Product Diversification: The Need for Innovation and the Role of a Balanced Scorecard

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Abstract

This paper tests the benefit of contemporary approaches to performance measurement systems represented by the Balanced Scorecard (BSC) to diversified organisations. Product diversification relationships, embracing both innovation and performance, were examined in a structural equation model, where the BSC is treated as an endogenous variable. We find product diversification to be significantly associated with the use of the BSC. The BSC is shown in turn to significantly associate with organisational innovation, the use of management initiatives of total quality management (TQM) and just in time (JIT) and performance.

Keywords:

Product Diversification
Balanced Score Card (BSC)
Innovation
Total Quality Management (TQM)
Just In Time (JIT)
Performance

Introduction

Since the mid-1900s the relationship between organisational diversification and innovation has received significant attention in research studies. Despite that, the picture provided in the literature is ambiguous with lack of consistency in empirical evidence.

Economic and strategic theory approaches emphasise the appropriateness of innovation to organisations with diversified structures (Nelson, 1959,Jacobs, 1969). On the other hand, arguments adopting an agency theory perspective cast doubt on the existence of such a link, emphasising management's risk aversion and subsequent reliance on short–term financial control systems in diversified firms. According to agency arguments, financially based management controls fail to link the organisational operational programs and resource allocation to the long-term strategic priorities, such as innovation, implied by diversification (Baysinger and Hoskisson, 1989).

Although the picture provided by the literature appears conflicting from a theoretical standpoint (Holthausen et al., 1995), the different theoretical views might be perceived as conveying an incomplete story, rather than a contradicting one. The main purpose of this study, therefore, is to complement the picture of the diversification and innovation relationship by suggesting an explanation that does not conflict with either theoretical thought. Economic and strategic arguments of positive relationships between diversification and innovation are perceived to be applicable to the general notion of the relationship. That is, diversification is defined as being shaped by new forms of product and production processes (Ansoff, 1959). Likewise, we interpret agency theory thoughts proposing a negative or non direct diversification effect on innovation to suggest the form of the effect as being a matter of management control.

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A closer look at the two theoretical streams shows that both recognise innovation as a priority for diversification. However, according to the agency theory argument, an obstacle to innovation in diversified firms is management implementation of inappropriate control systems.

In this paper, we specifically examine the product diversification, and propose that proper implementation of an internal control system can provide a solution to the agency problem in product diversified firms. The BSC, with its integration of financial and non-financial performance measures, can play a role in bridging the gap between the importance of innovation to product diversified firms and the unwillingness of these firms' management to undertake innovation risk. Further, we expect the implementation of a BSC system to link product diversification with improved performance.

Background

Organisations may follow different growth strategies to compete and to face economic uncertainty. Such strategies can be shaped by a concurrent pursuit of market penetration, market development and product development. Among growth strategies, diversification is well distinguished. While other strategies usually adopt the same technical, financial and merchandising resources used for existing product lines, diversification constantly leads to contextual changes in the business structure. It is produced by the requirement for new skills, new techniques, and new facilities and represents a distinct departure from past business practices (Ansoff, 1956).

It is expected, therefore, that innovation, defined as activities directed to the creation and improvement of new practical products and processes (Nelson, 1959), is valuable to diversification strategies as its value is implicit in the definition of these strategies. However, the sign of the relationship between diversification and innovation is ambiguous from a theoretical standpoint and also from results provided by research to date.

Economic and strategic theoretical approaches suggest that diversification encourages more innovation because it enables more opportunities for innovation outcomes to be exchanged and exploited (Nelson, 1959; Jacobs, 1969). An agency theory perspective also suggests that diversification reduces the organisational investment risk which encourages management to accept more risk from innovation (Garcia-Vega, 2006). In contrast, diversification can be a sign of an agency problem, where management avoids personal risk by diversifying the firm's activities. Hence, diversified firms might be unwilling to undertake innovation risk (Holthausen, 1995). The negative effects of diversification on innovation are also argued to be expected due to the complexity of increasing the number of decision-making channels in diversified structures (Scherer, 1984). It has been argued that rather than diversification, it is the degree of specialisation that helps focus the organisational innovation activities and therefore increase the efficiency of the innovation output (Glaeser et al., 1992; Feldman and Audretsch, 1999; Breschi et al., 2003).

Empirical testing of the relationship between diversification and innovation has received significant attention in the literature. However, various empirical approaches have produced contradictory and inconsistent findings. In fact, this inconsistency in previous research results has added to the theoretical ambiguity of the relationship. Product diversification and innovation measured by research intensity were significantly associated in two of three industries (i.e., the chemical and drug industries) tested by Grabowski (1968). Results of the same study show no significance for the two variable relationship in a third industry (i.e., the petroleum industry). Teece (1980) found that diversification and R&D expenditure in petroleum firms were significantly related, and attributed his findings to efficiency considerations, as his analysis of the petroleum industry demonstrated the relevance of the developed technology to the diversified products of petroleum firms. Results from Silverman (1999) suggest that a firm's innovation output influences its diversification. Silverman used a transaction cost interpretation to explain his results as diversification enables an efficient use of the firm's innovation outputs which are part of the

firm's existing resources. The findings of Kim and Kogut (1996) suggest that firms' development of technology impacts on their research experience and helps to open up new market opportunities, and lead to diversification. Breschi et al. (2003) tested the relationship between technological innovation and diversification; their results suggested that technological diversification did not occur randomly but was determined by the existing knowledge and key competences generated by the firm's technological innovation. More recently, Garcia-Vega (2006) reported that, in the 544 European firms tested in her study, an increase in technological diversity lead to an increase in R&D intensity and the number of patents.

