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A contingency model of the association between strategy, environmental uncertainty and performance measurement: impact on organizational performance

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Abstract

From a contingency framework, this paper attempts to contribute to a stream of literature that investigates determinants and consequences of performance measures. In general, it investigates the role of the choice of performance measures on the relationship between (a) strategic priorities and performance and (b) environmental uncertainty and performance. Two hypotheses are developed concerning this general relationship, predicting, respectively, a positive relationship between business unit strategy and performance through management's choice of non-financial measures of performance (H1) and a positive relationship between environmental uncertainty and performance through management's choice of non-financial measures of performance (H2). To test these hypotheses, a path analytical model is applied to questionnaire survey data from 52 manufacturing companies. As hypothesized, the results revealed the existence of a significant and positive association between management's strategic choice and performance acting through management's high use of non-financial measures for performance evaluation. On the other hand, the study found no evidence of a significant relationship between environmental uncertainty and performance through management's use of non-financial performance measures.
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Keywords: Strategy; Environment uncertainty; Performance measurement; Non-financial measures

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1. Introduction

In the last decade, interest in 'performance' (or effectiveness) measures has grown enormously as evidenced by the large literature on 'benchmarking', 'total-quality' measures and 'balanced-scorecards'. These embrace non-financial as well as financial measures and, more recently, have focused on measures of an organization's intellectual capital. The increased attention to performance evaluation by managers, consultants and academics reflects the increased pressure that organizations are to improve performance. In addition, the falling cost of information technology allows a range of measurements to be made relatively cheaply (Borthick & Roth, 1997; Cooper, 1989; Foster, 1996; Johnson, 1995; Johnson & Kaplan, 1987; Lynch & Cross, 1991).

A number of researchers report an increased organizational use of non-financial measures for performance evaluations in the last few years (Govindarajan & Gupta, 1985; Ittner & Larcker, 1998; Ittner, Larcker, & Rajan, 1997; Kaplan & Norton, 1992, 1996; Nanni, Dixon, & Vollmann, 1992; Simons, 1987, 1990). Such researchers suggest that the past high emphasis on traditional performance metrics such as return on investment or net earnings distracted from due concern for non-financial factors such as market share, customer satisfaction, efficiency and productivity, product quality, and employee satisfaction. Researchers also argue that non-financial measures may help managers to recognize changes in the business environment, determine and assess progress towards business objectives, and affirm achievement of performance goals (Kaplan & Norton, 1996).

The organizational literature (e.g. Miles & Snow, 1978, 1994) suggests that improved business performance requires an organizational structure, information systems and management style that are related to a specific-firm strategy. In general, the literature in this area suggests that strategically driven measures for performance evaluations provide both management and employees with the means to identify with the success of the strategy, and track their own contributions to its achievement (Kaplan & Norton, 1996; Lynch & Cross, 1991; Simons, 1995). However, strategy implementation does not occur in a vacuum—the level of uncertainty the firm is operating with is critical. As researchers (e.g. Dent, 1990; Govindarajan & Shank, 1992; Hope & Hope, 1995; Miles & Snow, 1978) point out, companies with different operating environments will have different strategic initiatives, and hence may require different management information systems, designed to enhance organizational performance. This relationship, however, is not a directly observable—it is dependent on the degree of certainty a firm holds about its current and future business operations (Chenhall & Morris, 1986; Chong & Chong, 1997; Mia, 1993). However, prior studies on the role of a performance measurement system in organizations (e.g. Govindarajan & Gupta, 1985; Ittner et al., 1997; Simons, 1987) have typically not addressed the possible intervening role of the type of performance measures on the relationship between strategic priorities, environmental uncertainty and organizational performance. Using a contingency-theoretic

perspective[1], this paper investigates the extent to which use of non-financial measures for performance evaluations may play a significant role in the relationship between (a) strategic priorities and organizational performance and (b) environmental uncertainty and organizational performance.

The remainder of the paper is organized as follows. Section 2 briefly reviews the relevant literature and develops the research hypotheses. Section 3 describes the research method applied, followed by the results in Section 4. Section 5 presents a discussion of the results, limitations and conclusions.

2. Literature and hypotheses development

The paper relies on 'contingency' theory to argue that competitive strategy determines the level of environmental uncertainty, which, in turn, determines the measures of organizational performance. From the set of potential contingency variables, the paper restricts itself to consideration of strategy and environmental uncertainty. These variables exert a major influence on organizational arrangements, as exemplified by the notions of structure, systems and management style. The next sections develop the study's hypotheses in turn.

2.1. Strategy, performance measures and organizational performance

Numerous researchers have examined the effects of strategic priorities on the design of accounting and control systems. The work of Govindarajan and Gupta (1985) found that firms following a 'build' strategy (increasing sales and market share) tended to place greater emphasis on non-financial measures (such as new product development, market share, R&D, customer satisfaction)[2] than firms following a 'harvest' strategy (maximizing short-term earnings). Similarly, Simons (1987) found that defender firms tended to rely more on financial measures such as short-term budgets to compensate their managers (see also Simons, 1995). The recent work of Ittner et al. (1997) found that the relative weight placed on non-financial measures was greater in firms following an innovation-oriented 'prospector' strategy than in firms following a 'defender' strategy.[3]

In this study, the unit of analysis is that of a strategic business unit[4] for which the Miles and Snow (1978) typology is appropriate. Following Miles and Snow,

[1] For a review of this literature see Chapman (1997), Langfield-Smith (1997), Otley (1980) and Van de Ven and Drazin (1985).

