Research

on

Consistency of Firm's Performance Evaluation and Compensation Plans with Competitive Strategy

by

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Abstract

According to "Contingency Theory" and several researches, there is no absolutely conclusive result to show that there is a best control system for all firms that fits all types of competitive strategy. Also, based on "Expentancy Theory" , in order to motivate employee, the compensation plans have to cover all performance measures that fully reflect employee's effort. Hence, this case-based research is set up for the purpose of studying the consistency of firm's performance evaluation and compensation plans with competitive strategy. All 285 of MBA students at the Faculty of Commerce and Accountancy, Chulalongkorn University, Thailand, are the experimental units. The controlled group with 141 regular MBA students are subdivided into two groups as low-cost group and product-differentiation group. Then each group is subdivided into two more sub groups as CEO and MD groups. For the treated groups with 144 executive MBA students, subdivision is done in the same manner as the controlled group. The experiment is set up to evaluate whether competitive strategy affects weights placed on performance measures used for firm's performance evaluation and compensation plans. Also, it is set up to evaluate the consistency of weights placed on performance measures for these two purposes under a given competitive strategy. The research results are as expected. That is, under low-cost strategy, a firm places more weights on financial performance measures for firm's performance evaluation resulting in short-term oriented compensation plans and vice versa. Under product-differentiation strategy, a firm places more weights on non-financial performance measures for firm's performance evaluation resulting in long-term oriented compensation plans and vice versa. Therefore, the consistency of two control systems are evidenced from this research. That is, for a given competitive strategy, a control system designed by first considering the appropriate firm's performance evaluation system to match with that strategy in terms of weights placed on performance measures followed by the compensation plans will be consistent with the control system designed by first considering the appropriate compensation plans to match with that same strategy and followed by the firm's performance evaluation system. However, executives of a low-cost strategy firm significantly place more weight on "productivity" which is one of non-financial performance measures for both firm's performance evaluation and compensation plans than those of a product-differentiation strategy firm. This means that although productivity is a non-financial performance measure, it still plays crucial role for a low-cost strategy firm than a product-differentiation one. This may be due to the fact that usually low-cost strategy firms emphasis on efficiency as an important mean to reduce cost. And "productivity" is one performance measure that evaluates the efficiency of firms.

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CONSISTENCY OF FIRM'S PERFORMANCE EVALUATION AND COMPENSATION PLANS WITH COMPETITIVE STARTEGY

Introduction

Planning and control are parts of management process where management accounting information plays crucial role. These two functions are related and have to be designed and implemented properly in order to drive the firm to its success under the selected strategy. Actually, strategy affects directly the planning process. They have to be aligned with each other. Then the control system is the tool to evaluate the achievement of the plan. The control system itself involves two important issues which are the firm's performance evaluation and the compensation plans. Based on the "Contingency Theory" and several researches that have been done so far in this area, there is no "best" control system for all firms and that such system should also "fit" the selected strategy.

It is, therefore, interesting to researchers to study the consistency of firm's performance evaluation and compensation plans along with the selected competitive strategy. Specifically, competitive strategy according to Porter (1980) is chosen because it is this type of strategy where contemporary management accounting mostly expands its role to cope with.

Background and Rationale

Competitive Strategy in Organization

According to Porter (1980), competitive strategy is about taking offensive or defensive action to create a defendable position in a business industry in order to cope successfully with competitive forces and generate a superior stakeholders' wealth. In fact, there are three internally consistent and successfully strategies for outperforming others: low-cost, product-differentiation, and focus strategies. Low-cost position defends an organization against all five competitive forces:

- *Competitive rivalry*: low cost means more margin to squeeze in a battle for the lowest price;
- *Buyers' negotiation power*: prices can only be lower at even more efficient competitors;
- *Supplier power*: more margin to cope with price increases;
- *New entrants*: it is harder to compete with existing, and efficient players;
- *Substitution*: favorable position relative to competitors usually obtains quickly.

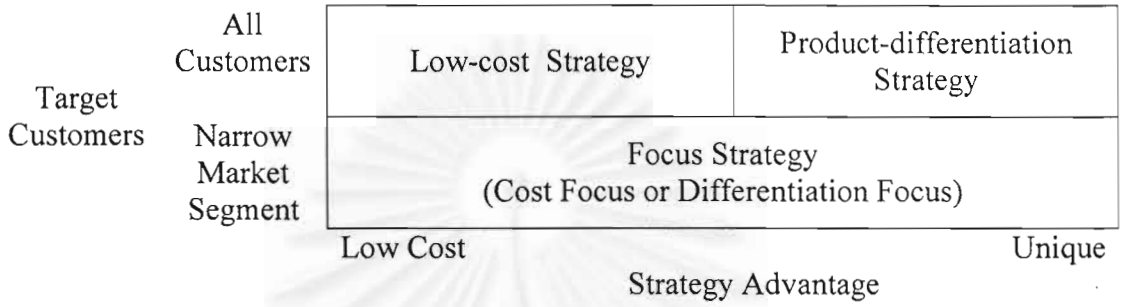
A firm attempts to provide a stable set of products and services to a well-defined portion of the total market while emphasizing improvements in current operating efficiencies in order to lower costs.

An alternative to low-cost strategy, product-differentiation strategy is to concern less about costs, but instead to seek to be perceived as offering something different or unique. A firm attempts to identify new product or service market opportunities, quickly adapts to changes in the external environment, and follows a "first-to-market" strategy. Be it durable, novel, rare, serviced globally, very reliable, or high emotional value, differentiation requires

the products to appeal to customers in other ways than low price. Differentiators have to invest more in research, design, materials, service, etc.

Also, firms may choose to focus on only a particular group of customers within a market or a limited product line. The focus strategy is built around serving a specific market segment extremely well. Porter (1980) adds to this that within a particular focus market or niche, low-cost and product-differentiation strategies are options as shown in Figure 1.

Figure 1: Competitive Strategy due to Target Customers and Strategic Advantage



Porter's conclusion is that a firm has no option but to choose one of the three types of competitive strategy, or risk getting "stuck in the middle". By logical deduction, this is undesirable because there will inevitably be a competitor that is either cheaper or better differentiated than one's firm is.

For the purpose of this research, only two types of competitive strategy are concentrated : low-cost and product-differentiation strategies. The focus strategy is excluded to make the research conclusion more explicitly.

Performance Measures

There are two types of performance measures used in firm's performance evaluation and compensation plans : financial and non-financial ones. Financial performance measures reflect the achievement of financial goals. Most of them are based on periodic earnings (quarterly or annually), components of earnings, or a variation of earnings. Non-financial performance measures usually are not measured in monetary terms and often reflect the drivers of financial performance such as measures of organizational learning and growth, business production process, efficiency, and customer value. They are mainly involved with subjectivity measures or indices.

The perceived inadequacies in traditional financial performance measures which are based on accounting figures have motivated a variety of performance measurement innovations ranging from the improvement of financial performance measures to inclusion of non-financial performance measures in the performance-measurement system (Ittner et al., 1997).

Integral performance measurement to track and adjust firm's strategy can be established through concept of the balanced scorecard by Kaplan and Norton (1992). In addition to the usual financial perspective using aspect of financial measures, it forces a firm to incorporate the customer perspective, firm's internal perspective, and firm's innovation and learning perspective.

For the purpose of this research, limited numbers of financial and non-financial performance measures are selected to make those experimental units become more concentrated during the experimental periods. These measures are listed in Table 1 and Table 2, and will be used in firm's performance evaluation and compensation plans later.

Table 1: Financial Performance Measures

Number	Measures
1	Earnings per Share
2	Price/Earnings Ratio (P/E Ratio)
3	Profit
4	Profit Growth
5	Percentage of Cost Reduction
6	Sales Growth
7	Percentage of Quality Cost on Sales
8	Percentage of Cost on Sales
9	Significant Financial Ratios (e.g., ROA, Liquidity Ratio, Inventory Turnover, etc.)

Table 2: Non-financial Performance Measures

Number	Measures
1	Productivity
2	Customer Response Time
3	Market Share Growth
4	Reputation and Image of Organization
5	Customer Retention
6	Level of Concentration on Research and Development
7	Customer Satisfaction Index
8	Percentage of Customer Complaints
9	Product/Services Quality

Compensation Plans

Evidence indicates that the use of non-financial performance measures in compensation plans is increasing. Of course, organizations have used non-financial performance measures for managing operations for many years, but including them in compensation plans is an important development.

Based on "Expectancy Theory" involving compensation plans, effort is high when employees have a high expectancy that their efforts affect performance and that the performance will be rewarded appropriately. That is in order to motivate employee, the compensation plans have to cover all performance measures that fully reflect employee's efforts. Financial performance measures alone are considered to be insufficient to capture all aspects of these employee's efforts especially when his or her efforts will benefit the firm's

success in the long run, e.g., the effort to increase customer satisfaction and brand royalty, the effort to improve product or process efficiency. Therefore, non-financial performance measures are included in the compensation plans to capture these types of employee's efforts. However, different types of competitive strategy result in different emphasis on the employee's efforts in some way. Hence, there is no single best compensation plan that fits all firms where they pursue different types of strategy.

For the purpose of this research, compensation plans that included only financial performance measures or emphasis more on financial ones are called "Short-term" compensation plans and those that emphasis more on non-financial performance measures are called "Long-term" compensation plans. Also, only compensation plans of managing director is considered since this is the executive level that takes part in the selection of a firm's competitive strategy.

