

An Evaluation of the Impact of Strategic Linkage on BSC Usage and Performance

Choongseop Lee^{*1}, Lookman Buky Folami^{**} and Yanghon Chung^{***}

Previous research supports the link between the balanced scorecard and firm performance. Research further suggests that this link may be affected by strategy, though few studies provide empirical support for this link. The purpose of this study is to examine and provide empirical evidence on how strategic linkage affects the relationship between BSC usage and performance. The research also examines factors that affect the extent of BSC usage in an environment outside the United States. Based on a sample of 259 South Korean firms, the results indicate that strategic linkage mediates the link between BSC usage and firm performance, though there was no moderating effect. The results provide support for the significant effects of organization size, market position and market competition on BSC usage. Marginal support is found for market uncertainty on BSC usage. Results indicate that product life-cycle and market growth do not impact on BSC usage.

1. Introduction

The competitive business environment has made choice of a performance measurement system one of the key decisions that organizations have to deal with today (Kaplan and Norton 1996, 2000). Many organizations have made the transition from performance measurement models biased towards financial measures to ones that integrate both financial and non-financial measures (Banker et al. 2004; Lipe and Salterio 2000; Ittner and Larker 1998a). Organizations have come to realize that exclusive reliance on financial indicators could promote behaviour that sacrifices long-term value creation for short-term performance (Porter, 1992).

One of the more integrated performance measurement models today is the balanced scorecard (BSC). The balanced scorecard is a strategic performance measurement tool that integrates financial measures with three other non-financial perspectives (Kaplan and Norton, 2001). The three non-financial perspectives include the customer perspective, internal business process perspective and learning and growth perspective. BSC emphasizes causal relationships among multiple measurements and their linkage to corporate strategies. BSC is widely considered as an effective tool for communicating and controlling corporate strategy (Kaplan and Norton 2004 2001a, 2001b, 2000, 1996; Malina

*: Department of Business Administration, Dong-A University, South Korea.

** : Department of Accounting, Bryant University, 1150 Douglas Pike, Smithfield, RI 02917, USA. Email: lfolami@bryant.edu

***: Department of Business and Technology Management, Korea Advanced Institute of Science and Technology (KAIST), South Korea.

and Selto 2001). For BSC to be effective as a performance measurement system it is important that BSC measures be properly aligned with strategy and financial performance measures (Banker et al. 2004; Krumweide et al. 2004; Kaplan and Norton 2001, 1996; Govindarajan and Gupta 1985). Prior research suggests that when strategic information and strategically linked measures are given adequate consideration in the implementation and use of BSC, a more effective performance measurement system is possible (Aranda & Arellano 2010; Humphreys and Trotman 2011)

While a number of studies propose the importance of strategic BSC usage in terms of firm performance, few studies have empirically examined the role of strategic linkage between BSC usage and performance and how it affects performance (Kaplan and Norton 1992, 1996; Chow 1997; Cravens 2000; Hoque and James 2000; Malina and Selto 2001; Maiga and Jacobs 2003). Previous research on BSC focused primarily on the use of different measures in terms of performance evaluation: whether financial or non-financial; common or unique; strategically linked or not; and subjective or objective (Lipe and Salterio, 2000; Ittner et al. 2003; Libby et al. 2004; Banker et al. 2004; Roberts et al. 2004).

The current study extends prior research by examining the effect of strategic linkage on the relationship between BSC usage and firm performance. Based on Hoque and James (2000), the study investigates contextual factors likely to impact BSC usage in a South Korean context. Though BSC practices are well documented in the United States, there is scant evidence on BSC practices in other countries (Creelman 1998; Hoque and James 2000). Hoque and James (2000) examined BSC usage among Australian companies and found organization size and product life cycle to be significantly related to BSC usage but strength of market position was not significant. In addition to the BSC usage factors used in Hoque and James (2000) three market environmental factors are included because BSC implementation has been driven primarily by changes in the firms' market environment.

The findings of the current study contribute to prior literature by providing evidence on the importance of strategic linkage in the study of the relationship between BSC usage and firm performance. In addition, the results support the findings of prior research (Hoque and James, 2000) on the importance of organization size to the adoption of BSC and strengthen external validity for this factor. This study also extends prior research by providing evidence on the importance of market competition, market uncertainty and market position to BSC usage in the South Korean context.

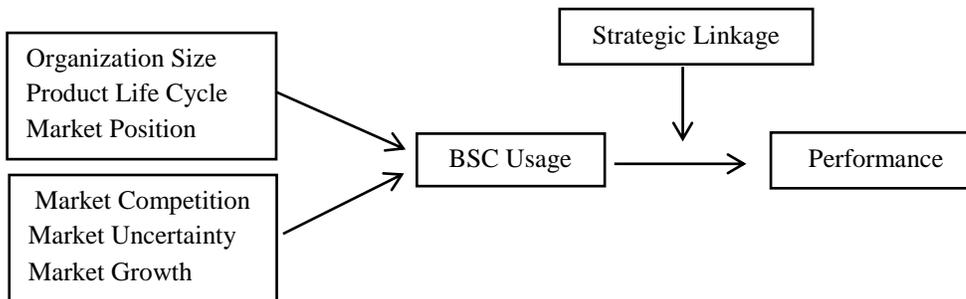
In the next section of the paper, the hypotheses and variables used to investigate the research issues are discussed including a brief review of the relevant literature. After that the research method of the paper is described, followed by the section on results and discussion and the section on summary and conclusion.

