

An Evaluation of the Relationship between Origins of Corporate Competencies and Business Performance of Taiwan's SMEs

Shiaw-Wen Tien¹, Ming-Lang Wang¹, and Chih-Hung Tsai^{2†}

¹Graduate Institute of Management of Technology, Chung-Hua University
30 Tung-Shiang, Hsin-Chu, Taiwan, ROC

²Department of Industrial Engineering and Management, Ta-Hwa Institute of Technology,
1 Ta-Hwa Road, Chung-Lin, Hsin-Chu, Taiwan, ROC,
Tel: +886-3-5430-466, E-mail: ietch@thit.edu.tw

Abstract

This study develops an exploratory model to evaluate the relationship between origins of corporate competencies and business performance, which targets small and medium-sized enterprises (SMEs) in Taiwan, analyzes 36 competence items in four functional dimensions: marketing, product design and development, manufacturing, and human resources management. The results from 760 valid samples from managers of Taiwan's SMEs reveal that in marketing competence and manufacturing competence were ranked high by Taiwan's SMEs managers. Elements contributed to manufacturing competence regarding reducing the number of suppliers has not been emphasized by Taiwan's SMEs managers. At the very top of the prevailing management competitive priority list are: (1) product or service quality, (2) timely delivery, (3) quality control improvement during the process, (4) increasing reliability of transportation, (5) introduction of new concepts and continuous improvement, and (6) improving after-sale services. The four competence dimensions are found highly correlated to business performance, which reflects the policy adjustments that Taiwan's small and medium-sized enterprises have made in the changing business environment to respond to the global market.

Key Words: Competencies, Business performance, SMEs (Small and Medium-sized Enterprises), An Exploratory Model

1. Introduction

The position of small and medium-sized enterprises in Taiwan's economic growth, and their contribution to industrial progress are broadly recognized. Nowadays, under the globalization and liberation trends, Taiwan's small and medium-sized enterprises have realized

† Corresponding Author

management hardships due to increases in operational cost and market scale limitations. The subjects of primary concern to small and medium-sized enterprises are improving enterprise quality and selecting appropriate management strategies. Porter (1990) confirmed that to position themselves in a leading role, enterprises must adopt strategies to take advantage of their own competencies including new product design, new production technology, training plan, quality control plan and improved supplier relationships. Corporate strategies and business performance have been the core topics of strategic management for the past three decades. A typical empirical example is the resource-based "core competence" concept (Prahalad and Hamel, 1990). Market competitiveness is based on enterprise internal competence and determines the future development of the enterprise. Internal competence is the cornerstone for enterprises to succeed in market competition (Corbett and Wassenhove, 1993). As one of four Asian dragons, Taiwan created a worldwide famous economic miracle, in which, the performance of small and medium-sized enterprises played a critical role. According to Small and Medium Enterprise Administration (SMEA) statistics, currently, there are more than 1.1 million small and medium-sized enterprises in Taiwan, with 7.42 million employees, i.e. 77.56 per cent of total workforce, and the total revenue of SMEs accounts for about 31.5 per cent of total production value. These SMEs continue to play an important role in ongoing economic growth in Taiwan. After Taiwan joined the WTO, the challenges facing Taiwan SMEs have ever intensified. Improving SME competencies has become a core topic that concerns both industry and government. Until now, there are few researches that have been attended to the analysis of marketing, product design and development, manufacturing, and human resource management resolution chose by Taiwan's SMEs. The purpose of this study intends to assess the relationship between the origins of corporate competencies and business performance of Taiwan's SMEs in the context of the changing business environment.

2. Related Research

Early studies were oriented towards a discussion of the impact that a single enterprise functional competence area has on overall enterprise performance (Capon *et al.*, 1990; Drcker, 1973; Ettlie, 1997; Hayes and Wheelwright, 1984; Tunalv, 1992). Brown and Eisenhardt (1995) asserted that functional integration is highly correlated to time, cost and quality. Recent studies showed that enterprises could increase their market competitiveness only by coordinating functional area competencies (Evans and Lindsay, 1996; Hill and Jones, 1989; Porter, 1990). Consequently, in this study, we have integrated some functional areas to evaluate the relationship between origins of corporate competencies and business performance.