The Postulated Model of Competitive Strategy, Firm's Performance Evaluation, and Compensation Plans

It is questionable about the relative weights placed on financial and non-financial performance measures in firm's performance evaluation and compensation plans. Several researchers, having done so far, find the same results where firms that exhibit a differentiation strategy put more weights on non-financial criteria than firms that exhibit low-cost strategy in bonus system (e.g., Govindarajan and Gupta (1985), Simon (1987), Ittner et al. (1997)). The studies find that the weights placed on both financial and non-financial performance measures depend on the choices of competitive strategy from which the firms have selected. This finding supports the "Contingency Theory" where there is no best design for a management accounting information system, but that it depends on situation factors. As a result of these studies, the postulated model can be characterized as Figure 2 and Figure 3.

Figure 2: The Postulated Model for Relationship of Competitive Strategy, Firm's Performance Evaluation, and Compensation Plans

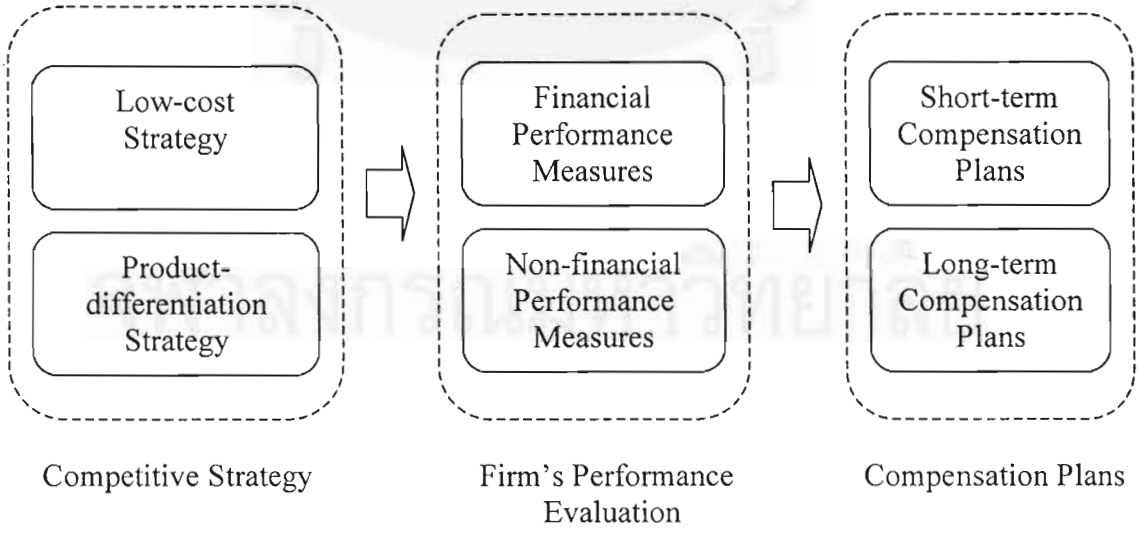
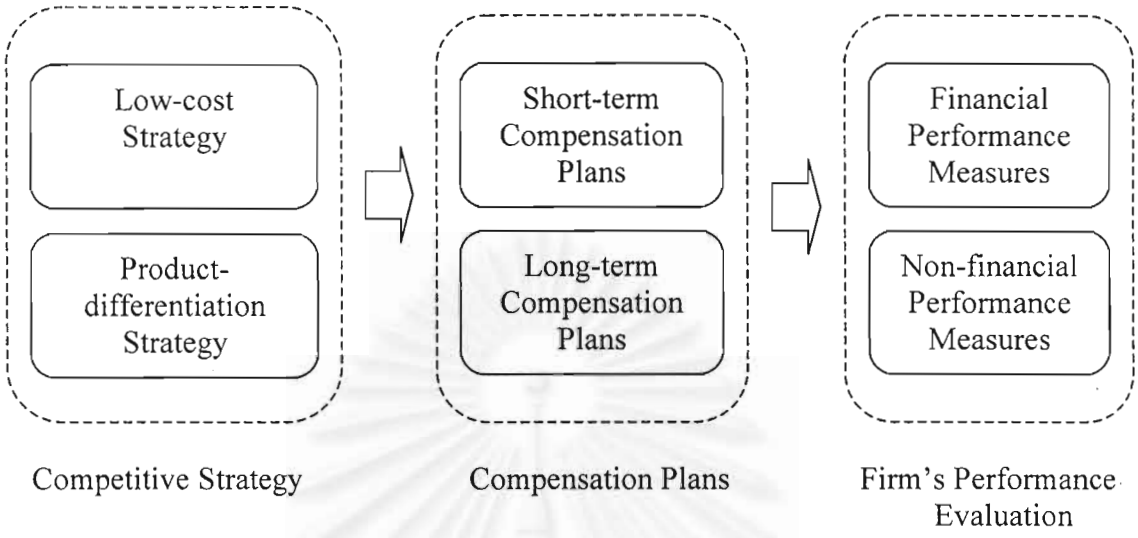


Figure 3 : The Postulated Model for Relationship of Competitive Strategy, Compensation Plans, and Firm's Performance Evaluation



Statements of Problem and Research Hypotheses

The proposition according to aforementioned rationale, contingency theory, and expectancy theory relating to competitive strategy, firm's performance evaluation, and compensation plans can be listed as the following :

Proposition : Competitive strategy affects weights placed on performance measures used for firm's performance evaluation and compensation plans. Given a competitive strategy, consistency of weights placed on performance measures for these two purposes is evidenced.

From the proposition and Figure 2, the two associated hypotheses are developed as follows :

H1 : Under low-cost strategy, a firm will place more weights on financial performance measures for firm's performance evaluation resulting in short-term oriented compensation plans.

H2 : Under product-differentiation strategy, a firm will place more weights on non-financial performance measures for firm's performance evaluation resulting in long-term oriented compensation plans.

From the proposition and Figure 3, the two associated hypotheses are developed as follows :

H3 : Under low-cost strategy, a firm will follow short-term oriented compensation plans resulting in more weights placed on financial performance measures for firm's performance evaluation.

H4 : Under product-differentiation strategy, a firm will follow long-term oriented compensation plans resulting in more weights placed on non-financial performance measures for firm's performance evaluation.

Research Methodology

Materials and Equipments

This research is a case-based experiment to overcome the high limitation of data retrieval from real business entity. Two cases are developed from two prototype firms in the pulp and paper industry to represent two scenario of two business competitive strategies: low-cost and product-differentiation strategies. These two cases provide general information of the industry and the firms, the administration and production process, the compensation plans and the selective financial ratios. Hiddens within the descriptive of each case are key characteristics reflecting the competitive strategy selected by the firm. The experimental units have to capture these characteristics along the lines and decide by themselves the competitive strategy selected by the firm of the assigned case.

Experimental Units

Eight groups of MBA students studying at the Faculty of Commerce and Accountancy, Chulalongkorn University, Thailand, participate in this experiment. Four groups of the students belong to regular MBA program where the students are not required working experience. The average experience of these groups is around one year and these groups are used as control ones. The other four groups of the students belong to executive MBA program where the students are required at least 3 to 8 years of working experience. These groups are used as treated ones. The reason of dividing MBA students into control and treated groups is that it is presumed that the experience in some ways affects the attitude and perspective of those who manage business. Within both control and treated groups, the students are divided further to Chief Executive Officer (CEO) and Managing Director (MD) sub-groups. Combining the control and treated groups after subdividing into CEO and MD sub-groups with the two developed cases representing low-cost and product-differentiation firms, the experimental units can be shown in Table 3. Each student represents each one of the experimental units in this research. Students know just only their assigned position within a firm.

Table 3: Details of Experimental Units

Competitive Strategy	Position	Working Experience	
		Regular MBA (Controlled Groups)	Executive MBA (Treated Groups)
Low-cost	CEO	Group of 31 Students	Group of 40 Students
	MD	Group of 30 Students	Group of 37 Students
Product-differentiation	CEO	Group of 38 Students	Group of 35 Students
	MD	Group of 42 Students	Group of 32 Students

Design of the Experiment

Two groups of regular MBA students are randomly selected to read a developed case. One group is masked to be CEO of the firm of the case. The other is masked to be MD of the same firm. The rest two groups of regular MBA students read the other developed case. Also, one group is masked to be CEO and the other is masked to be MD. The design is the same for four groups of executive MBA students. All 8 groups will be experimented separately, independently, and randomly for the purpose of bias reduction. In each run of the experiment, each student is instructed, monitored by researchers, and asked to crystallize the significance of the study, to understand the role he or she is masked, and to read the assigned case very intensively and carefully. Then each student, under the role-mask experiment, has to evaluate the two evaluation forms attached to the case. Each experiment lasts about 2 hours. The conceptual framework and meaning of competitive strategy, firm's performance evaluation, and compensation plans are understood by each student.

Dependent and Independent Variables

Dependent Variables

After each run of the experiment, observations are collected through three identical evaluation forms used for different purposes. The first form (Appendix A) is used by both CEO and MD groups to place weights on given financial and non-financial performance measures in order to evaluate the overall performance of the firm that they belong to (depending on which case is distributed to them). The second form (Appendix B) is used by CEO groups to place weights on given financial and non-financial performance measures in order to be used in compensation plans for MD. The third form (Appendix C) is used by MD groups to place weights on given financial and non-financial performance measures that they expect the CEO will use in compensation plans for them. It should be noted that in all evaluation forms both financial and non-financial performance measures are mixed together.