In contrast to these findings, diversification and innovation were reported as being inversely related in other studies. Baysinger and Hoskisson (1989) found that R&D intensity is negatively correlated with diversification; their results showed less R&D intensity in firms that had diversified in less related industries. They considered their result as consistent with the view that higher diversification strategies are implemented with a greater emphasis on short-term financial controls; R&D expenditures are considered long-term projects and therefore this can explain why the intensity of these projects is less in highly diversified firms. Miller (2004) noted that most of the firms that diversify in his study sample had more R&D intensity status prior to diversification. Miller attributed this finding to the fact that not all firms are innovative leaders. Rather, the majority of firms are innovative laggards who end their innovation race with lower profit and limited market share. These innovative laggards diversify to enhance their profitability and therefore cut R&D to fund their other options.

Hoskisson and Hitt (1989) and Hitt et al. (1990) indicate that reliance on financial controls in evaluating managers' performance in diversified firms negatively impacts innovation. These studies recognise that strategic controls tend to encourage more management commitment to innovation. However, although highly diversified firms may be able to better utilise innovations, managers in these firms tend to place more emphasis on objective financial criteria to assess performance. An explanation of the tendency provided by these studies is that diversification requires a process of richer strategic information and new knowledge in operations that managers may not understand sufficiently well to control. This leads to the use of more objective performance measures, which create managerial risk aversion and undervalues those firms investing heavily in innovation, which, as a result, may lower managers' commitment to innovation.

It is observed that the last three decades have witnessed notable developments in management accounting techniques including the introduction of a number of contemporary innovative techniques such as the BSC. The new techniques have been argued to affect the whole process of management accounting (i.e., planning, control, decision making, and communication) and have diverted the focus from the simple traditional role of cost determination and financial control to a more sophisticated role of value-creation through improvement of resource allocation efficiency (Abdel-Kader and Luther, 2008). In the beginning of the 1990s Kaplan and Norton introduced the BSC as a performance measurement and resource allocation tool that integrated both financial and strategic controls (Kaplan and Norton, 1992). Kaplan and Norton (1996) argue that the BSC forces the integration of the organisation's strategic controls of strategy implementation and long-term strategic targets with financial controls of short term budgetary targets. The system therefore helps to insure that organisations' short-term budgets support their strategies while creating shareholder value. According to Kaplan and Norton (1996), in an integrated management control system, managers continue to use short-term financial controls, but they also introduce non-financial controls with which managers can continually test both the theory underlying their firms' strategies and implementation of these strategies. Accordingly, the use of integrated performance controls like the BSC allows managers to think systematically about the assumptions underlying their strategy, which is an improvement over prior practices of making decisions based solely on short-term financial measures.

We view the BSC as having the potential to solve the theoretical conflict underlying the diversification-innovation relationship. In the context of product diversification, the use of

the BSC in organisations enables management to continue using financial controls that provide objective short-term performance evaluation. At the same time, the integration of strategic long-term controls motivates management commitment to innovation as an underlying factor of diversification strategy.

Theoretical Framework

Figure 1 provides the theoretical framework used to test the appropriateness of the BSC to product diversification. The framework is designed to examine the significance of the BSC in linking product diversification in the organisation to innovation and innovative management initiatives of total quality management (TQM) and just in time (JIT). The framework also examines the role of the BSC in linking product diversification to organisational performance.

The Significance of the BSC to Product Diversification

The literature has argued that information process constraints upon senior management in organisations pose communication and control problems, especially in firms with a complex structuring of activities. These problems should result in an increase in the use of sophisticated and specialised performance measurement systems (Hoque and James, 2000; Speckbacher, Bischof and Pfeiffer, 2003; Abdel-Kader and Luther, 2008). However, empirical evidence on the implementation of such systems including the BSC or an alternative form of integrated financial and non-financial performance measurement system, in diversified firms is not yet established.

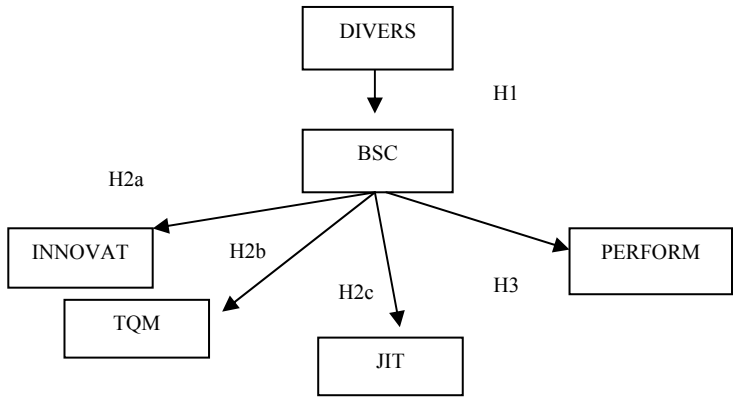
Generally, the BSC is promoted by Kaplan and Norton (1996) as a strategic tool that helps firms to link actions and operations with their strategy. According to Kaplan and Norton, financial performance measures are not sufficient to achieve such linkage; the addition of non-financial strategic measures in the BSC system results in a sophisticated control instrument that is balanced to enable coordination of operational and strategic targets.