We propose that capabilities in marketing, product design and development, manufacturing, and human resource management are origins of competencies of SMEs. Academic researches

proved the importance of manufacturing functions to factories and plants (Blackburn, 1991; Hayes and Wheelwright, 1984; Skinner, 1985; Tunalv, 1992). Beside, marketing and innovation are essential competences to enterprises (Drucker, 1973). Capon *et al.* (1990) advocated that corporate profitability is closely correlated to product innovation competence and market development competence. Leonidas *et al.* (2002) proposed a direct relationship between the determinants of market strategy and enterprise export competence. In recent years, human resources have been recognized as indispensable to competence in increasing market share, servicing customers and improving performance (Deming, 1986; Evans and Lindsay, 1996; Simerly, 1997; Sohel *et al.*, 2003). According to previous study, we argue that the strategy development process should include such dimensions as marketing, manufacturing, research and development and human resource etc. Functional strategy involves developing unique competences to provide companies or organizations competitive advantages (Hunger and Wheelen, 2001). As a matter of fact, inter-functional cooperation and communication are essential antecedents to business success (Bates *et al.*, 1995; Hausman and Montgomery, 1997; Papke-Shields and Malhotra, 2001). The emphasis on competence is a sustainable advantage, a long-term concept, which can be established and sustained only by long-run accumulated efforts, experience and technology (Dunning, 1993). Based on the literature and the characteristics of Taiwan's SMEs, this study summarizes origins of corporate competencies are attributed primarily to competence execution in marketing, product innovation, manufacturing and the human resource management dimensions, a comprehensive list of 36 competence items was developed. Only inter-functional enterprise competencies integration can support sustainable growth in intensified competition. The selection of these four functions and 36 items is based on their positive contribution to business performance (Conant *et al.*, 1990; Evans and Lindsay, 1996; Droge *et al.*, 1994; Simerly, 1997; Tunalv, 1992).

2.1 Marketing

Drucker (1954) stated that: "marketing is not a specific company activity. Conversely, it involves the entire organization. It is the organization viewed from the customers' point of view." Droge *et al.* (1994) found in their marketing research that the determinants of performance included marketing promotion and the effect that quality has on market share and return on investment. Furthermore, the transaction process and after-sale service that meets customers' requirements will increase sales volume and improve financial performance (Conant *et al.*, 1990; Hill, 1994). The literature relevant to marketing and production also showed that the critical factor in corporate competence development is to understand the customers' needs and provide products superior to other competitors' (Conant *et al.*, 1990; Hill, 1994; Hill and Jones, 1989). The application of marketing strategy and marketing competence development establishes a powerful and fruitful basis for developing competitive advantages. These types of companies tend to have superior performance in terms of profit,

return on investment, sales and market share (George and Spiros, 1997).

2.2 Product Design and Development

In his landmark study on "The Competitive Advantage of Nations", Porter (1990) emphasized the importance of innovation strategies to Japanese industries, which is also the essential factor driving the success of Japanese companies. To gain competitive advantages in market competition, product lines should have the following dimensions: new product introduction, product development cycle time, product improvement/refinement, new product development and original product development (Calantone *et al.*, 1995; Ettlíe, 1997; Porter, 1990). The critical factors to success in new product design and development include understanding the market needs, early mover strategies and integrated design practices (Ettlíe, 1997). Product design and development are considered enterprise innovation competence. The success or failure of a new product is measured in multiple dimensions. The research of product innovation showed that innovation has an obvious effect on overall enterprise performance, for example, profitability and revenue growth (Calantone and di Benedetto, 1990; Hayes and Wheelwright, 1984). Calantone *et al.* (1995) proved in his study on the furniture industry that new product research and development activities have significant impacts on ROI, ROI growth, market share, and market share growth. In general, the research results showed that a focus on innovation competence would increase overall business performance.

2.3 Manufacturing

The close correlation between manufacturing and competitive strategies supports competitive priorities (Leong *et al.*, 1990; Zahra and Das, 1993). Moreover, the alignment of manufacturing strategy and business strategy has a positive effect on business performance improvement, which will in turn help accomplish business objectives. The indexes that measure performance improvement include profitability and market share and so on (Sun and Hong, 2002). In the past, most literature concerning manufacturing competence stressed the selection of key tasks for manufacturers including materials management, production planning and control and capacity management (Hayes and Wheelwright, 1984; Hill, 1994; Krajewski and Ritzman, 1996). Materials management involves suppliers, inventory, production level, and distribution and so on. Product planning and control focus on planning, scheduling, process quality control and reducing manufacturing costs. Appropriate production levels and capacity management enable manufacturers to meet current and future demand and secure opportunities for sales growth and profits.