[2] For a review of the literature on performance measures see Hoque and James (2000), Ittner et al. (1997), Kaplan and Norton (1996), Lynch and Cross (1991) and Simons (1995).

[3] For an up-to-date review of the literature on the strategy typology, see Langfield-Smith (1997).

[4] Most of the strategic decisions taken by managers and the subject of academic research have been focused at the business unit level of the organization. The merits of this have been the subject of some debate. Van der Stede and Bruggeman (1993) summarize the arguments, and suggest that focusing research into the strategic implications on control systems can be most effectively done at the business unit level because different business units of an organization may employ different strategies, therefore requiring different control systems.

prospector firms seek new market opportunities by creating something that they perceive uniqueness in the market. Consequently, in these firms the level of uncertainty is high. The literature in this area suggests that if management wishes to stress effectiveness in innovation, developing customer satisfaction and a reasonable rate of return, their management accounting and control systems should be designed to support these arrangements (Ittner et al., 1997; Miles & Snow, 1978; Simons, 1987, 1990). For firms pursuing a prospector-type strategy, financial measures will influence the manager to pay less attention to the firm's critical success factors and competitive bases such as price, quality, reliability, service, innovation, customization and time. Measures for focuses such as these would necessarily come from knowing what the customer wants, the level of staff involvement in creativity and the ability of the firm to produce and market new products. Hence, a greater emphasis on non-financial criteria as opposed to narrow financial criteria should be more prominent in prospector firms than in defender firms.

The above rationale suggests the need to identify the relevant metrics of performance that are consistent with the strategy being followed, and that a significant relationship between strategic choices and organizational performance exists through management's choice of performance measures. Hence, the derivation of my first hypothesis:

H1. *A positive and significant association between business strategy and performance exists through management's choice and use of a performance measurement system.*

2.2. Environmental uncertainty, performance measures and organizational performance

Considerable accounting research provides empirical evidence to support the view that the environmental uncertainty is positively associated with the design of accounting control systems.[5] The literature in this area suggests that the greater managers perceive the influence of environmental uncertainty upon the performance of their organizations to be, the greater importance they will attach to management accounting systems (MAS) related information to deal with the situation. Mia (1993) in reviewing the literature in this area suggests that MAS information may help managers better understand uncertain situations.

Studies of the impact of environmental uncertainty on MAS information usage show that financial controls such as budgets for performance evaluation tend to be used to a lesser extent when uncertainty levels are relatively high (Govindarajan, 1984; Hayes, 1977; Macintosh & Daft, 1987; cited in Abernethy & Stoelwinder, 1991). The work of Chenhall and Morris (1986) also suggests that where environmental uncertainty levels are relatively high, organizations tend to use non-financial (broad scope) MAS information to a greater extent in order to cope with external environmental uncertainty more effectively. Chenhall and Morris suggest

[5] For an up-to-date review of this literature see Chapman (1997) and Otley (1980).

that business units that face unpredictable change may find that traditional financial evaluation systems, which are generally dealing with matters internal to the organization, are an ineffective control and communication device on account of that they are primarily historical and financial-oriented. Such evidence tallies with several other studies, as for example, Chong and Chong (1997), Gul and Chia (1994), Hoque and Hopper (1997), Mia (1993) and Mia and Chenhall (1994). According to these studies, effective organizations tend to place less reliance on financial performance measures under conditions of high environmental uncertainty. These studies, however, mainly focus on the relationship between environmental uncertainty and MAS information and budgets. The current study extends these studies by relating environmental uncertainty[6] to the choice of performance measures in organizations.

Consistent with the above studies, the argument here is that the choice (or type) of measures for performance evaluation is environmentally determined: higher levels of environmental uncertainty affecting the performance of firms are associated with greater emphasis on non-financial measures in performance evaluation. The greater the difficulty that a business unit faces, the greater the uncertainty it confronts. As Govindarajan and Shank (1992) suggest, when the environment is highly uncertain, management must think about how to cope with uncertainties. Therefore, in highly uncertain situations, measuring effectiveness of the firm requires management's greater reliance on non-financial measures (e.g. market share, customer satisfaction, efficient use of R&D dollars, efficiency and quality, etc.). In contrast, the emphasis of financial performance indicators (e.g. ROI, EPS, cash flow, and net earnings) is on commercial outcomes rather than process and operation. As pointed out by Govindarajan and Shank (1992), managers control their own actions, but they cannot control the states of nature that combine with their actions to produce outcomes.

