JOURNAL OF MANAGEMENT ACCOUNTING RESEARCH
Volume Twenty
2008
pp. 25–57

Performance Measurement System Design in Joint Strategy Settings

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ABSTRACT: This study examines empirically the association between joint strategies and the design of manufacturing performance measurement systems. Drawing on data collected from production managers in 84 industrial firms, the study seeks evidence of links between the implementation of differentiation, low-cost and joint strategies in production, and reliance on efficiency, financial, and customer-focused performance measures. The results indicate the paradoxical situation where virtually all units in the sample pursue competitive advantage in differentiation yet many rely intensely on efficiency and financial measures to measure manufacturing performance. Reliance on efficiency measures is observed to be associated with the pursuit of low-cost and differentiation strategies jointly. Reliance on financial measures, on the other hand, appears to be related to differentiation and not related to the strategic importance of low cost. The findings suggest that financial measures may have a role in monitoring the financial impact of differentiation and curbing excessive differentiation. However, efficiency measures are primarily related to the extent of strategic focus on low cost and may be observed in differentiating units when differentiation is pursued jointly with low cost.

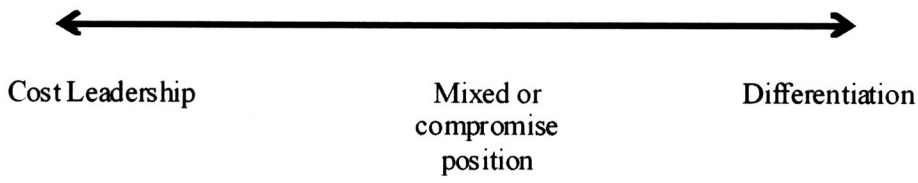
Keywords: strategy; joint strategy; performance measurement systems.

INTRODUCTION

Since Hopwood's (1972) seminal study, a great deal of research has been devoted to studying influences on the role of accounting data. At the strategic business unit (SBU) level, business strategy emerged in the 1980s as a significant contingent variable influencing management control system design (Govindarajan and Gupta 1985; Govindarajan 1988; Dent 1990; Simons 1987). At that time, researchers operationalized strategy using taxonomies that distinguished archetypal prospectors/defenders (Miles and Snow 1978), differentiators/cost leaders (Porter 1980), and entrepreneurs/conservatives (Miller and Friesen 1982). In this literature, the archetypes within each pair were treated as mutually exclusive; the opposite ends of a continuum with few, if any, shared attributes. As reflected in Figure 1, the classic view of "mixed" strategies is that low cost can only

We gratefully acknowledge the helpful comments of Margaret Abernethy, Eddy Cardinaels, Laurence van Lent, Mina Pizzini, Jeroen Suijs, participants at the Management Accounting Section meeting, Phoenix, 2005, seminar participants at Radboud University Nijmegen, 2007, and participants at the European Accounting Association meeting in Lisbon, 2007.

FIGURE 1
Representation of Strategic Archetypes—The End Points of a Continuum

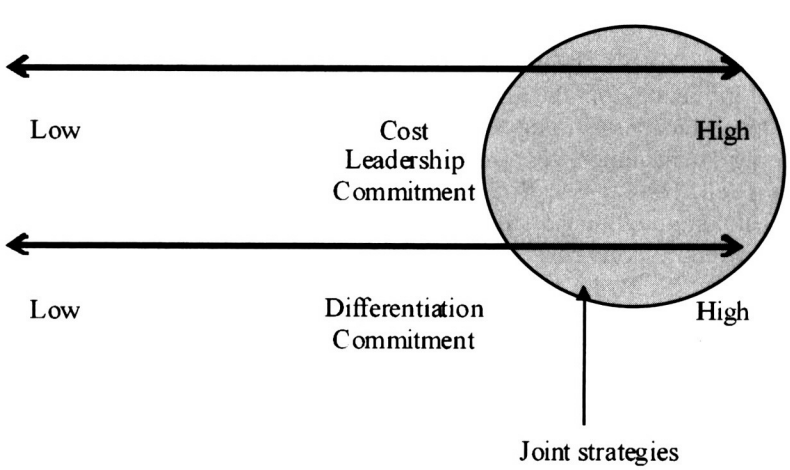


be achieved by compromising commitment to differentiation. Similarly, effective differentiation would compromise the level of commitment to a low-cost position.

Exemplifying the approaches taken in this literature, Simons (1987, 360) classifies firms by consensus into prospector/defender categories and does not examine those classified as "fitting neither type." Govindarajan (1988, 830) adopts Porter's archetypes and explicitly measures strategy in terms of "SBUs' intended trade-offs between becoming the cost leader and achieving differentiation." While these studies of the implications of strategic difference on management control systems or performance measurement systems are informative, the continued relevance of these archetypes in contemporary competitive environments has been questioned (Chenhall 2003).

In this study we examine the association between *joint* strategies and performance measurement system design in production subunits. We define joint strategy settings as those where there is a high emphasis on the pursuit of *both* low cost and differentiation in production strategy. As reflected in Figure 2, we define the joint strategy position as one in which the emphasis on low cost and differentiation are both high. We contrast joint strategies with archetypal strategies, defined as strategic positions in which the emphasis on differentiation *or* low cost is high, but not both.

FIGURE 2
Representation of Strategies as Independent Choices, Allowing Joint Strategies



We argue that in settings where low-cost and differentiation strategies are pursued jointly, the design of performance measurement systems is more complex than the configurations that match unidimensional strategic archetypes. We consider specifically the question of how the performance measurement demands of multiple strategic priorities are managed. Theoretically, it is possible to simply add measures as strategies become more complex. The literature does not suggest any optimal number of performance measures or combinations of measures. What is of interest here is the question of *strategy-consistent* performance measurement, when strategies themselves imply trade-offs.

The literature that links strategy with performance measurement suggests trade-offs in performance measurement. Measures consistent with low-cost strategies (such as efficiency and productivity) may induce behaviors that are not consistent with differentiation strategies (Govindarajan 1988; Kaplan 1990; Simons 1987; Abernethy and Lillis 1995; Dixon et al. 1990). Conversely, firms pursuing a low-cost strategy tend to rely on measures of efficiency and cost monitoring (Langfield-Smith 1997; Abernethy and Lillis 1995; Govindarajan 1988). It is implicit rather than explicit in this literature that low-cost firms will not invest in sophisticated measurement systems that track performance on differentiation attributes (e.g., customer responsiveness, lead times, rate of new product introduction).[1] These studies imply that strategy-consistent performance measure choices involve trade-offs in that specific measures are not suited to certain strategic contexts because of their potential behavioral consequences (Govindarajan 1988; Kaplan 1990; Abernethy and Lillis 1995; Lillis 2002). In this literature, each small move on the one-dimensional continuum of strategies implies an increased use of the measures that become more suitable and an analogous de-emphasis of the measures that become less suitable.

In this study we test the proposition that the pursuit of joint strategies reduces the potential to trade off performance measures. The simultaneous pursuit of multiple strategies requires the inclusion of performance measures relating to each strategic priority, without the de-emphasis on measures supporting alternative strategies that would occur if strategies and their associated performance measures were to vary along a continuum. We propose that management control in joint strategy settings requires more *intense* performance measurement in that it is likely to involve a higher use of a broad set of individual performance measures covering a range of key success factors as management attempts to monitor multiple strategic priorities.

We aim to contribute to the literature in two ways. First, by examining settings in which firms emphasize both low cost and differentiation simultaneously, this study departs from the mutually exclusive archetypal strategic profiles of the prior literature. Rather than representing strategic choice as a single continuum, this study reflects alternative strategies where the emphasis on each strategy can vary independently. We examine the use of specific categories of performance measures in the context of low-cost, differentiation, and joint strategies. We predict differences in manufacturing settings in the way reliance on financial and efficiency measures responds to different strategic settings. Our claim is that archetypal strategies will make trade-offs between performance measures that are likely to conflict in the short term (e.g., customer-focused and efficiency measures), relying heavily on one performance measure type and de-emphasizing the other—but that joint strategists rely heavily on both kinds of performance measures. The management of multiple priorities of

[1] The literature invariably discusses the need to supplement or supplant traditional cost-focused measures in "new" manufacturing settings where low cost is no longer the primary strategy. However, it does not address explicitly the effect of differentiation-focused performance measures in low-cost settings.

low cost and differentiation through, for example, flexibility and responsiveness in manufacturing settings have been identified in the literature as particularly challenging (Abernethy and Lillis 1995; Lillis 2002).[2]

Second, our examination of joint strategies and our examination of specific subcategories of financial and nonfinancial performance measures enable us to assess the impact of two different arguments for the persistence of financial and efficiency measures in differentiation settings. The first argument, already in the management accounting literature, relates to reliance on performance measures to curb excessive differentiation. We propose that this "curbing excessive differentiation" effect is managed through reliance on financial performance measures but not efficiency measures. We introduce a second argument relating to the presence of joint strategies. That is, reliance on particular performance measures in differentiation settings may be associated with the importance of low cost in conjunction with differentiation strategies. We propose that reliance on efficiency measures in differentiation settings is reflective of the presence of joint strategies. We examine empirically these two different arguments and their implications for performance measurement system characteristics.

The remainder of this paper is structured as follows. In the next section we review the prior literature and state the research question. Subsequent sections establish the hypotheses, outline the study design and method, describe the variables and their measurement, and present and discuss the findings. The paper concludes with discussion of limitations and future research directions.

