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ORGANIZATIONAL INNOVATION STRATEGIES: THE VALUE CO-CREATION STRATEGY (VCS) MODEL

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Abstract

Challenged with market competition, firms can effectively connect innovative research and development, marketing activities, and design resources by using a value co-creation method. After a pilot case study was completed and preliminary models were established, this study proceeded with 2 questionnaire surveys. The first questionnaire survey investigated the co-creation strategies of firms in marketing, innovation, and design. A total of 278 valid questionnaires were recovered. A second survey was conducted 1.5 years after new product launch to identify the NPD performance of the 278 sample firms. Eventually, a total of 242 valid questionnaires were recovered. The main findings in this study are presented as follows: a) A value co-creation strategy (VCS) conceptual model was proposed in response to innovation, marketing, and design co-creation strategies and NPD performance. b) A partial least squares method was used to examine the VCS model. The results show favorable fitness between the VCS model and questionnaire survey observation data, indicating that the VCS model has application value. c) The innovation, marketing, and design co-creation strategies of an enterprise affected NPD performance. In addition, through comprehensive co-creation strategies, these strategies and approaches affected NPD performance. The co-creation strategies in the VCS model were independent variables and mediating variables to NPD performance. Firms can reference the approaches proposed in this study to efficiently develop products and services on the basis of their organizational resources and market advantages and continually win market shares.

Key Words: Value Co-Creation Strategy (VCS), Marketing Strategy, Innovation Strategy, Design Strategy, New Product Development (NPD) Performance

Introduction

Since the concept of service science was proposed in 2004, IBM, the Big Blue in the personal computer industry, has been successfully transformed from designing computer hardware and equipment products to designing service-oriented products, which have attracted increasing attention worldwide. Firms have actively integrated tangible products and intangible services to pursue innovative value in an attempt to be close to consumers and the market timely. Ramaswamy and Gouillart (2010) investigated empirical business cases in the United States and determined that during new product development (NPD), firms emphasized value more than products or services. Value derives from the outcomes cocreated by all customers and members collaboratively participating in the value chain related to the enterprise. Thus, firms continue to communicate with consumers through value co-creation. In addition, the enterprise can consistently win market shares by developing only products and services jointly based on the collaboration among all departments in the enterprise, such as marketing, research and development (R&D), and design departments and stakeholders, including suppliers and employees (Camarinha-Matos et al., 2009; Bhalla, 2010).

How can design be involved in the value co-creation of firms? From the perspective of marketing, marketing and product design are closely matched (Souder & Song, 1997; Zhang et al., 2007; Luchs & Swan, 2011). During the process of launching new products, marketing and design departments must continually interact and exchange information with each other (Petiot & Grognet, 2006; Conway, 2007; Paul & Martin, 2007). Effectively connecting enterprise marketing activities and design is the impetus to product innovation (Gupta & Wilemon, 1990; Sherman et al., 2000).

From the perspective of R&D, innovation is the only and most effective survival capacity of an enterprise when posed with future challenges (Gary & Peter, 2001). Consistent innovation is the momentum to maintain enterprise advantages and ensure the growth of enterprise operations (Baxter, 1995; Dittrich & Duysters, 2007). In particular, during economic recession, rapidly introducing new products into the market helps firms overcome difficulties and reverses adverse situations (Ulrich & Eppinger, 2004; Booz, Allen, & Hamilton, 1982; Pugh, 1991; Christoph, 2007). From the perspective of stakeholders, marketing personnel and R&D designers of an enterprise must pay close attention to the challenges posed by changing market environments, respond to the movements of competitors, and integrate appropriate product design on the basis of goals established by the marketing and R&D departments to complete new products successfully (Tsai, 2006; Ravi, 2007; Girard et al., 2007; Luchs & Swan, 2011).

Therefore, research on how to jointly develop products and services as well as how to efficiently integrate business design processes and improve business performance has remained active (Andi & Minato, 2003; Hsu, 2006; 2011). Several studies have suggested that controlling enterprise product design

processes can improve NPD performance (Song et al., 1997; Olson, 1994; Durward et al., 1998). Previous studies have shown that design can be regarded as a critical value co-creation resource for firms and a crucial mechanism for integrating product development functions. Moreover, design is a section that composes the entire enterprise value chain (Baxter, 1995; Olins, 1990; Fujimoto, 1991; Ge & Wang, 2007; Aydin et al., 2007). When promoting product design, firms often require cooperation among and implementation at all business strategy levels to fulfil the comprehensive business strategy (Mozota, 2006; Renee, 2007). Thus, in this study, a value co-creation strategy (VCS) conceptual model was proposed to explain how firms achieve performance goals by considering innovation, marketing, and design strategies jointly. By applying the VCS, customers and firms can both acquire benefits and enhance customer satisfaction and enterprise brand value. In addition, Hsu (2012; 2013) have proposed relationship models regarding product design and marketing or innovative activities with respect to strategies and implementation. However, few empirical studies have examined the relationship model, as well as related practical approaches, between NPD performance and VCS, marketing, innovation, and design.

