005; Renee et al., 2007). Gupta and Wilemon (1990) claim that product innovation in hi-tech industry calls for the close coordination between R&D and marketing sectors in an enterprise. In addition, Sherman et al. (2000) also state that the cross-organizational function integration is a key factor that will influence the new product development cycle.

Many scholars claim that design is considered as an integral resource in enterprises, a mechanism for the integration of product development, and a serial loop in the total value chain of enterprises (Baxter, 1995; Olins, 1990; Fujimoto, 1991; Bruce and Jevanker, 1998; Twigg, 1998; Ge and Wang, 2007; Aydin et al., 2007). Consequently, enterprises need to integrate their resources and finish the new product through communication and coordination among different sectors according to the goal set in their marketing strategy and practical product design strategy (Souder and Song, 1997; Bloch, 2011; Luchs and Swan, 2011). Based upon the discussion of impact of marketing strategy on design strategy, the following hypothesis is offered:

*H2. Marketing strategy has a positive effect on design strategy.*

### 2.3 Effects of innovation strategy on design strategy

Innovation strategy refers to the idea that an enterprise is able to provide an environment for creativity and innovation condition in which it can offer unique products or services different from other competitors (Schuler and Jackson, 1987). With their resources and techniques, enterprises can process various combinations to generate different innovation strategies from which they can execute their enterprise policy and promote their performance (Tidd and Bessant, 2009 ; Gilbert, 1994 ; Dziura, 2001). Literature related to innovation strategy can be roughly divided into three categories: (1) Technical innovation strategy including a higher ratio of R&D expense in the revenue (Kuczmarski, 1992), being aggressive in the application of logo, royalty, and patents (Dziura, 2001), frequent introduction of new techniques to improve production or manufacturing procedure (Kuczmarski, 1992; Ulrich and Eppinger, 2004), constant improvement of the production procedure (Gobeli and Brown, 1987), and the like to achieve enterprises' goal; (2) Commercial innovation strategy including to bring up innovative products or services (Johne, 1999; Yoon and Lilien, 1985), to improve, renew, or extend current products or add new product lines (Kuczmarski, 1992; Ulrich and Eppinger, 2004), to change or relocate the target customer group (Atuahene-Gima, 1996), and so on; (3) Management innovation strategy includes the timely adoption of proper response strategy, build up and control the distribution channel so as to

cope with the change in outer environment (Chacko, 1988; Johne, 1999), to solve the customer's complaints in time (Johne, 1999), to adopt new management methods to promote the performance in the organization and to encourage customers to innovate by raising wage or welfare system (Subramanian and Nilakanta, 1996; Higgins, 1995), to stimulate R&D personnel to innovate by a proper performance measurement system (Gilbert, 1994), etc.
In processing product innovation, each strategic hierarchy in the enterprise should operate in coordination to implement the total policy of the company (Silbiger, 2005; Marxt and Hacklin, 2005; Veryzer and Mozota, 2005; Renee et al, 2007). According to the goal set in innovation strategy, in addition, an enterprise needs to collocate the practical product design task and integrate the innovation resource in the enterprise so as to work out new products through cross-organization communication and coordination (Sung and Gilmour, 2002; Mozota, 2006; Dell'Era and Verganti, 2007; Sari et al., 2007). Based upon the above concepts of innovation strategy, a hypothesis is offered for the relationship between innovation strategy and design strategy. It is listed below:

*H3. Innovation strategy has a positive effect on design strategy.*

According to the above literature review, a conceptual research framework covering H1~H3 is illustrated in Figure 2.