2.4 Human Resource Management

Employees are the most valuable assets to organizations (Ahmad and Schroeder, 2003;

Evans and Lindsay, 1996; Simerly, 1997). The human resource capital theory recognizes employee skills, experience and knowledge as assets with the potential to generate economic rent. To achieve global competitiveness, improved economic performance requires enhanced organizational efficiency (Simerly, 1997). If manufacturers can give employees a greater degree of autonomy in operations, manufacturers will be more competitive (Hill, 1994; Simerly, 1997). Taking Singapore and the Swiss for example, with scarce natural resources and adopting the same U.S. production technology, both countries have established their own competitive advantage through human resources development (Porter, 1990). Human resources are the competence that competitors cannot replicate. The human resources development elements contain employee autonomy, job enlargement, improved relationships between employees and management, and enhanced criteria for performance measurement (Evans and Lindsay, 1996; Simerly, 1997). The previous researches showed that the development of human resources management competence could improve the organizations' performance (Adler, 1988; Ahmad and Schroeder, 2003; Youndt *et al.*, 1996).

2.5 Performance

Fenwick and Amine (1979) stated that the appropriate criterion to determine the success of any corporate policy is whether it meets the predetermined goals. Consequently, enterprise performance measures should include whether the predetermined conditions have been satisfied but not only as objective indicators. Dess and Robinson (1984) recognized that the most common performance measurement was economic, using indicators like the rate of return on assets and sales growth rate. In comparing the correlation of strategy and performance in multinational enterprises and global industry, Carpano *et al.* (1994) adopted two performance indicators: the rate of return on investment and sales growth rate. Tsuneo (1981) summarized numerous researches performed by many scholars and concluded that enterprise objectives should include multiple objectives; sales growth, profitability, cash flow, market share and stability, etc.

Business performance can be measured in two ways. In a narrow sense, financial indicators are used to reflect enterprise accomplishments relative to the economic target. The previous empirical researches concentrated on financial performance models (Hofer, 1983; Venkatraman and Ramaujam, 1986). The indicators employed in this research methodology involve sales growth and profitability (for example, ROI and ROS). However, in a broad sense, business performance is measured not only by financial indicators but also non-financial indicators for operational performance. In such a structure, performance measurements include market share, sales revenue and market utility etc. (Smith and Grimm, 1987; Tushman and Romanelli, 1985). Based on the previous studies, we argue the measures of performance in this study include in financial and marketing dimensions by such indicators as after-tax profit, return on investment, sales and market share.

3. Methodology

3.1 Sample

This study targets Taiwan's SMEs. During the period between February 2005 and March 2005, questionnaires were sent by mail to the managers of SMEs in 11 industrial areas including the Taichung Industrial Area, Taichung Harbor Gwanglian Industrial Area, DaJia Yoshi Industrial Area, Dali Industrial Area, Changbing Industrial Area, Fushing Industrial Area, Beitou Industrial Area, Chuangshing Industrial Area, Fangyuan Industrial Area, Chushiang Industrial Area, and Nankang Industrial Area. Seven hundred ninety-two responses were received from 2,500 questionnaires sent. Thirty-two invalid questionnaires were excluded. The valid questionnaires totaled 760, accounting for a 30.4 per cent valid response rate. Table 1 shows the manufacturer data by industry, revenue, capital amount, and number of employees.

Table 1. Basic Data of SMEs in Survey

Basic Data Item		Times	(%)	Basic Data Item		Times	(%)
Industry	Electronic	73	9.6	Number of Employees	Below 5	105	13.8
	Photoelectricity	33	4.3		6~20	260	34.2
	Instrument and Equipment	52	6.8		21~50	143	18.8
	Plastic Processing	49	6.4		51~200	97	12.8
	Machinery Processing	105	13.8		201~300	27	3.6
	Textile	28	3.7		301~500	30	3.9
	Materials	50	6.6		Above 500	98	12.9
	Pharmaceutical	20	2.6	R&D Expense % of Revenue	0~1%	228	30
	Electrical Machinery	42	5.5		1%~3%	202	26.6
	Auto Parts	45	5.9		3%~5%	164	21.6
	Food	67	8.8		5%~10%	98	12.9
	Service	86	11.3		Over 10%	68	8.9
	Other	110	14.5	Primary Sales Area	Domestic	475	62.5
	Average Revenue for the Past 3 Years (NT\$)	Below 50 million	331		43.6	China Mainland	61
50~100 million		186	24.5		Other Areas in Asia	81	10.7
100~300 million		103	13.6		Europe and North America	128	16.8
300~500 million		34	4.5		Other Areas	15	2.0
500 million~1 billion		24	3.2		Average Education of Employees	Elementary	26
Above 1 billion		82	10.8	Junior High		44	5.8
Capital (NT\$)	Below 50 million	420	55.3	High School		245	32.2
	50~100 million	166	21.8	2-year College		419	55.1
	100~300 million	66	8.7	Graduate School		26	3.5
	300~500 million	18	2.4				
	500 million~1 billion	23	3.0				
	Above 1 billion	67	8.8				