In particular, with respect to product diversification, the BSC can provide a critical solution to the risk conflict facing the management of diversified firms. On the one hand, the BSC financial measures can provide objective measurement of performance. This is argued to be preferred by the firm's management when handling the structural and information complexity associated with diversification (Hoskisson and Hitt, 1989; Hitt et al., 1990). On the other hand, the BSC non-financial perspectives enable a strategic measurement of management fulfillment of the required commitment to innovation underlying diversification strategy.

Accordingly the following hypothesis is posited:

H1: The degree of product diversification is positively associated with the use of the BSC.

Figure 1: The Theoretical Framework



DIVERS = Diversification; BSC = The balanced score card; INNOVAT = Innovation; TQM = Total quality management; JIT = Just in time; PERFORM = Performance

The BSC and Organisational Innovation

Commitment of organisations to innovation and innovative management initiatives like TQM and JIT is expected when such innovation culture is facilitated by the use of the BSC. This expectation is explained considering the mutual strategic dimensions of innovation and innovative management initiatives and the BSC. The study framework reflects the Kaplan and Norton (1996) argument of the value of BSC as the *'cornerstone'* of a contemporary management system that supports organisation strategy. For an innovation orientation to take place, there is an increased need for relevant information, which is more likely non-financial, to address innovation characteristics and support relevant decision making and operations (Baines and Langfield-Smith, 2003). The BSC is 'open and informal, includes broad scope information, benchmarking and performance measures that indicate links between strategy and operations' (Chenhall, 2003, p. 141). In the light of this, proper implementation of the BSC system provides an appropriate control system that is likely to support drives for innovation. The study model implies that the BSC is used to help companies in implementing strategic initiatives towards becoming 'best in class,' 'the number one supplier' or an 'empowered organisation' (Kaplan and Norton, 1996).

Accordingly the following hypotheses are posited:

H2 (a): The use of the BSC is positively associated with innovation.
H2 (b): The use of the BSC is positively associated with the use of TQM.
H2 (c): The use of the BSC is positively associated with the use of JIT.

The BSC and Performance

The use of a BSC type system that includes a balanced integration of financial and non-financial indicators is proposed to lead to improvement in organisational performance. Kaplan and Norton (1992) argued that a BSC performance measurement system includes financial measures and complements those financial measures with non-financial measures oembracing three perspectives. The financial measures thus reflect the results of short-term performance, while the three non-financial measures reflect factors that drive financial performance in the long run.

Generally, reliance on appropriate accounting information contributes to efficient management of the organisation's resources and gradual improvement in organisational performance. Therefore, Baines and Langfield-Smith (2003) found that a change in management accounting information towards a greater reliance on non-financial performance measures reflects positively on organisational performance.

The implementation of an appropriate BSC system can be sufficient to positively affect performance (Hoque and James, 2000). This arises because the BSC presents significant opportunities for the organisation to improve outcomes by developing, communicating, and implementing strategy. The system enables management to select measures that reflect their organisation's short-term financial, as well as their long-term strategic, objectives. Improving performance on these measures indicates business profitability and efficiency (Malina and Selto, 2001). Hence, connecting measures of the four BSC perspectives to the organisation strategy can facilitate the use of BSC performance measurement as a tool for monitoring the value creation process. Hence, the following hypothesis is posited:
H3: The use of the BSC is positively associated with performance.

Research Method

The sample

A random sample targeted 1000 organisations from the Australian manufacturing industry, as listed by Business Who's Who of Australia (Dun and Bradstreet, 2007). The sample was stratified based on the nine manufacturing classifications of the Australian and New Zealand Standard Industrial Classification (ANZSIC) (Australian Bureau of Statistics, 2008). The overall response rate to a mail survey was 10.5%. Fifty five responses were received after the first survey mailing; the second mailing yielded fifty further responses. Though disappointing, a relatively low response rate was expected, given that one of the contributions of this study was the simultaneous consideration of multiple

constructs, necessitating a longer than average instrument.

The means of responses received after the first mailing of the survey were compared to those of responses received after the second mailing, to see if responses were different between the two groups. Mean responses from the two groups were highly correlated (R = 0.995, significant at the 0.01 level), providing some support for the absence of non-response bias (Baines and Langfield-Smith, 2003).

Responses were received from companies located in the states of Western Australia, Victoria, New South Wales, South Australia and Queensland. Most respondents described themselves as CEOs, directors or managers (75.2%) and had been with their companies for more than six years (65.6%).