LINKING STRATEGY WITH PERFORMANCE MEASUREMENT SYSTEM DESIGN

Many studies in the management accounting literature have attempted to identify contingent links between strategy and performance measurement system design. Studies linking strategy with management control system design attributes tend to focus on cost leader/differentiator or prospector/defender archetypes (Langfield-Smith 1997). Similarly, in the management literature, several authors have identified taxonomies of strategic capabilities in manufacturing (Buffa 1984; Stobaugh and Telesio 1983; Miller and Roth 1994). These taxonomies generally distinguish at least three different types of strategic capability—manufacturing at low cost, focusing on product-line breadth, or focusing on flexibility (Miller and Roth 1994). These strategies are supported by administrative choices and performance measures that reinforce the development of key capabilities (Miller and Roth 1994). Such taxonomies or archetypal classifications are useful in order to understand the implications of strategic *difference* for control system design. Indeed these taxonomies and archetypal strategy classifications provided a robust foundation for studies of administrative

[2] While propositions regarding the impact of strategy on management control system design are developed and tested typically at the SBU level, they carry management control implications and the potential for similar tensions at the functional, production management level. Cost leadership strategy at the SBU level implies tight cost control and standardization in manufacturing, whereas differentiation at the SBU level carries implications for product range, quality, and/or flexibility implications for manufacturing (Porter 1980; Chenhall and Langfield-Smith 1998; Abernethy and Lillis 1995; Lillis 2002). These flow-on effects to functional unit strategy and management control systems (particularly in manufacturing) are evident in the instruments used to assess strategy-consistent management control system attributes in studies framed at the SBU level (e.g., Chenhall and Morris 1995; Miller and Friesen 1982; Simons 1987; Khandwalla 1972; Chenhall and Langfield-Smith 1998). It is implicit in these instruments that SBU strategy and its implications are at least partially observable in the relative emphasis on, for example, standardization, product range, and tight cost variance monitoring in production environments.

and control systems because they were generally thought to capture the limited range of viable strategic options available (Miles and Snow 1978; Porter 1980; Langfield-Smith 1997; Doty et al. 1993). In general, this literature treats the major alternative strategic positions such as prospector/defender or cost leader/differentiator as fundamental choices. Each pair represents the extremes at the end of a continuum, with few viable options of combining the attributes of both. To the extent that mixed strategic profiles are reflected in these classic strategy studies (e.g., Miles and Snow's [1978] analyzer category), they are generally treated as either unstable through lack of focus (Porter 1980) or defined quite rigidly in terms of attributes (Miles and Snow 1978).

Since these classic studies, the strategic management and manufacturing management literatures have devoted considerable attention to the issue of whether the manufacturing strategies of low cost, quality, flexibility, and dependability are pursued jointly, independently, or sequentially (Belohlav 1993; Crowe and Nuno 1991; New 1992; Buffa 1984). While largely untested empirically, the view is expressed frequently that global competitiveness in manufacturing in the last two decades requires that firms choose a combination of manufacturing strategies and that world-class manufacturers will be those that balance all strategies (Drucker 1990; Hill 1988; Jones and Butler 1988; Nemetz and Fry 1988; De Toni and Tonchia 2001). Rather than perceiving joint strategies as unfocused and potentially underperforming, these authors imply that the most successful manufacturers will be those that strike the correct balance among cost, quality, and responsiveness strategies and develop the infrastructure to support their strategic profile (Lei and Slocum 2005). This literature does not specifically address the issue of how the "balance" is struck. It leaves unanswered the question of whether or to what extent compromise on one strategic priority (e.g., cost) is required to also pursue another (e.g., responsiveness). However, these studies do suggest that the joint and simultaneous pursuit of both is not only a viable but potentially successful strategy.

To the extent that strategies are, in practice, pursued jointly, the direct link between strategy and management control system design will not be observable in studies of strategic archetypes. There has been little study of the management control consequences of joint strategies. Chenhall and Langfield-Smith (1998) note the simultaneous presence of strategies focused on both low cost and flexibility in their strategic clusters. They also note performance differences among clusters of firms with evident joint strategies and speculate that the data point to the importance of "integrating systems to *both* differentiation and low price strategies" (Chenhall and Langfield-Smith 1998, 255; emphasis added). However, they do not focus on the design of systems to manage these joint strategies in their analysis. Auzair and Langfield-Smith (2005) similarly identify the presence of joint strategies, but do not examine their implications for control system design. This study presents current evidence of the prevalence of joint strategies and the association between these strategic choices and the use of performance measures.

In seeking to link strategic choices with the use of performance measures, this study hypothesizes specific differences in the reliance on financial, customer-focused, and efficiency measures in different strategic settings. A great deal of the source of apparent conflict in prior results relating to strategy/management control system (MCS) design appears to be attributable to subtle but important differences in the performance measurement constructs studied (Langfield-Smith 1997). We focus on use of specific categories of performance measures as our MCS variable as performance measures are conventionally associated with different strategic priorities. Customer-focused performance measures are particularly associated with differentiation strategies, because they typically relate to attributes of the

production process output that are valued by customers and can be used to give feedback at the operational level (Kaplan 1990; Abernethy and Lillis 1995; Chenhall and Langfield-Smith 1998). Examples include product quality and performance, delivery lead time, and customer responsiveness. Similarly, efficiency measures focus on monitoring inputs to the production process and on the resources used. Examples include labor and machine productivity and utilization, as well as the monitoring of scrap and waste. Therefore, efficiency measures match very well with a low-cost strategy (Abernethy and Lillis 1995; Chenhall and Langfield-Smith 1998). The literature is less clear on the association between use of financial measures and specific strategic archetypes, with use of financial measures being associated with both low-cost and differentiation strategies (Chenhall 2003; Simons 1987; Miller and Friesen 1982). In this study, we focus particularly on financial and efficiency subsets of accounting performance measures and theorize strategy-dependent differences in the relevance of these subcategories of accounting measures. Specifically, we theorize that differing levels of aggregation inherent in financial and efficiency measures lead to different strategic monitoring roles for these categories of measures.

The Research Question

This study examines empirically the performance measurement system characteristics associated with *joint* low-cost and differentiation strategies relative to *archetypal* low-cost and differentiation strategies. We focus on production strategy as it directly reflects the implementation of SBU-level priorities of low cost and differentiation. Joint and archetypal strategies are identified based on the extent of joint and separate emphasis on strategic capabilities related to low cost and differentiation by product breadth or flexibility. The performance measures examined fall into broad categories that distinguish overall financial measures such as profit, return on investment and cost variances, efficiency measures such as wastage and machine utilization, and customer-focused measures such as customer satisfaction and delivery performance.

THEORY DEVELOPMENT AND HYPOTHESES

In this section, we propose hypotheses relating to the association between strategic orientation and performance measurement. Figure 3 represents the strategic settings for which we hypothesize performance measurement differences.

We are interested in performance measurement characteristics when strategic commitment to both low cost and differentiation is high (Figure 3, Cell 1,1). We contrast the performance measurement characteristics of joint strategy firms (Figure 3, Cell 1,1) with archetypal low-cost firms (Figure 3, Cell 1,2) and archetypal differentiators (Figure 3, Cell 2,1). In the next section we consider characteristics of financial and efficiency performance measures that are integral to our expectations regarding performance measure characteristics in both archetypal and joint strategy settings.

Distinguishing Financial and Efficiency Measures

In this study we are particularly interested in the question of how reliance on efficiency measures and financial measures relates to the pursuit of low cost and differentiation both as distinctive strategies and in a joint strategy combination. As a first step in theorizing these relations, we explore expected differences in reliance on *efficiency* measures and more aggregated *financial* measures. To distinguish the relative importance of efficiency and financial measures in different strategic contexts, we draw on the notion of hierarchical and independent performance measurement system architecture (De Toni and Tonchia 2001). De Toni and Tonchia (2001) distinguish measures that are linked through aggregation

FIGURE 3
Representation of Strategic Settings

		Commitment to differentiation	
		High	Low
Commitment to low cost	High	Joint strategy firms 1,1	Archetypal low cost firms 1,2
	Low	2,1 Archetypal differentiation firms	2,2

from measures that correspond to diverse and independent perspectives. For example, a classic DuPont analysis illustrates a linkage through aggregation between production efficiency and net income. Alternatively, measures such as delivery performance and production efficiency do not readily aggregate into one another. Production efficiency demands efficient lot sizes, which may, in a multi-product setting, be inconsistent with attempts to improve delivery performance. While both measures may aggregate into net income improvements, they do so through different paths. Delivery performance drives net income through the revenue stream and production efficiency drives net income through cost reduction. Thus, the operational measures of efficiency and delivery performance are *independent* of each other and appear to support different priorities. However, both measures are *linked* with financial measures such as profit via aggregation.

Linking Financial Measures, Operational Measures, and Strategy Types

The performance measurement characteristic of linkage through aggregation is particularly descriptive of the relation between operational measures and financial measures (Berliner and Brimson 1988). While individual operational measures may conflict with each other, operational measures generally link with financial outcomes at a higher level of aggregation (Lillis 2002). Following these arguments we suggest that reliance on efficiency and financial measures are not expected to respond in the same way to the influence of key independent variables such as strategy. More specifically, operational measures such as efficiency and customer measures are expected to prevail in different strategic settings, whereas financial measures are expected to be common across these settings.

Strategies focused on differentiation by flexibility and product range are expected to be supported by customer-focused measures, and strategies focused on low cost are expected to be supported by efficiency measures. These are conventional propositions consistent with the prior literature (Miles and Snow 1978; Porter 1980; Govindarajan 1988;

Shank 1989; Kaplan 1990; Chenhall and Langfield-Smith 1998; Sim and Killough 1998; Daniel and Reitsperger 1991; Abernethy and Lillis 1995; Van der Stede 2000). Consistent with this literature, we hypothesize reliance on efficiency and customer-focused measures to be strategy-dependent.

In contrast, we argue that aggregate financial measures such as profit are consistent with local performances on both efficiency and customer-focused dimensions (Kaplan and Norton 1992; Chenhall and Langfield-Smith 1998). Over an extended time frame, financial measures are consistent with both low-cost and differentiation strategies as they capture both the cost and revenue impacts of strategic priorities such as flexibility and product line expansion. Emphasizing a combination of financial and customer-focused measures addresses the need for "balance" and an "integrative quality" in the performance measurement system (Kaplan and Norton 1992; Chenhall and Langfield-Smith 1998; Chenhall 2005), whereas an emphasis on cost control through production efficiency would introduce inherently conflicting measures (Lillis 2002). In other words, financial measures more usefully capture the cost and revenue impact of initiatives that, for example, increase customer satisfaction, whereas an efficiency measure will most likely provide a conflicting signal in that increasing customer satisfaction may increase costs. Therefore, we do not hypothesize any specific association between reliance on financial measures and the level of commitment to low cost or differentiation. We return to financial measures in a subsequent section when we hypothesize the impact of joint strategies. In that section we draw on the characteristics of joint strategy firms to identify the settings in which we expect to observe differential reliance on financial and efficiency measures.

Our first two hypotheses are benchmark hypotheses that are consistent with the prior literature. However, relying on the arguments developed above, we state hypotheses specifically relating reliance on efficiency and customer-focused measures to the pursuit of low cost and differentiation, respectively, but we do not expect reliance on financial measures to vary directly with the emphasis on either of these strategies.

H1a: Firms with a high commitment to a low-cost strategy (Figure 3, Cell 1,1 and Cell 1,2) will rely more on efficiency measures than firms with a low commitment to a low-cost strategy (Figure 3, Cell 2,1 and Cell 2,2).