NPD project managers of the information and communications technology (ICT) industry, in which new products or services rapidly replace the old, were used as survey respondents in this study. The VCS conceptual model was proposed in response to innovation, marketing, design, co-creation strategies, and NPD performance. In addition, the VCS model was validated, and data fitness was identified. Subsequently, the effect of the VCS model on NPD performance was analysed. Finally, the strategy types of the VCS model adopted by the sample firms were summarised, and NPD performance of the firms adopting diverse strategy types were compared.

Research Frameworks and Hypotheses

Relationship between enterprise innovation strategy and marketing strategy

Hsu (2013) asserted that combining marketing and innovation can create differentiated innovation processes and outcomes. In other words, marketing strategies can guide product innovation toward a correct direction. During the new product launch process, R&D and marketing departments of an enterprise must exchange information consistently (Petiot & Grognet, 2006; Conway, 2007; Paul & Martin, 2007). Effectively connecting enterprise marketing activities and design is the impetus of product innovation (Gupta & Wilemon, 1990; Sherman et al., 2000). Thus, firms appropriately using innovation strategies and marketing strategies can provide new additional value to customers and enhance enterprise competitiveness (Hsu, 2014). On the basis of the discussion on innovation strategy and marketing strategy, the following hypothesis was proposed:

H1. The innovation strategy of an enterprise significantly influences marketing strategy.

Relationship between enterprise innovation strategy and design strategy

Effective product innovation or service development is the cornerstone of enterprise survival and the motivation for maintaining competitive advantages (Driva et al., 2000; Pawar & Driva, 1999; Mozota, 2003; Veryzer & Mozota, 2005; Jamie & Costas, 2007). Firms must integrate goals established using innovation strategy with appropriate product design to complete NPD successfully (Sung & Gilmour, 2002; Mozota, 2006; Dell'Era & Verganti, 2007; Sari et al., 2007). When an enterprise undergoes product innovation, all strategic levels within the enterprise must cooperate to implement the overall enterprise strategy (Silbiger, 2005; Marxt & Hacklin, 2005; Veryzer & Mozota, 2005; Renee et al., 2007). In addition, firms combine goals established using innovation strategy with actual product design tasks and integrate innovation resources of the enterprise to complete new products through interorganisational communications and negotiations (Sung & Gilmour, 2002; Mozota, 2006; Claudio & Roberto, 2007; Sari et al., 2007). On the basis of this close relationship between innovation and design strategies of firms (Hsu, 2011a), this study postulated the following hypothesis:

H2. The innovation strategy of an enterprise significantly influences design strategy.

Relationship between enterprise marketing strategy and design strategy

Marketing and product design are closely correlated (Roy & Bruce, 1984; Souder & Moenaert, 1992; Souder & Song, 1997; Zhang et al., 2007; Luchs & Swan, 2011). During the product launch process, marketing and design departments must continually interact and exchange information (Petiot & Grognet, 2006; Conway, 2007; Paul & Martin, 2007). Effectively linking enterprise marketing activities and design drives product innovation (Gupta & Wilemon, 1990; Sherman et al., 2000). Several studies have claimed that design can be a critical integration resource of firms, representing a crucial mechanism that integrates product development functions. In addition, design is a series of segments in the entire enterprise value chain (Baxter, 1995; Olins, 1990; Fujimoto, 1991; Bruce & Jevanker, 1998; Twigg, 1998; Ge & Wang, 2007; Aydin et al., 2007). Thus, firms combine goals established using marketing strategy with actual product design strategy and integrate enterprise resources to complete new products through interorganisational communications and negotiations (Souder & Song, 1997; Bloch, 2011; Luchs & Swan, 2011). Thus, the following hypothesis was proposed:

H3. The marketing strategy of an enterprise significantly influences design strategy

