

Effects of Product Development on Operating Performance in Textile Industry

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ABSTRACT The leading status of textile industry in Taiwan has fallen behind electronic industry since 2004 and is regarded as the sunset industry. Nevertheless, the production of at least 450 billion NT dollars per year has raised 0.16 million employees. The absorption of employed population presents great contribution to the stability and development of the employment market in Taiwan. This study tends to explore the effects of Product Development on Operating Performance in textile industry with quantitative questionnaire survey. Total 450 copies of questionnaires were distributed to the supervisors, employees, and customers of Tainan Spinning and 384 copies were retrieved, in which 347 copies were valid, with the retrieval rate 77%. The research results show more successful product development could better enhance operating performance in textile industry. Apparently, electronic marketing has largely changed consumers' purchase behaviors. Especially, consumers do not need to shop on streets, but relaxingly purchase desired goods through the Internet. Online shopping therefore has become the trend for modern people. However, consumer demands are changeable that it is essential to understand the factors in customers shopping online in order to increase sales.

INTRODUCTION

Textile industry has been the major foreign exchange earning industry in Taiwan, with enormous contribution to the economy and the society. With the impact of international situations, including the cancellation of textile quotas, the formation of regional integration, and the emergence of emerging countries, textile industry is gradually losing the function of absorbing numerous employed populations because of the change of domestic production conditions resulting in outward downstream industries. Textile industry in Taiwan used to import raw materials and export after the processing then turned to provide raw materials and import natural cotton and synthetic fiber based on petrochemical industry, and developed a complete upstream, midstream, and downstream production system from the production of synthetic fiber, spinning, weaving, dyeing, ready-made clothes to costume and accessories. Since 1960s when the demands of international market were expanding, textile businesses in Taiwan have constantly transited from OEM (Original Equipment Manufacturer) to

developing new products and updating production equipment to expand the international market that textile industry presents the most complete production system in the industrial structure in Taiwan. Textiles in Taiwan are now one of the major suppliers in the international functional textile market.

When people are getting used to linking sunset industry and traditional industry with textile industry, it is still creating about 30%, or even up to 50%, trade surplus for Taiwan in the past decade. A lot of textile businesses in Taiwan have transited into manufacturers with high value-added products. The global textile market increases about 5%-6% every year that textile export in Taiwan still presents competitiveness, in spite of the competition of Mainland China and Southeast Asian nations. It is estimated that textile industry in Taiwan can still grow 100 billion NT dollars in five years. Weaving industry therefore has to cope with the orientation of regional integration, establish reciprocal supply chain systems, and develop marketing niche with high-value products. Simultaneous improvement of the three parts could have weaving industry sustainably develop in Taiwan. Collecting new information and training talents for actively developing new products and participating in domestic and international exhibitions allow expanding the export market and coping with in-

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ternational competition. Textile industry in Taiwan, covering about five thousand manufacturers and nearly 0.2 million employees, creates the production more than 450 billion NT dollars that it still contributes to the economic development and employment absorption in Taiwan. They are considered as the major reasons for exploring the industry in this study.

Literature Review

I. Product Development

Utterback et al. (1971) regarded New Product Development (NPD) as the combination of a series of information processing, through which to transform market opportunities and demands into production knowledge. Huang (2010) considered New Product Development as the key in businesses and the motive of competitive advantages. In the process of New Product Development, a business does not simply promote new products, but has to satisfy customer demands and cope with competitors' threats. It is therefore important for businesses correctly analyzing the consumer market to draw the new product development strategies mostly suitable for the business. Since such strategies are the basis of New Product Development, they would affect the innovation of New Product Development, and valuable information should be mastered in the process of New Product Development. Song and Montoya-Weiss (1998) regarded product strategies as the basis of product development. Referring to Cooper et al. (2009) indicated that clearly defining the product concept could have the company deliberately define and evaluate the target market, product requirements, and product profits in the development process. Accordingly, market-orientation could provide businesses with necessary information in the market, such as characteristics of customer demands, market trend, and competitors' technique, and assist them in drawing the strategic model mostly suitable for the businesses.

Lo (2011) mentioned that small and medium enterprises in Taiwan had to change in the large environment for survival; developing innovative products was regarded as one of the solutions. Referring to Lo's (2011) discrimination of product innovation, the dimensions of Technical Innovation, Functional Innovation, and Marketing Innovation are utilized in this study. In re-

gard to product innovation, the products should be measured from the aspect of consumers and Marketing Innovation should be enhanced. Moreover, product orientations of style design, brand segmentation, and good deal could enhance the product image and value. The higher product innovation requires stronger control of trade marketing that it is better to establish an autonomic marketing branch in oversea markets in order to directly acquire the first-hand information and enhance the decision-making power of trade marketing. The more direct trade marketing could result in better sales of innovative products. What is more, participating in exhibitions is a critical path to promote innovative products and acquire market responses for orders. Demand-oriented or market-oriented pricing could be applied to innovative products; and, intellectual property rights are the guard of innovative products and the primary condition for industrial competition.