The variables and their corresponding weights for both financial and non-financial performance measures after reclassified are shown in Table 4 and Table 5, respectively.

Table 4: Financial Performance Measures

Weight	Measures
V_1	Earnings per Share
V_2	Price/Earnings Ratio (P/E Ratio)
V_3	Profit
V_4	Profit Growth
V_5	Percentage of Cost Reduction
V_6	Sales Growth
V_7	Percentage of Quality Cost on Sales
V_8	Percentage of Cost on Sales
V_9	Significant Financial Ratios (e.g., ROA, Liquidity Ratio, Inventory Turnover, etc.)

Table 5: Non-financial Performance Measures

Weight	Measures
W_1	Productivity
W_2	Customer Response Time
W_3	Market Share Growth
W_4	Reputation and Image of Organization
W_5	Customer Retention
W_6	Level of Concentration on Research and Development
W_7	Customer Satisfaction Index
W_8	Percentage of Customer Complaints
W_9	Product/Services Quality

Each student within each experimental unit is asked to place weight on each performance measure denoted by $V_j; j = 1,2,...,9$ and $W_j; j = 1,2,...,9$ as shown in Table 4 and Table 5, respectively. Then response observations were calculated as the following:

$$FM_i = V_{i1} + V_{i2} + ... + V_{i,9}; i = 1,2,....., n$$

$$NFN_i = W_{i1} + W_{i2} + ... + W_{i,9}; i = 1,2,..., n$$

where $FM_i; i = 1,2,..., n$ is defined as total weight of financial performance measures, $NFM_i; i = 1,2,..., n$ is defined as total weight of non-financial performance measures, and n is the number of students in each experimental unit. The value range of FM_i and NFM_i for each response observation is subject to the condition that $FM_i + NFM_i = 153$. Then, for model A corresponds to H1 and H2, the response observations considered as dependent variable are $FM_i; i = 1,2,..., n$ calculated from the second and the third evaluation forms. And for model B corresponds to H3 and H4, the response observations considered as dependent variable are $FM_i; i = 1,2,..., n$ calculated from the first evaluation form. Both dependent variables are considered as random variables from business random phenomena, which can be determined by their probability distributions. As a result of the design of evaluation forms, FM_i and NFM_i can be interchangeably used for the analysis. Then, response variable used in this research is FM_i and there are two dependent variables for the study. The first one is the dependent variable from response observations FM_i calculated from the second and the third evaluation forms. The second dependent variable is the one from response observations FM_i calculated from the first evaluation form.

Independent Variables

The independent variables used in the experiment to confirm the specified hypotheses are the total weight of financial performance measures (FM_i) from the first evaluation form which is used for firm's performance evaluation, the total weight of financial performance measures (FM_i) from the second and third evaluation forms which is used for compensation plans, competitive strategy, business position, and status of MBA students whether they are controlled or treated groups. The two strategies are experimented by two developed cases : low-cost and product-differentiation ones. The total weight of financial performance measures for firm's performance evaluation and the total weight of financial performance measures for compensation plans are treated as co-variables in the study while the competitive strategy is treated as a treatment factor in the experiment. Both variables are experimented as independent variables. The business position (CEO and MD), and status of MBA students (controlled and treated) are treated as controlling variables.

According to the hypotheses and the aforementioned response variables and all explanatory variables both independent variables and controlling variables, the proposition can be diagrammed in two models as shown in Figure 4 and Figure 5. Model A corresponds to H1 and H2 and Model B corresponds to H3 and H4.

Figure 4 : Model A : Relationship among Competitive Strategy, Total Weight of Financial Performance Measures for Firm's Performance Evaluation, and Total Weight of Financial Performance Measures for Compensation Plans Regarding to Business Position and Status of MBA Students

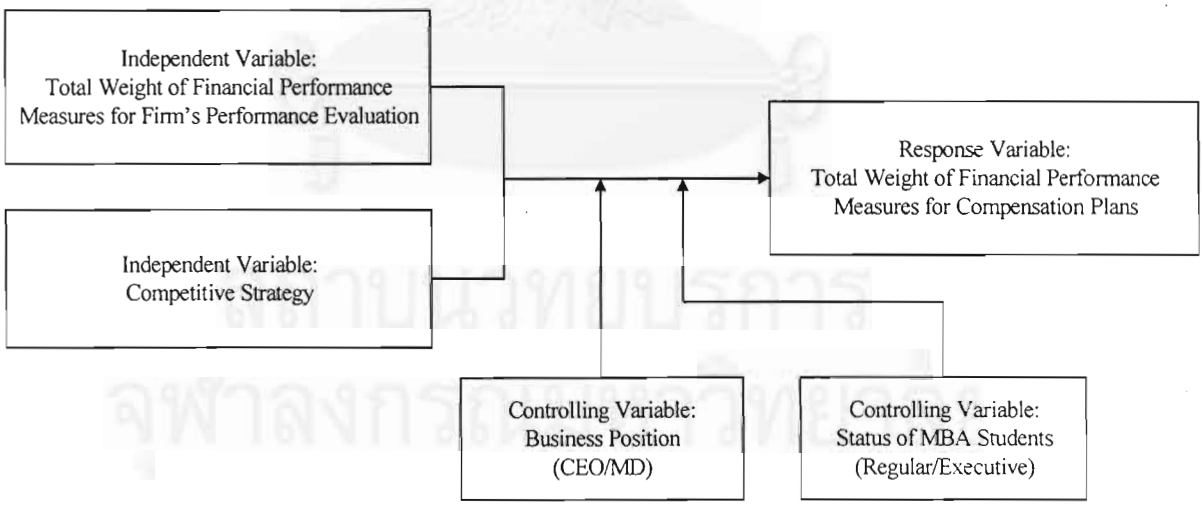
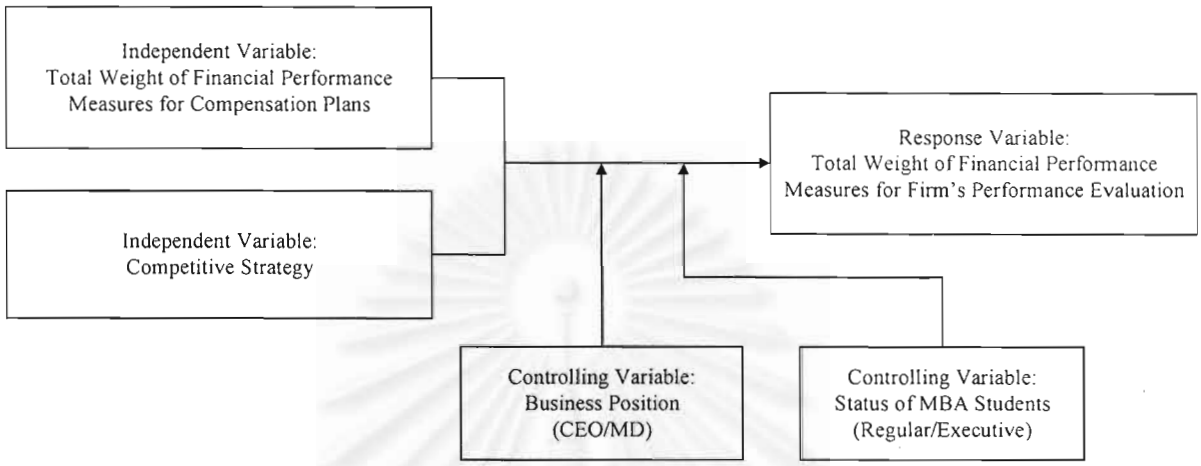


Figure 5 : Model B : Relationship among Competitive Strategy, Total Weight of Financial Performance Measures for Firm's Performance Evaluation, and Total Weight of Financial Performance Measures for Compensation Plans Regarding to Business Position and Status of MBA Students



Statistical Analyses and Their Assumptions

All hypotheses are accomplished with regression analysis. For Model A which corresponds to H1 and H2, the total weight of financial performance measures for compensation plans of each student is used as a response variable. The competitive strategy is treated as independent variable. Because this competitive strategy is a qualitative variable and manipulated by researchers, then it is treated as a treatment factor which has two levels, low cost and product differentiation. The total weight of financial performance measures for firm's performance evaluation is used as another independent variable. This variable is a quantitative one. The status of MBA students, controlled (regular MBA) and treated (executive MBA) groups, and the business position are used to be other independent variables but are treated as controlling variables. With the limitation of this parametric technique, it is required to check assumptions on response variables so that the validity could be accomplished. These assumptions are independence, homogeneity of variances, and normality of response variables. The independence test on response variables is not necessary due to randomization process of the experiment. The Kolmogorov-Smirnov test for normality is used to check goodness-of-fit for the response variables and the run test for independence is used to check the validity of response variables.