The Survey

The primary data required was respondents' (i.e., top executives) attitudes towards and perceptions of the measured constructs (Snow and Hambrick, 1980). Following Dillman (2000), a mailed survey questionnaire was used, in which aspects of the survey that seemed likely to affect the response quantity or quality were identified and shaped in a way that produced the highest number of responses (Dillman, 2000). The questionnaire was designed to collect demographic and other data for measuring the study variables.
The degree of product diversification was measured by the use of an instrument adopted from Cagwin and Bouwman (2002). Respondents were asked to rate their perceptions of seven statements addressing different aspects of their organisation's product diversity. Respondents indicated their perceptions on a 5-point Likert scale ranging from 1 = 'strongly disagree' to 5 = 'strongly agree'. The mean of the seven ratings given by each respondent to the seven statements indicated the overall degree of product diversification of each respondent's firm.

Following Hoque and James (2000), a twenty-item scale was included in the questionnaire to measure BSC usage. These items incorporate Kaplan and Norton's (1992) four dimensions of BSC.

A seven-item scale was used to measure product and process/technology innovation. Three items to measure process and technology innovation were adopted from Zahra and Covin (1993), while four items to measure product innovation were adopted from Bisbe and Otley (2004).

Following Sila and Ebrahimpour (2005), TQM was measured by asking respondents to indicate the extent of use of each of 17 tools used in quality management in their organisations.

The Fullerton and McWatters (2002) instrument was adopted to measure JIT practices. This instrument comprises ten items/statements. These items/statements addressed three determinant factors of JIT use: firstly, a manufacturing component that explained the extent to which organisations had implemented general manufacturing techniques associated with JIT; secondly, a quality component that examined the degree to which firms had implemented procedures for improving process and product quality, and thirdly, the extent to which companies had implemented JIT purchasing and *kanban*. The latter is considered a unique JIT factor by Fullerton and McWatters (2002), so that the likelihood that firms who are not fully committed to a JIT program would adopt such practices is low.

In accordance with previous research (Gupta and Govindarajan, 1984; Chenhall and Langfield-Smith, 1998; Baines and Langfield-Smith, 2003; Bisbe and Otley, 2004) performance was measured as the degree of goal attainment along several financial and non-financial dimensions. Using the Baines and Langfield-Smith (2003) instrument, organisational performance comprises a two-part measure: first, respondents were asked to compare the change in their business performance over the past three years, relative to their competitors, based on nine financial and non-financial dimensions of performance; secondly, participants were required to assess the same performance dimensions according to their importance to the businesses. The final rating of each performance dimension was calculated by multiplying the respective 'performance' and 'importance' rates. A single performance rating was thus calculated for each firm as the weighted-average for all

dimensions. Higher weighted-average scores indicate higher performance.

Data Analysis

The survey items were consolidated to form six summary constructs (i.e., constructs of the study), that were ultimately used in the structural equation modeling analysis. Summary constructs included product diversification (DIVERS), BSC, TQM, JIT, innovation (INNOVAT) and performance (PERFORM). All measurement items were tapped on a five point scale from 1 to 5.

Descriptive Statistics

Table 1 shows that the sample organisations reported measures distributed from the lowest to the highest level of each summary construct. Overall, organisations were reported to be more likely diversified in their products, above average for their use of BSC and extent of innovation and marginally average for their use of TQM and JIT. Performance in the sample organisations was generally perceived to be marginally average.

Table 1: Descriptive Statistics of the Summary Constructs

Summary Construct	Theoretical Range	N	Min	Max	Mean	Std. Deviation
DIVERS	1 - 5	105	1.14	5.00	3.3639	.7180
BSC	1 - 5	105	1.22	4.88	3.3572	.5985
INNOVAT	1 - 5	105	1.00	4.88	3.3045	.7709
TQM	1 - 5	105	1.06	4.00	2.7519	.7220
JIT	1 - 5	105	1.00	4.78	2.9898	.7735
PERFORM	1 - 5	105	1.33	4.80	2.7695	.7604
DIVERS = Diversification; BSC = The balanced score card; TQM = Total quality management; JIT = Just in time; INNOVAT = Innovation; PERFORM = Performance						

Content Validity and Reliability

Most of the questionnaire measurement items (see Appendix 2) were adopted from previous research. Such adoption enhances the research's relevance, validity and comparability. The history of the adopted measurement instruments indicates that prior users were probably satisfied with the validity and reliability of these measures (Brownell, 1995). The study used summated scales, for which several indicator constructs and dimensions were averaged in a composite measure to represent the study constructs. Summed scales increase the reliability of measurement, as measurement error that might occur in each single scale will be averaged (Hair et al., 1998). Before mailing out the survey, the survey instrument was tested and modified through the pilot phase of the study.

Examination of the correlation matrix of the study constructs (Table 2) did not include correlations sufficiently high to question the measures' validity or suggest the presence of multicollinearity. All correlations were less than r = 0.75 (Cavana et al., 2001). Responses, then, were refined using exploratory factor analysis and Cronbach's coefficient alpha to establish each measure's validity and internal reliability as suggested by Churchill (1979)

Table 2: Pearson Correlation Matrix

	DIVERS	BSC	TQM	JIT	INNOVAT	PERFORM
DIVERS	1					
BSC	.218*	1				
TQM	-.065	.444**	1			
JIT	-.048	.472**	.617**	1		
INNOVAT	.003	.604**	.436**	.423**	1	
PERFORM	.070	.586**	.321**	.265**	.545**	1

*. Correlation is significant at the 0.05 level (1-tailed).