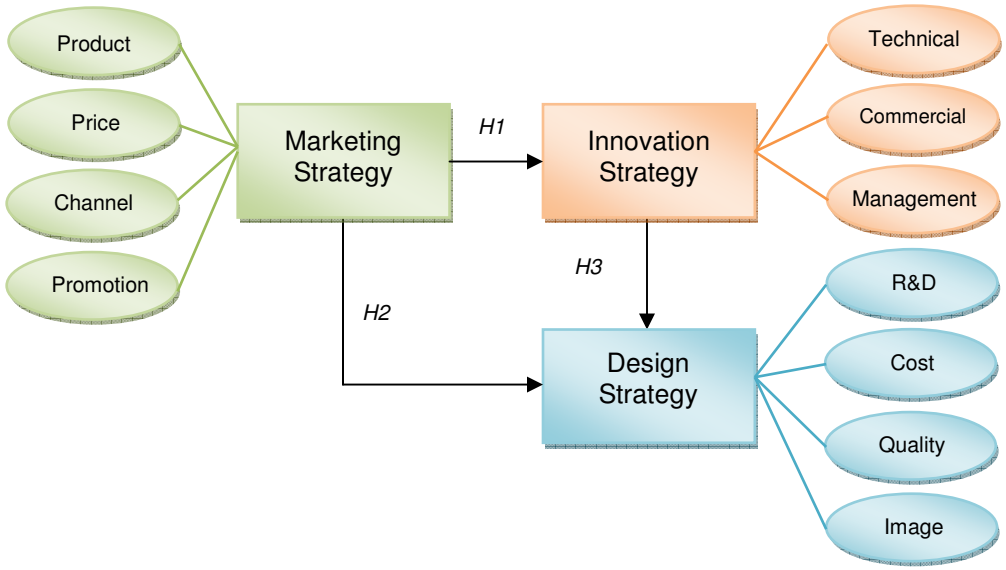


**FIGURE 2:** The correlation model of marketing strategy, innovation strategy, and design strategies.

## 3. METHOD

### 3.1 Effects of marketing strategy on innovation strategy

The definitions of variables investigated in this study are listed in Appendix. Variable measurements regarding marketing strategy cover four major strategic dimensions, including product, price, channel, and promotion. They are selected from Kotler (1997), McCarthy and Perreault (2003), Thorpe and Morgan (2007), and Hughes and Morgan (2007). Regarding the measurement of design strategy, four major dimensions are taken into consideration in this study, covering to reinforce R&D capacity, to reduce production cost, to ensure product quality, and to uplift enterprise image. They are selected from Sung and You (1999) and Hsu (2011a). At last, variables related to innovation strategy cover three major strategic dimensions. The variables regarding technical innovation strategy are primarily selected from Kuczmarski (1996), Dziura (2001), Ulrich and Eppinger (2004), and Gobeli and Brown (1987). The variables about

commercial innovation strategy are principally from Johne (1999), Yoon and Lilien (1985), Kuczmarski (1996), Ulrich and Eppinger (2004), and Atuahene-Gima (1996). The variables about management innovation strategy are mainly chosen from Chacko (1988), Johne (1999), Subramanian and Nilakanta (1996), Higgins (1995), and Gilbert (1994).

### 3.2 Research setting, sample and data collection

In this study, the members in Taiwan Electrical and Electronic Manufacturers' Association (TEEMA) were used as the survey pool. The survey is divided into the pilot test and the formal questionnaire survey.

At the pilot test stage, focus group interview (FGI) was used to specify the target user group, the research limit, and the relations among variable dimensions. Seven experts (four experienced managers and three expert scholars) were invited to verify whether the variables extracted from literature were suitable. In the pilot test, the experts were asked to respond their degrees of agreement in each question on a 5-point Likert scale. On the scale, 1 means "never or do not agree at all" and 5 means "always or totally agree." In this stage, 40 enterprises were obtained. From factor analysis and reliability analysis, the construct validity and reliability were examined. The result demonstrated that the extracted factor could fully explain the variance, indicating a high construct validity. Moreover, the Cronbach's α for each variable was higher than 0.8, meaning that the survey questions had proper reliability.

In the formal questionnaire survey, 1000 enterprises were randomly selected from TEEMA, from which managers at the NPD divisions were interviewed. After repeated contacts, 265 enterprises were obtained, reaching 26.5% of effective survey samples.