Therefore, the defined multiple linear regression model for the first group of hypotheses (H1 and H2) is shown as follows :

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \varepsilon_i ; i = 1,2,...,n$$

where

Y_i is total weight of financial performance measures for compensation plans,

X_{1i} is a dummy variable and used as a controlling variable for two types of competitive strategy (X_{1i} = 0 represents low-cost strategy, X_{1i} = 1 represents product-differentiation strategy),

X_{2i} is total weight of financial performance measures for firm's performance evaluation,

X_{3i} is a dummy variable and used as a controlling variable for two business position categories (X_{3i} = 0 represents CEO position, X_{3i} = 1 represents MD position),

X_{4i} is a dummy variable and used as a controlling variable for two status of MBA student categories (X_{4i} = 0 represents regular MBA group, X_{4i} = 1 represents executive MBA group).

This multiple linear regression model is used to evaluate how total weight placed on financial performance measures for firm's performance evaluation affects the compensation plans for executives.

For Model B which corresponds to the other group of hypotheses (H3 and H4), the defined multiple linear regression model is developed based on the same concept as that of the first group with the exception that total weight of financial performance measures for firm's performance evaluation is used as a response variable and total weight of financial performance measures for compensation plans is used as an independent variable. The defined model is shown as follows :

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \varepsilon_i ; i = 1,2,...,n$$

where

Y_i is total weight of financial performance measures for firm's performance evaluation,

X_{1i} is a dummy variable and used as a controlling variable for two competitive strategy categories (X_{1i} = 0 represents low-cost strategy, X_{1i} = 1 represents product-differentiation strategy),

X_{2i} is total weight of financial performance measures for compensation plans ,

X_{3i} is a dummy variable and used as a controlling variable for two business position categories (X_{3i} = 0 represents CEO position, X_{3i} = 1 represents MD position),

X_{4i} is a dummy variable and used as a controlling variable for two status of MBA student categories (X_{4i} = 0 represents regular MBA group, X_{4i} = 1 represents executive MBA group).

Also, this multiple regression model is used to evaluate how the compensation plans for executives affect the firm's performance evaluation. For the validity evaluation, the assumptions on dependent observations are also checked.

Study Results

(1) Test of Model A : Relationship among Total Weight of Financial Performance Measures for Firm's Performance Evaluation, Competitive Strategy, and Total Weight of Financial Performance Measures for Compensation Plans Regarding to Business Position and Status of MBA Students

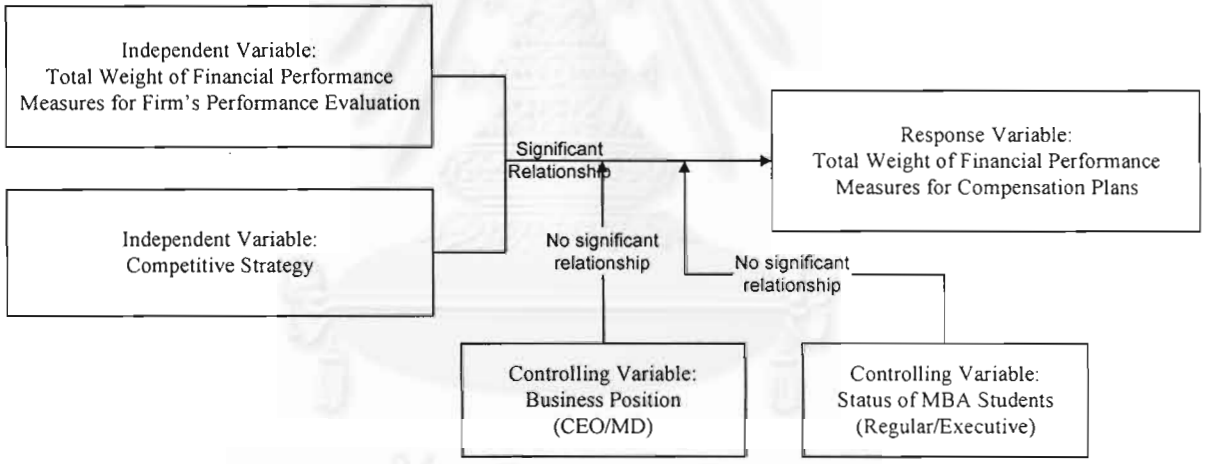
The results from multiple regression analysis show that, with significance level of 0.05, there is statistically significant partial relationship between total weight of financial performance measures for firm's performance evaluation as an independent variable and total weight of financial performance measures for compensation plans for executives as a dependent variable with the t statistic value of 2.78 (p-value = 0.006) with its regression coefficient of 0.190 which is a positive-sign coefficient. The competitive strategy, another independent variable, has the t statistic value of –3.20 (p-value = 0.002) with its regression coefficient of –7.88 which is a negative-sign coefficient. According to the above results, the business position and status of MBA students are assigned as controlling variables. However, the analysis shows no significant evidence for business position affecting total weight of financial performance measures for compensation plans with the t statistic value of 0.75 (p-value = 0.454). Also, the analysis shows no significant evidence of status of MBA students affecting total weight of financial performance measures for compensation plans with the t statistic value of –0.86 (p-value = 0.392). The regression coefficients for both variables are 1.73 and –2.065, respectively.

The above results mean that different types of competitive strategy and different firm's performance evaluation will result in different compensation plans for executives. Because the significant regression coefficient value for competitive strategy (low-cost strategy = 0 and product-differentiation strategy = 1) is –7.88 and it is negative value (-), it shows significant evidence that total weight of financial performance measures for compensation plans for a firm with low-cost strategy is greater than total weight of financial performance measures for compensation plans for a firm with product-differentiation strategy. More specifically, for a low-cost strategy firm, the higher the estimated total weight of financial performance measures for firm's performance evaluation is, the higher the estimated total weight of financial performance measures is used in compensation plans for executives. On the other hand, for a product-differentiation firm, the lower the estimated total weight of financial performance measures is, the lower the estimated total weight of financial performance measures is used in compensation plans for executives. All estimated regression coefficients are shown in Table 6 and the relationship results are summarized in Figure 6.

Table 6: Multiple Regression Analysis of Total Weight of Financial Performance Measures for Compensation Plans on Competitive Strategy and Total Weight of Financial Performance Measures for Firm's Performance Evaluation as Independent Variables and Business Position and Status of MBA Students as Controlling Variables

Variable	Linear Regression Coefficients (B)	t Values	p Values
Competitive Strategy	-7.88	-3.20	0.002
Total Weight of Financial Performance Measures for Firm's Performance Evaluation	0.19	2.78	0.006
Business Position	1.73	0.75	0.454
Status of MBA Students	-2.07	-0.86	0.392
Constant	75.73	10.87	0.000

Figure 6 : Model A : Relationship Results



To validate the multiple regression analytical procedure, all assumptions were diagnostically checked using overall standard criteria for being a reasonable and workable analysis as shown in Table 7.

Table 7: Checklists for being Reasonable and Workable Multiple Regression Analysis

Criteria	Checking[1] Results
1. Are regression coefficients significantly different from zero using F or t tests?	Yes
2. Are signs (+ or -) of regression coefficients appropriate?	Yes
3. Are residuals normally distributed with mean zero?	Yes
4. Do residuals display the constant variance pattern?	Yes
5. Does the casewise residuals plot exhibit a random (independence) pattern?	Yes
6. Are there any outliers on the casewise-standard residual plot?	Yes

(2) Test for Model B : Relationship among Total Weight of Financial Performance Measures for Firm's Performance Evaluation, Competitive Strategy, and Total Weight of Financial Performance Measures for Compensation Plans Regarding to Business Position and Status of MBA Students

The results from multiple regression analysis show that, with significance level of 0.05, there is statistically significant partial relationship between total weight of financial performance measures for compensation plans for executives as an independent variable and total weight of financial performance measures for firm's performance evaluation as a dependent variable with the t statistic value of 2.78 (p-value = 0.006) with its regression coefficient of 0.142 which is a positive-sign coefficient. The competitive strategy, another independent variable, has the t statistic value of –5.03 (p-value = 0.000) with its regression coefficient of –10.42 which is a negative-sign coefficient. According to the above results, the business position and status of MBA students are assigned as controlling variables. The analysis shows no significant evidence of business position affecting total weight of financial performance measures for firm's performance evaluation with the t statistic value of –0.32 (p-value = 0.746). However, the analysis shows significant evidence of status of MBA students affecting total weight of financial performance measures for firm's performance evaluation with they t statistic value of –4.40 (p-value = 0.000). The regression coefficients for both variables are –0.65 and –8.86, respectively.