H1b: Firms with a high commitment to a differentiation strategy (Figure 3, Cell 1,1 and Cell 2,1) will rely more on customer-focused measures than firms with a low commitment to a differentiation strategy (Figure 3, Cell 1,2 and Cell 2,2).

Distinguishing Performance Measures in Joint and Archetypal Strategy Settings

Firms in the "high commitment" categories in H1a–H1b include both joint and archetypal strategy cases. Thus, the expectations developed above in relation to differences in performance measurement systems in low-cost and differentiation settings do not distinguish our expectations in joint and archetypal strategy cases. Note that if commitment to low cost and differentiation are measured on a single continuum, then H1a–H1b would imply that differentiators rely *less* on efficiency measures than low-cost firms, and low-cost firms rely *less* on customer-focused measures than differentiation firms. Because we use independent scales and we allow for high commitment to both strategies, we do not make these predictions. Rather, to capture the joint strategy effect, we propose that commitment to differentiation will *not* be associated with lower reliance on efficiency measures if differentiation is pursued jointly with a low-cost strategy. Similarly, we propose that

commitment to low cost will not be associated with lower reliance on customer-focused measures if it is pursued jointly with a differentiation strategy.

H2a: Firms committed jointly to a low-cost and differentiation strategy (Figure 3, Cell 1,1) will not rely less on efficiency measures than archetypal low-cost firms (Figure 3, Cell 1,2).

H2b: Firms committed jointly to a low-cost and differentiation strategy (Figure 3, Cell 1,1) will not rely less on customer-focused measures than archetypal differentiation firms (Figure 3, Cell 2,1).

As we do not predict for joint strategy firms any less reliance on customer-focused measures than differentiating firms or any less reliance on efficiency measures than low-cost firms, and we do not conjecture any specific association between reliance on financial measures and the level of commitment to low cost or differentiation, we are, in effect, proposing that *intensity* of performance measure use is higher for joint strategy cases as more performance measures are used in order to capture multiple priorities. While the extant literature does not directly address the performance measurement demands of joint strategies, it does trace the expansion of performance measurement systems in the context of the evolution of new strategic initiatives in the past two decades (Chenhall and Langfield-Smith 1998; Ittner and Larcker 1997; Sim and Killough 1998; Fullerton and McWatters 2002; Eccles 1991). The literature also emphasizes the importance of capturing all critical dimensions of strategy in performance measurement systems (Kaplan and Norton 2001; Nanni et al. 1992; Norreklit 2000; Lillis 2002). Consistent with the greater complexity of key performance parameters to be managed in joint strategy settings, we hypothesize that joint strategies require a higher intensity in reliance on performance measures than archetypal strategies. We use the term performance measurement intensity to reflect the reliance on more performance measures to capture a greater range of key success factors in joint strategy cases.

H2c: Firms committed jointly to a low-cost and differentiation strategy (Figure 3, Cell 1,1) will reflect higher intensity in reliance on performance measures than firms committed to archetypal differentiation (Figure 3, Cell 2,1) or low cost (Figure 3, Cell 1,2).

Joint Strategies and "Curbing Costly Differentiation" as Alternative Arguments for the Prevalence of Financial/Efficiency Measures in Differentiation Settings

This joint strategy argument for the prevalence of efficiency or financial measures in differentiation settings is distinguishable empirically from an alternative argument, already in the literature, that firms rely on budget pressure or financial measures to "curb excessive differentiation" (Miller and Friesen 1982; Simons 1987; Khandwalla 1972). While the firms committed to low-cost strategies may discourage differentiation through an explicit emphasis on cost control and efficiency, it is also argued that tight financial control is important in entrepreneurial, differentiating, or prospector settings where differentiation is encouraged. In such settings, financial measures curb the tendency for excessive and disadvantageous differentiation by enabling the monitoring of cost of differentiation against the value generated through improved outcomes for customers (Chenhall 2003; Simons 1987; Miller and Friesen 1982).

We expect the "curbing excessive differentiation" rationale to apply for financial measures but not efficiency measures. Operational measures of efficiency and customer responsiveness are problematic in combination. Tight cost control may actually impede initiatives focused on increasing flexibility and broadening product lines (Otley 1994; Abernethy and Lillis 1995; Lillis 2002). Tight cost control is implemented in manufacturing through an array of measures that may include measures of product cost, but more generally focus on the more timely, actionable cost drivers of labor time, waste, and machine utilization (Bruns and McKinnon 1993). These efficiency measures facilitate the minimization of product costs through standardization, waste reduction, and high levels of machine utilization. These measures are often optimized through product standardization and long production runs. By focusing only on cost impacts and not revenue effects, efficiency measures do not effectively capture the cost/benefit trade-offs involved in differentiation. Rather, we argue that financial control, which is necessary to curb excessive differentiation, is more effectively managed using aggregate financial measures. By embracing both cost and revenue effects, financial measures have the potential to better capture the cost/benefit trade-offs involved in differentiation decisions. Thus, efficiency measures are not optimal in differentiation settings. We expect efficiency measures to be present in some settings where there is a strong emphasis on differentiation, but we attribute this to the presence of joint strategies.

In joint strategy settings, efficiency measures are expected to remain important to support the implementation of the low-cost element of the joint strategy. In such settings, management is faced with the inherent challenge of managing a joint strategy with potentially conflicting elements. For firms competing on differentiation without an emphasis on low cost, aggregate financial measures provide a more effective means of managing the cost/benefit trade-offs inherent in differentiation.[3] This leads to an expectation that reliance on efficiency measures will be higher in differentiation settings where the commitment to low cost is also high, than in archetypal differentiation settings.

In summary, we predict that reliance on efficiency measures will be more characteristic of joint strategy firms (Figure 3, Cell 1,1) than of archetypal differentiation firms (Figure 3, Cell 2,1). In contrast, reliance on financial measures will be equally characteristic of archetypal differentiators and joint strategy firms, because both attempt to curb unprofitable differentiation (indicated by no significant differences in reliance on financial measures between Cell 1,1 and Cell 2,1 in Figure 3).

H3a: Firms committed jointly to a low-cost and differentiation strategy (Figure 3, Cell 1,1) will rely more on efficiency measures than archetypal differentiator firms (Figure 3, Cell 2,1).

H3b: Firms committed jointly to a low-cost and differentiation strategy (Figure 3, Cell 1,1) will not rely more on financial measures than archetypal differentiator firms (Figure 3, Cell 2,1).

STUDY DESIGN AND METHOD

The study was conducted with a structured questionnaire. To pre-test the questionnaire and establish face validity of the survey items, the instrument was evaluated by a panel of

[3] We acknowledge that there may still be timing differences between the investment in differentiation strategies (cost) and the revenue payoffs. Such timing differences limit the extent to which financial measures fully capture trade-offs. However, in a stable state, the argument holds that the combination of financial and customer-focused measures will more effectively capture the cost/benefit trade-off in differentiation than the combination of efficiency and customer measures.

12 academic colleagues. Following this evaluation, the survey instrument was revised, and reviewed by three academic experts in the field (who were part of the original panel). In addition, the instrument was pilot-tested with respondent managers by starting the survey on a small-scale basis. After verification that no adjustments were needed, the survey continued on a larger scale. Data were collected from 84 production managers in industrial firms in The Netherlands in the years 2000–2001. A general database (Reach) of Dutch firms was used to produce a list of industrial firms with at least 100 employees (3,654 firms). Firms were selected across a range of industries with the aim of selecting participants with a variety of strategic orientations. The target sample of firms receiving a questionnaire was determined randomly.

Broad characteristics of the sample and the managerial participants are given in Appendix A. "Firms" in this context are either fully independent or subunits of other larger firms. However, they all appear as separate entries in the database. The production manager who was targeted as respondent was the person supervising the production activities within a business unit. If the researched organization had no business unit structure, then the production manager responsible for all production activities relating to a certain group of products was approached. This means that the production department might be located at the level of the whole organization or at a lower organizational level. The names and addresses of the production managers were obtained by telephone calls to the firms in the sample, which resulted in questionnaires being administered to 140 managers.[4] The response rate was 60 percent: 140 effective contacts[5] yielded 84 returned questionnaires. For six firms, more than one production manager is included in the sample. For one firm, five production managers are included in the sample, another firm corresponds to three managers, and four firms are represented by two production managers.[6] For the remaining 68 firms only one production manager is included.

Respondent and nonrespondent firms are compared using characteristics of industry and size (number of employees). On the basis of these characteristics, companies are classified into four categories for industry (see Appendix A, A–D) and into three categories for size (< 500, 500–1000, > 1000). For both characteristics, a Chi-square test indicates no differences between the respondents and the nonrespondents. The conclusion that the respondent and nonrespondent categories are similar is affirmed by the result of an Independent Samples t-test, which was executed for the number of employees.

THE VARIABLES AND THEIR MEASUREMENT

Reliance on Performance Measures

A list of performance measures was developed by a combination of the instruments of Abernethy and Lillis (1995) and Perera et al. (1997) (see Appendix B, question 2). The production managers were asked to indicate how much importance is attached to each of the performance measures when their performance is reviewed periodically.

Three types of performance measures are distinguished using exploratory factor analysis: (1) customer-focused measures, (2) broad financial measures, and (3) efficiency measures. The exploratory factor analysis indicates that one measure (customer complaints) has

[4] For seven firms, contacts between the university and firms in the originally identified list were used to facilitate access.

[5] The term "effective contacts" is used to exclude companies that did not manufacture anymore, that had a vacancy for the production manager's job, or that refused to give the production manager's contact details because of company policy.

[6] In these cases, the production managers were responsible for businesses in different industries and/or with different strategic profiles; see the "Descriptive Statistics" section for further detail.

a low communality, so this measure was dropped from the analysis. Provided that the KMO-score is higher than 0.5, factor analysis is appropriate (Kaiser and Rice 1974). The KMO-score for this factor analysis is 0.71. Factor analysis of all remaining items on three factors results in three separately identifiable factors: reliance on customer-focused measures (*RCUST*), reliance on financial measures (*RFIN*), and reliance on efficiency measures (*REFF*) (see Table 1). Cronbach's alpha for each of the variables is sufficient: 0.86 for the customer measures, 0.70 for the financial measures, and 0.71 for the efficiency measures.[7] The reliance on each type of measure was determined by taking an average of items that load on each factor.

We also combine the "reliance" measures to capture the intensity of performance measure use *INTENS*. Performance measure intensity (*INTENS*) is measured as the average reliance score across all items in the three performance measure categories.