II. Operating Performance

Performance could be evaluated by employee performance and organizational performance. Drucker (1999) pointed out the measurement of performance through non-financial ways that Operating Performance was segmented by time; the short-term objective should consider the value of shareholders, while the long-term objective aimed to balance the sustainable operation and survival. Robbins (2001) indicated that financial performance and marketing performance were generally used for operating performance of a business. Financial performance contained rate of return, return on sales, pretax income, volume of sales, and sales growth rate, while market shares were the representative of marketing performance. Erdogan et al. (2001) considered that the denouncement and problems in operation could be discovered through the measurement of operating performance aiming at the operational performance and the employees' work performance. In other words, operating performance of a business stands for the business performance of the organization interacting with external environments.

Aiming at the definition and indicator of performance, the following dimensions in operating performance organized by Chang (2009) are utilized for this study.

1. Operational performance, also named business performance, is the expansion of strategic research after traditional strategic studies, covering market shares, product quality, and introduction of new product, in addition to financial indicators. Defining for the youth and child welfare organizations, the value-added with non-financial data is regarded as the measuring indicator.
2. Financial performance is a commonly utilized concept in traditional strategic research, such as growth rate of sales volume and profit margin. Defining for the youth and child welfare organizations, the growth rate of fundraising is the measuring indicator.
3. Organization effectiveness is broadly applied to strategic management and organizational theory, including loyalty, turnover intention, and work attitude. Based on the entire organization, it refers to the degree achieving the set objective. Defining for the youth and child welfare organizations, the welfare services of the youth and child and the families and the total income of the organization, including donation, business income, governmental subsidies, interests, property, and other incomes, are the measuring indicators for achieving the organizational objective or growth rate.

III. Effects of Product Development on Operating Performance

Szutu (2010) proposed one of the strategies to promote operating performance, as considering the minimal impact of products on the environment during the production and the balance among quality, convenience and price required by customers. In this case, a business should have the innovation of product functions and appearance designs conform to and satisfy customer demands so as to enhance the operating performance and satisfy customers.

Based on the above research, the positive relations between product development and operating performance are inferred, and the following hypotheses are proposed in this study.

H1: Product Development presents significantly positive effects on Operational Performance in Operating Performance.

H2: Product Development shows remarkably positive effects on Financial Performance in Operating Performance.

H3: Product Development reveals notably positive effects on Organization Effectiveness in Operating Performance.

H4: Gender appears remarkable moderating effects on the correlations between Product Development and Operating Performance.

H5: Age shows significant moderating effects on the correlations between Product Development and Operating Performance.

H6: Occupation presents significant moderating effects on the correlations between Product Development and Operating Performance.

H7: Educational background reveals notable moderating effects on the correlations between Product Development and Operating Performance.

H8: Disposable income shows remarkable moderating effects on the correlations between Product Development and Operating Performance.

RESEARCH METHOD

I. Research Framework

From the above literature review, the conceptual framework (Fig. 1) is drawn to discuss the relations among demographic variables, product development, and operating performance.

II. Measurement of Research Variable

1. Product Development

Fifteen questions are included in this dimension, which, referring to Lo (2011), are divided into (1) Technical Innovation, (2) Functional Innovation, (3) Marketing Innovation, (4) Product Support, and (5) Information Collection.

2. Operating Performance

Fourteen questions are contained in this dimension, which, referring to Chang (2009), are classified into (1) Operational Performance, (2) Financial Performance, and (3) Organization Effectiveness.

III. Research Subject

Tainan Spinning is selected as the research subject. Tainan Spinning, established in March 21, 1955, mainly produces cotton yarn and fiber