Table 2. Ranking of Indicators for All Competence Dimensions

Item	Rank/Mean
Marketing (MKT)	
Quality of Products and Services	4.1684
Improving After-sale Services	4.0289
Increasing Business Reputation	4.0118
Speed and Effectiveness of Decision-making System	3.9868
Establishing Private Brand	3.8842
Price Differentiation	3.8803
Exploring Niche Market	3.8684
Creating New Promotion Method	3.8368
Product Design and Development (PDD)	
Introducing New Concept and Continuous Improvement	4.0408
Existing Products and Services Enhancement	4.0013
Research and Development of New Products and Services	3.8605
Reducing Lead Time of New Product Research and Development	3.7303
Infusion of Research and Development Fund	3.7197
Manufacturing Competence (MFG)	
Materials Management	
Reducing Inventory Level	3.9250
Improving the Quality of Suppliers	3.8829
Increasing Number of Standard Components in Manufacturing Process	3.7645
Increasing Number of Outsourced Parts	3.4776
Reducing Number of Suppliers	3.3592
Product Planning and Control	
Prompt Delivery of Customer Orders	4.1039
Improving Process Quality Control	4.0763
Increasing the Reliability of Transportation	4.0618
Reducing Replication	3.9803
Reducing Waste Material Ratio	3.9803
Reducing Production, Material, and Recurring Expenses	3.9526
Production Capacity Management	
Increasing Utilization of Capacity	4.0145
Increasing Efficiency of Production Scheduling	4.0118
Arranging Preparation Effectively	3.9487
Reducing Preparation Time for Machinery	3.8697
Expanding Capacity	3.8658
Human Resource Management (HRM)	
Establishing Rules for Duty and Manufacturing Process Manual	3.9868
Improving Employee-Management Relations	3.9224
Performance-based Compensation Structure	3.8829
Improvement of Management Skills	3.8776
Promotion of Training Classes	3.8487
Job Responsibility Diversification	3.7461
Employee Authorization	3.6776

3.2 Instrument

Competencies and performance were measured using a Likert 5 Points Scale. The question items in the questionnaire were confirmed during the interviews with several managers, covering 36 items in four functional areas, as shown in Table 2. Managers first filled out the current situation of competence items where "1" indicates very poor and "5" indicates very well. Business performance was measured using the following items: Sales revenue (Y_1), After-tax profit (Y_2), Market share (Y_3), and Return on investment (Y_4). In the scores for performance items, "1" indicates no good at all, and "5" indicates very well.

3.3 Analysis

Based on the research methodology literature, descriptive statistics and regression analysis are appropriate for examining the subjects covered in this study. The conceptual and theoretical structure of the relationship between corporate competencies and business performance derived from this study is illustrated in Figure 1.

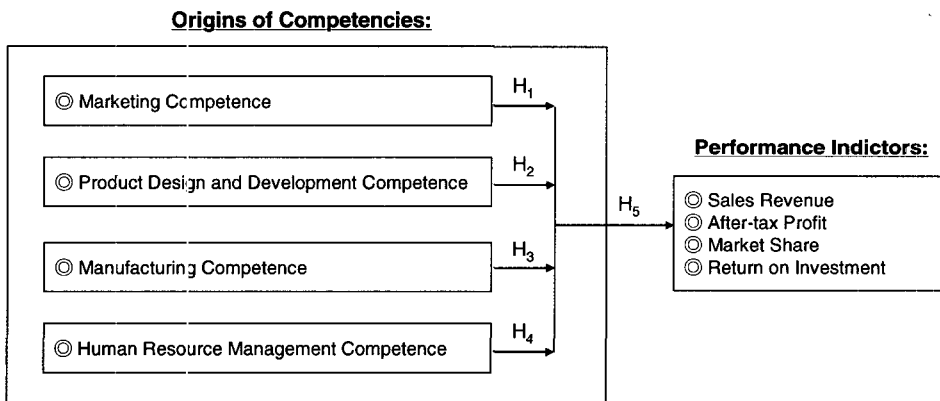


Figure 1. Origins of Competencies and Performance

The sections related to competencies and business performance indicators in the questionnaire were all based on the theories in the relevant literature. The scales or measurement items were derived from academic researches reflecting expert opinions. Therefore, this study has high reliability. Cronbach α coefficient was calculated for all question items in every dimension according to the answer scores. Nunnally (1978) proposed acceptable reliability of 0.8 for fundamental research and 0.7 for exploratory research. As shown in Table 3, the marketing competence, product design and development competence, manufacturing competence, and human resource management competence reliability were all above 0.8, indicating that this research meets the reliability requirement.