**. Correlation is significant at the 0.01 level (1-tailed).

A principal component analysis (PCA) was performed on the survey's seven statements used to address different aspects of product diversity. Results of the factor analysis revealed that the seven items loaded on a single factor with eigenvalue 2.81. Initial analysis of reliability indicated a Cronbach's alpha value of 0.74 for the seven scales. The analysis revealed that deletion of two items (the fourth and the sixth items, see Appendix 1) would increase alpha to 0.77. Results of the factor analysis indicated loading of these two items on the factor to be less than statistically significant (0.50). Accordingly, a decision was taken to eliminate them from the analysis. The resulting alpha (0.77) corresponded with that reported by Cagwin and Bouwman (2002).

PCA was performed to determine whether the BSC survey items can be grouped according to the BSC's four perspectives. The factor analysis revealed the existence of five factors with eigenvalues greater than one, representing 67% of the total data variance. Items representing 'financial', 'internal process' and 'learning and growth' perspectives respectively loaded on three different factors, indicating that items representing these three perspectives can be grouped as anticipated. 'Customer' perspective items loaded on two factors; five of the eight items loaded on the fourth factor, while the other three items grouped under a fifth factor. Cronbach alpha was 0.71 for the 'financial' perspective, 0.84 for the 'internal' perspective, 0.85 for the 'learning and growth' perspective and 0.75 and 0.70 for the two 'customer' perspective factors respectively. Therefore, a mean score was calculated for each of the 'financial', 'internal' and 'learning and growth' perspectives. The 'customer' perspective was measured as the average of the means of its two components. An overall mean of the resulting measures of the four BSC perspectives was then used to measure BSC. Higher overall mean scores indicate higher use of the BSC.

PCA conducted on the seven INNOVAT scales confirmed the existence of the 'process' and 'product' innovation components. The two factors explained 79% of the total variance in the data. Reliability analysis indicated Cronbach alpha values of 0.90 for technology and process innovation scales and 0.89 for product innovation scales. Mean scores were calculated for each of the two innovation types. The average of the two means was used to represent overall INNOVAT in each organisation. Higher mean scores indicate higher innovation in the participant organisation.

PCA was conducted on the 17 five-point scales used to measure TQM. The 17 scales loaded significantly on one factor with an eigenvalue of 7.24. Reliability analysis indicated a value of 0.91 for Cronbach's alpha. Accordingly, the mean usage rate of these 17 tools was calculated as an indicator of the overall TQM. Higher mean scores indicate higher use of TQM.

The results of factor analysis confirmed the expected three JIT perspectives. Three factors were extracted, each with an eigenvalue greater than one, for the manufacturing component, the quality component and the unique JIT component. Together they explained 69% of the total data variance. The Cronbach's alphas were 0.86, 0.91 and 0.59, respectively, for the

three JIT components. Nunnally (1978) suggests that alpha coefficients in the range 0.5 to 0.6 be considered workable for exploratory research, and that efforts to enhance reliability to above 0.8 can be wasteful in basic research, an argument cited by Fullerton and McWatters (2002) in support of their acceptance of 0.7 alpha coefficients.

Accordingly, the mean scores calculated for each of the three JIT factors were averaged to represent JIT in each responding organisation. Higher mean scores indicate higher use of JIT.

Cronbach alpha of the PERFORM instrument indicated a value 0.87 for the 'change' measures and 0.78 for the 'importance' measures. Reliability analysis of both parts did not suggest that deletion of any item would increase alpha.

Structural Equation Modelling

A structural model was developed to test the study hypothesis and was based on the study's theoretical model (Figure 2).

The structural equation modeling (SEM) capabilities of LISREL 8.7 software were employed to test the study model. Covariances were included between error terms in constructs as suggested by LISREL, but only where such covariances were theoretically justified (Baines and Langfield-Smith, 2003).

The model demonstrated adequate fit status in terms of chi-square (x^2) test statistics and different fit indices. P-values of 0.08 and 0.060 (associated with the chi-square (x^2) tests of 13.99 and 14.96, df = 8) exceeded the recommended 0.05 value and indicated a good fit for the model. Values for NFI (0.94), NNFI (0.95), CFI (0.97) and GFI (0.97) all exceeded the recommended 0.90 level indicating good fit. The value for RMR (0.04) did not exceed the recommended 0.05 level. RMSEA value (0.09) was below the 0.10 and indicated an acceptable level of fit.

This showed that the structural model achieved a good fit status (Bollen, 1989, Hoyle, 1995, Tabachnick and Fidell, 1996).