Following the above rationale, it can be argued that there is a greater need for increased communication within firms operating in high levels of environmental uncertainty. This need for greater communication may be satisfied with greater usage of non-financial measures as these measures provide management with a framework that helps them assessing uncertainty in a wide range of areas such as market demand, customer satisfaction, innovation, supplies and employees. These arguments form the basis of my second hypothesis:

[6] The current literature on business environment suggests that the environmental uncertainty of most companies has been increasing rapidly in the 1990's driven by factors like an acceleration in the rate of technological dissemination, greater deregulation and globalization (Cooper, 1995; D'Aveni, 1995; Goldman, Nagel, & Preiss, 1995; Hamel & Prahalad, 1994). Companies are adapting to this uncertainty by adopting strategies, structures (including size, 'downsizing' and 'right sizing') and systems (including performance evaluation) that allow flexibility, keep options open and support a fast response capability. In this study, environmental uncertainty refers to a firm's inability to predict accurately the effects of various aspects of its external environment such as customers, suppliers, deregulation and globalization, technological processes, competitors, government regulations/policies, economic environment, and industrial relations (Gordon & Naryanan, 1984; Govindarajan, 1984; Hoque & Hopper, 1997).

H2. *A positive and significant association between organizational environmental uncertainty and performance exists through management's choice and use of a performance measurement system.*

3. Research method

Data were collected using a mailed questionnaire survey administered to chief executive officers (CEOs) in 100 New Zealand manufacturers randomly selected from the 1994 edition of *New Zealand Business Who's Who.*[7] A mail survey was employed because it enables the gathering of information from a broad cross-section of firms at relatively lost cost (Chenhall, 1997; Gosselin, 1997; Shields, 1995). Only those organizations with at least 100 employees were included in the target sample. It is expected that small organizations are less likely to have a real need for complex management systems. A total of 52 useable questionnaires were received, a response rate of 52%. A follow-up letter, which was sent to each non-responding firm 4 weeks after the initial mailing, along with several telephone calls, undoubtedly influenced this high response rate. The existence of possible response bias between the early and late responses was undertaken by a *t*-test. No significant differences were found in the results. Furthermore, the *t*-test reveals no significant differences between the respondents and non-respondents in terms of size and industry membership. Thus, it is reasonable to believe that non-response bias is not significant in the study. Appendix A presents the statistics on respondents in terms of size in employees, assets and sales and also industry group.

3.1. Measurement of variables

3.1.1. Business strategy

Following previous studies (e.g. Abernethy & Guthrie, 1994; Chong & Chong, 1997; Ittner et al., 1997), strategy was measured relative to the two extreme strategic postures (i.e. prospectors and defenders) of the Miles and Snow (1978) typology. Respondents were given descriptions of these strategic priorities. They were asked to indicate the degree of emphasis that their firms had given to the above strategic priorities over the last 3 years on a five-point Likert-type scale from 1 (defender strategy) to 5 (prospector strategy).[8] Thus, this construct measures the firm's competitive strategy, with higher scores representing firms that are closer to the prospector end of the strategy continuum. The mean score for the construct is 3.98 and the standard deviation is 0.94.

3.1.2. Environmental uncertainty

In this study, environmental uncertainty was assessed using eight items: (1) suppliers' actions, (2) customer demands, tastes and preferences, (3) market activities

[7] This was the latest edition at the time of this study.
[8] For a similar use, see Chenhall and Langfield-Smith (1998) and Ittner et al. (1997).

of competitors, (4) deregulation and globalization, (5) government regulations/policies, (6) economic environment, (7) industrial relations, and (8) production and information technologies. These items were developed from the early widely used instruments developed by Gordon and Naryanan (1984) and Govindarajan (1984) as well as from discussions of the current literature in the area (e.g. Cooper, 1995; D'Aveni & Gunther, 1995; Goldman et al., 1995; Hamel & Prahalad, 1994; Hoque & Hopper, 1997). As has been noted earlier in the paper, the nature of today's business environment has changed significantly in recent years. It is, therefore, fundamental for a contemporary questionnaire to be grounded in the extant literature. Consequently, the above stated early instruments of Gordon and Naryanan (1984) and Govindarajan (1984) required fine-tuning in order to link them to the current literature.[9] The instrument employed was then subjected to pre-testing. This involved handing a draft of the instrument to a group of five CEOs. In general, the participants revealed the items used to be matters of concern for their firm's current operating environment. Respondents were asked, on a five-point Likert-type scale ranging from 1 (very predictable) to 5 (very unpredictable), to indicate the relative predictability of the firm's external environment along the above eight factors. The descriptive statistics (means and standard deviations) of responses to each question on environmental factors is presented in Appendix B.

Appendix B also provides a correlation matrix between the eight environmental factors. Significant correlation coefficients between most of the variables suggest that they are related and may constitute one or more factors (Bryman & Cramer, 1990). Consequently, a principal component analysis (PCA) of the eight environmental items was used to decide whether to combine them into overall factors. Appendix B presents the factor loadings derived from a PCA. It extracted one factor explaining 68.3% of the variance. The factor score was saved as variable for use in the analysis. The Cronbach coefficient alpha (Cronbach, 1951) was computed to measure internal reliability of the instrument. The Cronbach alpha 0.75 for the scale suggested that the scale was internally reliable (Nunnally, 1967).