Strategy

The instrument to measure strategic orientation was based on the instrument used and validated by Miller and Roth (1994). This instrument has already been introduced in the accounting literature by Chenhall (2005). Rather than using a single weighted strategy index to classify firms as either "low-cost" or "differentiation" strategic archetypes, this instrument allows commitment to low cost and each form of differentiation to vary independently.

This instrument contains 11 items (see Appendix B, question 1). A factor analysis results in four factors. The factors that are identified reflect four types of production strategy focus: a volume flexibility strategy, a market scope strategy, a product performance strategy, and a commitment to low-cost strategy (see Table 2). The first factor, volume flexibility (*VF*), captures the emphasis on volume flexibility, dependability, speed, and quality conformance. The second factor, product performance (*PP*), captures the emphasis on design flexibility, product performance, and customer service. The third factor, market scope (*MS*), captures the emphasis on advertising, breadth of distribution, and breadth of product line. The fourth factor, commitment to low cost (*CL*), captures the emphasis on low price. *VF*, *PP*, and *MS* are production strategy variables reflecting the pursuit of differentiation strategies, whereas *CL* is a production strategy variable reflecting the pursuit of low cost. For this factor analysis the KMO-score is 0.64.

It is notable that the precise structure of the factors arising from the use of the Miller and Roth (1994) instrument is variable in the literature (contrast for example Miller and Roth 1994 with Chenhall 2005). While factor loadings in this paper are in many cases consistent with either Miller and Roth (1994) or Chenhall (2005), there is some evident instability in these factors across studies. In particular, the volume flexibility and product performance strategies represent a mix of attributes that are difficult to interpret and "name" consistently with other studies. What is important in this study is that the volume flexibility factor, the product performance factor, and the market scope factor that we identify are forms of differentiation. They are all clearly distinguishable from the emphasis on low cost.

[7] Note that each measure within the factors in Table 1, if taken individually, is not necessarily consistent with our theoretical argument regarding the use of those measures in different settings. For example, standard product costs fall into "financial measures," whereas our argument would suggest that standard product costs are not, in themselves, integrative. However, the measures that load onto the factor called "financial measures" in combination are integrative. High factor loadings for financial measures apply to measures that are consistent with our theoretical positioning (e.g., profit, ROI). It is the factor that captures the measures used in combination and it is that combination of measures that needs to be theory-consistent. Similar arguments apply to the other factors. Both strategy-consistency and the potential for conflict between measurement subgroups (e.g., efficiency and customer-focused measures) needs to be evaluated at the factor level rather than the individual measures.

TABLE 1
Reliance on Performance Measures

Rotated Component Matrix	Customer-Focused	Efficiency	Financial
Delivery performance	**.701**	.122	−.157
Product returns	**.518**	.349	−.103
Inventory turnover	**.468**	.097	.262
Customer satisfaction	**.627**	.069	.233
Cost/quality improvements	**.400**	.319	.278
Cooperation people	**.568**	.241	−.119
Responsiveness demands	**.623**	−.049	.037
Sales assistance	**.716**	.048	.150
New products	**.580**	−.172	.278
Outgoing quality	**.614**	.423	−.258
Vary product characteristics	**.654**	.121	.254
Lead time standard	**.792**	.130	−.094
Lead time variations	**.786**	.108	.032
Efficiency	.108	**.658**	−.056
Product defects	.258	**.548**	.138
Set-up times	.492	**.545**	.171
Material scrap	−.081	**.732**	.220
Machine utilization	.052	**.704**	.108
Profit/net income	−.094	−.091	**.736**
Standard product costs	−.085	.298	**.519**
Return on investment	.177	.177	**.646**
Sales	.207	−.037	**.644**
Purchase price variance	.038	.177	**.704**
Eigenvalue	5.56	2.79	2.74
Variance explained	24.2%	12.1%	11.9%

Extraction method: Principal component analysis
Rotation method: Varimax with Kaiser normalization

Bold indicates the factor loadings of the items that represent the factor.
See Appendix B for complete wording of survey items.

This critical distinction is clear in our factor structure and consistent with the factor structure in both Miller and Roth (1994) and Chenhall (2005).

Method of Analysis

In order to explore the nature and implications of joint relative to archetypal strategies, we dichotomize each of the strategy variables at the mean and analyze the resultant groups. This treatment is consistent with our theory regarding joint and archetypal strategies. That is, we are theoretically interested in comparing those cases with high scores on *both* low cost and differentiation with those reflecting high scores on *either* low cost or differentiation and low on the other. Mixed strategies reflect a level of commitment to both low cost and differentiation, but in a compromise position where increases in commitment to one strategy occur at the expense of commitment to the other. Thus, "mixed" strategies reflect a mid-point combination rather than a high/high combination. This is a critical distinction, and

TABLE 2
Focus of the Production Strategy

Rotated Component Matrix	Volume Flexibility	Product Performance	Market Scope	Low Cost
Volume flexibility	**.729**	−.202	.212	−.213
Conformance	**.571**	.340	.085	.109
Speed	**.704**	.080	−.017	.010
Dependability	**.756**	.263	.003	.078
Design flexibility	−.017	**.535**	.256	−.225
Product performance	.232	**.835**	−.100	−.236
After sales service	.196	**.736**	.266	.143
Advertising	.014	.054	**.862**	−.223
Broad distribution	.177	.118	**.809**	.158
Broad line	−.009	.386	**.635**	.420
Low price	.010	−.205	.029	**.845**
Eigenvalue	2.1	2.0	2.0	1.2
Variance explained	19%	18%	18%	11%

Extraction method: Principal component analysis
Rotation method: Varimax with Kaiser normalization

Bold indicates the factor loadings of the items that represent the factor.
See Appendix B for complete wording of survey items.

our choice to examine the performance measurement differences between different strategic groups allows this high/high combination to be identified and analyzed as a specific joint strategy group.

In order to assess the relations between strategic focus and reliance on particular performance measures by group, we construct 12 ANCOVA models. Each model includes an interaction term for one of the differentiation strategies (volume flexibility, product performance, and market scope) and commitment to low cost. The dependent variable in each case is one of the three reliance measures (reliance on efficiency measures, customer-focused measures, and financial measures) or intensity of performance measure use. In each model, the two differentiation strategies that are not included in the interaction are employed as covariates. This enables us to control for other strategic priorities when assessing the relations between each strategy and each performance measure category.

We also include a range of control variables that may systematically relate to reliance on performance measures: design age, uncertainty, and size. Chenhall (2003) mentions environmental uncertainty, strategy, organizational structure, technology, and size as important contingency variables related to management control system design. Strategy is already included as one of the main independent variables in the study. Uncertainty is included to capture environmental uncertainty. Structure and some aspects of task/technology are captured through the restriction of the sample to production managers. Other aspects of technology that are likely to vary within the sample are expected to reflect strategy (e.g., standardization) or product life cycle (Merchant 1984; Hoque and James 2000). Design age is introduced to depict the array of technologies in the sample related to maturity and/or product life cycle (see also Hoque and James 2000). Size is considered as an important control variable because it represents the variety in the sample related to organizational

structure. Larger firms are, for instance, considered to be more hierarchical and decentralized (Chenhall 2003). In addition, size is included because it is has been shown to be related to the way in which control systems have been utilized (see, e.g., Simons 1987). The control variables are measured as follows:

- Design age (*DESAGE*), which captures product and process maturity, is measured by the comparative design age of the firms' products relative to competitors.
- Uncertainty (*UNCERT*), which is measured by the average beta of the industry to which the company belongs for four consecutive years (two years before, one year before, current, after). Since beta is not available for non-public companies, we calculate the average beta from all publicly listed companies of the same industry (using two-digit SIC-codes, see Appendix A, 1–17) in The Netherlands as a proxy for operating environment faced by the company. The data were collected from Compustat.
- Size (*SIZE*), measured as a continuous variable based on the total number of employees working in the company.

The empirical model is therefore:

$$R_i = \beta_0 + \beta_1 DS_j + \beta_2 CL + \beta_3 DS_j * CL + \beta_4 DS_{jk} + \beta_5 DSJ_l + \beta_6 DESAGE + \beta_7 UNCERT + \beta_8 SIZE + \varepsilon_i \quad (1)$$

where:

R_i = reliance on performance measure i (i = efficiency, customer-focused, financial measures, and intensity of performance measure use);
DSj = pursuit of differentiation strategy j (j = volume flexibility, product performance, or market scope);
CL = pursuit of cost leadership; and
DSJ_k and DSJ_l = pursuit of differentiation strategy k and l (k and l = volume flexibility, product performance, or market scope ($j \neq k \neq l$)).

Descriptive Statistics

Descriptive statistics are provided in Table 3. One of the strategy variables (volume flexibility) is slightly skewed. The correlation matrix is provided in Table 4. Significant correlations that are consistent with our predictions are evident between reliance on efficiency measures and the pursuit of low cost, and reliance on customer-focused measures and pursuit of volume flexibility. There are no significant correlations between reliance on customer-focused measures and the differentiation strategies of product performance or market scope.

The results of this correlation analysis suggest that the association between performance measurement and strategy might differ for the specific forms of differentiation strategy in ways that we have not anticipated in this study. It is possible that the individual performance measures used in this study, on the whole, better fit to a volume flexibility strategy than to a product performance or market scope strategy. For example, many of our customer-focused measures are not tightly linked to the achievement of priorities related to a market scope strategy, like advertising, broad distribution, and a broad line. In addition, descriptive statistics in Table 3 suggest that commitment to volume flexibility is the dominant form of differentiation in our sample. Commitment to product performance and market scope might

TABLE 3
Descriptive Statistics

Variable	Mean	Median	Standard Deviation	Theoretical Range	Actual Range	n
REFF	3.84	3.90	0.93	1–7	1–5.6	81
RCUST	4.59	4.58	1.10	1–7	1.23–6.69	74
RFIN	4.19	4.40	1.23	1–7	1.60–7.00	72
Strategy-volume flexibility	22.76	23.00	3.43	4–28	4–28	83
Strategy-product performance	14.82	15.00	3.74	3–21	3–21	84
Strategy-market scope	12.72	13.00	4.29	3–21	3–20	82
Strategy-low cost	5.04	5.00	1.49	1–7	2–7	83
Design age	3.29	3.00	0.93	1–5	1–5	83
Uncertainty	0.16	0.16	0.08		0–0.42	84
Size	652.76	337	862.65		25–4800	84

REFF = reliance on efficiency performance measures;
RFIN = reliance on financial performance measures; and
RCUST = reliance on customer-focused performance measures.

not be sufficiently high across our sample to find an association with performance measurement in the way we have hypothesized. This is a limitation of this study that we address in the concluding section. It is notable also that among the strategy variables, reliance on financial measures is correlated only with a strategic emphasis on volume flexibility and market scope.