Table 3. Reliability of Variables in Study

Questionnaire Dimension	Origins of Competencies			
	Marketing Competence	Product Design and Development Competence	Manufacturing Competence	Human Resource Management Competence
Cronbach α	0.8582	0.8464	0.8757	0.8523

The data analysis is comprised of two phases. In Phase 1, descriptive statistics is used to illustrate the current situation of competencies. In Phase 2, relational analysis and regression analysis are applied to investigate the relationship between the origins of competencies and performance (Droge *et al.*, 1994). A simple regression coefficient (β_i) for every performance element is estimated using least-squares, as explained by the following formulas:

$$\text{Performance}_1 = \alpha_1 + \beta_1 X_1(\text{MKT}) + \mu_1 \quad (1)$$

$$\text{Performance}_2 = \alpha_2 + \beta_2 X_2(\text{PDD}) + \mu_2 \quad (2)$$

$$\text{Performance}_3 = \alpha_3 + \beta_3 X_3(\text{MFG}) + \mu_3 \quad (3)$$

$$\text{Performance}_4 = \alpha_4 + \beta_4 X_4(\text{HRM}) + \mu_4 \quad (4)$$

To analyze the impact of the four competence dimensions on performance, the following multiple regression formulas were established in this study. The multiple regression coefficient (β_i) is estimated using least-squares, as illustrated by the formula below:

$$\text{Performance}_5 = \alpha_5 + \beta_1 X_1(\text{MKT}) + \beta_2 X_2(\text{PDD}) + \beta_3 X_3(\text{MFG}) + \beta_4 X_4(\text{HRM}) + \mu_5 \quad (5)$$

Where μ_i is a random disturbance term and regression coefficient (β_i) represents the expected change in performance index caused by a unit of change in the i th independent variable (origins of competencies).

3.4 Assumption

The study is focus on the four main origins of corporate competencies. Marketing (X_1), product design and development (X_2), manufacturing (X_3), and human resource management (X_4) are independent variables. Sales revenue, after-tax profit, market share, and return on investment are dependent variables. The assumptions were developed according to the model presented in Figure 1. The following assumptions were used in this study.

H₁: The competence of marketing is positively related to business performance.

H₂: The competence of product design and development is positively related to business performance.

H₃: The competence of manufacturing is positively related to business performance.

H₄: The competence of human resources management is positively related to business performance.

H₅: The improvement of corporate competencies jointly leads to positive business performance.

4. Results

4.1 Origins of Competencies

Enterprise competencies come from the mentioned four competence areas. The average and rank order of the current situation of 36 competitive priority items is detailed in Table 2. Table 2 depicts the rank by functional significance. The first six items in the four functional areas show a certain degree of consistency, which suggests that enterprises tend to have better performance for the items executed well. Among the first six items, two belong to marketing: (1) quality of products and services and (2) improving after-sale services (as shown in Table 2). The mean in quality of the products and services is 4.1684, the largest among the first six items. The mean in after-sale services is 4.0289. These results demonstrate the changes in key competence items among Taiwan's SMEs. In the past, when competition was not as intense, quality and after-sale services were never the focus for most cases SMEs provide outsourcing for large-scale enterprises. Consequently, in an intensified competition environment, SMEs have clearly realized the important role of quality products and services and improvements in after-sale services play in sustainable enterprise growth. Three of the first six most important items belong to manufacturing competence: (1) prompt delivery of customer orders (with a mean of 4.1039), (2) improving process quality control (with a mean of 4.0763), and (3) increasing transportation reliability (with a mean of 4.0618). By now quality has become the common focus of attention by SMEs. In the actual transaction process, prompt delivery of customer orders plays an even more important role, which may be related to the fines imposed on manufacturers for delays in delivery, or direct impact on procurement of subsequent orders. Increasing transportation reliability ensures that any possibility of damage during transportation is minimized. This item complements prompt delivery of customer orders.

Introduction of new concepts and continuous improvement (with a mean of 4.0408) is the only item from the product design and development competence area in the first six items. This implies that with technological advancement, shortened product lifecycle and intensified market competition, SMEs are more focused on innovation competence. This discovery is very helpful to SMEs because in response to brutal challenges, the importance of this competitive priority item, the introduction of new concepts and continuous improvement, is not negligible. In the least important competence items, one is from the human resources man-

agement area: employee autonomy (with a mean of 3.6776). The other two are from the manufacturing competence area: increasing the number of outsourced parts (with a mean of 3.4776) and reducing the number of suppliers (with a mean of 3.3592). Less attention is paid to employee autonomy probably because of the psychology of SME owners or the business patterns of SMEs. Most Taiwan's SME owners started their businesses from the scratch and worked very hard. All of the efforts coupled with the opportunities led them to business success. Some SMEs are run by families, in which employee autonomy is minimal. Increasing numbers of outsourced parts and reducing the number of suppliers are strategic competencies that can help manufacturers improve efficiency. These two items are not the focus of attention. A possible reason for not emphasizing these items have not appear to be as important required by customers as compared to prompt delivery of orders and guaranteed quality. Conversely, the data reflects that in such a changing business environment, SMEs have changed their manufacturing patterns and material management to respond to intensified competition.