The above results mean that with different types of competitive strategy and different compensation plans for executives will result in different firm's performance evaluation. Because the significant regression coefficient value for competitive strategy (low-cost strategy = 0 and product-differentiation strategy = 1) is –10.42 and it is negative value (-), it shows significant evidence that total weight of financial performance measures for firm's performance evaluation with low-cost strategy is greater than total weight of financial performance measures for firm's performance evaluation for a firm with product-differentiation strategy. More specifically, for a low-cost strategy firm, the higher the estimated total weight of financial performance measures for compensation plans for

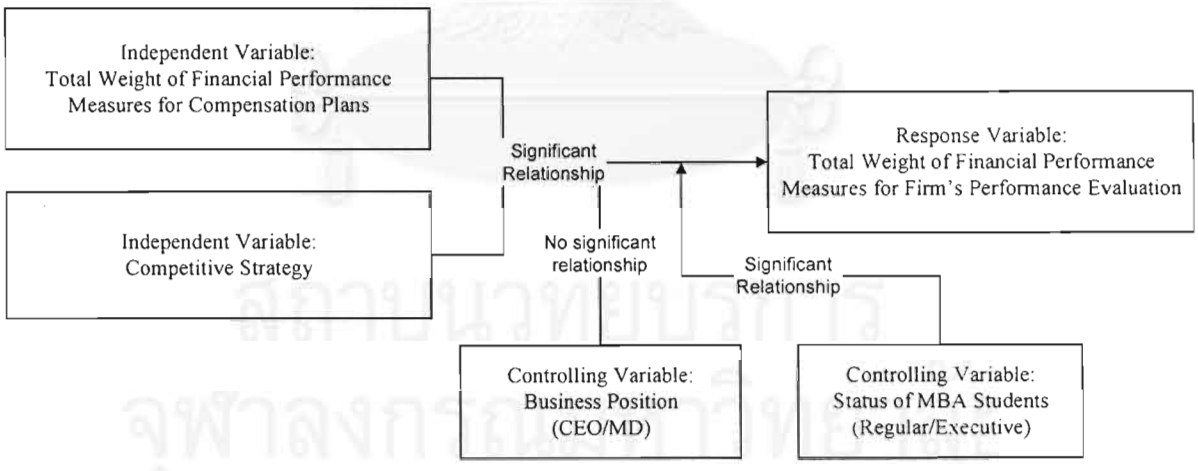
[1] All analytical results are in Appendix D.

executives is, the higher the estimated total weight of financial performance measures is used for firm's performance evaluation. On the other hand, for a product-differentiation firm, the lower the estimated total weight of financial performance measures for compensation plans for executives is, the lower the estimated total weight of financial performance measures is used for firm's performance evaluation. All estimated regression coefficients are shown in Table 8 and the relationship results are summarized in Figure 7

Table 8: Multiple Regression Analysis of Total Weight of Financial Measures for Firm's Performance Evaluation on Competitive Strategy and Total Weight of Financial Measures for Compensation Plans as Independent Variables and Business Position, Status of MBA Students as Controlling Variables

Variable	Linear Regression Coefficients (B)	t Values	p Values
Competitive Strategy	-10.42	-5.03	0.000
Total Weight of Financial Performance Measures for Compensation Plans	0.14	2.78	0.006
Business Position	-0.65	-0.32	0.746
Status of MBA Students	-1.87	-4.40	0.000
Constant	82.41	15.82	0.000

Figure 7 : Model B : Relationship Results



To validate the multiple regression analytical procedure, all assumptions were diagnostically checked using overall standard criteria for being a reasonable and workable analysis as shown in Table 9.

Table 9: Checklists for being Reasonable and Workable Multiple Regression Analysis

Criteria	Checking[2] Results
1. Are regression coefficients significantly different from zero using F or t tests?	Yes
2. Are signs (+ or -) of regression coefficients appropriate?	Yes
3. Are residuals normally distributed with mean zero?	Yes
4. Do residuals display the constant variance pattern?	Yes
5. Does the casewise residuals plot exhibit a random (independence) pattern?	Yes
6. Are there any outliers on the casewise-standard residual plot?	Yes

(3) Comparisons of Estimated Weights on Financial and Non-financial Performance Measures between Low-cost Strategy and Product-differentiation Strategy Firms

(3.1) Estimated Weights on Financial and Non-financial Performance Measures for Firm's Performance Evaluation

The analysis in (2) shows no significant evidence of business position affecting total weight of financial performance measures for firm's performance evaluation. However, the analysis shows significant evidence of status of MBA students affecting total weight of those measures for firm's performance evaluation. Therefore, the comparisons of estimated weights of financial and non-financial performance measures for firm's performance evaluation between low-cost strategy and product-differentiation strategy firms are shown separately for different status of MBA students, regular and executive MBA students, which proxy the working experience of the experimental units. The details of these comparisons are shown in Tables 10 and 11 respectively.

From these two tables, for a low-cost strategy firm, executives significantly place more weights on almost all financial performance measures than those of a product-differentiation firm for firm's performance evaluation. For a product-differentiation strategy firm, on the other hand , executives significantly place more weights on almost all non-financial performance measures than those of a low-cost strategy firm for the same purpose. It should be noted that for a low-cost strategy firm under the perspective of controlled groups or regular MBA students, productivity which is the most well-know non-financial performance measure, also plays crucial role for firm's performance evaluation.

[2] All analytical results are in Appendix E.

Table 10: Comparisons of Estimated Weights of Financial and Non-financial Performance Measures for Firm's Performance Evaluation between Low-cost Strategy and Product-differentiation Strategy Firms : Controlled Groups or Regular MBA Students

Performance Measures	Low-cost Strategy	Product-differentiation Strategy	t Values	p-Values (One-Tailed)
Financial Performance Measures				
• Earnings per Share	9.87*	7.04	3.57	0.0005
• Price/Earnings Ratio (P/E Ratio)	6.47	5.47	1.31	1.000
• Profit	11.0*	7.82	4.46	0.000
• Profit Growth	13.25*	10.82	4.0	0.000
• Percentage of Cost Reduction	12.65*	6.37	9.93	0.000
• Sales Growth	8.42	7.85	.87	0.190
• Percentage of Quality Cost on Sale	8.01	7.21	1.31	1.000
• Percentage of Cost on Sales	11.84*	6.26	9.35	0.000
• Significant Financial Ratios (e.g., ROA, Liquidity Ratio, Inventory Turnover, etc.)	11.77*	9.83	2.48	0.008
Non-financial Performance Measures				
• Productivity	9.49*	7.64	2.77	0.003
• Customer Response Time	3.50	5.29*	-2.91	0.002
• Market Share Growth	10.74	12.01*	-1.95	0.030
• Reputation and Image of Organization	6.91	9.35*	-2.98	0.002
• Customer Retention	7.93	9.48*	-2.43	0.008
• Level of Concentration on Research and Development	4.20	7.15*	-4.48	0.000
• Customer Satisfaction Index	7.45	12.51*	-7.75	0.000
• Percentage of Customer Complaints	4.82	8.66*	-4.64	0.000
• Product/Services Quality	7.38	13.85*	-8.57	0.000

Table 11: Comparisons of Estimated Weights of Financial and Non-financial Performance Measures for Firm's Performance Evaluation between Low-cost Strategy and Product-differentiation Strategy Firms : Treated Groups or Executive MBA Students

Performance Measures	Low-cost Strategy	Product-differentiation Strategy	t Values	p-Values (One-Tailed)
Financial Performance Measures				
• Earnings per Share	9.40*	7.13	.96	0.002
• Price/Earnings Ratio (P/E Ratio)	8.38*	5.80	3.34	0.0005
• Profit	10.29*	7.95	3.50	0.0005
• Profit Growth	12.31*	10.59	2.81	0.003
• Percentage of Cost Reduction	11.06*	8.25	4.58	0.000
• Sales Growth	7.84	7.53	.51	0.300
• Percentage of Quality Cost on Sale	8.35*	6.73	2.79	0.003
• Percentage of Cost on Sales	9.92*	8.13	2.78	0.003
• Significant Financial Ratios (e.g., ROA, Liquidity Ratio, Inventory Turnover, etc.)	10.31	10.30	.01	0.500
Non-financial Performance Measures				
• Productivity	7.73	7.28	.72	0.240
• Customer Response Time	3.91	6.32*	-3.98	0.000
• Market Share Growth	10.00	10.94	-1.61	0.050
• Reputation and Image of Organization	7.10	8.99*	-2.36	0.010
• Customer Retention	7.86	7.97	-.17	0.430
• Level of Concentration on Research and Development	3.90	6.41*	-4.12	0.000
• Customer Satisfaction Index	8.60	10.75*	-3.11	0.001
• Percentage of Customer Complaints	5.47	7.66*	-2.81	0.003
• Product/Services Quality	9.55	12.46*	-4.05	0.000

(3.2) Estimated Weights on Financial and Non-financial Performance Measures for Compensation Plans

The analysis in (1) shows no significant evidence of both business position and status of MBA students affecting total weight of financial performance measures for compensation plans. Therefore, the comparisons of estimated weights of these measures for compensation plans between low-cost strategy and product-differentiation strategy firms will be shown based on overall perspective which is in Table 12.

The results in this table are consistent with those for firm's performance evaluation. Also, a low-cost strategy firm places significantly more weights on productivity than a product-differentiation firm for compensation plans.