3.1.3. Management's choice and use of non-financial performance measures

In this study, 13 items measured non-financial performance measures usage. These items were developed from a number of recent studies such as Abernethy and Lillis, 1995, Ittner et al., 1997, Kaplan and Norton (1996), Lynch and Cross (1991) and Perera, Harrison and Poole, 1997. The instrument was also subject to pre-testing during which five CEOs were encouraged to comment on items that were unclear and irrelevant to them. Whilst most of them perceived all of the items as relevant and meaningful in their organizational circumstances, some items needed to be reworded in the light of their comments. Respondents were asked to indicate their organization's extent of use of the stated performance measures over the last 3 years, ranged from 1 (to a little extent) to 5 (to a very great extent).

[9] Environmental uncertainties may have increased over time this does not mean that the original models in this vein are invalid. This paper simply argues that the 'new' features of uncertainty require fresh conceptual notions and new operational measures.

Summary descriptive results from the questionnaire appertaining to these 13 performance measures are presented in Appendix C. To facilitate the path analysis, a single scale was constructed for the above types of measures by computing the average of respondents' scores for each item within the construct. The Cronbach alpha for this construct is 0.87.

3.1.4. Organizational performance

Organizational performance was measured using an instrument developed by Govindarajan (1984) and subsequently used by Abernethy and Guthrie (1994), Abernethy and Stoelwinder (1991), Chenhall and Langfield-Smith (1998), Chong and Chong (1997) and Govindarajan and Gupta (1985). There are advantages in using a well-tested and robust instrument widely used in other studies. However, given the focus of the current study, this instrument has been refined by the addition of two items, workplace relations and employee health and safety. This instrument was also pre-tested. The questionnaire asked respondents to assess their organization's performance over the past 3 years, across 12 dimensions[10] on a five-point Likert-type scale, ranging from 1 (well below average) to 5 (well above average). A single global performance score for each firm was calculated by taking the average for all items (Chenhall & Langfield-Smith, 1998). The Cronbach alpha coefficient was 0.75, indicating satisfactory internal reliability for the scale.

4. Research results

Descriptive statistics and Pearson correlation coefficients for all variables are presented in Table 1. To test the model as presented in Fig. 1, a path analysis was used.[11]

Three types of variables (exogenous, endogenous, and unmeasured) can be observed in the model. Business unit strategy (X_1) and environmental uncertainty (X_2) can be termed as the exogenous variables since they are not influenced by any other variables in the model. The performance measures (X_3) and organizational performance (X_4) are both endogenous variables since (X_1) and (X_2) in the model affect these variables. The $R_i^{'}$s ($i = v$ and w) represent the variables not included in the model. The relations between the variables are specified by path coefficients (p_{ij}), which are equivalent to standardized β coefficients.

As explained in the theory section, strategy and environmental uncertainty both have indirect effects on performance acting through use of performance measures: strategy to use of performance measures (p_{31}) to performance (p_{43}); and environmental uncertainty to use of performance measures (p_{32}) to performance (p_{43}). In

[10] The 12 dimensions are: operating profits, ROI, sales growth rate, market share, cash flow from operation, new product development, market development, R&D, cost reduction programmes, personnel development, workplace relations and employee health and safety.

[11] A path analysis is useful in examining the pattern of relationships between three or more variables. It provides quantitative estimates of the causal connections between sets of variables. For a detailed discussion of path analysis, see Asher (1976), Davis (1985) and Pedhazur (1982).

Table 1
Descriptive statistics and correlation matrix for all measured variables

	Strategic priorities (X_1)	Environmental uncertainty (X_2)	Use of non-financial measures (X_3)	Organizational performance (X_4)
Descriptive statistics				
No. of items used	1	8	13	12
Theoretical range	1–5	8–40	13–65	12–60
Observed range	1.5–4.8	14–37	13–65	2458.8
Mean	3.98	26.20	43.50	45.72
Standard deviation	0.94	5.79	3.58	6.21
Cronbach alpha	na	0.70	0.87	0.75
Correlation matrix				
X_1	1.00			
X_2	0.11	1.00		
X_3	0.31*	−0.05	1.00	
X_4	0.32*	0.01	0.88**	1.00

* Statistically significant at the 1% level (two-tailed).
** Statistically significant at the 5% level (two-tailed).

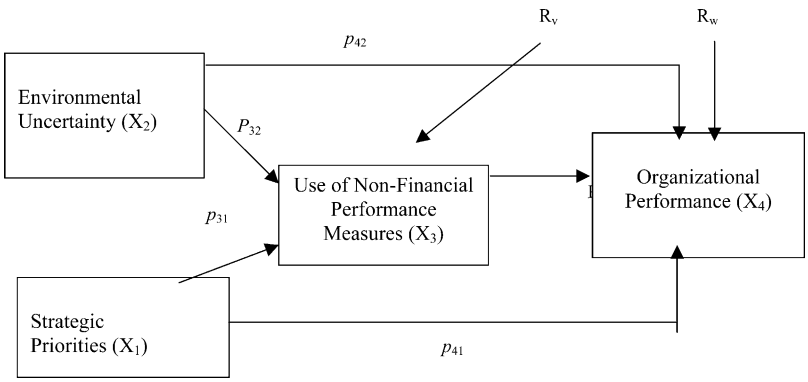

Fig. 1. A path model of the study.