Hypotheses Testing

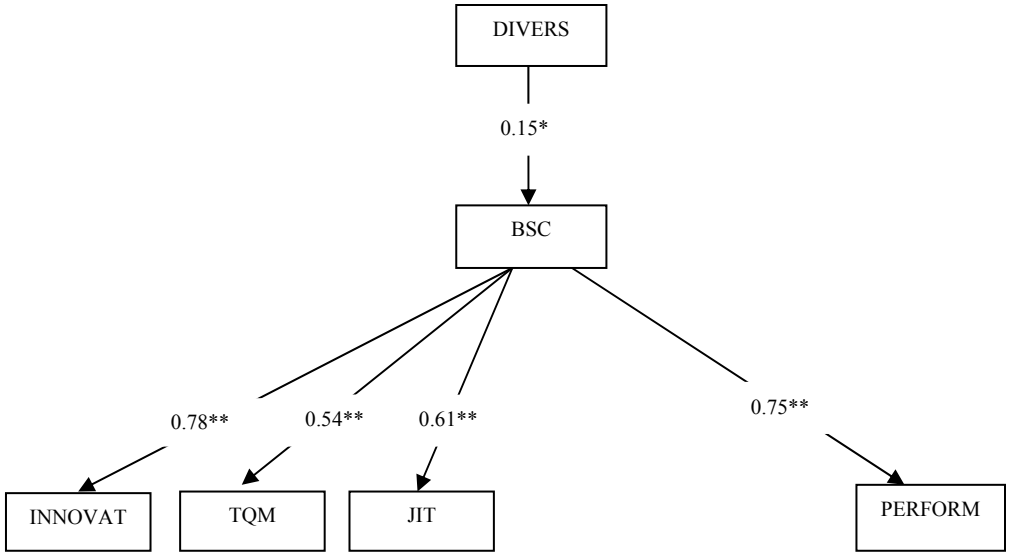
Testing of the study hypotheses is provided through the analysis of relationships across the study model (Figure 2). The association between DIVERS and BSC was first tested. Then, the tests of associations between BSC and each of INNOVAT, TQM, JIT and PERFORM were performed.

With reference to Table 3, DIVERS-BSC was found significant ($p < 0.05$) and BSC-INNOVAT, BSC-TQM, BSC-JIT and BSC-PERFORM were all significant ($p < 0.01$). Therefore, DIVERS direct association with BSC was demonstrated to be significant, which provides support for H1. The association between BSC and INNOVAT, TQM, JIT and PERFORM were also significant. Hence, H2a, H2b, H2c and H3 were also supported.

Discussion

The data analysis of the structural relationships in the study model (Table 3 and Figure 2) provided support to the three hypotheses. The study results, therefore, provide evidence on the appropriateness of BSC to diversified structures. This was demonstrated in the direct relationship between product diversification and the use of the BSC. The BSC appropriateness was also reflected in the significant relationships between the BSC and innovation, TQM, JIT and performance. Significant relationships between the BSC and innovation, TQM, JIT and performance suggested the role the BSC plays in facilitating relationships between product diversification and these variables.

Figure 2: The Structural Model



* Significant at the 0.05 level (1-tailed).

** Significant at the 0.01 level (1-tailed)

DIVERS = Diversification; BSC = The balanced score card; INNOVAT = Innovation; TQM = Total quality management;

JIT = Just in time; PERFORM = Performance

P-values of 0.08 and 0.06, NFI (0.94), NNFI (0.95), CFI (0.97) and GFI (0.95), RMR (0.04) RMSEA (0.09)

As a precaution against the small sample size of 105, the structural model was tested partly using smaller component models. Paths in these smaller models were identical to those found when the whole model was fully tested (following Baines and Langfield-Smith, 2003). However, the minimum sample size required for SEM to provide valid fit indices is said to be ruled by two criteria. First, the minimum sample is supposed to range between 100 and 200 (Hair et al., 1998; Baines and Langfield-Smith, 2003). Second, the sample size to degree of freedom ratio required has been suggested to be either 5:1; according to Hair et al (1998) or 10:1; according to Kline (1998) (i.e., cited by Baines and Langfield-Smith, 2003). Degrees of freedom were 8 for the study model, indicating a sample size between 40 and 80. Both of these requirements which have been satisfied The direct and significant positive association found between product diversification and the use of the BSC provides empirical evidence of the use of sophisticated performance evaluation system like the BSC in managing the complexity of diversified firms. This is consistent with contingency notions that the greater the complexity, sophistication and communication problems, the greater the need for sophisticated and more specialised accounting techniques (Abdel-Kader and Luther, 2008). However, this present study is the first to empirically provide substantive evidence of the relationship between diversification and the use of the BSC. The significant influence of product diversification on the BSC indicates that the complexity and sophistication of diversified structures requires BSC reports to reduce uncertainty, monitor planning, provide control and improve decision making.

Table 3: Regression Coefficients of Structural Model Parameters

No.	Relationship	Structural Coefficient	Standard Error	T-Value	P-Value
1	DIVERS → BSC	0.15	0.07	2.27	0.03*
2	BSC → INNOVAT	0.78	0.10	7.70	0.00**
3	BSC → TQM	0.54	0.11	5.04	0.00**
4	BSC → JIT	0.61	0.11	5.44	0.00**
5	BSC → PERFORM	0.75	0.10	7.34	0.00**
6	DIVERS → BSC → INNOVAT	0.12	0.06	2.18	0.03*
7	DIVERS →BSC → TQM	0.08	0.04	2.07	0.04*
8	DIVERS →BSC → JIT	0.09	0.04	2.10	0.03*
9	DIVERS →BSC → PERFORM	0.11	0.05	2.17	0.03*

* Significant at the 0.05 level (1-tailed).