2. Research Hypotheses and Variables

While prior research provides limited support for the link between BSC usage and performance (Kaplan and Norton 2001; Hoque and James 2000), few studies have examined the role of strategy in this link (Maiga and Jacobs 2003; Gosselin 2011). The

primary objective of this research is to investigate if strategic linkage affects the relationship between BSC usage and firm performance, as depicted in Figure 1.

Figure 1



Since Kaplan and Norton (1992), BSC has been one of the most useful tools for measurement of firm performance because of its ability to communicate and measure progress towards attainment of the firm's vision and strategy. By linking multiple measures to firm strategy, BSC establishes cause and effect relationship in a control system that enhances firm performance for survival and long-term benefit (Banker et al. 2004; Kaplan and Norton 2000).

Using archival data, Malina and Selto (2001) found evidence to support the effectiveness of BSC as a strategic communication and management control device. They also suggest that by using BSC, an effective management control mechanism appears indirectly to cause positive outcomes through strategic alignment. Banker et al. (2004) suggest that managers must understand the linkage between performance measures and business unit strategy in order to benefit from the adoption of the BSC and for the successful implementation of a BSC. Govindarajan and Gupta (1985) find that benefits from using non-financial performance criteria are related to the business unit's strategy. Hoque and James (2000) allude to the absence of strategic linkage in their model as a possible explanation for their failure to find support for the interaction effects of the three BSC usage factors on firm performance. In a longitudinal study conducted among financial institutions, Aranda and Arellano (2010) found that the implementation of BSC increased the importance given to BSC measures by managers and also increased consensus on strategic priorities.

Based on prior research and the discussions above, the hypothesis used to examine the primary objective of this study is as follows:

H₁: Strategic linkage has a significant impact on the relationship between BSC usage and firm performance.

In addition to the primary objective, this study examines BSC usage factors found to be significant in prior research of Hoque and James (2000) and additional market environment factors that have the potential to affect BSC usage in a South Korean context. Hoque and James (2000) found organization size and product in the early life cycle stage to be positively associated with BSC usage among a sample of 166 Australian firms. They did

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not find any support for market position. External validity would be strengthened for these factors if the same association persists among South Korean firms.

Three additional market environment factors used in this study that have the potential to affect BSC usage are market competition, market uncertainty and market growth. These market environment factors are included as BSC usage factors because the inception of BSC is due primarily to market environmental changes in conjunction with the necessity for non-financial measures.

Globalization of the market place creates intense competition for firms in industrialized nations. The highly competitive market place creates a need for businesses to measure non-financial factors and value drivers leading to success in this new environment (Maiga and Jacobs 2003). Said et al. (2003) mention that competition compelled firms to implement management strategies and systems to overcome dissatisfaction with traditional short-term perspective financial measurement systems. Because BSC strategically integrates financial and non-financial performance measures, firms in highly competitive markets are more likely to use BSC than firms in less competitive markets (Chung et al. 2004; Kaplan and Norton 2001).

On perceived environmental uncertainty, the literature suggests that firms operating in environments characterized by uncertainty have a greater need for non-financial measures than firms operating in stable environments (Gosselin 2011; Said et al. 2003; Ittner and Lacker 1998). Rees and Sutcliffe (1994) suggest that since nonfinancial measures are contemporaneously available for the purpose of evaluating the impact of current efforts, managers can take immediate corrective action by using them. Said et al (2003) mention that incorporating non-financial measures in a firm's performance measurement system may also provide more direct and timely feedback on managerial effort. Ittner and Larker(1998) suggest positive associations between perceived environmental uncertainty and the demand for non-financial measures. Thus, firms operating in a market environment characterized by uncertainty may have a greater need for BSC.

Businesses that operate in a market environment with rapid growth need to adapt management system to be able to take advantage of the opportunities in the market place and avoid the danger of uncontrolled rapid growth. Said et al. (2003) mention that prospector firms seek new products and markets via initiatives which are unlikely to be immediately evident in the financial results of operations. Firms that follow a prospector strategy are more likely to rely on non-financial measures of performance (Govindarajan and Gupta 1985). BSC retains measures of financial performance (the lagging outcome indicators) but supplements these with non-financial measures on the drivers and lead indicators of future financial performance (Kaplan and Norton, 2001a). In order to stay competitive and on target in growing market environment, firms are more likely to place greater emphasis on an integrated financial and non-financial performance measurement system such as BSC.

Based on prior research and the above discussions, the hypothesis to examine the associations between BSC usage and the six factors mentioned is as follows:

H₂: BSC usage is positively associated with organization size, businesses with products at the early stage, businesses with a strong market position, market competition, market uncertainty and market growth.