order to generate the necessary coefficients, we need the zero-order correlation coefficient (r) for strategy and environmental uncertainty and the standardized regression coefficients from the following two equations:

$$X_2 = p_{21}X_1 + p_{2u}R_u \tag{1}$$

$$X_3 = p_{31}X_1 + p_{32}X_2 + p_{3v}R_v \tag{2}$$

$$X_4 = p_{41}X_1 + p_{42}X_2 + p_{43}X_3 + p_{4w}R_w \tag{3}$$

where X_1, strategic priorities; X_2, environmental uncertainty; X_3, use of non-financial measures of performance; X_4, organizational performance; P_{ij} the standardized

Table 2
Results of regression

Variable		Path coefficient	Coefficient value	t value	p
Eq. (1): $X_2 = p_{21}X_1 + p_{2u}R_u$					
X_1	Strategy	p_{21}	0.107	0.746	n.s.
$R^2 = 0.107$; Adjusted $R^2 = 0.011$; $F(1, 48) = 0.557$, $p =$ n.s.					
Eq. (2): $X_3 = p_{31}X_1 + p_{32}X_2 + p_{3v}R_v$					
X_1	Strategy	p_{31}	0.306	2.170	0.035
X_2	Environmental uncertainty	p_{32}	−0.086	−0.608	n.s.
$R^2 = 0.309$; Adjusted $R^2 = 0.096$; $F(2, 46) = 2.436$, $p = 0.099$					
Eq. (3): $X_4 = p_{41}X_1 + p_{42}X_2 + p_{43}X_3 + p_{4w}R_w$					
X_1	Strategy	p_{41}	0.030	0.405	n.s.
X_2	Environmental uncertainty	p_{42}	0.011	0.163	n.s.
X_3	Non-financial measures usage	p_{43}	0.877	12.059	0.000
$R^2 = 0.886$; Adjusted $R^2 = 0.785$; $F(3, 45) = 54.676$, $p = 0.000$					

regression coefficients, and R_i the standardized residuals. The results of this exercise are presented in Table 2.

To assess the indirect relationships, the direct and indirect effects of the variables in the model were calculated by combining the path coefficients and the zero-order correlation between the variables under study, as presented in Table 3.

Following Table 3 and using the results presented in Table 2, estimates of each of the relations postulated by Hypotheses 1 and 2 were computed. The results presented in Table 4 reveal the presence of direct, indirect, spurious and unanalyzed relations between the variables in the model. Theoretically, the sum of the magnitudes of direct, indirect, spurious and unanalyzed (if any) relations between two variables is equal to the observed correlation between the same variables (Asher, 1976; Davis, 1985).

Table 3
Decomposition of the relations hypothesized

Combinations of variables	Observed correlation	Decomposition of association			
		Direct effects	Indirect effects	Spurious effects	Unanalyzed effects
X_1 with X_2	r_{12}	p_{21}			
X_1 with X_3	r_{13}	p_{31}			$+p_{32}r_{12}$
X_2 with X_3	r_{23}	p_{32}			$+p_{31}r_{12}$
X_1 with X_4	r_{14}	p_{41}	$+(p_{42}r_{12}) + (p_{43}r_{13})$		
X_2 with X_4	r_{24}	p_{42}	$+(p_{41}r_{12}) + (p_{43}r_{23})$		
X_3 with X_4	r_{34}	p_{43}		$+(p_{41}r_{13}) + (p_{42}r_{23})$	

Table 4
Computation of the direct and indirect effects

Combinations of variables	Decomposition of association					
	Observed correlation	Direct effects	Indirect effects	Spurious effects	Unanalyzed effects	Total effects
X_1 (strategy) with X_2 (environmental uncertainty)	0.11	0.11	–	–	–	0.11
X_1 (strategy) with X_3 (non-financial measures usage)	0.31	0.30	–	–	$+(-0.09 \times 0.11)$	0.31
X_2 (environmental uncertainty) with X_3 (non-financial measures usage)	−0.05	–0.08	–	–	$+(0.31 \times 0.11)$	−0.05
X_1 (strategy) with X_4 (organizational performance)	0.31	0.03	$+(0.01 \times 0.11)$ $+(0.87 \times 0.31)$	–	–	0.30[a]
X_2 (environmental uncertainty) with X_4 (organizational performance)	0.01	0.01	$+(0.03 \times 0.11)$ $+(0.87 \times -0.05)$	–	–	−0.03[a]
X_3 (non-financial measures usage) with X_4 (organizational performance)	0.88	0.87	–	$+(0.03 \times 0.31)$ $+(0.01 \times -0.05)$	–	0.88

[a] The difference between the observed correlation and the total of the direct, indirect, spurious and unanalyzed effects is due to rounding off of the numbers.

Hypothesis 1 hypothesizes an indirect effect of strategic priorities (X_1) on organizational performance (X_4) acting through use of non-financial measures (X_3). The results presented in Table 4 show a positive zero-order correlation coefficient between strategic priorities and organizational performance ($r_{14} = 0.31$, $p < 0.05$). The observed correlation is composed of a positive but insignificant direct effect between strategic priorities and organizational performance ($p_{41} = 0.03$, n.s.) plus the significant indirect effect ($p_{42}r_{12} + p_{43}r_{13} = 0.27$, $p < 0.05$) of strategic priorities on organizational performance acting through use of non-financial performance. Therefore, H1 is supported.