** Significant at the 0.01 level (1-tailed)

DIVERS = Diversification; BSC = The balanced score card; TQM = Total quality management;

JIT = Just in time; INNOVAT = Innovation; PERFORM = Performance

P-values of 0.08 and 0.06, NFI (0.94), NNFI (0.95), CFI (0.97) and GFI (0.95), RMR (0.04) RMSEA (0.09)

The use of BSC was shown to positively influence organisational innovation and the implementation of TQM. Association of the BSC use with organisational innovation and innovative management initiatives is intuitively explained, considering the mutual strategic dimensions of these management systems and the BSC. Innovation and innovative management initiatives reflect an innovation culture and a significant customer focus towards the achievement of competitive advantage. Thus, there is an increased need for relevant information, which is more likely non-financial, to address these characteristics and support decision making and operations (Baines and Langfield-Smith, 2003). Proper implementation of the BSC system, hence, provides an appropriate control system that is likely to support drives for excellence (Abdel-Kader and Luther, 2008).

BSC association with organisational performance is consistent with findings of previous studies (e.g., Baines and Langfield-Smith, 2003). This study, therefore, provides further empirical evidence on the appropriateness of the BSC as an information system that contributes significantly to efficient management of the organisation's resources and to improvement in organisational performance. The strong direct impact of using the BSC on organisation performance implies effectiveness of the system for improving performance, and links between BSC measures and business efficiency and profitability (Malina and Selto, 2001).

Analysis of the model reveals the significant role that BSC plays in bridging the relationship between product diversification and key strategic variables of innovation and innovative management initiatives of the TQM and JIT. The model also highlights the bridging role of the BSC in linking product diversification to organisational performance. A positive overall effect of product diversification on these variables is shown in the study model to be through the use of the BSC.

Conclusion

This study demonstrated evidence of the key role of BSC in the efficiency realisation of diversification capabilities.

The study model provides harmonisation to different theoretical views, that may appear

conflicting, of the relationship between organisational diversification and innovation. From strategic and economic perspectives, the use of the BSC facilitates strategic and economic benefits of innovation to diversified firms. From an agency viewpoint, the BSC keeps the use of financial controls, which provide objective performance measurement and satisfies the risk reluctance tendency of management in diversified firms. In addition to financial controls, strategic non-financial controls are used in the BSC system which helps in the implementation of long-term strategic objectives implied by diversification, such as innovation.

Findings also indicate the key role that BSC plays in linking diversification to performance in tested organisations. However, as with similar empirical studies (notably Hoque and James, 2000; Cagwin and Bouwman, 2002; Baines and Langfield-Smith, 2003), there are limitations to this study that should be considered in interpreting the results.

First, the relatively low response rate may undermine the generalisability of the results; the usable sample size of 105 responses, though adequate, is not a 'generous' size for SEM analysis. A greater sample size would have provided more confidence in the results of the analysis.

Second, the possibility exists that the respondents are not reliable representatives of the company practices which provide the subject of this study. It is recommended, therefore, that future research seeks more objective data to be collected from actual organisational records, where possible. More detailed and focused surveys and longitudinal case studies could also provide greater insights into levels and associations of the study constructs.

Third, a limitation to the study model is the assumption of causality. It could be that some relationships are in the opposite directions demonstrated in the study model, or they might even be reciprocal. For example, it may be that greater use of TQM, JIT or innovation has caused greater use of the BSC or that an emphasis on diversification strategy has been motivated as a result of the use of a multidimensional performance evaluation system such as the BSC. It may also be that some variables other than the BSC drive innovation and performance. Further, the assumption of linearity of relationships of the study constructs might not always hold true. The modeling technique used does not reflect whether the relationship between the study factors is linear, or if linearity in relationships is limited only to certain relevant ranges. Case study approaches or survey approaches that utilise more complex statistical techniques could potentially provide better evaluation of such relationships.

Fourth, the BSC and innovation measures might not recognise the strategic linkage of a real usage of these systems in tested organisations. These measures establish firms' frequency and extent of use of these management initiatives. Therefore, it might be that the set of measures used did not represent or capture the general intention of these systems, especially when testing the alignment with diversification strategy. For this reason, an inductive case-based approach to measure the study relationships is recommended. 'How' and 'why' questions can then be more appropriately investigated in a complex and dynamic environment, facilitating a deeper appreciation of different experiences (McAdams and Bailie, 2002).

Fifth, the conduct of the study was confined to product diversification in a manufacturing context. Therefore, interpretation of the study results to other diversification forms and/or other business sectors should be conducted with care. An extension of the study to fit other diversification forms and organisations from different business areas is, therefore, recommended. Further, this research was limited to constructs internal to the organisation. The inclusion of external organisational constructs would be a step forward towards a more complete picture; testing relationships of the study model constructs with environmental and cultural constructs, for example, provides another opportunity for future research.