Co-creation strategy and NPD performance of firms

Numerous studies have suggested that by performing correct development processes, firms can improve NPD performance (Song et al., 1997; Olson, 1994; Durward et al., 1998). Research has indicated that design can be regarded as the value co-creation resource which

represent a crucial mechanism that integrates product development functions. In addition, design is a section that composes the entire enterprise value chain (Baxter, 1995; Olins, 1990; Fujimoto, 1991; Ge & Wang, 2007; Aydin et al., 2007). When firms innovate products, co-creation collaboration between all strategic levels within the enterprise is required to execute the overall strategy of the enterprise (Mozota, 2005; Renee, 2007). Hsu (2012; 2013) have claimed that the concept of VCS can integrate enterprise innovation, marketing, and design strategies to jointly achieve the performance goal of firms. Thus, by applying VCS, firms can effectively develop innovative products, which profit both customers and firms and enhance customer satisfaction and enterprise brand value. Therefore, the following hypotheses were postulated:

H4. The marketing strategy of an enterprise significantly influences value co-creation.

H5. The innovation strategy of an enterprise significantly influences value co-creation.

H6. The design strategy of an enterprise significantly influences value co-creation.

H9. Value co-creation of an enterprise significantly influences NPD performance.

Enterprise marketing strategy and NPD performance

Souder and Song (1997) asserted that marketing strategy is correlated with product development. Marketing strategy can guide and improve product quality (Jeremy et al., 2005) and the implementation process of product R&D (Luchs & Swan, 2011). Souder and Moenaert (1992) stated that successful technology application requires the integration of R&D and marketing departments. Gupta and Wilemon (1990) investigated the interaction between R&D and marketing departments and determined that product innovation of the high-technology industry relies on close cooperation between R&D and marketing. Kinchen (2010) and Hsu (2011) have indicated that product design could specify marketing strategy and demonstrate product development outcomes physically. Therefore, Sherman et al. (2000) claimed that interdepartmental functional integration between product development and marketing is a crucial factor that influences product development cycles. Several scholars have indicated that integrating enterprise product development processes can improve NPD performance (Carlsson, 1991; Griffin & Hauser, 1996; Gupta et al., 1985; Ruekert & Walker, 1987; Pinto et al., 1993; Rusinko, 1997; Song et al., 1997; Olson, 1994; Durward et al., 1998; Lau et al., 2007). Thus, the following hypothesis was proposed:

H7. The marketing strategy of an enterprise significantly influences NPD performance.

Enterprise design strategy and NPD performance

Product design strategy and NPD

performance are correlated (Cooper & Kleinschmidt, 1987; Souder & Song, 1997; Ulrich & Person, 1998). The effort that firms invest in product design can be evaluated according to NPD performance (Pawer & Driva, 1999; Driva et al., 2000). In addition, optimal NPD performance is a goal firms pursue (Baxter, 1995; Mumin, 2010; Ciriaco et al., 2010). Hsu (2009) indicated that firms exhibiting diverse design strategy types demonstrated different financial and nonfinancial performance. Thus, the following hypothesis was proposed in this study:

H8. The design strategy of an enterprise significantly influences NPD performance.

Enterprise innovation strategy and NPD performance

Innovation strategy can rapidly introduce new products into the market, which helps firms overcome difficulties and reverses adverse situations (Ulrich & Eppinger, 2004; Booz, Allen, & Hamilton, 1982; Pugh, 1991; Christoph, 2007). Firms combine goals established using innovation strategy with actual product design tasks and integrate innovation resources of the enterprise to complete new products through interorganisational communications and negotiations (Sung & Gilmour, 2002; Mozota, 2006; Claudio & Roberto, 2007; Sari et al., 2007). Several other studies have suggested that efficiently integrating the enterprise innovation process and capacity can improve NPD performance (Carlsson, 1991; Griffin & Hauser, 1996; Gupta et al., 1985; Ruekert & Walker, 1987; Pinto et al., 1993; Rusinko, 1997; Song et al., 1997; Olson, 1994; Durward et al., 1998; Handfield et al., 1999; Andi & Minato, 2003; Hsu, 2006). However, Roger et al. (2006) indicated that innovation strategy indirectly affects NPD performance through mediating variables. Thus, the following hypothesis was proposed:

H10. The innovation strategy of an enterprise significantly influences NPD performance

According to a review of relevant literature, the conceptual research framework established in this study and the 10 hypotheses (*H1 to H10*) are presented in Figure 1.