3. Research Method

3.1 Sample and Data Collection

A questionnaire was mailed to the Controller and Financial Directors at the head office of a random sample of 500 South Korean companies from the Hankyung Business Yearbook in 2004. The packages sent out include a cover letter and a postage-paid self-addressed envelope. Follow-up calls were made to the Controllers and Directors to encourage participation in the survey and confirm the receipt of the questionnaire. The data were collected from a sample of 270 firms (54% response rate), out of which 11 were not usable because they were not complete. The final sample size in this study is 259 (51.8% response rate) consisting of 115 manufacturing (44.9%), 67 service (26.2%), and 60 merchandizing (23.4%) companies. The minimum sample size required to reject α equals .05 at power level of 90% and effect size of .10 for 6 independent variables is 181¹ (Cohen, Cohen, West & Aiken 2003). A sample size of 259 is more than adequate for power analysis at the 90% interval level. Table 1 provides other characteristics of the final sample of firms.

3.2 Measurement of Variables

3.2.1 Organization Size

Organization size was initially measured by using number of employees. The natural log of the number of employees is used in the regression model because of non-normality issues. That is consistent with the approach used in prior studies (Merchant 1984; Libby and Waterhouse 1996; Schniderman 1999, Hoque and James 2000).

Table 1: Sample Characteristics

Characteristics	Number	Minimum	Maximum	Mean	Std.
Employee	259	2	20,000	528.77	1853.22
Sales*	251	1	2,000,000	14,331.09	134,272.94
Assets*	247	0.5	1,051,450	11,364.66	83,632.06
Business year	255	1.03	72.41	19.48	15.27
Area	Total: 256, Manufacturing (115, 44.9%), Merchandizing (60, 23.4%), Service (67, 26.2%), Others (14, 5.5%)				
Size within industry	Total: 258, Small (74, 28.7%), Middle (128, 49.6%), Large (56, 21.7%)				

*unit: 100,000,000 korean won (about 100,000 dollars)

3.2.2 Product Life-Cycle Stage

Product life-cycle consists of four stages. They are emerging, growing, maturing, and declining stages. Based on the survey instrument used by previous studies (Merchant 1984; Hoque and James 2000), this study asks respondents to indicate the percentage of products they have at each of the four stages. The variable used in the regression, product life-cycle stage (PLS), is then calculated as in Hoque and James (2000) by the sum of the percentages for emerging and growing stages minus the sum of the percentages for maturing and declining stages.

3.2.3 Market Position

This variable is measured using the instrument developed by Merchant (1984) and used in a previous study (Hoque and James 2000). Using a five-point Likert scale, respondents indicate their company's revenue share relative to the leading firms in their industry (segment).

3.2.4 Market Competition

Market competition is one of three dimensions of market environment. The other two dimensions are Market uncertainty and Market growth. Based on prior studies (Roure and Maidique 1986; Sandberg and Hofer 1987), the study uses ten questionnaire items by 5-point Likert scale from 1(very much not so) to 5(very much so) to measure market environment. Factor analysis with varimax rotation of the ten items reveals three underlying dimensions named as market competition, market uncertainty and market growth. Eigen values of these factors are above 1 and Cronbach's alpha for the variables are higher than 0.65, showing satisfactory internal reliability for further analysis. Table 2 provides the result of factor analysis on the market environment variables.

Market competition variable encompasses 4 survey items which are number of competitors within industry, degree of entry barrier, existence of similar competitors and competition of main product or service. The mean score of the item measurements is used in further analysis for the study. The variable represents the competitiveness of the market in which the business operates (Kaplan and Norton 1992, 1996a, 1996b).

3.2.5 Market Uncertainty

Market uncertainty variable measures uncertainty with regards to product life-cycle, customer preference, technology changes and competitors' behavior (Merchant 1984; Kaplan and Norton 1992, 1996a, 1996b). Market uncertainty factor consists of 4 survey items listed and the mean score of measurements is used in further analysis.

Table 2: Result of Factor Analysis, Market Environment

Items	Loadings	Eigen Value	Common Factor (Cronbach's α)
Many competitors to the company in industry	0.806	2.905	Market Competition (0.7305)
Easiness for other companies to go into the industry	0.652		
Similar competing companies (size, product/service)	0.742		
High degree of market competition of main item	0.779		
Life cycle of the main item(product, service) is short	0.647	1.991	Market Uncertainty (0.6625)
Customers' preference changes are difficult to predict	0.738		
Technologies of main items are difficult to predict	0.785		
Competing company's behavior is difficult to predict	0.607		
Comparative high growth rate of main item Industry	0.831	1.151	Market Growth (0.6576)
High undeveloped demand of the main item Industry	0.850		

* Varimax Orthogonal Rotation, Communality 60.479%

3.2.6 Market Growth

Market growth variable is measured as the factor consisting of 2 survey items such as the growth rate of the industry in which the firms operates compared to that of other industries and the degree of undeveloped market demand for the industry. The mean score of these two items is used in further analysis.

3.2.7 BSC Usage

The four perspectives of BSC are measured using a 20-item scale used in prior studies and based on the Kaplan and Norton (1992) conceptualization of BSC. The survey items of the degree of performance index usage are measured on a 5-point Likert scale ranging from 1 (not at all) to 5 (most usage). Factor analysis with varimax rotation is performed and, after excluding 3 items with low factor loadings (below 0.4), 17 items are loaded nicely on the four perspectives of BSC.