Hypothesis 2 hypothesizes an indirect effect of environmental uncertainty (X_2) on organizational performance (X_4) acting through use of non-financial performance measures (X_3). The results presented in Table 4 with respect to this hypothesis are rather disappointing as they demonstrate no significant relationship between the environmental uncertainty and organizational performance ($r_{34} = 0.001$, n.s.). This observed correlation is composed of an insignificant direct effect of the environmental uncertainty on performance ($p_{42} = 0.001$, n.s.) plus the insignificant indirect effect ($p_{41}r_{12} + p_{43}r_{23} = 0.02$, n.s.) of the environmental uncertainty on performance acting through use of non-financial performance measures. These data, therefore, provide no support for H2.

Though not hypothesized in this study, it is clear from Table 4 that business unit strategy is positively and significantly associated with management's greater emphasis on non-financial measures for performance evaluation ($\beta_3 = 0.306$, $p < 0.05$). The data also indicate the presence of a direct and positive relationship between management's emphasis on non-financial performance measures and increased organizational performance.

5. Discussion and conclusions

This paper sought to examine the links among the firm's business strategy, external environment, the use of measures for performance evaluation, and organizational performance. To test these relationships, the study surveyed 52 New Zealand manufacturing firms.

As expected, the results suggest no direct relationship between business unit strategy and organizational performance. Rather, the relationship between these two variables appears to be significantly indirect, as hypothesized. In addition, a significant and positive association between strategy and management's use of non-financial measures for performance evaluation has been found. These results suggest that business unit strategy is an important antecedent of performance evaluation systems design and use of non-financial measures is an important antecedent of organizational performance. This evidence is consistent with the view that a congruent (good fit) matching of strategic priorities and the choice of performance measures in performance evaluation is essential to enhanced organizational performance (Govindarajan & Gupta, 1985; Ittner et al., 1997; Lynch & Cross, 1991; Simons, 1987, 1995). In contrast, the path model results provide no support

for the hypothesized positive relation between environmental uncertainty and organizational performance through use of non-financial performance measures. This evidence is not consistent with the view that when firms experience greater difficulty in predicting future events, greater reliance should then be placed on non-financial indicators for performance evaluation of the firm. Additionally, the insignificant associations among environmental uncertainty, performance measures and organizational performance do not corroborate the findings of existing studies on the relationship between environmental uncertainty and MAS design (Chenhall & Morris, 1986; Chong & Chong, 1997; Gordon & Naryanan, 1984; Ezzamel, 1990; Govindarajan, 1984; Gul & Chia, 1994; Mia, 1993).

These results can be explained in terms of the study's several limitations. First, the study uses a modified version of the environmental uncertainty, derived from early contingency theory as well as from the current literature. For example, in updating the two early instruments on environmental uncertainty (Gordon & Naryanan, 1984; Govindarajan, 1984), it includes two new variables in the construct, deregulation and globalization and industrial relations. Future research may shed further light on this issue by testing this modified version. Second, organizational performance was measured using a questionnaire asking the respondents to self-assess their organization's performance; such self-assessment may introduce bias in the performance measure. In this study, most organizations were not listed on the New Zealand Stock Exchange; therefore, the actual performance data were not readily available from public sources. Third, any generalization of the study's results to manufacturing organizations or beyond cannot be made without considerable caution. The many dimensions and the relative influences might be reliably explored by case studies. Fourth, this study is constrained to New Zealand; it is possible that companies in other settings differ from their New Zealand counterparts. This may be so because of the size of the New Zealand economy, the nature of market competition, legal and regulatory constraints and economic policies or structures that might differ among countries. Thus, future research may also be designed to compare the findings in this study with findings that relate to companies in other countries. Finally, the findings of the study are time dependent; therefore, a longitudinal study in different settings using more 'softer' methodologies (e.g. case studies) may shed further light on this issue.

Despite these limitations, the findings reported in this paper and further research would help improve our understanding of the factors that play a significant role in the choice of performance measures in organizations to affect performance.

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Appendix A. Profile of the respondents

Employees	*n*
0–149	23
150–299	14
300–449	3
450–999	7
1000 or greater	5
Total	52

Sales turnover (A$ million)	*n*
Under 50	9
50–99	16
100–199	9
200–399	10
400–499	3
Over 500	5
Total	52

Total Assets (A$ million)	*n*
Under 50	19
50–99	16
100–199	10
200–499	4
Over 500	3
Total	52

Industry classification[a]	*n*
Food, beverage and tobacco	4
Wood and paper products	8
Petroleum, coal and chemical products	4
Non-metallic products (glass, ceramic, cement)	5
Machinery and equipment	9
Printing, publishing and recorded media	6
Metallic (iron and steel) products	8
Textile, clothing, footwear and leather	8
Total	52

[a] Industry classification was based on the Australian and New Zealand Standard Industrial Classification code.