Research Methods

Sample and Data Collection

Pretest: At the questionnaire pretesting stage, the focus group interview method was used to determine the participants, research scope, and relationship among all of the variable dimensions. Seven professionals (four experienced product

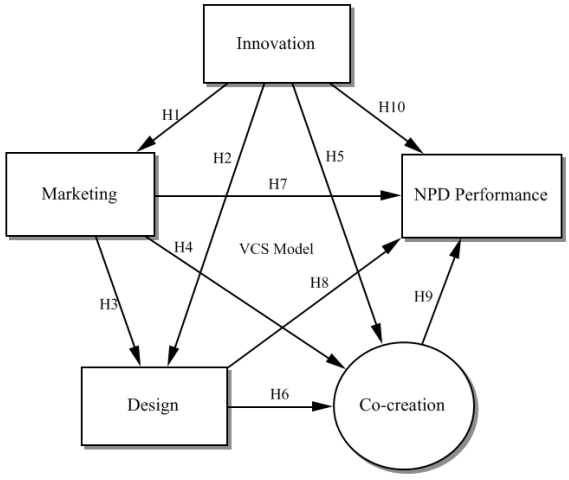

Figure 1. CVS conceptual model proposed in this study

decision-making managers from the industry and three expert scholars) were invited to discuss the preliminary cases and initial conceptual model. In addition, these professionals ascertained that the measurement variables extracted from the literature were suitable for the current study. Subsequently, pretest questionnaires were distributed. The respondents responded to each item on the questionnaire on the basis of their level of agreement with the content described. A 5-point Likert scale was used to denote the level of agreement (1 represents strongly disagree and 5 represents strongly agree, or 1 represents never and 5 represents always).

The member name list database of the Taiwan Electrical and Electronic Manufacturers' Association (TEEMA), in which a random sampling was conducted, was used as the sample population. The NPD project managers were used as survey respondents. A total of 150 questionnaires were distributed, and 38 questionnaires were recovered. Factor analysis and reliability analysis were conducted to verify the construct validity and reliability of the questionnaire. The results showed that the meaning of all of the variables could be fully explained according to the extract factors, indicating construct validity. Co-creation (CS), marketing (MS), innovation (IS), and design (DS) strategies exhibited a significantly positive correlation with NPD performance (NP; Pearson correlation coefficient = 0.867, $p < .01$). In addition, the Cronbach's α of each item was higher than 0.85, indicating that the items had suitable reliability. Thus, a formal questionnaire survey was conducted on the basis of the validated questionnaire.

Formal questionnaire survey: From the TEEMA database, 1,000 firms were randomly sampled for two surveys. After repeated follow-up tracks, valid questionnaires from 283 firms were obtained in the first survey. After new product launch period of 1.5 year, a second survey was conducted on the firms that re-

sponded to the first survey to collect data on NPD performance. The survey result revealed that 231 valid questionnaires were recovered from the firms, yielding a 23.1% effective recovery rate.

This study adopted the partial least squares (PLS) method, which is an analysis technique used to explore or construct predictive models, particularly causal models between latent variables. PLS is superior to common linear structural relations models. This study adopted the PLS method on the basis of the following considerations: (a) Can employ multiple dependent as well as multiple independent variables (IVs). (b) Can handle multicollinearity among independent variables. (c) Robust despite data noise and missing data. (d) Strong prediction for independent latent variables based on response variables. (e) Allows for reflective and formative latent variables. (f) Applied to a small sample. (g) free from distributional constraints (Pirouz, 2006). The questionnaire data were repeatedly sampled for 1,000 times by using the bootstrap resampling method to estimate and infer the parameters.

Data Analysis and Results

Data Accuracy Analysis

Table 1 lists the means, standard deviation (SD), average variance extracted $(AVE)^2$, and correlation matrices of the primary dimensions of each strategy (MS, IS, DS, CS, and NP). Table 2 presents the standardised loading (SL), composite reliability (CR), and AVE of all of the factor dimensions. The CRs of all of the primary dimensions were .897, .866, .915, .893, and .987. The overall CR was .912, which is higher than the standard value of .70 (Hulland, 1999), indicating favourable internal consistency of the model. In addition, the AVEs of the primary dimensions were .857, .859, .891, .893, and .897. The overall AVE was .879, which is higher than the .5 standard value (Fornell & Larcker, 1981).

A further observation of the conceptual model (illustrated in Fig. 2) showed the direct and indirect relationships between each strategy. The SL of the model reached a level of statistical significance, and the standardised path coefficient reached statistical significance. Moreover, the individual SL was higher than the SL of other factors. Overall, the reliability and validity of the model was acceptable, and R^2 values were used to determine the explanatory effect of the model.