Reliability tests for the four perspectives are also performed and the results show acceptable levels (Nunnally 1967) of Cronbach's alpha (Cronbach 1951) range of .84 to .89. BSC usage measure used in the analysis is the average of the mean score for each of the four perspectives of BSC. Table 3 presents the factor analysis results for the measure.

Table 3: Result of Factor Analysis, BSC items

Items	Loadings	Eigen Value	Common Factor (Cronbach's α)
Sales Increase rate	0.857	1.008	Financial Perspective (0.8424)
Operating profit ratio	0.877		
Rate of Return on Investment	0.732		
Delivery(service) on time ratio	0.840	1.553	Customer Perspective (0.8500)
Time spent between order and delivery	0.869		
Time related to communication with the customer	0.811		
Performance related to the productivity of labor	0.636	1.870	Internal Process Perspective (0.8787)
Performance related to the efficiency of raw material	0.780		
Performance related to the increase in product quality	0.723		
Performance of the decrease in operating expense	0.778		
Degree of decrease in operating time	0.709		
Degree of success rate in developing items	0.639	7.646	Learning and Growth Perspective (0.8915)
Degree of expert knowledge in market	0.817		
Degree of expert knowledge in technology	0.826		
Degree of acceptance of acquired new knowledge	0.668		
Degree of innovation in merchandising technologies	0.631		
Degree of innovation power of organization members	0.589		

* Varimax Orthogonal Rotation, Communality 71.035%

3.2.8 Strategic Linkage

Strategic linkage can be interpreted as the alignment of firms' resources to their organization's strategy. Strategic linkage variable in this study measures the degree of BSC usage in terms of firm's strategic purpose. Kaplan and Norton (1996, 2000) suggest three ways of aligning individual performance with the overall strategy. These are communicating and educating strategies, setting goals and linking rewards to performance measures. The strategic linkage variable measures the extent of BSC efficiency for those roles.

The instrument used to measure the strategic linkage variable consists of four survey items which include degree of BSC usage for encouraging responsible management, degree of usage for communication, degree of usage for compensation basis and degree of understanding BSC indexes and recognition of their usage. These items are measured on a 5-point Likert scale ranging from 1 (very low) to 5 (very high). Factor analysis with varimax rotation of the 4 measures comes up with a single factor with eigen value of 2.75, which is enough to confirm construct validity of the variable. Cronbach's alpha for testing internal reliability of the strategic linkage variable is 0.85, an acceptable level. In further analysis, the mean score of these four items is used. Table 4 presents the factor analysis results for this measure.

Table 4: Result of Factor Analysis, Strategic Linkage

Items	Loadings	Eigen Value	Common Factor
BSC index encourage responsibility management	0.829	2.751	Strategic Linkage (0.8476)
BSC index encourage communication in organization	0.810		
Degree of linkage of BSC index to bonus system	0.828		
Understanding of BSC index and it's usage	0.850		

* Varimax Orthogonal Rotation, Communalities 68.771%

3.2.9 Organizational Performance

The measure of organizational performance is the mean of five dimensions of performance: return on investment, margin on sales, capacity utilization, customer satisfaction and product quality measured by using the same procedure followed in prior research (Hoque and James 2000; Merchant 1984; Abernethy and Lillis 1995). Along a 5-point Likert scale ranging from 1 (very low) to 5 (very high), respondents were asked to compare their company's performance on each of the five dimensions to their competitors' performance.

The factor analysis with varimax rotation for these measures reveals a single factor with eigen value of 2.63 and satisfactory Cronbach's alpha score of 0.78 for reliability of the variable. In empirical models in this study, the mean score of these 5 items is used. Table 5 presents the factor analysis results for this measure.

Table 5: Result of Factor Analysis, Organization Performance

Items	Loadings	Eigen Value	Common Factor (Cronbach's α)
Return on Investment	0.756	2.631	Organization Performance (0.7726)
Margin on sales	0.799		
Capacity Utilization	0.694		
Customer Satisfaction	0.705		
Product Quality	0.665		

* Varimax Orthogonal Rotation, Communalities 52.611%

4. Results and Discussion

Descriptive statistics for all variables are presented in Table 6. Overall, characteristics of variables in Table 6 have relatively low standard deviations compare to their means. Before testing empirical models for this study, correlations among variables were tested and the results are presented in Table 7. In Table 7, several correlations of six variables among BSC usage factors show statistically significant p-values but the sizes of corresponding coefficients are all below 0.3, indicating very weak relationships among them. The correlations between BSC usage and its factors reveal that Organization size, Market position, Market uncertainty and Market growth variables are possible influential factors on BSC usage since they are statistically significant. The correlation between Organizational

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performance and BSC usage variables is also statistically significant. The strategic linkage variable is correlated significantly both with BSC usage and Organizational performance variables. Based on a preview of relationships among variables, the empirical models of this study are expected to reveal hypothesized relations among variables with statistically meaningful interpretation for the necessary test results.