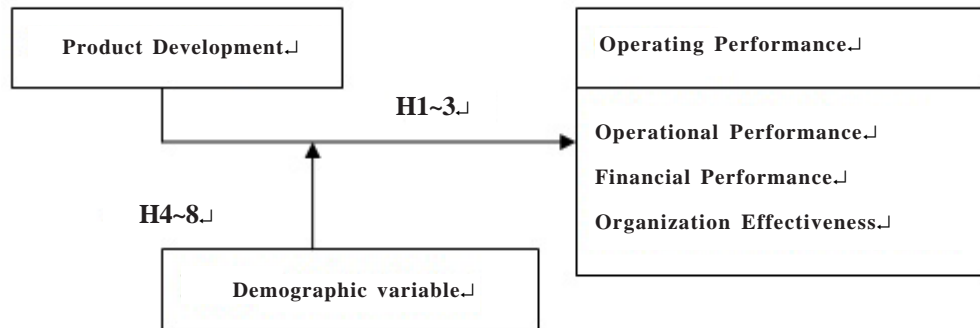


Fig. 1. Research framework

products and is the largest polyester staple fiber and spinning mill in Taiwan. Tainan Spinning presents the vision of 1.) enhancing the transition of core businesses in Taiwan, including high value-added products with R&D differentiation and specialization and fiber businesses developing toward specialization, 2.) developing the internationalization of businesses, such as the plan of expanding the cotton mill in Vietnam and the chained process of weaving, dyeing, and finishing and continuing oversea spinning and fiber production bases at proper timing and locations, 3.) expanding the shift in investment, containing the practice of diverse businesses, continuing to look for and evaluate the intervention in different businesses, or cultivate other star businesses, and 4.) increasing the asset value by actively developing lands and distribution systems.

IV. Research Sample and Data Analysis

By field distributing and collecting questionnaires, 450 samples of the supervisors, employees, and customers of Tainan Spinning are distributed questionnaires and 384 copies are collected, in which 347 copies are valid, with the retrieval rate 77%. Each retrieved copy is regarded as a valid sample for this study. SPSS is utilized for data analyses, and Factor Analysis, Reliability Analysis, Regression Analysis, and Analysis of Variance are applied to testing the hypotheses.

V. Analysis

Regression Analysis is applied to understanding the relations between Product Development

and Operating Performance, and Analysis of Variance is utilized for discussing the effects of demographic variables on the relations between Product Development and Operating Performance.

RESULTS

I. Factor Analysis

With Factor Analysis, Product Development is extracted three factors of technical innovation (eigenvalue=3.517, $\alpha=0.82$), functional innovation (eigenvalue=2.867, $\alpha=0.80$), and marketing innovation (eigenvalue=2.344, $\alpha=0.85$), and the covariance explained achieves 78.681%.

With factor analysis, operating performance is extracted the factors of operational performance (eigenvalue=2.378, $\alpha=0.83$), financial performance (eigenvalue=2.034, $\alpha=0.86$), and organization effectiveness (eigenvalue=1.591, $\alpha=0.81$), and the covariance explained reaches 80.473%.

II. Correlation Analysis of Product Development and Operating Performance

(1) Correlation Analysis of Product Development and Operational Performance in Operating Performance

With regression analysis to test H1, Table 1, functional innovation ($\beta=1.963$, $p=0.012$) and marketing innovation ($\beta=1.832$, $p=0.017$) appear significant effects on operational performance in operating performance that H1 is partially supported.

Table 1: Regression analysis of product development towards operating performance

Dependent variable → Independent variable ↓	Operating performance								
	Operational performance			Financial performance			Product development		
	\hat{a}	Beta	\bar{n}	\hat{a}	Beta	\bar{n}	\hat{a}	Beta	p
Technical innovation	1.177	0.153	0.178	1.046	0.146	0.183	1.647*	0.206	0.035
Functional innovation	1.963*	0.232	0.012	2.341**	0.278	0.000	1.463	0.187	0.058
Marketing innovation	1.832*	0.227	0.017	2.117**	0.251	0.001	0.731	0.098	0.347
F	9.484	13.758	20.762						
Significance	0.000***	0.000***	0.000***						
R2	0.311	0.354	0.383						
Regulated R2	0.051	0.047	0.062						

Note: * stands for $p < 0.05$, ** for $p < 0.01$.

Data source: Self-organized in this study

(2) Correlation Analysis of Product Development and Financial Performance in Operating Performance

With regression analysis to test H2, Table 2, functional innovation ($\beta=2.341$, $p=0.000$) and marketing innovation ($\beta=2.117$, $p=0.001$) show remarkable effects on financial performance in operating performance that H2 is partially supported.

(3) Correlation Analysis of Product Development and Organization Effectiveness in Operating Performance

With regression analysis to test H3, Table 2, technical innovation ($\beta=1.647$, $p=0.035$) reveals notable effects on organization effectiveness in operating performance that H3 is partially supported.

III. Moderating Effects of Demographic Variable

(1) Effects of Gender on the Relations between Product Development and Operating Performance

The analysis of variance results, Table 2, present the remarkably effects of gender on the relations between functional innovation and operational performance, technical innovation and financial performance, and technical innovation and organization effectiveness that H4 is partially supported.