RESULTS AND DISCUSSION

First we provide a strategic profile of the sample by classifying firms by strategic orientation, based on dichotomous groups (Table 5). This table reflects a finer categorization by strategy than is reflected in Figure 3. Differentiation focus is distinguished into the three categories of differentiation produced by the factor analysis.

There is a lot of strategic variety reflected in the sample. There are only five firms that score higher than the mean on commitment to low cost and do not also score higher than the mean on at least one of the three differentiation scales. According to the production subunit managers' responses, 79 of the 84 firms in the sample seek to compete by differentiating their products (score higher than the mean on one of the three differentiation commitment scales). Of the 79 firms that score high on commitment to differentiation, 33 also score high on commitment to low cost.[8] In our subsequent analyses, particularly for H2 and H3, we focus specifically on comparing archetypal and joint strategy cases where differentiation is by volume flexibility rather than product performance or market scope. Therefore, in Table 5, more information is also provided about the strategic profile related to differentiation on the volume flexibility scale and the low-cost scale, which is indicated as the number of firms in each cell (23 joint strategy firms; 15 archetypal cost leaders; 25 archetypal differentiators; 21 firms that score low on both volume flexibility and commitment to low cost).

[8] The pursuit of joint strategies in all three categories (volume flexibility, product performance, and market scope) is pervasive across industry groups.

TABLE 4
Pearson Correlations between the Variables

	REFF	*RCUST*	*RFIN*	Volume Flexibility	Product Performance	Market Scope	Commitment to Low Cost	Design Age	Uncertainty	Size
REFF	1									
RCUST	.333*** .004	1								
RFIN	.276** .019	.217* .071	1							
Volume flexibility	−.074 .519	.411*** .000	.229* .055	1						
Product performance	−.104 .360	.163 .164	.155 .194	.385*** .000	1					
Market scope	.205* .072	−.015 .903	.236** .049	.257** .021	.372*** .001	1				
Commitment to low cost	.381*** .001	.029 .808	−.071 .556	−.021 .853	−.157 .155	.055 .623	1			
Design age	−.022 .850	−.080 .501	.156 .193	.062 .579	.139 .210	.116 .301	.039 .726	1		
Uncertainty	.040 .728	.010 .935	.037 .759	.013 .908	−.024 .828	.013 .909	.179 .106	.184 .095	1	
Size	−.057 .618	.190 .104	.144 .226	.172 .119	.207* .059	.143 .200	−.085 .443	.110 .322	.058 .600	1

*, **, *** Significant at the 0.1, 0.05, and 0.01 levels, respectively.

TABLE 5
Cross-Tabulation of Firms Pursuing Low Cost, Product Performance, Volume Flexibility, and Market Scope

		Commitment to Differentiation			
		High *VF*		Low *VF*	
		High *PP*	Low *PP*	High *PP*	Low *PP*
High *CL*	High *MS*	10	4		
		[23]			
	Low *MS*	5	4		
			cell 1.1		
Low *CL*	High *MS*	9	5	8	4
		[25]		[21]	
	Low *MS*	7	4	7	2
			cell 2.1		cell 2.2

High is > mean, Low is ≤ mean.
CL = commitment to low cost;
VF = commitment to volume flexibility;
PP = commitment to product performance; and
MS = commitment to market scope.
For the commitment to volume flexibility differentiation scale the following legend applies:
= joint strategies (light shaded, cell 1,1); n = 23.
= archetypal differentiation (dark shaded, cell 2,1); n = 25.
= archetypal cost leadership (very dark shaded, cell 1,2); n = 15.
= low on both differentiation and low cost (unshaded, cell 2,2); n = 21.

All hypotheses were tested by performing ANCOVA analyses and by using contrast analyses. Firm dummies were not significant in any of the ANCOVAs. In addition, a cross-tab of firm observations, industry, and strategic profile indicates that in three of the six firms with multiple observations production departments operated in different industries. In the other three firms, the departments operated in the same industry, but had a different strategic profile in terms of Table 5.[9]

Hypotheses 1a and 1b

To test H1a–H1b we examine first the main effects of the strategy terms in Equation (1). The results are reported in Table 6[10] and show that commitment to low cost is significant in explaining reliance on efficiency measures; thus, H1a is supported. Hypothesis 1b is partially supported as commitment to differentiation by volume flexibility is significant in explaining reliance on customer-focused measures but commitment to differentiation by product performance and market scope are not significant in explaining reliance on customer-focused measures. As discussed above in the context of the correlation analysis,

[9] The three firms with multiple observations in the same industry represent seven subunits in total across the three firms.

[10] We test these hypotheses using dichotomized variables and ANCOVA analyses for consistency with our later test of the joint strategy cases relative to archetypal strategy cases. We also test H1a–H1b using OLS regression and full scale-variables and find similar results. Low-cost commitment is significant in explaining reliance on efficiency measures (t-stat 3.088, $p < .01$). Differentiation by volume flexibility is significant in explaining reliance on customer measures (t-stat 2.9, $p < .01$). There are no significant results for differentiation by product performance or market scope. Reliance on financial measures is significantly associated with commitment to volume flexibility (t-stat 1.774, $p < .1$) and market scope (t-stat 1.794, $p < .1$).

TABLE 6
Analysis of Manager's Adjusted Mean Reliance on Performance Measures
Tests of Between-Subjects Effects

Dependent Variable	Reliance on Efficiency Measures[a]			Reliance on Customer-Focused Measures[b]		
Source	**Mean Square**	**F**	**Sig.**	**Mean Square**	**F**	**Sig.**
Volume flexibility	0.069	0.083	.774	5.268	4.539	.037
Product performance	0.034	0.041	.841	0.530	0.457	.501
Market scope	2.602	3.123	.081	0.583	0.502	.481
Cost commitment	4.514	5.419	.023	0.254	0.218	.642
Design age	0.054	0.064	.800	0.594	0.512	.477
Uncertainty	0.008	0.010	.921	0.066	0.057	.812
Size	0.130	0.156	.694	2.067	1.781	.187

Dependent Variable	Reliance on Financial Measures[c]		
Source	**Mean Square**	**F**	**Sig.**
Volume flexibility	5.777	4.215	.044
Product performance	2.311	1.558	.217
Market scope	2.479	1.809	.183
Cost commitment	4.259	3.108	.083
Design age	2.135	1.558	.217
Uncertainty	0.622	0.454	.503
Size	0.020	0.015	.904

[a] R^2 = .120 (Adjusted R^2 = .034).
[b] R^2 = .131 (Adjusted R^2 = .037).
[c] R^2 = .179 (Adjusted R^2 = .088).

these different patterns associated with different forms of differentiation are unexpected and are acknowledged as a limitation of this study.

Hypotheses 2a and 2c

To test our second set of hypotheses, in which we distinguish our expectations between joint and archetypal strategies, we perform contrast tests within the framework of the ANCOVA analyses. In the ANCOVA analyses, the interaction terms (see Equation (1)) capture the impact of emphasis on low cost jointly with each differentiation strategy, after controlling for other strategic commitments and the control variables. The results are reported in Table 7 for the volume flexibility differentiation scale.

In the case of the volume flexibility/cost commitment mix (Table 7, Panel A), the results show that the interaction terms are significant in explaining reliance on efficiency measures, customer-focused measures, and intensity of performance measurement when controlling for commitment to product performance and market scope, as well as design age, uncertainty, and size. However, the interaction terms are not significant in the joint strategy models linking product performance and commitment to low cost, or market scope and commitment to low cost.

Evidence consistent with H2a would be either equal or higher reliance on efficiency measures by joint strategists as compared to archetypal cost leader firms. This support

TABLE 7
Analysis of Manager's Adjusted Mean Reliance on Performance Measures
Cost Commitment and Volume Flexibility

Panel A: Tests of Between-Subjects Effects

Dependent Variable	Reliance on Efficiency Measures[a]			Reliance on Customer-Focused Measures[b]		
Source	**Mean Square**	**F**	**Sig.**	**Mean Square**	**F**	**Sig.**
Cost commitment (*CL*)	3.155	3.921	.052	0.216	0.212	.647
Volume flexibility (*VF*)	0.011	0.013	.908	6.894	6.753	.012
Interaction *CL* and *VF*	2.815	3.498	.066	10.098	9.891	.003
Market scope	2.335	2.902	.093	1.110	1.087	.301
Product performance	0.097	0.121	.729	0.145	0.142	.708
Design age	0.203	0.253	.617	1.883	1.844	.179
Uncertainty	0.106	0.132	.717	0.485	0.475	.493
Size	0.033	0.040	.841	3.801	3.723	.058

Dependent Variable	Reliance on Financial Measures[c]			Intensity of Performance Measures[d]		
Source	**Mean Square**	**F**	**Sig.**	**Mean Square**	**F**	**Sig.**
Cost commitment (*CL*)	5.038	3.669	.060	0.208	0.363	.549
Volume flexibility (*VF*)	5.932	4.320	.042	4.032	7.042	.010
Interaction *CL* and *VF*	1.203	0.876	.353	6.227	10.877	.002
Market scope	2.324	1.692	.198	0.009	0.015	.902
Product performance	2.105	1.533	.220	0.408	0.712	.402
Design age	1.699	1.238	.270	0.601	1.050	.310
Uncertainty	0.826	0.602	.441	0.194	0.338	.563
Size	0.083	0.061	.806	1.419	2.479	.121

[a] R^2 = .162 (Adjusted R^2 = .067).
[b] R^2 = .247 (Adjusted R^2 = .153).
[c] R^2 = .191 (Adjusted R^2 = .086).
[d] R^2 = .271 (Adjusted R^2 = .173).