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Appendix 1

Diversification Measurement Instrument

Please rate your perceptions of your organisation's products by indicating your position on the 5-point scale ranging from 1 = "strongly disagree" to 5 = "strongly agree":

	Strongly Disagree	**Disagree**	**No Opinion**	**Agree**	**Strongly Agree**
There are major differences in lot sizes between products	1	2	3	4	5
There are major differences in production volumes between products	1	2	3	4	5
Over time, there are major changes in production volumes within products	1	2	3	4	5
Costs of support departments are similar for each product	1	2	3	4	5
Product lines are diverse	1	2	3	4	5
Within product lines, products require similar processes to design, manufacture and distribute	1	2	3	4	5
There are frequent changes to your products, services and processes	1	2	3	4	5

Appendix 2:

TQM Measurement Instrument

Please indicate on the five-point scale the extent to which the following tools are used for quality improvement in your organisation:

	Not at All	**Not Often**	**Neutral**	**Often**	**To a Great Extent**
Brainstorming	1	2	3	4	5
Cause and effect/Fishbone diagrams	1	2	3	4	5
Flowchart	1	2	3	4	5
Gantt chart	1	2	3	4	5
Tree diagram	1	2	3	4	5
Check sheet	1	2	3	4	5
Control charts	1	2	3	4	5
Data points	1	2	3	4	5
Histogram	1	2	3	4	5
Pareto analysis	1	2	3	4	5
Process capability	1	2	3	4	5
Scatter diagram	1	2	3	4	5
Storyboard case study	1	2	3	4	5
Starting teams	1	2	3	4	5
Maintaining teams	1	2	3	4	5
Ending teams/projects	1	2	3	4	5
Effective meetings	1	2	3	4	5

JIT Measurement Instrument

Please indicate on the five-point scale the extent to which your firm has implemented the following techniques:

	No Intention	**Considering/ Begining**	**Partially**	**Substantially**	**Fully**
Focused factory	1	2	3	4	5
Group technology	1	2	3	4	5
Action plan to reduce setup times	1	2	3	4	5
Total productive maintenance	1	2	3	4	5
Multi-function employees	1	2	3	4	5
Uniform work load	1	2	3	4	5
Product quality improvement	1	2	3	4	5
Process quality improvement	1	2	3	4	5
Kanban system	1	2	3	4	5
JIT purchasing	1	2	3	4	5

Innovation Measurement Instrument

On the five-point scale, please rate the extent to which your firm focuses on the following in comparison to your major competitors:

	Much Lower	Lower	Neutral	Higher	Much Higher
Level of automation of plants and facilities	1	2	3	4	5
Using the latest technology in production	1	2	3	4	5
Capital investment in new equipment and machinery	1	2	3	4	5
The launching of new products	1	2	3	4	5
Modifications to already existing products	1	2	3	4	5
In new products, being first-to-market	1	2	3	4	5
The percentage of new products in your product portfolio	1	2	3	4	5

BSC Measurement Instrument

Indicate on the five-point scale the extent to which each of the following items is used in your organisation to assess performance:

	Not at All	Not Often	Neutral	Often	To a Great Extent
Operating income	1	2	3	4	5
Sales growth	1	2	3	4	5
Return on investment	1	2	3	4	5
Labour efficiency variance	1	2	3	4	5
Rate of material scrap loss	1	2	3	4	5
Material efficiency variance	1	2	3	4	5
Manufacturing lead time	1	2	3	4	5
Ratio of good output to total output	1	2	3	4	5
Percent defective products shipped	1	2	3	4	5
Number of new products launched	1	2	3	4	5
Number of new patents	1	2	3	4	5
Time to market new products	1	2	3	4	5
Survey of customer satisfaction	1	2	3	4	5
Number of customer complaints	1	2	3	4	5
Market share	1	2	3	4	5
Percent shipment returned due to poor quality	1	2	3	4	5
On-time delivery	1	2	3	4	5
Warranty repair cost	1	2	3	4	5
Customer response time	1	2	3	4	5
Cycle time from order to delivery	1	2	3	4	5

Performance Measurement Instrument

1. On the five-point scale, rate your firm's performance during the last three years on the following performance measurements in comparison to your major competitors:

	Well Below	**Below**	**Average**	**Above**	**Well Above**
Return on investment	1	2	3	4	5
Profit	1	2	3	4	5
Cash flow from operation	1	2	3	4	5
Cost control	1	2	3	4	5
Development of new products	1	2	3	4	5
Sales volume	1	2	3	4	5
Market share	1	2	3	4	5
Market development	1	2	3	4	5
Personal development	1	2	3	4	5

2. On the provided five-point scale, rate the following ten performance dimensions according to the importance of these dimensions to your business:

	No Importance	**Little Importance**	**Important**	**Highly Important**	**Extremely Important**
Return on investment	1	2	3	4	5
Profit	1	2	3	4	5
Cash flow from operation	1	2	3	4	5
Cost control	1	2	3	4	5
Development of new products	1	2	3	4	5
Sales volume	1	2	3	4	5
Market share	1	2	3	4	5
Market development	1	2	3	4	5
Personal development	1	2	3	4	5