Table 6: Descriptive Statistics of Variables

Name	Abbrevatn.	mean	Std. Dev.	Theoretical Range	Actual Range
Organization Size	Size_LN	528.77 (4.58)*	1853.22 (1.78)*	NA	2 - 20,000
Product life cycle Stage	PLS_HJ	-16.46%	76.12%	-100% -- +100%	-100% -- +100%
Market Position	MKTSHR	3.51	0.98	1 -- 5	1 -- 5
Market competition	CPT_MKT	3.88	0.84	1 -- 5	1 -- 5
Market uncertainty	UCT_MKT	2.99	0.84	1 -- 5	1.5 -- 4.75
Market Growth	GWT_MKT	2.91	0.99	1 -- 5	1 -- 5
BSC Usage	TOT_USG	3.53	0.67	1 -- 5	1 -- 5
Strategic Linkage	SL4	3.63	0.80	1 -- 5	1 -- 5
Organization Performance	TO5_PFM	3.38	0.66	1 -- 5	1 -- 5

*Transformed statistics

4.1 Hypothesis 1: ANOVA and Regression Analyses

To test hypothesis 1 of the impact of strategic linkage on the relationship between BSC usage and firm performance, this study examines both the moderation and mediation effects of strategic linkage on BSC usage and performance. The purpose of testing both moderation and mediation effects is two-fold. First, the existence of either moderation effect or mediation effect indicates that strategic linkage affects the relationship between BSC usage and performance. Second, result of both tests provides some ideas of how the impact of strategic linkage works on the relationship between BSC usage and performance.

Moderation effect means that the magnitude of strategic linkage affects the strength and/or direction of the relation between BSC usage and performance. On the other hand, mediation effect means that strategic linkage represents the generative mechanism or process through which the BSC usage variable is able to influence the performance variable. In other word, moderation effect is that a sample can be divided into several sub-samples in terms of the relationship between BSC usage and performance based on the magnitude of

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strategic linkage, while mediation effect is that strategic linkage which affects the relation of all sub-samples because of the mediating function of the strategic linkage variable.

Table 7: Correlation Matrix (Pearson Coefficients), n = 259

Variable	Size_In	pls_hj	mktshr	cpt_mkt	uct_mkt	gwt_mkt	bsctot	SL4	to5_pfm
Size_In	1.000								
pls_hj	-0.129* (0.041)	1.000							
mktshr	0.177** (0.005)	-0.108 (0.092)	1.000						
cpt_mkt	-0.005 (0.941)	0.014 (0.822)	0.213** (0.001)	1.000					
uct_mkt	0.003 (0.957)	-0.019 (0.764)	0.024 (0.706)	0.287** (0.000)	1.000				
gwt_mkt	-0.071 (0.254)	0.060 (0.347)	0.182** (0.004)	-0.112 (0.073)	0.157* (0.012)	1.000			
bsctot	0.171** (0.006)	-0.021 (0.745)	0.366** (0.000)	-0.051 (0.413)	0.195** (0.002)	0.162** (0.010)	1.000		
SL4	0.122 (0.051)	-0.003 (0.959)	0.319** (0.000)	-0.034 (0.718)	0.076 (0.222)	0.195** (0.002)	0.550** (0.000)	1.000	
to5_pfm	0.196** (0.002)	-0.104 (0.102)	0.625** (0.000)	-0.090 (0.150)	0.091 (0.145)	0.282** (0.000)	0.333** (0.000)	0.462** (0.000)	1.000

** p < 0.0

4.2 Moderation Effect of Strategic Linkage

The moderation effect of the strategic linkage variable on BSC usage and performance is tested by a two-way ANOVA procedure similar to the approach used in Hoque and James (2000). BSC usage and strategic linkage variables are dichotomized into high-low groups for the two-way ANOVA model with the interaction term of BSC usage and strategic linkage variables. Moderation effect exists if the coefficient of the interaction term has statistical significance, which implies that the relationship between BSC usage and firm performance change is based on the magnitude of strategic linkage. Table 8 shows the results of ANOVA procedure.

Table 8: 2-Way ANOVA: Moderating effect - Strategic Link on BSC & Performance

Source of Variation	Sum of Squares	DF	Mean Square	F-value	Significance
Overall BSC usage (a)	15.101	1	15.101	42.518	0.000**
Strategic Linkage (b)	2.663	1	2.663	7.499	0.007**
Two-way Interaction	0.088	1	0.088	0.247	0.620
Explained	23.528	3	7.843	22.082	0.000
Residual	89.501	252	0.355		

** p < 0.05

The results in Table 8 do not support the existence of the moderation effect of strategic linkage on BSC usage and Performance. However, the results do support the existence of a significant association between performance and BSC Usage (F = 42.518, p = .0000). This is consistent with the findings of prior research (Hoque and James 2000). The results also indicate a significant association between performance and strategic linkage (F = 7.499, p = .007), a finding consistent with the conceptualization of BSC as a strategic performance measurement system (Kaplan and Norton 1996a, 1996b).

4.3 Mediation Effect of Strategic Linkage

Following the procedure in Baron and Kenny (1986), this study uses regression analyses to test for the mediation effect of strategic linkage on the relationship of BSC usage and performance. The regression models to test for mediation effect are stated below:

$$X_2 = \alpha_0 + \beta_1 X_1 + e \quad (1)$$

$$Y = \alpha_0 + \beta_2 X_1 + e \quad (2)$$

$$Y = \alpha_0 + \beta_3 X_1 + \beta_4 X_2 + e \quad (3)$$

Where Y = Organizational performance; X₁ = BSC usage; X₂ = Strategic linkage; and e = error term.