4.2 The Correlation between Competencies and Performance

The mean and standard deviation of marketing (MKT), product design and development (PDD), manufacturing (MFG) and human resources management (HRM) competence and the performance measured by the four criteria are illustrated in Tables 4, 5, and 6.

Table 4. The Correlation between Descriptive Statistics and Competencies

Competence	Mean	Standard Deviation	Correlation with			
			X ₁	X ₂	X ₃	X ₄
X ₁ (Marketing, MKT)	3.9582	0.6172	1			
X ₂ (Product Design and Development, PDD)	3.8705	0.6671	0.6084***	1		
X ₃ (Manufacturing, MFG)	3.8922	0.5277	0.5170***	0.6139***	1	
X ₄ (Human Resource Management, HMN)	3.8489	0.6195	0.5175***	0.4825***	0.4598***	1

Note: *P < 0.1; **P < 0.05; ***P < 0.01

Table 5. The Correlation between Descriptive Statistics and Performance

Performance	Mean	Standard Deviation	Correlation with			
			Y ₁	Y ₂	Y ₃	Y ₄
Y ₁ (Sales Revenue)	3.9207	0.5291	1			
Y ₂ (After-Tax Profit)	3.8079	0.5915	0.8171***	1		
Y ₃ (Market Share)	3.8632	0.5955	0.7841***	0.7984***	1	
Y ₄ (Return on Investment)	3.8786	0.5857	0.7632***	0.8260***	0.8129***	1

Note: *P < 0.1; **P < 0.05; ***P < 0.01

Table 6. The Correlation between Competencies and Performance

Performance	Correlation with			
	X ₁ (Marketing)	X ₂ (Product Design and Development)	X ₃ (Manufacturing)	X ₄ (Human Resource)
Y ₁ (Sales Revenue)	0.4857***	0.5247***	0.5101***	0.5474***
Y ₂ (After-Tax Profit)	0.4897***	0.5072***	0.5140***	0.5558***
Y ₃ (Market Share)	0.4911***	0.4976***	0.5000***	0.5363***
Y ₄ (Return on Investment)	0.4608***	0.5254***	0.4964***	0.5454***

Note: *P < 0.1; **P < 0.05; ***P < 0.01

In Table 4, marketing competence, product and design and development competence, manufacturing competence and human resource management competence all show significant correlations when $p < 0.01$. Table 5 shows the significant correlations between the four performance measures when $p < 0.01$. As shown in Table 6, the four competences (MKT, PDD, MFG, and HRM) are significantly correlated to the four performance measures when $p < 0.01$. The results proved that an increase in marketing competence, product design and development competence, manufacturing competence, and human resource management competence all make positive contributions to business performance. The emphasis on the positive contribution by human resource management competence to after-tax profit is consistent with the conclusion drawn from prior academic researches on manufacturers (Simerly, 1997).

4.3 Results from Regression Analysis

In this study, two types of regression analyses were employed. In the simple regression model, four competence areas were considered independent variables and four performance measures were defined as dependent variables. The model ran 16 times. In the multiple regression model, MKT, PDD, MFG, and HRM were the independent variables and every performance index was a dependent variable. The multiple regression model ran 4 times. The simple regression analysis results with four competence areas (MKT, PDD, MFG, and HRM) as the independent variables are shown in Tables 7, 8, 9, and 10.

Tables 7, 8, 9, and 10 also show that the Model R^2 , two-tail P-value, estimated intercept, and estimated non-standard and standard slope. R^2 for all models are significant at the $P < 0.01$. All estimated intercept values are significant at the $P < 0.01$. The results proved the inference in this study that execution degree in all competence areas positively contributes to SME business performance when $P < 0.01$. From the individual perspective, the four competence areas are all important determinants in measuring overall business performance. This conclusion supports the accuracy of the operational definition of competence given in this study, and also agrees with the conclusions from the literature mentioned above (Calantone and di Benedetto, 1990; Conant *et al.*, 1990; Hayes and Wheelwright, 1984; Hill, 1994; Porter,

1990). Prior to the multiple regression analysis, this study performed multilinearity test.