Appendix B. Reduction of external environmental uncertainty factors: factor matrix using PCA and descriptive statistics

Variables	Mean	Standard deviation	Factor loading
Descriptive statistics			
1. Suppliers' actions	2.58	1.36	0.82
2. Customer demands, tastes and preferences	3.52	1.09	0.80
3. Deregulation and globalization	3.98	0.94	0.79
4. Market activities of competitors	3.63	1.10	0.78
5. Production and information technologies	3.50	1.16	0.78
6. Government regulation and policies	3.06	1.27	0.73
7. Economic environment	3.25	1.21	0.68
8. Industrial relations	2.69	1.39	0.64

Correlation matrix

1	2	3	4	5	6	7	8
1. 1.00							
2. 0.39*	1.00						
3. 0.22*	0.31**	1.00					
4. 0.48*	0.32**	0.23*	1.00				
5. 0.37**	0.21	0.38**	0.15	1.00			
6. 0.36**	−0.05	0.30*	0.35*	0.32*	1.00		
7. 0.35*	0.20	0.40**	0.48**	0.18	0.41**	1.00	
8. 0.38*	0.22	0.34*	0.47**	0.07	0.22*	0.64**	1.00

Percentage of variance explained is 68.3.

** Statistically significant at the 5% level (two-tailed).

* Statistically significant at the 1% level (two-tailed).

Appendix C. Descriptive statistics for the reported use of non-financial measures

	Observed range[a]			
	Minimum	Maximum	Mean	Standard deviation
Material and labor efficiency or productivity	1	5	4.01	0.97
Process improvements and re-engineering	1	5	3.56	1.11
New product introduction	1	5	3.01	1.22
Employee development and training	1	5	2.96	1.04

(continued on next page)

Customer satisfaction	1	5	3.90	0.92
On-time-delivery	1	5	3.19	1.02
Relations with suppliers	1	5	2.89	1.26
Workplace relations	1	5	2.90	1.13
Employee health and safety	1	5	3.53	1.16
Market share	1	5	3.94	1.03
Warranty repair costs	1	5	2.84	1.32
Customer response time	1	5	3.26	1.15
Employee satisfaction	1	5	3.50	1.18

[a] Theoretical range, 1 = to a little extent; 5 = to a great extent.

References

Abernethy, M. A., & Guthrie, C. H. (1994). An empirical assessment of the 'fit' between strategy and management information system design. *Accounting and Finance*, *34/2*, 49–66.

Abernethy, M. A., & Lillis, A. M. (1995). The impact of manufacturing flexibility on management control system design. *Accounting, Organizations and Society*, *20/4*, 241–258.

Abernethy, M. A., & Stoelwinder, J. U. (1991). Budget use, task uncertainty, system goal orientation and subunit performance: a test of the 'fit' hypothesis in not-for-profit hospitals. *Accounting, Organizations and Society*, *16/2*, 105–120.

Asher, H. B. (1976). *Causal modeling*. Beverly Hills: Sage Publications.

Borthick, A. F., & Roth, H. P. (1997). Faster access to more information for better decisions. *Journal of Cost Management*, *10/4*, 19–24.

Bryman, A., & Cramer, D. (1990). *Quantitative data analysis for social scientists*. London, UK: Routledge.

Chapman, C. S. (1997). Reflections on a contingent view of accounting. *Accounting, Organizations and Society*, *22/2*, 189–205.

Chenhall, R. H. (1997). Reliance on manufacturing performance measures, total quality management and organizational performance. *Management Accounting Research*, *8/2*, 187–206.

Chenhall, R. H., & Langfield-Smith, K. (1998). The relationship between strategic priorities, management techniques and management accounting: an empirical investigation using a systems approach. *Accounting, Organizations and Society*, *23/3*, 243–264.

Chenhall, R. H., & Morris, D. (1986). The impact of structure, environment, and interdependence on the perceived usefulness of management accounting systems. *The Accounting Review*, *61/1*, 16–35.

Chong, V. K., & Chong, K. M. (1997). Strategic choices, environmental uncertainty and SBU performance: a note on the intervening role of management accounting systems. *Accounting and Business Research*, *27*, 268–276.

Cooper, R. (1989). You need another cost system when.... *Harvard Business Review*, *67/1*, 77–82.

Cooper, R. (1995). *When lean enterprises collide*. Boston: Harvard Business School Press.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*, 297–334.

D'Aveni, R. A., & Gunther, R. E. (1995). *Hypercompetitive rivalries*. New York: The Free Press.

Davis, J. A. (1985). *The logic of causal order. Quantitative applications in the social sciences*. Thousand Oaks, CA: Sage Publications.

Dent, J. F. (1990). Strategy, organization and control. *Accounting, Organizations and Society*, *15*(1–2), 3–26.

Ezzamel, M. (1990). The impact of environmental uncertainty, managerial autonomy and size on budget characteristics. *Management Accounting Research*, *1*, 181–197.

Foster, G. (1996). Management accounting in 2000. *Journal of Cost Management*, *Winter*, 36–39.

Goldman, S. L., Nagel, R. N., & Preiss, K. (1995). *Agile competitors and virtual organizations*. New York: Van Nostrand Reinhold.

Gordon, L. A., & Naryanan, V. K. (1984). Management accounting systems, perceived environmental uncertainty and organizational structure: an empirical investigation. *Accounting, Organizations and Society*, *19/1*, 330–348.

Gosselin, M. (1997). The effect of strategy and organizational structure on the adoption and implementation of activity-based costing. *Accounting, Organizations and Society*, *22/2*, 105–122.