Baron and Kenny (1986) stated that mediation effect exist if all coefficients of the above three regression models are significant and β₃ is less than β₂. The results from the above regression analysis are shown in Table 9.

Table 9: Mediating Effect of Strategic Linkage

Panel A: Regression of Mediator on Independent Variable

Model: $X_2(\text{Strategic Linkage}) = \alpha_0 + \beta_1 \cdot X_1 + e$				
Variable	Coefficient	Estimate	t-value	p-value
Intercept	α_0	1.310	5.835	0.000**
X_1 : Overall BSC usage	β_1	0.657	10.504	0.000**
Adj. $R^2 = 0.300$, $F(1, 254) = 110.330(p=0.000)$, Durbin Watson = 0.910, ** $p < 0.05$				

Panel B: Regression of Dependent Variable on Independent Variable

Model: $Y(\text{Organizational Performance}) = \alpha_0 + \beta_2 \cdot X_1 + e$				
Variable	Coefficient	Estimate	t-value	p-value
Intercept	α_0	1.548	8.136	0.000**
X_1 : Overall BSC usage	β_2	0.518	9.782	0.000**
Adj. $R^2 = 0.271$, $F(1, 254) = 95.695(p=0.000)$, Durbin Watson = 1.669, ** $p < 0.05$				

Panel C: Regression of Dependent Variable on Independent Variable and Mediator

Model: $Y(\text{Organizational Performance}) = \alpha_0 + \beta_3 \cdot X_1 + \beta_4 \cdot X_2 + e$				
Variable	Coefficient	Estimate	t-value	p-value
Intercept	α_0	1.277	6.487	0.000**
X_1 : Overall BSC usage	β_3	0.382	6.203	0.000**
X_2 : Strategic Linkage	β_4	0.249	4.004	0.000**
Adj. $R^2 = 0.312$, $F(2, 253) = 58.695(p=0.000)$, Durbin Watson = 1.711, ** $p < 0.05$				

Panel D: Coefficient Comparison

Coefficient	Absolute size	t-value
β_2 in Panel B	0.518	9.782
β_3 in Panel C	0.382	6.203
Comparison : $Z = 3.741(P=0.000)$	$\beta_3 < \beta_2$	$\beta_3 < \beta_2$

Panel A in Table 9 shows the results of regression model (1). The regression model (1) has F-value of 110.330 ($p=0.000$), DW-value of 0.910, and adjusted R^2 of 0.3, indicating a well specified model with no auto-correlation of error term. The coefficient β_1 (BSC usage) is 0.657 and statistically significant at $p=0.05$ level ($t=10.504$, $p=0.000$). This test result implies that BSC usage positively and significantly affects strategic linkage. Panel B in Table 9 shows test results of regression model (2). The regression model (2) has F-value of

95.695 ($p=0.000$), DW-value of 1.669 and adjusted R^2 of 0.271, indicating a well specified model with no auto-correlation of error term. The coefficient β_2 (BSC usage) is 0.518 and statistically significant at $p=0.05$ level ($t=9.782$, $p=0.000$). The result implies that BSC usage positively and significantly affects Organizational performance. Panel C in Table 9 shows the results of regression model (3). The regression model (3) has F-value of 58.695 ($p=0.000$), DW-value of 1.711, and adjusted R^2 of 0.312, indicating a well specified model with no auto-correlation of error term. The coefficients β_3 (BSC usage) and coefficients β_4 (Strategic linkage) are 0.382 ($t=6.203$, $p=0.000$) and 0.249 ($t=4.004$, $p=0.000$), respectively. Both coefficients are significant at $p=0.05$ level and implies that BSC usage and Strategic linkage variables positively and significantly affects the Organizational performance variable in the model. Panel D in Table 9 represents comparison results of coefficient β_2 (BSC usage) in model (2) and β_3 (BSC usage) in model (3). The absolute value of β_3 (0.382) and its corresponding t-value is less than β_2 (0.518) and its t-value. Statistical significance test for the difference of β_3 and β_2 was performed by Sobel's Z-test as suggested by Baron and Kenny (1986). The test score 3.741 ($p=0.000$) confirms that β_3 is statistically less than β_2 , indicating the mediating effect of the Strategic linkage variable on BSC usage and performance.

On the whole, test results indicate that the Strategic linkage variable does have mediation effects on the relationship of BSC usage and Organizational performance. This finding is consistent with the literature on BSC regarding the role of strategic linkage on BSC and performance (Kaplan and Norton 1996; Banker, Chang and Pizzini 2004). The result of testing the mediation effects provides support for the first hypothesis that strategic linkage has a significant impact on the link between BSC usage and firm performance.

4.4 Hypothesis 2: Regression Analysis

To test hypothesis 2 regarding the relationship between BSC usage and the six factors of BSC usage, the study used multiple regression analysis. Prior research provides support for organization size and product life-cycle as influential BSC usage factors using a sample of Australian firms (Hoque and James, 2000). The current study replicates Hoque and James (2000) and extends the literature by including additional explanatory factors of BSC usage using a sample of South Korean firms from several industry segments. The model to test hypothesis 2 is stated:

$$Y = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + e \quad (4)$$

Where Y = Overall BSC Usage, X_1 = Organization size, X_2 = Product life-cycle stage, X_3 = Market position, X_4 = Market competition, X_5 = Market uncertainty, X_6 = Market growth, and e = error term.