Table 12: Comparisons of Estimated Weights on Financial and Non-Financial Performance Measures for Firm's Performance Evaluation between Low-cost Strategy and Product-differentiation Strategy Firms

Performance Measures	Low-cost Strategy	Product-differentiation Strategy	t Values	p-Values (One-Tailed)
Financial Performance Measures				
• Earnings per Share	0.63	9.71	1.46	0.070
• Price/Earnings Ratio (P/E Ratio)	8.00*	6.77	1.99	0.020
• Profit	11.55*	10.48	2.12	0.020
• Profit Growth	12.88	12.24	1.43	0.080
• Percentage of Cost Reduction	11.55*	8.43	7.19	0.000
• Sales Growth	9.36	9.98	-.59	0.280
• Percentage of Quality Cost on Sale	7.79*	7.08	1.72	0.043
• Percentage of Cost on Sales	10.16*	7.87	5.40	0.000
• Significant Financial Ratios (e.g., ROA, Liquidity Ratio, Inventory Turnover, etc.)	10.65	10.30	.62	0.270
Non-financial Performance Measures				
• Productivity	8.58*	7.16	2.92	0.002
• Customer Response Time	3.63	4.72*	-2.47	0.007
• Market Share Growth	11.03	11.30	-.66	0.260
• Reputation and Image of Organization	6.46	6.92	-.85	0.200
• Customer Retention	6.84	7.33	-1.12	0.130
• Level of Concentration on Research and Development	3.61	5.56*	-4.62	0.000
• Customer Satisfaction Index	7.53	9.63*	-4.53	0.000
• Percentage of Customer Complaints	5.21	7.22*	-3.7	0.000
• Product/Services Quality	8.01	11.03*	-5.36	0.000

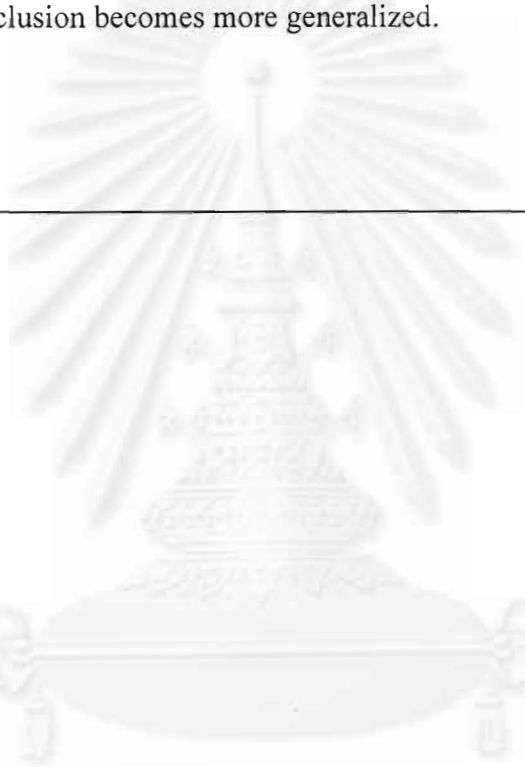
Research Conclusions

It could be concluded that competitive strategy has significant effect on weights placed on performance measures for both firm's performance evaluation and compensation plans. For a low-cost strategy firm, executives will emphasis more on financial performance measures than non-financial ones for both firm's performance evaluation and compensation plans regardless of their business position and working experience. For a product-differentiation strategy firm, executives will, however, emphasis more on non-financial performance measures than financial ones for both stated purposes. It is also evidenced that productivity which is a non-financial performance measure plays more crucial role in firm's performance evaluation and compensation plans for a low-cost strategy firm than for product-differentiation one. This may be due to the fact that usually low-cost strategy firms emphasis on efficiency as a way to reduce cost and productivity is one mean to measure efficiency.

It is interesting from the research results that for a given competitive strategy, the control system designed by first considering the appropriate firm's performance evaluation system to match with that strategy in terms of weights placed on performance measures followed by the compensation plans will be consistent with the control system designed by first considering the appropriate compensation plans to match with that same strategy and followed by the firm's performance evaluation system.

Implications for Future Research

This research is a case-based experiment. Although this type of research is widely followed in management accounting research area, extension to the real world situation is encouraged. Also, the experiment may be repeated with different firm's environment and industry so that the conclusion becomes more generalized.



REFERENCES

Poter, M.E., *Competitive Strategy*, New York : Free Press, 1980.

Otley, D.T., The Contingency Theory of Management Accounting : Achievement and Prognosis, *Accounting, Organizations and Society*, Vol. 5, 4, 1980, pp. 413-428.

Govindarajan, V. and A. Gupta, Linking Control Systems to Business Unit Strategy: Impact on Performance, *Accounting, Organizations and Society*, Vol. 10, 1, 1985, pp. 51-66.

Simon, R., Accounting Control Systems and Business Strategy: An Empirical Analysis, *Accounting, Organizations and Society*, Vol. 12, 4, 1978, pp. 357-374.

Kaplan, R.S., and D.P. Norton, The Balanced Scorecard-Measures that Drive Performance, *Harvard Business Review*, Vol. 70, 1, 1982, pp. 71-79.

Ittner, C.D., D.F. Larcker, and M.V. Rajan, The Choice of Performance Measures in Annual Bonus Contracts, *The Accounting Review*, Vol. 72, 2, April 1997, pp. 231-255.

_____ ,and _____ , Innovations in Performance Measurement : Trends and Research Implications, *Journal of Management Accounting Research*, Vol. 10, 1998, pp. 205-238.

Hilton, R.W., M.W. Maher, and F.H. Setto, *Cost Management : Strategies for Business Decisions*, Second Edition, Mcgraw-Hill/Irwin, 2003.

Appendix A

Evaluation Form 1 : Weights Placed on Performance Measures for Firm's Performance Evaluation

Objective: To evaluate the important levels of performance measures which executives (CEO/ MD) perceived in using them for the purpose of firm's overall performance evaluation.

Personal Data:

1. Gender ☐ Male ☐ Female
2. Age.....years
3. Education.....Area of concentration at undergraduate level.....
4. Experience.....years.

Based on the case provided, which types of competitive strategy do you think the firm select.?

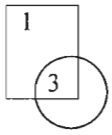
☐ Low-cost strategy ☐ Product-differentiation strategy

Step 1 : Consider the following performance measures that the case-study firm applies to evaluate the overall firm's performance :

1. Earnings per Share
2. Price/ Earnings Ratio or P/E Ratio
3. Productivity
4. Customer Response Time
5. Profit
6. Profit Growth
7. Percentage of Cost Reduction
8. Sales Growth
9. Percentage of Quality Cost on Sales
10. Market Share Growth
11. Reputation and Image of Organization
12. Customer Retention
13. Level of Concentration on Research and Development
14. Customer Satisfaction Index
15. Percent of Cost on Sales
16. Significant Financial Ratios (e.g. ROA, Liquidity Ratio, Inventory Turnover, etc.)
17. Percentage of Customer Complaint
18. Product/Service Quality

Step 2 : Rank the Importance of Performance Measures

1. Consider performance measures provide in step 1 and compare them in pairwise, e.g. compare performance measures no. 1 with  no.3

2. Circle performance measure that consider more important for firm's overall performance evaluation. 

3. Compare each pair until finish.

1 2															
1 3	2 3														
1 4	2 4	3 4													
1 5	2 5	3 5	4 5												
1 6	2 6	3 6	4 6	5 6											
1 7	2 7	3 7	4 7	5 7	6 7										
1 8	2 8	3 8	4 8	5 8	6 8	7 8									
1 9	2 9	3 9	4 9	5 9	6 9	7 9	8 9								
1 10	2 10	3 10	4 10	5 10	6 10	7 10	8 10	9 10							
1 11	2 11	3 11	4 11	5 11	6 11	7 11	8 11	9 11	10 11						
1 12	2 12	3 12	4 12	5 12	6 12	7 12	8 12	9 12	10 12	11 12					
1 13	2 13	3 13	4 13	5 13	6 13	7 13	8 13	9 13	10 13	11 13	12 13				
1 14	2 14	3 14	4 14	5 14	6 14	7 14	8 14	9 14	10 14	11 14	12 14	13 14			
1 15	2 15	3 15	4 15	5 15	6 15	7 15	8 15	9 15	10 15	11 15	12 15	13 15	14 15		
1 16	2 16	3 16	4 16	5 16	6 16	7 16	8 16	9 16	10 16	11 16	12 16	13 16	14 16	15 16	
1 17	2 17	3 17	4 17	5 17	6 17	7 17	8 17	9 17	10 17	11 17	12 17	13 17	14 17	15 17	16 17
1 18	2 18	3 18	4 18	5 18	6 18	7 18	8 18	9 18	10 18	11 18	12 18	13 18	14 18	15 18	16 18	17 18

Step 3 : Summarize Important Circles of Each Performance Measures

1. Count frequency of important circles placed on each performance measures and put the numbers in the Score Column.

2. In case performance measures have equal scores, return to the pairwise between those performance measures in step 2 and add extra 0.5 points to the circled one.