## 4. DATA ANALYSIS AND RESULTS

### 4.1 Data accuracy analysis

Table 1 lists the mean, standard deviation, and correlation matrix of each dimension. Table 2 lists the composite reliability (CR) for each dimension: 0.91, 0.89, 0.88 respectively and the total CR of 0.89, beyond the standard 0.70 (Hulland, 1999), indicating a good inner consistency in the model. In addition, the average variance extracted (AVE) for each dimension was 0.87, 0.71, 0.85 respectively. More importantly, the total AVE was 0.82, higher than the standard value of 0.5 (Fornell and Larcker, 1981).

| | Mean | Sd | MS | IS | DS |
|---|---|---|---|---|---|
| **Marketing strategy** | 4.135 | 0.908 | 1.000 | -- | -- |
| **Innovation strategy** | 3.946 | 0.761 | 0.658 | 1.000 | -- |
| **Design strategy** | 3.757 | 0.937 | 0.692 | 0.860 | 1.000 |

MS: Marketing strategy; IS: Innovation strategy; DS: Design strategy

**TABLE 1:** Basic statistics.

| Core Constructs | Item | SL | SE | t-value | CR | AVE |
|---|---|---|---|---|---|---|
| **Marketing strategy** | MS1 | 0.97 | 0.43 | 10.84 | 0.91 | 0.87 |
| | MS2 | 0.88 | 0.33 | 14.60 | | |
| | MS3 | 0.87 | 0.32 | 19.72 | | |
| | MS4 | 0.93 | 0.46 | 10.89 | | |
| **Design strategy** | DS1 | 0.95 | 0.22 | 34.50 | 0.89 | 0.71 |
| | DS2 | 0.95 | 0.28 | 19.22 | | |
| | DS3 | 0.91 | 0.50 | 10.19 | | |
| | DS4 | 0.88 | 0.28 | 19.44 | | |
| **Innovation strategy** | IS1 | 0.93 | 0.30 | 18.53 | 0.88 | 0.85 |
| | IS2 | 0.94 | 0.43 | 11.45 | | |
| | IS3 | 0.89 | 0.39 | 11.29 | | |

SL: Standardized loading; SE: Standardized error; CR: Composite reliability; AVE: average variance extracted

**TABLE 2:** Accuracy analysis statistics.

### 4.2 Research model fit assessment

In this study, Lisrel 8.8 was used in the Structural Equation modeling (SEM) for the research model fit assessment by the Maximum likelihood method. The results indicated that $x^2/df$ (the ratio of chi square over the degrees of freedom) = 1.765, goodness-of-fit (GFI) = 0.989, adjusted goodness of fit index (AGFI) = 0.985, comparative fit index (CFI) = 0.983, incremental fit index (IFI) = 0.986, the root mean square error of approximation (RMSEA) = 0.048. Because the evaluation criteria $x^2/df$ was smaller than 2.0 and because GFI, AGFI, CFI, and IFI were bigger than 0.90, RMSEA was smaller than 0.05 (Gefen et al. 2011; Hair et al., 1998; Atuahene-Gima and Li, 2002; Baker et al., 2002; Brown et al., 2000; Cannon and Homburg, 2001; Noble and Mokwa, 1999). This indicates a proper total Goodness-of-fit.

### 4.3 Hypotheses tests

The theoretical model investigated in this study contains potential dependent variables and potential independent variables. The influences among potential variables cover direct effects, indirect effect, and total effect.

In Table 3, it is clear that marketing strategy has a direct effect on innovation strategy and design strategy. The direct effect value marketing strategy has on innovation strategy is 0.46 ($\beta$ = 0.46, $t$ = 3.97, $p$<0.01), reaching the significant level. And the direct effect value marketing strategy has on design strategy is 0.26 ($\beta$ = 0.26, $t$ = 4.27, $p$<0.01), also reaching the significant level.

Besides, innovation strategy also has a direct effect on design strategy, with the direct effect value of 0.57 ($\beta$ = 0.57, $t$ = 6.57, $p$<0.001), reaching the significant level. Among all direct effects, innovation strategy has the biggest direct effect on design strategy, with the direct effect value of 0.57; marketing strategy has a direct effect value of 0.46 on innovation strategy; marketing strategy has the lowest direct effect 0.26 on design strategy.