(2) Effects of Age on the Relations between Product Development and Operating Performance

The analysis of variance results, Table 2, show the significant effects of age on the rela-

Table 2: moderating effects of demographic variables on the relationship between product development and operating performance

Demographic variable	Product development	Operational performance	Financial performance	Organization effectiveness
Gender	Technical innovation	Not significant	Significant	Significant
	Functional innovation	Significant	Not significant	Not significant
	Marketing innovation	Not significant	Not significant	Significant
Age	Technical innovation	Significant	Not significant	Not significant
	Functional innovation	Not significant	Not significant	Significant
	Marketing innovation	Not significant	Significant	Not significant
Occupation	Technical innovation	Not significant	Significant	Not significant
	Functional innovation	Significant	Not significant	Significant
	Marketing innovation	Not significant	Significant	Significant
Educational Background	Technical innovation	Significant	Significant	Not significant
	Functional innovation	Not significant	Significant	Significant
	Marketing innovation	Significant	Not significant	Significant
Disposable Income	Technical innovation	Significant	Not significant	Not significant
	Functional innovation	Significant	Significant	Not significant
	Marketing innovation	Significant	Not significant	Not significant

Source: Self-organized in this study

tions between technical innovation and operational performance, marketing innovation and financial performance, and functional innovation and organization effectiveness that H5 is partially supported.

(3) Effects of Occupation on the Relations between Product Development and Operating Performance

The analysis of variance results, Table 2, reveal the significant effects of occupation on the relations between functional innovation and operational performance, technical innovation, marketing innovation and financial performance, and functional innovation, marketing innovation and organization effectiveness that H6 is partially supported.

(4) Effects of Educational Background on the Relations between Product Development and Operating Performance

The analysis of variance results, Table 2, appear the notable effects of educational background on the relations between technical innovation, marketing innovation and operational performance, technical innovation, functional innovation and financial performance, and functional innovation, marketing innovation and organization effectiveness that H7 is partially supported.

(5) Effects of Disposable Income on the Relations between Product Development and Operating Performance

The analysis of variance results, Table 2, show the remarkable effects of disposable income on the relations between technical innovation, functional innovation, marketing innovation and operational performance, and functional innovation and financial performance that H8 is partially supported.

CONCLUSION

The above results and analyses are summarized as follows.

1. Technical Innovation appears significantly positive effects on the operating performance. Textile enterprises could reduce the costs; enhance the efficiency, and even the novel products with Technical Innovation to further promote the operating performance. The approach and path for Technical Innovation could be divided into internal sources and external sources. The former refers to the research and development in-

novation in an enterprise, while the latter contains machinery purchase, technology licensing, and various types of contract cooperation. Technical Innovation in Taiwan is mainly external sources because of the economic scale of markets and the scale of enterprises.

2. Functional Innovation presents remarkably positive effects on the operating performance. Textile enterprises transfer the original products into the ones with distinct quality and characteristics through prices, quality, and performance or provide better products based on brand-new knowledge to satisfy or create the demands for different levels and consumers so as to enhance the operating performance.
3. Marketing Innovation shows notably positive effects on the operating performance. Marketing Innovation is a new composition among various factors, including the innovation of products, market domains, marketing tools, and marketing concepts. Apparently, textile enterprises could promote the operating performance by enhancing the changes of market composition and the creation of market systems, pioneer and occupy the new markets resulted from the development of new products, and further satisfy the new demands.

RECOMMENDATIONS

Consequently, this study concludes that the more successful of product development would better enhance the operating performance of textile enterprises. The following suggestions are further proposed in this study.

1. Establish the supply chain of the entire textile industry to make Taiwan the optimal option to purchase textiles.

It is therefore suggested that the textile alliance could be expanded to different-industry alliance to provide the complete upstream of materials, fiber, and yarns, midstream of cloth, and downstream of costume and accessories, dyeing and finishing, waste recycle and reuse conforming to international environmental standards. Particularly, based on the trust of Taiwanese textile industry among international brands, the national image of environmental kingdom could have Taiwan become the first choice of textile purchase. It could further assist Taiwanese tex-

tile industry in mastering the business opportunities.

2. Establish a broader environmental value by integrating textile industry with charity. The warm hearts of Taiwanese people are well-known as they provide a lot of humanitarian aids for domestic and international major events. When the environmental protection is integrated with charity, the broader value would be established. For instance, the provision of work opportunities in textile recycle for the disadvantaged group with low income could build the unique environmental culture and value of Taiwan. In such an international trend of environmental protection and corporate responsibility, it offers international buyers with a more meaningful environmental option and, at the same time, promotes the business.
3. Integrate Product Development technology in textile industry with global customer-market orientation.

Product Development in textile industry could satisfy customer demands by integrating global customer-market orientation with the environmental protection and social commitment of businesses. Furthermore, the economic development is suitable for the status of Taiwanese textiles in

the international market. That is to establish the industrial competitive strengths with fine quality and low prices.

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