Govindarajan, V. (1984). Appropriateness of accounting data in performance evaluation: an empirical examination of environmental uncertainty as an intervening variable. *Accounting, Organizations and Society*, *9*, 125–135.

Govindarajan, V., & Gupta, A. K. (1985). Linking control systems to business unit strategy: impact on performance. *Accounting, Organizations and Society*, *10/1*, 51–66.

Govindarajan, V., & Shank, J. K. (1992). Strategic cost management: tailoring controls to strategies. *Journal of Cost Management*, *6/3*, 14–25.

Gul, F. A., & Chia, Y. M. (1994). The effects of management accounting systems, perceived environmental uncertainty and decentralization on managerial performance: a test of three-way interaction. *Accounting, Organizations and Society*, *19*(May–June), 413–426.

Hamel, G., & Prahalad, C. K. (1994). *Competing for the future*. Boston: Harvard Business School Press.

Hayes, D. F. C. (1977). The contingency theory of management accounting. *The Accounting Review*, *52/1*, 22–39.

Hope, T., & Hope, J. (1995). *Transforming the bottom line*. London: Nicholas Brealey Publishing.

Hoque, Z., & Hopper, T. (1997). Political and industrial relations turbulence, competition and budgeting in the nationalized jute mills of Bangladesh. *Accounting and Business Research*, *27/2*, 125–143.

Hoque, Z., & James, W. (2000). Linking balanced scorecard measures to size and market factors: impact on organizational performance. *Journal of Management Accounting Research*, *12*, 1–17.

Ittner, C. D., & Larcker, D. F. (1998). Innovations in performance measurement: trends and research implications. *Journal of Management Accounting Research*, *10*, 205–238.

Ittner, C. D., Larcker, D. F., & Rajan, M. V. (1997). The choice of performance measures in annual bonus contract. *The Accounting Review*, *2/2*(April), 231–256.

Johnson, H. T. (1995). Management accounting in the 21st century. *Journal of Cost Management*, *Fall*, 15–19.

Johnson, H. T., & Kaplan, R. S. (1987). *Relevance lost: the rise and fall of management accounting*. Boston: Harvard Business School Press.

Kaplan, R. S., & Norton, D. P. (1992). The balanced scorecard—measures that drive performance. *Harvard Business Review*, *70/1*, 71–79.

Kaplan, R. S., & Norton, D. P. (1996). Using the balanced scorecard as a strategic management system. *Harvard Business Review*, *74/1*, 75–85.

Langfield-Smith, K. (1997). Management control systems and strategy: a critical review. *Accounting, Organizations and Society*, *22/2*, 207–232.

Lynch, R. L., & Cross, K. F. (1991). *Measure up!*. Cambridge, MA: Blackwell Publishers.

Macintosh, N. B., & Daft, R. L. (1987). Management control systems and departmental interdependencies: an empirical study. *Accounting Organizations and Society*, 49–61.

Mia, L. (1993). The role of MAS information in firms: an empirical study. *The British Accounting Review*, *25/3*, 269–285.

Mia, L., & Chenhall, R. H. (1994). The usefulness of management accounting systems, functional differentiation and managerial effectiveness. *Accounting, Organizations and Society*, *19/1*, 1–13.

Miles, R. E., & Snow, C. C. (1978). *Organizational strategy, structure and process*. New York: McGraw Hill.

Miles, R. E., & Snow, C. C. (1994). *Fit, failure and the hall of fame*. New York: Free Press.

Nanni Jr., A. J., Dixon, J. R., & Vollmann, T. E. (1992). Integrated performance measurement: management accounting to support the new manufacturing realities. *Journal of Management Accounting Research*, *4*, 1–19.

Nunnally, J. C. (1967). *Psychometric theory*. London: McGraw-Hill.

Otley, D. T. (1980). The contingency theory of management accounting: achievement and prognosis. *Accounting, Organizations and Society*, *5/4*, 413–428.

Pedhazur, E. J. (1982). *Multiple regressions in behavioral research: explanation and prediction*. New York: Holt, Rinehart and Winston, Inc.

Perera, S., Harrison, G., & Poole, M. (1997). Customer-focused manufacturing strategy and the use of operations-based non-financial performance measures: a research note. *Accounting, Organizations and Society*, *22/6*, 557–572.

Shields, M. D. (1995). An empirical analysis of firms' implementation experiences with activity-based costing. *Journal of Management Accounting Research*, *7*, 148–166.

Simons, R. (1987). Accounting control systems and business strategy: an empirical study. *Accounting, Organizations and Society*, *12*, 357–374.

Simons, R. (1990). The role of management control systems in creating competitive advantage: new perspectives. *Accounting, Organizations and Society*, *15*(1–2), 127–143.

Simons, R. (1995). *Levers of control*. Boston, MA: Harvard Business School Press.

Van de Ven, A. H., & Drazin, R. (1985). The concept of fit in contingency theory. In B. M. Staw, & L. L. Cummings (Eds.), *Research in organizational behaviour*. Greenwich, CT: JAI press.

Van der Stede, W., & Bruggeman, W. (1993). Fitting management control systems to the competitive advantage: a research note. *British Journal of Management*, *4/3*, 205–218.