Table 7. Simple Regression Analysis Results with MKT (X_1) being Independent Variable

Dependent Variable	Model R^2	Intercept	β Value of X_1		Error
			Non-Standard	Standard	
Y ₁ (Sales Revenue)	0.235***	2.295***	0.411	0.486	1.735
Y ₂ (After-Tax Profit)	0.239***	1.950***	0.469	0.490	1.800
Y ₃ (Market Share)	0.240***	1.988***	0.474	0.491	1.892
Y ₄ (Return on Investment)	0.211***	2.148***	0.437	0.461	1.697

Note: *P < 0.1; **P < 0.05; ***P < 0.01

Table 8. Simple Regression Analysis Results with PDD (X_2) being Independent Variable

Dependent Variable	Model R^2	Intercept	β Value of X_2		Error
			Non-Standard	Standard	
Y ₁ (Sales Revenue)	0.274***	2.331***	0.410	0.525	1.692
Y ₂ (After-Tax Profit)	0.256***	2.067***	0.450	0.507	1.752
Y ₃ (Market Share)	0.247***	2.144***	0.444	0.498	1.853
Y ₄ (Return on Investment)	0.275***	2.093***	0.461	0.525	1.689

Note: *P < 0.1; **P < 0.05; ***P < 0.01

Table 9. Simple Regression Analysis Results with MFG (X_3) being Independent Variable

Dependent Variable	Model R^2	Intercept	β Value of X_3		Error
			Non-Standard	Standard	
Y ₁ (Sales Revenue)	0.259***	1.956***	0.505	0.510	1.633
Y ₂ (After-Tax Profit)	0.263***	1.565***	0.576	0.514	1.723
Y ₃ (Market Share)	0.249***	1.667***	0.564	0.500	1.761
Y ₄ (Return on Investment)	0.245***	1.734***	0.551	0.496	1.688

Note: *P < 0.1; **P < 0.05; ***P < 0.01

Table 10. Simple Regression Analysis Results with HRM (X_4) being Independent Variable

Dependent Variable	Model R^2	Intercept	β Value of X_4		Error
			Non-Standard	Standard	
Y ₁ (Sales Revenue)	0.299***	2.145***	0.461	0.547	1.816
Y ₂ (After-Tax Profit)	0.306***	1.765***	0.531	0.556	1.905
Y ₃ (Market Share)	0.287***	1.879***	0.515	0.536	1.937
Y ₄ (Return on Investment)	0.297***	1.894***	0.516	0.545	1.824

Note: *P < 0.1; **P < 0.05; ***P < 0.01

In this step, the independent variables were examined for multilinearity. The variance inflation factor (VIF) was used in this study for estimation. The results are shown in Table 11. All independent variables show $VIF < 10$ and the average VIF equals 1.772 (Berk, 1977; Chang, 1997; Marquardt, 1970). The result proves that no multilinearity exists in the multiple regression model in this study. This in turn supports the correct implementation of multiple regression analysis.

Table 11. VIF from Multiple Regression Model

Independent Variables	Variance Inflation Factor (VIF)
Marketing Competence (MKT)	1.822
Product Design and Development Competence (PDD)	2.017
Manufacturing Competence (MFG)	1.748
Human Resource Management Competence (HRM)	1.501
Average VIF	1.772

In the multiple regression model: marketing, product design and development, manufacturing and human resources management competence were the independent variables while the four performance measures were the dependent variables. The analysis results are shown in Table 12, including model R^2 , model P-value, β value of independent variables and intercept. The dependent sales revenue, after-tax profit, market share, and return on investment variables in the multiple regression model were all significant at the $P < 0.01$ level. This conclusion supports hypothesis 5 proposed in this study. Based on the multiple regression results, the focus on human resources management competence, manufacturing competence and product design and development competence certainly have positive impacts on the financial and marketing performance of SMEs. The only exception is that an increase in marketing competence does not have an immediate impact on return on investment. This result may be caused by the operational characteristics of SMEs being affiliates of larger manufacturers or the OEMs of exporters. Consequently, there does not exist any significant relationship between an increase in marketing competence and return on investment.

Table 12. Multiple Regression Analysis Results

Dependent Variables	Model R^2	Intercept	β Value				Error
			X_1	X_2	X_3	X_4	
Y_1 (Sales Revenue)	0.418***	1.226***	0.093***	0.148***	0.193***	0.261***	1.764
Y_2 (After-Tax Profit)	0.420***	0.724***	0.119***	0.129***	0.237***	0.310***	1.828
Y_3 (Market Share)	0.400***	0.828***	0.141***	0.126***	0.225***	0.289***	1.899
Y_4 (Return on Investment)	0.408***	0.934***	0.065	0.192***	0.198***	0.305***	1.757

Note: * $P < 0.1$; ** $P < 0.05$; *** $P < 0.01$

So far, the five hypotheses proposed in this study were all supported by the statistical analysis results. Sixteen simple regression analysis model iterations and 4 multiple regression analysis model iterations show that marketing, product design and development, manufacturing, and human resources management competence have significant impacts on the four performance measures; sales revenue, after-tax profit, market share, and return on investment. The above conclusion provides managers of SMEs guidance on improving the enterprise attributes, increasing competencies, and enhancing business performance.