Panel B: Adjusted Means (Standard Error) for Reliance on Performance Measures (Cost Commitment and Volume Flexibility)

Reliance on Efficiency Measures

	Commitment to Volume Flexibility	
Cost Commitment	**High**	**Low**
High	4.24 (0.19)	3.87 (0.25)
	$\mu_{1,1(\text{joint strategy})}$	$\mu_{1,2(\text{archetypal cost leader})}$
Low	3.43 (0.19)	3.85 (0.21)
	$\mu_{2,1(\text{archetypal differentiator})}$	$\mu_{2,2}$

(*continued on next page*)

TABLE 7 (continued)

Reliance on Customer-Focused Measures

Cost commitment	Commitment to Volume Flexibility: High	Commitment to Volume Flexibility: Low
High	5.15 (0.22) $\mu_{1,1(\text{joint strategy})}$	3.67 (0.31) $\mu_{1,2(\text{archetypal cost leader})}$
Low	4.45 (0.21) $\mu_{2,1(\text{archetypal differentiator})}$	4.60 (0.26) $\mu_{2,2}$

Reliance on Financial Measures

Cost Commitment	Commitment to Volume Flexibility: High	Commitment to Volume Flexibility: Low
High	4.26 (0.26) $\mu_{1,1(\text{joint strategy})}$	3.38 (0.33) $\mu_{1,2(\text{archetypal cost leader})}$
Low	4.54 (0.26) $\mu_{2,1(\text{archetypal differentiator})}$	4.20 (0.30) $\mu_{2,2}$

Intensity of Performance Measures

Cost Commitment	Commitment to Volume Flexibility: High	Commitment to Volume Flexibility: Low
High	4.75 (0.17) $\mu_{1,1(\text{joint strategy})}$	3.59 (0.24) $\mu_{1,2(\text{archetypal cost leader})}$
Low	4.22 (0.17) $\mu_{2,1(\text{archetypal differentiator})}$	4.35 (0.20) $\mu_{2,2}$

The two differentiation strategies that are not included in the interaction, design age, uncertainty, and size are employed as covariates. The cell means are estimated adjusting for the effects of these covariates based on the statistical model in the ANOVA analysis.

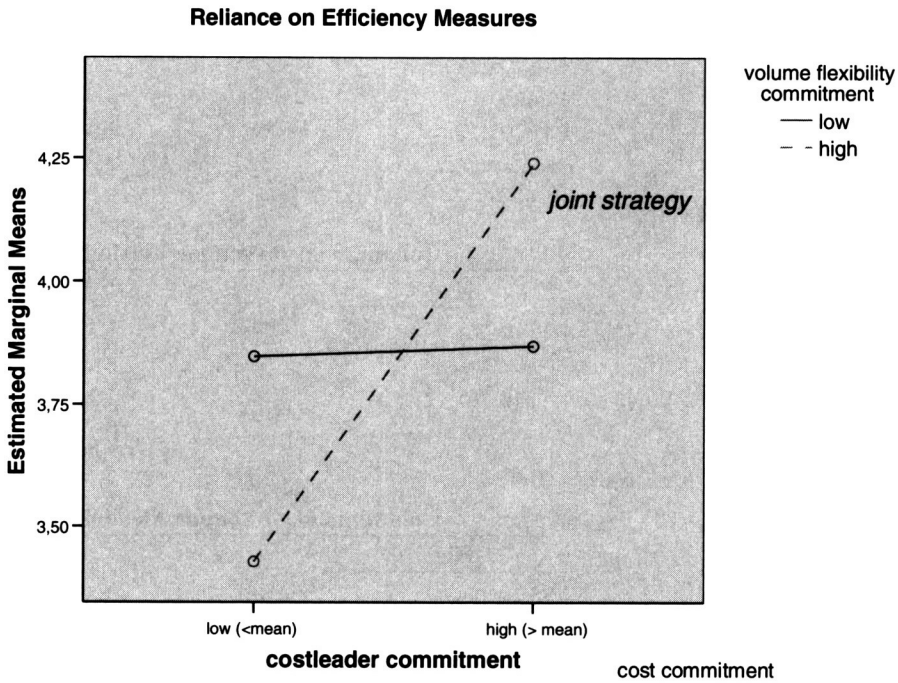
Panel C: Simple Effects Analysis Comparing Reliance on Performance Measures and Resultant Contrast Tests (Cost Commitment and Volume Flexibility)

Mean Differences (Standard Errors) Tested (see Panel B)	p-value
Reliance on Efficiency Measures	
$\mu_{1,1(\text{joint strategy})} - \mu_{1,2(\text{archetypal cost leader})} = 0.371\ (0.313)$	$p \leq 0.239$ (support H2a)
$\mu_{1,1(\text{joint strategy})} - \mu_{2,1(\text{archetypal differentiator})} = 0.813\ (0.269)$	$p \leq 0.004$ (support H3a)
Reliance on Customer-Focused Measures	
$\mu_{1,1(\text{joint strategy})} - \mu_{1,2(\text{archetypal cost leader})} = 1.475\ (0.382)$	$p \leq 0.000$
$\mu_{1,1(\text{joint strategy})} - \mu_{2,1(\text{archetypal differentiator})} = 0.700\ (0.304)$	$p \leq 0.025$ (support H2b)
Reliance on Financial Measures	
$\mu_{1,1(\text{joint strategy})} - \mu_{1,2(\text{archetypal cost leader})} = 0.884\ (0.420)$	$p \leq 0.039$
$\mu_{1,1(\text{joint strategy})} - \mu_{2,1(\text{archetypal differentiator})} = -0.284\ (0.366)$	$p \leq 0.440$ (support H3b)
Intensity of Performance Measures	
$M_{1,1(\text{joint strategy})} - \mu_{1,2(\text{archetypal cost leader})} = 1.162\ (0.288)$	$p \leq 0.000$ (support H2c)
$\mu_{1,1(\text{joint strategy})} - \mu_{2,1(\text{archetypal differentiator})} = 0.529\ (0.237)$	$p \leq 0.029$ (support H2c)

(*continued on next page*)

TABLE 7 (continued)

Panel D: Graphical Depiction of Effects of Volume Flexibility and Cost Commitment on Reliance on Performance Measures



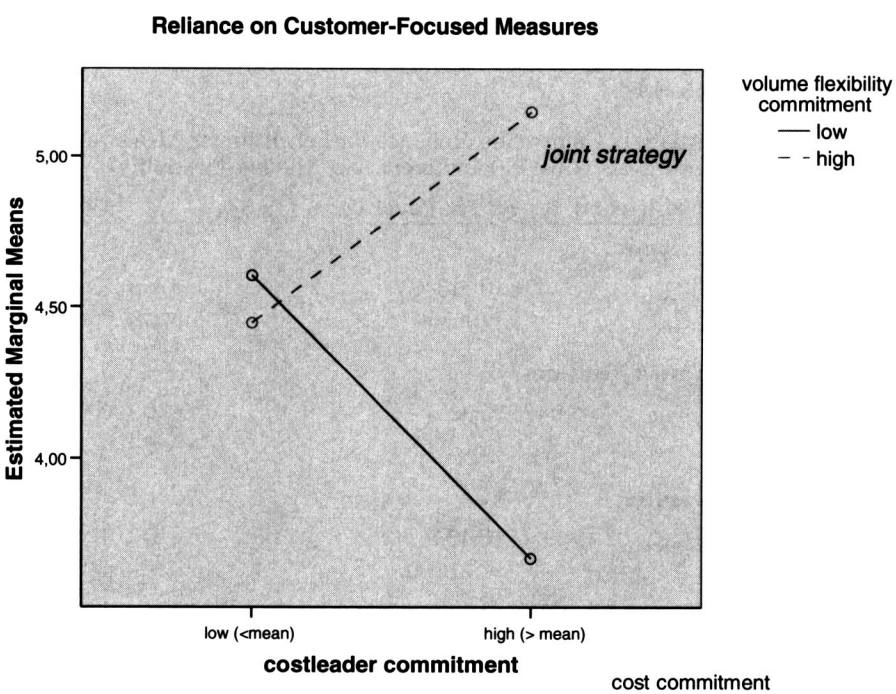


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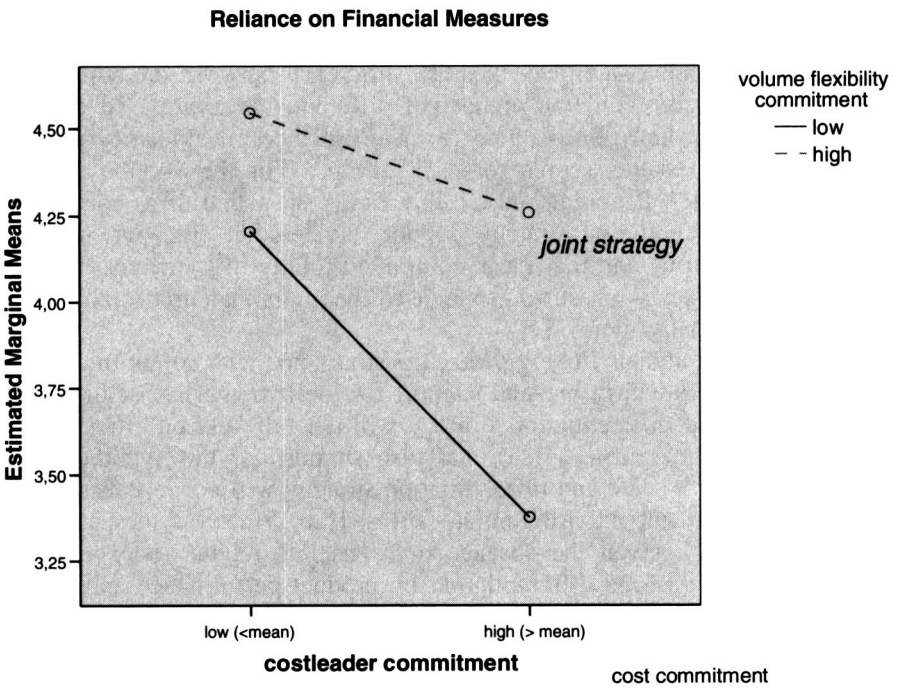
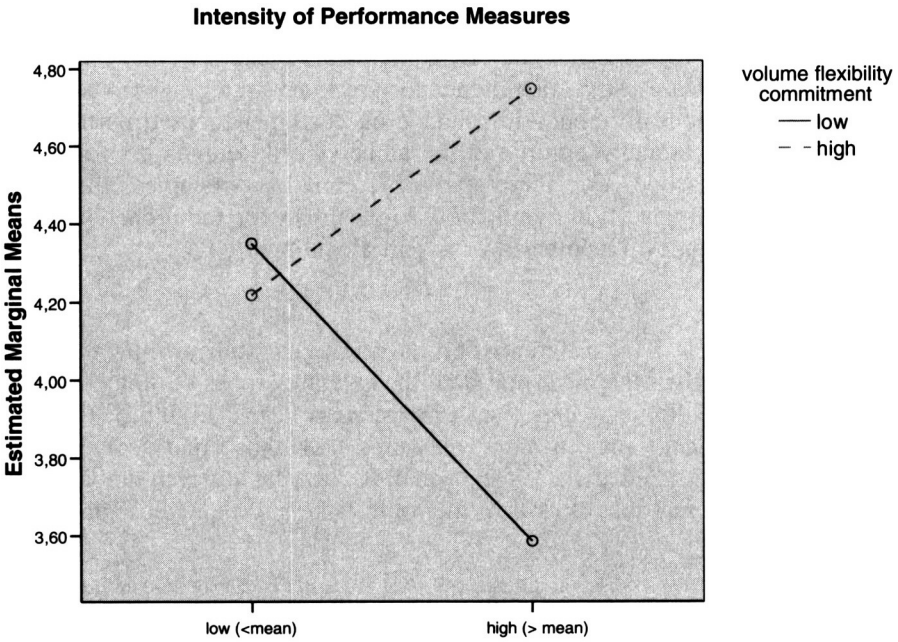
TABLE 7 (continued)