Table 3 also demonstrates that marketing strategy also has an indirect effect on design characteristics on the effect path of marketing strategy→ innovation strategy→ design strategy. On the path analysis of indirect effects, the effect vale is 0.23 ($\beta$= 0.23, $t$ = 3.55, $p$<0.05), reaching the significant level.

The above analysis indicates that marketing strategy will directly influence design strategy, with a direct effect value of 0.26. In addition, marketing strategy can influence design strategy through the intervene variable of innovation strategy (indirect effect value = 0.23). Overall, marketing strategy will have a total effect of 0.52 on design strategy, indicating the important role marketing strategy plays on design strategy. From the analysis of Table 3 and Table 4, H1, H2, and H3 are confirmed and supported.

| | | **Innovation strategy** | | **Design strategy** | |
|---|---|---|---|---|---|
| | | $\beta$-value | $t$-value | $\beta$-value | $t$-value |
| **Marketing strategy** | Direct effect | 0.46 | 3.97** | 0.26 | 4.27** |
| | Indirect effect | -- | -- | 0.23 | 3.55* |
| | *Total effect* | 0.46 | 3.97** | 0.52 | 5.47* |
| **Innovation strategy** | Direct effect | | | 0.57 | 6.57*** |
| | Indirect effect | | | -- | -- |
| | *Total effect* | | | 0.57 | 6.57*** |

* p<0.05; ** p<0.01; *** p<0.001

**TABLE 3:** Direct, indirect, and total effect rules.

| Hypotheses | Paths | Expected signs | Effect | Results |
|---|---|---|---|---|
| **H1** | Marketing strategy → Innovation strategy | + | 0.46 | Supported |
| **H2** | Marketing strategy → Design strategy | + | 0.26 | Supported |
| **H3** | Innovation strategy → Design strategy | + | 0.51 | Supported |

**TABLE 4:** Hypotheses rules.

## 5. DISCUSSIONS AND CONCLUSION

Related literature reveals that if an enterprise is not active in product design innovation and marketing activity, it may be wiped out in the market due to the shortage of evident added values in their products (Millett, 1990; Cooper and Press, 1995). On the contrary, if enterprises can efficiently launch new products that can better satisfy the customers than the competitors, they can make more profits and enter a new market section earlier and build up a rivalry disorder (Wheelwright and Clark, 1992; Kuczmarski, 1992; Song and Xie, 2000; Claudio and Roberto, 2007). However, these studies are only cases or conceptual proposals, lacking in the theoretical combination and empirical evidences, neither are the empirical evidences for the correlation between these variables and design innovation-related factors.

Many studies regarding concrete product design issue are conducted by specific enterprises or product cases (Feit, 2009; Hsu, 2009; Bloch, 2011; Hsu, 2011a). Because these cases are likely to be influenced by the design capacity and marketing factors, it is hard to clarify the correlation among marketing strategy, innovation strategy, and design strategy. Furthermore, past studies about design strategy. are short of thorough scale of measurement.

Therefore, in this study, the actual executors of product marketing strategy were studied regarding the correlation among marketing, product design, product innovation, and the like details in enterprises. Such a theoretical and empirical study is hoped to make contribution to the theoretical and practical domains of product marketing and design innovation.

The result of confirmatory factor analysis indicated a proper construct validity, i.e., the convergent validity and discriminant validity for each variable reaching the statistical requirement. Moreover, results of structural equation modeling also demonstrated a good fitness in the theoretical model and the observed data. The three hypothesis proposed in the study were supported. In other words, the product design strategy will be influenced by the enterprise marketing strategy and innovation strategy. Therefore, enterprises can carry out their product innovation through the coordination of practical product design and the goal set up in the marketing strategy by a more efficient integration of R&D resources and cross-organization coordination in an enterprise. The results obtained in this study can reinforce the results in related studies (for example, Petiot and Grognet, 2006; Conway, 2007; Paul and Martin, 2007), and confirm the idea that an effective connection of marketing activity and design procedure is fundamental to enterprise innovation (Roy and Bruce, 1984; Souder and Moenaert, 1992; Gupta and Wilemon, 1990; Sherman, et al., 2000; Zhang et al., 2007; Luchs and Swan, 2011).