5. Discussion

5.1 Critical Competencies Factors

In this study 36 competence items were ranked by current execution degree. In the marketing competence area, product and service quality, improving after-sale services and increasing business reputation attracted most of the attention from SME managers. This is in agreement with the conclusion from previous literature (Conant *et al.*, 1990; George and Spiros, 1997; Hill, 1994; Hill and Jones, 1989). This reflects the customer demand impact in the changing business environment. This result provides an important indicator of marketing competence in SME operations. In the manufacturing area, prompt delivery of customer orders, improving process quality control and increasing transportation reliability were the common focus among Taiwan's SME managers. The significance of quality control agrees with the findings from academic researches (Evans and Lindsay, 1996). Superior quality is the basis of other competitiveness sources, for example, transportation and cost efficiency (Nobel, 1995). Excellent process quality control can reduce the replication rate and quantity of waste materials and make a positive contribution to prompt delivery of customer orders. Therefore, superior process quality control is an important index in the manufacturing competence area. In the product design and development competence area, SME managers emphasize the introduction of new concepts and improvement of existing products and services. Because of limited resources and the unique business features of SMEs, gradual innovation is more appropriate for better and longer-term SME growth (Afuan, 1998). In the human resources management area, establishing duty and manufacturing process manuals, improving the employee-management relationship and developing a performance-based compensation structure have received widespread attention among SME managers. However, compared to the items in the other three competence areas, the ranking by current situation for these three items is lower. By no means does this result indicate that human resources management is not important. The possible reasons are: (1) Taiwan's SMEs are usually family businesses, where owners do not release decision-making power; and (2) managers are more focused on order procurement and production due to the limited operational scale and resources. Based on the

top three competence items, SME managers have recognized the market changes and began paying more attention to human resources management competence development because lack of good human resources makes sustainable business growth impossible (Deming, 1986). Following the future development trend, if SME owners and managers can adjust their existing concepts, continuously pay more attention to human resources management competence, SMEs should be able to substantially increase their competitiveness. This should be an important topic of future research.

5.2 Critical Factors of Business Performance

The simple regression analysis results show that the focus on marketing, product design and development, manufacturing and human resources management competence has a positive impact on various performance measures. From the multiple regression analysis results, the four competence dimensions showed a positive impact on business performance. One thing worth further exploration is that concentration on human resources management competence has a significant impact on the four performance measures. This is new finding for Taiwan's SMEs. Wathen (1995) proved that the concentration on manufacturing competence cannot directly impact business performance because production strategy is only part of the overall business strategy. It seems that concentration on human resources management competence, improving employee-management relationship, and establishing a performance-based compensation structure can inspire employees of Taiwan's SMEs to maximize their capacities to help the business growth in every functional area. To existing enterprises, a staff of excellent and well-trained employees provides the essential basis for increasing business competencies (Porter, 1990). To the managers of SMEs, employee loyalty and assistance must be obtained for production process control, design and improvement. The change of concept should acknowledge by all managers.

6. Conclusions

An exploratory model is proposed in this study to analyze the relationship between origins of corporate competencies and business performance in Taiwan's small and medium-sized enterprises. A deeper-level study of 36 competence items in four competence areas: marketing, product design and development, manufacturing, and human resources management was conducted. The five hypotheses were tested using statistical data proving that corporate competencies improvement can certainly affect business performance. Marketing competence and manufacturing competence were at the top of the priority list for SME managers. Human resources management competence had significant impact on business performance. Based on this data, concentration on the overall competence areas will usually result in better perfor-

mance. In the changing environment, this study provides in-depth analysis of the important items in all competence areas. To SME managers, strategic decisions have a direct impact on business performance. In global market competition, concentration on a single competence item cannot ensure a competitive advantage. Only those enterprises with multiple competences will sustain business growth. The following directions may be used to guide subsequent researches. First, further study can be performed on any variation in impact that the selected competitive priorities may have on SME performance at various scales or patterns. Second, further study can be performed to compare SME strategic decision and implementation in developed countries (e.g., U.S., Canada) and other emerging countries (e.g. Thailand, Philippines, Malaysia) to Taiwan. Third, further analysis can be performed on any variation in strategic decisions and focus on SME competence items that may be caused by a variance in the sales region, employee education and R&D expenses % of sales revenue. Further understanding of SME operational characteristics, market cooperation and competition status can be derived from this type of comparative analysis.

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