The test results of the above regression are shown in Table 10. Analysis of results in Table 10 together with the variance inflation factors (VIF) calculated in the regression analyses do not indicate that multi-collinearity would be a problem in analyzing the regression results. The regression model (4) has F-value of 9.315 ($p=0.000$), DW-value of 1.806 and adjusted R^2 of 0.172, indicating a well specified model with no auto-correlation of error term. The

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results from Table 10 indicate that coefficients of organization size ($t=1.989$, $p=0.048$), market position ($t=5.651$, $p=0.000$) and market competition ($t=1.937$, $p=0.050$) variables are positively and significantly associated at $p=0.05$ level with the BSC usage variable. The coefficient of market uncertainty variable is marginally significant ($t=1.704$, $p=0.090$), while coefficients of product life-cycle and market growth variables are not statistically significant.

Overall, results indicate support for hypothesis 2 that the BSC usage factors of organization size, market position, market competition, and market uncertainty are positively associated with BSC usage. Results do not support hypothesis 2 of positive associations of product at the early stage and market growth with BSC usage.

Table 10: Regression Result of Overall BSC usage

Model: $Y = \alpha_0 + \beta_i \cdot X_i + e$ ($i = 1 \sim 6$), Dependent Variable: Overall BSC usage						
Variable	Coefficient (Predicted Sign)	Estimate	t-value	p-value	Tolerance	VIF
Intercept	α_0	1.715	5.880	0.000		
X ₁ : Organization Size	$\beta_1(+)$	0.044	1.989	0.048**	0.943	1.060
X ₂ : Product Life Cycle	$\beta_2(+)$	0.057	0.112	0.911	0.966	1.035
X ₃ : Market Position	$\beta_3(+)$	0.232	5.651	0.000**	0.883	1.132
X ₄ : Market Competition	$\beta_4(+)$	0.097	1.937	0.050**	0.844	1.185
X ₅ : Market Uncertainty	$\beta_5(+)$	0.084	1.704	0.090*	0.858	1.166
X ₆ : Market Growth	$\beta_6(+)$	0.066	1.624	0.106	0.902	1.109
Adj. $R^2 = 0.172$, $F(6, 234) = 9.315(p=0.000)$, Durbin Watson = 1.806, * $p<0.1$, ** $p<0.05$						

Additional analyses were also performed by regressing each of the four dimensions of BSC performance on the six BSC usage factors. The results from these analyses are shown in Panels A through D of Table 11. For the Financial perspective of BSC, results from Panel A in Table 11 indicate that organization size ($t=3.829$, $p=0.000$), market position ($t=2.088$, $p=0.038$) and market competition ($t=1.913$, $p=0.057$) variables are significant. Product life-cycle, market uncertainty and market growth variables are not significant.

Table 11 - Panel A: Regression Result on BSC Financial Perspective

Variable	Coefficient	Estimate	t-value	p-value	Tolerance	VIF
Intercept	α_0	1.826	4.660	0.000		
X ₁ : Organization Size	β_1	0.113	3.829	0.000**	0.943	1.061
X ₂ : Product Life Cycle	β_2	-0.007	-1.032	0.303	0.962	1.039
X ₃ : Market Position	β_3	0.115	2.088	0.038**	0.884	1.131
X ₄ : Market Competition	β_4	0.130	1.913	0.057*	0.836	1.197
X ₅ : Market Uncertainty	β_5	0.093	1.406	0.161	0.849	1.177
X ₆ : Market Growth	β_6	0.014	0.256	0.798	0.898	1.113
Adj. $R^2 = 0.101$, $F(6, 233) = 5.468(p=0.000)$, Durbin Watson = 1.763, * $p<0.1$, ** $p<0.05$						

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Results from Panel B in Table 11 indicate that only market position variable ($t=3.105$, $p=0.002$) is significantly associated with the Customer perspective.

Table 11 - Panel B: Regression Result on BSC Customer Perspective

Variable	Coefficient	Estimate	t-value	p-value	Tolerance	VIF
Intercept	α_0	2.660	6.084	0.000		
X ₁ : Organization Size	β_1	-0.046	-1.405	0.161	0.942	1.062
X ₂ : Product Life Cycle	β_2	0.009	1.106	0.270	0.962	1.039
X ₃ : Market Position	β_3	0.191	3.105	0.002**	0.882	1.134
X ₄ : Market Competition	β_4	0.060	0.792	0.429	0.837	1.195
X ₅ : Market Uncertainty	β_5	0.090	1.222	0.223	0.851	1.175
X ₆ : Market Growth	β_6	0.026	0.426	0.670	0.897	1.115
Adj. R ² = 0.039, F(6, 232) = 2.593($p=0.019$), Durbin Watson = 1.670, ** $p<0.05$						

Panel C in Table 11 shows that the Internal Business Process perspective is significantly associated with the market position variable ($t=4.632$, $p=0.000$) and marginally associated with the market competition variable ($t=1.757$, $p=0.080$).