Hypotheses Tests

Figure 2 shows that the innovation strategy directly affects marketing, design, co-creation, and NPD performance. The direct effect value of innovation on marketing was .513 (β = .513, p < .01), with an indirect effect of .347, reaching a level of significance. The overall effect was .860, and the explanatory power attained 92.3%. Thus, H1 was supported. The direct effect value of innovation on design was .507 (β = .507, p <.05), with an indirect effect

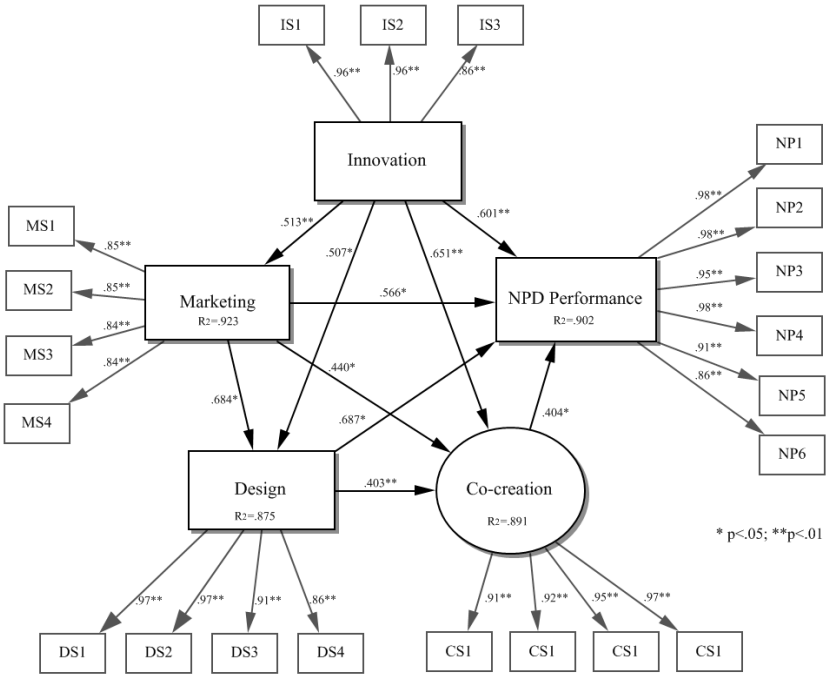

Figure 2. VCS framework PLS model

Table 1. Basic statistics

	Mean	Sd	MS	IS	DS	CS	NP
MS	4.449	.233	(.734)				
IS	3.674	.472	.817	(.738)			
DS	4.376	.210	.789	.822	(.794)		
CS	3.914	.385	.771	.850	.871	(.798)	
NP	4.135	.390	.816	.857	.815	.851	(.805)

Notes: MS: Marketing strategy; IS: Innovation strategy; DC: Design strategy; CS: Co-creating strategy; NP: New Product Development Performance; ( ): AVE^2

of .351, reaching a level of significance. The overall effect was .858, and the explanatory power reached 87.5%. Thus, H2 was supported. The direct effect value of innovation on co-creation was .687 (β = .687, p < .05), with an indirect effect of .328, achieving a level of significance. The overall effect was .891, and the explanatory power reached 89.1%. Thus, H5 was supported. The direct effect value of innovation on NPD performance was .601 (β = .601, p < .01), with an indirect effect of .330, which was significant. The overall effect was .931, and the explanatory power attained 93.1%. Thus, H10 was supported.

Table 2. Accuracy analysis statistics

Core Constructs	Item	*CL*MS	*CL*IS	*CL*DS	*CL*CS	*CL*NP	Alpha	SL	CR	AVE
MS	MS1	*.913*	.823	.876	.822	.850	.989	.929	.897	.857
	MS2	*.862*	.816	.845	.813	.793				
	MS3	*.968*	.813	.861	.797	.884				
	MS4	*.972*	.916	.827	.793	.867				
IS	IS1	.936	*.837*	.856	.882	.898	.860	.847	.866	.859
	IS2	.931	*.846*	.804	.837	.835				
	IS3	.847	*.858*	.832	.846	.798				
DS	DS1	.827	.948	*.906*	.841	.931	.891	.953	.915	.891
	DS2	.924	.916	*.975*	.907	.941				
	DS3	.788	.833	*.963*	.903	.918				
	DS4	.796	.825	*.968*	.912	.944				
CS	CS1	.927	.951	.849	*.852*	.787	.885	.913	.893	.893
	CS2	.965	.944	.924	*.841*	.823				
	CS3	.836	.819	.962	*.984*	.798				
	CS4	.852	.833	.918	*.976*	.781				
NP	NP1	.849	.963	.924	.943	*.861*	.872	.920	.987	.897
	NP2	.918	.948	.853	.941	*.953*				
	NP3	.943	.931	.927	.938	*.951*				
	NP4	.944	.929	.813	.967	*.915*				
	NP5	.925	.958	.785	.915	*.923*				
	NP6	.941	.912	.953	.945	*.963*				