Performance Measures	Scores
1. Earnings per Share	
2. Price/ Earnings Ratio or P/E Ratio	
3. Productivity	
4. Customer Response Time	
5. Profit	
6. Profit Growth	
7. Percentage of Cost Reduction	
8. Sales Growth	
9. Percentage of Quality Cost on Sales	
10. Market Share Growth	
11. Reputation and Image of Organization	
12. Customer Retention	
13. Level of Concentration on Research and Development	
14. Customer Satisfaction Index	
15. Percent of Cost on Sales	
16. Significant Financial Ratios (e.g. ROA, Liquidity Ratio, Inventory Turnover, etc.)	
17. Percentage of Customer Complaint	
18. Product/Service Quality	

Appendix B

Evaluation Form 2 : Weights Placed on Performance Measures for Compensation Plans

Objective : To evaluate the important levels of performance measures that CEO perceived in using them for MD's

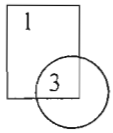
Step 1 : Consider the following performance measures that the CEO of the case – study firm consider in MD's compensations plans :

1. Earnings per Share
2. Price/ Earnings Ratio or P/E Ratio
3. Productivity
4. Customer Response Time
5. Profit
6. Profit Growth
7. Percentage of Cost Reduction
8. Sales Growth
9. Percentage of Quality Cost on Sales
10. Market Share Growth
11. Reputation and Image of Organization
12. Customer Retention
13. Level of Concentration on Research and Development
14. Customer Satisfaction Index
15. Percent of Cost on Sales
16. Significant Financial Ratios (e.g. ROA, Liquidity Ratio, Inventory Turnover, etc.)
17. Percentage of Customer Complaint
18. Product/Service Quality

Step 2 : Rank the Importance of Performance Measures

1. Consider performance measures provide in step 1 and compare them in pairwise, e.g. compare performance measures no. 1 with no.3

2. Circle performance measure that consider more important for firm's overall performance evaluation.



3. Compare each pair until finish.

1 2																
1 3	2 3															
1 4	2 4	3 4														
1 5	2 5	3 5	4 5													
1 6	2 6	3 6	4 6	5 6												
1 7	2 7	3 7	4 7	5 7	6 7											
1 8	2 8	3 8	4 8	5 8	6 8	7 8										
1 9	2 9	3 9	4 9	5 9	6 9	7 9	8 9									
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1 17	2 17	3 17	4 17	5 17	6 17	7 17	8 17	9 17	10 17	11 17	12 17	13 17	14 17	15 17	16 17	
1 18	2 18	3 18	4 18	5 18	6 18	7 18	8 18	9 18	10 18	11 18	12 18	13 18	14 18	15 18	16 18	17 18

Step 3 : Summarize Important Circles of Each Performance Measures

1. Count frequency of important circles placed on each performance measures and put the numbers in the Score Column.

2. In case performance measures have equal scores, return to the pairwise between those performance measures in step 2 and add extra 0.5 points to the circled one.

Performance Measures	Scores
1. Earnings per Share	
2. Price/ Earnings Ratio or P/E Ratio	
3. Productivity	
4. Customer Response Time	
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6. Profit Growth	
7. Percentage of Cost Reduction	
8. Sales Growth	
9. Percentage of Quality Cost on Sales	
10. Market Share Growth	
11. Reputation and Image of Organization	
12. Customer Retention	
13. Level of Concentration on Research and Development	
14. Customer Satisfaction Index	
15. Percent of Cost on Sales	
16. Significant Financial Ratios (e.g. ROA, Liquidity Ratio, Inventory Turnover, etc.)	
17. Percentage of Customer Complaint	
18. Product/Service Quality	

Appendix C

Evaluation Form 3 : Weights Placed on Performance Measures for Compensation Plans

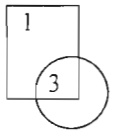
Objective : To evaluate the important levels of performance measures that MD expects CEO to apply in his/her compensation plans

Step 1 : Consider the following performance measures that MD of the case – study firm consider in MD's compensation plans :

1. Earnings per Share
2. Price/ Earnings Ratio or P/E Ratio
3. Productivity
4. Customer Response Time
5. Profit
6. Profit Growth
7. Percentage of Cost Reduction
8. Sales Growth
9. Percentage of Quality Cost on Sales
10. Market Share Growth
11. Reputation and Image of Organization
12. Customer Retention
13. Level of Concentration on Research and Development
14. Customer Satisfaction Index
15. Percent of Cost on Sales
16. Significant Financial Ratios (e.g. ROA, Liquidity Ratio, Inventory Turnover, etc.)
17. Percentage of Customer Complaint
18. Product/Service Quality

Step 2 : Rank the Importance of Performance Measures

1. Consider performance measures provide in step 1 and compare them in pairwise, e.g. compare performance measures no. 1 with  no.3

2. Circle performance measure that consider more important for firm's overall performance evaluation. 

3. Compare each pair until finish.

1 2															
1 3	2 3														
1 4	2 4	3 4													
1 5	2 5	3 5	4 5												
1 6	2 6	3 6	4 6	5 6											
1 7	2 7	3 7	4 7	5 7	6 7										
1 8	2 8	3 8	4 8	5 8	6 8	7 8									
1 9	2 9	3 9	4 9	5 9	6 9	7 9	8 9								
1 10	2 10	3 10	4 10	5 10	6 10	7 10	8 10	9 10							
1 11	2 11	3 11	4 11	5 11	6 11	7 11	8 11	9 11	10 11						
1 12	2 12	3 12	4 12	5 12	6 12	7 12	8 12	9 12	10 12	11 12					
1 13	2 13	3 13	4 13	5 13	6 13	7 13	8 13	9 13	10 13	11 13	12 13				
1 14	2 14	3 14	4 14	5 14	6 14	7 14	8 14	9 14	10 14	11 14	12 14	13 14			
1 15	2 15	3 15	4 15	5 15	6 15	7 15	8 15	9 15	10 15	11 15	12 15	13 15	14 15		
1 16	2 16	3 16	4 16	5 16	6 16	7 16	8 16	9 16	10 16	11 16	12 16	13 16	14 16	15 16	
1 17	2 17	3 17	4 17	5 17	6 17	7 17	8 17	9 17	10 17	11 17	12 17	13 17	14 17	15 17	16 17
1 18	2 18	3 18	4 18	5 18	6 18	7 18	8 18	9 18	10 18	11 18	12 18	13 18	14 18	15 18	16 18	17 18

Step 3 : Summarize Important Circles of Each Performance Measures

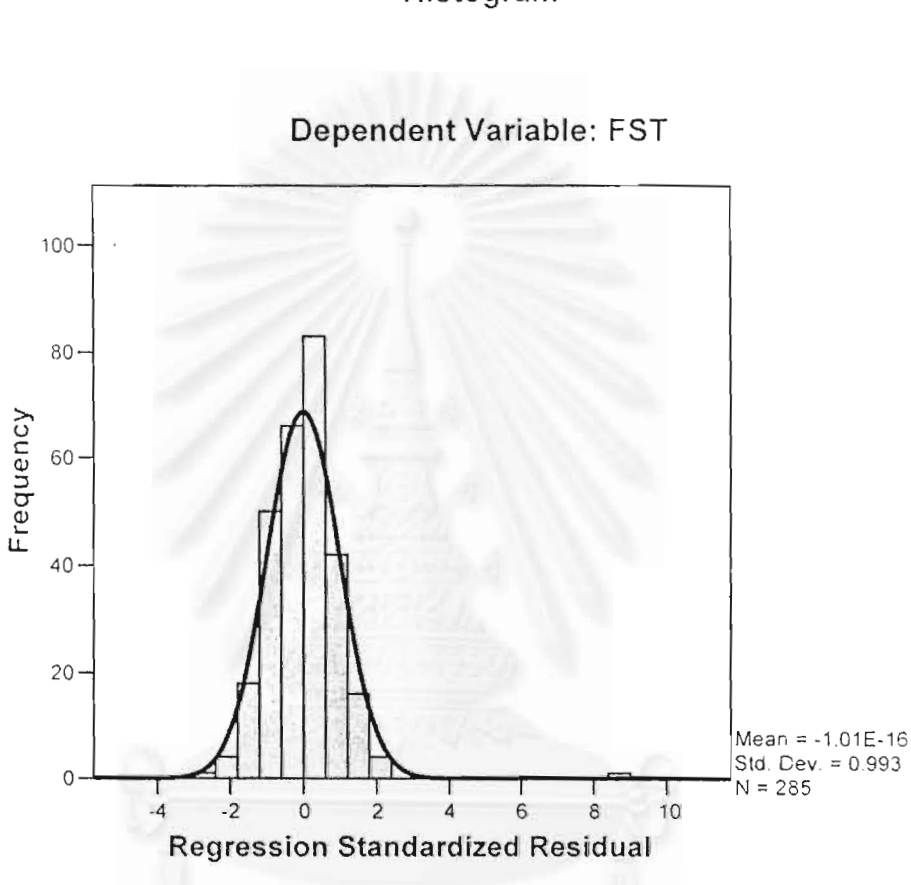
1. Count frequency of important circles placed on each performance measures and put the numbers in the Score Column.

2. In case performance measures have equal scores, return to the pairwise between those performance measures in step 2 and add extra 0.5 points to the circled

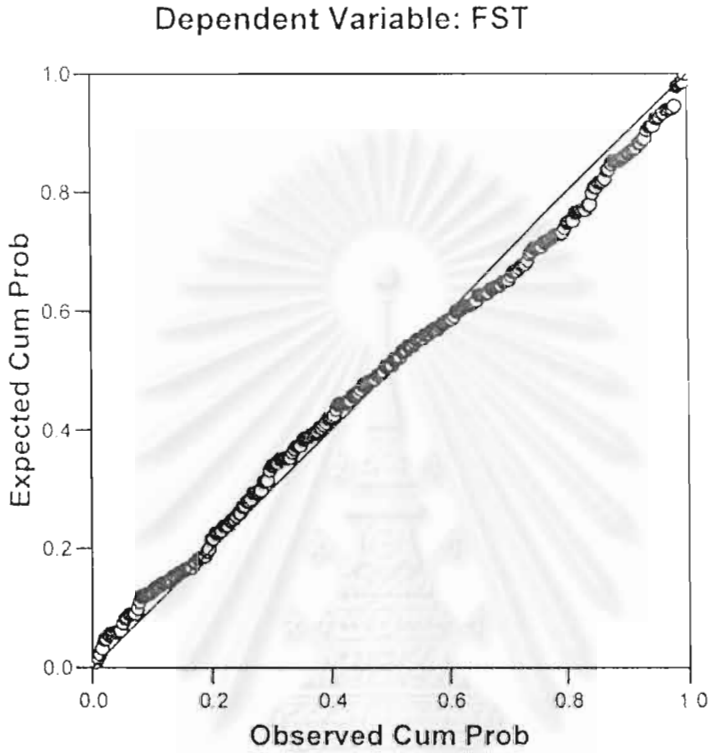
Performance Measures	Scores
1. Earnings per Share	
2. Price/ Earnings Ratio or P/E Ratio	
3. Productivity	
4. Customer Response Time	
5. Profit	
6. Profit Growth	
7. Percentage of Cost Reduction	
8. Sales Growth	
9. Percentage of Quality Cost on Sales	
10. Market Share Growth	
11. Reputation and Image of Organization	
12. Customer Retention	
13. Level of Concentration on Research and Development	
14. Customer Satisfaction Index	
15. Percent of Cost on Sales	
16. Significant Financial Ratios (e.g. ROA, Liquidity Ratio, Inventory Turnover, etc.)	
17. Percentage of Customer Complaint	
18. Product/Service Quality	