would be reflected in no difference or a significant positive difference between the adjusted cell estimates for the joint strategy and archetypal cost leader firms. Evidence consistent with H2b would be either equal or higher reliance on customer-focused measures by joint strategists as compared to archetypal differentiator firms. Support for H2b would be reflected in no difference or a significant positive difference between the adjusted cell estimates for the joint strategy and the archetypal differentiator groups. To examine these effects, we use contrast analyses to compare mean reliance on efficiency and customer-focused performance measures scores for each group.[11] For the volume flexibility/cost commitment mix (Table 7, Panels B and C), the results show that firms committed jointly to a low-cost and differentiation strategy do not rely less on efficiency measures than archetypal cost leader firms and that firms committed jointly to a low-cost and differentiation strategy do not rely less on customer-focused measures than archetypal differentiator firms (but even significantly more).[12]

In the joint strategy models linking product performance with commitment to low cost and market scope with low cost, we find support for the hypothesis that firms committed jointly to a low-cost and differentiation strategy will not rely less on efficiency measures than archetypal cost leader firms (H2a), and also support for the hypothesis that firms committed jointly to a low cost and differentiation strategy will not rely less on customer-focused measures than archetypal differentiator firms (H2b). However, these results are hard to interpret satisfactorily, given the absence of a baseline relation between reliance on customer-focused measures and differentiation by product performance and market scope (no support for H1b for these two strategic profiles).

The intensity of reliance on performance measures is higher in the joint strategy groups than in the archetypal differentiation on volume flexibility group, providing support for H2c. Table 7, Panel D graphically depicts the interaction form and reveals that the joint strategy firms (Figure 3, Cell 1,1) differentiating on volume flexibility have a higher use of efficiency and customer-focused measures than any of the other cells and that the intensity of the performance measure use is also higher for the joint strategy group.

There is no significant difference in reliance on customer-focused performance measures between the joint strategy group and the archetypal differentiators for product performance and market scope. For these two differentiation strategies, the intensity of performance measures is also not significantly higher than for the archetypal cost leader and differentiation strategies. Hypothesis 2c is partially supported.

Hypotheses 3a and 3b

The results (see Table 7 for differentiation on volume flexibility) show that those firms that score high (greater than the mean) on both the extent of focus on low cost and at least one of the three differentiation scales (i.e., joint strategy firms: Figure 3, Cell 1,1) show significantly higher reliance on efficiency measures than those that score high only on differentiation (Figure 3, Cell 2,1). As expected, archetypal differentiation firms reflect lower reliance on efficiency measures than the joint strategy group (thus supporting H3a).

[11] The power for the tests related to the "no-differences" H2a, H2b, and H3b may be considered adequate. For a conventional ANOVA with $\alpha = 0.05$, a large effect size, and four groups, a total sample size of 72 leads to a power of 0.80, which is a conventional level (Cohen 1992). As can be observed in Table 5, total sample size is 84 (23 in Cell 1,1; 15 in Cell 1,2; 25 in Cell 2,1; 21 in Cell 2,2). Contrast coding usually provides even greater statistical power (Buckless and Ravenscroft 1990).

[12] Various splits on the data were performed, including a median split, and the performance measure patterns were broadly consistent with the mean split both for H2 and H3.

Reliance on financial measures is *not* significantly lower for archetypal differentiation firms than for joint strategy firms, thus providing support for H3b (tabulated for differentiation on volume flexibility in Table 7). In untabulated results, H3a and H3b are also supported for differentiation on product performance and market scope. Thus, these hypotheses are supported across all forms of differentiation. However, again given the lack of support for H1b for product performance and market scope, these results are difficult to interpret for these two strategic profiles.

Additional Analysis

In order to explore in more depth the way performance measures are used in combination in joint strategy cases, we examine the individual measures within the *REFF*, *RCUST*, and *RFIN* categories. The results for all component measures are given in Table 8 for differentiation on volume flexibility.

Relative to archetypal differentiation cases the joint volume flexibility/low-cost strategy cases show higher reliance on several individual measures including increased reliance on measures of cooperation, responsiveness, sales assistance, efficiency, set-up times, material scrap, and machine utilization. The mix of measures appears to be consistent with the balancing act required to be both flexible and low cost. The risks associated with an emphasis on efficiency are balanced by measures of cooperation and responsiveness. The risks associated with being responsive at high cost are balanced by classic measures of manufacturing efficiency such as scrap, machine utilization, and other efficiency measures.

Relative to archetypal cost leadership cases these joint strategy cases reflect reliance on a broad range of customer-focused measures (Table 8). Thus, the resultant joint strategy effect is not driven by one or two specific measures. Also of interest, direct measures of efficiency also seem more important in joint strategy than in archetypal cost leadership cases even though the emphasis on low cost is high for both types of firms. Across these joint and archetypal strategy cases there are few observable differences in reliance on financial measures. However, it is notable that reliance on return on investment is significantly higher in joint strategy settings than in archetypal low-cost settings, possibly reflecting the importance of this measure in capturing the trade-offs associated with differentiation.

Also notable in Table 8 is the more specific information on the measures that bring about the higher intensity of reliance on performance measures in joint strategy cases.[13] Table 8 shows that the higher average reliance on performance measures indicated by the test of H2c clearly comes from a variety of measures, not just a few.

DISCUSSION

These results support the proposition that performance measurement differences are associated with the pursuit of joint rather than archetypal strategies. Reliance on efficiency measures appears to vary with the strategic emphasis on low cost. In joint strategy cases, efficiency measures are used in combination with financial and customer-focused measures. The prevalence of differentiation strategies in conjunction with a focus on low cost necessitates the design of more comprehensive performance measurement systems as firms try to pursue these strategies jointly.

[13] We conducted a similar analysis using the other two forms of differentiation (product performance and market scope). For brevity, the results of this analysis are not reported. Consistent with the less significant results overall for these forms of differentiation, the results on individual measures are also less significant.

TABLE 8
Simple Effects Analysis Comparing Reliance on Individual Performance Measures and Resultant Contrast Tests (Differentiation on Volume Flexibility)

	Adjusted Means (Standard Error)				Mean Differences (Standard Error)	
	$\mu_{2,2}$	$\mu_{1,2}$ archetypal cost leader	$\mu_{2,1}$ archetypal differentiator	$\mu_{1,1}$ joint strategy	$\mu_{1,1}-\mu_{1,2}$ joint–cost	$\mu_{1,1}-\mu_{2,1}$ joint–differ.
Delivery performance	4.826 (.345)	4.594 (.418)	5.571 (.317)	6.112 (.326)	1.518*** (.531)	.541 (.457)
Product returns	3.556 (.417)	4.259 (.490)	4.506 (.362)	4.567 (.369)	.308 (.614)	.061 (.519)
Inventory turnover	3.184 (.446)	2.427 (.531)	4.167 (.389)	3.915 (.397)	1.489** (.666)	−.252 (.558)
Customer satisfaction	3.893 (.394)	3.335 (.503)	4.268 (.350)	4.663 (.361)	1.328** (.623)	.395 (.505)
Cost/quality improvements	3.585 (.387)	3.690 (.469)	4.676 (.355)	4.928 (.366)	1.238** (.595)	.252 (.512)
Cooperation people	4.672 (.341)	3.787 (.402)	4.125 (.305)	5.192 (.313)	1.404*** (.510)	1.067** (.439)
Responsiveness demands	4.327 (.344)	4.277 (.406)	3.547 (.308)	4.763 (.317)	.486 (.516)	1.217*** (.444)
Sales assistance	4.589 (.368)	3.607 (.434)	3.980 (.329)	4.945 (.338)	1.338** (.551)	.965** (.474)
New products	3.413 (.392)	2.436 (.462)	3.052 (.351)	3.809 (.360)	1.372** (.587)	.757 (.505)
Outgoing quality	5.852 (.229)	5.197 (.278)	5.606 (.211)	6.120 (.217)	.923*** (.353)	.515* (.303)
Vary product characteristics	3.379 (.372)	2.812 (.451)	3.312 (.342)	4.071 (.352)	1.259** (.573)	.758 (.493)
Lead time standard	4.358 (.438)	2.736 (.503)	4.482 (.382)	5.213 (.392)	2.477*** (.640)	.731 (.550)
Lead time variations	4.007 (.397)	2.581 (.468)	4.097 (.355)	4.836 (.365)	2.255*** (.595)	.739 (.511)
Efficiency	5.203 (.327)	4.657 (.397)	5.056 (.301)	5.973 (.310)	1.316*** (.504)	.917** (.434)
Product defects	4.891 (.323)	5.149 (.391)	4.486 (.297)	5.019 (.305)	−.130 (.497)	.533 (.427)
Set-up times	2.793 (.359)	2.881 (.436)	2.877 (.330)	3.716 (.340)	.835 (.553)	.840* (.476)
Material scrap	4.122 (.401)	4.613 (.487)	3.713 (.369)	5.039 (.380)	.426 (.618)	1.325** (.532)
Machine utilization	4.733 (.401)	4.888 (.471)	3.938 (.360)	5.142 (.368)	.254 (.599)	1.204** (.516)
Profit/net income	4.417 (.457)	4.745 (.541)	5.479 (.419)	5.029 (.419)	.283 (.684)	−.450 (.595)
Standard product costs	5.200 (.408)	3.997 (.467)	5.316 (.363)	4.917 (.364)	.920 (.594)	−.399 (.515)
Return on investment	4.126 (.404)	4.000 (.490)	4.824 (.372)	5.168 (.382)	1.168* (.623)	.344 (.536)

(*continued on next page*)

TABLE 8 (continued)

	Adjusted Means (Standard Error)				Mean Differences (Standard Error)	
	$\mu_{2,2}$	$\mu_{1,2}$ archetypal cost leader	$\mu_{2,1}$ archetypal differentiator	$\mu_{1,1}$ joint strategy	$\mu_{1,1}-\mu_{1,2}$ joint–cost	$\mu_{1,1}-\mu_{2,1}$ joint–differ.
Sales	3.002	2.330	3.942	3.093	.763	−.849
	(.451)	(.534)	(.392)	(.402)	(.668)	(.564)
Purchase price variance	3.404	2.595	3.341	3.073	.479	−.268
	(.445)	(.506)	(.393)	(.404)	(.648)	(.564)

The results also support the proposition that such strategy-contingent performance measurement system designs may be difficult to observe in data that focus only on strategic archetypes. The patterns in reliance on performance measures observed here in the context of joint strategies differ from the patterns documented in the mixed or "in between" strategy positions identified in the prior literature. We present evidence that joint strategy performance measurement patterns are consistent with the importance of multiple strategic priorities, rather than the alternative trade-off position.