Table 11 - Panel C: Regression Result on BSC Internal Bus. Perspective

Variable	Coefficient	Estimate	t-value	p-value	Tolerance	VIF
Intercept	α_0	1.566	4.064	0.000		
X ₁ : Organization Size	β_1	0.044	1.501	0.135	0.938	1.066
X ₂ : Product Life Cycle	β_2	-0.002	-0.237	0.813	0.963	1.038
X ₃ : Market Position	β_3	0.253	4.632	0.000**	0.888	1.126
X ₄ : Market Competition	β_4	0.118	1.757	0.080*	0.839	1.191
X ₅ : Market Uncertainty	β_5	0.078	1.198	0.232	0.849	1.178
X ₆ : Market Growth	β_6	0.056	1.060	0.290	0.900	1.111
Adj. R ² = 0.112, F(6, 232) = 6.005($p=0.000$), Durbin Watson = 1.795, * $p<0.1$, ** $p<0.05$						

The results from Panel D in Table 11 indicate that the Learning and Growth perspective is significantly associated with organization size ($t=2.133$, $p=0.034$), market position ($t=5.897$, $p=0.000$) and market growth ($t=2.449$, $p=0.015$). These results reveal that the Product life-cycle variable is not associated with any of the four BSC perspectives. Results also indicate that each of the four BSC perspectives has different usage factors associated with it.

Table 11 - Panel D: Regression Result on BSC Learning and Growth

Variable	Coefficient	Estimate	t-value	p-value	Tolerance	VIF
Intercept	α_0	1.366	3.922	0.000		
X ₁ : Organization Size	β_1	0.056	2.133	0.034**	0.943	1.060
X ₂ : Product Life Cycle	β_2	0.004	0.608	0.544	0.966	1.035
X ₃ : Market Position	β_3	0.289	5.897	0.000**	0.883	1.132
X ₄ : Market Competition	β_4	0.068	1.128	0.261	0.844	1.185
X ₅ : Market Uncertainty	β_5	0.090	1.523	0.129	0.858	1.166
X ₆ : Market Growth	β_6	0.118	2.449	0.015**	0.902	1.109
Adj. R ² = 0.192, F(6, 234) = 10.50($p=0.000$), Durbin Watson = 1.893, ** $p<0.05$						

5. Summary and Conclusions

This study examines the effect of strategic linkage on the relationships between BSC usage and firm performance. In addition, the associations of contextual factors such as organization size, product life-cycle stage, market position, market competition, market uncertainty and market growth with BSC usage are also investigated. The results indicate that strategic linkage mediates the effect of BSC usage on firm performance. The findings do not support the existence of a moderation effect of strategic linkage on BSC usage and performance. The distinction between mediating versus moderating effect of strategic linkage on performance is an important consideration for future research design on the role of strategic linkage to BSC usage. Moderation effect means that the strength and/or direction of the relation between BSC usage and firm performance is influenced by the magnitude of strategic linkage, while mediation effect means that strategic linkage represents the generative mechanism or process through which the BSC usage variable is able to affect the firm performance. Separating moderation and mediation effects of strategic linkage may provide insight on how to use BSC for improving firm performance and understanding how efficiently BSC usage indexes are related to the performance.

The current study also provides evidence on BSC practices outside the United States. The findings indicate that in South Korea, BSC usage is significantly associated with organization size, market position, market competition and market uncertainty, while product life-cycle and market growth are not significant. The results also indicate that each BSC perspective has different usage factors. It is implied that a proper alignment of BSC measures with strategy is important to realize the benefits of the BSC usage on firm performance.

6. Limitations

The study did not control for the availability and type of strategic information in the use of BSC. Prior studies (Cheng and Humphreys 2012; Kaplan, Petersen, and Samuels 2012) suggest that such information could affect some of the findings, such as the lack of moderation effect on the link between BSC measures and performance. Future studies should control for strategic information in the study of the link between BSC, strategy and performance. The sample used in this study is made up of South Korean firms. As such, caution should be exercised in generalizing the findings of this study to other countries. On the whole, it is suggested that more research is necessary to provide evidence on the contextual factors that influence BSC usage and on the circumstance where BSC usage is appropriate.

7. Future Research

The findings of this study suggest a distinction in how strategy affects the link between BSC usage and performance. Future research is needed better to understand how strategic linkage mediates the effect of BSC on performance. This would include an investigation into the efficiency of BSC usage index to measure performance within a strategy framework. Hopefully, this line of research would provide insight on how to use BSC to improve firm

performance.

The difference observed in the Hoque and James (2000) study and the current study with regards to BSC usage factors warrants further investigation. It is possible that the difference is driven by environmental factors (Australia vs. South Korea), which by itself would be interesting. Future research using other countries data (such as Japan and China) is needed to replicate and perform a comparative analysis. The findings of such analysis will provide better understanding on the role of product life-cycle stage and market variable as BSC usage factors.

Endnotes

¹ Sample size calculator located at <http://www.danielsoper.com/statcalc3/calc.aspx?id=1> based on Cohen et al (2003) sample size formula $n^* = L/f^2 + k + 1$, where $f^2 = R^2/(1-R^2)$, $L = f^2(n-k-1)$, and $k =$ number of independent variables

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