Appendix D

Normality Diagnostic Checking by Histogram and Normal Probability Plot



Normal P-P Plot of Regression Standardized Residual



Normality Diagnostic Checking by One-sample Kolmogorov-Smirnov Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Standardized Residual	285	.0000000	.99293277	-2.59588	8.51117

One-Sample Kolmogorov-Smirnov Test

		Standardized Residual
N		285
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	.99293277
Most Extreme Differences	Absolute	.064
	Positive	.064
	Negative	-.039
Kolmogorov-Smirnov Z		1.079
Asymp. Sig. (2-tailed)		.195
Exact Sig. (2-tailed)		.197
Point Probability		.000

a. Test distribution is Normal.

b. Calculated from data.

Independence Diagnostic Checking by Run Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Standardized Residual	285	.0000000	.99293277	-2.59588	8.51117

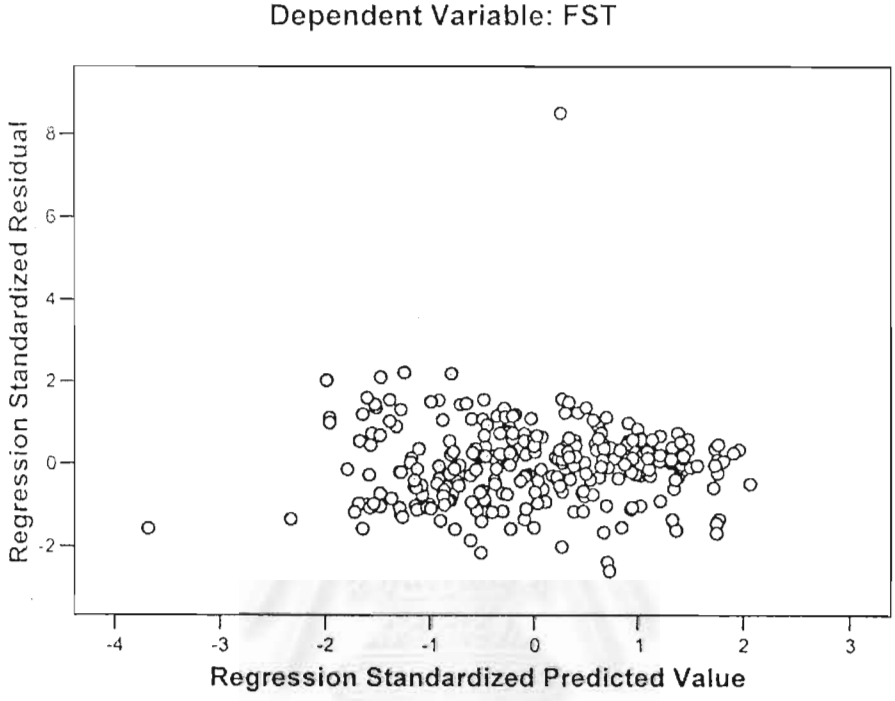
Runs Test

	Standardized Residual
Test Value[a]	.02609
Cases < Test Value	142
Cases >= Test Value	143
Total Cases	285
Number of Runs	152
Z	1.009
Asymp. Sig. (2-tailed)	.313
Exact Sig. (2-tailed)	.314
Point Probability	.029

a. Median

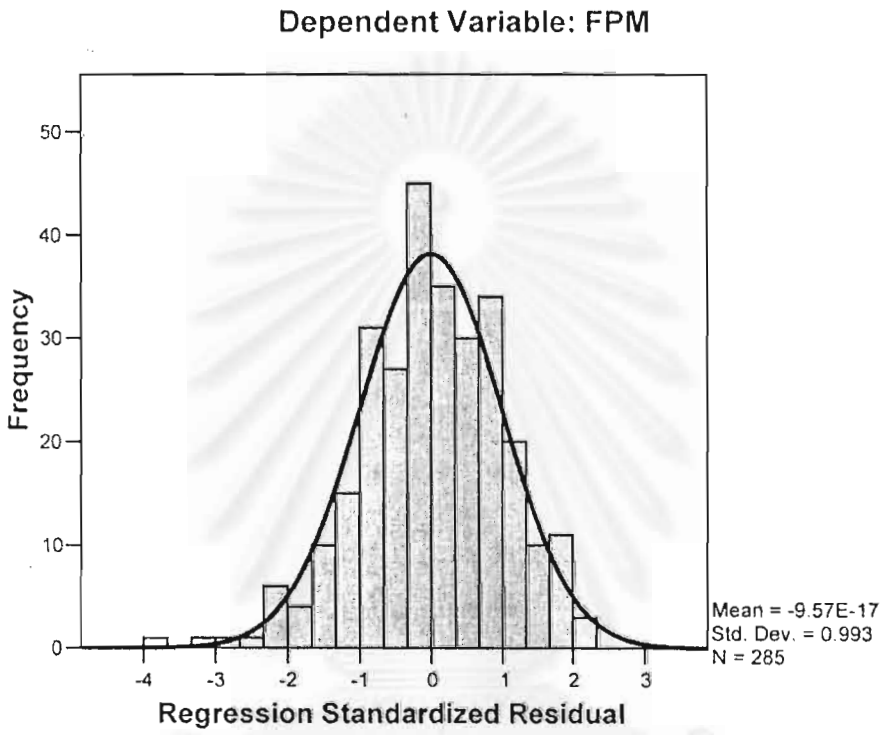
Homogeniety-of-Variances Diagnostic Checking

Scatterplot

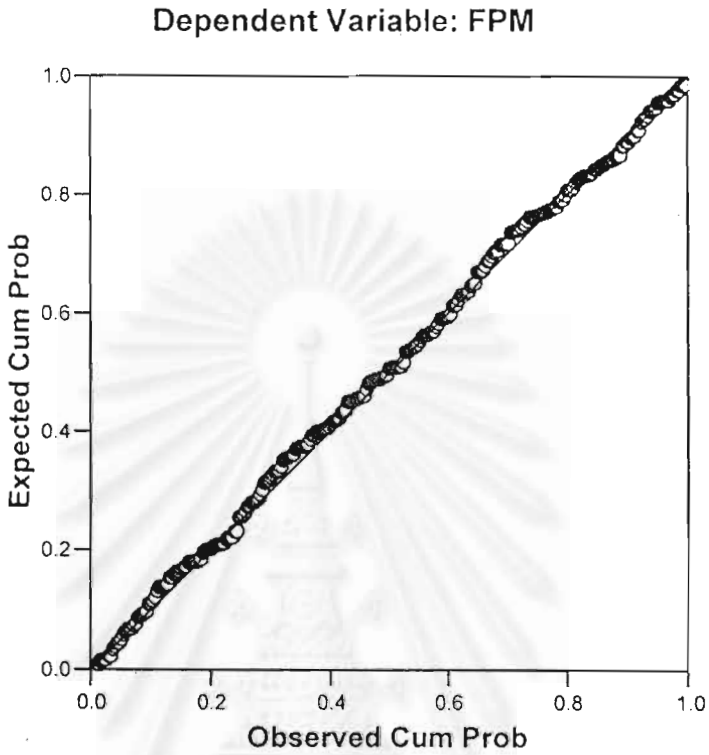


Appendix E

Normality Diagnostic Checking by Graphical Methods



Normal P-P Plot of Regression Standardized Residual



Normality Diagnostic Checking by One-sample Kolmogorov-Smirnov Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Standardized Residual	285	.0000000	.99293277	-3.76828	2.18578

One-Sample Kolmogorov-Smirnov Test

		Standardized Residual
N		285
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	.99293277
Most Extreme Differences	Absolute	.033
	Positive	.023
	Negative	-.033
Kolmogorov-Smirnov Z		.556
Asymp. Sig. (2-tailed)		.917
Exact Sig. (2-tailed)		.930
Point Probability		.000

a. Test distribution is Normal.

b. Calculated from data.

Independent Diagnostic Checking by Run Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Standardized Residual	285	.0000000	.99293277	-3.76828	2.18578

Runs Test

	Standardized Residual
Test Value[a]	.01718
Cases < Test Value	142
Cases >= Test Value	143
Total Cases	285
Number of Runs	147
Z	.416
Asymp. Sig. (2-tailed)	.678
Exact Sig. (2-tailed)	.678
Point Probability	.043

a. Median

Homogeneity-of-Variances Diagnostic Checking

Scatterplot