The results suggest support for both the "joint strategy" effect and the "curbing costly differentiation" effect in driving reliance on efficiency and financial measures in differentiating firms. The results indicate that reliance on *efficiency* measures is not related to differentiation in itself, but rather it is the joint presence of commitment to low cost that drives reliance on efficiency measures in these cases. An examination of the individual measures driving this result suggests that joint strategy cases reflect a balancing act in which measures of responsiveness and efficiency are utilized to manage multiple, potentially conflicting priorities. On the other hand, reliance on *financial* measures is generally not significantly different between joint strategy and archetypal differentiator firms. These observations are consistent with the reliance on financial measures to curb excessive differentiation, consistent with the interpretations of Simons (1987) and Sim and Teoh (1997).

More broadly, the findings of this study suggest the prevalence of manufacturing firms pursuing strategic advantage in differentiation rather than low cost. The study also detects the widespread pursuit of joint strategies focused on both low cost and differentiation through flexibility and market scope. In essence, the firms in the sample are either pursuing multiple strategies jointly, or they are archetypal differentiators. In this sample, very few firms focus on low-cost/price strategies. The study relates these strategic characteristics to performance measurement system composition. In particular we provide evidence of the widespread reliance on efficiency and financial performance measures, even in this setting dominated by differentiating firms. Comprehensive performance measurement systems comprising efficiency, financial, and customer-focused performance measures are associated with the pursuit of joint strategies. Archetypal differentiating firms focus less on efficiency measures than joint strategy firms, but they rely extensively on sets of aggregative financial performance measures, which appear to serve a purpose in monitoring and discouraging unprofitable excesses of differentiation.

These results suggest that the "curbing excessive differentiation" argument does not apply to all "tight" financial and cost controls exercised in prospector-type settings (Chenhall 2003). The argument appears to hold for broad-based financial controls. However, the observation of cost and efficiency control in differentiation settings appears to be a function of joint strategies rather than the need to monitor excessive differentiation more directly. While our data are not informative regarding the reasons for this distinction, it is

likely that broad financial measures are superior to more micro cost-control measures in capturing the cost/benefit trade-offs associated with differentiation. Such an observation is consistent with the characteristic of aggregation associated with financial measures, and their consistency with a range of operational efficiency and customer-focused measures.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

The results are subject to several limitations. First, we limit this study to the examination of performance measurement characteristics in joint and archetypal strategy settings. In limiting the study this way, we are not suggesting that the expansion of performance measurement systems in joint strategy settings resolves the inherent conflicts in joint strategy positions. In fact, we suggest that the mixed performance measures that match joint strategies are likely to be internally conflicting. Such measures create a management challenge. We neither examine nor speculate on how firms adopting joint strategies and utilizing inherently conflicting measures develop their control systems to effectively manage this conflict. Lillis (2002) suggests that the inherent conflicts may potentially be managed both through the construction of measures and the intensity with which they are used. It is possible, for example, that the joint strategy firms are those in which some element(s) of the control system (such as high-quality measurements, subjective evaluation by superiors, long-term focus) supports managers in balancing their activities to achieve both differentiation and low-cost goals. Alternatively, it could be that the joint strategy firms have inherently low levels of conflict between the strategies. For example, firms in which set-up times are low, or the introduction of new products is relatively less disruptive to manufacturing, may find the joint pursuit of differentiation and low cost less problematic. This issue is left for further research.

The second limitation relates to common method bias in that all of the data were collected with Likert-scale instruments from a single respondent at each location. However, the use of instruments already established in the literature and the extensive range of strategy and individual performance measure scales used help to circumvent these potential drawbacks by making it more difficult to respond with artificial consistency. Third, the use of perceptual measures in relation to strategy and reliance on performance measures is a common limitation in studies of this kind. Fourth, we control for some common influences on control systems in our study, namely uncertainty, design age, and size, but there are potentially omitted variables that may be influencing results. We have designed the study in such a way that we are able to detect differences in performance measurement system design across companies in various strategic settings. However, we can only make inferences with regard to associations between strategy and performance measurement system design, as causal relationships cannot be tested with ANOVA analyses. Fifth, our factor analysis produces three different forms of differentiation strategy and these do not appear to have consistent relations with performance measurement. These results are not all consistent with our theoretical predictions and they ultimately reduce the generalizability of our results in different differentiation settings. Our key theoretical expectations relating to reliance on efficiency and financial measures in joint strategy cases relative to differentiation cases are supported empirically in this study across all differentiation types. Nonetheless, we offer only preliminary and partial evidence of a performance measure intensity effect in the context of joint strategies. Sixth, we do not test the performance implications of fit between strategy and control-system selection, relying instead on control system selection as evidence of fit. Finally, the survey addresses a range of strategy combinations, resulting

in relatively few observations for each specific combination. Thus, we are unable to undertake an in-depth analysis of the performance measurement system implications of specific strategy combinations.

This study is deliberately restricted in its level of analysis, manufacturing focus, the management control system attributes that are embraced within the study, and the range of strategies examined. These restrictions limit generalizability beyond manufacturing settings and beyond the specific performance measurement system attributes and strategy combinations studied. This leaves open many opportunities to examine in some depth the implications of a range of strategic choices on other management control system attributes such as measures of divisional manager performance, bonus and incentive schemes, controls over capital investment decisions, and the relative flexibility/rigidity of control use. In addition, there are opportunities to explore in more depth the performance measurement implications of more specific strategy combinations, including the different types of differentiation examined here. To date, the mix of strategic priorities has received little attention in nonmanufacturing settings, providing further research opportunities.

APPENDIX A
DEMOGRAPHIC DATA RELATING TO THE SAMPLE

1. Industry Classification of Participating Firms

Industry (based on SIC)	Number of Firms
A. 1. Food, 2. Beverage and tobacco.	23
B. 3. Textile products, 4. Apparel manufacturing, 5. Paper products, 6. Printing and related activities, 7. Chemicals, 8. Plastic and rubber, 9. Non-metallic mineral products.	13
C. 10. Primary metal, 11. Fabricated metal, 12. Computer and electronic products, 13. Electric equipment, appliances, and components.	28
D.14. Furniture and related products, 15. Machinery, 16. Transportation equipment, 17. Miscellaneous.	20
Total	84

2. Size of Participant Firms (by number of employees)

Size	Number of Firms
≤ 200	30
200−≤ 400	18
400−≤ 600	10
600−≤ 800	10
800 +	16
	84

3. Descriptive statistics

	Average	Range
Size of firms (no. of employees)	653	25–4800
Manufacturing unit manager		
Service in firm	12.8 years	0–37 years
Time in current position	4.7 years	0–35 years

APPENDIX B
EXTRACT OF STRUCTURED QUESTIONNAIRE

Question 1
Production Strategy

1. Please indicate the relative importance attributed to each of the following competitive capabilities in appealing to customers and competing in the marketplace for the products completed in your production department. (Please circle one number on each line.)

		1 = Not Important						7 = Critically Important
Low price	to compete on price	1	2	3	4	5	6	7
Design flexibility	to make rapid design changes and/or to introduce new products quickly	1	2	3	4	5	6	7
Volume flexibility	to respond to changes in volume	1	2	3	4	5	6	7
Conformance	to offer consistent quality	1	2	3	4	5	6	7
Performance	to provide high-performance products	1	2	3	4	5	6	7
Speed	to deliver products quickly	1	2	3	4	5	6	7
Dependability	to deliver on time (as promised)	1	2	3	4	5	6	7
After sales service	to provide after sales service	1	2	3	4	5	6	7
Advertising	to advertise and promote the product	1	2	3	4	5	6	7
Broad distribution	to distribute the product broadly	1	2	3	4	5	6	7
Broad line	to deliver a broad product line	1	2	3	4	5	6	7

Question 2

When *your performance is reviewed periodically* by your immediate supervisor, how much importance is attached to each of the following items? (Please circle one number on each line. If other items are taken into account, then please add them to the list and grade how important you think they are in the same way.)

	1 = Not Important						7 = Very Important
1. On-time delivery performance records	1	2	3	4	5	6	7
2. Number of customer complaints	1	2	3	4	5	6	7
3. Labor utilization/efficiency statistics	1	2	3	4	5	6	7
4. Report on product defects	1	2	3	4	5	6	7
5. Profit/net income	1	2	3	4	5	6	7
6. Change-over set-up times	1	2	3	4	5	6	7
7. Number of product returns and/or warranty claims	1	2	3	4	5	6	7
8. Inventory turnover ratio	1	2	3	4	5	6	7
9. Report on whether standard product costs are met	1	2	3	4	5	6	7
10. Survey of customer satisfaction	1	2	3	4	5	6	7
11. Measurement of cost reduction due to quality improvements	1	2	3	4	5	6	7
12. Cooperation of people in manufacturing	1	2	3	4	5	6	7
13. Responsiveness to the demands of other departments	1	2	3	4	5	6	7

14. Customer satisfaction with sales assistance/problem solving	1	2	3	4	5	6	7
15. Rate of introduction of new products	1	2	3	4	5	6	7
16. Return on investment	1	2	3	4	5	6	7
17. Outgoing quality	1	2	3	4	5	6	7
18. Evaluation of the ability to vary product characteristics	1	2	3	4	5	6	7
19. Lead time from order to delivery (standard products)	1	2	3	4	5	6	7
20. Lead time for customer-requested product variations	1	2	3	4	5	6	7
21. Sales	1	2	3	4	5	6	7
22. Material purchase price variance	1	2	3	4	5	6	7
23. Rate of material scrap loss	1	2	3	4	5	6	7
24. Measurement of machine utilization and down time	1	2	3	4	5	6	7
25. ...	1	2	3	4	5	6	7

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