Notes: *CL*: Cross loadings; SL: Standardized loading; CR: Composite reliability; AVE: Average variance extracted.

In addition, Figure 2 illustrates the direct correlation effect of marketing on design, co-creation, and NPD performance. The direct effect of marketing on design was .684 (β = .684, p < .05), reaching a level of significance, and the explanatory power achieved 87.8%. Thus, H3 was supported. The direct effect of marketing on co-creation was .440 (β = .440, p < .05), with an indirect effect of .276, achieving a level of significance. The overall effect was .716, and the explanatory power attained 89.1%. Thus, H4 was supported. The direct effect of marketing on NPD performance was .556 (β = .556, p < .05), with an indirect effect of .178, which was significant. The overall effect was .734, and the explanatory power achieved 90.2%. Thus, H7 was supported. In addition, the direct effect of design on co-creation was .403 (β = .403, p < .01), achieving a level of significance. Thus, H6 was partially supported. The direct effect of design on NPD performance was .651 (β = .651, p < .01), with an indirect effect of .163, reaching a level of significance. The overall effect was .814, and the explanatory power achieved 90.2%. Thus, H8 was supported. The direct effect of co-creation on NPD performance was .404 (β = .404, p < .05), reaching a level of significance. Thus, H9 was partially supported. Overall, except for the partially supported H6 and H9, all of the hypotheses were supported.

Conclusion and Management Meanings

Previous studies have considered design or design strategies as an integrated resource of firms and a product integration mechanism that represents a

section composing the overall enterprise innovation value chain (Baxter, 1995; Olins, 1990; Fujimoto, 1991; Bruce & Jevanker, 1998; Wheelwright & Clark, 1992; Twigg, 1998). However, most of these studies were cases or individual conceptual interpretations that lacked theoretical integration. This current study validated the relationship of these issues, particularly among marketing, innovation, and design co-creation strategies. The NPD project managers of ICT industries that launch new products or services to rapidly replace the old were used as the survey respondents. On the basis of the innovation, marketing, design, and co-creation strategies and NPD performance, a VCS model was proposed. In addition, the VCS model and survey data fitness were validated.

Through statistical analysis, the survey sample number of this study met construct validity. In other words, the convergent validity and discriminant validity of each variable reached statistical requirements. According to the empirical analysis results of PLS, the theory model constructed in this study and the collected observation data exhibited favourable fitness, supporting various hypotheses of this study.

Firms can combine the goal established by using marketing or innovation strategy with actual product design tasks. By using the VCS, firms can increase the efficiency of overall resource integration and facilitate interorganisational collaboration to complete innovative products. The findings of this study can enhance the results of previous studies (Maidique & Zirger, 1984; Gupta et al., 1985; Souder, 1987; Li & Atuahene-Gima, 2001; Sung & Gilmour, 2002; Mozota, 2006; Claudio & Roberto, 2007; Sari et al., 2007). Moreover, the product design can commercialise marketing and innovation strategies and can be used as a specific item to analyse product innovation. These findings corresponded with the research findings of Hsu (2013; 2014).

A review of Ulrich and Eppinger (2004) showed that the proportion of new product earnings to the total sales amount was approximately 30% to 40%. Using the US manufacturing industry as an example, 40% of the revenues derived from the contribution of new products. Regarding profits, 32% resulted from the earnings of new products (Haas, 1989). According to the US Product Development and Management Association, 32.4% of the enterprise turnovers resulted from the new products launched within the previous 5 years. For high-technology industries, this proportion reached 42.3% (Griffin & Hauser, 1996). This study was the first empirical study to examine critical factors, such as product innovation, marketing, design, and value co-creation strategies, and NPD performance by administering two-stage surveys. Enterprises can reference the proposed method according to their organisational resources and market advantages to develop products and services efficiently and face the ever-changing market.

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