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## APPENDIX

1. Variables for the measurement of marketing strategy

(1) Product

☐ Commodity or service to satisfy the target user group’s needs.

☐ Profits the product brings to the customer in quality, function, core value, and the like communication aspects.

☐ Emphasize product appearance or inner features.

☐ Emphasize the width of the product line.

☐ Emphasize the depth of product line.

☐ Have a good intellectual property right management system.

(2) Price

☐ To compete for the growth of sales volume and market share.

☐ To compete for the best profit.

☐ The price setting meets the regulation of consumer law.

☐ Satisfy customers in different market sectors.

(3) Channel

☐ Deliver products in an economical and efficient way.

☐ Adapt channel timely to cope with the change in environment.

☐ The channel matches the product image.

☐ Offer better reward for the channel dealer.

(4) Promotion

☐ Product can offer extra incentives for customers to purchase.

☐ Adopt promotion to trigger the free customer to purchase.

☐ Add the customer's identification to the company, brand or product quality.

☐ Add the understanding and communication among customer, company, and product.

2. Variables for the measurement of design strategy

(1) Reinforcing R&D ability

☐ Work out new products through the acquisition or cooperation with advanced manufacturer.

☐ Increase the ratio of R&D and design expense in the revenue to uplift product design and R&D abilities.

☐ Reinforce professional NPD know how to improve the efficiency in product design and development.

☐ Apply new or current techniques and parts to work out products of unique functions.

(2) Reducing production cost

☐ Reduce the total product production cost through subtle selection of parts and materials in the way of working together with other divisions.

☐ Add functions and values to products under the cost limit through professional design skills.

☐ Subtly respond to the change in outer environment through the application of product design ability.

☐ Integrate parts so that it is easy to assembly and maintain through modulization and standardization in design.

☐ Uplift the product competition ability through mutual supports in design and production from manufacturers.

(3) Ensuring product quality

☐ Uplift the product reliability, durability, and maintenance to enhance the total product quality standard.

☐ Ensure products meet the safety regulations and standards.

☐ Reduce the consumption of energy, materials, and chemicals, minimizing the pollution to the environment.

☐ Create social and cultural utilities of products through emotional, affective, and life style consideration.

☐ Apply human factors technique to meet the user's operational needs in hardware or software design of products.

(4) Uplifting enterprise image

☐ Reinforce company and brand images to build up a good reputation in counterparts and customers.

☐ Enrich competition ability in the market by product differentiation.

☐ Create and uplift the image or value of enterprise, product, and brand through unique aesthetics, semantic representation, and product form.

☐ Work out modern and unique products through particular product form feature, colors, and texture.

☐ Offer better design services and reinforce the promotion in sales by commodity exhibition, advertising, and display.

☐ Develop new products for different user groups to meet their requirements.

3. Variables for the measurement innovation strategy

(1) Technical innovation

☐ Invest a higher ratio of R&D expense from the revenue than the counterpart.

☐ Have a good intelligent royalty management system.

☐ Being aggressive in the application of patents.

☐ Have enough key techniques and patents.

☐ Improve R&D procedure to reach the company goal.

☐ Quick launch new products in the market.

☐ Introduce new techniques to improve manufacturing procedure.

(2) Commercial innovation

☐ Work as a leader in the new product market.

☐ Fast in adjusting the current product line.

☐ Offer new products or services that can better meet the customer's demands.

☐ Commercialize a product faster than the competitors.

☐ Change or relocate the target customer group for market segmentation.

☐ New products or techniques are often copied by the competitors.

(3) Management innovation

☐ Take advantage of information technology to accelerate product development and supply chain management.

☐ Encourage customers to innovate by raising wage or welfare system.

☐ Stimulate R&D personnel to innovate by a proper performance measurement system.

☐ Being flexible and efficient in production and shipment.

☐ Be able to handle customers' complaints and solve their problems.

☐ Adopt proper response strategy in time to cope with the change in outer environment.